PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BE

EDITED BY

THE HONORARY SECRETARI

JANUARY TO DECEM

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PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JANUARY, 1870.

The monthly meeting of the Society was held on Wednesday, the 5th instant, at 9 P. M.

The Hon'ble J. B. Phear, Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced :—

1. From H. Hexter, Esq., a specimen of *Chamæleo vulgaris*, obtained near Bughodeer, Grand-trunk road.

Dr. Stoliczka observed that the specimen exhibited was a very interesting one, representing a peculiar variety of *Ch. vulgaris*, not common in India.

The skin is somewhat stretched, but the total length of the specimen was certainly 12 inches, or a little more, the tail measuring slightly more than one half of it. Dr. Günther (Reptiles of India, p. 162) remarks that most of the Indian specimens are of a green colour, and Dr. Gray, in his monograph of the *Chamæleontidæ* (Proc. Zool. Soc. for 1864, p. 469) states that "the bands are in Indian specimens generally absent, though in some (specimens) clearly indicated."

The general colour of the body in the present specimen is a distinct greyish olive, having throughout a slight green tinge which, according to Mr. Hexter's account, appears to have been more prevalent, and variable in the live animal, but it faded remarkably quickly after death. Each side is marked with eight somewhat irregular orange brown cross bands; the first three bands of the fore part of the body being divided into a few spots; above the shoulder there is a conspicuous white spot, and a broadish horizontal strip of the same colour behind the fore foot. The head above, and partially at the

sides, the greater part of the feet and three-fourths of the terminal end of the tail are bright yellow, the feet and tail being rather narrowly banded with bright orange. The upper crest of the body is grey, it slightly continues on the anterior greyish portion of the tail; the lower crest is white, and specially in front very distinctly developed. The forehead is very concave and the occipital crest high; the posterior flaps are not developed, but the orbital ridge which begins at the rostral end is very prominent, and joins the posterior end of the occipital ridge by a flexuous curve, being slightly bent downwards behind the eye, but at the same time continuous throughout. A distinctly separate low ridge runs from the end of the occipital crest to the upper posterior end of the tympanoid region; the scales on this ridge are elongately tubercular, but not much larger than those accompanying it on both sides. The scales on the gular sack are small and arranged longitudinally in two rows.

The deeply excavated forehead and the numerous cross bands distinguish the present specimen as the variety called by Dr. Gray *marmoratus*, but the author of the monograph does not state where that variety was obtained; it is certainly a peculiar one, for judging from our specimen, it does not exhibit a trace of the two longitudinal bands on the sides of the body, noted as characteristic of the typical *Ch. vulgaris* of Africa and Europe. Fitzinger applied the name *Ch. Coromandelicus* to the Indian *Chamæleon*, but the name *Ch. Ceylonicus*, Laur., used by Dr. Jerdon in his account of the species has priority (J. Asiat. Soc. B., XXII, p. 466.)

Dr. Gray (loc. cit.) however, says that "after rigorous examination and comparison," the differences existing in the European, African and Asiatic forms do not possess specific value. There can be no doubt that both forms are very similar and perhaps referable to one species only. Setting aside coloration and comparing various specimens of the Indian *Chamæleon*, it is remarkable to find that the posterior extension of the supraorbital ridge is always very distinct in them, and the same also applies to the ridge descending from the posterior end of the occipital crest downwards, while in the African form these ridges appear to be much less developed. In Geoffroy's figure of the Egyptian *Chamæleon* (Descript. scient.

de l' Egypt &c., pl. 4) those ridges are scarcely noticeable, and the second one mentioned almost entirely absent.

According to Mr. Hexter's account, the specimen submitted was obtained in the jungles near Bughodeer, and appears to be rare. The geographical distribution of the species is stated to be (among others) "India generally," but I do not know how far it extends in India northwards, for its special haunts are Ceylon and the whole of Southern India. I do not know whether it has been recorded from Central India, but in any case its occurrence so far North as the Grand trunk road deserves special notice.

2. From the Superintendent, Great Trigonometrical Survey of India,—2 copies of Report of the Operations of the Trigonometrical Survey for 1868-69.

3. From the Government of India, Foreign Department,—three Amharic MSS. from Magdala.

The Hon'ble Mr. Phear stated that the three volumes are the only ones which we possess in Amharic, and they form, therefore, a valuable acquisition to our library.

4. From the author through the Rev. C. H. Dall,—a copy of Observations on the Geology of Alaska, by W. H. Dall.

5. From the author,—a copy of a pamphlet entitled "On the Desirability of a National Institution for the Cultivation of the Sciences by the Natives of India, by Dr. Mahendralál Sircar."

6. From J. Avdall, Esq.,—a copy of Lettre d' Abgar, ou histoire de la conversion des Edesseéns, par Laboubnia, traduite sur la version Armenienne du Vme. Siecle, Venice, 1868.

7. From Allan Humo, Esq.,—one volume entitled "My Scrap Book, or Rough Notes on Indian Oology and Ornithology;" Part I., Raptores, No. 1, Calcutta, 1869.

This is an important publication on Indian Ornithology, completing in many respects Dr. Jerdon's "Birds of India."

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

Allan Humo, Esq., J. Wood Mason, Esq., Capt. A. G. Ross.

The following gentlemen are candidates for ballot at the next meeting :—

Baden Powell, Esq, C. S., Lahore, proposed by Colonel R. Maclagan, seconded by Mr. Thornton.

J. H. Newman, Esq., M. D., Assistant Surgeon to the Political Agency, Joudhpur, proposed by R. M. Adam, Esq., seconded by Dr. F. Stoliczka.

Fred. Wm. Alexander de Fabeck, Bengal Medical Service, Jeypore, Rajpootana; proposed by H. H. Locke, Esq., seconded by Dr. J. Anderson.

The following gentlemen have intimated their desire to withdraw from the Society,—T. E. Coxhead, Esq., W. U. Bourke, Esq., Baron O. Ernsthausen, J. A. Crawford, Esq.

The following letters were read :—

1. From John Beames, Esq., C. S.,—dated Balasore District, Camp Agarpara, December 16th, 1869.

"Enclosed (*Vide* pl. I) I send an accurate copy of an inscription I stumbled upon yesterday among the ruins of an old temple at Koparí some thirty miles south of Balasore.

"The inscription was cut on the back of a slab of grey stone, the front of which was adorned with a statuette of a divinity, resembling that of Lakshmi. I would have sent the whole thing to the Society, but the villagers appear to worship it, and went so far as to send for a Brahmin to turn the image round for me to copy the inscription!

"Perhaps Bábu Rájendralála, or some other member, would kindly favour me with a translation. The people were anxious to know what it meant, and I promised to get one of the great 'Calcutta pandits' to translate it. If it has any general interest, pray use it in your Journal."

The copy of the inscription was submitted to Bábu Rájendralála Mitra, who writes under date of 5th January, 1870, as follows :—

"The bulk of the inscription is made up of the well-known Buddhist creed *Ye dharmá hetu, &c.*, incised in the Kutila character of the 10th century. The letters are ill-formed and defective, and the spelling full of gross mistakes. The latter half of the fifth line and the whole of the sixth and seventh lines contain new matter, but the last, with the exception of the concluding two

Copy of

letters, is illegible, and a lacuna, in the middle of the sixth, renders it very doubtful reading. The words *Om sarva tath-a gata hridaya* and *dharma tunga* are distinct, and they imply that for "the enhancement of virtue" *(dharma tunga)* and the delight (?) "of the hearts of all Tath-agatas" or Buddhas, the statuette was dedicated by some one. The name of the donor has been lost in the last line.

"The statuette is, of course, not of Lakshmi, but of a Buddhist divinity, probably of Máyádeví.

"The discovery of the statuette is interesting as affording a proof in support of the opinion that Balasore was once a flourishing seat of Buddhism and contained many topes and shrines of great sanctity."

2. From Mr. M. L. Ferrar, C. S., dated Pertabgurh, 22nd December, 1869:—

I have been asked by a friend in England to try to find out who was the gentleman whose seal bears the following inscription—that is to say, to find out the rank he held in India, and in whose service. The seal is said to be a red cornelian in gold setting.

"Iftikhár ud daulah ihtishám ul mulk William Douglas Nix Bahádur Shahámat Jang, 1215." (Hijrí, I presume.)

Could you, or any of my fellow-members of the Society inform me?

The following papers were read:—

I.—Note on a Circle of Stones situated in the District of Eusufzye,—*by* Colonel Sir Arthur Phayre. (Abstract.)

The writer describes a stone-hengo situated near Sung Butté, about fifteen miles east of Mardán, the head quarter station of the Corps of Guides, and relates several traditions regarding them.

An excellent photograph accompanies the description.

The paper and a lithograph of the stone-hengo will shortly be published in the Journal.

The Hon'ble Mr. Phear observed—that stone structures similar to those described by Sir A. Phayre, were found scattered over a very large area of the earth's surface. They were often taken to be evidence of the wide spread existence of a particular race of

people, but it would probably be safer to say only, that they were indicative of a particular stage of civilization. It is curious that in Cornwall, where monolithic remains of a somewhat similar character are found, essentially the same local tradition often attaches to them as that mentioned by Sir A. Phayre, namely, that a party passing over the moor on some excursion was turned into a group of stone pillars by the evil power. Clearly the tradition belongs to a late date, when all knowledge of the purpose of the original structure was lost, and itself points to a certain ill informed stage of civilization, which looks to supernatural agency to account for anything lying outside the common experiences of life. But the community of tradition does not necessarily imply community of race in the people who give rise to it and transmit it.

Mr. Blochmann said that similar stone-henges had been alluded to as existing in Kashmír by Lt.-Col. Newall in his paper on the 'Temples of Razdán,' lately read before the Society. Col. Newall mentioned especially a place called Bhadiakul near which, as it would appear, extensive monuments exist of 'Druidical' worship from times prior to the Buddhistic Era.

Sir Richard Temple mentioned that those stone circles were found almost throughout India.

Dr. Stoliczka said that Sir John Lubbock in his last edition of the "Pre-historic times," mentions the occurrence of these stone circles throughout Asia, from the borders of Russia down to the Pacific seas. He describes and figures several of them as "sepulchral stone circles" of the so-called megalithic period.

II.—Observations on a Sanad, granted by Sháh 'Álam to Rájah Pitya'mbar Mitra Baha'dúr,—*by* H. Blochmann, Esq., M. A.

I have been asked by Babu Rájendralála Mitra to exhibit a *Sanad* granted by Sháh 'Álam to Rájah Pityámbar Mitra Bahádur, one of the Bábu's ancestors.

The *Sanad* is of the kind called *Farmán i Sabtí* (فرمان ثبتي, Áín i Akbarí, p. 261, No. 2) and confers upon the Rájah 14 villages in the Parganah of Haweli i Iláhábád, generally called Cháil, the revenue of which [villages] amounts to 21891 rupees. The grant specifies an *Altamghá* tenure for ever *(in'ám i altamghá, nasalan ba'da*

nasalin o baṭnan ba'da baṭnin) without *taçdíq o yáddásht*, or liability of keeping up a military establishment. Nor is the income liable to future taxation, on the ground that the revenue of the villages has increased. All taxes are remitted, as *peshkash*, *mál*, *jihát*, *faujdári*; also *sáyir* imposts, as *qanalghah*,* *muhaççilánah*, *dároghánah*, *zábitánah* (surveying taxes), *shikár o bekár* (?), the five per cent. *muqaddamí*, and the two per cent. *qánúngoí*.

The date of the grant is 5th Jumáda II., of the 26th year, A. H. 1199, or A. D. 1784.

On the back of the grant, the following fourteen villages are specified :—

1. *Mahgánw*, the jágír of Rajah حالي (?) Rám.
2. ..... (name not legible), an *altamghá* tenure of the late Baqáullah Khán, in exchange for a *mauza'* of the name of كهنولا *K'hanwlá*.
3. *Hatwá*, held in *Altamghá* by .... *Munshí i Mustaufí*.
4. *Rasúlpúr*, the jágír of the late Bahádur 'Alí Khán.
5. *Amraul*, in the name of Amíruddín Khán, the Díwání of the Çúbah of Iláhábád.
6. *Bhimraulí* (*kháç*)
7. *Achharpúra Saraulí*.
8. *Bargánw*.
9. *Bahrámpúr*.
10. *Basoná*.
11. *Bak'hhálah* [or *Yak'hálah (?)*]
12. *Jagdespúr Sobhá*.
13. *Naí Sarái*.
14. *Bhálí*.

The Surveyor General's Map of the District of Allahabad for 1845, contains the names of villages Nos. 3, 4, 5, 6, 8, 10, 12, 14, of which Amraul (5), Basoná (10) and Jagdespúr (12) lie on the Jamnah, the last on the right bank, in the Parganah of Bárah. The other villages lie north and north-west of Allahabad. No. 7,

* I do not know the correct pronunciation of the (Turkish) word قنلغه. It is not given in any Dictionary or Glossary, native or European. On the fly leaf of one of my MSS. I found the remark that قنلعه is the same as the Hindí دهنيا, coriander seed. The tax on *qanalghah* is mentioned by Abul Fazl (Aín text, p. 301) as one of the *vexatious* taxes which Akbar abolished.

Achharpúr, may correspond to the *Ulcharpúr* of the map. For No. 13, *Nal Saráí*, the map has *Saráí Neem*. Instead of No. 9, *Bahrámpúr*, the map has *Ibráhímpúr* and *Ibráhímábád*, which names are often interchanged.

The right hand corner Sanad is adorned with a black seal, containing in gold the name of *Abul Muzaffar Jaláluddín Sháh 'Álam Pádisháh i Ghází*, and the words سنهٔ احد and the year 1173, [A. D. 1759], the first year of Sháh 'Álam's reign. The seal is surrounded by an eccentric circle, and the space between the two circumferences is filled up by fourteen small circles each containing the name of a Tímuride, from Tímúr to 'Álamgír Pádisháh, son of Jahándár Pádisháh. To the left of the seal in the middle, above the grant, the name of the reigning Pádisháh is given in large *Ṭughrá* characters; and to the left of it, in the left hand corner of the paper, the *Sanad* itself commences with two short lines according to custom (*vide* Áín translation, p. 263.) The reverse of the Sanad contains a large ink seal with the names of *Jumlatulmulk Madárulmahám I'timáduddaulah 'Açafjáh Burhán ul mulk, Abulmançúr Khán Çafdarjang, Shujá'uddaulah, Najíb Khán 'Açafuddaulah Bahádur Hizbarjang, Yár i Wafádár Sipahsálár Rustam i Hind, Sháh 'Álam Pádisháh i Ghází*; and below another ink seal containing the words *Khánahzád Khán Bahádur Fidwí i Sháh 'Álam Pádisháh i Ghází*, with the year 1188 [A. D. 1774.]

The following is the text of the *Sanad* :—

درین وقت میمنت‌اقتران فرمان والاشان واجب‌الاذعان صادر شد که
موضع مهگانو وغیره عمله پرگنه حویلي عرف چایل سرکار و صوبه الهآباد *که
مبلغ بیست و یك هزار و هشتصد و نود و یك روپیه حاصل آن است از
حالصهٔ جدید در وجه إنعام‌التمغای راجه پتیامبرمتر بهادر با فرزندان بمعافی
تصدیق و یادداشت و توفیرآنچه از حسن تردد برجمع آن بیفزاید از پنجسدس
ربیع لوي‌ئیل حسب الضمن مقرر باشد باید که فرزندان نامدار کامگار والاتبار
(princes) و وزرای ذوالاقتدار و امرای عالي‌مقدار وحکام کرام وعمال کفایت
فرجام و متصدیان مهمات دیواني و متکفلان معاملات سلطاني و جاگیرداران و
کروریان حال واستقبال ابدا ومؤبدا در استقرار و استمرار این‌حکم مقدس‌معلی
کوشیده مواضع مرقومه را نسلا بعد نسل و بطنا بعد بطن خالدا و مخلدا
بتصرف آنها وا گذارند و از صوادم تغییر (sic) و تبدیل مصوّن و محروس

* It was Akbar who changed the name *Iláhábás*, which existed before his times, to *Iláhábád*; *vide* Badáoní, II, p. 176, and Mr. Beames's edition of Elliot's Glossary, II, 262.

دانسته بعلت پیشکش صوبه داري و فوجداري و مال و جهات و سایر اخراجات
مثل قتلغه و محصلانه و داروغانه و ضابطانه و شکار و بیکار (؟) و دهنیمي مقدمي
و صددوئي قانونگوئي مزاحم و متعرض نشوند و از کل تکالیف دیواني و
مطالبات خاقاني معاف مرفوع القلم شمارند درین باب تاکید آکید (sic) و قدغن
مزید دانسته هرسال سند مجدد نطلبند واز یرلیغ کرامت تبلیغ والا تخلف
وانحراف نورزند * بتاریخ پنجم شهر جمادی الثاني سال بیست و ششم از
جلوس ابدمانوس معلي زیب تحریر یافت *

The expression *az panjsuds i rabi' i loi el*, 'from five-sixths of the month of Rabí' of the (Chagatâi) year of the *Loi* (dragon)' is unclear to me, and the substitution of the clumsy cycles of the Chagatâi Era for Akbar's Era, or the Hijrah, is surprising. The word *bekár* I do not understand; آکید a mistake for اکید without the *madd*, and تغئیر is a queer spelling for تغییر or merely تغیر *taghír*. I know nothing as to the validity of the Sanad.

III.—A THIRD LIST OF BENGAL ALGÆ, *determined by* Dr. G. v. Martens, *Professor of Botany in Stuttgard,—communicated through* Mr. S. Kurz.

The following is a continuation of Professor v. Martens' numerous determinations of Algæ, which I collected in the course of the last few years in the Bengal Presidency, on the Andaman islands, in Arracan, and in Burma. Two lists, containing about 20 to 25 species, have been already published in the Botanical Journal "Flora" for 1869. In submitting this third series of determinations, I have only to express my deep obligations to Prof. v. Martens for the great interest which he had taken in the study of the Bengal Algæ, and for the liberality with which he has placed the result of his examination at my disposal.

The freshwater-Algæ of Bengal, and indeed of India generally, are as yet very imperfectly known, though the number of species to be met with everywhere in our jheels, tanks, rivers, &c., appears to be a very large one. The minuteness of many forms, the care necessary in the preparation of the collected materials, and especially the great difficulty which is experienced in the determination of Freshwater-Algæ in a dried state, seem to have been the principal cause of their having been almost totally neglected by Indian

botanists, meanwhile more than 1000 species of *Musci* and *Hepaticæ* have become known from British India alone. With regard to Indian seaweeds, Prof. v. Martens' work "Die Tange der Preussischen Expedition nach Ost-Asien," contains almost all that is known about them. In a very cursory exploration of Bengal I have obtained about 40 to 50 species of fresh- and brackwater-Algæ, but this number is only a fraction of what really can be found in a country like Lower Bengal, in the flora of which the richness of water plants is the most characteristic feature. As my researches into the flora of the cryptogamic plants of Bengal, and of India generally, are now in progress, I defer for a future opportunity the communication to the Society of a systematical list, containing all that is known of Bengal Algæ.

S. KURZ.

31st December, 1869.

1.—*From the Sikkim Himalaya.*

1885.* *Oscillaria interrupta*, Martens, filis 1/1000 lin. crassis, laete aerugineis, distincte articulatis ; articulis diametro aequalibus ad duplo longioribus, punctatis, linea hyalina interruptis.—Oct. 1868. Above Senadah, 7100 feet.—Mixed with it are threads of *Oscillaria antliaria*, Mart.

1886. *Oscillaria brevis*, Kützing.—Oct. 1868, Sinchul, 7000 feet.

1887. *Spirogyra decimina*, Link.—Jellapahar, 7800 feet.

1888. *Zygnema insigne*, Kg. = *Tyndaridea insignis*, Hassal.—Between Khersiong and Senadah, 6—7000 feet.

1889. *Vaucheria*, without fructification and, therefore, indeterminable, 7000 feet.

1890. *Scytonema aureum*, Meneghini.—Near Punkabaree, on rocks, 1500—2000 feet.

Chroolepus villosum, Kg.—Tongloo, 10,000 feet.

2. *From Lower Bengal.*

1743. *Oscillaria Juliana*, Men.—In drains at Sealdah, Calcutta.

1756. *Microcystis aeruginosa*, Kg.—Forms in May a thin superficial layer in tanks at Sibpúr near Howrah. (Formerly known only from Stuttgard, where I detected it in the Royal Gardens.)

* These and the consecutive are the current numbers of my "Cryptogamae cellulares," now amounting to more than 2600. (S. KURZ.)

1757. *Spirogyra adnata*, Link. Rajmahál hills, water fall near Sahibgunge.

1763. *Hydrocoleum heterotrichum*, Kg.—Manbhúm, Eastern Behár.

1764. *Chaetophora Indica*, Mart., globosa, majuscula, viridis; filis flaccidis, repetite dichotomis, elongatis, acuminatis; articulis diametro aequlibus vel duplo ad quadruplum longioribus, saepe obsoletis; spermatiis globosis, sessilibus.—Forms *Nostoc*-shaped chains on dead branches in rivulets, near Behárináth, Manbhúm.

1789. *Scytonema palmarum*, Mart., cespite compacto ex viridi cinereo; filis parce ramosis, subflexuosis, aequicrassis, cum vagina arcta 1/225 ad 1/200 lin. crassis, luteolis vel sordide virescentibus, basi hyalinis; articulis diametro brevioribus, distinctis, granulatis.—Calcutta, Botanic Garden, between the old sheaths on the stems of *Phoenix sylvestris*, wherein rain-water is usually accumulating.

1794. *Synedra Ulna*, Ehrenberg, with single threads of *Oscillaria subfusca*, Vaucher.—At the waterfall near Mahárájpúr, Rajmahál hills.

1804. *Scytonema tomentosum*, Kg.—Calcutta Botanic Garden.

1882. *Palmoglœa Kurziana*, Mart., gelatinosa, late expansa, obtuse lobata, 3 ad 6 lin. crassa, olivaceo—lutescens, laevis, exsiccatione collabens rugulosa, chartae arcte adhaerens; globulis numerosis, ellipticis, 1/250 lin. longis, 1/300 lin. crassis, filis tenuissimis, hyalinis, flexuosis intertextis.—Calcutta, Botanic Garden, on brick-laid paths, during and, especially, towards the close of the rainy season.

1933 and 1883. *Spirogyra nitida*, Lk.—Northern Bengal, between Kissengunge and Titalya, frequent; also at Howrah, &c.

1893. *Zygogonium Bengalense*, Mart., filis parce ramosis, elongatis, hyalinis, articulis diametro (1/150 ad 1/125 lin.) 4- ad 8-plum longioribus; substantia gonimica in globulos fuscos bipartita; spermatiis globosis 1/80 lin. crassis.—Northern Bengal, in deep stagnant waters between Silligoree and Titalya, forming large rounded greyish cloudy masses.

1894. *Hypheothrix investiens*, Mart., strato effuso, luride olivaceo; filis internis diluto aerugineis, 1/750 lin. crassis, obsolete articulatis, torulosis, punctatis; vaginis rubescentibus, opacis, arctis, 1/500 lin. crassis.—Northern Bengal, between Silligoree and Titalya, in stagnant waters, forming a dense covering on water-plants.

More or less intermixed with the last species occur *Scytonema chlorophaeum*, Kg., *β. tenuius*, Mart., and the next one.

Allogonium depressum, Mart., filis hyalinis, articulis diametro (1/450 lin.) 5-ad 6-plum longioribus, demum partim in globulos concatenatos lutescentes, margine hyalinos 1/125 lin. latos et 1/180 lin. tantum longos intumescentibus.

1932. *Phormidium oryzetorum*, Mart.,* strato membranaceo, tenui, viridi; filis tenerrimis, parum flexuosis, aerugineis; articulis obsoletis, diametro (1/1800 lin.) brevioribus.—In inundated rice fields in Howrah District, Calcutta; floating.

1934. *Spirogyra elongata*, Kg., occurs with the former and with *Oscillaria Grateloupii*, Bory.

1935. *Ulothrix pectinalis*, Kg., in stagnant waters and tanks in Howrah district.

1936. *Oscillaria Kurziana*, Mart., strato tenui, saturate viridi; filis pulchre aerugineis, non granulatis; articulis diametro (1/450 lin.) aequalibus, geniculis hyalinis; apiculo attenuato, curvulo, *O. Cortianae*, Pollini, affinis.—Calcutta, Botanic Garden, in shallow waters of the flower-pots, wherein water-plants are cultivated, as *Cryptocoryne*, etc., also occurring with *Navicula cryptocephala*, Kg.

1937. *Cladophora Roettleri*, Kg., Howrah, Aug. 1869.

1938. *Spirogyra Heeriana*, Naegeli, Calcutta, Aug. 1869.

IV.—ON SOME NEW OR IMPERFECTLY KNOWN INDIAN PLANTS,—by S. Kurz, Esq, (Abstract.)

This paper contains descriptions of 26 new species belonging to various families, chiefly of phanerogamic plants. Besides that varied and very important information is given regarding other Indian plants which were up to this imperfectly known, or incorrectly identified.

The paper is accompanied by two plates; on one of them three figures are given representing the distinctive characteristics in the sheaths of *Schizostachyum brachycladum*, *Zollingeri* and *longispiculatum*, considered by Col. Munro as belonging to one and the same species, but evidently distinct. On the other plate an illustration of the interesting Javanese fern *Hemionitis Zollingeri*, Kurz, is supplied.

* This is the most common Alga in Lower Bengal, covering in large spongy patches the ponds, ricefields, &c., and adding much towards a natural manure of the fields. (S. KURZ.

V.—List of birds obtained in the Khasia and North Cachar hills,—by Major H. H. Godwin-Austen, F. R. G. S., Deputy Supdt. Topograph. Survey of India. (Abstract.)

In this list Major Godwin-Austen enumerates about 200 species from the above named hills. A few new species are described, and very valuable information is recorded of many which were somewhat imperfectly known. In cases where rare birds were obtained, a description and measurements, taken from live specimens, were submitted. As regards the geographical distribution of Indian birds, the list must be looked upon as a very interesting on, for the whole of that important Indo-Chinese province is not included in Dr. Jerdon's work, though the names of the birds are mostly noticed. The author was cautious not to burden literature with new names unless sufficiently authenticated. He has given descriptions of several species which he considered may be new, and a few of these species (as a *Cypselus*, *Trochalopteron*) will be described by Dr. Jerdon.

The author further acknowledges the great assistance he has received from Dr. Jerdon personally, "who has named many doubtful species, and some that I—says the author—had been unable to identify."

V.—Note on the Kjökkenmöddings of the Andaman islands,—by Dr. F. Stoliczka.

On my recent visit to Port Blair, I was informed by Mr. Fr. Ad. de Röepstorff, Extra Asst. Supdt. at Chatham island, of the existence of several kitchen-middens in the neighbourhood of the settlement. The same officer also shewed me a great number of shells and fragments of pottery which he lately obtained from one of the shell mounds. Being personally acquainted with the numerous Kjökkenmöddings on the Danish coast, Mr. Röepstorff readily recognised the identity of both these formations; and the importance of their being subjected to a careful search. I was naturally very desirous to examine some of these mounds, but as my stay was to be only a very short one, Mr. Röepstorff suggested that I should visit a place near Chatham island, the so called Hope Town, and very kindly offered to accompany me to the exact locality which he had previously seen.

Hope Town is a small convict settlement in a shallow bay, north of Chatham island. The inner edge of the Bay is occupied by a mangrove swamp, and in the eastern corner of it, we met with the first shell mound, just behind the mangrove swamp, and at the bank of a small fresh water stream. This Kjökkenmödding, evidently of a somewhat round circumference, was about 60 feet in diameter, and some 12 feet in height, but nearly half of it had been used in making a road which leads close by. This was,. in some respects, welcome, because it saved a good deal of digging.

The mound in itself does not present anything extraordinary, it is a simple accumulation of shells intermixed with a great number of bones of the Andaman pig, *Sus Andemanensis*, fragments of rude pottery, and numerous stones varying in shape and size, —such as a Kjökkenmödding near Copenhagen or any other place in Denmark can be observed. A few large trees growing on it indicate that it could not have been much disturbed, at least during the last two or three decenniums.

1. We examined the mound all round and dug up a portion of it, in order to see what kind of shells prevail, and which of them principally served as food to the inhabitants. The most common species appeared to be *Trochus Niloticus*, *Pteroceras chiragra* and *lambis*, *Turbo (Senectus) articulatus*, *Murex adustus* and *anguliferus*, *Nerita albicilla*, *polita*, *Georgina* and *exuvia &c.* The *Neritæ* especially were very numerous; and the last two are mostly found on the branches and roots of the mangrove vegetation close by. Among the first named Gastropods, the specimens of *Trochus*, *Pteroceras*, *Murex* &c., &c., chiefly were of very large size, not many were half grown. Pelecypoda (or Bivalves), as *Spondylus aurantius*, *Arca scapha* and *fasciata*, *Tridacna gigas* and *squamosa*, *Capsa deflorata*, *Paphia glabrata*, &c., &c., are not uncommon, but still far less numerous than the Gastropods. Of *Ostrea crista galli*, Lam., a species of quite an ancient type and very closely allied to the jurassic *O. Marshii*, Sow., or *flabelloides*, Lam., I have also obtained several valves, and this is one of the very few species which now appears to be rare in the harbour, for I have observed scarcely any live specimen during my stay, while

at the Nicobars I found it to be common. *Spondylus aurantius* is also a rare shell now. All the other species of Molluscs above enumerated, and many others not particularly alluded to, occur in large quantities on the neighbouring coral-reefs, from which they evidently were obtained, with the exception of the *Neritae* which, as already noted, are generally found on the mangrove vegetation. Of land-shells *Cyclophorus foliaceus* and *Spiraxis Haughtoni*, both extremely common in the jungles all round, were also numerous, and evidently formed an article of food.

Looking at the shell fauna, there is no difference to be observed in the size of the specimens found in the Kjökkenmödding and those at present occurring near the islands. The *Trochi* generally have the top part of the shell broken off, the specimens of *Pteroceras* and *Murex* are broken on the back of the last whorl, where the shell is thin, and other species of Gastropods have been treated in a similar, or slightly different, manner, in order to facilitate the extraction of the fleshy portion of the animal. The valves of Pelecypoda are simply opened, but as already mentioned, they are not equally numerous. Thick shells like *Tridacnæ*, and others, like *Ostreæ* and *Spondyli* which live more or less firmly attached to rocks or corals, are not so easily obtained as Gastropods; and if obtained, the valves are sometimes opened only with the greatest difficulty during the life of the animal. Species of *Pinna* for instance, which are easily procured and posses a thin shell, but contain comparatively very little fleshy substance, are hardly represented in the mound! This shews that the Andamanese made, if possible, a judicious selection from the scanty materials available for their table.

2. The large number of bones of the Andaman pig is remarkable. A complete skull obtained from the mound did not exhibit any difference from the living animal, it belonged though to a very small but not a young specimen. Several of the thicker bones which contained marrow, were split and broken up in the usual manner, as has been the practice with ancient people in Europe and elsewhere. I have not observed any other kind of bones of fishes or birds, but they may occur.

3. The fragments of pottery are of a rather thin kind, on the surface roughly grooved or striated, and indicate by their form that

they were derived from cup-shaped vessels of a very simple construction. The scratches or grooves on both the inner and outer surfaces are very dense, crossing each other irregularly; they are mostly straight, and have apparently been made by an obtuse point of a shell or a stone. The material is common clay, mixed with a little sand* and very imperfectly moulded, as seen by the irregular fracture. No potter's wheel has evidently been applied, and the vessels were not burnt but only baked in the sun. On a few of the fragments, which appear to be from near the upper peripherical edge of the pot, a few curved lines are to be observed, but on the whole they are very rudely and irregularly executed.

Regarding the form of the pottery itself, the question was very soon settled. For, on visiting on the subsequent morning, the North Bay with the object of examining a recently made settlement, or rather a small camp, of the Andamanese, Mr. Röepstorff found in the jungle, not far from the deserted camp, a large pot which must have been in use only a short time previous. This pot is of a simple cup-form,† rounded below, about 10 inches high, and with a diameter of about 11 inches at the outer margin. The thickness of the material varies from ¼ to ⅓ of an inch; the inner and outer surface is marked with irregular grooves, the perpendicular ones being much more distant than the horizontal. Fragments of this pot are not distinguishable from those found in the shell mounds. The only fire-place near the camp was indicated by a few scattered stones, rather inconvenient for such a kind of cooking pot!

It is not even certain, whether this rude kind of pottery is generally used by the Andamanese, for I have been informed that in some parts of the island their only cooking utensils are large specimens of *Turbo marmoratus*, valves of *Tridacna gigas* and others.

In submitting the rude fragments of pottery, previously mentioned, to an archæologist in Europe, no one would long hesitate in referring them to the stone age, at least to the neolithic period; for, indeed, they are almost identical with the fragments of pottery found in the Danish kitchen middens, though here fragments of pottery are comparatively very rare.

* Derived from the decomposition of tertiary sandstone.

† That no improvement in this very simple kind of pottery has taken place is remarkable, for the Nicobarese are well known to possess good pottery, carrying on a regular trade with it between their different islands.

hardly be regarded as sufficient for killing the Andamanese pig, as already pointed out by Mr. Theobald, a few years ago.* For this purpose, more effective implements of iron, such as the inhabitants use at the present date, must, no doubt, have been employed for some little time past.

To the east of Port Mouat, there is an extensive Gabbro formation, and in this nests of hornstone occur. It is probable that from this, and similar other localities, the chert chips were obtained, which Mr. Theobald *(l. cit.)* quotes as having been found by Col. Haughton in an Andamanese camp. It is only natural that the aborigines did their best to procure a better material than the sandstone which is the prevalent formation. South of Port Mouat, a small patch of a metamorphic rock occurs, and as some beds of it are rather quarzose and hard, they very likely did not remain unnoticed by the aborigines. Further examinations of the Kjökkenmöddings will, no doubt, prove successful in this respect.

Mr. Röepstorff informs me, that especially at Port Mouat there are in several places very extensive shell mounds, all in similar situations to the one I have described. In fact they are scarcely anywhere wanting near the sea shore, where there is a situable locality, with a supply of fresh water and with a coral-reef not far distant, from which shells can be obtained. Some of the mounds are still in process of increasing; for the Andamanese always return after a certain time to the same locality, and generally stop as long as the supply of shells and jungle fruits lasts; they do not appear to be very proficient in fishing, at least as far as one can judge from the population near Port Blair.

Viewing the occurrence of these Kjökkenmöddings in the light of what we already know of the very low state of civilization of the Andamanese, there could scarcely be anything very remarkable about them. They shew us that an aboriginal population† was, or still is, very largely subsiding on Molluscs which are either collected on the coral-reefs or in the jungles; that the people hunt down the pig—the only large mammal probably to be found,—extract the marrow from the bones, employ stone axes and other stone

* Vide Journal, Asiatic Society, 1862, p. 326.

† Short people with oval skulls, roundish face, not peculiarly prominent eyebrows, with hairs growing in small tufts, &c., &c.

implements as their daily utensils, that they make a kind of coarse pottery, not burning but only drying the same in the sun, that they do not appear to be acquainted with any sort of grain or other kind of cereals, &c.—However, when we come to compare these few simple facts with what we know of the Kjökkenmöddings of other parts of the world, they become of an intense interest. We could almost verbally repeat the same as the results of the many successful examinations of the Danish and other shell-mounds by Steenstrup, Worsaae, Sir J. Lubbock, Sir Ch. Lyell and many others. In Europe, especially in Denmark, some parts of Scotland, &c., we look upon the kitchen-middens as the pre-historic remains of an ancient population which has entirely disappeared; here we have exactly similar mounds formed by a population which still vigorously strives for its existence with the foreigner. It is only natural to expect, therefore, that a study of the latter will supply the most reliable data in comparing the two thoroughly allied formations, and that thus the archæologist may greatly profit from the researches of the historian.

I cannot, however, venture to enter now upon this large field of inquiry with the very scanty materials at my disposal, but I may be allowed to indicate, at least, a few points which will shew how valuable a thorough examination of the Kjökkenmöddings on the Andaman, and other similarly situated islands, can become for the study of European Archæology, and at the same time increase our knowledge of the physical changes of the islands themselves.

The kitchen-middens are always situated close to the sea shore. The occurrence of them far inland would indicate that some terrestrial changes in the islands have taken place. Mr. Kurz in his report on the Andamans, (selection of the Bengal Government 1868), drew the conclusion from the occurrence of some purely terrestrial trees in what is now a mangrove swamp, that the islands are in a sinking state. But from the account which he gives of several conglomerate banks on the western side of the islands, it is clear that the beach must have been locally raised. On some of the Nicobar islands, considerable upheavements along the sea-shore have taken place, as indicated by comparatively recently-formed strata high above the present sea level; and it is very probable that on the

Andamans oscillatory movements of the ground have taken place similar to those known from other parts of the Bengal Bay. It would be interesting to see whether and how far these changes affected the population, the history of which we have very probably to decipher from the few remains, (such as the Kjökkenmöddings) which we find on the islands, for there is, I am afraid, no chance of the discovery of many other kinds of Andamanese libraries!

Of no smaller interest will the examination of the mounds be with regard to the fauna of the islands at large. Perhaps the occurrence of other larger mammalia, than the pig, may be indicated. I have already stated that *Ostrea crista galli* and *Pectunculus aurantius* appear to be at present rare in localities, where those species seem to have been common at no distant time; the demand for the Andamanese table evidently seems to have interfered with their natural increase. A complete series of the shells occurring in the mounds,—some of which are, no doubt, of great antiquity,—may shew similar changes, as those known from the Baltic coast, where *Littorina littorea* and *Cardium edule* never reach now the size which they did, when, thousands of years ago, the ancient population lived upon them.

Again, much has been written for and against the cannibalism of the Andamanese, but direct evidence is in every case wanting. They are reported as the wildest cannibals by some of the oldest Arab merchants,* who had notice of them, while the Nicobarese (on the Lendjebâlous islands) are represented as a quiet people, who approach the foreigners' ship in small canoes, and are anxious to exchange ambergris and cocoa-nuts for iron.—If we find in the Kjökkenmöddings human bones intermixed with those of other animals, and treated in a similar manner as these, we may be permitted to say that the Andamanese were, at one time, or are up to this date, cannibals. In the Danish Kjökkenmöddings researches in this respect were unsuccessful. In fact the occurrence of human bones is there of an extreme rarity, only a few skulls which are believed to be contemporaneous with the shell-mounds having as yet been discovered.

* Géographie d'Aboulféda, &c. &c., par M. Reinaud, I, p. CDXIV. The author states that the Andamanese have no canoes; for if they had any, they would eat up all the people inhabiting the neighbouring islands.

The customs now prevalent among the Andamanese islanders, may help us to explain this scarcity of human bones during the stone-age in Europe. The reverence paid by the Andamanese to the dead seems to be the only expression which approaches to anything like a religious view. In case of death the body is buried, and after a year or so dug out, and the bones are divided among the nearest relations. If a married man, the widow, or one of the children, receives the skull, which is painted over with red earth and carried about in a net work, tied with strings round the waist or neck. For this reason it is very difficult to procure a perfect skeleton, and we can hardly expect to obtain human remains of their own tribe in the mounds.—It is just possible that similar customs may have prevailed during ancient times in Europe, for here the occurrence of human bones with implements and other remains is known to be always of extreme rarity.

The Nicobarese, (or Najbárs, as they are called by the most ancient Muhammadan travellers, *vide* Jour. Asiat. Soc., Bengal, V, p. 467), treat their dead in a very similar manner, but whether they brought this custom with them when they spread over the Nicobar islands, or whether they accepted it from the aboriginal islanders which they seem to have nearly exterminated, it is difficult to prove. I don't think there can be a doubt that the present Nicobarese are descendants of the Malays, and they certainly must have immigrated before the Muhammadan creed was spread over the neighbouring islands, which took place in Sumatra as well as in Malacca, &c. &c., before the close of the thirteenth century.* But a comparison of the present very deficient social state of the Nicobarese with the advanced political and social arrangements of the Malays on Sumatra, &c. &c., during the 11th and 12th centuries indicates that their separation is very probably of a much older date. The study of the languages† of those different insular tribes is probably best adapted in approximately deciphering the data, and I only allude to them here because the immigration of the Malay Nicobarese appears to have had a great influence upon the Andamanese themselves.

* Vide Reinaud's Géograph. d'Aboulféda, I, p. CDXXII; Marsden's History of Sumatra, p. 344, &c., &c.

† Mr. Blochmann informs me that he has not been able to find any distinct admixture of Arabic words in the Nicobarese language, judging of course from the very imperfect vocabularies we possess of it.

We know from a few scanty historical records that the Nicobarese were eager to exchange iron for their own produce, and as their wars with the Andamanese are also alluded to, we are perhaps entitled to suppose, that the latter obtained their scanty iron implements from the former. The introduction of iron on the Andamans seems, therefore, to be comparatively recent, and iron implements are even now scarce among the aborigines. It is in fact not known whether the use of iron has become general among all the people who inhabit the different islands of the Andaman group. The parts to the west of Port Mouat are said to be populated by particularly wild tribes, which live almost entirely secluded from the rest, and do not allow even the eastern Andamanese to approach their homes. The examination of the Kjökkenmöddings may also contribute something towards the knowledge of the time at which the Andamanese became acquainted with iron, though it is, as already alluded to, not very probable that many remains of this metal will be found. However, it may be shewn whether the people ever attempted to supply its wants by the extraction of any other metal, or whether the introduction of iron has followed immediately the stone-age.

In conclusion, I may remark that the Andamanese seem to be only a portion of a large aboriginal population, which apparently inhabited the entire tract of the islands from the most northern point of the Andamans through the Nicobars down to Sumatra and other neighbouring islands.

The accounts which we have (from Marsden's History of Sumatra, and other works on the subject) of the true aborigines of the southern islands appear to be in many respects also applicable to the Andamanese. The officers of the Danish Corvette "Galatea" in 1847, tell us, that an aboriginal tribe inhabits the interior of Great Nicobar. The people of this tribe are spoken of by the Malay Nicobarese as perfect savages of a peculiar dark complexion. It is by no means improbable that these are the brethren of the Andamanese, for we do not need to be surprised in not finding traces of the same aborigines on the Northern Nicobar islands. These are mostly very narrow and their interior to a very large extent deprived of forest. Whether forest trees in these parts did exist, or not, seems

problematic. I should be very much inclined to believe that these northern islands were formerly, in spite of the poor soil, covered with a forest jungle, in a similar manner, as parts of them are up to the present date. When staying for a few hours* in the Nangcouri haven, I visited a place of Camorta on the western side of the harbour, where near a small deserted building, a piece of ground about a mile long had evidently been years ago cleared, the forest having been burnt down. Scarcely a single sound tree was growing on the place, but the whole was thickly covered with the same kind of rough Cyperaceous grass, which almost solely occupies the interior portions of the northern island. Looking at this state of things the idea, that the jungles on the northern islands may have been burnt down at a time, when the immigration of the Malay Nicobarese took place, in order to exterminate the aboriginal population, does not appear to be without foundation.

The President said the thanks of the meeting were due to Dr. Stoliczka for his paper. It was a very fitting pendant to the paper of Sir A. Phayre which had just been read. That brought under notice a phase of an antique civilization, which had long passed away; this dwelt upon the features of a primitive civilization, which was still in existence; for kitchen middens, undistinguishable in character from those of Europe, also appeared to be still growing under Nicobarese habits of life. There could be no inference of identity of race here. It was to be hoped that the acquirements and mode of living of the Nicobarese and Andamanese would be well studied and recorded before their present primitive condition should be altered under English influences.

* In October, 1869, Steamer Scotia, Capt. J. Avern.

LIBRARY.

The following additions have been made to the Library since the last meeting in December 1869.

*** Names of Donors in Capitals.

Presentations.

Journal Asiatique, Nos. 51, 52.—THE ASIATIC SOCIETY OF PARIS.

Proceedings of the Royal Society, No. 114.—THE ROYAL SOCIETY OF LONDON.

The Journal of the Linnean Society, Zoology, Nos. 41,42.—THE LINNEAN SOCIETY OF LONDON.

Bulletin du Comité Agricole et Industriel de la Cochinchine, tome second, Numero 4.—THE COMMITTEE OF AGRICULTURE AND INDUSTRY OF COCHINCHINA.

Proceedings of the American Philosophical Society, No. 81.—THE AMERICAN PHILOSOPHICAL SOCIETY.

Transactions of the American Philosophical Society, Vol. XIII.—THE SAME.

Report of the British Association, 1867.—THE BRITISH ASSOCIATION.

Journal of the American Oriental Society, Vol. IX, No. 1.—THE AMERICAN ORIENTAL SOCIETY.

Zeitschrift der Deutschen Morgenlændischen Gesellschaft, Band XXIII, Heft. 3.—THE GERMAN ORIENTAL SOCIETY.

Rough Notes on Indian Oology and Ornithology, by A. Hume, Part I; Raptores.—THE AUTHOR.

Notes on the Land shells of the Seychelles Islands, by G. Nevill. —THE AUTHOR.

Observations on the Geology of Allaska, by W. H. Dall.—THE AUTHOR.

The Calcutta Journal of Medicine, Vol. II.—THE EDITOR.

Professional Papers on Indian Engineering, No. 25.—THE EDITOR.

General Report on the Operations of the Great Trigonometrical Survey of India, 1868-69.—THE SUPERINTENDENT G. T. SURVEY.

Report on Public Instruction in Coorg, 1868-69.—THE GOVERNMENT OF BENGAL.

Report on the Revenue Survey Operations of the Lower Provinces, 1867-68.—THE SAME.

Report of the Administration of the North Western Provinces, 1868-69.—THE GOVERNMENT N. W. PROVINCES.

Selections from the Records of Government, North Western Provinces, No. 6.—THE SAME.

Warren's Kála Sankalitá.—THE GOVERNMENT OF MADRAS.

Lettre d'Abgar, ou histoire de la conversion des E'desséens, par Laboubnia, traduite sur la version Arménienne du Vme. Siecle.—J. AVDALL.

Purchase.

Revue des Deux Mondes, 1st Sept. to 1st Nov.—The North British Review; Oct. 1869.—The Edinburgh Review, Oct. 1869.—The Quarterly Review, Oct. 1869.—The Westminster Review, Oct. 1869.—Revue et Magasin de Zoologie, Nos. 8 and 9.—Revue Archéologique, Nos. 9 and 10.—The Annals and Magazine of Natural History, Nos. 22 to 24.—Revue Linguistique, Oct. 1869.—The Quarterly Journal of Science, Oct. 1869.—The American Journal of Science, No. 142.—The London, Edinburgh and Dublin Philosophical Magazine, Nos. 254 to 256.—The Journal of the Chemical Society, July to Sept. 1869.—Journal des Savants, Aug. to Oct. 1869.—Comptes Rendus, Nos. 7 to 17.—Hewitson's Exotic Butterflies, parts 71 and 72.—Böhtlingk and Roth's Sanscrit Wörterbuch, 41 part.—Gould's Birds, Suppt. part 5.—Simson's India Nos. 7 to 9.—Maury's Physical Geography of the Sea.—Muir's Sanscrit Texts, Vol. I.—Commentar über das Avesta, von F. Spiegel, Vol. I.—Nature, Nos. 1 to 5.

Exchange.

The Athenæum for Sept. 1869.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR FEBRUARY, 1870.

The Annual meeting of the Society was held on Wednesday, the 2nd of February, 1870, at 9 o'clock P. M.

On the proposition of Mr. H. F. Blanford,

Dr. S. B. Partridge was voted to take the chair.

ANNUAL REPORT.

The Council of the Asiatic Society of Bengal, in submitting their annual report for the year ending 31st December, 1869, are glad to be able to congratulate the Society on its increasing prosperity, both as regards the accession of new members and the improved nature of its finances.

There have been in the course of the year 51 ordinary members elected, a larger number than that of any previous year. On the other hand, the Society has to deplore the loss of 7 ordinary members by death, 25 members retired, and the names of four were removed from the list, for non-compliance with the rules of the Society. This shews a total loss of 36, and leaves a net increase of 15 members.

The number of ordinary members at the close of the year was 442, of which 304 were paying and 138 absent members. In both there has been a slight increase, as compared with the past year, 1868, namely, 10 on the paying and 5 on the absent list.

The Council also satisfactorily observe that the total number of ordinary members has also steadily increased for the last ten years, as shewn in the subjoined table:

	Paying.	*Absent.*	*Total.*
1860	195	47	242
1861	225	55	280
1862	229	82	311
1863	276	79	355
1864	288	92	380
1865	267	109	376
1866	293	94	387
1867	307	109	416
1868	294	133	427
1869	304	138	442

The ordinary members the death of which the Council regret to announce are—Lieut.-Col. C. D. Newmarch, R. E.; Ch. Ae. Oldham, Esq.; J. B. Nelson, Esq.; J. G. Hicks, Esq.; Rajah Satyasarána Ghoshala, C. S. I.; Bábu Saradaprasáda Mukerjé, and the Rev. M. D. C. Walters.

The healthy condition of the Society is further shewn by the marked improvement in its finances. The income of the past year has exceeded the estimate by 1208 Rupees, and in effecting a saving in the items of estimated expenditure wherever it appeared advisable to do it, the Council has now the pleasure to state that all the debts of the Society have been paid, and that a balance of 2,438 Rupees was still left to the credit of the Society at the end of the year; the reserved fund of the Society remaining the same, 2000 Rupees, as in the previous year. At the same time there is the very large amount of Rupees 8,966 still outstanding for unpaid subscriptions and sales of publications, chiefly to members.

The Council have further the satisfaction to announce the completion of the xxxviiith volume of the Journal and one volume of the Proceedings. In addition to these, the January Proceedings for the current year have been issued, and the first numbers of both parts of the Journal for 1870 are considerably advanced in the press.

Museum.

In November 1868 formal sanction was given to the transfer of the Society's Natural History and Archæological collections to the

charge of the Trustees of the Indian Museum; and the donations received by the Society in those Departments during the year have, as usually, been handed over to the same trustees. A detailed statement of these donations has been published in the December Proceedings of the past year.

Coin Cabinet.

The collection of coins has received an increase of 4 silver and 37 copper coins all which were presented to the Society.

Library.

During the year, 750 volumes or parts of volumes have been added to the library. Among the presentations of publications, the Council would specially mention those from the Vienna Academy of Science, amounting to more than 100 volumes, a large portion of them relating to meteorological study; from the Christiania University, and many other public Institutions and Societies considerable additions have also been received. Of Sanskrit and other MSS. 36 have been presented to the Society, a series of 344 MSS. has been purchased by Bábu Rájendralála Mitra, and 1 Persian MSS. has been exchanged.

At the suggestion of the library committee, a sub-committee of five members was appointed for the purpose of revising the present Catalogue of the Library. This work is now in progress, and the Council hope that they may be able to report the completion of this revision to the Society at an early date. A Maulavi has been lately appointed to check the catalogue of the Persian MSS., and a Pandita to check the Sanskrit MSS. of the Society. These arrangements when completed, will markedly increase the accessibility and consequent usefulness of our library.

A list of the Societies and other Institutions from which publications have been received in exchange for those of the Society, has been added further on. The number of corresponding Societies is a comparatively small one, but the Council confidently hope that, as soon as the catalogue of the library will be completed, it may considerably be increased, inasmuch as the interest in the publications of the Society is rapidly advancing.

Publications.

These extend over nearly 1000 pages, with 34 plates, and sever-

al illustrations printed in the text. The general classification of our publications, introduced in 1865, proved to be a marked success, and has greatly facilitated their accessibility to members and other men of science.

Eleven numbers of the Proceedings were issued, extending over 336 pages with 7 plates. Of Part I of the Journal (Philology &c.) 224 pages illustrated by 4 plates have been published in four quarterly numbers, and of Part II, (Natural Science &c.) 278 pages and 23 plates also in four quarterly numbers. Each part has been separately paged and supplied with an index &c.

In addition to these 127 pages, and a few tabular statements of records of Meteorological observations have been issued, quarterly, with the numbers of Part II.

Owing to the increased bulk of the monthly Proceedings, the Council have decided to raise the price of the same, fixing the annual subscription at 4 Rupees, and the price of each number at 8 annas.

The income from the sale of the publications has exceeded the estimate by 400 Rupees.

Bibliotheca Indica.

During 1869, twenty-three fasciculi have been issued of Oriental Works, *viz.* 14 Persian, and 9 Sanscrit.

A. Persian Works.

Of Persian works the *Muntakhabuttawárikh* by Badáoni, and the *Sikandarnámah i Bahrí* by Nizámí have been completed. The former work was commenced in 1864, and consists of three volumes, the first of which contains the history of Sabuktigín to Humáyún, the second volume contains the history of the first 41 years of the Emperor Akbar ; and the third volume contains biographical notices of poets, learned men, saints, &c., that lived in the 10th century of the Hijra. Maulawí Ágha Ahmad 'Alí, the editor of this valuable history, has added a short introduction on the life and writings of the author.

Of the latter work, the *Sikandarnámah i Bahrí*, the first fasciculus had been issued by Dr. Sprenger as far back as 1842 under the title of *Khiradnámah i Sikandarí*. The second and completing fasciculus has been edited by Maulawí Ágha Ahmad 'Alí, whose valuable Essay on the life and works of Nizámí, and the History of the

Masnawí of the Persians will shortly be issued as an Introduction to this work.

Of the Persian works in progress, Maulawís Kabíruddín and Ghulám Qádir, of the Madrasah, have edited 8 *octavo* fasc. of Kháfi Khán's History, entitled *Muntakhabul Lubáb*, and Mr. H. Blochmann has edited four *Quarto* Fasc. of his critical text of the *Áín i Akbarí*. Of the English translation of the Áín two fasciculi were issued in the course of last year.

The Council also have received Introductory Notes, and Indexes of Names and Places, to the *'Álamgírnámah* and *Pádisháhnámah*, by Maulawís 'Abdul Hai and 'Abdurrahím of the Madrasah. These indexes are now printing, and will greatly add to the value of the texts.

B. Sanscrit Works.

The most important event the Council has to record in connexion with this department of the Society, is the grant by Government of Rupees 3000 per annum for the publication of Sanskrit works. On receipt of the orders on the subject, the Philological Committee submitted, in May last, a report recommending the publication of several works of great value, and measures have since been taken to carry out their recommendation.

In the Sanskrit series, Pandit Ánandachandra Vedántavágisa has completed his edition of the *Grihya Sutra* of Asvaláyana and published two fasciculi of the *Tándya Bráhmana*. Professor Mahesachandra Nyáyaratna has issued one fasciculus each of the *Sanhitá* of the Black Yajur Veda, and of the *Mímánsá Darsana* of Jaimani with the commentary of Sávara Svámi, and Bábu Rájendralála Mitra has brought out two Nos. of the *Taittiriya Áranyaka* of the Yajur Veda. The *Tándya Bráhmana* was undertaken in May last on the recommendation of the Philological Committee. It is the largest and most important *Bráhmana* of the *Sáma Veda*, and contains the earliest speculations on the origin, nature and purport of a number of Hindu sacrifices, rites and ceremonies, interspersed with a variety of anecdotes of great interest. The book is divided into twenty-five chapters, the first three of which have been published in two fasciculi. The *Grihya Sutra* is a manual of rules and directions for the performance of domestic rites and

cording to the ordinance of the *Rig Veda.* The text is explained by a running commentary by Gárganáráyana, and the editor has appended to it an elaborate Index to the Sutras, alphabetically arranged. A short preface in Sanskrit describes the MSS. used in preparing the text for the press. Of the *Mímánsá* about one half has been printed, and the forthcoming fasciculus will complete the first volume. Protracted illness has prevented Bábu Rájendralála Mitra from completing his edition of the *Tattiriya Bráhmana* and the *Aranyaka.* The texts have, however, all been printed and the necessary indexes and prefaces, ready in manuscript, will, it is hoped, be published in course of the current year.

Considerable progress has likewise been made in the collection of MSS. and the collation of texts for the publication of several new works. Professor Rámamaya Tarkaratna has compiled an edition of the *Nrisinha Tápani* with the commentary of *Sankara Áchárryya,* after careful collation of five different codices ;. and Pandita Haramohun Vidyábhushana has prepared a text of the *Gopála Tápani* with the commentary of Nárayana after a comparison of seven different MSS. Carefully collated texts of the *Agni Purána,* the *Gopatha Bráhmana* of the Atharva Veda, the *Taittiríya Pratisakhya,* and the *Gobhila* and the *Látyáyana Sutras* of the Sáma Veda have also been prepared and will immediately be sent to press. Of the two Tápanis several sheets have already been printed.

In February last the Government of Bengal requested the Society to undertake the task of collecting information regarding Sanskrit MSS., extant in the country, and the scheme thereupon suggested by the Philological Committee was finally sanctioned on the 23rd of June following. Owing, however, to certain unavoidable difficulties, no steps were taken to carry out the scheme until the beginning of September when a pandita was deputed to report on the Library of the Rájá of Krishnagar. The pandita has since submitted returns of 540 MSS. not included in the Society's collection. Bábu Rájendralála Mitra, during his late sojourn in Benares, has also examined several private collections, containing altogether upwards of six thousand MSS., from which he obtained the loan of some works to be copied for Government. His notes of rare works in those

collections are now in the press, and will comprise notices of about 250 MSS.

Of works commenced during 1869, the Council have to mention the *Rubá'iyát i 'Umar i Khayyám*, and an English Translation of the *Vedánta Sutra* by Professor Banerjea. The first fasciculi of these works are shortly expected. Mr. Beames has commenced the collation of his MSS. of Chand's Epic.

The following is a detailed list of the works published during 1869.

Works completed in 1869.

Persian.

The *Muntákháb ut Tawáríkh* by *'Abdul Qádir ibn i Mulúk Shah i Badáoní*, edited by Maulawí Ágha Ahmad 'Alí, No. 161, Fasc. V, Vol. III; New Series.

The *Sikandarnámah i Bahrí* by Nizámí, edited by Maulawí Ágha Ahmad 'Alí, No. 171, Fasc. II; N. S.

Sanscrit.

The *Taittiriya Áranyaka of the Black Yajur Veda*, with the Commentary of *Sáyanáchárya*, edited by Bábu Rájendralála Mitra, No. 159, 169, Fasc. VII and VIII; N. S.

2. The *Grihya Sutra of Ásvaláyana* with the commentary of *Gárgya Náráyana*, edited by Ánandachandra Vedántavágisa, No. 164, Fasc. IV; N. S.

Works in progress.

Persian.

The *Muntákháb ul Lubáb, by Kháfí Khán*, edited *by* Maulawís Kabír-uddín Ahmad and Ghulám Qádir, Nos. 155, 156, 160, 165, 166, 167, 172, 173, Fasc. V to XII; N. S.

The *Áín i Akbarí by Abul Fazl i Mubárik i 'Allámí*, edited by H. Blochmann, M. A., Nos. 157, 162, 168, 176, Fasc. VII to X; N. S.

The *Áín i Akbarí*, English Translation, by H. Blochmann, M. A. Nos. 158 and 163, Fasc. II and III; N. S.

Sanscrit.

The *Mimánsá Darsana with the Commentary of Sabara Svámi*, edited by Pandita Moheshachandra Nyáyaratna, Nos. 154, 174, Fasc. VII and VIII; N. S.

The *Tándya Bráhmana with the Commentary of Sáyanáchárya*, edited by Ánandachandra Vedántavágisa, Nos. 170, 175, 177, Fasc. I, II, III; N. S.

The *Sanhitá of the Black Yajur Veda with the Commentary of Mádhavácháryа*, edited by Mahesachandra Nyáyaratna, No. 221, Fasc. XXII; Old Series.

FINANCE.

Owing to the financial difficulties, brought to the notice of the Society at the last annual meeting, the Council at the beginning of 1869 again carefully discussed the several items of income, and were desirous not only to keep the expenditure within the estimated limits, but to effect if possible a saving in order to meet the heavy debt.

The following is a comparative statement of income and expenditure.

INCOME.

Heads.	*Estimate.*	*Actual.*
Admission fees,	1200	1632
Subscriptions,	9200	9180
Journal,	1200	1636
Secretary's Office,	0	8
Library,	350	752
Coin Fund,	50	0
Building,	0	0
	12,000	13,208*

EXPENDITURE.

Heads.	*Estimate.*	*Actual.*	
		For 1869.	For previous yrs.
Journal,	5000 Rs.	3197 Rs.	3673 Rs.
Secretary's Office,	2000 ,,	2354 ,,	238 ,,
Library,	3200 ,,	2039 ,,	600 ,,
Coin Fund,	300 ,,	0000	000
Building,	800 ,,	697 ,,	000
Miscellaneous,	700 ,,	428 ,,	000
Total,	12000 Rs.	8715 Rs.	4511 Rs.
Grand Total,	12000 Rs.	13226 Rs.	

* To this has to be added the floating balance at the end of 1868, being 2,334 Rupees.

The above statements shew that almost in every instance the expectations of the Conncil have been realized, and that moreover the actual income exceeded the total estimate by 1208 Rupees. This excess together with the balance of 2334 Rupees to the credit of the Society at the end of 1868 and the savings effected during the year enabled the Council to pay off all the outstandings of previous years; and besides that to retain a balance of 2438 rupees in order to cover the expenditure, incurred on account of the past year, 1869.

Wherever the actual expenditure has exceeded the estimate, it was always done by a special recommendation of the Finance Committee, and subsequent order of the Council. The monthly reports of the Council, as recorded in the Proceedings of the Society, shew the various instances in which the Council deemed it necessary to incur a greater expenditure than that estimated for. The heaviest outlay is that under the head of the Journal, but is owing to the large amount paid on account of previous years' publications. The next excess is that in the Secretary's Office, and this is due to the new arrangement for the bi-monthly despatch of the Society's publications to Europe, the increase of pay granted to the cashier, and the appointment of additional officers on the establishment for the purpose of checking the catalogues of MSS. The following is an abstract of accounts for the year.

INCOME.	*Rs.*	*As.*	*P.*
Admission fees,	1632	0	0
Subscriptions,	9180	12	0
Journal,	1636	9	6
Secretary's Office,	8	13	6
Library,	752	6	0
Vested Fund,	110	0	0
General Establishments,	1	6	0
Coin Fund,	0	0	0
Orient. Publ. Fund,	429	9	9
Messrs. Williams and Norgate,	1061	7	0
Museum Catalogues,	395	13	4
Carried over, Rs.	152(		

Brought forward, Rs.	15208	13	1
Miscellaneous,	15	11	0
Sundries,	540	4	9
	15,764	12	10
Balance of 1868. In the Bank of Bengal,	2261	10	9
Cash in hand,	92	9	7
Rs.	18,119	1	2

EXPENDITURE.

	Rs.	*As.*	*P.*
Subscription,	129	0	0
Journal,	6870	7	6
Secretary's Office,	2463	13	8
Library,	2328	12	6
Vested Fund,	0	4	4
Coin Fund,	0	0	0
Building,	697	12	0
Orient. Publ. Fund,	79	3	0
Messrs. Williams and Norgate,	1481	5	6
Conservation of Sanscrit MSS.,	458	10	6
Zoological Garden,	12	0	0
Catalogue of Persian MSS.,	30	0	0
Miscellaneous,	416	5	3
Sundries,	713	6	7
	15,681	0	10
Balance In the Bank of Bengal:			
Dr. Muir's,	898	10	0
As. Society's,	1411	4	7
Cash in hand,	128	1	9
Rs.	18,119	1	2

By the death of several Members outstandings to the amount of 448 Rs. have to be written off.

The following will shew the Financial position of the Society :—

	Cash Assets.	*Outstandings.*	*Gross Assets.*	*Liabilities.*
1869	4,438	8,966	13,404	3,205

The following is their Budget for the coming year :—

INCOME.

	Rs.	As.	P.
Admission fees,	1200	0	0
Subscriptions,	9000	0	0
Publications,	1200	0	0
Library,	600	0	0
Coin Fund,	0	0	0
Building,	0	0	0
Secretary's Office,	0	0	0
	12000	0	0

EXPENDITURE.

	Rs.	As.	P.
Publications,	5000	0	0
Library,	2700	0	0
Coin Fund,	300	0	0
Building,	800	0	0
Secretary's Office,	3200	0	0
	12000	0	0

OFFICERS.

The general duties of the Secretary, including the publication of the Proceedings, during the year have been carried on by Professor Blochmann and Dr. Stoliczka. The Philological part of the Journal was edited by Mr. Blochmann and the Natural History by Dr. Stoliczka. Colonel Gastrell carried on the duties of financial Secretary until September, when on his leaving Calcutta Colonel Hyde kindly offered to accept the onorous duties of the Treasurer and retained the charge of the same to the end of the year.

The Council favourably record their satisfaction with the services of the Assistant Secretary, Bábu Pratápachandra Ghosha, B. A., and the Assistant Librarian Bábu Money Lall Bysack, who have been assiduous in the performance of their duties.

It was proposed by Mr. H. F. Blanford and seconded by Mr. D. Waldie that the report as read be adopted.—Carried unanimously.

The balloting lists of officers and members of the Council of the Society, as recommended by the Council, having been submitted the Chairman proposed, and it was agreed to that Mr. H. F. Blanford and Mr. D. Waldie act as scrutineers.

The Chairman next submitted the accounts of the Society for the past year, and proposed that Sir Richard Temple and Mr. D. Waldie be requested to act as auditors.—Carried.

The ballot having been taken the scrutineers reported that the following gentlemen have been elected officers and members of the Council of the Society for the ensuing year.

President.

The Hon'ble J. B. Phear.

Vice-Presidents.

Thomas Oldham, LL. D. | J. Fayrer, M. D., C. S. I.
Bábu Rájendralála Mitra.

Treasurer and Secretaries.

Lieut. Col. H. Hyde, R. E. (Financial Department).
H. Blochmann, M. A., (Philological Department).
F. Stoliczka, Ph. D., (Natural history Department).

Members of Council.

The Hon'ble J. B. Phear.	J. Ewart, M. D.
Thomas Oldham, LL. D.	The Hon'ble W. Markby.
J. Fayrer, M. D., C. S. I.	Col. H. Thuillier, R. E.
Bábu Rájendralála Mitra.	Bábu Devendra Mallik.
S. B. Partridge, M. D.	C. H. Tawney, M. A.
The Hon'ble J. P. Norman.	H. F. Blanford, A.R.S.M.
Lieut. Col. H. Hyde, R. E.	H. Blochmann, M. A.

F. Stoliczka, Ph. D.

List of Societies and other Institutions with which exchanges of publications have been made during 1869.

Batavia :—Société des sciences des Indes Nederlandéses.
Berlin :—Royal Academy.
Bombay :—Asiatic Society.
Boston :—Natural History Society.
Bordeaux :—Bordeaux Academy.
Brussels :—Scientific Society.
Cherbourgh :—Société Imperiale des Sciences Naturelles.
Calcutta :—Agric. and Hortic. Society of India.
——— :—Tattvavodhini Sabhá.
——— :—Geol. Surv. of India.
Christiania :—University.
Dacca :—Dacca News and Planters' Journal.
Dera :—Great Trigonometrical Survey.
Dublin :—Royal Irish Academy.
——— :—Natural History Society.
Edinburgh :—Royal Society.
Germany :—Oriental Society.
Lahore :—Agricultural Society of Punjab.
London :—Royal Society.
——— :—Royal Asiatic Society of Great Britain and Ireland.
——— :—Royal Institution.
——— :—Royal Geographical Society.
——— :—Museum of Practical Geology.
——— :—Zoological Society.
——— :—Statistical Society.
——— :—Geological Society.
——— :—Linnean Society.
——— :—Athenæum.
——— :—Anthropological Society.
Lyon :—Agricultural Society.
Madras :—Government Central Museum.
Manchester :—Literary and Philosophical Society.
Munich :—Imperial Academy.
Netherlands :—Royal Society.
New York :—Commissioners of the Department of Agriculture.
Paris :—Ethnographical Society.
——— :—Geographical Society.

Paris :—Asiatic Society.
St. Petersburgh :—Imperial Academy of Science.
Vienna :—Imperial Academy of Science.
Washington :—Smithsonian Institution.

The chairman then read the following brief address of the President, Dr. Thomas Oldham, who has been called away from the presidency town by important official duties.

ADDRESS OF THE PRESIDENT.

GENTLEMEN OF THE ASIATIC SOCIETY,

The necessity of attending to important professional duties, at a distance from Calcutta, will, I regret to say, prevent my having the pleasure of being with you at the annual meeting of your Society. I do not, however, wish that anniversary to pass, without a few words of congratulation, and of farewell, although I cannot deliver them to you personally.

It was my duty to point out to you at the last anniversary meeting, that from the state of the finances of the Society, your Council had been compelled to insist upon the necessity for curtailing, in every possible way, the expenditure of the Society. It was even seriously in contemplation to suspend the publication of the Journal of the Society, until the finances had recovered. But, it was determined that every effort should be made in other directions, before this last act, amounting almost, as we thought, to the extinction of the Society, should be resorted to. We felt strongly also, that if the Society had failed to command the support of those interested in natural history and philological enquiries, the cause of that failure must be sought in the action of the Society itself, and must not be presumed to arise from any absence of an intelligent appreciation of the value or importance of such enquiries. This view I endeavoured to impress upon you in my brief address of last year. And I rejoice to think that the same views have guided the management of your So-

ciety during the past year. In brief, we felt that to be successful, the Society must be useful; and that to be useful, it must adopt very much the same principles of action which alone are known to succeed in other associations. Among the most important of these, punctuality in all the arrangements of the Society appeared to stand first. Punctuality in judgment, punctuality in accounts, punctuality in publications.

I need not here insist on the fact, that without a sufficient income, no Society can carry out its operations. And when, as in the Asiatic Society of Bengal, the sole source of such income is the voluntary contributions of its members, it was of the very first importance that these contributions should be promptly available for the objects to which they were to be applied. Our first efforts were, therefore, directed to endeavouring to bring in all outstanding claims of this kind, and to establish a system of more regular, and prompt collections, and payment. The result has been that your Council are able to report to you, that we have during the year 1869, received of arrears of previous years on all accounts Rs. 2,681-5-0. But we must still point to the fact, that in a similar way, *on all accounts* there was at the close of the year 1869, no less than Rs. 8,966, still due to the Society.

More than two-thirds of this large sum is made up of the admission fees, and annual contributions of members! And I cannot avoid again urging upon the members of the Society, that it is not possible for the Council of the Society, to carry into practice their ardent wishes to render the Society effective, and to do this punctually and quickly, unless they are supported by the members at large. The fact of their becoming members, I assume to be sufficient proof of their appreciation of the advantages to be gained from such association; but if this membership brings with it privileges, it also creates duties, and the obligation to fulfil their part of the contract by paying regularly the contributions, which as members they have agreed to pay, is not the least of these.

During the year just passed, there have been elections of 51 members. Against this we have lost from various causes, 36, leaving an actual addition to the list of 15 members; the total at close of 1869 being 442, as against 427, at close of 1868. But so far as income is

to a book or a daily or weekly or even monthly journal, no matter what its special subject might be, if they found that, instead of appearing at the appointed time it came at long and irregular intervals, the issue of January say, appearing in December! And it is equally so with the Journal of your Society; unless it appears regularly and at stated intervals, it will unavoidably cease to excite any interest in the subscribers.

Gentlemen, no one save those who have actually tried the experiment, can realize the difficulty, and the labour involved in the regular issue of such a publication in this country. And if I speak strongly of the obligations the Society is under to its Secretaries for this result, and for the regular issue of your Journal and Proceedings, I do so, because I can speak from personal and intimate knowledge of the exertions it has necessitated, and of the time which has been, in the midst of other and pressing duties, devoted to it. That this regularity in issue is appreciated, I have had during the year many very gratifying proofs, and only a short time since, an old and very valued contributor to the Journal, and member of the Society, in Europe, acknowledging the receipt of some parts of the Journal which were wanting to complete his series of some years since, says with earnestness: "As to 1868, I am now able to go to the Binder with everything for the year complete, long before the close of 1869, which for the Journal of the Asiatic Society of Bengal is wonderful!!" I can only express an earnest hope that the Secretaries may be enabled to maintain this regularity of issue, convinced that the members will duly appreciate the importance of their exertions. I would even venture to suggest that by alternating the appearance of the different numbers, these advantages would be even more fully secured. If the members, taking 4 numbers of each part as the regular issue for the year, or eight in all, 1 of Part I, were to appear say in February, April, July and October, and the numbers of Part II, in March, June, September, and December, the members would have a number of the Journal every six weeks or two months. Such a systematic issue, could only be maintained by having the printing and illustrations of the Journal prepared some time before the date of issue. But with the large number of

valuable papers which are now coming to the Society, there will be no difficulty in this.

I alluded last year to certain objections which had been made to the present division of the Journal, according to the subject matter of the papers published, and endeavoured to shew, that this appeared to me a question which nothing but experience could answer. I think now we can come to a definite conclusion in the matter. There has been no difficulty finding good original matter for both of the divisions, and a full number of Journals have been issued, while the fact regarding the sale of these numbers are sufficient in my opinion to prove how fully the public appreciate the division. The returns of sales shew the following numerical result:—

Year.	Subscribed volumes.	Double numbers.	Double numbers of previous years.	Part I, numbers of current year.	Part II, numbers, curr. year.	Double numbers, curr. year.
1860	71	13				
1861	69	15				
1862	68	15				
1863	70	30				
1864	67	34				
		Division of Journal was introduced.				
1865	108		45	2	3	1
1866	113		15	0	5	3
1867	80		37	36	95	3
1868	77		38	30	64	1
1869	77		30	46	81	1

This tabular statement shews that the applications for the Journal, were in 1860 only 13, in 1864, 34, in 1865, the first year after the division was introduced 51, and in 1868, 133 and for last year 158. Now, not only does this satisfactorily shew the increasing value attached to your Journal in this country, but the separate sales of the separate parts, shew, I think, very conclusively that a considerable proportion of this increase of demand has

arisen from the increased facilities afforded by the division of the subjects treated of, to all who are more especially interested in one branch of enquiry rather than another.

Similar favorable reports of the sale of our Journal reach us from our agents at home, though we have not as yet received detailed statements of the separate applications.

I would also ask attention to the fact that during the last few years, much more has been given to the members than hitherto, while to the public the cost has been considerably reduced.

Whatever doubts therefore I have had as to the practicability of effectively maintaining this division of our Journal, have been entirely dispelled by the experience of last year, and I believe this division to be not only convenient (which was obvious) but also both practicable and profitable.

I would also ask your attention to the greatly increased interest and value of the papers published in your Journal, and to the improvement in the illustrations. That the contributions have excited much attention from the highest authorities on the subjects treated of is shewn by the criticisms on them, which have appeared in the Scientific Journals of Europe. The Society is indebted for one of the most attractive illustrations in the Journal of last year, to Mr. W. T. Blanford, who has contributed the very admirably executed coloured plate of a new species, *Trochalopteron Fairbankii*, described by himself. Indeed it has only been by similar contributions of time and labour, that under the pressure of limited resources, we have been able to produce so valuable a volume of the Journal during the year.

It had been my wish to have taken a brief retrospect of the labour of the Society during the year, but my absence for some months will preclude the possibility of this. There is one subject which has been prominently brought forward, on which I would say a few words. We have had more than one communication on the early history of the Sundarbans; and have been strenuously urged to initiate a regular examination of this wild and now uninhabitable jungle district, with a view to determine the existence, and investigate the ruins of cities said to occur, or

known to occur, within its limits. And the most terrific stories of the inroads of savage pirates, of the occurrence of tremendous gales—and awful waves carrying with them the devastation of everything, have been invited to account for the extinction of these cities, and the abandonment of the lands then under cultivation. The joint action of the Society and others has been invited to stir up the Government of the country to undertake a systematic examination of the whole area; and wonderful prospects have been held up of intending archæological discoveries to reward the risk of life and health, which such an expedition would involve. I cannot agree with these views—and for this reason, that I am compelled to view the changes which have occurred in this Sundarban tract as the necessary results of undeviating natural laws, involving nothing more than the most gradual and ordinary changes, such as are still in progress.

I suppose no one will hesitate to acknowledge that the whole of the country, including the Sundarban proper, lying between the Hughly on the west, and the Megna on the east, is only the delta caused by the deposition of the debris carried down by the rivers Ganges and Brahmaputra, and their tributaries. It is also equally well known that in such flats, the streams are constantly altering their courses, eating away on one bank and depositing on the other, until the channel in which they formerly flowed became choked up, and the water is compelled to seek another course. It is also certain that in this peculiar delta, the general course of the main waters of the Ganges has gradually tracked from the west towards the east, until of late years the larger body of the waters of the Ganges have united with those of the Brahmaputra and have together proceeded to the sea as the Megna. Every stream whether large or small, flowing through such a flat, tends to raise its own bed or channel, by the deposition of the silt and sand it holds suspended in its waters,—and by this gradual deposition the channel bed of the stream is raised above the actual level of the adjoining flats. It is impossible to suppose a river continuing to flow along the top of a raised bank, if not compelled to do so by artificial means, and the consequence of this filling in and raising of its bed, is that at the first opportunity, the stream necessarily abandons its original

course, and seeks a new channel in the lower ground adjoining—until after successive changes it has gradually wandered over the whole flat and raised the entire surface to the same general level. The same process is then repeated, new channels are cut out, and new deposits formed. Bearing these admitted principles in mind, look to the delta of the Ganges and Brahmaputra. The Ganges river emerging from its upper levels round the Rajmahal Hills, and prevented by their solid rocky barrier from cutting further to the west, sought its channel in the lower ground adjoining—and originally flowed, into the main body of its waters along the general course now indicated by the Bhaghirathi and Hughly. But gradually filling up this channel it was again compelled to seek a new course in the lower, because as yet comparatively unfilled in ground, lying to the east. And the same process being repeated it wandered successively from the rocky western limit of the delta-flat towards the eastern. If this progress eastwards was allowed to be sufficiently slow to admit of the gradual filling in of the country adjoining, the delta was formed continuously up to the same general level, and the larger streams or channels passing through this flat to the sea became unavoidably diminished in size, and in the quantity and force of the water they carried, the main body passing around further to the east, and having its course in the channels successively formed there. I need not here point out the successive stages in the formation of the delta, or shew how these have been exactly paralleled by similar changes in the course and deposits of the Brahmaputra, and the other rivers which unite with the Ganges. We are at present concerned rather with the results arising from these changes as affecting the existence and distribution of population.

The very first necessity for the existence of man is the presence of drinkable sweet water. Where this cannot be procured, it is certain that man can make no settlement,—and it is equally certain that the removal or destruction of the sources of supply of this necessary element of existence will compel him to abandon his abode, and change his habitation. We have not to go beyond the delta of the Ganges itself to see the application of these facts, in explanation of the former history of the Sandarban. The more modern course of the large rivers give us a patent illustration of

the successive conditions of all. To the east where now the great body of the waters of these rivers is discharged, we find the force of the fresh water sufficient to overcome the strength of the tide, and the influx of salt water from the sea. And down to the very mouths of the rivers here, fresh water (often for hours in the day flowing over a basis of salt water beneath) can readily be procured. The consequence is that towns and villages line the banks of every stream, and population and cultivation follow the course of this, the prime element of their existence. To the east as we have said the filling in of the Delta has not yet reached the same level as to the west, and the fresh waters here retain sufficient power, therefore to be carried down to the sea. In earlier times, precisely similar conditions must have existed further to the west; the larger portion of the river waters found their exit through the channels there, and were thus in sufficient force to be carried down to the very sea, and the natural consequences of this was, that man fixed his abode, where he could procure fresh water, towns and cities arose, and taking advantage of the great facilities for trade offered by their position, increased in importance and number, until the necessary changes in the course of the streams which supplied them deprived them of the possibility of existence. That this is the natural interpretation of the facts, appears to me abundantly evidenced by the circumstance that within this abandoned tract and in its vicinity, at the present day, when the swarming population is seeking utility for settlement in every direction, not a single spot finds its settler, save where fresh water is to be had; and the traveller may go for days or weeks through the countless anastomising creeks and channels of the tidal Sundarban, without finding a single abode, whereas the moment be reaches any spot where fresh water is obtainable, he finds cultivation spreading and the population increasing.

I alluded to the existence down to the very sea board of towns and villages along the corner of the Megna &c., where fresh water is still procurable. But I cannot shut my eyes to the consideration that in the course of time (and very probably, as I believe, in a very short time unless prevented by artificial means), these very localities must themselves be again deserted and a Sundarban tract will then be found in the eastern face of the delta, as it now is in the western.

than I have been to promote your interests. My absence from among you this evening, which necessity alone could have caused has confirmed my opinion that your President ought to be one constantly resident in Calcutta. And I look forward with great hopes to the steady progress and increased utility of the Society, under the presidency of the learned member, to whom I now resign the Chair.

Camp Chanda, January 22nd, 1870.

Before the meeting terminated it was proposed by the chairman, Dr. S. B. Partridge, and seconded by H. F. Blanford, Esq., and carried with acclamation—

That the special thanks of the Society be given to Colonel J. E. Gastrell for his very able services rendered to the Society as Treasurer for the last six years.

Ordinary Meeting for the month of February, 1870.

The meeting then resolved into an ordinary meeting—

Dr. S. B. Partridge, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced :—

1. From Colonel G. H. Saxton, Canúr,—a set of iron implements &c. found in a cromlech in the estate of Major Sweet. The following letter, dated 25th Nov., 1869, accompanied the donation.

"The accompanying were quite recently dug out from a cromlech on the estate of Major Sweet in the South side of the Nilgherry plateau. Many other things of the same description as well as some quite different, were found in the same place. Similar Cromlechs exist all over the Nilgherries, and some have been opened before this, but I believe not many. In some of those, precisely similar articles have been found, but in others the search has been fruitless, perhaps they had been previously opened. I dont know whether the Society has on record any information regarding the Nilgherry cromlechs, but I send these, hoping that some Archæologist may make them interesting by instituting enquiries, which I shall be happy to assist in, after my return to the hills in the hot season. None of the present hill tribes possess the slightest knowledge as to the origin of either

the cromlechs, or the numerous cairnes still existing. No objection is offered by the hill people to any one excavating in the Cairnes. There is, however, some superstitious dread in existence about any interference with the cromlechs. Major Sweet personally opened this cromlech, and extracted those relics on his own property, and the only feeling shewn, appears to have been a fear, that the spirits of the bygone people, to whom these relics belong, would surely resent the sacrilege, which the present tribes would therefore not join in committing. In some instances I learn, that the Burghes have made objection to the opening of cromlechs, but never on any plea that the monument at any time appertained to the forefathers of any existing tribe.

The metal of which these implements are made appears to be generally iron and brass, but it requires examination. The earthenware chatties are all filled with earth and bones of which some are enclosed. The Todars are undoubtedly the oldest occupants of these hills, now existing. Their traditions claim for the tribe a great antiquity, and declare, that the Todars were originally created on the Nilgherries; and that the other tribes immigrated from some other country. I am not aware what evidence exists, on which to found any opinion as to the period, back to which the Todars would carry their traditions, but it seems clear that both cromlechs and cairnes are antecedent to that. On what grounds I know not, but popular belief gives from 800 to 2000 years as the age of the relics I now send. Mr. Metz, a German Missionary who has for 25 years worked on the Nilgherries, and for that long time held intimate intercourse with the hill tribes, indeed lived with them in their villages and huts, is the only person who can be able to form any reliable opinion on this subject, and I hear that he says they *must* be 800 and *may* be 2000 years old. It is remarkable and very corroborant of great antiquity that no coin of any kind has ever been found amongst these remains of a bygone age."

The pottery, sent by Col. Saxton, is quite similar to that described from the Coorg Cromlechs by Dr. T. Oldham, in the Proceedings of the Society for August, 1869. The iron implements

are to a great extent identical in form with those described and figured in Vol. III, of the Transact. Bombay Literary Society, p. 324, &c.

2. From J. G. Delmerick, Esq., Rawul Pindi,—specimens of moulds used in counterfeiting coins; the following letter accompanied the specimens.

"A few weeks ago the Police of this District, in searching for implements of coining, discovered in the houses of Chandra Mall and his brothers Jewaya Mall, goldsmiths and residents of the town of Rawul Pindi, a quantity of moulds and forged Bactrian coins. These men are well known coin dealers, and as the moulds themselves would no doubt be objects of interest to the members of the coin committee, I have despatched by dâk bhangy four of the best specimens. They are composed of a fine description of clay, and are the only ones in good preservation. The others were in broken bits and formed a pretty large heap on the Magistrate's table. I suspect that the men received timely information of the movements of the Police, and were thus able to break up nearly the whole of the moulds, but nevertheless there was ample evidence to prove that they were old and systematic offenders."

"The moulds, I send, are all of the largest silver coins of Eucratides, of Heliocles and Laodice, of Hermeus, and of Azilises.

I may add that no implements of coining *proper* were found and that the fabricated coins were destroyed by order of the Magistrate."

General A. Cunningham published many years ago notices on forged coins of the Bactrians and Indo-Scythians; vide Journal Asiatic Society, Bengal, 1840, Vol. IX, p. 1217 &c. The moulds forwarded by Mr. Delmerick shew a high finish, and coins cast in them require careful examination to be detected as falsifications.

3. From the Government of India, a copy of catalogue of Sanscrit manuscripts in the southern division of the Bombay Presidency.

In connection with the specimens of implements forwarded by Col. Saxton, the President announced that Mr. H. Rivett-Carnac has brought a fine collection of similar relics from Central India, and will lay them before the meeting.

Mr. H. Rivett-Carnac, in exhibiting these specimens of iron and other implements found in tumuli near Nágpúr, observed that he would not trouble the members with any lengthened description of the tumuli from which these remains had been obtained. Detailed accounts of the Cromlechs, Kistvaens, and Barrows of Central and Southern India had, from time to time, appeared in the Society's Journal, and in the Journals of the Bombay and Madras Societies, and the existence and character of these remains were doubtless well known to many gentlemen present. He would, however, desire to remind the meeting of the interesting point noticed by Colonel Meadows Taylor, who examined many Barrows in the Deccan, and who on his return to England visited and excavated some of the old tumuli in the North of England, and found an extraordinary resemblance to exist between the remains in India and in Europe.

Colonel Meadows Taylor in his paper, read before the Royal Irish Academy,* had brought out in a most striking manner, the perfect similarity that exists between the Barrows and Cromlechs of the Deccan, and the tumuli of Western and Northern Europe. Nágpúr is situated on the eastern border of the trap formation of the Deccan, and here, where the stone most ready to hand consists of basalt, the tumuli are found in the shape of mounds surrounded by a single or double row of trap boulders, and similar in shape and construction to the well known Barrows of Scotland, the North of England, and other parts of Europe. Further to the East of Nágpúr on the sandstone formation, the form of tumuli changes, and Cromlechs or Kistvaens, similar to the "Kitscoty House" of Aylesford take the place of the Barrows.

And it is not only in the shape of the tumulus that the most extraordinary identity is to be traced between the prehistoric remains of India and Europe, but in the manner in which the bodies are buried in the urns and in the ornaments, and weapons placed with the urns within the tomb, the same striking resemblance is to be traced between the discoveries made in both countries. The specimens before the meeting were, Mr. Rivett-

* See the papers of Colonel Meadows Taylor, C. S. I., in the Journal of the Royal Irish Academy, and in that of the Ethnological Society.

Carnac said, but a few of a very large number of articles found in these Barrows, but they were quite sufficient to establish the identity referred to. These iron implements were invariably found together with pottery urns, or with fragments of them, for it was extremely difficult to get out the urns intact. Most of the specimens in the collection spoke for themselves, but the iron snaffle, the stirrups, the spear and other accoutrements of the warrior, whose tomb had been examined, were, he ventured to think, of special interest. He would also draw attention to a very perfect specimen of an iron battle-axe. It would be seen that the iron crossbands by which the axe was fastened to the handle were still intact. A reference to the Illustrated Catalogue of the Royal Irish Academy would shew that this specimen had an exact counterpart in an axe found in Ireland, in a Barrow similar to that from which the axe now exhibited was exhumed. And the same remark applied to the bangles and other articles in the collection, which would be found to resemble, in every respect, remains discovered, under exactly similar circumstances, in Ireland, which remains were figured in the Catalogue above referred to.

Another circumstance was perhaps worthy of notice, and might be useful in assisting to determine the age to which they belonged. On the sculpturings of the Bhilsa and Oomraoti topes, a people, who would appear to be distinct from the Aryans, were there represented wearing bangles, and armed with battle-axes similar to those now exhibited.

There was yet another circumstance connected with the remains which was perhaps as interesting as any of the points above noticed of the similarity between the remains in India and Europe. And he was not aware that this point had been noticed before. His attention had first been drawn to it by a work entitled "Archaic Sculpturings" written by Sir James Simpson, the well known antiquarian. This book contained an account, with illustrations, of peculiar marks found on the monoliths, which surround the Barrows in Northern Europe. Now although he (Mr. Rivett-Carnac) had often visited the Nágpúr tumuli, and noticed some indistinct markings on the weather-worn stones, he had never paid any very particular attention to them, until

he saw the engravings in Sir James Simpson's work. He was then immediately struck by the further extraordinary resemblance between the so-called "cup marks" on the monoliths surrounding the Barrows in England, and the marks on the trap boulders which encircled the Barrows near Nágpúr. Indeed, if the members interested would be so good as to compare the sketch of the Barrows and cup marks given in Sir James Simpson's book, with the tracing laid before the meeting of the "cup marks" on one of the Barrows at Junapani, near Nágpúr, this extraordinary resemblance would at once be apparent. The identity between the shape and construction of the tumuli, and between the remains found in the tumuli of the two countries had already been noticed, and now here was a third, and still more remarkable point, the discovery on these tumuli of markings which corresponded exactly with the markings found on the same class of tumuli in Europe. He would not trouble the meeting now with any theories founded on this extraordinary resemblance. A paper containing a full account of the discoveries, with sketches of the tumuli, the remains found therein, and the markings on the stones would soon be published, and all who took any interest in the subject would find therein such information as he was able to give. The subject of the similarity of the pre-historic remains of the Deccan and Northern Europe had also been treated of, most exhaustively, by Colonel Meadows Taylor in a paper which was doubtless familiar to most of the members. But the "cup markings" to which allusion had been made above, had not, he believed, been noticed before, and they formed, he would submit, another and very extraordinary addition to the mass of evidence which already existed in favor of the view, that a branch of the nomadic tribes who swept, at an early date, over Europe, penetrated into India also.

These tumuli were to be traced from Southern India, through the Deccan, to Nágpúr. He had not as yet been able to ascertain whether they were found in the country lying between Nágpúr and the Punjab. But on the frontier they were met with in large quantities, and from thence they could be traced, as if marking the line of progress of some great tribe, through Central Asia and Russia into Northern Europe.

Enquiries were now being made on the subject, and he hoped soon to be able to inform the Society of the result of further discoveries, and also that the chain of tumuli, the record of the movements of tribes between Central India and Northern Europe, was complete.

A lengthened discussion ensued in which Mr. E. C. Bayley, Mr. H. F. Blanford, the chairman and several other members took part.

Dr. A. M. Verchere drew the attention to a sketch which was published with his paper in the Journal of the Society for 1867, (Pt. II., p. 114). His suggestion then was that the small holes, or cups, in large boulders between Jubbee and Nikkee on the Indus, have been either made by a race of men, or that they had a glacial origin. He then thought rather to incline to the latter than to the first hypothesis, but it is just as well possible that those excavations have been executed by men. There are at present no settlements of any kind in the close neighbourhood.

The following gentlemen duly proposed and seconded at the last Meeting were ballotted for and elected ordinary members :—

Baden Powell, Esq., C. S. | J. H. Newman, Esq., M. D.
Surgeon Fred. Wm. Alex. De Fabeck,

The following have intimated their desire to withdraw from the Society :—

E. G. Man, Esq.	W. L. Granville, Esq.
Lieut. Col. G. B. Malleson.	P. Carnegy, Esq.
The Hon. F. Glover.	A. H. Giles, Esq.

The Council reported that they have ordered on a recommendation of the Finance Committee—that debts to the amount of 448 Rs. due to the Society, and 33 Rs. 10 ans. due to the Oriental Fund, by members and gentlemen deceased, be written off.

The receipt of the following communications was announced :—

1. Notes on some new species of birds from the North Eastern Frontier of India,—by Dr. T. C. Jerdon.

2. Notes on Indian Herpetology,—by Dr. T. C. Jerdon.

3. Observation on some species of Indian birds, lately published in the Society's Journal,—by Allan O. Hume, C. B.

4. Note on a few species of Andamanese land-shells, lately described in the American Journal of Conchology,—by Dr. F. Stoliczka.

The following paper was read,—

NOTES ON SOME NEW SPECIES OF BIRDS FROM THE NORTH-EASTERN FRONTIER OF INDIA,—by Dr. T. C. Jerdon.

Whilst in upper Assam last spring, I obtained a living specimen of a *Ceriornis* which at the time I was led to consider as *Cer. Temminckii*, but on comparing the figures of Gould (Birds of Asia), I found it to be a new and undescribed species, which I propose to call *Ceriornis Blythii*, after the late very able Curator of our Museum.

The species is conspicuously distinguished from *C. Temminckii*, as well as from the two other Indian species, by the uniform plain colouring of the lower parts, which are of a reddish stone colour without any spots. The red of the head, neck and breast is of a peculiarly vivid flame colour.

One specimen was brought down to Suddya by some Mishmese from the adjoining hills; it died shortly after, but the skin was preserved. An intelligent Assamese official, who is a good sportsman, assured me that he knew the bird well, and that it was found in winter at a comparatively low level in Upper Assam. A second specimen was brought down alive some little time afterwards, and this one I brought safely to Calcutta, and handed over to Dr. J. Anderson for transmission to the zoological Garden in London. A coloured drawing of the specimen has been made, before it was shipped.

Along with the last named specimen, a fine new Monal was brought down from the same hills. This differs conspicuously from *Lophophorus Impeyanus* in the total want of a crest, in the upper tail coverts being pure white, and in the tail itself of a darker rufous colour than in that species, and broadly tipped with white. The feathers of the back and rump are white, with a black centre to each feather. It is a larger and stouter bird

than the common Monal of the north-west Hymalayas. The orbital skin is blue in both species. In a notice lately sent to the editor of the Ibis, I have named this species *Loph. Sclaterii.* The only specimen known I had also brought to Calcutta, and it was forwarded to England, together with the *Ceriornis.*

This unexpected discovery of two new pheasants within the limits of our north-Eastern possessions indicates that we are at the borders of a somewhat distinct avifauna which yet leaves a large new field of enquiry open to the Indian naturalist.

Besides these two novelties I have obtained through Major Godwin-Austen a new swift, of which I append a description, and also a new pigeon which will be described shortly. Major Godwin-Austen discovered a new *Trochalopteron*, of which I had lately sent the description to the "Ibis."

Ceriornis Blythii, Jerdon.

Whole head, neck and breast vivid igneous red, head sub-crested with a narrow streak of black from the base of the bill to the occiput; a second streak from the eye to the nape; whole upper plumage, including wing-coverts, upper tail and sides of breast and flanks with white black-edged ocelli; some of the lowermost of the upper tail coverts buff with dark cross bands; quills dusky brown, with pale brownish bands; tail dusky brown.

The whole of the lower parts from the breast to under tail coverts of a reddish ashy or stone colour, the feathers very slightly darker at the tip. The skin of face and throat yellow, more or less mixed with orange and emerald green at the lowest part, it is bordered laterally by a very narrow black line; bill dusky; legs fleshy; size much the same as that of the other Indian species of *Ceriornis*, perhaps a trifle smaller.

From the hills at the head of the valley of Assam, and said in winter to descend nearly to the level of the river. Called by one good Assamese sportsman, *Húr-húria*, meaning the Golden Bird.

Lophophorus Sclaterii, Jerdon, ("Ibis" for 1870.)

Head not crested; whole upper surface of head, neck, interscapularies and wing coverts brilliant shining metallic blue-green, with the back of the neck bronzy gold, and reflections of the same here

and there; quills black, upper back and rump white, the feathers all black shafted; upper tail coverts white; tail reddish-brown, broadly tipped with creamy white; all the lower parts deep black. Bill dingy yellow; facial skin cobalt blue; legs, dusky yellowish. Size rather larger than that of *Lophophorus Impeyanus.*

The feathers of the head are exceedingly short and crisp. The living bird from which this description was taken, was brought down by some shikarees from the hills above Suddya. When I first saw it, the feathers of its head were not in good condition, and I thought that the absence of the crest might have been accidental. It has, however, moulted since I first saw it, and there is not the smallest appearance of a crest; indeed the feathers are particularly short, crisp, and curved in different directions. The other two species of Monal are both well crested, though the crest is of a different form in the new *Lophophorus L'Huysii* from that of the long known Impeyan pheasant.

Cypselus tectorum, Jerdon.

The thatch palm-swift.

Above glossy greenish brown, paler and less glossed below, somewhat albescent on chin and throat; quills and tail darker, brown-black.

Length about 4¼ inches; wing, 4½; tail 2⅛.

This Swift is quite of the type *of Cyps. batassiensis*, but a much darker coloured bird, and with a shorter tail. I first saw it in Major Godwin-Austen's collection of birds made in the hills of North Cachar, and that gentleman permitted me to describe it. True to its type, it builds on palm leaves, but on such as form the roofs of the Nagas in those hills. Major Godwin-Austen obtained the nest and egg, being very similar to those of *batassiensis.*

On coming to Calcutta, I found that the same species had been procured by one of the Museum collectors from the Garro Hills, and since that Major Godwin-Austen has written to me "*Cypselus tectorum* found again on the roofs of Garro huts."

Then why absent in the intermediate range of the Khasi and Jaintia hills? Simply, I presume, because these races, being a little more civilized, do not thatch their huts with palm leaves.

The other papers on the list were postponed till next meeting on account of the late hour at which the meeting terminated.

LIBARY.

The following books have been added to the Library since the Meeting held in January.

Presentations.

*** Donors in capitals.

Bulletin de la Société de Géographie, Oct. to Nov., 1869 :—THE GEOGRAPHICAL SOCIETY OF PARIS.

The Quarterly Journal of the Geological Society, Nov., 1869 :—THE GEOLOGICAL SOCIETY OF LONDON.

Proceedings of the Academy of Natural Science of Philadelphia, Nos. 1 to 6, 1869 :—THE ACADEMY.

Journal of the Academy of Natural Science of Philadelphia, N. S., Vol. VI, part III :—THE SAME.

Report of the Executive Committee of the Memorial to the late H. Falconer :—THE COMMITTEE.

Discours d' ouverture du 6th Decr. 1869, par M. Garcin de Tassy : —THE AUTHOR.

Rámáyana, Vol. I, No. 10, edited by Pandita Hemachandra :—THE EDITOR.

Memoirs of the Geological Survey of India, Vol, VII, part I :—THE GEOLOGICAL SURVEY OF INDIA.

Annales Musei Botanici Batavii, edidit F. A. Guil. Miquel. Tom. IV, Fasc. 1 to 5 :—THE BATAVAIN SOCIETY.

Selections from the Records of the Government of India, Home Department, No. 71 :—THE BENGAL OFFICE.

Report on the Administration of the Customs Department in the Bengal Presidency for 1868-69 :—THE SAME.

Purchase.

Zenker's Handwörterbuch, Heft xiv.—Comptes Rendus, Nos. 18 and19:—Revue et Magasin de Zoologie, No. 10.—American Journal of Science No. 143.—Revue des Deux Mondes, 15th Nov.—Ain i Akbari :—Tarikh Badaoni.—Khazinat-ul-Asfiú.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR MARCH, 1870.

The monthly Meeting of the Society was held on Wednesday, the 2nd instant, at 9 o'clock P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last monthly Meeting were read and confirmed.

The receipt of the following presentations was announced :—

1. From Dr. Mohendralála Sarkára, a copy of Calcutta Journal of Medicine, Vol. II, Nos. 9 and 10.

2. From Colonel J. E. Gastrell, a very fine specimen of *Macrocheira Kaempferi*, from Japan, and a specimen of a large *Ostrea*, also from Japan.

3. From Bábu Yatíndramohana Thákura, a copy of Sangita Sára.

The following gentlemen are candidates for ballot at the next Meeting :—

Capt. R. D. Osborn, B. Staff Corps, proposed by Dr. F. Stoliczka, seconded by Lt.-Col. H. Hyde.

R. Stewart, Esq., proposed by Lt.-Col. Hyde, seconded by Dr. Stoliczka.

Benjamin Smith Lyman, Esq., proposed by Dr. Stoliczka, seconded by Mr. H. Blochmann.

Dr. T. W. Innis, C. B., proposed by Lt.-Col. H. Hyde, seconded by H. F. Blanford, Esq.,

Col. A. D. Dickens, C. B., proposed by Lt.-Col. H. Hyde, seconded by the Hon'ble J. B. Phear.

The following gentlemen have intimated their desire to withdraw from the Society :—

R. J. Richardson, Esq., B. C. S., Dr. J. M. Coates, Bábu Abhayacharana Mallika, Dr. R. H. Curran.

The following letter received from Col. G. H. Saxton, through Col. H. Thuillier, relating to a recent fall of an Aerolite near Nidigullam (Vizagapatam district), was read :

Camp Parvatypore, Vizagapatam District, January 27th, 1870.

I have just seen a very interesting specimen of an Aerolite, which fell near this, last Sunday, 23rd January, 1870. I have made an official application to the Madras Government, asking it to authorize its being given over to me for the purpose of being sent to our Calcutta Museum. In the mean time, I enclose a rough sketch, shewing the size, shape and striated markings of it. One end is broad, and quite smooth, with a polish. The whole appears pure iron or steel. The striæ are all obliquely in the direction of its elongation, and are very pretty. The length is about 6½ inches, the breadth between 4 and 5, and the thickness varies considerably; on the heel or sole-like end, which is polished, the surface is broad and flat, 2 or 3 inches, it then becomes thinner, but irregularly, and the other end is almost sharp; but I hope to have the pleasure of sending the specimen itself.

It penetrated about 20 inches into the ground where it fell. Now for a description, from hearsay, of the circumstances attending the fall. The local European officer who has charge of it tells me, that he did not see the meteor, but he heard the noise, which he likens to that caused by a house falling down. Others describe the noise more as that of an explosion, with subsequent prolonged rumblings. Those who saw the meteor, describe it as being very large and beautiful, and as bursting with increased brilliance at the time of the explosion. All agree that it passed over this place from the north to south, and the village where it fell is just about 6 miles almost due south from this. It is given on the Atlas sheet, No. 108 at Lat. 18-41-20 and Long. 83-28-30 as "Nidigullam." At this village itself the people were greatly alarmed. Some received violent shocks, and a man near to whom it fell, was stunned. This I hear from the Sub-Magistrate who, with others from this place, went to the village, and took possession

of the Aerolite, which the villagers had carried to their temple and under much alarm were making púja to. There is not the least appearance of any stony substance mixed with what seems to be well purified iron. It weighs 407 tolas, or about 10 pounds.

Dr. Stoliczka observed that should this Aerolite really prove to be iron, it would be the first from India, but the strong striation on the crust seems rather to indicate that the specimen is a stone, though probably containing a very large percentage of iron, as does for instance the Mooltan Aerolite, which fell some short time ago.

From C. A. Elliott, Esq., C. S., Futtehgurh, a letter referring to the translation of the Hindí Epic, called the Alkhund.—Mr. Elliott says that he has translated about two-thirds of the work, and that he has prepared an abstract of it for the Society's Journal, which he hopes soon to forward to the Society. The work itself contains about 20,000 lines, though there is a great deal of repetition in it. The text of the poem, Mr. Elliott says, sadly needs recension, and a local printer has expressed his willingness to print the work from Mr. Elliott's MS.

The Council reported that they have elected the following gentlemen to serve in the several sub-Committees :—

SUB-COMMITTEES FOR 1870.

FINANCE.

Dr. S. B. Partridge.
H. F. Blanford, Esq.

LIBRARY.

Dr. T. Oldham.
W. S. Atkinson, Esq.
Bábu Rájendralála Mitra.
Dr. J. Anderson.
G. Nevill, Esq.
J. Wood Mason, Esq.
C. H. Tawney, Esq.
V. Ball, Esq,

PHILOLOGY, ARCHÆOLOGY, &c.

E. C. Bayley, Esq.
The Rev. J. Long.

C. H. Tawney, Esq.
Bábu Rájendralála Mitra.
Moulavie Abdul Luteef Khan Bahádur.
Bábu Yátindramohana Thakura.
The Rev. K. M. Banerjee.
Dr. Mohendralála Sarkára.

NATURAL HISTORY, INCLUDING PHYSICAL SCIENCE.

Dr. T. Oldham.
Dr. J. Fayrer, C. S. I.
H. F. Blanford, Esq.
Dr. S. B. Partridge.
W. S. Atkinson, Esq.
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THE COMMITTEE OF PAPERS.

The Members of the Council.

The following papers were read:

I.—NOTES ON INDIAN HERPETOLOGY,—*by Dr.* T. C. Jerdon.

Rec. 1*st February*, 1870.

As some time will probably elapse before my work on the Reptiles of India can be published, I think it advisable to lay before the Society a short account of some recent discoveries in Indian Herpetology, a few of which are the result of my own researches, and very many from the most successful labours of Major Beddome, Conservator of Forests in Madras.

Many years ago, in the Society's Journal for 1853, Vol. XXII, p. 462 and 522, I gave a summary of the Reptiles of Southern India. After the first part had been written, I was suddenly removed to a distant station, and was unable to take my type specimens with me, and they were unfortunately never again seen by me, having been lost or destroyed; but, to complete the paper, I gave a very brief notice of the *Ophidia* and *Batrachia*, naming several new species of the former, and many of the latter order. Most of the *Ophidians* have been found again, but till recently hardly any of the *Batrachians;* and it was a source of great satisfaction to me when Major Beddome, who had previously chiefly confined his attentions to *Ophidians*, partly at my earnest solicitations, directed his researches to *Lizards* and *Batrachians;* and he has re-discovered most of my supposed new species noticed in the Journal, and has also found very many new *Saurians* and a few *Batrachians*. Science owes him a large debt of gratitude for successfully working out the Reptile Fauna of Southern India; and I, on my own part, beg him to accept my best thanks for giving me the opportunity of making known accurately the species collected by myself a quarter of a century ago.

I propose in my work on the Reptiles of India to include those of Assam, the Khasi hills, Cachar, Sylhet, Tipperah, and Chittagong, stopping however at Arracan which, with the rest of the Burmese provinces, has already been given by Mr. Theobald in his Catalogue of Burmese Reptiles, and who, I am glad to say, is making many additions to his former collections, and will, I hope, duly publish the result in a separate form. I shall also include the Reptiles of Ceylon, and this addition to the extent of my Indian province will, I hope, make the work of much greater value.*

In the present notice I shall take Dr. Günther's "*Reptiles* of British India" as the ground work of my observations.—

I have hardly any new Chelonian Reptiles to add to the Indian Fauna, but have to record three not hitherto known in our province as just defined.—*Manouria emys* is not uncommon in the hills of

* I propose, if my health will permit me, to give a second edition of the "Birds and Mammals" of India, with the addition of species from the districts noted above, making them of greater use to the Indian naturalist.

North Cachar, where fine and large specimens were obtained by Major Godwin-Austen, and from enquiries I made, it extends still further west to the Jaintia hills. This gentleman has presented some specimens to the Indian Museum, one of which measures 22 inches. This Tortoise, hitherto recorded from Burma, differs from all other forms in the pectoral plates not meeting in the centre of the plastrum.

The same zealous naturalist also obtained a few shells of what appears to be *Pyxidea Mouhotii*, figured by Dr. Günther, and recorded as from Siam. He has presented specimens of this also to the Indian Museum.

Cyclemys dentata of Bell, the prior name of which appears to be *Emys dhor*, Gray* per Buchanan Hamilton's MS. name, and which was afterwards called *Emys dentata* by Gray in Hardwicke's Ill. Ind. Zoology, must be added to the Indian Fauna. It is by no means rare in the upper provinces. I first saw it at Delhi, where it was called *Dhád*, (evidently a form of the same word as B. Hamilton's), and afterwards at other places.

Günther has figured with Gray's MS. name, a Tortoise as *Cyclemys Oldhami* from Burmah. Theobald says that the very specimen figured was taken by himself, and is merely an old specimen of *orbiculata*. It was 8 inches long, and the figure in Günther shows a more oval form than the largest specimen in the Indian Museum, and the vertebral plates differ slightly.—I have quite recently obtained in the Sylhet district a very fine specimen of a *Cyclemys* which is of a still more elongated form, the sides being almost parallel, and, though differing in some parts, much more resembles Günther's figure than any specimens of true *orbiculata*, the name of which, as given by Bell, announces its very rounded form. This specimen is 15¾ inches long on a straight line, and 10½ broad, by about 5½ in height. It is of an uniform blackish colour above and below.

It differs from Günther's figure in being a more elongated oval form, but agrees very nearly with the description, with the following exceptions. The first two of the middle vertebral plates are dis-

* Described and figured in Gray's Synops. Rept, p. 20, pl. 8 and 9. A work not in Calcutta, I believe.

tinctly longer than broad, whilst Günther says "the three middle vertebral plates as *long* as *broad*," which applies exactly only to the third in the series. The postgulars are shorter, the suture between them not being nearly so long as the postgulars; the pectorals are not nearly so long as the abdominals, and the suture between them is not so much arched as in Günther's figure; the preanals are little shorter than the abdominals; the anals are rather longer than broad, and bluntly pointed behind, whilst in two specimens noted by Dr. Günther, they are as broad as long in one, and broader in the other. On the whole I do not consider that the differences here noticed suffice for specific separation from *C. Oldhami* as described by Günther, but the whole aspect and structure of the shell appears to point out a difference from *C. dhor* or *C. orbiculata*. However, till young specimens of various ages from the same localities are obtained, no satisfactory conclusion can be arrived at. Dr. Günther entirely ignores *C. dhor*, or *orbiculata*, as a species of British India, and therefore does not point out the differences from that species which his adoption of Gray's MS. name of *Oldhami* would imply him to believe in.

The margin of *Geoemyda carinata*, Blyth, is entire behind. The type specimen so completely resembles the figure of *Emys Belangeri*, Lesson, figured in Bélang.'s voyage (Rept. pl. 1), that I am constrained to believe them identical. This figure has been hitherto usually assigned as a synonym of *Emys trijuga*; the original was said to have been taken near Calcutta, which Blyth doubted, never having seen that species in lower Bengal, though it abounds in Southern India and Burma. The figure, if intended for *E. trijuga*, is certainly, as Günther remarks, *not good*; but on the contrary it is a very fair representation of Blyth's species, and as such I shall accordingly consider it, and note in my Reptiles of India.

Pangshura Sylhetensis, n. sp.

I lately procured from the stream that runs from the Terria Ghat at the foot of the Khasi hills several specimens of a new tortoise closely resembling *P. tecta*, but differing in the following points. The posterior margin of the shell is very strongly serrated, this effect being added to by a division of the hinder marginal plates;

the last vertebral plate too is much narrower posteriorly, being pointed behind in the largest specimen; the lateral suture of this plate is continuous with the suture dividing the penultimate marginal plate from the one next above it, whilst in typical *tecta* the lateral margin joins the centre of the penultimate plate. The first two vertebral plates are less strongly ridged. The 4th vertebral does not appear to differ in shape from that of *tecta*. The plastrum also does not differ appreciably from that of *tecta*, except that in all plates the dark spots are of greater extent.

The differences noted above are constant in specimens of the following dimensions: The largest has the shell 7¾ inch. long by 5⅞; the next 6 by 4½, and the smallest 3¾ by 3. Had I only had one specimen, I should have hesitated at making a distinction, but with three of such different ages, I am inclined to think there is more than a casual variety.

Among the Monitor Lizards, (*Varanidæ*) *Psammosaurus scincus*, Merr., not recorded by Günther among the Reptiles of India, is given by Theobald in his Cat. Rept. Museum Asiat. Soc., from the Punjab, Salt Range. I found it very common in the N. W. P. and the Punjab, in the latter country indeed more common than *Varanus dracæna*. I also found it common at Delhi, Umballa, Lahore and other parts of the Punjab. It has recently been described by Carlleyle in the Journal of the Society, Vol. XXXVIII, under the name of *Varanus ornatus*, where a good account of the fresh coloration is given. Some time before the notice, I presented a young specimen in spirits to the Museum from Umballa.*

I found *Varanus lunatus* also in several of the Museums up-country, to wit Delhi and Lahore; and Carlleyle met it also in the vicinity of Agra.

Of the *Lacertidæ* Günther records but three inhabiting our province, of two of which he had not seen specimens, and of the third only one specimen exists in the British Museum. This lizard, named by Günther *Acanthodactylus Cantoris*, I found extremely abundant in Hurriana, in the country about

* I find by a note in J. A. S.'s Vol. XXIV, p. 715 that Blyth was the first to recognise this African Reptile from Theobald's specimen, and he moreover states that he has seen other specimens from the other provinces.

Hissar, Sirsa, and extending, though more sparingly, to the foot of the Alpine Punjab.* I got it at Bheirber in the bed of the river there, and within a very few miles of the head quarters of another true Lizard, cogeneric with *Ophiops Jerdoni*, Blyth. Theobald, on examining the hitherto unique specimen of this curious reptile, found that the nostrils were not as in *Ophiops* between two nasals followed by 3 small post-nasals, but in one nasal followed by two post-nasals, and he accordingly placed it under the genus *Tropidosaura*. But this last group has distinct eyelids, being a sub-genus of *Lacerta*, whilst *Ophiops Jerdoni* and this new species want them entirely. As the presence or otherwise of eyelids is, I consider, a more important character than the position of the nasals, I shall (in conformity with a suggestion of Dr. Stoliczka, who has been good enough to examine these specimens and other doubtful species of mine) call them *Pseudophiops*, and the new species found by me in the Alpine Punjab I shall call *Pseudophiops Theobaldi*. It is very common on the ascent of the first range of hills beyond Bheirber, in rocks and bare ground; and I found one specimen on the banks of the river close to where I got *Acanthodactylus Cantoris*, both frequenting the boulders in the dry bed of the river. It closely resembles *P. Jerdoni*, but differs in its more elongate and depressed head; the posterior frontals are separated by a small intercalated linear scale; the 3rd chin-shield forms a suture with its fellow, whilst in *Jerdoni* it is separated by small scales; and there are several other points of difference which will be noted more particularly in the "Reptiles of India." The colour is brown above, with a narrow pale yellowish line on each side from the eyebrow, lost on the tail; and another wider from below the eye through the ear to the thigh; between these stripes is a series of irregular black spots, which are slightly continued both above the upper and below the lower line; lower parts pearly white; tail pale brown with a reddish tinge, most distinct in young specimens. Length of one 3 inches, the tail being $1\frac{3}{4}$.

Major Beddome has recently found *Ps. Jerdoni* on the banks of the Toombuddra, and another place in Southern India. My first type specimen, now in the Museum, was got by me at Mhow in Central

* The young are very beautifully striped longitudinally.

India. At Saugor, also in Central India, I got several small specimens of a Lizard of which I have a sketch with some details which, in spite of its geographical position, appears to resemble *Ps. Theobaldi* more closely than *Jerdoni*; but without specimens this fact cannot be satisfactorily settled. It is found on all the rocky hills about Saugor, but rather rare.

Major Beddome has also quite recently sent me one specimen of yet another species of this genus, obtained by him on the Bremnagherry hills, at an elevation of 5000 feet. It differs from both the previous species in having a pair of small anterior frontals, the other two having one large one; the head is still shorter than in *Jerdoni* and more triangular, the tail is distinctly more rounded at the base than in either of the other two species, in which it is somewhat depressed. The coloration is very similar to that of the two others. I shall call this species *Pseudophiops Beddomei.*

Cabrita Leschenaultii, D. and B., recorded by me in my Catalogue from the banks of the Cavery and neighbouring parts, has been recently procured in these localities by Major Beddome, and he has also obtained one specimen of a second *Cabrita* which he has named *C. Jerdoni.* It is from the same district as the other, but differs from the typical species in several important points, as noted in the description of the species in the Madras Medical Journal for 1870, No. I, p. 34 &c.

I find that *Tachydromus sex-lineatus* extends into Assam and the Khasi hills, where by no means rare about Shillong. Günther has not seen it from a locality north of Rangoon.

Dr. Stoliczka informed me of a second species of *Tachydromus* which was sent by Mr. H. L. Haughton to the Museum from Goalpara in Assam. It differs from the last and indeed from all the species cited by Günther, except *T. japonicus*, in having 4 pairs of chin-shields instead of 3, but it has 6 dorsal series of scales, and 10 ventral series; all of them keeled. Its coloration is very similar to that of *T. sex-lineatus*, but the glistering pale green longitudinal stripe is broader, and the dark line below narrower. I shall with the concurrence of the Curator name this *Tachydromus Haughtonianus.* Length 8½ inches, of which the tail measures 5¾.

Of the *Scincidæ* I have ascertained by numerous specimens from Darjeeling, the Sutlej valley and Kashmir, that Günther's

Eumeces Himalayanus is identical with Blyth's *Mocoa Sikimensis*, which has thus a wider distribution, for which Günther's name would have been more appropriate, than the local but prior name of Blyth.

Theobald has described (Cat. Rep. Asiat. Mus. p. 25) a curious Scink as *Pleistodon (Eumeces) scutatus*, the locality of which was unknown. I procured one specimen of this interesting form in the Alpine Punjab, on the route from Jhelum into Kashmir.

Major Beddome has sent me specimens of a form of *Euprepes* which comes under Günther's first section *Ateuchosaurus*, distinguished among other points by the two-keeled scales. He names this *Ateuchosaurus Travancorieus*, having first obtained it in the Travancore hills, but has since found it in Malabar, and S. Canara, though rare. I procured it many years ago in Malabar, and noticed it at page 479 of Vol. XXII of the Journal, without describing it, as the specimen was unfortunately lost, but I took a sketch of it which I still possess. It is a small species, (vide Mad. Med. Journ. 1870, No. 1, p. 33).

The same indefatigable naturalist has also recently procured *Euprepes trilineatus*, Gray, only hitherto obtained by myself from one locality, and a second very closely allied species which I have called *Euprepes Beddomei*. It differs from *trilineatus* in its shorter, much more elevated head, with correspondingly shorter muzzle, in the upper labial shields posterior to the eye being larger and higher, in the median occipital plate being pointed instead of truncated behind, in the larger number of body scales, the smaller size of the spines, bordering the anterior edge of the ear, and in having 5 instead of 3 pale bands which extend well on to the base of the tail.

The imperfect specimen of *Tiliqua trivittata*, Gray, of Central India, presented by myself, still exists in the Museum here, and is evidently a distinct species from *T. rufescens* (or *carinata*, Schneid.) of which it is classed as a variety by Günther, differing, as Theobald, remarked by its 5-keeled scales. Its head also is shorter and higher, and there are some other points of difference.

Neither Major Beddome nor myself have found an identified *Lygosoma Dussumierii* of D. and B., from the Malabar Coast, which

Günther erroneously identifies with *Eumeces indicus*, a large species which I obtained in warm valleys in Sikim.

Several scinks obtained by Dr. Stoliczka within our limits, and described by Steindachner, have to be added to our Reptile Fauna, viz. *Euprepes Petersii* from Chamba, *Mocoa Blythii* from the Wangur valley, and *Mocoa Stoliczkana* from Spiti, &c.

I found the beautiful *Pseudopus gracilis* very common at Shillong. The spots on the body described as black or dusky, are in the living animal a beautiful and shining turquoise blue, quite similar to those of the European species.

I have ascertained that the very curious *Sphenocephalus tridactylus* of Blyth, stated to be from Afghanistan, is very common in the desert and sandy parts of the Southern and Western Punjab, extending quite to the borders of Sindh, and probably throughout the latter country also. Indeed, I should doubt its occurrence at all in the elevated region of Afghanistan. It is known in those parts of the Punjab which it frequents as the *Rig Mâhi* i. e. Sand-fish, the same name by which the *Scincus officinalis* is known by and sold in Indian bazars, both being esteemed aphrodisiac. Its habits when alive fully bear out Mr. Blyth's conjecture on this point; it dives into the sand with great ease and celerity.

Major Beddome lately detected a very curious lizard of this family *Sepsidæ* in the Museum at Madras, which he described as *Sphenocephalus? pentadactylus.* (Madr. Jour. Med. So. 1870, No. 1, p. 30). It is stated to be from the banks of a river in Malabar.

Among the Geckos, Major Beddome has discovered several new *Hemidactyli* and *Gymnodactyli*, besides my *G. Malabaricus* which he has quite recently sent me from the foot of one of the ghats leading from Lognaad into lower Malabar, where also I procured my specimens. *Hemidactylus aurantiacus*, and *H. reticulatus* are described (l. cit.) by Major Beddome from Shevaroys and Colegal respectively.

I have recently got *Hemidactylus triedrus* from Bandelkund sent me by Colonel Tiornan to whom I had written to endeavour to procure the specimens of an Agamoid lizard hereafter to be noticed.

The *Gymnodactyli* are named by Maj. Beddome respectively *G. marmoratus*, *gracilis Wynaadensis* and *ornatus*, and I find from my

drawings that I had previously found *Wynaadensis* in the same district. These small *Gymnodactyli* resemble each other very closely, and possibly one of them may on comparison be found identical with *G. Jerdoni*, described by Theobald in his catalogue. Major B. has ascertained that *G. indicus*, Gray, described from specimens sent home by myself has generally an unequal number of pores on one side than on the other side. A very curious new form has been described by Beddome, from the Tripatty hills in North Arcot, as *Calodactylus aureus*. The Gecko has the ends of the toes dilated into large disks, (vide Madras Med. Journ. 1870, No. 1, p. 30, pl. II).

My *G. littoralis* has hitherto not occurred to Major Beddome, or any of his collectors, but, I have little doubt, will yet reward their labours. It is very distinct from any of the other small Geckos, having the basal plates of the toes much dilated,—especially the most anterior one which is double the size of the others and somewhat nail-shaped; beyond this the apical portion of the phalanges are composed of small narrow plates all terminating in nails. The subcaudal scutæ are large.

I have recently obtained what appears to be a fine new species of *Pentadactylus* of Günther from the Khasi hills. This I shall call *P. Khasiensis*. It has numerous larger rounded tubercles mixed with the very small scales of the back. The nostrils are situated between the rostral, 1st labial and a supranasal, and are followed by several small scales. There are 10 upper labials, the last long and somewhat undulating on its upper edge, and 11 lower labials. The body above is covered with about three series of elongated spots, which become two at base of tail, and finally unite into one. It is a large species.

I possess one or two specimens of *Nycteridium Schneideri* from the Khasi hills; rare apparently so far north, though it is mentioned by Günther from Assam and Bengal. The only other novelty to mention in this family is a species of *Eublepharis* which appears distinct from both *Hardwikii* and *macularius*, a species not in Günther, but recorded in Theobald's Catologue. Unfortunately it is only a young specimen and imperfect. I got it in Hurriana and shall provisionally call it *Eublepharis fasciatus*. It has the larger tubercles of the back larger and finer than in *macularius*, and

less close and narrower than in *Hardwickii.* It is beautifully banded with white, having one nuchal band as in the last named species, but 3 dorsal ones, besides one on the root of the tail. Its head and body are 1¾ inches long, but the tail is imperfect.

Of the *Agamidæ* I have obtained two apparently new species of *Japalura,* one from Sikkim, the other from the Khasi hills, which I have named respectively *microlepis* and *planidorsata.* The former, of which I only obtained one specimen, differs conspicuously from *variegata,* which is also extremely common in Darjeeling, by the much smaller scales being more sparingly mixed with large ones. The back is reddish, abruptly separated from the greenish color of the sides by a series of somewhat raised scales; the dorsal crest is very low and continued to the base of the tail. The head and body is 2⅝ inches; the tail (imperfect) 2½.

The other new species is a very remarkable one, lately procured in the Khasi hills; the back is very flat, in which it resembles the last; it has no nuchal nor dorsal crest, but a double series of very slightly enlarged keeled scales separated by only one row of smaller scales, but on the neck by four or five; and there are several series of angularly bent larger scales, the angles directed backwards. The superciliary scales are strongly keeled, and there are several scales above the tympanum enlarged and prominent. It has a strong similarity in the arrangement of the scales to *Japalura Swinhonis* from China.

One specimen from head and body nearly 2, tail about 3¼ inches. I found two specimens only. They are of a dull yellowish colour with dusky cross bands, and the sides mottled dusky.

Peters* has two sub-genera, which with *Japalura* should perhaps form sub-divisions of *Otocryptis,* all agreeing in the concealed tympanum. He describes a *Ptycolæmus gularis* from Calcutta (bought).

The smaller race of *Sitana,* being the one procured at Pondicherry and the south of India, must retain Guerin's name of *Sitana ponticeriana;* and the Deccan species, being the larger of the two, cannot well stand as *S. minor,* and will require a new name, for which I propose *Deccanensis,* that part of India being its head quarters.

* Monat. Berl. Akad., 1864, p. 386.

I have also got one specimen of a new *Oreocalotes* from the valley of the Sutlej near Kotegurh, which I call *Oreocalotes major*. I have not seen a specimen nor a drawing of *Oreocalotes minor* to compare it with, but it differs from the description of that species by its smaller and much more numerous body scales, by the abdominal scales being conspicuously larger than those of the sides and in its mode of coloration. The general colour is purplish grey above, with some black cross bands on the head, which become arrow shaped on the trunk and the root of the tail; a blackish band runs from behind the eye along the side of the neck; the sides of the body are green, mixed with black, (the black scales being small and smooth, and the green ones large and keeled); limbs and tail with dusky cross bands and rings; the throat whitish, with a few black specks, and a very small light purple gular lap; belly tawny white with brown specks. Length 9¼ inches; the tail being rather more than 6.

Beddome has recently got specimens of *Calotes Elliotti*, the *C. Rouxi* of my catalogue from the western forests.

I have got five specimens of *Calotes Maria* from the Khasi hills, and of a second species which is apparently Blyth's *Calotes platyceps*. This differs conspicuously from *C. Maria* by the fewer scales of the body, the very much larger scales of the throat, the lower sincipital crests, the inferior of which is situate immediately above the orbit, and not at a distance as in *Maria*. Both are beautifully green with more or less various marks. *C. maria*, being much the largest species, some specimens measuring 18 inches, of which the tail is above 13. *C. platyceps* scarcely exceeds 12 or 13 inches, the tail being 9.

I much doubt the occurrence of *C. Maria* in the North Western Himalayas, whence recorded by Günther on the authority of one of the Schlagintweits; but, as I will have frequent occasions to note in my "Reptiles of India," several of the habitats of the Reptiles given by the brothers Schlagintweit appear to be erroneous, probably from displacements of labels.

Oriotiaris Elliotti, Günther, is clearly *Calotes tricarinatus*, Blyth, which that naturalist in a MS. copy of his paper "on some Reptiles" &c., forwarded to me, has marked *new genus*. It is rather uncommon about Darjeeling, and never grows to a large size. Günther strangely puts its with a query as *Calotes Maria*.

One of the type specimens of my *Calotes nemoricola* still exists, though much injured, in the Museum here, and it is very distinct from *C. gigas*, also from the same locality.

The only Agamoid lizard noted in my Catalogue is the one described by Blyth from specimens obtained by myself at Saugor in Central India as *Brachysaura ornata*. All my endeavours to procure specimens for a more minute examination of this very curious form have hitherto failed. From some remarks made to me by Colonel Tytler, I was led to believe that Bundelkund would prove to be the head quarters of this Agamoid, and this indeed is highly probable, but Colonel Tiornan to whom I applied has not yet succeeded in getting me specimens. Till some one with sufficient scientific proclivities examines those districts, we must rest satisfied with our incomplete information. From a rough sketch of the Lizard and some of its details, I can add to the notes furnished by Blyth, the following scraps of its structure.—Scales rather large, in distinct transverse bands, not directed so obliquely upwards as in *Calotes*, not quite so straight as in *Salea*, nostrils at some distance from the snout in a large scale ; a distant shoulder fold ; one large tuberculate scale in the middle of the head, surrounded by smaller 4—6 sided ones ; a ridge of strong scales protecting the eye. Length of one about 6 inches, the tail being not quite 3.

To the section of Rock lizards, I have to add a species of *Trapelus*, also from the Alpine Punjab, quite distinct from Günther's *Trapelus megalonyx*. The central shields of the head, 2 or 3 series, are large ; the upper lip is surrounded by 31-32, instead of 39 shields, there are no conspicuously large shields on back and sides ; the scales on the upper base of the tail conspicuously larger than those on the under side ; the foreleg does not reach the hip-joint ; the nails are sub-equal and all very much smaller than the thumb ; coloration yellowish brown, with a series of dark brown oblique bands interrupted on the median line and on the sides, below pale yellowish. Length of specimen 7 inches, the tail being 4½.

Agama agilis, Oliv., an African Lizard, was added to the peninsular Fauna by Theobald, who obtained it in the Panjab Salt Range. I have never observed it.

I am not quite satisfied of the distinctness of *Stellio indicus* and *Laudakia tuberculata*, or rather I am inclined to class them with Günther as one, but unfortunately I did not secure many specimens (for comparison) from different localities.

Steindachner's *Stellio himalayanus*, brought by Stoliczka from Ladak and Tibet, is quite distinct, but hardly enters our province.

From information, recently sent me by Major Beddome, the beautiful *Liolepis guttata* must be added to the Peninsular Fauna. I sent him a specimen procured by myself at Thayetmyo, and he in reply wrote back that he had recently got this Lizard from Canara, quite identical with my Burmese specimen. This is a highly interesting addition to our Peninsular Reptile Fauna.

In my Reptiles of Sth. India, under the head of *Acanthodactylus Nilgheriensis*, I state that I have reasons for believing that that Lizard, and the Chameleon named in my Catalogue as *C. pumilus* from the Nilgherries, on the authority of Walter Elliot, were most probably Cape species that had somehow got mixed with his Indian specimens.

Dr. Stoliczka has pointed out (Proceedings Asiat. Soc. for Jany. 1870, p. 2,) that the ridge on the upper part of the head of the Indian *Ch. vulgaris* are stronger than in the African form, and that there are no lateral longitudinal bands on the body. These and some other differences are, by no means, opposed to the once current opinion, that the Indian form is specifically distinct from the African, the former having been called *Ch. Ceylonicus*, Laur.

Among *Ophidian* Reptiles I have fewer novelties to point out than in the *Saurian* or *Batrachian* Reptiles.

A considerable number of new species of the curious earth Snakes, chiefly of the families of *Uropeltidæ*, have been added by Major Beddome. The remarkable *Xenopeltis unicolor* has been obtained in Southern India, as recorded by Theobald. Amidst the multitude of species of the families now known to science, I am not certain to which my three species of *Cylindrophis* can be referred, but with regard to my placing them in that genus, I have the authority of Dr. Cantor (to whom I referred several of my doubtful species), and whose remarks I now keep in possession.

Under the head of *Oligodon*, I have only to remark that I believe the figure of Russell 1, pl. 19, which has been called *Col. tæniolotus*, but generally referred to the young of *Tripidonotus stolatus*, refers to a species of *Oligodon*. The general aspect, short head, markings, short tail and few sub-caudal scuta are all marks of that group, and the presence of palatine teeth recorded by Russell is not a certain negative sign, for I see that several of this group have lately been shown to possess them. Whether this snake can be referred to one of the lately described species or not, it must (in case my observations are verified) stand as *Oligodon tæniolatum*.

I lately procured two species of *Cyclophis* in the Khasi hills. One of them appears to be *Cyclophis frænatus* of Günther, described from Afghanistan and Mesopotamia. The only difference I can detect in the description is, that in my specimen, the temporals are 2 + 2, the first temporal having apparently a small one cut out of its anterior edge. Length of my specimen 14½, the tail being 4⅛.

A specimen* in the Museum (No. 81½), marked *Dipsas monticola*, Cantor apud Blyth, appears to be the same species; a second small black mark begins behind and below the gape, continued as a line of specks on two or three lowest series of scales, and finally just forming a dark edging above and below the last row of long scales, and is lost on the posterior part of body; below pale yellow.

The other species is a much smaller snake, a female, only 7¾ inches long, having 5 large eggs in her $\frac{3}{8} \times \frac{3}{16}$ of an inch. The tail was 1¼. The single large nasal is posteriorly obliquely slit up to the edge, one preocular and two postoculars; the supraciliaries small and occipitals large; 15 scales; ventral scuta 127 to 135, and 33 to 38 sub-caudals. The color is brown, with a pale lateral band from the eye extending to the tip of the tail; below this a mottled brown and yellowish band; chin, throat and anterior part of neck yellow, the rest of the lower parts red. Upper labials 6, normally, the last three sub-equal in size, and not as in *frænatus* where the 6th is as large as the 4th or 5th together; temporals 1 + 1. I propose for this one the name of *Cyclophis rubriventer*.

I obtained one small specimen of a snake in lower hills of the

* This is to all appearance the type of Blyth's *D. monticola*, Cant. [EDIT.]

North Western Himalayas, which from its long snout ought to be placed among the *Dryophidæ;* but the scales are not lengthened, it has the coloration of a young *Compsosoma*, and the tail is short, with few sub-caudals. The specimen unfortunately is not in very good order, and I do not like to name it at present. The head is somewhat depressed, with a long-pointed snout, very distinct from the neck; eye of moderate size; body not compressed; nostril much higher than broad, extending on the upper surface of the snout; anterior parietals only a little smaller than the posterior; nostril in one long nasal, faintly grooved; one loreal rather larger than high; two preoculars, the lower one touching 3 upper labials, and two postoculars; temporals 2 + 2 + 3, or the first upper one divided into two; 8 upper labials, 5th and the edge of the 6th enter orbit; 19 rows of smooth scales; 175 ventral scutæ and 44 pairs of sub-caudals. The second pair of chin shields is the largest and ridged externally. Length of specimen, 12¼ inches, the tail being 1⅝.

I obtained another very remarkable snake quite recently on the Khasi hills, which does not agree with any recorded genus (to description of which I have access), and the family to which it belongs is also doubtful. It has a blunt head, very distinct from the thin neck; long, rather compressed body, and long tail; its scales are very numerous, not imbricated (as in some of the *Homalopsidæ*), and the shields of the head are short, and do not cover the occiput, but the nostrils appear to be lateral.

I propose calling the genus after our accomplished and able Secretary in the Natural History Department, Dr. F. Stoliczka, and the species—

Stoliczkia Khasiensis.—It has two pairs of frontals, the first pair very small and from the state of the specimen rather difficult to notice; the second one very large. The rostrum is slightly injured, but the nostrils appear to be lateral, though placed rather in front, and apparently surrounded by a slightly swollen edge; the vertical is very short, broader than long; the supraorbitals rather small; one large preocular; 2 postoculars; no large temporals, small scales like those of the body immediately following the postocular; 8 upper labials, 5th and 6th entering the orbit, the last very long;

3 pairs of small chin shields ; 27 to 31 rows of small lengthened ovate tuberculated or ridged scales, increasing in size towards the ventrals, those forming the last row on either side being largest; ventral scutæ 207, anal undivided; sub-caudals 114, single. Length of specimen, 26½ inches, the tail being 7¾. Colour a dusky plumbeous above, white below.

Some of the characters of this remarkable species approximate it to the *Dendrophidæ :* its somewhat depressed head, long thin neck, compressed body, and long tail, scales increasing in size towards the ventrals &c. ; in the character of the shields of the head, and of the scales of the body, it resembles certain *Homalopsidæ*, and its short blunt head has an appearance of some of the *Amblycephalidæ*, and it has the single sub-caudals of *Cercaspis* and *Amblycephalus.* I shall not attempt now to refer it to any family, but leave that for the future.

I obtained a single example of the very rare *Xenurelaps bunguroides*, *Elaps bunguroides* of Cantor, of which only one specimen is known, the type example in the Museum at Oxford. My specimen is a rather smaller one, being 15 inches, of which the tail is 2⅓. It has 224 ventral scutæ and 44 sub-caudals, and 13 to 15 rows of scales on the body. It only differs from Günther's description by having one white intercepted line commencing on the vertical, and extending to the throat on each side. When alive, the color of the body was a deep rich madder-brown, and the bands were yellow, paling posteriorly. The chin and throat are whitish, which passes into red, gradually deepening on the posterior part of the body and tail, and there are numerous oblong black marks on the abdominal and sub-caudal centres.

The number of anurous Batrachians noted by me in my paper formerly alluded to, from Southern India, was 28. Of these, two are doubtful, as distinct from allied species, *viz.*, *Rana nilagirica* from *R. gracilis*, my *R. agricola*, and *Pyxicephalus fodiens* from *P. brevis*, my *P. pluvialis*. Of the other supposed new species named there, three have been described by Günther under different names, and Major Beddome and myself have obtained these, and all the other supposed new species, with two exceptions, which I doubt not will yet

be procured by Major Beddome. This gentleman has also found at least six new species not observed by myself.

I have also obtained at Darjeeling and the Khasi hills at least 6 new species. I can only enumerate these here, but will endeavour to give recognizable characters in another paper.

Rana crassa of my Catalogue has been noticed by Theobald, and is distinct from *Rana Kuhlii* of Ceylon which it much resembles.

I have obtained one fine new *Rana* at Darjeeling, somewhat allied to *R. Liebigii*, but distinguished from it by its more fully webbed feet. I call this *Rana Sikimensis*.

Beddome has got one new very handsomely marked true frog from Southern India, which he names *Rana vittata*. He has also procured my *Rana flavescens* and *R. curtipes*, both which are *Hylorana*, and quite recently *Hylorana Malabarica*, sufficiently distinct from Günther's *H. temporalis* of Ceylon, as indeed that naturalist suspected, though he had not seen *Malabarica*. My *Hylorana curtipes* is a most distinct form from *Malabarica*, and Günther must have had a very hazy idea of *Malabarica*, when he asserted, on seeing a copy of my drawing of *H. curtipes*, that it was most probably *H. Malabarica*, he himself acknowledging that he had never seen that species.

Beddome has sent another small species of *Hylorana* which he calls *H. bipunctata*.

A species of *Hylorana* common at Shillong, which, from its coloration, I considered at the time to be *erythræa*, I find on examination and comparison of specimens to be quite new, and shall from its most curious bird-like voice call it *Hylorana pipiens*. It has much larger legs than any of the other Indian *Hylorana*, and is of a much more slender habit altogether, with longer and sharper muzzle and more slender limbs.

My *Polypedates variabilis* is the same as *P. pleurostictus*, Günther, as he himself suspected. Beddome has obtained one small new species of this genus, and I have got three new ones, one very remarkable one from Sikkim, and two beautiful species from the Khasi hills. A very large green backed one is perhaps the one just mentioned by Blyth in a note as *Polyp. smaragdinus* from the Naga hills, which name I shall retain for it. The other Khasi

one is a complete link to *Rhacophorus*, having the basal portion of the fingers webbed. It is a very beautiful species which I shall call *P. annectans.*

P. smaragdinus grows to a large size, about equalling *Pol. marmoratus*, Blyth, (*Afghana*, Günther). It resembles *P. maculatus* something in habit, but is not so slender : the upper surface of the head and hind neck is slightly rough with minute tubercles, whilst the lower surface of body is perfectly smooth. The body is not nearly so long as the hind leg to the heel, whilst in *maculatus* it is as long or slightly longer. Colour, a beautiful green above, below yellow. The sides of body and thighs variegated and banded with reddish brown and black. The disks of the fingers and toes are not very large. Length of one, head and body 3½ inches, hind leg 6¼.

I obtained *Rhacophorus gigas* in Sikim and the Khasi hills, where I also obtained what appears to be the true *Rhacophoras Reinwardtii.* This is a much smaller species than *gigas*, and all my Khasi specimens have one or two deep blue spots on the sides of the body, but the dark mark on the webs of the toes is less marked, than in the figures of this species in Schlegel.

I recorded *Rhacophorus Reinwardtii* apud Dum. and Bibron, from Malabar in my Catalogue, whence it was also procured by the French collectors, but Günther has entirely ignored this genus as from Southern India. Major Beddome has sent me a specimen, on comparing which with Khasi specimens a perceptible difference is apparent. The head and body of the Malabar are indistinctly though finely tuberculated ; the habit is more slender, and there is a distinct fold of skin over the eye in *Reinwardtii*, absent in this. The head too is perhaps a trifle longer. I shall provisionally call it *Rhacophorus malabaricus.* It has the spots on the sides of the body, so conspicuous in Khasi specimens of *Reinwardtii.*

I have also got a new *Pyxicephalus* from the Khasi hills, and Beddome has sent me apparently my *P. rufescens* from the Wynaad. He also sent me small specimens of *P. breviceps*, which from their appearance during life, he, like myself, considered to form two distinct species, and which Theobald also considers to be distinct.

I obtained numerous specimens of *Xenophrys monticola*, Günther, both at Darjeeling and the Khasi hills. It has distinct vomerine teeth which Günther was unable to detect in the specimens of the British Museum. I also obtained five specimens of a large species of *Xenophrys* both in Sikim and the Khasi hills, which I propose describing as *Xenophrys gigas*.

Besides *Ixalus tinniens*, *Ixalus femoralis (glandulosa* of my Catalogue), *I. Wynaadensis*, and *I. opisthorhodus* (my *Limnodytes phyllophila)*, all of which Beddome has obtained, he has got at least three new species of this genus in Southern India; and I have got another in the Khasis.

Beddome has likewise obtained *Caloula montana* of my Catalogue, which appears perhaps to be *C. obscura* of Günther, and another species which I have not yet seen, but which, from his description, appears to be *C. guttulata* of Pegu, lately figured by Günther. He has also procured a small form allied to *Caloula*, which appears to be identical in generic form with one obtained by Dr. Stoliczka in Penang, for which he proposes the name of *Ansonia*, and which he will himself describe shortly.

I have procured *Diplopelma rubrum* from Nellore where I first obtained it, and it appears to be one of the varieties of *Diplopelma ornatum* apud Günther, as I see that many specimens were presented by myself, but I consider it perfectly distinct from *D. ornatum* of Dumeril and Bibron, with which my *D. malabaricum* is perhaps identical. I have also received from Major Beddome a specimen of *D. carnaticum* of my Catalogue, which again is quite distinct from *D. rubrum*, and appears to be generally spread. I have specimens from Assam and Central India.

II. Observations on some species of Indian birds, lately published in the Society's Journal,—by Allan O. Hume, C. B. (Abstract).

This paper contains much additional information regarding some species of birds which have been noticed in Vol. xxxviii, Pt. 2, of our Journal by Mr. W. T. Blanford. Mr. Hume has been for many years paying special attention to Indian Ornithology, and with the help of many friends has brought together one of the

finest collections of Indian birds. At the same time, he has collected a very large amount of new information regarding many birds which previously were hardly or only little known, and such additional observations on some species, formerly recorded by Mr. W. T. Blanford, he offers in the present paper which will be, it is hoped, soon published in the Society's Journal.

III.—NOTE ON A FEW SPECIES OF ANDAMANESE LANDSHELLS, LATELY DESCRIBED IN AMERICAN JOURNAL OF CONCHOLOGY,—by Dr. F. Stoliczka.

The last number of the above Journal, Part 2, vol. v., (p. 109, pl. 10) brought us a welcome addition to Indian Conchology in the way of illustrations of well known species, described under new names. The paper to which I allude is entitled "*Descriptions of new species of terrestrial Mollusca from the Andaman islands, Indian Archipelago*, by Geo. W. Tryon, Jr."

It is not my object to point out the very vague knowledge the author of the above paper appears to possess of the history and geography of our Andaman settlement. It would perhaps be unfair to expect from the author, that he should know that this settlement has now a population of about 8000 or more foreign inhabitants (European and native), and that it has been the largest Indian convict settlement for upwards of 12 years. It is also probably not to be expected that the author should be acquainted with the numerous publications in our Journal regarding the fauna of those islands by Mr. E. Blyth, by Col. Tytler and Lieut. Beavan in the "Ibis," with various papers on the physical geography and the population of those islands, (also in our Journal), with Dr. Mouat's "Adventures and researches among the Andaman islanders, London, 1863," together with an appendix on the fauna by Mr. Blyth, and perhaps not even with the couple of scanty notices in our Journal by Mr. Theobald regarding the shells of those islands,—but how Mr. Tryon could have overlooked a well known species described by Chemnitz about 90 years ago, and figured in Reeve's Monograph, and moreover the numerous papers of Mr. Benson about Andamanese landshells in the Annals and Mag. Nat. Hist., between the years

1859 and 1864, it seems almost incredible to an Indian naturalist to believe! The words, "as I cannot discover any species* attributed to these islands in the various monographs" appear the more remarkable, as Mr. Tryon is believed to have for years paid special attention to the reviews of Conchological literature, and as Editor and Recorder of the American Journal at one time, when speaking with apparent very weighty authority on the Indian *Unios*, evinced a great interest in the general welfare of Indian Conchology! (vide Am. Journ. Conch. 1867, vol. iii, p. 201).

There are about 20 species of landshells enumerated by Mr. Benson and Theobald in their publications, and my late investigations will probably increase the number to 30. Some species are identical with those of the Nicobars.

In order to prevent any misinterpretations of Mr. Tryon's well executed (and very welcome) figures, I give now a list of the identifications; but I will not further refer to the subgeneric distinctions of the species, as I hope shortly to be able to publish some notes regarding the anatomy of the animals, and other peculiarities of the shells of the various species.

1. *Rhysota (Helix) Chambertinii*, Tryon, l. cit. p. 109, pl. 10, fig. 2, is *Helix Haughtoni*, Benson, Ann. Mag. Nat. Hist., 1863, 3 ser., vol. ix, p. 87.

2. *Ampelita (Helix) Bigsbyi*, Tryon, l. cit. p. 110, pl. 10, fig. 3, is *Helix trochalia*, Benson, A. M. N. H. 1861, 3 ser., vol. vii, p. 82.

3. *Orobia (Helix) Andamanensis*, Tryon, l. cit. p. 110, pl. 10, fig. 4, is *Helix exul*, Theobald, Jour. As. Soc. Bengal, 1864, xxxiii, p. 245, which is possibly the same as *Hel. stephus*, Benson, Ann. M. N. H., 1861, 3 ser., vol. vii, p. 84.

4. *Opeas (Bulimus) Pealei*, Tryon, l. cit. p. 110, pl. 10, fig. 5, is *Spiraxis Haughtoni*, Benson, A. M. N. H., 1863, 3 ser., vol. xi, p. 90.

5. ? *Cyclostoma Leai*, Tryon, l. cit. p. 111, pl. 10, fig. 6, is the old *Cyclophorus foliaceus*, Chemnitz, sp. Tryon's figure

* *Helix Helferi*, *Strep. Andamanica* and *Hel. Andamanica* excepted. No doubt, Mr. Tryon has perhaps since found out more in Pfeiffer, "Mon. Hell." vols. v and vi.

could be almost taken for that in Reeve's Icon. vol. xiii, Monog. *Cyclophorus*, pl. xiii, where an account of the history of the species is given, according to Benson. Chemnitz very probably received a specimen of this species from the Nicobars, together with *Cyclophorus turbo*, Chem., through the Moravian Missionaries; for I also obtained two specimens of *foliaceus* from the neighbourhood of the Nancowry harbour on Camorta, though this species is here, as compared with the peculiar Nicobar one, very rare.

Mr. Tryon further mentions from the Andamans *Plectopylis achatina*, Gray. I never received a specimen from there, but found the species most abundant near Moulmein on the lime-stone hills, and *only* on these. I don't know whether there are any limestone rocks on the Andamans. A species allied to *Helix procumbens* and *gabata* of Gould occurs at the Andamans, and very young shells are not much unlike those of *Pl. achatina*.

The same author further mentions *Helicina Nicobarica*, Phil.; this is probably *Hel. scrupulum*, Benson, A. M. N. H., 1863, 3 ser., vol. xii, if at all distinct from the last.

IV.—NOTES ON THE GENUS *Hara*, by Surgeon F. Day. (Abstract).

The author describes a new species, *H. Jerdoni*, of this remarkable genus of siluroid fishes, and offers general remarks regarding the only other two Indian species which he admits, *H. Buchanani*, and *H. conta*.

This paper will appear in the first number of the Journal for this year, to be published shortly.

V.—NOTE ON NORTH WESTERS,—by the Hon'ble J. B. Phear.

In this note I merely offer an hypothesis to explain the remarkable "Nor-Wester" storms, which invariably precede the setting in of our rainy season. We are all familiar enough with the phenomena, the typical form of which may be described pretty nearly as follows:—The monsoon breeze is blowing steadily from the Bay of Bengal, (say S. E., S. or S. W.). A heavy mass of clouds appears in the N. W.; it rises in the sky very rapidly, preserving an even front, which stretches in a long sharply defined line from S. W. to N. E. Rain is seen to be falling towards the N. W.;

this approaches with the cloud and is accompanied by much thunder and lightning. The southerly breeze still, however, continues until the line of cloud-front has reached, or even passed, the zenith, when, for a few seconds, there occurs a complete calm, followed by a sudden and mighty rush of wind from the N. W.— the rain arrives,— there is a heavy downfall— the storm passes by— and for a time there is almost a complete absence of wind with a lowered temperature.

My explanation is this:—The air coming from oceanwards is largely charged with vapour at a comparatively high temperature, and I suppose that a much colder current of air is suddenly (so to speak) poured out upon it from the N. W. and passes over with considerable velocity. Rapid condensation takes place along the surface of contact of the upper and lower strata of air— dense cloud is formed; there is electrical disturbance; and this state of things advances with the front of the advancing N. W. current. As the result of the condensation, a large mass of water is precipitated to the surface of the earth. This, in falling, displaces air, the water as it nears the ground driving the air out of site with increasing force. By the continuation of the process, as the front of the upper stream of cold air passes on, an uninterrupted sheet of falling water is produced, which *apparently* advances with the cloud above and wind below. Actually, however, the path of each drop (excepting those of the forefront) may, I imagine, possibly be pretty nearly vertical: before condensation, the vapour, if not brought to rest by the friction of the two currents, was moving with the lower current of air towards the N. or N. W.; it does not acquire any new horizontal velocity merely by becoming condensed, and as the drop falls (if the height be great) it will manifest, if anything, relative to the earth a slight increment of velocity towards the west. So far, then, there is certainly no reason why the drops should move in the direction of the storm; on the contrary, they ought to have a velocity towards the N. and W. But the formation and falling of the water effects a transfer of matter from above to below; a partial vacancy, or rarefaction, thus takes place beginning at the point of condensation, and the relatively dense cold air of the upper current is at once ready to press into the opening: it pursues the

falling water downwards and becomes thus mixed with the lower current. At this stage we have the lower current, which is, to use a convenient word, possessed of a velocity towards the north and west, infiltrated by the upper cold current which is possessed of a velocity towards the S. E. The resultant condition of the mixture may be any modification of the storm velocity, even to quiescence. Obviously, however, the air which comes down from above, must always lose a very large proportion of its velocity, for it cannot continue its forward course, without carrying with it the whole of the air which remained undisplaced by the rain between the cloud and the earth, and which had an initial velocity in the opposite direction.

My explanation shortly amounts to this, that the large body of water generated and falling as the upper current passes on, produces the "Nor-Wester" by driving violently forward the air which is displaced by it in its passage to the earth, while the air which is not so displaced, is either brought to rest, or acquires a comparatively small forward velocity (towards the S. E.) from the upper current of air permeating it. If this explanation be correct, and the facts occur as I have supposed them, they afford a remarkable instance of transfer of motion. It would also follow from these facts that the atmospheric pressure would increase during the passage of the storm; for, in the first place, the advent of the upper current of cold, and therefore relatively dense air, would, to some extent, effect an addition of mass to the local atmosphere; and secondly, the two opposing currents checking each other's course, would bring about a condensation of the air, which is the product of their union. And it is some confirmation of my theory that, in truth, a rise of the barometer does, I believe, uniformly occur during a "Nor-Wester."

Also on the flanks of the storm there ought to be according to the foregoing theory a strong wind, coming *from* the place of the falling water. This would manifestly last as long as the storm remained within a certain limited range, and would change its direction as the storm passed by. As far as my observation has extended, the phenomena which actually occur bear this out.

VI. On certain protracted irregularities of Atmospheric pressure in Bengal, in relation to the Monsoon rainfall of 1868-69,—by Henry F. Blanford, Esq. Meteorological Reporter to the Government of Bengal. (Abstract).

Mr. Blanford said that the object of his paper was to bring to notice certain irregularities in the distribution of barometric pressure during the monsoons of 1868 and 1869, which had much influenced the course of the wind currents during those two seasons, and had evidently contributed largely to produce the anomalous rainfall of Bengal and the N. W. Provinces, the important consequences of which must be fresh in the recollection of all.

Having spoken of them as irregularities, he would, before proceeding to describe them, briefly notice what appear to be the normal features of barometric pressure in the S. W. monsoon in India. On this subject, unfortunately but little direct evidence is forthcoming, since no records, or none admitting of comparison with those of the Bengal stations, are to be had for the greater part of India. Indirect evidence, however, is available; and this indicates as probable that at the beginning of the S. West monsoon a focus of minimum pressure exists over the central region of the peninsula, and that towards the middle or end of the monsoon, as Col. Strachey has suggested, this focus is probably transferred to the Punjab. That such is the case may be inferred from the direction of the winds, which on the Bombay side are westerly during the hot weather and early months of the S. W. monsoon, while in Bengal the prevailing direction is from the South East. It is to be inferred that they blow, in accordance with Buys Ballot's law, towards a place of minimum pressure, with a tendency to circulate round it; the law of their movement being the same as that of the winds in a cyclone. A similar inference is to be drawn from the fact displayed in Dove's Isothermal charts, as well as in that of Messrs. Schlagintweit, *viz.* that in the hot weather, the focus of highest mean temperature is about Nagpore,—in the rains, in the Punjab: and a persistently high temperature necessarily produces a low barometric pressure by the expansion and consequent overflow of the air above the heated region. Again,—the course of the isobaric lines

across the Bay of Bengal (as inferred from the stations around the coast) is from North East to South West, or in general conformity to the outline of the peninsula, with the lower pressure (in the S. W. monsoon) lying to the North West. If the normal pressure then be such as is inferred, the normal winds in Bengal would be from S. E., (in accordance with the law already alluded to); but if an independent focus of low pressure be interposed in their course somewhere in Lower Bengal, it would follow that the vapour-bearing winds would be drawn in towards it, and would there discharge their moisture as rain, while dry westerly winds would prevail in the N. W. Provinces. This is what actually happened in both 1868 and 1869.

The re-distribution of pressure of the change of the monsoons occurs in the months of March and October. In 1868, as early as the month of April, a slight barometric depression (relatively to places around) appeared in the N. W. corner of the Bay of Bengal, the barometer at False Point being lower than that at Cuttack, and that at Saugor Island lower than at Calcutta. This difference was more marked in May, and still more so in June, at the beginning of which month the rains set in very heavily in and around Calcutta. The heaviest fall was over Balasore and Coutai, where it exceeded 30 inches. It was very heavy at Calcutta and Midnapore (between 20 and 30 inches), and diminished rapidly in all directions around. The wind resultants for the month shew the influence of the depression very markedly, those of all stations being more westerly than is usually the case. In July the rains were not heavy, and an area of low pressure in the direction of Hazareebagh appears to have exercised an influence over the winds, rendering them more easterly. But in August the former focus was again intensified, the minimum pressure being very near Saugor Island, and the winds were again drawn towards it. The rainfall of this month was very heavy (exceeding 30 inches) over Hooghly and Kishnagur, therefore at a distance of about 100 miles to the north of the place of barometric depression. It exceeded 20 inches at Calcutta, Burdwan and Jessore, diminishing in all directions around. In September, the depression remained, but was less marked and influential, and it did not disappear entirely till December. Throughout the season, the winds in the country to westward of the Delta never

become S. E. During the greater part of it they were westerly, and in September they veered to north east. Hence apparently the dryness of the N. W. P. throughout the season.

In 1869, shortly after the redistribution of pressure in March, a slight depression appeared over a region including Berhampore, Monghyr, Patna and Hazareebagh. In May it was intensified, especially over the first named station, and reached its lowest point in June. There was then a mean difference of 0.14 of an inch between Calcutta and Berhampore. The effect of this depression on the winds and rainfall was similar to that of the Saugor Island depression of the previous year. At Patna, the wind was north, and at Hazareebagh and Cuttack south and somewhat westerly. The rainfall in this month, as in the previous year, was heaviest, not over the place of depression, but at some distance (150 miles) to north of it; especially over Buxa (Bhotan Doars), Dinajpore and Rungpore. Generally it exceeded 20 inches over the country north of the Pudda river. In the Delta it was below 20 inches.

In July, August and September, the depression did not disappear, but appears to have moved westward. So that, at the end of the rains, Monghyr, Patna and Hazareebagh were all lower than Berhampore.

In conclusion, Mr. Blanford commented on the peculiar relation that appeared to exist between the place of greatest barometric depression, and that of greatest rainfall, the latter appearing always to be to north of the former in the instances cited; and he suggested as a possible explanation, the existence of two barometric depressions, so related that one would act by retarding, without arresting, the wind currents in their progress towards the other. In such a case, it appeared possible that an accumulation of air would be produced not over but somewhat beyond the site of the first depression, and that the heaping up of a nearly saturated atmosphere, aided by diffusion of the vapour, would determine an excessive rainfall in that place.

He also pointed out the apparent influence of the Berhampore and Monghyr depression, on the course of the Cyclones which passed over Bengal in 1869. The first, in May, passed over Jessore; the second, in June, when the Berhampore depression was most intense,

passed directly towards that station across the delta, and speedily broke up on the north of the Ganges.

The third, in the beginning of October, when the lowest pressure was distributed over Monghyr, Patna and Hazareebagh, took an unusual course to the north west and between these stations.

The President said that in inviting discussion upon the paper which had just been read, he need not dwell upon the great value of Mr. Blanford's investigations. It had long been understood that the dominant cause of monsoon winds was the periodic occurrence of a terrestrial locus of minimum barometric pressure. And a persistent condition of low barometric pressure simply meant, that for some reason or another the spot in the earth's surface where it occurred, was a focus of maximum heat. He believed that Schlagintweit's map of isothermal lines exhibited a centre of maximum heat in the Punjab, during the rainy season, and no doubt the S. W. monsoon of our Presidency was greatly influenced by such a centre. Mr. Blanford's observations led to the remarkable conclusion, that in some seasons, if not always, there were other minor centres, or at least one centre in Bengal itself, which materially interfered with and disturbed the action of the principal centre. It was curious that an area of maximum rainfall should be found at a certain distance on the north side of this minor centre, and Mr. Blanford had offered a very ingenious theory to account for the fact. He (the President) however, felt some difficulty in accepting this theory. It appeared to him inconsistent with the maintenance of the barometric depression, which could only be attributable to the continuance of local surface heat in excess of that in the neighbourhood. The effect of the greater local heat was, by a process of internal expansion to lift the superincumbent column of air relatively to the surrounding air, by reason of which the upper portions of it became, as it were, poured aways sideways, and so the amount of atmospheric material in the vertical column was lessened; and as long as the relatively low barometer obtained, this operation must be going on. Therefore, the passing monsoon current must be affected by it, and if so, the motion of the particles of vapour in it could not safely be calculated as if they were sliding under the action of gravity upon the gradient lines of equal pressure. He would

himself be disposed to suggest that the expanding process, to which he referred, directly produced the result which Mr. Blanford mentioned; clearly, most of the discarded air and vapour would be thrown off on the side towards which the wind is blowing, *i. e.*, in the case of the S. W. monsoon in Bengal, towards the *North*, and thus there would be accumulation of vapour on that side; also the additional heat of the area of minimum barometric pressure would diminish the saturation of the incumbent air and consequently the rainfall; so that the comparison between the rainfall on that area, and on an area north of it, would in this way be doubly affected.

Mr. H. F. Blanford made some further remarks regarding the explanation which he gave of the scarcity of rainfall in the north west Provinces during the last year, and also regarding the suggestions made by the President.

Col. the Hon'ble R. Strachey observed that the greatest obstacle which is in the way of a satisfactory explanation of the various air currents lies in the high range of mountains which bounds India towards North. He thought that we are as yet far from being sufficiently acquainted with the varied influences which the Himalayan range undoubtedly has upon those atmospheric changes in India, and until our knowledge of this range has been much more improved, it seemed to him almost impossible that we could arrive at anything like a satisfactory explanation of the causes of those atmospheric disturbances. With regard to the rainfall, this difficulty is by far not so great, and an almost quite satisfactory explanation of it can be given. Col. Strachey then explained in detail the rainfall and its causes throughout India. He pointed out the remarkable diminution of the rainfall in the whole tract of country along the bases of the Himalayas from Bengal towards Peshawur, then towards Mooltan, and alluded to the local variations along the Western ghats.

After some further remarks on the same subject by Mr. H. F. Blanford, the meeting broke up.

LIBRARY.

The following additions have been made to the Library since the last meeting in February.

Presentations.

*** Names of Donors in Capitals.

Forhandlinger ved de Skandinaviske Naturforskeres, Tiende Möde, i Christiania fraden 4de. til den 10de. Juli, 1868 :—DET. KONGELIGE NORSKE UNIVERSITET I CHRISTIANIA.

Forhandlinger i Videnskabs-Selskabet i Christiania, Aar 1868 :—THE SAME.

Nyt Magazin for Naturvidenskaberne : udgives af den physiographiske Forening i Christiania ved M. Sars, og Th. Kjerulf, sextende Binds, Med 1-2 :—THE SAME.

Norges Officielle Statistik, udgiven i Aaret 1866, Beretning om Almueskolevæsenets Tilstand i Kongeriget Norges Landdistrikt for Aarene 1861-1863, udgiven af Departementet for Kirke og undervisningsvæsenet :—THE SAME.

Norges Officielle Statistik, udgiven i Aaret 1867, Tabeller vedkommende Skiftevæsenet i Norge i Aaret 1865, samt den Kongelige Norske Regjerings underdanigste indstilling af 16de Juli, 1867 :—THE SAME.

Norges Officielle Statistik, udgiven i Aaret 1865, Beretning om Skolevæsenets Tilstand i Kongeriget Norges Landdistrikt for Aarene 1864-1866, og i Rigets Kjobstæder og Ladesteder for Aaret 1867, udgiven af Departementet for Kirke og undervisningsvæsenet :—THE SAME.

Norges Officielle Statistik, udgiven i Aaret 1868. Fattig-Statistik for 1866, tillige med oversigt for Aarene fra 1851 af, udgivne af Departementet for Kirke og undervisningsvæsenet : —THE SAME.

Tabeller vedkommende Norges Handel og Skibsfart i Aaret 1867, udgivne Departementet for det Indre :—THE SAME.

Beretning om Rigets Œconomiske Tilstand i Aarene 1861, 1865, forste Hefte indeholdende de af Rigets Amtmænd Afgivne specielle Beretninger, udgivne af Departementet for det Indre :—THE SAME.

Resultaterne af Folketællingen i Norge i Januar 1866, forste Hefte, indeholdende Tabeller over Folkemængde med mere i Rigets Forskjellige jurisdiktioner samt Folkemængde fordelt efter alder,

En fremstilling af det Norske—aristokratis—historie indtil kong Sverrestid af Ebbe Hertzberg :—THE SAME.

La Norvège Littéraire par P. Botten-Hansen :—THE SAME.

Den Norske Lods udgiven af den Geografiske opmaaling, 3die 4de Hefte :—THE SAME.

Ungedruckte, unbeachtete und wenig beachtete Quellen zur Geschichte des Taufsymbols und der Glaubensregel, herausgegeben und in Abhandlungen erläutert von Dr. C. P. Caspari, II. :—THE SAME.

Det Kongelige Norske Frederiks Universitets, Aarsberetning for Aaret 1868, med Bilage :—THE SAME.

The United States Sanitary Commission, a sketch of its purposes and its works :—THE GOVT., U. S. A.

The Sanitary Commission of the U. S. Army, a succinct narrative of its works and purposes :—THE SAME.

A record of the Metropolitan Fair in aid of the United S. Sanitary Commission held at New York in April, 1864 :—THE SAME.

History of the United States Sanitary Commission by C. J. Stille :—THE SAME.

Brooklyn and Long Island Sanitary Fair 1864 :—THE SAME.

Memorial of the Great Central Fair for the United States Sanitary Commission by C. J. Stille :—THE SAME.

Military Medical and Surgical Essays, 1862-1864 :—THE SAME.

Annual Report of the Board of Regents of the Smithsonian Institution for 1867 :—THE SMITHSONIAN INSTITUTION.

Anuual Report of the Trustees of the Museum of Comparative Zoology 1866 and 1868 :—THE MUSEUM OF COMPARATIVE ZOOLOGY.

Entomological Correspondence of T. W. Harris, M. D., edited by S. H. Scudder :—THE BOSTON NATURAL HISTORY SOCIETY.

Proceedings of the Boston Natural History Society for 1868 :—THE SAME.

Memoirs of the Boston Natural History Society Vol. I, Pt. IV :—THE SAME.

Letters of the National Academy of Sciences, Philadelphia, 1866 : THE NATIONAL ACADEMY OF SCIENCES AMERICA.

Report of the Committee of the Bengal Chamber of Commerce, 1869 :—THE BENGAL CHAMBER OF COMMERCE.

Bulletin de la Societé de Géographie, Dècembre, 1869 :—THE GEOGRAPHICAL SOCIETY OF PARIS.

PROCEEDINGS

OF

THE ASIATIC SOCIETY OF BENGAL.

An extraordinary General Meeting of the Society was held on Wednesday, 9 P. M., 16th March, 1870.

The Hon'ble J. B. Phear, President, in the chair.

The President said that the special object for which the extraordinary General Meeting was convened by the Council of the Society was fully explained in the notice issued which is follows :—

H. R. H. THE DUKE OF EDINBURGH

"having expressed a desire to become a member of the Asiatic Society of Bengal, an Extraordinary General Meeting of the Society is hereby convened by the Council of the Society, under Rule 31 of the Bye-Laws, for the purpose of proceeding in the matter of his election.

The Meeting will be held this day, Wednesday, the 16th instant, 9 P. M., at the Society's Rooms, Park Street."

The President observed that he had very little to add to what is stated in this notice. The report of H. R. Highness's desire to join our Society as a Member having reached too late to be brought before the last monthly meeting of the Society, the Council thought it desirable to convene an *Extraordinary General Meeting* for the special purpose that H. R. Highness may be elected before he leaves the shores of India, which he was so graciously pleased to honor with his visit.

The President then requested Dr. Fayrer to move the proposition.

Dr. J. Fayrer, C. S. I., briefly alluded to H. R. Highness's special wish to become a member of the Society and moved—

That His Royal Highness, Prince Alfred Ernest Albert, Duke of Edinburgh, be elected an ordinary member of the Asiatic Society of Bengal.

The President seconded the proposition which was put to the meeting and carried unanimously.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR APRIL, 1870.

The monthly general meeting of the Society was held on Wednesday, the 6th instant, at 9 P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The following presentations were laid on the table :—

1. From the Government of Madras—7 copies of Captain M. W. Carr's "The Seven Pagodas."

2. From the Government of India, Home Department—A Catalogue of Sanscrit works in the Library of His Highness the Mahárájá of Mysore.

3. From H. J. Rainey, Esq., two modern copper Coins, bearing the inscription, "Island of Sultana," in English, and the coat of arms of the E. I. Company.

4. From the Author—A copy of "A Treatise on Asiatic Cholera," by Dr. C. Macnamara.

5. From the Government of India—A copy of correspondence relating to an inscription found at Barsee Taklee, near Akola in the Hyderabad assigned Districts.

6. From T. W. Tolbort, Esq., C. S.,—A MS. copy of a Hindustáni pamphlet, being an analysis of Mr. G. Campbell's Ethnology of India, published in the Society's Journal.

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

Capt. R. D. Osborn, B. S. Corps.
R. Stewart, Esq.
B. Smith Lyman, Esq.
Dr. T. W. Innis, C. B.
Col. A. D. Dickens, C. B.

The following gentlemen are candidates for ballot at the May Meeting :—

Dr. Warth, Indian Inland Customs, proposed by Dr. F. Stoliczka, seconded by R. M. Adam, Esq.

Dr. W. Schlich, Deputy Conservator of forests, proposed by Dr. Stoliczka, seconded by S. Kurz, Esq.

J. E. Dobson, M. B., Staff. Asst. Surgeon, proposed by Col. H. Hyde, seconded by Dr. T. Oldham.

J. Macnagten, Esq., Darbhángá, proposed by Mr. H. Blochmann, seconded by Col. Hyde.

J. H. Damant, Esq., C. S., proposed by E. V. Westmacott, Esq., seconded by Dr. Stoliczka.

Rájá Satyánand Ghoshál, proposed by Bábu Rájendralála Mitra, seconded by the Hon'ble J. B. Phear.

The following gentlemen have intimated their desire to withdraw from the Society :—

G. M. Tagore, Esq.
T. B. Lane, Esq.

The President gave notice that at the next monthly general Meeting it would be proposed on behalf of the Council that a donation of Rs. 100 out of the Society's Funds should be made in aid of the subscription to relieve the necessities of Mrs. Piddington. The Council considered that they had not themselves the power, in the ordinary course of managing the Society's affairs, to apply a sum of money to such a purpose as this, but they felt confident that the Society would gladly seize this opportunity, sad as it was, of testifying its high appreciation of the remarkable services done by Mr. H. Piddington to the cause of science and the interests of the Asiatic Society of Bengal.

The President also announced that the Council had formed a Committee, consisting of Dr. Partridge, Mr. Blanford and him-

self, for the collection of subscriptions from individual members of the Society and from others interested in the progress of science. He was afraid, it was only too certain that the widow of Mr. Piddington was in a deplorable state of destitution, and he trusted that they would one and all by coming forward with their contributions emphatically declare that this was a thing, which should not be.

The receipt of the following communications has been announced :—

1. Observations on some Indian and Malayan Amphibia and Reptilia, by Dr. F. Stoliczka.

2. Notes on some places of historical interest in the District of Huglí, by H. Blochmann, Esq.

3. Paper on old Delhi, by J. D. Tremlett, Esq.

4. *Gentziana Jæschkei* re-established as a new genus of *Gentzianaceæ*, by S. Kurz, Esq.

5. Notes on the Andamanese, by Surgeon F. Day.

6. Notes on a trip to the Andamans, by V. Ball, Esq.

7. On the relation of the Uriya to the other Modern Aryan languages, by J. Beames, Esq., B. C. S.

The following papers were read :—

I.—Observations on some Indian and Malayan Amphibia and Reptilia, by Dr. F. Stoliczka (Abstract).

The species described in this paper have been partially collected by the author along the Burmese and Malayan coast, in Penang and Singapore, partially at the Nicobar and Andaman islands, only a few species are noticed from Java, and a few also from the N. W. Himalayas. Short notes on the geographical distribution, and on the general character of the Amphibian and Reptilian fauna of the Andamans and Nicobars, form a brief preface to the detailed descriptions. Complete lists of all the known species occurring on the two last named groups of islands are appended.

The following is a list of the species noticed, with the localities wherefrom specimens have been obtained, and brief characteristics of the new species. Of those species marked with an asterisk (*) illustrations will be given.

AMPHIBIA.

BATRACHIA.

1. *Rana gracilis*, Wiegm., (typical)—Sundarbans, Arracan, Rangoon, Moulmein, Penang, Wellesley Province, &c.

Ditto ditto var. **Andamanensis**,—Andamans.

Ditto ditto var. **Nicobariensis**,—Nicobars.

Ditto ditto var. **pulla**,—Penang hill.

2. *Rana cyanophlictis*, Schneid.—Orissa.

3. *Pyxicephalus breviceps*, Schneid.—from near Kotegurh.

*4. **Polypedates Hascheanus**, n. sp.

A small species from the forests of Penang hill;—distance between anus and heel slightly less than the length of the body; brown, lighter or darker, a blackish band between the eyes, a W mark between the shoulders, a pair of blackish spots about the middle of the body, limbs with dark cross bands; body of largest specimen $\frac{15}{16}$ inch long.

5. *Plyp. maculatus*, Gray,—Penang.

* 6. *Hylorana Tytleri*, Theob. (?? = *erythræa*, Schleg.)—Moulmein.

* 7. **Hylorana Nicobariensis**, n. sp., from the Nicobars. Allied to *H. temporalis* of Günther, but has two small glandular tubercles behind the angle of the mouth; distance between anus and heel less than the length of the body, 4th toe less than its half.

Ansonia, n. gen. (*Rhinodermatidæ.*)

Body slender, limbs long and slender, fingers free, toes half-webbed, disks scarcely swollen; muzzle short, canthus rostralis sharp; no teeth; tongue entire, oval, elongated.

* 8.—**A. Penangensis**, found on rocks in streams on Penang hill. Full grown specimen $\frac{14}{16}$ inch, hind limb $1\frac{5}{16}$ inches; body tubercular, black with pale yellowish white spots on the side and purplish red below, between the limbs and on the lower belly.

* 9. *Diplopelma Carnaticum*, Jerdon.

10. *Caloula pulchra*, Gray, from Moulmein.

11. *Bufo viridis*, Laur., from the Sutlej valley.

12. *Bufo melanosticus*, Schneid., from Bengal, Burma, Malay-Peninsula, Andamans and Nicobars.

REPTILIA.

LACERTILIA.

13. *Ptychozoon homalocephalum*, Kuhl,—Nicobars.

14. *Gecko guttatus*, Daud.—Burma and Andamans.

15. *Gecko stentor*, Cant.—Andamans.

16. *Gecko Smithii*, Gray,—Java.

17. *Phelsuma Andamanense*, Blyth,—Andamans.

18. *Peripia Peronii*, Cant.—Penang.

19. *Peripia Cantoris*, Günth.—Andamans.

20. *Hemidactylus *frenatus*, Schleg.—Burma, Penang, Andamans and Nicobars.

21. *Hemidactylus maculatus*, D. and B.—Moulmein, Andamans, Calcutta, &c.

22. *Cyrtodactylus rubidus*, (*Puellula rubida*, Blyth)—Andamans.

23.* **Cyrtodactylus affinis**, n. sp.—Penang.

Like *Gymnodactylus pulchellus*, Gray, in form and coloration, but with longer fingers and toes, and apparently more depressed body, no enlarged chin shields, or sub-caudals, and no femoral pores.

24. *Tiliqua carinata*, Schneid. (*Eup. rufescens* apud Günth.) —Bengal, Burma, Penang, Andamans, &c.

25. *Tiliqua olivacea*, Gray,—Nicobars.

26.* **Tiliqua rugifera**, n. sp.—Nicobars; each scale five carinated; scales in 26 series round the body, 23 transverse rows between the limbs, 8 longitudinal rows on the belly; brown above, two pale streaks on the anterior half of the body, pale yellowish or greenish white below.

27.* **Mabouya Jerdoniana**, n. sp.—Penang.

Like *M. agilis*, Gray, but it has 7 supraciliaries, 8 upper labials, scales in 39 series round the body, 60 transverse rows between the limbs, pre-anals scarcely, sub-caudals distinctly enlarged.

28. *Hinulia maculata*, Blyth,—Martaban.

29.* **Riopa lineolata**, n. sp.—Martaban. Similar to *R. Bowringii*, Günth., and equal to it in size, but with scales in 24 longitudinal series round the body, and 60—65 transverse series between the limbs.

30. *Calotes mystaceus*, D. & B.,—Arracan, Bassein, Moulmein, &c.

31. *Bronchocele cristatella*, K u h l,—Penang.

32. ,, *Moluccana*, L e s s.—Singapore.

33. ,, *jubata*, D. and B.—Java, Nicobars.

34. *Tiaris subcristata*, B l y t h, (*Coryphylax Maximiliani*, F i t z.) —Andamans and Nicobars.

35. *Draco volans*, L.—Penang.

OPHIDIA.

36. *Cylindrophis rufus*, L a u r.,—Upper Burma.

37. *Ablabes melanocephalus*, G r a y,—Singapore.

38. ,, *Rappii*, G ü n t h.,—Simla.

39. ,, *collaris*, G r a y,—Simla.

40.* ,, **Nicobariensis**, n. sp.—Nicobars.

Scales smooth in 17 series, vent. 189, anal bifid, sub-caudals 87, coloration similar to *melanocephalus*, but the lateral spots are smaller and much more numerous; length 17½ inch of which tail is 4¼ inch.

41. *Ptyas mucosus*, L.,—N. W. Himalaya, Moulmein, Andamans.

42. *Ptyas hexahonotus*, C a n t.,—(*Xenelaphis idem* apud G ü n t h.) —Penang.

43. *Compsosoma radiatum*, R e i n.,—Moulmein.

44. ,, *melanurum*, S c h l e g.—Andamans.

45.* ,, *semifasciata*, (*Platyceps idem*) B l y t h,—south of Simla.

46. ,, *Hodgsonii* G ü n t h.,—N. E. of Simla.

47. *Tropidonotus quincunctiatus*, S c h l e g., (*Trop. Tytleri* and *striolatus*, B l y t h) —Burma, Andamans.

48. *Trop. stolatus*, L.—Moulmein, Amherst.

49. ,, *platyceps*, B l y t h, (*Zamenis Himalayanus*, Steindach.) Kulu.

50. *Gonyosoma oxycephalum*, B o i e.—Andamans.

51. *Dendrophis picta*, G m e l.—Burma, Andamans, Nicobars, Penang.

52. *Dend. caudolineata*, G r a y,—Penang.

53. *Chrysopelea ornata*, S h a w,—Penang, Burma.

54. ,, *rubescens*, G r a y,—Penang.

55 *Psammophis condanurus*, M e r r. (*Phayrea isabellina*, T h e o b.) —Simla.

56. *Tragops fronticinctus*, G ü n t h.,—Amherst.

57.* *Dipsas hexagonotus*, B l y t h,—Andamans.

58.* ,, *multifasciata*, B l y t h.—South of Simla.

59. *Lycodon striatus*, S h a w.—from near Kotegurh.

60. ,, *aulicus* L. (*Tytleria hipsirhinoides*, T h e o b a l d),—Andamans and India generally.

61.* *Tetragonosoma effrene*, C a n t. (*var.*)—Banca.

62. *Python molurus* L i n n.—Upper Burma, Malayan Peninsula.

63. ,, *reticulatus*, S c h n e i d.—Nicobars.

64. *Hypsirrhina plumbea*, B o i e,—Upper Burma.

65. *Cerberus rhynchops*, S c h n e i d.—Burma, Andamans, Nicobars, &c.

66. *Hipistes hydrinus*, C a n t.—Amherst.

67.* **Cantoria Dayana,** n. sp.—Amherst. Form typical, scales in 19 series, ventrals 268, anal bifid, sub-caudals 56; dull bluish black with numerous yellowish cross-bands, narrow on the back but widening laterally.

68. *Bangurus cœruleus*, S c h n e i d.—Bassein.

69.* *Ophiophagus elaps*, S c h l e g.—Burma, Andamans.

70. *Naja tripudians*, M e r r.—N. W. Himalaya, Andamans.

71. *Callophis intestinalis*, L a u r.—Upper Burma.

72. *Enhydrina Valakadyn*, B o i e. (*E. Bengalensis*, G r a y)—Orissa.

73, *Enh. shistosa*, D a u d.—Gopalpore.

74. *Pelamis platurus*, L., (*P. bicolor*, S c h n e i d.)—Bay of Bengal.

75. *Trimeresurus gramineus*, S h a w.—Khasi hills.

76. ,, *erythrurus*, C a n t.—Burma, Java.

77. ,, *carinatus*, G r a y.—N. W. Himalaya.

78.* ,, *porphyraceus*, B l y t h.—Andamans.

79.* **Trim. mutabilis,** n. sp.—Andamans and Nicobars. Scales in 21 series, ventrals 156-167, sub-caudals 48-62; second labial forms the angle of the facial pit or is divided in two shields; color uniform reddish brown or with numerous greenish white cross bands on the back, laterally with longitudinal bands.

80.* *Trim. Cantori*, B l y t h.—Andamans and Nicobars.

81.* **Trim. convictus**, n. sp. Penang.

Like *T. monticola*, Günth., but with much larger scales which are disposed in 21 series; vent. 132, subcaudals 29.

82. *Halys Himalayanus*, Günth.—N. W. Himalaya.

83. *Daboia Russelli*, Shaw,—N. W. Himalaya.

CHELONIA.

84. *Emys crassiollis*, Bell,—Penang.

Dr. Stoliczka gave a short sketch of the relations existing between the Andaman and Nicobar Reptilian fauna and that of Burma on the one and of Java, Sumatra and the Philippine islands on the other hand. All these islands, he said, &c., have many species common. He also specially noticed the very great number of Viperine snakes (*Trimeresurus*) which are to be met with at the Nicobars, but fortunately these species appear to be less dangerous than continental forms usually are. The Nicobarese say that not a single fatal case results from the bite of these *Trimeresurus*, and certainly all the specimens examined had a comparatively small poison-gland. The result of the bite is said to be only a swelling of the wounded part. Dr. St. also exhibited a specimen of the rare *Callophis intestinalis* obtained from Upper Burma. The species has the poison-glands extending from the head to about $\frac{1}{3}$ of the total length of the body, lying free in the cavity of the anterior part and causing the heart to be much further removed backward, than is generally the case in other species of snakes.

The President thought there were one or two remarkable features in Dr. Stoliczka's interesting paper.—One to which he particularly referred was the relative inefficiency of the poison in certain snakes of Penang and the Nicobars in comparison with the poison of the cognate species found in this country. He did not know whether the circumstances which rendered the possession of an invariably fatal weapon necessary to particular classes of snakes in the struggle for life, while others could maintain themselves without it, had yet received much attention. *A priori*, he thought one would be disposed to expect that a poison which would disable without causing immediate death, would be more deterrent in its effects, and, therefore, more widely useful to its possessor than one which killed instantly.

At any rate it was curious to find some of the insular species of snakes, though provided with a perfect poison apparatus, much less fatal in the effect of their bite than other closely allied species in Bengal were. The investigation of the causes which had led to this difference ought to be attractive.

A short discussion on the effects of snake-poisoning ensued. Mr. Waldie desired to know what the symptoms were resulting from the bite of the Nicobar vipers, and whether they are the same as usually known to originate from the bite of other poisonous snakes.

Dr. Stoliczka said that the Nicobarese only speak of a swelling of the bitten part, and that they exhibit very little fear of these snakes. Dr. Stoliczka also observed that the poison gland in the species of *Trimeresurus* which he had examined, has a simple glandular form without any appendages, but the skin forming it is very tough, and internally partitioned by numerous irregular lamellæ. The poison of the fresh snake was always in a comparatively small quantity present, and appeared less viscose than the Cobra poison. The differences between the effects of poisoning of the *Cobra* and *Daboia* had been pointed out by Dr. Fayrer.

II.—Notes on places of historical interest in the District of Hugli,—*by* H. Blochmann, Esq., M. A. (I.—*Madáran and Panduah.*)

The Historians of India assign to Bengal much narrower limits than we do at the present day. In the *Ṭabaqát i Náçirí* and the *Táríkh i Fírúzsháhi*, the earliest Muhammadan histories in which Bengal is mentioned, the territories attached to the towns of Sátgánw (Húgli), Sunnárgánw (East of Dacca), and Lak'hnautí (Gaur), are called *Diyár i Bang*, perhaps a verbal translation of the old term *Bangadesh*. The districts north of the Ganges were partly attached to Lak'hnautí, partly to Sunnárgánw. The word *Bengal* or *Bangálah*, if I am not mistaken, does not occur in the *Ṭabaqát i Náçirí*, and is but rarely met with in the *Táríkh i Fírúzsháhi*. Nor does it occur on Muhammadan coins. One of the earliest passages, in

which the form *Bangálah* occurs, is a Ghazal* by Háfiz, which he sent from Shiráz to Sulṭán Ghiásuddín, who reigned over Bengal from 1367 to 1373.

In later histories, again, the term *Diyár i Bang* becomes obsolete, and no other name occurs but *Bangálah*.

The south coast of Bengal, which we now-a-days call the 'Sundarban,' went by the general name of *Bháṭi* (بهاٹی) which signifies *lands overflown by the tide*; but Abulfazl, in the *Akbarnámah*, includes in this term the whole tract along the Megna and Brahmaputra.

The above mentioned three towns, Sátgánw, Lak'hnauti, and Sunárgánw were fast decaying at the time when Todar Mall completed (1582) his *Aṣl i Ṭúmár i Jam'*, or rent-roll of Bengal, of which we have a copy in the Áin. Lak'hnauti, from the earliest times, was notorious for its fevers, which caused the kings of Bengal continually to shift their residence to neighbouring towns, as *Pandúah* and *Akdálah*; and Satgánw, in 1582, was no longer considered as *bandar* or harbour, nor were tolls collected there:† but it had, as late as 951, or A. D. 1544, a mint.‡ Sunnargánw was soon after eclipsed by Dhaká (Dacca).

In official documents Bengal is often mentioned under the title of *Jannatu'l Bilád*, or the Paradise of countries: and Lak'hnauti was called *Jannatábád i Bangálah*§ or Paradise town: but the Muhammadans gave it at an early period the nickname of *Dozakhpúr i Ni'mat*, or 'Hell town of riches.' Lak'hnauti and Sátgánw had, moreover, a bad name with the emperors of Dihli, who in allusion to the frequent revolts of their governors, conferred upon

* شکرشکن شوند همه طوطیان هند ... بیت ... بهند بسی ... شکر ...

(Metre Mujtaṣ) "The parrots of India will become sugar-sweets, when this Persian sugar (Hafiz's poem) comes to Bengal."

† The distance between Satgánw and Sunárgánw is only 30 miles, but the harbour tolls are only collected at the latter place. The emperors are in the habit of the Firingi.

‡ The distance is much greater from Satgánw to Lak'hnauti. The village of Satgánw is now [illegible] of 1582.

§ Phoenix, [illegible] p. 72. The fine mosque [illegible] was built in A. H. 946 (A. D. [illegible]).

¶ In opposition [illegible] was called [illegible] Dozakhpúr.

or

these towns the titles of *Bulghákpúr* and *Bulghák Khánah*,* or House of Rebellion.

The Western frontier of Bengal, at the time of Todar Mall's settlement, coincided almost exactly with a straight line drawn from *Gaḍhí* to *Chittuá*. The former was a fort, the name of which often occurs in the History of Bengal, and was situated a little north of Rajmahall, or *Á'gmahall*, as it was then called. Muhammadan historians generally call it the 'door' (*báb*) of Bengal, and compare it to Báramúlah, the 'door' of Kashmír, and to Fort Lak'hí, south of Sahwán (Siwistán), the 'door' of Sindh. The latter, the Parganah of Chittuá, lies N. E. of Mednipúr (Midnapore), and formed then the south west boundary of Bengal and Orissa. The districts west of this line, as Bancoorah, Pachíṭ, Singhbúm, Palámau,† Chuttiá Nágpúr, and Hazáribágh, &c., were not considered as belonging to Bengal. They were comprehended under the general name of Jhárkanḍ, or Jhárk'hanḍ (Jungle Districts), which, according to the Akbarnámah, reached in the north as high as the Parganah of Muhair in south Bihár, S. E. of Gayá, and in the west, as far as Ratanpúr in Central India.

The districts, or Sirkárs, which formed the western boundary of Bengal, were five—1. *Ṭánḍah*, which extended to the south of Murshidábád; 2. *Sharífábád*, from the south of Murshidábád to Bardwán; 3. *Sulaimánábád*, which consisted of portions of the present districts of Naddiá, Bardwán and Húglí; 4. *Sátgánw*, which extended from the Parganah of Arsá, in which Húglí lies, southwards along the river, to below Habrah (Howrah) and over the territories of Calcutta, the 24-Parganahs, and the south of Naddiá; and 5. *Madáran*, which formed the south western and southern boundary of these districts, extending, in a broken semicircle, from Shergarh or Ranee-

* *Akbarnámah.*

† Palámau was annexed during the reign of Sháhjahán (March, 1644), and re-annexed under Aurangzíb (1661). *Vide* the interesting chapters regarding Palámau in the *Pádishahnámah* (II, p. 356), and *'Álamgírnámah* (*pp.* 648, 660). The former work has the spelling پلامون *Palámaun*, the latter پلاون *Paláun*. Regarding the meaning of *Á'gmahall*, *vide Pádishahn.*, I, p. 433, a very readable page containing a few new facts regarding Húglí and Sátgánw.

Pachíṭ was attached to Bihár; its zamíndár, Bír Naráin, held under Sháhjahán a command of Seven Hundred.

gunje, to Manḍalg'hát, near the junction of the Rúpnaráin and the Damúdar with the Húgli river, a little above Diamond Harbour.

The present district of Húglí therefore consists of portions of the old Sirkárs of Sharífábád, Sulaimánábád, and Sátgánw. The name of Sharífábád is scarcely ever used now-a-days, but reminds us of Sharíf i Makkah, the father of Sulṭán Husain Sháh; and Sulaimánábád was early changed by the people to the shorter form 'Salímábád,' by which name it is still known at the present day. Its principal Parganah, Haweli i Sulaimánábád, is now merely called Hawelí, and commenced a little S. E. of Bardwán, extending southwards, to both sides of the Damúdar. A small portion of it belongs now to the Húglí district. There is no doubt that the original name 'Sulaimánábád' refers to Sulaimán,* the second last Afghán king of Bengal.

Sulṭán 'Aláuddín Husain Sháh,† whom I mentioned just now, ruled over Bengal from 1498 to 1521 A. D. He is even now-a-days remembered by the people; and numerous legends and stories, current in the villages of Bengal, refer to the times of Husain Sháh the Good. Even the geography of the country re-echoes his name. The Parganah of Husainábád in the Gaur District, the Masjid Husain-Sháhí in G'horág'hát, Husain Sháhí in Sirkár Bázúhá (Mymensing), the parganahs of Husainpúr and Husain Ujyál in the Sirkárs of Sharífábád and Sulaimánábád remind us of his name. In the south of Bardwán especially, and in the north of the present district of Húglí, Husain Sháh plays a prominent part in the legends of the pea-

* He died A. H. 980, or A. D. 1572 (Akbarnámah, Badáoní, Ṭabaqát). The *Riázussaláṭín*, which Prinsep and Thomas follow, has 981.

† In some histories, as the Ṭabaqát i Akbarí, and even in Elphinstone, Husain Sháh is called 'Aláuddín, or 'Alánddín II. His full name is *Sulṭán 'Aláuddín Abul Muzaffar Husain Sháh*, son of Sayyid Ashraf Sharíf i Makkah; but when kings have several names, the last name is the real name, and should be used when a historian finds the whole name too long. The author of the *Riyáz* even took some trouble to verify his name by referring to old inscriptions in Gaur. Lest a doubt should remain, I may cite the Arabic inscription on the old mosque of Cheran, near Sáran, which Mr. E. Tiery of Chaprah sent me some time ago. The inscription is of interest, as it shews the N. W. boundary of the kingdom of Bengal in the *beginning* of Husain Sháh's reign.

قال النبي صلى الله عليه و سلم من بنى مسجدا لله بنى الله له بيتا
مثله في الجنة ، هذا المسجد الجامع للسلطان المعظم المكرم علاؤ الدنيا والدين

santry. In Mayápúr, which lies west of Chinsurah, in the Parganah of Bairah about 7 miles from the right bank of the Damúdar, a Masjid and a tank still exist which were completed by Husain Sháh; and about 12 miles N. E. of Mayápúr, there is a village Sháh Husainpúr, which was called so to perpetuate his memory.

The above mentioned five Sirkárs, which formed Western Bengal, present many points of interest for the historian. Of their local history we know, at present, next to nothing. Little, too little, has hitherto been collected, though the field is fair, yielding, like every other branch of enquiry into the past ages of this country, a rich and immediate harvest. A mere glance even at our Trigonometrical maps calls to our minds the names of Bengal kings and grandees, and of Muhammadan warrior-saints who fell for the cause of the Prophet. Let us only take the district of Húgli. There is Mahánát'h and Paṇḍuah, on the E. I. Railway, where the Paṇḍub Rájah succumbed to a nephew of Jaláluddín Firúz Sháh, emperor of Dihlí; and opposite to it, Nímtallah G'hatál (گهاتال), west of Calcutta, the seat of the Rájahs of Bardah, who were continually at war with the Rájahs of Bardwán. Near to it, we have Chandarkoná, the most westerly point of the Húgli district, where up-country Rájpúts of the Chauhán clan founded a colony.* In the North Western part of the district, in the Parganah of Jahánábád, we have Madáran, once the capital of a Sirkár, but now so decayed, that it is not to be found in Rennel, nor on our Trigonometrical maps, whilst its site was even a mystery to Stewart, the historian of Bengal. Close to Madáran, again, we have Gog'hát, an old seat of powerful Brahmins, and further eastwards, Mayápúr, about 7 miles from the right bank of the

ابوالمظفر حسين شاه السلطان ابن سيد اشرف الحسيني خلد الله ملكه
و سلطانه في سنه ٩٠٩ تسع و تسعمائة *

'Thus says the Prophet (may God's blessing rest upon him!): He who builds a mosque for God, shall have a house like it built for him by God in Paradise.'

'This is the Jámi' Masjid (erected) by the great and benevolent Sulṭán 'Aláuddunyá wa-ldín Abul-Muzaffar Husain Sháh, the king, son of Sayyid Ashraf, a descendant of Husain. May God perpetuate his reign! A. H. 909. (= A. D. 1503-4).

* Mr. Beames edition of Elliot's Glossary I, p. 67, note. Bír Bhán, zamíndár of Chandarkoná, held under Sháhjahán a command of Five Hundred. *Pádisháhnámah* I, *b*, p. 322.

Damúdar, where Muhammadan zealots broke the Maya Chandí Ido and where Husain Sháh built a tomb for Mauláná Sirájuddín. Nort of Húgli again, lies the sacred Tribení, with the shrine of Zafar Khá i Ghází, the 'friend' of Sháh Çafí, the saint of Panḍuah, and th Ghat of the last king of Orissa. Near Maṇgrá (Mugra), on the E. Railway, the station before Panḍuah, an old road (*sarak*) is sti pointed out* as the frontier of the Kingdom of the Gajpatís of Oriss Close to it lie eleven huts, called the village of Sátgáṇw, whic was the capital of Lower Bengal from the times of 'Izzuddín, i first governor, in A. D. 1206, to 1567, when Dáúd's mother thre herself there at the feet of Khán Jahán, Akbar's Lieutenant, who, few weeks before, had defeated and killed her son, the last King Bengal. There is Húgli itself, with its little *Ban Masjid*, or Fore Mosque, where Hindús and Muhammadans, as elsewhere, offer u small clay figures of horses, and get cured of diseases; whilst th ground on which the Mosque stands, pays rent to the Roman Cath lic Church at Bandel, the first church built in Bengal (1599). He are also numerous battle-fields, still pointed out by the peasant The Akbarnámah, which contains so much regarding Bengal, thoug the passages remain to be translated, mentions at least six battl fought by Akbar's generals in the Húgli district.

The whole district, in fact, is full of places of historical interes Numerous also are the legends which have gathered round then and I have often been surprised to hear villagers tell stories whicl when carefully examined, are found to throw a faint, though i many cases unexpected light on the history of the empire of Dihl or of the kingdoms of Bengal and Orissa, or even on periods fo which we possess no historical records. It is time that somethin should be done towards the collection of these stories, which ar the true Annals of Rural Bengal. It is almost useless to say any thing regarding the great value, especially in India, of legendar information. "Whether the stories," says Mr. C. A. Elliott, in hi excellent work, entitled 'The Chronicles of Onao,' "are tru "or false, they are believed by the people; they influence thei "actions, and form topics of conversation; they give the clue t "many a past and present quarrel, and without a knowledge o

* Rev. Mr. Long.

"them, it is almost impossible to decide many of the disputes "that daily arise. * * * A knowledge of the popular tradition "gives to its possessor both influence over the people, and the key "to their hearts." A little kindness shewn on the part of the enquirer, makes villagers talkative; they are pleased to see their stories appreciated, and remember forgotten details quicker than the pencil can write. They willingly place their time and services to the disposal of the enquirer, and to take down their traditions is more a pleasure than an antiquarian task.*

In this note I have restricted myself to a few remarks on *Madáran* and *Panḍuah.* The legends are entirely derived from Muhammadans, with whose dialect and mode of thinking I am more familiar.

I.—Mada'ran.

In reading over Stirling's Report on Orissa, in the XVth volume of the Researches of our Society, I came across the following passage (p. 284):—

'Whilst Pertab Rudra Deo, king of Orissa, was occupied in repelling or provoking the attacks of the Muhammadans of the Dekhan, *the Afgháns from Bengal made an inroad into the province in great force.* They advanced as far as Kaṭak, and pitched their camp in the neighbourhood of the city, when the Governor Anant Singhar finding himself unable to oppose any effectual resistance, took refuge in the strong fortress of Sárangaṛh, south of the Katjúrí.'

Stirling then goes on relating how the Bengal Muhammadans plundered Kaṭak and Púrí, but failed to secure Srí Jeo, the national idol of Orissa. Rájah Pertab at last came from the Dak'hin and defeated them in a battle, which crippled him, however, so much that he was glad to conclude a peace nearly on the enemy's terms. The Muhammadans then returned to Bengal.

* Some villagers *do* know how to tell a tale. Their ease and fluency of speech has indeed often astonished me. No amount of cross-questioning will confound them. The Lexicographist even may learn from them, and enrich the margin of his dictionary with new words and phrases. To give only one example. In Panḍuah, I heard at least five times on one day different people use شاهت *sháhat* in the sense of *salṭanat*, rule, government, an Indo-Persian word not to be found in our dictionaries.

Stirling does not give the date of this invasion. He merely says that Pertab reigned from 1493 to 1524. Now on turning to the annals of Bengal we find that Pertab's contemporary was Husain Sháh, who has been mentioned above. But the history of this king, as far as we know it, says nothing of the invasion of Orissa related by Stirling. All that is said of Husain Sháh is, that *the tributary Rájahs, as far as Orissa, paid implicit obedience to his command*, and that *during his reign he was beloved by his subjects*. And yet, the peasants in the Húglí district talk now-a-days of the invasion of Orissa under Husain Sháh! and more remarkable still, they ascribe the foundation of the old Fort of Madáran to Husain's general that led the expedition to Orissa, and point out his tomb in the District.

The geographical position of the old town of Madáran had for a long time been a puzzle to me. In vain do we look for this place on Rennel's maps. Stewart (p. 99) places it in Birbhúm, but our Trigonometrical maps mention no place of the name of Madáran. Abulfazl in the Akbarnámah speaks often of this town. Sulaimán stopped here, before crossing the frontier of Bengal and Orissa; so did Mun'im Khán, Akbar's second Khán Khánán, Rájah Todar Mall, and the grand Rájah Mán Singh. In the Áin, Madáran is mentioned as the name of a large Sirkár, the sixteen parganahs* of which were assessed at Rs. 2,35,085. One of its villages, named Hirpah, had a Diamond

* 1. *Ánhattí*, Alhaṭṭí, or Alháṭí, S. of Jahánábád, in the District of Húglí.
2. *Bálgaḍhí*, a Parganah in Húglí, bordering on Bhoṛsat. It is called on the Maps *Belgurrie*, or *Balgury*.
3. *Bírbhúm*. The eastern portions of the present district of Birbhúm.
4. *Bhowálbhúm*.
5. *Chittuá*, now Chittoa in Midnapore (Mednípúr).
6. *Champánagarí*, now in the District of Bardwán.
7. *Haweli i Madáran*. Now Jahánábád, Húglí District.
8. *Saínbhúm*, now in Bírbhúm.
9. *Samarsánhas*, now Summersye, in the Districts of Húglí and Bardwán.
10. *Shergarh*, commonly called *Sík'harbhúm*, now Raneegunge.
11. *Sháhpúr*, now a Parganah in Mednípúr.
12. *Kát*.
13. *Manḍalg'hát*, now in the Húglí District, between the Damúdar and the Rúp Naráin.
14. *Mákor* or *Nágor* (?).
15. *Mínábág*.
16. *Hesauli* (?). Perhaps a mistake for *Mysadul* in Húglí, South of No. 13.
I have not been able to identify Nos. 12, 14, 15.

wards to bathe in the Bhagirati. "You have disturbed my prayer," exclaimed Ismá'íl to the Devs, "come down and perform the service which I shall impose upon you as a punishment." "We cannot interrupt our flight to the river," replied the Devs, "but on our return we will do whatever thou commandest." After some time the Devs came back, and presented themselves before Ismá'íl, who commanded them to build, at the place where he was, an immense fort, after the model of the fort of Lanká (Ceylon). The Devs at first objected, because they had never been in Lanká; but, as Ismá'íl remained firm, they quickly despatched one of their number to Lanká, and before morning dawned, the Fort of Madáran was completed. The new fort was immense; in fact it consisted of seventy-two forts, and was therefore called *Báhattargaṛh*, or seventy-two forts, 'which the ignorant vulgar has changed to *Bhítargaṛh* or 'Inner Fort.' This alteration appears the more natural as round about the seventy-two forts, at an immense radius, a round wall extends, which, in opposition to *Bhítargaṛh*, is now-a-days called *Báhirgaṛh*.'

"But the circuit of the Fort which the Devs had built in one night, was so great that much land belonging to Hindús had been taken away for it. Now there was a Brahmin in Brahmangáṇw, half a mile north of Bhítargaṛh, who had some influence (*rasái*) with Husain Sháh; and as a tank belonging to him had been taken within the new fort, he went straight to Gaur and told Husain Sháh that Ismá'íl prepared for a revolt. Had he not built an immense fort near the frontier of Orissa, without telling the king? This appeared convincing, and Husain Sháh sent a messenger to Madáran, to recall Ismá'íl to Court. Ismá'íl was just superintending the digging of a tank near Gog'hát, about four miles east of Madáran, when the order (*farmán*) came. Hence the tank is even now-a-days called *Farmándig'hi*, the Tank of the Order.

"Ismá'íl obeyed the call of his king; but no sooner had he arrived in Gaur, than he was executed by Husain Sháh.

"When the head had been severed from the body, strange to behold, the headless trunk mounted a horse that stood near, and rode off in the direction of Madáran, whilst the head flew up and followed the rider, hovering high in the air perpendicularly above the body.

country round about Bhítargaṛh is often called *Madínah Madáran.* Within Bhítargaṛh there are two tanks, called *Kajlah* and *Patlah Taláo,* both from the times of Hazrat Ismá'íl. As in Paṇḍuah, a tame alligator lives in one of the tanks, and on calling 'Sadárí Madárí the animal will come near the land.

The great veneration in which Ismail's tomb at Madáran has been held, has given rise to the establishment of *Dargáhs* in other places. Thus at Darwíshpúr, near Haripal (W. of Biddabattee, E. I. R.) a spot is sacred to his memory; and near Shyúṛí (شیوڑی), or as we call it, Sooree in Bírbhúm, a field and a large tree are sacred to him, and travellers have to alight from their tattoos or palkees and humbly walk on foot past the field.

About a *kos* S. E. of Madáran, there is another place, which I cannot find on the Trig. Maps, called Dínánáth, where two large gateways are standing forming entrances to an enclosure containing about eight or ten *bighahs.* The gateways were erected, in A. H. 1136, or A. D. 1723-24, by Shujá'uddaulah Mútaminul Mulk Asad Jang, in commemoration of his return from Orissa to Bengal. People say, the enclosure was a standing military bázár (*farúdgáh*). I have succeeded in getting facsimiles of the inscriptions.

If we strip the legend of the headless rider of the wonderful, we have the plain story that Ismá'íl, Ganj i lashkar, a general of Husain Sháh, invaded Orissa from Bengal in the beginning of the 16th century, gained a signal victory over of the Orissians at Kaṭak, and then returned to Madáran, where he built a Fort within the walls of which he lies buried. Whatever difference of opinion may exist as to the historical value of legends in general, it strikes me that the Madáran legend confirms and completes, in a most unexpected manner, the Uṛia accounts from which Stirling extracted the above mentioned details of the Muhammadan invasion of Orissa.

II. *Paṇḍuah* (پنڈوہ).

Paṇḍuah is the second station after Húglí on the E. I. Railway. It was till lately the chief town of the Parganah of the same name and occurs as such in Todar Mall's rent-roll, where the Parganah is assessed at 1823292 dáms, or 45582 *R.* It became English in

September 1760, and formed part of what was then called the 'Zamindárí of Bardwán.' There were formerly fortifications, and traces of the old wall and ditch may still be seen at a good distance from the present village. The ruins of its old mosques, and the great size of its tanks with their massive *ghâts* amply confirm the tradition that Paṇḍuah was, till lately, a town of importance. Its paper manufactories existed till the beginning of the present century: the term *Paṇḍuí Kághiz* is even now well known among Muhammadans. The Paṇḍuah paper, I am told, was prized for its thinness and durability, whilst the *Arwalí Kághiz*, or paper of Arwal, a town and parganah in Bihár, on the right bank of the Son, is still valued for its thickness.

The inhabitants of Paṇḍuah are chiefly Muhammadans. In former times Hindús had been kept out, though of late lower castes, as shop-keepers, have settled there; but even now-a-days, I am told, not a single Brahmin is to be found there. The inhabitants all claim to have descended from the saint whose story is given below, and the nobility (*sharáfat*) of their origin is never questioned outside of Paṇḍuah.

With the exception of the Áín, I have not found Paṇḍuah mentioned in the works of Indian Historians. Another town of the same name, which the inhabitants of Paṇḍuah spoke of as the 'greater Paṇḍuah' (بڑا پنڈوہ), occurs often in the Táríkh-i-Fírúz Sháhí (reign of Fírúz Sháh, Ed. Bibl. Ind. p. 588, &c.). It lies north of Máldah on the road to Dinagepore, and is generally called on our maps *Purrooa*, instead of *Paṇḍuah*, the nasal *ṇ* being omitted, and the *ḍ* changed to *r*. It was a mint town,* and for some time the residence of Ilyás Bhangrah, king of Bengal (1343 to 1358.)

The decline of Paṇḍuah appears to be due to the epidemic for which the whole district is notorious; all whom I asked on this subject, unanimously attributed the decay of the town to the prevalence of fevers.

The places of historical and archæological interest in Paṇḍuah are the tower, two old mosques, of which one is in ruins, and the

* Thomas, *l. c.* p. 56, note. The two mints, Mu'azzamábád and Ghiáspúr, mentioned by Thomas on pp. 61, 62, can perhaps be verified. The former is probably the same as Mu'azzampúr in Sunnárgánw; the latter belongs to Lak'hnautí.

The ruins of Great Paṇḍuah deserve to be examined. In Vol. XVI. of our Journal, p. 397, the two Paṇḍuahs are confounded.

tomb of Sháh Çafíuddín (شاه صفي الدين), which lie close togethe about twenty minutes' walk from the station. Without enterin into a minute description of these buildings, which I wish reserve till several drawings have been completed, I may state th the tower resembles in structure the Quṭb Manár near Dihl The inside walls are well enamelled. A fine view may be ha from the top. The mosque to the west of the tower, is very lon and low, as early Pat'hán mosques are. Within are two rows 21 pillars each, 6 feet high, with high arches. The roof contai 63 very low cupolas. On the west side is a steep declivity, at th foot of which is a tank. The mosque is built of small light-re bricks which, like the 42 pillars, once belonged to a Buddhi temple. The whole east side of the mosque is one mass of Buddhist ornaments in excellent preservation. The pillars inside are basalt ;* about half of them are well ornamented, others are barel cut. The distance between the doors is the same as the thickne of the walls, about one yard and three quarters. The inner wester wall is ornamented with low niches of Buddhistic design. In th N. W. corner of the mosque a high platform has been erected solid masonry with a small room on it, which is said to have serve Sháh Çafí as *Chillahkhánah* (چله‌خانه, or room to which hermit withdraw for forty days). Outside the mosque a few unfinishe basalt pillars lie about. There is no inscription on the mosque Across the road, south of the tower, is the *Astánah* (threshold) o tomb of Çafíuddín. It has no inscriptions on its walls. Wes of the tomb is a ruined mosque of the 14th or 15th century, wit ornaments half Buddhistic, half Musalmán. It has outside thre basalt tablets, with Arabic inscriptions in large Ṭughrá character containing verses from the Qorán, &c. There is another inscriptio inside. They are very high on the walls ; facsimiles are bein taken of them. The story goes that the mosque was built by rich merchant in fulfilment of a vow made by him for the safe re turn of his ships (to Sátgánw ?) ; but he built it with chunam mad out of cowries, and demanded, moreover, that no one should repai it unless he took the same kind of lime. ' Hence it is now in ruins.

* Dr. Stoliczka informs me that the basalt of these pillars is the same as th basalt found in the Rájmahal Hills.

from Paṇḍuah. Sháh Çafí was a man of illustrious descent. His father, Barkhurdár, was a noble of the Court of Dihlí, and had married a sister of the Emperor Fírúz Sháh. Once a feast was given in Paṇḍuah, to celebrate the circumcision of a boy, and a cow had been killed on the occasion. This sacrilege was reported to the Paṇḍub Rájah, who had the child killed. Çafí then went to Dilhí, complained to his uncle, the emperor, and asked him to give him a sufficient number of troops to punish the Rájah. His request was granted; but as the expedition was a religious war, Çafí before setting out for Bengal, went to Pánípat-Karnál, to ask the blessing of Bú 'Alí Qalandar, a renowned saint. The blessing was not withheld, and the saint assured Çafí that he had received the glad tidings of victory from heaven. Çafí now moved to Paṇḍuah. In his army there were also two other men of renown, Zafar Khán i Ghází, whose shrine is at Tribení, north of Húglí, and Bahrám Saqqá, who had imposed upon himself the task of serving as Bhíshtí (*saqqá*) in a war against infidels. His shrine is at Bardwán. But it was a difficult matter to crush the power of the Rájah; for near his residence at Mahánáth he had a tank, the waters of which possessed miraculous powers; and whenever a Hindú had been killed, the Paṇḍub Rájah threw the dead body into the tank, and life and health were immediately restored. Çafí soon saw that his efforts would be fruitless, unless the restorative power of the tank was first broken. This was at last accomplished by some faqírs who had attached themselves to his expedition. They killed a cow, and managed to throw the liver into the tank, when all at once the Devs, upon whose presence the virtue of the water depended, went away. The Rájah was now easily defeated, and his power completely broken. The old temple in Paṇḍuah was also destroyed, and the present mosque built with its materials. The large tower was used as Manárah for the call to prayer, and every Hindú was driven out of the town.

'Çafí soon after continued his wars with the infidels, and was at last killed in a fight. His children buried him at Paṇḍuah, and erected the vault, which, together with his mosque, still exists. His descendants increased so rapidly, that Paṇḍuah soon became a large place. The fame also of the nobility of its inhabitants, who all

The President felt sure that the Society would give hearty encouragement to Mr. Blochmann in his efforts of collecting the scattered traditions of the country. The stores must be rich, for no other form of history obtained among the people, and that the necessary faculty exists in full development is shown by the extraordinary performances of those pandits whose business it is to recite the sacred books.

Babu Rajendralala Mitra, after a few remarks on the paucity of historical records among the Hindus, said that when the Society undertook the compilation of the Muhammadan historical series in the Bibliotheca Indica, it was expected that a flood of new light would be thrown on the mediæval history of India.

The works selected, were mostly the writings of eye-witnesses of men who either took part in the occurrences they described, or were so favorably situated as to be familiar with, or able to collect the most authentic records of their times. Their works too were full of the minutest details and held in the highest estimation by the people of this country. Owing, however, to shortcomings on the part of the editors, and some other causes, those materials had not been sufficiently utilized. He was glad, therefore, to notice that Mr Blochmann had taken up the task, and the interesting paper that had been read to the meeting, shewed what valuable use may be made of them. There were many nooks and corners in Bengal—many monuments of old—the history of which was completely enveloped in darkness, and which can be only brought to light by a diligent study of the records. The tower of Panduah had attracted the notice of every traveller by the East Indian Railway, but none could get any information about it from the people of the country Mr. Blochmann's paper will now unveil the mystery that hung over it. The Babu, in conclusion, expressed a hope that Mr. B would do for other districts of Bengal what he had so ably done for Hooghly and Burdwan.

The Rev. J. Long observed that he had obtained from the neighbourhood of Panduah two Budhist coins which are about thirteen hundred years old, and indicate that Budhism must have been at that time flourishing in those districts.

At the close of the meeting, the President introduced to the members present His Excellency Mons. de Baronowsky, a Russian gentleman, late Governor of the Province of Orenberg. The fact that the Society had in the last number of its Proceedings republished some important papers upon Central Asia indicated the great interest which it took in the countries constituting the Russian Empire, and he was sure they would be glad to welcome their distinguished visitor. The President's proposition was warmly seconded by the meeting.

M. de Baronowsky, in expressing thanks to the President and to the members, briefly alluded to the object of his visit to India, and spoke of the great scientific and commercial importance which attaches itself to an intimate relation of the Indian possessions with Northern Asia.

LIBRARY.

Additions to the Library, during the month of March, 1870.

*** Names of donors in capitals.

Presentations.

Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. IV, Part I.—THE ROYAL ASIATIC SOCIETY.

Journal of the Chemical Society, Vol. VII, for November and December, 1869, 2nd Series, Vol. VIII, January, 2nd Series, 1870. —THE CHEMICAL SOCIETY.

Journal of the Royal Geological Society of Ireland, Vol. XII, Part II.—THE ROYAL GEOLOGICAL SOCIETY OF IRELAND.

Proceedings of the Royal Society, Vol. XVIII, No. 116.—THE ROYAL SOCIETY.

Proceedings of the Royal Institution of Great Britain, Vol. V, Nos. 49, 50, 51.—THE ROYAL INSTITUTION OF GREAT BRITAIN.

Bulletin de la Societé Géographique, Janvier, 1870,—THE GEOGRAPHICAL SOCIETY OF PARIS.

Proceedings of the Portland Society of Natural History, Vol. I, Pt. II.—THE PORTLAND SOCIETY OF NATURAL HISTORY.

Jahrbuch der Kaiserlich-Königlichen Geologischen Reichsanstalt. Band XIX, April, May, June.—THE IMPERIAL GEOLOGICAL INSTITUTE OF VIENNA.

Bijdragen tot de Taal-land-en Volkenkunde van Nederlandsch Indie, IV-1.—THE BATAVIAN SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deal XXX. —THE BATAVIAN SOCIETY.

De Wajangverhalen van Pala Sara, Pandoe en Radhen Pandji in het Javaansch, met Aanteekeningen, door T. Roorda.—THE BATAVIAN SOCIETY.

A Treatise on Asiatic Cholera, by Dr. C. Macnamara,—THE AUTHOR.

Etude sur le Lalita Vistara, by P. E. Foucaux,—THE AUTHOR.

Indo-Parthian Coins, by E. Thomas, Esq.—THE AUTHOR.

Rahasya Sandarbha, Vol. V. No. 57,—THE EDITOR.

Report on the Charitable Dispensaries under the Government of Bengal 1868, by J. Murray, Esq., M. D.—THE GOVERNMENT OF BENGAL.

Selections from the Records of the Government of India, Home Department, No. LXXII to LXXIV.—THE SAME.

Records of the Geological Survey of India, Vol. II, Pt. 2, 3 and 4.—THE SAME.

Report on the Cartographic Applications of Photography, by Lieut. J. Waterhouse.—THE GOVERNMENT OF INDIA, HOME DEPARTMENT.

Annual Report on the Convict Settlement of Port Blair for the year 1868-69.—THE SAME.

Selections from the Records of the Government of India, Foreign Department, No. LXXIII,—THE GOVERNMENT OF INDIA, FOREIGN DEPARTMENT.

Report on the Revenue Survey Operation in British Burma, 1868-69.—THE BENGAL GOVERNMENT.

Report on the Revenue Survey Operation of the Lower Provinces, 1868-69.—THE SAME.

Report on the Vegetation and the Forests of the Andaman Islands, by Mr. S. Kurz.—THE SAME.

The Seven Pagodas, by Capt. Carr, (with plates).—THE MADRAS GOVERNMENT.

General Report on the Topographical Survey of India, 1868-69. by Col. Thuilier,—THE SURVEYOR GENERAL.

Records of the Geological Survey of India, Vol. III, Pt. 1.—THE GEOLOGICAL SURVEY OF INDIA.

Purchase.

The Annals and Magazine of Natural History, Vol. V, No. 26.

Comptes Rendus, Tome LXX, No. 1 to 5.

Journal des Savants, Jan., 1870.

Revue des Deux Mondes, 15th December, 1869, 1st and 15th Jany., 1st Feby. 1870.

Quarterly Review, No. 155, January, 1870.

Westminster Review, January, 1870.

North British Review, No. 102.

American Journal of Science and Arts, No. 44.

Indian Annals of Medical Science, No. XXVI.

Revue Archeologique, Jan. 1870.

The Ferns of British India, Part XXIII.

Jacut's Geographisches Wörterbuch, Vierter Band, Zweite Hælfte, von F. Wüstenfield.

Assyrian Dictionary, by E. Norris, Pt. II.

Facts and Arguments for Darwin, by F. Müller.

Numismata Orientalia illustrata, by the late W. Marsden.

Vergleichende Grammatic, Zweiter Band, Erste und Zweite Hælfte, von F. Bopp,

Fragmenta Historicorum Arabicorum.—Tomus Primus, continens partem tertiam operis Kitábo-'l-Oyún wa 'l-hadáïk fi akhbári 'l-hakáïk, quem editerunt M. J. de Goeje et J. P. de Jong.

Indische Streifen, (Zweiter Band), von Albrecht Weber.

The London, Edinburgh, and Dublin Philosophical Magazine, Vol. 39, No. 259.

Mirát ul 'Arús, by Maulwí Názir Ahmed.

Geschichte der Sprachwissenschaft und Orientalischen Philologie in Deutschland, von T. Benfey.

Exchange.

Athenæum, January,—Nature, Nos. 10 to 18.

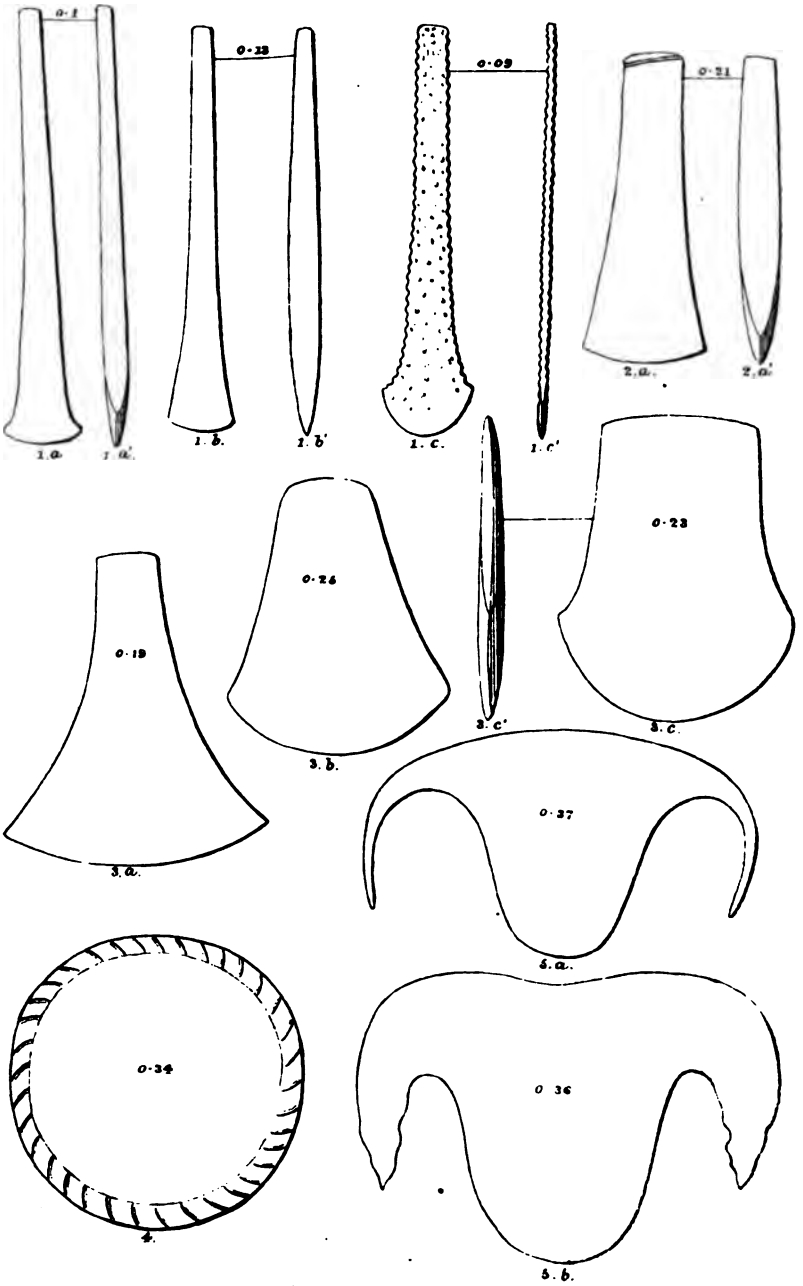
some idea of the shape and dimensions of the various articles.—I have this day despatched a box containing specimens of each.

"4. The copper pieces are divided into three sets shewn (on pl. II), in the figures 1, 2, 3, in all there are many variations in shape, size and weight. The following dimensions of the type represented by Fig. 1a—1c shew the principal difference in size of the various specimens in inches, as—length $24\frac{3}{4}$, $21\frac{1}{2}$, $17\frac{1}{2}$; breadth in front, or at the sharpened and wider end-4, 3; breadth near the middle $2\frac{1}{2}$, $1\frac{1}{2}$; the thickness varies from $\frac{3}{4}$ to $\frac{1}{4}$ inches. The various dimensions of the type represented by Fig. 2 are in inches: length $8\frac{3}{4}$, 4; breadth at the sharpened end $6\frac{1}{4}$, $5\frac{1}{4}$, $2\frac{7}{8}$; breadth above 1, $2\frac{1}{4}$; breadth in the middle $2\frac{1}{2}$; and the corresponding measurements of the form shewn in Fig. 3a—3c are in inches: length $7\frac{1}{4}$, $6\frac{3}{4}$, $5\frac{1}{4}$; greatest breadth in front, or at the sharpened end, $6\frac{1}{4}$, $4\frac{1}{2}$, $2\frac{3}{4}$; breadth above, or at the narrow end 4, $3\frac{1}{2}$. Of these copper pieces were found—of fig. 1, 90, of fig. 2, which gradually passes into the next, 25 specimens, and of the form shewn in fig. 3, 209.

"The silver pieces are principally of two different shapes, one circular and the other cornuted, somewhat like the upper portion of a bull's head with large downward curved horns, (see figures 4 and 5). The greatest diameter of these thin plates varies as follows—5 inches, $4\frac{1}{2}''$, $5\frac{1}{2}''$, the shorter or vertical diameter of the cornuted pieces varies from $4''$ to $5\frac{1}{4}''$. There were found 39 pieces of the form represented by fig. 4, and 63 of that represented by fig. 5a and 5b.

"5. The place where the discovery was made, is a piece of waste land, contiguous to the present village of Gungeria; the spot where the excavation was made, is about 100 yards to the south-west of the village, and about a mile from the nearest neighbouring village, the hole in the ground from which all were taken, is only about 3 feet long by 3 wide and 4 deep. All the inhabitants agree that, until about 20 years ago, this particular place was always covered with jungle; during that year it was cleared and planted with *kúdú*, and that since then, has been left uncultivated as a grazing-place for the village cattle.

"6. The oldest residents in the neighbourhood are unable to throw any light on the origin of these curiosities. The copper pieces, judging from their shape and size, appear to have been in-



for reference see p.132.

tended, some for axes and others for "phals" or spuds (an implement used for removing the earth adhering to ploughs). The silver pieces may have been used for ornaments, and the mark (about one-eighth of an inch in width) which is visible on all of them, leads one to believe that they were at some time or other set or inlaid in something, possibly wood, or lime; one disc of silver has a number of small holes pierced round the edge.

"7. The copper pieces when found, were arranged carefully, the longer pieces being in alternate transverse layers, and the others in regular order one above another. The silver was found in a lump by the side of the copper, all the plates adhering together, so that at first it looked like a ball of earth. The quality of both the silver and copper has been pronounced by local goldsmiths to be very good.*

"8. Nowhere within the borders of the village of Gungeria are there traces of anything which can lay claim to antiquity. But about 3 miles to the south-east, around the village of Mhow (or Mow), there are ruins of a Buddhist temple of considerable antiquity, and many roughly carved stones which show that, when the surrounding country was covered with jungle, this place (Mhow) was inhabited, and of some importance. About 4 miles to the north-east of Gungeria, on the top the hill of "Soonderdeyhe" is a Gond shrine, of some note, surrounded by a low wall of loosely packed undressed stones; a path, winding between the rocks and clumps of bambús, and commanded at intervals by traverses of loose stones, leads up from the valley below. The hill is covered with, and surrounded by, thick jungle, so that, without guides, it would be almost impossible to find even the path leading to the shrine.

"9. The copper implements, or arms whichever they may be, are perhaps remnants of the copper age. Most of them have apparently never been used, but there are a few with turned edges and broken corners and other marks of wear and tear. The fact that hardly two of the copper pieces are of the same size, weight or

* Mr. A. Tween examined both, the copper and silver, and found the former to be almost pure; it contained only about one half per cent. of lead. The silver contained 0.37 per cent. of gold, which quantity is often to be observed in old silver utensils or ornaments. [Edit.]

shape, and the marks of the hammer (see fig. 1c), which are plainly visible on some, lead to the belief that all were made up by hand and not cast.

"10. The silver discs are nearly all of the same shape and size, but the horned pieces vary considerably; all are very thin. On first looking at these, the idea strikes one, that the circular discs were first made and the cornuted pieces or tridents were afterwards cut out of them. But on carefully comparing one with the other, it was found that some of the tridents are much larger than the discs and, therefore, could not have been cut out from them. No pieces, fragments or clippings of any kind were found.

"11. If these implements and ornaments are so interesting as at first sight they appear to be, you will perhaps kindly let me know the opinion of your Society, of their date, origin, &c. For my part, I shall be only too happy to give or procure for you any information I can gather regarding them, or any other remains of archæological interest in the neighbourhood."

Dr. Oldham drew attention to the remarkably good style of workmanship exhibited in the manufacture of these copper remains. Some of them were beautifully sharp and the hammer marks were still visible, but they hardly could be brought in close comparison with implements from the so-called copper age of Europe. Very few exhibited any proof of having been in use, one or two did so, either by the edges being chipped or broken, or by the hammered in and beaten tops. From Mr. Bloomfield's description of the locality and the condition under which these implements had been found, it appeared very probable that they formed a treasure or were accumulated and put away for safety. The silver pieces were said to be like those used to attach to the front of dedicated Bulls, but some of the native members would be better able to speak to this.

Bábu R. Mitra said that the silver pieces are somewhat similar to those now used for the object mentioned by Dr. Oldham, but he was in doubt whether those submitted to the meeting had really served the same purpose or not. The present race of cattle, he thought, had the horns turned upwards, not downward as in these, and pieces imitating the former shape are now in use.

2. From Bábu Gopinátha Sena,—a copy of a Table shewing the mean monthly variations of the Barometer in the Surveyor General's office, Calcutta, from 1855 to 1869.

From R. V. Stoney, Esq.—a piece of a calcareous tuffa taken out of a Sísú tree near Cuttack.

The following letter, addressed to Dr. T. Oldham, was received with the specimen,—

Cuttack, April 17th, 1870.

"By to-day's post I send you a bit of limestone which I took out of the heart of a Sísú tree.

"I do not know whether such a thing is generally known, or whether it is only down here where trees present such a peculiarity. Perhaps you will bring it to the notice of the Asiatic Society, if you think it deserves mention.

"Many trees in the Tributary Mehals have pieces of this stone in fissures in them, but principally Assin, Swarm, Sisú, and Ablous. I have seen a piece as long as 7 inches by 2 inches thick, but quite irregular in shape, it generally is found about six feet from the ground, the wood closes up again after receiving it. The natives use it for eating with pawn, and have a curious way of burning it, which is by putting a piece of the stone with a lighted bit of wood into a handful of straw, then turning a twisted straw rope round it, and swing it round the head for a few minutes, when it is found fully burnt, and ready for use."

Several members made observations on the specimen submitted. It appeared clear that the calcareous tuffa must have been formed in the tree, and perhaps the lime had been dissolved by the atmospheric water out of the substance of the tree and then again deposited. The only objection against this explanation would appear to be, that most of the trees, mentioned by Mr. Stoney as containing pieces of the lime, are growing on siliceous ground, and Mr. Kurz to whom the specimen was submitted, stated that he occasionally met with very small siliceous concretions in some of those trees, as also in bambús, but never with any deposits of lime.*

* The specimen, though enclosing portions of old wood of the tree, does not exhibit any such structure as would lead to suppose that the origin of formation can be attributed to insects; it rather seemed as if the decayed wood had been

Dr. Oldham promised to obtain further information on Mr. Stoney's interesting discovery.

From the Rev. C. H. Dall,—From Calcutta to London, by the Suez Canal.

From Wm. H. Dall, Esq., through the Rev. C. H. Dall,—Materials for a monograph of the family *Lepetidæ*.

The following gentlemen duly proposed and seconded at the last meeting were ballotted for and elected ordinary members.

Dr. Warth, Agra.

Dr. W. Schlich, Deputy Conservator of Forests.

J. E. Dobson, Esq., M. D.

C. Macnaghten, Esq.

Rájá Satyanand Ghoshál.

G. H. Damant, Esq.

The following gentlemen are candidates for ballot at the June meeting.

Bábu Vrindávanachandra Mandala, Zemindar of Balasore, proposed by Bábu Rájendralála Mitra, seconded by Mr. H. Blochmann.

W. W. Hunter, Esq., LL. D. proposed by the Hon'ble J. B. Phear, seconded by Dr. J. Ewart.

Sir Richard Couch, proposed by the Hon'ble J. B. Phear, seconded by the Hon'ble J. P. Norman.

Rájá Ameer Hussun, Khán, Bahádur, Talookdár of Mahmúdabád, proposed by Moulvie Abdoollateef, Khán, Bahádur, seconded by Bábu Rájendralála Mitra.

The following gentlemen have intimated their desire to withdraw from the Society.

Capt. W. J. Seaton.

E. Wilmot, Esq.

Bábu Priyanátha Setha.

The Council reported that, on the recommendation of the Philolo-

cemented by the lime. Mr. Tween made a rough analysis of a small portion of the specimen, and found that 50 grs. of the limestone lost on ignition 4.2 grs., and dissolved in nitric acid left 0.9 of insoluble matter. This equals to — organic matter - - - - - - 8.4 per cent.
soluble (mostly carbonate of lime,) - - 89.8
insoluble (silica, alumina &c.) - - - 1.8. [EDIT.]

gical Committee, they have resolved that the following works be printed in the Bibliotheca Indica—

The Sáma Veda.

The Farhang i Rashídí.

The Council proposed—that the elections of the following gentlemen, not having complied with the conditions of Rule 5 of the bye-laws of the Society, are to be cancelled,—N. Daly, Esq., A. J. Hughes, Esq., the Rev. J. Marks, Lieut. C. H. T. Marshall, T. W. Rawlins, Esq., Major J. F. Sherer, Lieut. Col. J. Morland.—The proposition was carried.

—That Rs. 100 due from the following gentlemen, dead, be written off,—from J. Furlong, Esq., Rs. 64, R. Jardine, Esq., Rs. 12, J. Kavenagh, Esq. Rs. 24,—Carried.

—That the names of the following gentlemen, not having complied with the conditions of rule 13 of the bye-laws of the Society be struck off the member roll,—C. Davies, Esq., Mahárájá Sir Mánsing Bahádur, Bábu Rájendra Datta, Bábu Ramanátha Sásu, A. Fisher, Esq.—Carried.

The President also brought forward, on behalf of the Council, the following proposition, due notice of which was given at the last meeting of the Society: "That a donation of Rs. 100 out of the Society's Funds should be made in aid of the subscription for Mrs. Piddington."—Carried.

The following papers were read:—

I.—*Notes on Old Dihlí,—by* J. O. Tremlett, Esq.

(Abstract.)

Mr. Tremlett in this paper restricts his remarks to such ancient Hindú and Pat'hán buildings as have a historical or architectural interest, and are situated in or around the site of old Dihlí. The paper forms an excellent supplement to General Cunningham's reports, published in Vol. XXXIII of the Society's Journal.

The following places are described in this paper—the Tank of Súraj Kanḍh, the Colonnade of the Great Mosque at the Quṭb Manár, the mosques of Shamsuddin Iltitmish (Altamsh), Sulṭán Ghárí, the tomb of Ghiásuddín Balban, 'Ádilábád, the Palace of Fírúzábád, the mosques of Jahán Khán, the tombs of Fírúz Sháh Tughluq, Mubárik Sháh, Sikandar Lodhí, and the Puráná Qil'ah

The paper concludes with a very interesting chapter, entitled "*Proposed Criteria towards fixing the dates of Pat'hán buildings at Dihli.*" Dr. Oldham read some portions of the paper and expressed the hope that Mr. Tremlett's notes may soon be printed in Part I of the Society's Journal.

II.—*On the Relation of the Uṛia to the other modern Aryan languages*, by J. Beames, Esq., B. C. S.

Mr. Beames, in this paper, alludes to the appearance of a Bengali pamphlet, 'Uṛia not an independent language,' by Bábu Kántichandra of Balasore. Though 'destitute of philological acumen,' the book had caused some sensation, and induced Mr. Beames to institute a comparision between Uṛia and Prakrit. He had come to the conclusion that Uṛia was a sister, not a daughter, of Bengali.

Mr. Beames hopes in a short time to bring out his Comparative Grammar of the Aryan Languages of India, in which the arguments will appear in a fuller form.

Bábu Rájendralála Mitra then rose and addressed the meeting at some length. He said that all along he had been of opinion that Uṛia was a daughter of Bengali, and that Mr. Beames' arguments had not changed his opinion. He thought that Mr. Beames' proofs were very limited, both in number and force. The differences between Uṛia and Bengali were altogether so insignificant, that no calm observer would look upon them as anything but slight dialectical deviations or differences in pronunciation. He certainly believed with Mr. Beames, that a *chása* of Gumsar would not understand a *chása* of Dacca; but he also believed that a peasant of Kent would not understand a peasant of York, and yet no one would call the dialect of either a sister of the English Language.

Mr. Beames' paper and Bábu Rájendralála Mitra's strictures will shortly appear in the second fasciculus of the Philological Part of the Journal.

III.—*Note on a Persian MS. entitled* MIR-A'T UL QUDS, *a Life of Christ compiled at the request of the Emperor Akbar by Jerome Xavier,* —*by* H. BLOCHMANN, ESQ., M. A., *Calcutta Madrasah.*

The curious Persian MS. which I have the pleasure of exhibiting to-night, was given to me by the Rev. Mr. Don of the Calcutta Free

Church. The work is entitled *Mir-át ul Quds* or 'Mirror of Sanctity,' and is a Life of Christ, written in A.D. 1602, at the request of the Emperor Akbar, by Jerome Xavier, nephew to the renowned Francis Xavier. Hough in his History of Christianity in India, (Vol. II, p. 282) says of Jerome Xavier—'Having studied Persian for the purpose of commending Christianity to the Emperor himself, he composed two works in that language; the first entitled, *The History of our Lord Jesus Christ.* The second, *The Life of the Apostle St. Peter.* These works were interwoven with Persian legends,* which he imagined would render them more acceptable to his imperial disciple.' In a foot note, he adds—

'These two works, in manuscript, fell into the hands of Louis de Dieu, a celebrated professor of oriental languages in the University of Leyden, who published them with a Latin version, and some notes, "which, says the Jesuit Alegambe, were worthy of the fire." * * The purport of Louis de Dieu's notes was, to defend the Sacred Scriptures against the imputation of sanctioning such gross falsehoods as Jerome Xavier had mixed up with them. * * * Besides his works on the Gospel, J. Xavier composed a similar version of the Koran in Portuguese. * * *La Croze, pp.* 332, 333.'

The MS. before the meeting, is the first of the abovementioned works. Although Xavier's works have been translated, for polemic reasons, into Latin by Louis de Dieu, who was professor of Oriental Languages at Leyden in 1639, or twenty-two years after J. Xavier's death, I thought that the insertion in our Journal of a short notice of this curious MS., from a *literary* point of view, might not be out of place. On previous occasions I drew the attention of the members to the religious views of the Emperor Akbar, by laying before them passages bearing on this subject, which I had collected from Muhammadan Historians. A short notice of Le Dieu's translation itself might form a fitting sequel to my former remarks; but the discovery, in India, of a MS. of J. Xavier's text, is a

* This is not the case. Neither the Mir-át-ul-Quds, nor the history of St. Peter, contains Persian legends. That Jerome Xavier should have mixed up *Persian* legends, in order to please Akbar, is most improbable, unless Hough means *Pársí* legends. There is sufficient evidence in the *Mir-át-ul-Quds* to shew that J. Xavier was thoroughly acquainted with Akbar's religious views.

matter of some curiosity, when we remember the anxiety of Akbar's successors to destroy the monuments of his apostacy from Islám. Le Dieu's translation of the *Mir-át ul Quds* is not in our Library. We have only his text and translation of the life of Peter (No. 37 in our Catalogue).

The following is a translation of J. Xavier's preface.

Alláhú Akbar!

Mir-át ul Quds, in which an account is given of the wonderful history of I'shú' Kiristús, and of his heavenly teaching and his miracles.

Words intended to be spoken at the time of prostration (*zamínbos**) before His Majesty.

When the extraordinary accounts of the Messiah spread over the surface of the earth, Abgar, king of Edessa, desired to see him. He therefore sent a messenger to him with an invitation to come to his kingdom, the half of which was at his service. He also sent a skilful painter who was to take the likeness of Christ, so that the king might at least have a portrait of the Saviour, should he not be willing to come to Edessa. The messenger saw Christ and brought him the invitation.

When he heard that Christ found it inconvenient to go to Edessa, the painter 'collected his strength,' called his whole genius into play, and drew a likeness which surpassed his expectations. But when on the following day, he compared the portrait with the features of the Messiah, he was ashamed of his work. He then set about to alter it, and his feeling of shame left him, and he glorified God. The second and third days he studied the features deeper; but he only got more ashamed than he had been before. He renewed his attempts. All, however, was in vain: whatever he completed to-day, he had to reject the following day, till he despaired of his art, and grew thoroughly ashamed and sorry.

But Jesus had compassion on him, and asked him, at the time of his departure, to give him a cloth. The painter did so, and Christ drew it over his face and returned it to him. To his great joy, the painter saw that the saintly features of the Messiah had

* *Vide* Aín translation, p. 213, note 2. The story of king Abgar of Edessa was intended to furnish a parallel between J. Xavier and the painter; but there is a *lusus verborum* in the names *Abgar* and *Akbar*, which the Oriental mind understands to appreciate.

to

left a clear and faithful impression on the cloth. The painter took it to Edessa, and gave it to his king, who preserved it rejoicingly, and shewed it every honor and adoration. By its means he conquered all his difficulties.

This story I have, not without reason, put in the beginning of my work. Your Majesty has heard an account of Christ's sublimeness and greatness according to authorities* which differ in their evidence; and as you expressed a desire to have a truthful account, you were pleased, in your search for truth and love of wisdom, to order me, the meanest of your servants, Pádrí Jerome Xavier,† whom you have graciously admitted to Court, to write in Persian a history, containing everything done and said by Christ, as we find it in our books. Having been engaged in this calling for forty years, and studied Persian for seven or eight years, I now eagerly and zealously fulfil your Majesty's command. I have thrown my whole heart into this work, and girdled myself with the waistband of zeal; I have spent many days in completing this book, and denied myself the comforts, and even the necessaries of life, in order to carry out the wishes of your Majesty, who is God's shadow on earth. Royal orders cannot in a less degree be honoured, especially in matters which to conceal would do men harm, and which to promulgate is an act of worshipping God,‡ as the angel Raphael said to Tobias—'To guard the secrets of kings is good; but to make God's hidden wisdom known to men, is laudable and approved of by all.'

If in presenting this book and portrait of Christ to your Majesty I have been late, the truth is, that I made several attempts, thinking after my own fashion that I had completed it; but as often I made a clean copy of my rough notes, and compared the Persian with the features of the Latin (لطين, *laṭín*) original, I was dissatisfied, and what I had looked upon as complete, appeared deficient and defective, so much so that I, too, was ashamed of my work, and

* J. Xavier evidently means the numerous Muhammadan histories of the Prophets. Thus the *Rauzatuṣṣafá*, a work which Akbar prized, contains a rich collection of Eastern tales regarding Christ.

† The text has زيرونيمو شوير *Zeronímo Shavír.*

‡ Akbar's favourite phrase; *vide* my *Áín* translation, p. 11.

dispaired of my capability and understanding. But I prayed without ceasing, and by the mercy of God, and the auspiciousness (*iqbál*) of your Majesty's reign, I have overcome my difficulties, and am now at last satisfied with my work. I therefore make bold to lay the book at the foot of your throne. May Christ bless your Majesty, and all that listen to its contents! I am perhaps not wrong in thinking that of all works which, during the reign of your Majesty, have been translated into Persian, this work will recommend itself most to your Majesty's attention; for no book of this nature appears to have been composed in former times, because either Persian scholars were not acquainted with Latin, or Latin scholars did not understand Persian, or because there never was a king who, like your Majesty, loves wisdom for its own sake, and searches for it with an equal amount of zeal.

I therefore hope that your Majesty will be pleased to accept this work, less for the labour and devotion which enabled your servant to complete it, but because it shews who Jesus was, and what he did and taught.

Let it be known that this book is divided into *four* chapters. The *first* chapter treats of the birth of the Messiah and of his life prior to the commencement of his teaching. The *second* chapter gives an account of his miracles and his doctrine. The *third* chapter describes the circumstances of his death, and what, in his love, he suffered for the salvation (*salámati*) of men. The *fourth* chapter gives a sketch of his resurrection and ascension.

I have not written down all I could have written. However, the work as it is, will, I trust, sufficiently shew your Majesty, what Christ was.

As the footprint shows the size of the elephant, and the mark of the paw the strength of the lion, so will, I hope, this work shew your Majesty my zeal to serve you. I intreat your Majesty to order this book to be read in your august assembly; for its doctrine is the source of all virtue, and peace of mind, and balm for the soul. People may say that all books are balm for the soul; but this book above all others will give peace to your Majesty's heart, as Christ has said—'My word is balm for the soul, and eternal life.'

I have to premise that the greater portion of this work is taken from the holy Gospels, and I have avoided citing from other writings; but I have noted my authorities in the margin* of the book, where I have also given the headings of the several chapters. Several of the Christian doctrines set forth in this book may, indeed, defy and vex man's understanding; but they are a mirror reflecting Divine truth, and are fully explained in other works of mine which are nearly ready, and which, with God's assistance, will soon be finished.

May the Lord Jesus take your Majesty in His keeping and, according to the desire of your servant, vouchsafe you His knowledge, upon which alone the salvation of your soul depends.

Written at Ágrah, 15th Urdíbihisht (April) 1602.

The book ends with copies of two letters, one written by Pilate to the Emperor Tiberius and the Roman Senate regarding Christ, and the other written by 'Lintul,' Pilate's predecessor to Tiberius, regarding the external appearance of Christ.

J. Xavier then mentions a Maulaví of Láhor who assisted him in the Persian translation, and says—

'This sublime book and its auspicious preface have been compiled from the Gospels and other prophetic books by me, Pádrí Zerónimo Shavír, the Firingí, of the Society of Jesus, at present in Ágrah, by order of the king of kings, the enlightened ruler, the lord of the age, Jaláluddín Akbar, the greatest (*akbar*) of kings. May God perpetuate his reign!—; and Mauláná 'Abdussattár, son of Qásim, of Láhor,† now residing at Ágrah, has translated it, jointly with me (*ba ittifáq i man*), in the year 1602, the 47th year of the reign of His Majesty.'

* They are not given in the MS.

† Hough (p. 285) calls him '*Abdel Senarin Kasem*, which is no Muhammadan name. If Le Dieu gives this name, he must have read عبدالستارين قاسم, for عبدالستارين قاسم.

How well J. Xavier knew Akbar's peculiarities may be seen from the fact that he calls him *Jaláluddín Akbar*, instead of *Jaláluddín* Muhammad *Akbar*. Akbar disliked the name *Muhammad*. Abulfazl also, in his list of Akbar's Grandees in the Áín, leaves out the names *Muhammad* and *Ahmad*, whenever practicable.

The following table of contents of the first Chapter will give a good idea of the nature of J. Xavier's life of Christ.

Chapter I.

The Childhood of Jesus.

The birth of Mary. The good circumstances of her parents. An angel appears to her father at Jerusalem, announcing Mary's birth. The parents return to Nazareth. Anna, Mary's mother, conceives, Thursday, 8th December, or 16th *Dímáh* of Akbar's Era. Mary born, 8th September, or 15th *Shahríwar* of Akbar Era. Meanings of the word *Mary*. The angels announce Mary's birth to some inhabitants of Nazareth. Mysterious music heard from heaven. The inhabitants of Nazareth resolve to keep the 8th September a holiday. Papal edict of A. D. 1250 regarding the celebration of the Day. Mary is consecrated to God in the temple, on Friday, 21st November, or 29th Áb́án of Akbar's Era, and put under the care of pious female teachers. An account of wonderful events which took place on her going up the steps of the temple. Her daily occupations in the temple, her virtues. She uses continually the phrase *Deo gracias*. She remains in the temple up to the age of thirteen. Wonderful election of Joseph as her husband. Joseph is forty years old, his virtues, his purity. How painters usually represent him. Reasons why Mary was married to Joseph, the chief object being to confound Satan, who knew from the prophetical books that the Messiah would be born of a virgin—hence, though watchful, he did not look for her among married women. Description of Mary, her slender wrist, oval face, light brown complexion, large blue eyes, golden hair, long hands, elegant fingers.

Birth of Christ. Gabriel's announcement. Mary's age is 13 years, 6 months. Meaning of *Nazareth*. Interview of Mary and Elizabeth. Inferences regarding the spiritual power of Mary. Birth of John. Doubts of Joseph. He will not complain to the Ruler of Nazareth, resolves to flee and leave Mary. God sends an angel to him in a dream. Christ born, exactly at 12 o'clock, midnight. Mary worships her son. Gospel events. No original sin. Events which took place in other parts of the world at the time when the Messiah was born. An olive oil spring appears in Rome, becomes a large river, and flows into the sea. The temple of Janus closed,

general peace. Conversation between the emperor Augustus and Sibylla, who shews him a likeness of Christ. Curious voices from heaven. A temple of Apollo falls in. Appearance of three suns in Spain, gradually flowing into one. In another part of Spain, a cloud of light appears.

Account of Herod. Jacob's prophecy that the Messiah would be born during his reign, is fulfilled. Circumcision. The three wise kings of Arabia, and an account of how their bodies, after their death, came to Constantinople, then to Milan, and at last to Cologne, where they are at present. Their coming was foretold in Psalm lxxi and Is. lx.

Jesus presented in the temple. Doubts of Simeon regarding the possibility of a virgin giving birth to a son. He thought that the word *virgin* was a mistake of a copyist. He is now convinced of his error. Story of Hannah the prophetess. A feast held to her honor in A. D. 570 at Constantinople, after an epidemic. The feast ordered to be generally observed by Pope Sergius (*pápah sarshio*) in 888.

Flight of Joseph to Memphis in Egypt. Miraculous power of the water of a well in which Jesus was washed. Murder of the children in Bethlehem. Herod kills his own son by mistake. The murder of the children is reported to the Emperor Augustus, who said that pigs were safer in the household of Herod than children. These children are the first Christian martyrs. Joseph returns from Egypt.

Jesus in the temple. A short history of the temple. The wickedness of Antiochus Epiphanes. Jesus continues obedient to Joseph and Mary. He does not teach before the age of thirty.

To judge from several quotations in Hough, it would appear that Le Dieu's MS. of the *Mir-át ul Quds* had no title. His edition of the 'Life of Peter' contains no preface; nor does J. Xavier mention himself as the author of the book. Le Dieu merely ascribes the book to J. Xavier, because it bears the same date (1602), and because the phraseology of both books is the same, a fact regarding which there can be no doubt. Mauláná 'Abdussattár is not mentioned. To the title *Dástán i San Piedro*, or

History of St. Peter, Le Dieu adds on the title page of his edition the words *ammá álúdah*, 'but contaminated.' Le Dieu's edition contains also a most interesting (Latin) letter written in 1598 by J. Xavier and Emmanuel Pigneiro, who accompanied Akbar to Kashmír, and back to Láhor and Ágrah. Their views regarding Akbar's character, the behaviour of the Hindús and Muhammadans towards Christians, and their moderate success as missionaries, &c., deserve the attention of the Historian. The letter contains also several allusions to the wellknown *cunabula*,* or representations, in wax, of the Messiah in the manger at Bethlehem, which the Pádrís exhibited at Christmas to the amusement of Hindús and Muhammadans.

Instead of 'Hindús and Muhammadans,' J. Xavier uses 'Mauri et Ethnici,' which corresponds to the phrase 'Moors and Gentoos,' which we find so often in old Sanads of the E. I. Company, and in early histories. Orme was the first that objected to this term. For 'Mughuls' and 'Akbar,' the letter gives invariably the curious spellings *Mogorani* (sic) and *Acabar*.

There is nothing to shew that Le Dieu observed the historical value of J. Xavier's books: he was too much engaged in hot controversy to be struck by the tolerance shewn by a Muhammadan ruler towards Christians.

The Persian of J. Xavier's work is easy and flowing. There are very few passages, if any, that sound 'outlandish.' Le Dieu did not detect any linguistic flaws either. One phrase, however, struck me as peculiar. 'Pádrí J. Xavier, of the Society of Jesus' is translated by—

پادري زيرونيمو شويير از طايفهٔ صحبت ايشوع

—but *çuhbat* does not mean 'Society,' but 'society' in the sense of 'friendship.'

* This word has enabled me to correct a corrupt passage in the History of Akbar by Badáoní, printed in our *Bibl. Indica*. 'Cunabala,' transliterated would be كنابلان, with a final *nún i ghunnah*. The MSS. of Badáoní (vide my Áín translation, p. 193, *l.* 3 from below) have a word بلبلان or, without dots, بلبلان, for which we have no doubt to read كنابلان. The passage translated would thus be—

'The ringing of bells as in use with the Christians, and the shewing of the figure of the cross, and the *cunabula* at their feast, and other childish playthings of theirs, were daily in practise [at Akbar's Court].'

In his transliteration of foreign names, J. Xavier naturally follows the pronunciation of his mother-tongue. For Biblical names, however, he follows the Hebrew, which he had evidently studied. Thus he writes—

كفرنحوم, *Kafarnahúm*, Capernaum, according to the Hebrew כפרנחום

ايشوع, *Ishú'*, Jesus, for ישועה

عالمة, *'álimah*, a virgin, or rather, a young woman, Is. vii. 14, for עלמה *'almáh.*

J. Xavier also proposes four new, but rather fanciful or impossible, etymologies of the word *Mary*, or *Miryam*. He says it means 1. *high*. It seems as if he had derived it from רום. 2. *Sea of bitterness*, from ים *yám*, sea, and מר *mar*, bitter. 3. *Teacher*. It is difficult to guess what Xavier means; perhaps he derives it from מורה, the Part. Hiph. of ירה *to teach*. 4. Master (Mistress?) of the Sea, from the Chaldee מרא Lord, and *yám*, a sea. The usual etymology from מרי, the 'rebellious,' or 'coy,' is not given.

Mr. Don's MS. also contains a small collection of 'Prayers' in Persian.

IV. *Gentiana Jæschkei*, re-established as a new genus of *Gentianaceæ*, by S. Kurz, Esq.

The President suggested that this paper be considered as read, as it only contains detailed descriptions,—and that, on account of the late hour, the following papers be postponed for the next meeting—

V. Notes on the Andamanese, by Surgeon F. Day.

VI. Notes on a trip to the Andamans, by V. Ball, Esq.

VII. A short list of Andaman Test words, by F. A. de Röepstorff, Esq.

VIII. Notes on Archæological remains found near Taxila, by J. G. Delmerick, Esq.

IX. Archæological Notes, by A. C. L. Carlleyle, Esq.

LIBRARY.

The following additions have been made to the Library since the last meeting, in April :—

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society, Vol. XVIII, No. 114 :—THE ROYAL SOCIETY OF LONDON.

Journal Asiatique, Tome XIV, No. 54 :—THE ASIATIC SOCIETY OF PARIS.

Quarterly Journal of the Geological Society, Vol. XXVI, No. 101 :—THE GEOLOGICAL SOCIETY OF LONDON.

Bulletin de la Société de Géographie, 1870, Février :—THE GEOGRAPHICAL SOCIETY OF PARIS.

Memoirs read before the Anthropological Society of London, Vol. III :—THE ANTHROPOLOGICAL SOCIETY.

Anthropological Review, No. 27 :—THE SAME.

Reports of the Agri-Horticultural Society of the Panjab, 1869 : —THE AGRI-HORTICULTURAL SOCIETY OF THE PANJAB.

On the Excavation of a large raised Stone circle or Barrow near the village of Wurreegaon, near Kamptee, by Major G. G. Pearse :—THE AUTHOR.

On Turtle and Fish-oils, by F. Day, F. L. S., F. Z. S :—THE AUTHOR.

Mabda-i-'Ulúm, translated into English, by 'Azímuddín Ahmad :—MAULAVI SAYYID KARAMAT ALI'.

Mákhaz-i-'Ulúm, translated into English, by 'Obaidullah :—THE SAME.

Mabda-i-'Ulúm, in Urdú, by Maulaví Karámat 'Alí :—THE AUTHOR.

Calcutta Journal of Medicine, Nos. 11 and 12 :—THE EDITOR.

Ueber die Sprache Jacob Grimms, von Karl Gustav Andresen :—W. STOKES, ESQ.

Der Ursprung der Sprache, von L. Geiger :—THE SAME.

Transactions of the Royal Irish Academy, Vol. XXI :—THE SAME.

First Annual Report of the Sanitary Commissioner for Bengal, for 1868 :—THE GOVERNMENT OF BENGAL.

Progress Report of Forest Administration in the Province of Oudh for 1868-69 :—THE SAME.

Progress Report of Forest Administration in British Burma for 1867-68 :—THE SAME.

Progress Report of Forest Administration in Bengal for 1867-68 :—THE SAME.

Report on the Land Revenue Administration of the Lower Provinces for 1868-69 :—THE SAME.

Table shewing the mean-monthly variations of the Barometer in the Surveyor General's Office from 1855—1869 :—BA'BU GOPINATHA SENA.

Purchase.

Die Süd-Afrikanischen Mollusken, von Prof. Dr. Ferd. Krauss :—Calcutta Review, April 1870 :—Revue Archeologique, Fév. 1870 :—Annals and Magazine of Natural History, No. 27 :—The L. E. and Dublin Philosophical Magazine, No. 260 :—Revue Linguistique, Jan. 1870 :—Ibis, No. 21 :—The Quarterly Journal of Science, January, 1870 :—Comptes Rendus, Nos. 6 and 7 :—Alphabetical list of Sanscrit MSS. in the India Office Library, London.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JUNE, 1870.

The monthly meeting of the Society was held on Wednesday, the 1st instant, at 9 o'clock P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced—

1. From Bábu Chandrasikhara Banerji, Deputy Magistrate, Jájpúr,—a rectangular piece of garnetiferous gneiss with the Buddhist formula "Ye Dhamma hétu &c., &c., &c.," found in the Alti Hills.

2. From M. L. Ferrar, Esq., C. S.—a packet of copper coins which, Mr. Ferrar writes, had been dug up near Partábgarh on the ancient site of a fort, said to have belonged to the Bhurs who held the country before the Rájpúts took it.

Mr. Blochmann said —

The coins which Mr. Ferrar has presented to the Society, are all Muhammadan copper coins. One belongs to Jaláluddín Fírúz í Khílji, one to Muhammad Sháh Tughluq, two to Ibráhím Sháh Sulṭán of Jaunpúr, and three to Síkandar Sháh ibn i Buhlúl Lodhí. The others I cannot make out. Copper coins of Ibráhím Sháh of Jaunpúr and of Sikandar Sháh occur in prodigious quantities in Audh. The Sikandar Sháh of 917 A. H. sent by Mr. Ferrar, is of some interest, because the beginning of the legend is very distinct, and corrects the reading proposed by Marsden (II, p. 546). He reads السلطان بهلول بن سكندر شاه الرحمن ..... المنور, but Mr. Ferrar's coin clearly gives المتوكل بالرحمن, for the almost meaningless المنور.

But I have not seen a single specimen of Sikandar Sháh's coins, which contains the name of the Egyptian Khalifah.

Among his notes on Jaunpúr coins, Marsden (p. 557) mentions as a peculiarity the occurrence of the term مملكة '*dominatio*,' and that 'the word سلطاني takes the form of an adjective.'

But سلطاني is an abstract noun, and is used as a title instead of سلطان, just as on every page of the Akbarnámah or Badáoní we find جهانباني, شهنشاهي, &c., for جهانبان, and شهنشاه.

3. From Bábu Gopinátha Sena—a table shewing the mean monthly and mean hourly variations of humidity, as determined at the Surveyor General's Office Observatory.

4. From Col. G. B. Malleson, Mysore—a lithographed copy of Ashtánga Hridaya.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected Ordinary Members :—

Bábu Vrindávana Chandra Maṇḍala.
W. W. Hunter, Esq., LL. D.
Sir Richard Couch.
Rája Amír Hasan, Khán, Bahádur.

The following gentlemen are candidates for ballot at the July meeting :—

E. Lethbridge, Esq., M. A. Professor, Húglí College, proposed by Mr. Allardyce, seconded by Mr. Blochmann.

A. R. Miller, Esq., proposed by V. Ball, Esq., seconded by the Hon'ble J. B. Phear.

The following gentleman have intimated their desire to withdraw from the Society :—A. H. Pirie, Esq.; W. Smith, Esq., C. E.; R. V. Stoney, Esq.; R. A. Gubboy, Esq.; Dr. J. Fawcus.

The following letters have been received:

—From His Royal Highness, Prince Alfred, Duke of Edinburgh, thanking the Society for the honor they have done him by electing him an Ordinary Member of the Society, and expressing his desire to become a Life member of the Society, in conformity with Rule 14 of the Bye-Laws.

—From the Government of India, Correspondence regarding the silver pieces and copper utensils found near Gungeria, an account of which was printed in the Proceedings for last month.

—From the Government of India, Correspondence* on certain excavations of cairns and stone circles at Khairwarah in the Wurdah District.

The following papers were read :—

I.—*Observations on the Andamanese*, by Surgeon FRANCIS DAY, F. L. S. and F. Z. S.

[Received 2nd March, read 1st June, 1870.]

The inhabitants of the Andaman islands have for many years been looked upon with great curiosity by Ethnologists,† by mariners, and by the Indian Government, in consequence of their vicinity to our convict settlement of Port Blair. Exaggerated accounts have been given of their appearance; they have been regarded as cannibals; pieces of flint, now used for shaving or tattooing, have been described as arrow-heads for shooting fish; in fact their showing themselves on the shore has given rise to as much awe as that of large wild carnivorous animals bent on mischief. Merchant vessels generally kept many miles to the East of Barren island, in order to avoid contact with the aborigines.

Having been lately directed to proceed to the Andamans for the purpose of making certain investigations respecting the fisheries‡ I took the opportunity of obtaining as much information as I could respecting the aborigines. In my enquiries I was warmly seconded by Mr. Homfray§ the energetic officer who, (amongst his other duties,) has charge of these people and their "Homes," and who alone, amongst the foreign races, has mastered their language. I also carefully went through Mr. Homfray's monthly reports. Consequently a large amount of the information, contained in the following, was derived from him, whilst he accompanied me in my

* The publication of this Correspondence has been postponed until more extensive information can be obtained.

† It is stated at the Andamans, that many skulls of convicts have been sent away as those of the aborigines, whilst *a tame monkey, received from India* and given to the crew of a passing man-of-war, has lately received a new specific name in London as being indigenous on these islands!

‡ Much of this information is contained in my report on the fisheries of the Andaman islands. I have, however, drawn it up more in detail, as the former is not available for the general reader.

§ Known to the Andamanese as *Myo-jolah*, "master of masters."

wanderings with the Andamanese around the various stations, looking out for the best fishing-grounds. These people worked with us in the jungles amongst the small streams, they speared fish in the harbours, shot them with bows and arrows, or captured them with their hands, or by means of small nets in the sea, and elsewhere they collected shells, crabs and reptiles, and in fact appeared desirous of doing whatever they were able.

I do not propose in this paper entering into any speculations respecting the origin of these people,* but to confine my remarks to their present appearance, manners, customs, language, amusements and methods of providing themselves with food.

Those now living on the island are estimated to be about 1000 in number, but this must be a guess, as no means are available by which such could be verified or refuted. Around the settlement, there are better means of estimating their strength, and there they appear to be about 400, divided into tribes, rarely above 30 strong, for when they are more, they quarrel. The country is partitioned amongst them, and one tribe does not interfere in the territory of another, in fact such used to cause war between them. Tribes fix upon a spot for a depôt, here the sick are tended, and any extra supplies, they may have, are hoarded. On two tribes meeting, the great sign of friendship is the presence of women, for when hostility is intended, the weaker sex are sent to a place of safety.

Their huts, if they deserve the name, are merely palm tree leaves most loosely put together; they try and get shelter under any overhanging trees or rocks. Bones of animals or fish which have been eaten, shells, &c. &c. are all thrown into one heap close by, the smell of which is very offensive. When they can no longer bear it, they move on, returning when they imagine disagreeable odours have disappeared.

These people, when guests of Europeans, or expecting presents, have moderately good tempers, but a very slight offence rouses

* Some may be of African origin or mixed African descent, their woolly hair and other signs apparently afford such a solution, but some again have entirely smooth hair, and but few very thick blubber lips or the Hottentot's projecting jaws. Shipwrecked sailors have generally been killed by the arrows and spears of the Andamanese, or else the last few survivors have been kept as slaves and thus assisted in continuing this mixed race.

them. When in their jungles they are said to be very irritable. One evening after we had returned from fishing, the aborigines retired to the "Home" at Port Mouat, when a lad of about 8 years ordered a girl, much older than himself, to go and bring him some drinking water; as she did not move at once, he shot an arrow at her which took effect just above the eyebrow. Another day one small boy with a knife cut to pieces a girl's basket for some equally cogent reason.

Quarrels in the "Homes" are of frequent occurrence, but the riotous ones mostly listen to the words of the elders, and become quiet. If, however, one of them refuses to be appeased, the other sits quite still, and does not answer him, and this mostly ends in an arrow being shot near, rarely hitting him; subsequently all is over. They do not appear to be vindictive amongst themselves. In November 1864 the North and South point tribes, having had a misunderstanding, were induced to meet and a pig was given them for a feast. However they again fell out, and the knife which had been supplied to kill their food, was employed by one of the South tribe to threaten the life of one of the North, and all ended in a terrible row. It was some time before order was restored, when they embraced and howled for a quarter of an hour.

One of the last great quarrels with the convicts occurred in June 1864, and was occasioned by a murder committed in the following manner. On the morning of the murder, the aborigines entered the north outpost in some numbers, carrying with them their bows and arrows, and begged for food, but did not obtain what they considered sufficient. They asked for more, which was refused, and being irritated, they sought their opportunity, and while the Tolidar Girbar Sing was off his guard, Jacko, the chief of the North tribe and Moriarty, chief of the South tribe, fired at him with their arrows from a few yards distance, and with fatal effect. Girbar Sing was the man whose duty it was to punish them, a class of persons not generally looked upon favourably.

Amongst themselves they usually give up anything another may wish for, so should they desire to retain an article, they secrete it.*

* A walk with them through a bazaar is no sinecure, they want everything they see, think it very hard not to get what they ask for, and steal whatever

Should an European they know be at his meals, and they are allowed to come inside the room, he has but little chance of concluding in peace. They mount the chairs, get on to the table, look at, and often touch everything. One will say to another, that piece is mine, and so on, in fact they apportion out everything amongst themselves, and watch with much interest all that is eaten. If he does not soon cease, remarks become more severe. "What a greedy man he is!" "He will eat everything, leaving us nothing," and so on. If he drinks any liquor, they consider most of the "grog" as they term it, should be theirs.*

Their language is very deficient in words, and the different tribes have distinct dialects. So much is this the case, that the inhabitants of the Little Andamans are unable to understand those of the South Andamans. Now many English and Hindustani words are beginning to be incorporated with their language. As for numerals, they are entirely absent, a necessity for them has not as yet been perceived by these people, so when they talk of having taken quantities or numbers of anything, it is impossible to have any idea of their meaning, and what still more increases this difficulty is, that in framing an answer, they often do so from the question, almost repeating the same words. This has perhaps led to their being considered more untruthful than they really are. Thus being asked, if it is true that a wreck has occurred, they will probably say it has, and perhaps it has, at some period long past.

They divide the day into three portions, sunrise, midday, sunset, recognising no subdivisions. In like manner, the year with them has three seasons: *first*, the dry, *ea-ra-bodilin*, or Northern sun, a period which extends from February to May: *secondly*, the rainy *goo-mo-lin*, being from June until September: and *thirdly*, the moderate season, *Pa-pa-lin*, lasting from October to January.

they can lay their hands upon. Secreting articles is not looked upon as a wrong deed, but as cleverness by these people.

* Being asked one day how the owner of the dinner was to live, if they deprived him of what was his food, they were very ready with an answer, observing, If we poor people want fish we must catch it, if we require pigs we must kill them, if we wish for a hut we must build it, but it is not so with you. You never built the house you live in, you did not make the furniture, grow your rice, catch your fish, kill your mutton or even cook your food. You call to some one to bring you what you want and it comes, so if we eat all this, you have only to call for more. They thus finished the argument, and almost as rapidly consumed all the food.

They are by no means deficient in acuteness, and appear to have good memories, thus they soon discovered that they were called by the newcomers by names anything but complimentary, and as every race has such epithets at their disposal, which they freely employ, the Andamanese (who like a joke) recognise each race by the several terms of abuse which were used in addressing them.

On first seeing writing employed, they laughed at it, protesting the impossibility of making out what had been committed to paper, and now they look upon it with great curiosity.

Crying signifies with them reconciliation with enemies, or joy at meeting old friends or acquaintances from whom they have been long parted. When two tribes meet, the newcomers have to commence, and the women have the priority in weeping; subsequently the men take it up; whilst it becomes the duty of the hosts to reciprocate in the same manner, first the females weeping, and afterwards the males. Occasionally, the performance cannot be completed in one night, especially should the parties have been long separated, it may even be continued through several successive days. After the crying has been completed, dancing begins; that of the women, a few years since, differed from that of the men, they having to clap their hands, &c., sing to the music of the stamping of the men's feet. Their songs are the recital of events which have taken place since their last separation. The conclusion of the performance is for both parties to join in a grand dance. Now, however, the men and women occasionally dance together. Females who intend dancing, have the modesty to employ a few extra leaves, and they relieve the men in striking the sounding board with their feet. Should it be the intention to dance all night, an extra coating of paint is put on, which is said to act as a preventive against exposure. It is very evident that dancing is a favourite amusement. Having occasion one day (as we were starting upon a fishing excursion) to go inside one of the convict barracks at Port Mouat, the Andamanese set to work to dance with great vigour on the boarded floor, and it was with the greatest difficulty that we could induce them to desist.

They do not appear to have many amusements. Staring at them-

selves in a looking-glass is a great attraction. Having held a watch to the ear of one at Port Mouat, the next day every body of the tribe came to listen to the ticking, with which they seemed as delighted as children. The day I arrived at Viper, they saw a kite for the first time, and were excessively pleased at flying it, doubtless once having seen it, they will now manufacture them themselves. Excellent as is their aim in throwing stones, some one last year showed them how to connect two stones together by a piece of string, and to throw them up, so that they catch in the branches of a tree at a great height from the ground.

Although clothes scarcely form part of their attire, they always beg pieces of cloth, and it is curious to see how they mimic those who consider garments a necessity. Their laziness is probably not to be surpassed; sooner than get a bamboo to knock down fruit, they will cut down the tree or its branches. They seem to think the convicts are an inferior race, and should work for their benefit.

In mentioning the *clothing* of these people, perhaps an incorrect term is employed, for the males are essentially destitute of it. Paint forms their clothing, its mode of application shows whether it is put on for simple ornament, with the intention of joining in the dance, to prevent sickness, drive away disease, or is a sign of mourning. Sometimes, however, a few fibres are fantastically worn around the forehead, neck, waist, or below the knee, in the form of a garter, but all other clothing they consider immaterial. They believe themselves to be decent, and laugh at other people's ideas of propriety; still when landing at Ross, they used not to object, as a favour to the residents, to wearing trousers for the occasion, and these were kept ready for them at the landing-place, being returned on their re-embarking in their canoes.

The women, however, have some slight show of decency, for they twist up fibres into the form of thin ropes, which they cover with cloth and wear round their waists, whilst dependent behind, (also sometimes in front) are about a dozen tails hanging half way down to the knees, anteriorly two or three leaves fresh gathered from the jungle, completes their essential costume. As ornaments, they wear a string of their ancestors' bones around their necks, or a skull is slung in a basket over their backs, or a belt on their shoulders,

should they have a baby to carry. Destitute of clothing themselves, these savages pity foreigners going through their jungles, especially in the rains.

Painting or adorning the body is done with red or olive-coloured earth, and this is the business of the females. For the former, iron is collected from a mineral spring, burnt red* and mixed with fat, and this is used as an ornament or charm. I had an opportunity of seeing one of these springs, and the aborigines were excessively jealous, lest I should help myself to any of the exuding iron, as they required it all for themselves. They collected it into leaves, binding it up into parcels with fibres. Olive-coloured mud is likewise a decoration, when painted in an ornamental manner, but if the body, head and forehead are daubed over with it, and the head plastered with mud, it is a symbol of mourning.

All the adults have their bodies tattooed, which operation is commenced from an early age, and until it is completed, they are not considered eligible for marriage. As soon as they begin to swim, which is at about 8, tattooing begins. Formerly it used to be done twice a year, the instrument employed being a piece of sharpened flint bound to a stick; but now a smaller portion of the body is operated upon once a fortnight, and this goes on until the individual is adult. The present instrument is a bit of a broken bottle, inserted into the split extremity of a stick, for they dread a knife. A considerable amount of blood is lost in these operations, which are performed by making an incision nearly one-third of an inch long and going to some depth. They do not form figures as is done by the Burmese.

Having an objection to hair, they shave all off, with the exception of one narrow strip from the crown to the nape, which, however, is kept cut close. They rarely have eyebrows, beard, moustache or whiskers, and usually but few eyelashes. Formerly shaving

* Dr. Waldie having been good enough to analyse their red preparation, reports it to be as follows:—

Peroxide of iron, ...	42·7
Quartz in small fragments and very little of any other rocky or earthy matter, ...	56·4
Water expelled by ignition, ...	·9
	100·0

was done every six months, by old women, with pieces of sharpened flint, but now every fortnight by means of bits of broken glass bottles. This custom is evidently a sanitary one, as the jungle is so full of insects, that it would be impossible to keep the hair free from vermin.

They marry as soon as they are able to support a wife, and I understood that the rule was, only to have one. The youthful swain eats a peculiar kind of ray fish termed *Goom-dah*, which gives him the title to the appellation of *Goo-mo*, signifiying "a bachelor desirous of marrying." Girls, arriving at a marriageable age, wear certain flowers, to distinguish themselves by. Before marrying, young men take a species of oath, after which they sit very still for several days, scarcely taking any food. Those who have been pig hunters refrain for one year, commencing in April, from eating pork, using turtle, tortoise or fish instead, but they do not cease hunting pigs, as they are necessary for the food of the tribe. The turtle hunters in like manner use pork during this probationary year, and during this period honey must not be tasted. This is apparently done for the purpose of ascertaining whether the individual is able to support a family.

The marriage ceremony is simple, a man about 16 or 18 is engaged to a girl of 13 or 15 belonging to a different family, with the consent of the girl's guardian, who is generally the chief of the tribe. On the marriage day, they are seated apart from the others, and pass their time in staring at one another. As the shades of the evening set in, the girl's guardian advances, and taking the hands of the pair joins them together; they then retire into the jungles, where they pass their honey-moon. On the bridegroom's return to the tribe with his bride *Jeedgo*, crying and dancing are kept up with great spirit. Subsequent to marriage, they are not so useful as previously for the general welfare of the community, the married woman, termed *Chamah*, has now to erect her husband's hut and attend to his requirements, consequently she is not ordered about by the chief.

The wife has to perform all the home duties, providing shelter, mats for lying upon, cooking the food, procuring water and shell fish, carrying loads when changing from place to place, shaving

and painting her husband, as well as attending him when sick. The husband has to protect his wife, make canoes for fishing, the implements for hunting pigs and turtle and spearing fish, whilst he also obtains food when not provided by the bachelors or spinsters.

Widowers and widows have no objection to re-marry, I saw one woman who had done so within one month of her husband's death, but this was looked upon as rather premature.

When children are born, the infant is first bathed in cold water, and then warmed over a fire, on the supposition that by beginning early to stand changes of temperature, it will be of a hardy constitution. They do not appear to be very successful, however, in rearing their little ones. Men and women seem equally fond of carrying the babies about; all pet them; when they cry for anything, they give it; and over-kindness early consigns the little one to the grave.*

Children are named some months before they are born, after some family or favourite cognomen, consequently there is no distinction between that of the males and the females. Owing to their vocabulary of names being limited to about twenty, they have to prefix some word to each, expressive of something in the appearance of the individual, or the locality from whence they come.

Amongst the numbers of Andamanese I saw, there was only one woman who had as many as three living children, of this she appeared to be very proud, and I was informed, that no other family possessed more than two. From April 1868, to April 1869, 38 deaths were reported, and only 14 births amongst those families which reside near our settlements. During four years, only six infants have lived, whose parents resided at the homes; of monthly visitors only 12, and of the half yearly ones some 20.

The Andamanese, at least those who reside near the settlement, are not a long lived or healthy race: but few appear to pass two score years. They suffer severely from fever and lung complications, and although the jungles are their natural home, illness

* Those children which are brought up in our schools, and clothed, rapidly succumb, as might be anticipated, to the non-clothing and exposure system, to which they become exposed on returning to their families, and resuming their life of freedom.

attacks them in newly cleared pieces of land as virulently as it does the foreign races. The sun's rays and strong winds act injuriously upon them, in fact they say a chief of the evil spirit rides upon the strong sea breezes and causes sickness. The high winds and the rains in August are occasion of a good deal of fever and bowel affections.

They have no remedies except their olive-coloured mud, with which they plaster themselves for headaches, and also employ as a non-conductor of heat. In 1864 one having been wounded by slugs whilst pillaging, the only remedy his tribe knew of was covering the spot with their red or olive paint. Now they have great faith in quinine, and take it readily for fevers or headaches. If medicines are offered them, they invariably request the donor to taste it first, and subsequently they have no objection to swallow it.

Should an adult die, he is rapidly buried, and the tribe migrates for about a month, to another locality, at least eight or ten miles off, in dread of the ghost of the departed. A corpse is viewed with much fear, whilst almost equal repugnance is shown when going near a burial-ground, which with them is never on a hill nor or an elevated piece of the country. The following instances give an idea how their chiefs are buried.

Jacko, chief of the North tribe, died on July 1st, 1865, leaving two married sisters, whose husbands' duty it was to bury his corpse. Death took place at 6 A. M. and within two hours his remains were rolled up in leaves by the oldest people of the tribe, and corded with fibre, preparatory to their being consigned to the grave. The latter was merely two feet deep, and merely a few feet above high water mark. Here the corpse was placed in a half sitting position, with the face turned towards the rising sun. Previous to filling in the grave, one by one they took their last farewell, and each gently blew upon his face and forehead. After the grave was filled in, there did not remain more than six inches of earth above the body, but this is deemed sufficient to preclude the ribs from being broken, whilst there are no wild animals to exhume the corpse. A few stones were now heaped over the grave, above these some burning faggots, and mourning garlands were placed in conspicuous places along the shore, to mark a chief's interment. Before retiring, a cup

of water was left at the head of the grave, in case the spirit of the deceased should feel thirsty during the night.

Four months subsequently, the nearest of kin went to the place of sepulture and brought away the lower jaw, which about that time had become divested of flesh; a month afterwards, the shoulder bones and a rib were extracted, and after six months the skull, now freed from impurities. This was slung round the neck of the principal mourner, and subsequently every one had it in turn to carry about.

The ceremony for the burial of a chief is, however, generally somewhat different from that described for J a c k o. A stage is erected some twenty feet from the ground, and on this the corpse is placed. The powerful spirit of the chief it is hoped will be satisfied, and not injure any one who may incautiously pass near, whilst a fire is lighted below this stage to scare away any evil spirits which may be lurking about. The extraction of the skull and bones, it is considered, requires great skill and courage, whilst by keeping them carefully, and wearing them during pain and sickness, it is supposed the ghost of the departed will be induced to be friendly to the wearer.

Should a stranger die amongst a foreign tribe, his funeral-rites are entirely neglected, the chief generally directs some of the young men to carry away the corpse, and throw it into the jungle or into the sea. The evil influences of a stranger's spirit are not dreaded.

Should those of other tribes go to condole and sympathise with a widower, the custom is to fall into his arms, both embracing each other and crying for about ten minutes, subsequently the afflictions are recited.

When I was at Port Mouat, the Rutland chief was in mourning for his only child, and was daubed all over with olive-coloured earth (a process which is repeated daily), whilst a rather thick coating of mud covered his head. This mourning lasts for one month. During periods of deep sorrow they are very silent, entirely refraining from the use of red paint and other decorations, from taking much food, even from eating their favourite pork, whilst honey must not pass their lips, but instead they have daily to throw honeycomb, if obtainable, into the fire. As soon as the period of mourning has

expired, they wash off the olive-coloured earth, and revert to their red paint.

Having no ties to keep them to one place, the Andamanese wander about for food, or as their fancy dictates. They have scarcely a want, but as luxuries they esteem tobacco, especially Cavendish, and "grog." They do not care for sugar, but are immoderately fond of honey, they eat the *cuttle fish*, are much addicted to *chitons*, but despise raw oysters. Formerly they appear to have consumed almost anything; on wet days worms, caterpillars, roots, nuts, mangrove seeds, sharks, shell-fish, &c., &c., articles which they now generally refuse. Amongst fish, they prefer the mullet, and one day having placed a quantity of different species before them, they helped themselves in the following order, observing that the first took the best, the last got those which were most inferior: *Chorinemus*, *Platycephalus*, *Horse-mackerel* or *Caranx*, *Chrysophrys calamara*, and lastly *Tetrodon* or frog-fish, which latter has generally the credit of being poisonous. They eat cats, but now spare dogs, because they are found to be useful.

Government instituted various Homes or places of shelter for these aborigines, which many of them make their head quarters. It is a principle wisely commenced, to induce them to cease plundering, and which has most undoubtedly had a very satisfactory effect. But it is a mistake to suppose that they subsist on the food provided by Government, for the whole allowance is only 200 rupees monthly to cover all expenses. In the year 1868-69, the following were the earnings of the aborigines: 500 pigs, 150 turtles and tortoises, 20 wild cats, 50 iguanas, and 6 dugongs, irrespective of fish. The total number of rations given was 48,248, giving a daily average of 132 persons, including women and children, allowing each individual only 9 pies daily, and showing an increase in those fed of 14,575 rations over the previous year, but with a decrease of expenditure of Rupees 209-3-4, thus demonstrating them to have been more self-supporting. Since the establishment of these homes, a great change has been inaugurated, the convicts are left unmolested, implements of agriculture are not stolen, the fishing stakes are left undisturbed, the gardens are no longer pillaged, run-away convicts have been re-captured, and shipwrecked sailors assisted.

At the "Home," the following is the manner in which they pass the day. At a very early hour they have something to eat, for about 4 A. M. their uncovered bodies become cold, which necessitates their replenishing their fires, and once up eating begins. When residing in the same house, there is no rest after this early hour. About 7 A. M. some of the men go out foraging according to the season: it may be pig-hunting, fishing, or capturing tortoises or turtles. The young men and boys assist in making, paddling and steering canoes. The women in a body go for shells, shellfish, fruits and bulbs, in which they are assisted by the girls; whilst the elderly people keep at home, making baskets, nets, bows and arrows, attending the sick, &c. Between 2 and 8 P. M. the foragers return with their spoils, these are as far as possible equally divided amongst all.

Prior to the advent of the Europeans, the Andamanese lived entirely upon the products of the waters and of the jungles, never tilling the soil, and storing up but little for a future day's supply. One of the first questions usually asked respecting these people is, "Are not they cannibals?" They repudiate the idea, and in return wish to know "why when food abounds should they devour human beings," a feast which they believe would cause their death.

They eat nothing raw, not even fruit. In cooking meat, they either throw it on the embers, turning it over when the under side appears to be done, or else cooking the flesh of the tortoise, turtle, or pork in unbaked earthen chatties.* Their appetites are large, for they appeared to be easily able to consume 6 lb of fish at one sitting, and after a very short time had no objection to begin again. A large *Pinna* forms their plate, a *Nautilus* shell their drinking cup. They have no regular periods for their meals; when they are hungry they eat, no matter at what time, whilst it is an almost essential commencement to give them a good meal before starting for any excursion.

Their principal food at the first or north-sun period is honey, fruit, and turtles. In the rainy season, they do not wander about very much, owing to the difficulty of obtaining shelter, then the

* I have seen them cook a prawn by placing it inside the bowl of a pipe which they were smoking!

jack seeds last them for three months. In the early part of the middle season pigs are common, but when becoming scarce, fishing and turtle-catching takes their place. In the report for July, 1865, I observe it stated "they are only now aware that cucumbers, potatoes, and pumpkins are eatable, and they use tobacco, all which a short time ago, they used to fling away."

Pigs, towards the month of September, begin to rove about the jungles, finding their way to the coasts and creeks, and it is during this time, that many are killed. In the year 1865, they first began to use dogs for pig-hunting which they learnt from some run-away Burmese convicts, previously they had to lie in wait hours and sometimes days, even in the hopes of seeing one or two, now the dogs find them almost at once, they are consequently held in great esteem, and every dog they see they wish for. The Andamanese, however, have curious ideas respecting pork as food, and when they are able to choose, use it as follows. The children and weakly persons eat sucklings, the bachelors and spinsters use those of medium size, whilst adults prefer the stronger boar.

As they capture their principal supply of fish and turtle during the low tides, and do not dry or salt any, it follows that they have abundance at that time of the lunar month, whilst at the intervals they are comparatively destitute.* At the change of the monsoon (October) they generally shift their quarters to more healthy spots. One of their encampments which has been dwelt in for some time, is not a model of cleanliness, whilst innumerable fleas and other animals render going through it anything but a pleasing occupation. Beef they consider too coarse for food, neither as a rule will they eat birds. About January the *Dugong* shows itself in Port Mouat Bay, coming to feed upon a species of sea weed which is also relished by the turtles.

In January likewise honey becomes common and they bring down the honey-comb with great dexterity, neither smoking the bees nor being stung themselves. A wild shrub "Jenedah" exists in the jungles, and its juice appears to have an intoxicating effect upon the bees. The person who is to ascend the tree, takes a piece in his hand, and biting through the bark, the pungent juice exudes

* The turtle season with them ends about the month of April.

into his mouth, this is spat at the bees, which are said (for I did not personally witness it, though I was shown the shrub, and an Andamanese went through the process,) to become intoxicated, or else to fly away. Wax obtained from the honey-comb is much used for their bow strings, likewise for covering the fibre which attaches the heads to arrows, as well as for stopping leaks in their canoes.

One of the most necessary pieces of property to these people is a canoe, a moderately sized one being capable of accommodating about 20 persons, whilst it is used for the purpose of obtaining food for about 30. It is scooped out of a tree by men, who work with a species of adze. They take their turn at this employment, during which period they are supplied with food by the others. When completed, their canoe is of a very fragile construction, and rarely lasts above one year, for they are continually thinning its sides by scooping out and ornamenting its interior. In fact when made, no care is taken of it, and its sides are easily stoved in. It is ballasted by stones, and has a prow projecting about two feet, on which the fisherman stands. These prows become especially useful whilst fishing turtle and spearing skates and rays.

The bamboo pole which is employed for pushing along the canoe, has a sharp moveable iron head at its one extremity, and to this is attached a long line. When the bamboo is thrown, and the spear becomes imbedded in the prey, it slips away from the bamboo, but being attached to the line, the animal is securely held by the fisherman. Their eyes, whilst slowly and silently moving about, are as sharp as hawks : the spear is mostly thrown with a good aim, and should the fish be large, some of those in the boat dive down, attacking the victim with knives and spears, whilst others endeavour to pass a line over the game. Should the water be too deep to pole about, one or two men or boys paddle the boat, as silently as possible, the man on the prow directing them which way and how fast to go, by signs made with his hands or feet, but not a word is spoken.

For their small or hand nets, very similar to a common landing net without the handle, they use a fibre as a thread, which they work at very neatly, employing their fingers as a mesh, and by

changing from the little to the index digit, they gradually augment its size as desired. When turtles are scarce, a large net is used, this is attached to stakes which encircle the whole of a reef to which these animals resort for food. Just before the tide commences to ebb, they fix the net, thus penning in all the turtles which may be there at the time, but which fight most desperately to break out of the enclosure; the Andamanese now use spears to secure them, and as a rule but few escape.

Their bows and arrows are mostly employed for shooting fish in shallow water, the upper two-thirds of the arrow is a light reed, the lower portion a heavier sort of wood armed with a piece of iron, or a sharp nail. Major Haughton in 1862 observed, in the Proceedings of this Journal, upon the flint arrow heads having been employed by them for shooting fish, and some such fashioned pieces of flint are still found amongst their heaps; but the aborigines do not recollect when these articles were so employed, they, however, remember their being in use for shaving and tattooing.

It will not be amiss in this place to take a slight retrospect concerning the origin of the "Homes," which are now kept up for the Andamanese. When these islands were taken re-possession of in 1857, doubtless the aborigines caused great trouble. Convicts, who ran away, were killed, as were also others who were felling the jungles, for these savages move about so stealthily, that scarcely a bough moves, nor does a leaf rustle. They are excellent trackers and thus ascertain the number of persons that have passed, and judge pretty accurately how long it is since they passed.

They helped themselves to the implements employed in felling timber, they used convicts' leg irons for spears, and nails for arrow-heads, they had no scruple as to how they were obtained. Consequently their vicinity led to insecurity, to the prevention of works of clearance being carried on, to garden cultivation being extended, to the prevention of bamboos being obtained from the jungles, to the plundering of the fishing-stakes, and the settlement suffered accordingly.

At first hostages were taken from the tribes, some of whom were kept in irons in the convict settlement, a plan which does not ap-

pear to have caused unqualified satisfaction, whilst on faults being committed the lash was freely resorted to. On June 12th, 1864, three convicts at the North outpost, in a most unprovoked manner were ruthlessly murdered, so all hospitality and friendship was withdrawn, they were prohibited entering our stations, unless unarmed, and if seen plundering, the sentries were directed to fire upon them with slugs. In those times the aborigines distrusted us as much as the convicts feared them, and on coming into the settlement, they kept their arrows in their bows ready for immediate recourse to, and whilst some parleyed, others stood watching a few yards off, ready for a fight, or to secure a retreat.

Owing to the hostility of the Andamanese, convicts had to be restricted within bounds, no one could venture into the jungles. About the middle of June, some of the aborigines visited Haddo, food was given them, and they were asked to bring some bamboos, which they promised to do, but only brought a few dead ones. They were evidently merely spies, for after a day or two, they entered Aberdeen and Phœnix bay stations in force, plundered the gardens and carried off some convicts' clothes. However, towards the end of the month, they appeared inclined to become more friendly, they brought in some escaped convicts, whom, however, they first plundered, besides removing every bit of iron from the boat in which they had escaped. On being taxed with this, they at first pleaded surprise, then said, they would make restitution, and brought a canoe as an exchange for the mischief they had done to the Government boat. At first this was not quite understood and the canoe was sent back, but they returned it the next day, explaining that they desired it to be kept as a reimbursement for the injury they had done to the Government boat, so no longer considered the canoe theirs.

A Home was kept up on Ross island, but those who had been engaged in plunder, were not permitted to land there, thus Moriarty, who had assisted in killing the Tollidar (already referred to), was considered ineligible, which caused very great dissatisfaction. The women and children made rafts of bamboos and so floated to Ross, or even swam over on the support of a single bamboo. In October this year, they again plundered Aberdeen and its neighbourhood,

and it began to be very evident that unless some hold were obtained over the tribes, all works must cease. It was proposed to issue a general amnesty, especially as the chiefs were becoming very irate, and without their controlling power the tribes were found to be most hostile, plundering everything they could lay their hands on. In the month of December this amnesty was carried into effect, and then to a great extent the chiefs began to keep the people in order. However the aborigines continued to be very suspicious, imagining that in their being treated at Ross, they were sorts of hostages, and used frequently to request to be taken over to the mainland, as they were not permitted to swim over, because they took more property with them, than they had a legal claim to. One day the whole forty asked to go, and finding no objection was raised, they returned after a few days on a bamboo raft and became quiet.

In May, 1866, the Home was removed to the mainland as the junglees' presence was not considered any longer to be desirable. In November of this year, the murderer Jim was released, the tribes promising in future to try and stop murders, and to discontinue the use of war bows and arrows. Some of them were taken to see an execution, and it was explained to them, that that was the manner we treated murderers, and they at once expressed their intention of refraining from murders in future. In 1868-69, they apprehended fourteen convicts from the Punjáb and two Burmans who had escaped, and also brought in some shipwrecked mariners.

My first interview with the people was on January 9th, 1870, at North bay where I went with Mr. Homfray to look for them and induce their coming fishing. The sea was rather high, and it was not until 11 A. M. that we discovered one of their canoes, containing two of these people. We pulled for the place, they, however, had landed and made their boat fast. It will be difficult to forget their appearance. There sat on the stumps of trees two lads, destitute of clothing. They had some ornaments made of fibre around their heads, and strings like garters below the right knee. As for inducing them to move, they simply declined, observing they were waiting for more of the tribe; however, they pointed out where the encampment was.

Leaving them, we went to their camp to try our persuasions on some of the others to accompany us to Viper. We found a number of females and children, all of whom appeared very glad at seeing "Myo-jolah." They were engaged as usual, in smoking short clay pipes, and eating, having taken some fish, prawns, and crabs. On being told that I wanted fish, they brought out all they had, and let me help myself. After a long talk, the females consented to go to Viper, for as Mr. Homfray had judiciously remarked, the boys would soon follow. It was finally arranged that they should go in our boat, and we were to take a canoe in tow, containing some more of the aborigines. Scarcely had we started before one of them seized my umbrella, and it was explained to me that she did not like the sun's rays, and proposed that "I should hold my umbrella over her head."

When we arrived at Viper, we found thirty more people had preceded us, and by evening we mustered nearly seventy. It was, however, too late to go out, so we passed the afternoon in feeding them, letting them fly a kite, with which they were highly delighted, in ascertaining the Andamanese names of fish, and information respecting the best fishing grounds.

The next morning eating commenced about 5 A. M., and by 6·30 we had 43 of them in the boats, and left for Phœnix bay and South point. Before starting, however, they ridiculed the idea of our getting fish, as it was not low tides whilst there was a strong wind and rough water. Still as my stay was limited, we persevered, and on arriving at Phœnix bay, had to commence proceedings by lighting large fires and distributing rice, plantains, poppaws, sugar-cane and tobacco, whilst they caught crabs, which they cooked on the embers. In fishing we did so badly that at their suggestion we crossed the point to South bay. As we went near the inhabited part of the station, they begged for what they saw, and collected little bits of iron. The tide being low and the water not so rough, they did better at this place; they shot one *Lethrinus rostratus*, Cuv. and Val., one *Teuthis vermiculata*, Kuhl. and v. Hass., and several *Glyphidodon sordidus*, Forsk. Besides these, the younger children captured many specimens of *Periophthalmus Koelreuteri*, Schn.

On the 11th, we left Viper for a fresh water creek with 20 of the people. On arriving at the landing place, we saw a storm rising, and the aborigines waved about their hands and arrows, to beat or flog away the evil spirit which was creating the disturbance; nevertheless they were unsuccessful, and it poured all day. We landed at one of their deserted encampments, but the fleas and other vermin were so plentiful, we had to retreat to our boats. Their huts were palm leaves, supported on sticks in the most primitive style. We took a few fish and bivalves up the creek, but the weather became so severe that we were compelled to return. The Andamanese asserted that a large fresh water lake exists in the island, but too far away for us to go to. As we were going back, the boat hook catching in a tree went overboard; instantly one of the Andamanese boys darted overboard and recovered it.

On the 13th we went across to the Andamanese Home, a long thatched shed, the head quarters of one of their tribes. On one side of the entrance was a large heap of the bones of tortoises, turtles, dugongs, and also a few shells, the refuse of their meals. Inside were people and dogs, the latter as regards feeding evidently considering all were on an equality, whoever could take the food first being the lawful owner. Here we again had to give them fruit and sugar-cane, which was equally divided under the inspection of their queen, a quiet looking venerable old woman. Having distributed pipes and tobacco, we at last induced them to start for a cruize through the jungle, in order to ascertain what fish there were in the fresh water streams, and what specimens of natural history we could collect.

The distance across country was five miles, but the road a mere jungle foot track. We told the aborigines to obtain fish, shells, reptiles and grasses, and they set to work to collect. We had not gone far, when those ahead called out to us to come on, and pointing to a tree asserted, they saw a snake between the bark and the stem. The fissure was scarcely noticeable, but having removed the dead bark, out came a snake (*Lycodon aulicus*) which we secured. They also obtained from the streams, specimens of *Gobius giuris*, H. B., *Ophiocephalus gachua*, H. B., *Haplochilus panchax*, H. B., and *Muræna maculata*, H. B., also some Crustacea, many land

shells,* some lizards,† and five species of wild grasses. About 6 P. M. we arrived at the Home at Progress creek where we left them. The next day was a repetition of the previous one only carried on on the opposite side of Port Mouat. On the 15th I had to return to Ross, but in the early morning, prior to our starting, the Andamanese brought in two tortoises, a turtle, and some fish shot and speared since 6 P. M. the previous evening.

From the 18th to the 20th, assisted by these people, I made an examination of some of the sea fisheries, and the mode how they take sea fish, a short description of which will perhaps give the best idea of how they work. On January 18th, it being low spring tide, we started from Port Mouat at 7 A. M. for MacPherson's straits and arrived at the encampment of the Rutland chief about 11 A. M. We found them close to the sea shore, where some fine trees overhung the rocks, on which they were lazily reclining. We passed the body of the only child of the chief tied up in a tree, its spirit being supposed to be powerful, the little one having died about a fortnight previously.

About 3 P. M. we embarked, taking with us seventeen of the aborigines in our boat, their ages varying from about nineteen to ten years. The females and younger children, with three hand nets remained in the stern of the boat: the bachelors with three bows and arrows and one spear in the forward part, and as usual the latter were constantly chaffing the former. One youngster took the rudder and we prepared to start for "Jolly boys" island, some two miles away. Scarcely was the anchor raised, when a lad in a canoe came with some fish, and likewise handed in a piece of dead coral, amongst the branches of which numerous beautiful little fish were to be seen alive, as well as some lovely little crabs. On suggesting that they might have got in there by accident or been put there for show, over the side of the boat dashed a young savage, who dived down and rose again to the surface with another piece of coral as large as his head, and in it were forty small but living fish.

* *Cyclophorus foliaceus* Chem., and *Spiraxis Haughtoni*, Bens., being the most common.

† *Tiaris suberistata*, Blyth, is the commonest tree-lizard; besides, several species of GECKOTIDÆ occur.

As we were again on the eve of starting, we heard a shout of *úchrah, úchrah* (fish, fish) when another canoe arrived, with some splendid specimens obtained by means of bows and arrows. At last we started, the Andamanese as usual carrying fire with them, and soliciting tobacco and pipes, their most constant word being *jay, jay,* (give, give). As a foretaste of what might be expected, provided they did well, we presented the chief with a looking-glass, some tobacco, and a box of fusees, whilst we also gave our fellow passengers another box of fusees, which, however, they had exhausted before we arrived at the termination of our short pull, as they were unable to resist the amusement of making fire without trouble to themselves.

We passed shoals of fish, many being of the most brilliant hues. Now our fishing commenced, the females started off along the shore to fish in their manner, the bachelors with their bows and arrows and spears proceeded as far out upon the reef as they could, whilst the younger children stayed with us to collect shells and small fish.

As soon as we commenced wading into the sea, hundreds of fish darted about, either from under one piece of coral to another, or from sea-weed to sea-weed.

We first collected the little *Blennies* which are exceedingly active and disappear in holes under the coral, just as one is feeling sure of obtaining them, we, however, captured a sufficient number of specimens. Occasionally when feeling under a sea-weed or coral for a fish, a crab would lay hold of the hand of the investigator. At one yell rather louder than any which had preceded it, I went to the spot and saw the beautifully scarlet and striped *Pterois volitans* swimming off, whilst all the Andamanese refused having anything more to do with the "sea devil," as they term these fishes, on account of the severity of the wound produced by their spines. The water was very clear and shallow, and all this fish's elongated fins were expanded, it appeared in no particular hurry, but seemed to be quietly sailing away, as much as to challenge us to touch it. I threw a pocket handkerchief over it, and thus obtained it safely.

Many fishes, never previously seen by me, darted past us, and the little Andamanese began to warm to their work and took some larger fishes as *Serranus dispar*, Günther, *Scolopsis ciliatus*, Lacép., *Mugil*

macrochilus, Bleeker, *Teuthis vermiculata*, K. and v. H., *Glyphidodon sordidus*, Forsk., *Chœrops cyanodon*, Richardson, *Hemigymus melanopterus*, Bl., *Callyodon viridescens*, Blkr. &c. Whilst thus engaged, we heard a loud shout out on the reef, and on looking, perceived a skate, *Rhynchobatus tuberculatus*, Cuv., nearly six feet long struggling with some of our fisherman. We found, however, that there were many small species which we could not capture, so the next day returned with a large sheet. On splashing the water, these fish retired amongst the branches of the coral. We then spread the sheet close to the coral, sinking it with stones and placing some sea-weed and sand upon it. As soon as all was quiet, the fish came from their place of security, got amongst our sea-weed when we lifted the sheet out of the water, and thus obtained them. The Andamanese are familiar with this mode of catching fish.

We continued collecting about an hour, during which period we obtained, without using anything but the boys' hands, many species of fish, about 60lb weight of shells and specimens of the so-called sea slugs, *Bêche de mer* (*Holothuria*) which abounds there. In about one and a half hours 31 large mullet, *Mugil macrochilus*, Blkr., averaging about 3lb. each, and upwards of 30 other large fishes as well as many small ones had rewarded the labours of our archers, and that without the loss of a single arrow. The succeeding day, the same parties killed 56 large mullets by bows and arrows within the space of two hours.

As soon as a shoal of fish, or even one large fish is viewed, all become at once on the alert, they dash about with the greatest activity, run over the sharp coral without caring for it, whilst their eyesight is most acute. They fire their arrows at objects in the water, which no European, unused to the work, could perceive. They appear to aim under the fish, and mostly hit it through the bowels, when struck, away darts the unfortunate victim carrying off the floating arrow, which, however, soon becomes entangled in the sea-weed or else the tired and wounded fish gives in, the arrow floats, the captive's life is nearly over. The smaller children have miniature bows and arrows, the latter being unarmed, but having its end sharpened; with these they practice upon small fishes, also on those which have been wounded by their elders. The usual

mode of killing captured fish is to bite through the vertebral column just behind the head, but some of the sea fishes they first exercise the younger children upon. The fish is thrown into the sea, and of course darts away, the boys and girls dash in after and recapture it. Sometimes they will do this, especially with the *Teuthididæ*, several successive times. To a stranger it at first appears very improbable that they will recapture it, but I never saw them lose one.

As we were preparing to leave, the Andamanese having asserted that they had obtained as much as they could carry and sufficient for food, one of the girls brought a specimen of the pretty yellow and white banded *Amphiprion percula*, Lacép., and on being told that it was good, observed she could get numbers more. She took us to a sea nettle, *Actinia*, which she detached from the coral rock, by inserting her hand behind the attachment of this polype, and on shaking it into the hand, two more of these little fishes came out. Subsequently this was repeated to twelve others, and all had two living fish inside them, except one which had three. They asserted that this was their usual abode. A few days previously, Captain Hamilton had observed to me that some little striped fish lived inside a polype at North bay. One day he dug one out, dragged it to the shore and captured three little fish from its interior, replacing them in the sea they appeared not to know what to do, swimming round and round as if looking for something. The living polype was now returned to the sea and they at once swam to it, following it as it was dragged back again through the water to its original locality. As I was going over to North bay fishing, he came with me to see if he could not find a specimen, unfortunately after discovering one and obtaining a fish from it, *Amphiprion bifasciatum*, Bl., he got stung by the polype, consequently I did not see it, but I have the fish. At Gopaulpore, I found living specimens of *Therapons* inside *Medusæ*, which the fishermen asserted to be common.

On returning towards our boat, a large number of esculent swallows were observed soaring about, some of them darting in, others coming out, of a low cave. We sent in some of the Andamanese to look for nests, and they brought us two old ones, observing the season was too late, whilst the convicts had cleared it a few months

previously. We obtained some specimens of the birds by standing at the entrance of the cave and knocking them down with our hands as they flew out. Further on, we came across a *Chiton* attached to a rock, and they drew attention to it as being a great dainty. But on being asked their opinion upon *Holothuriæ* and oysters as food, they expressed great disgust at the idea of eating them.

It was dark by the time we reached the boat, but some of the aborigines went before us, had lighted a fire and were cooking and eating fish. They divided their captures before we left the island, but there was a second division on reaching their encampment as the chief came on board our boat, and he claims everything. After he is satisfied, it is time for the rest to receive their shares. We gave the chief several presents, amongst which the spears for *Dugong* hunting appeared to be most acceptable, and concerning which all expressed unqualified satisfaction. He gave us a large turtle, some more varieties of fish, wished us "good night" in English, and we left this tribe, after having been three days with them. Their chief and his people appeared more inclined to work than either of the other two tribes, amongst whom we had previously been. Still in conclusion, it is but just to remark that all behaved well, whether hunting the jungles for snakes, and shells, or the streams, backwaters, estuaries, creeks, or the sea for fish, although it was plain that all except the Rutland islanders, considered it was a considerable trouble. One tribe in fact requested to know how soon I was going, as they were becoming tired of work, and hearing that if we did well that day, it would be the last; they seemed stimulated to renewed activity, and were rewarded by my taking my departure.

II.—*Notes on a trip to the Andamans*,—by V. Ball, Esq. (Abstract.)

The author read an interesting account of his visit to the Andaman home at Port Mouat, in company with Mr. Homfray and Dr. Curran, Asst. Surgeon of Viper island. In his observations, Mr. Ball supported the views expressed in the previous paper as regards the manners and customs, and the reputed cannibalism of these people. He met the aborigines busily at work about their domestic occupations. A woman was seen by Mr. Ball engaged in

chipping off flakes of glass from a bottle with a quartz pebble. It took some time till a suitable flake was obtained, for the purpose of shaving. He was also informed by Mr. Homfray, that the Andamanese still perfectly understand the manufacture of flint flakes, and drew the attention of the meeting to the great interest attached to the execution of this art, of which geological researches give daily proofs that it has been once in practice more or less almost throughout the whole world. The very simple form of huts does not appear to prevail throughout the islands, for Mr. Ball was informed by Capt. Duncan that on Little Andaman the houses were of a bee-hive shape, resembling those of the Nicobarese, only much larger and not elevated from the ground. In conclusion Mr. Ball quoted passages from Mr. Wallace's Malay Archipelago, in which the author says that the Nigritos inhabiting the Andaman islands "had in all probability an Asiatic rather than a Polynesian origin."

Besides the general account of his visit, Mr. Ball submitted "Notes on the Geology and the Ornithology near Port Blair" which, it is hoped, will be published in the Journal.

III.—*A short list of Andamanese Test words,*—by F. A. de Röepstorff, Esq., Extra Asst. Supdt., Port Blair.

The words noted in the present list are taken from the dialect spoken by the Andamanese tribe at Port Blair. They are very few, but the Andamanese are mostly kept very carefully away from all communication with Europeans, and it is not easy to procure even all the essential words, though some of those now submitted may assist a visitor to Port Blair.

For the words marked with an * I am indebted to Mr. Homfray, the protector of the Andamanese.

a. is pronounced as in the word bar.
e. " " " better.
i. " " " bill.

Arrow (for fish), rá-ta.
Arrow (for killing pigs), í-a-la-da.
bad, ja-bag-da.
belly, jo-dó-da.

black, wo-lu-bai-a-da.
boat, bá-já-da.
bow (to shoot with), kar-ma.
(to) burn, chápa in-olun-ga-kæ.
come, min-ni-katsh.
cry, te-gi-ké.
down, ka-ó-lé.
drink, willi-ké.
*(to) eat, mœ-kré.
eye, dál-da.
*father, ar-o-de-rœ.
*fish, úk-ra.
fire, chápa.
food, mæk.
*(to) go, tól-pik.
go (Imperative), ón.
good, bæ-rin-ga-da.
hand, ko-ru-da.
head, tshæ-ta-da.
*here, læg-ja-da.
*I, dol-la.
I, angól.
iron, wó-lu.
little, ar-kit-ja-da.
large, i-ji-bæ-ri-ga-da.
*mother, ar-bæ-te-rœ.
mother, tsha-no-la.
nose, tsho-run-ga-da.
rain, jung-da.
rice, i-ăt.
run away, katsh-ké.
*(to) sleep, má-me-kæ.
*(to) swim, pot-ké.
sail, a-kan-gei (that is go about in a canoe).
silence, mi-lan-ga-ké.
scold, to-wo-ké.
stone, tæ-li-da.

swine, ro-go.
*there, u-tsha-da.
tooth, toog-da.
turtle, jædi.
*turtle, ga-ri-da.
up, ka-la-ge-a-da.
(to) want, tár-tup-pu-ké.
water, I-na-da.
white, ta-la-óg-da.
woman, a-pèl.
*you, un-go-la.
you, an-gól.

The President, in inviting discussion on the three last papers read, pointed out that there are great many differences between several of the same terms noted in Mr. Röepstorff's list, and that published by Col. Tickell in the Society's Journal for 1864. If all the transliterations be correct, they certainly would indicate, he thought, considerable differences between the various dialects.

Mr. Ball observed that from the short account that was read, it would appear that Dr. Day is inclined to consider the Andamanese as a mongrel race, which is certainly in opposition to all the observations made by other naturalists, and seems inconsistent with the facts.

Dr. Stoliczka said that the statement made in Dr. Day's paper does not necessarily imply a generalisation of the term mixed race. Dr. Day stated to him that some of the people with smooth hair uncommonly resemble Madrasese. Dr. Mouat relates an instance of a Punjábí having been married to an Andamanese woman, and from other facts recorded there would seem little doubt that an intermixture of the races has, as elsewhere, occasionally taken place.

IV.—*Notes on Archæological Remains at Sháh kí Dherí, and the site of the ancient city of Taxila,—by* J. G. Delmerick, Esq.

The President said that the object of Mr. Delmerick's paper was to identify the site of the ancient city of Taxila with the present place of Sháh kí Dherí. The photograph which accompanied the

paper, shewed a number of well finished heads, chiefly of Buddha, artistically grouped. Some of the heads looked, indeed, as if of Greek origin rather than Indian. Mr. Delmerick had also kindly offered to send to the Society several of the heads themselves, which would be laid before the meeting in due course.

V.—*Archæological Notes,*—by A. C. L. Carlleyle, Esq.

Mr. Blochmann said—

Mr. Carlleyle, Curator of the Riddell Museum, Agra, has, on several previous occasions, favoured the Society with most costly photographs, tracings and rubbings of inscriptions and coins, &c. His presentations, if published, would indeed fill volumes. He sent lately through Mr. E. C. Bayley, several photographs of Bactrian and Buddhists coins, as also a large collection of well executed rubbings, regarding which Mr. Bayley observes—

'The rubbings are very interesting; they are several new ones among them, as a new Apollodotus, &c.'

Among the photographs lately sent by Mr. Carlleyle, there are a few Muhammadan coins which deserve notice.

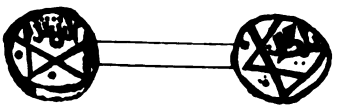
1. A coin of Sher Sháh, with the Hindí legend *Srí Sher Sháh.*
2. A rupee of Jahángír—

   Obverse : نورالدين محمد جهانگير

   Reverse : لا اله الا الله محمد رسول الله

3. A coin by 'Alamsháh, struck at Dihlí *(Hazrat i Dihlí)* in A. H. 853.
4. A coin of *Iltitmish,* or, as he is generally called in school-books, '*Altamsh.*'

   Obverse : التتمش.—*Reverse :* سلطان



Name and title stand in double triangles.

The legend is التتمش, although the two ت have only two dots, for want of room; but the two *shoshahs* of the *t* are clearly visible between the *lám* and *mím.*

The two *t's* are moreover, distinct on Raziyah's coin, publishe by Mr. E. Thomas (*Pat'hán coins*, p. 19.)

Regarding the name *Iltitmish*, Mr. E. Thomas has an interest ing note in the Journal of our Society for 1867, p. 37.

Iltitmish was born during an eclipse of the moon. Muhammada historians in relating this circumstance, use, as if designedly, the ob solete *girift i máh*, instead of the common Arabic term *khusúf*, 'a eclipse of the moon,' and they appear to look upon *Iltitmish* as th Turkish equivalent for the Persian *girift i máh*. Perhaps Mr Thomas' forthcoming edition of the Coins of the Pát'hán King will set this matter at rest.

As the name of this king occurs in poems, the metre helps us t a certain extent; for the passages in which *Iltitmish* is mentioned require invariably three long syllables, *i. e.*, a word of the *wazn* o مفعولن *maf'úlun*; and we would have to choose between *Iltitmis* (التتمش), *I'litmish* (ايلتمش), and *Iltimish* (التيمش), no other pro nunciation suiting the metre.

VI.—*Notes on some Javanese Algæ,—by* Dr. G. v. Martens, i Stuttgard,—*communicated by* S. Kurz, Esq.

[Received 30th April, Read 1st June, 1870.]

Dr. v. Martens has had the kindness to examine my Javanese and other Algæ,* of which he communicated to me the names and descriptions in his letter, dated 26th March, 1870. I now take the pleasure of placing the interesting results (with his permission) before the Society.

The Algæ noted in this communication were chiefly† collected by myself in the province Buitenzorg in Western Java, at a time when I paid comparatively little attention to this class of plants, and, therefore, the number of species is only very small in comparision with what has become already known from those regions, so

* There are numerous Andamanese and several Bengal Algæ, which I retain for a future opportunity. Prof. v. Martens is now examining the remainder of my Bengal and Burmese Algæ, and it seems, therefore, preferable to submit the results of these examinations in a separate paper. In doing so, unnecessary repetitions will be avoided, and at the same time a better phytogeographical sketch can be given of the respective countries, than if treated separately.

† With a single exception which refers to a species obtained at Singapore.

prolific in interesting cryptogams. In spite of that, several new species and even a new and well marked genus are the results, clearly indicating, how much still remains to be done in Indian Phycology. Zollingers' and E. v. Martens' collections of Algæ in the Indian Archipelago are far the richest as yet made in those countries, but in looking over the following short list, it can easily be observed that a good number of species, although not new to science, still are very interesting in a phyto-geographical point of view, as they were never before found by former botanists in those localities.

40.* *Calothrix maxima*, Martens; fluitans, 6 pollicaris et ultra, chalybea vel fuscescens, filis sine vagina 1/120 ad 1/100 lin. crassis, distincte articulatis; articulis diametro triplo ad quadruplum brevioribus, linea tenerrima dimidiatis; vaginis fuscis, 1/100 ad 1/75 lin. crassis.

Hab. Javae, frequens in flumine Tjiliwong prope Buitenzorg.

48. *Oscillaria antliaria*, Martens; ad saxa trachytica in flumine Tjiliwong pr. Buitenzorg,—frequens.

55. *Tolypothrix implexa* Martens; chalybeo-aeruginea, cæspitosa, cæspitulis ad 3 lin. altis; filis granulosis dense intricatis, parce ramosis; articulis diametro (1/450 lin. cum vagina) aequalibus, plerumque obsoletis; vaginis arctis.—Inter muscos ad ripam fluminis Tjiliwong prop. Buitenzorg,—frequens.

123. *Nitella sp. nov.? N. nidificæ* affinis; in fossis ad viam publicam ad Megamendong, c. 4600 ped.

313. *Scytonema tomentosum*, Kg., ad terram argyllosam inundatam prope Bogor tempore pluviali frequentissime.

315. *Hydrocoleum majus*, Martens; caespite pollicari ex chalybeo viridi, vaginis mollibus amplioribus pellucidis, filis inclusis nunc simplicibus ad 1/100 lin. crassis, nunc binis v. ternis, 1/300 ad 1/180 lin. crassis, saepe tumescentibus et flexuosis, tenuiter transverse striatis, virescentibus v. violascentibus, articulis diametro (1/90 ad 1/75 lin. cum vagina) brevioribus.—Ad terram argillosam et fluitans in aquis stagnantibus oryzetorum circa Buitenzorg.

* This and the following numbers refer to my collections of cryptogams (Kurz).

317b. *Spirogyra decimina*, Link; in fossis ad viam supra montem Megamendong pr. Tugu, c. 4600 ped. s. m.

318. *Phormidium inundatum*, Kg.; in aquis currentibus oryzetorum ad terram argillosam.

331. *Psichohormium fuscescens*, Kg.; in aquis oryzetorum pr. Buitenzorg natans.

335. *Cladophora sordida*, Kg.; in oryzetis ad Campong (vicum) Borong tang pr. Buitenzorg.

337. *Spirogyra majuscula*, Kg.; in oryzetis valli Tjiliwong pr. Buitenzorg, 830 ped. s. m.

338. *Spirogyra adnata*, Link; ad saxa declivia fluminis Tjiliwong pr. Buitenzorg.

370. *Lyngbya majuscula*, Harvey; in fossis oryzetorum circa Macara, pr. Buitenzorg, c. 1000 ped. s. m.

370b. *Lyngbya fluviatilis*, Martens, (Tange der Preuss. Exped. Ost. Asien, 19, t. iii. f. 5); ad saxa in rivulo Tjiberrem pr. Macara, ad Buitenzorg, c. 1000 ped. s. m.

524. *Nostoc papillosum*, Kurz; olivaceo-viride, explanatum, conglomeratum, senectute cavum, papillosum, umbonatum, filis internis dense implicatis, curvatis, articulis ellipticis, violaceis, 1/700 lin. crassis.—In monte Salak inter muscos juxta rivulum quoddam prop. Bodjong frequens, c. 3000 ped. s. m.

Kurzia, Martens, nov. gen. Fila articulata, longitudinaliter connata, tubulum ramosum spinosum confervoideum formantia; spermatia globosa, minuta, fusca, in superficie sparsa.

672. *K. crenacanthoidea*, Martens; filis pollicaribus, valde intricatis, pallide viridibus, 1/30 ad 1/20 lin. crassis, flexuosis, ramis divaricatis, subsecundis, articulis filorum connatorum in diametro (1/200 lin.) aequalibus, v. duplo ad quadruplum longioribus; spinis alternantibus, plerumque binatis vel ternatis, pellucidis, triarticulatis, sursum curvatis, acutiusculis, 1/20 lin. longis, basi 1/80 lin. crassis.—Inter Tjiboddas et Tjiburrum, in cavis montis Panggerango,* c. 4500 ped. s. m.

* It forms in the excavations along the path, going up the Pongerongo, green dense strata, covering especially the interior portions of these cavities, and receiving no other supply of water except what percolates through the earth. [S. Kurz].

A very remarkable Alga, very much resembling *Crenacantha orientalis*, Kützing, a species which has as yet only been found in a well in Hebron, Palestine. It differs, however, by the not jointed corticate stem and branches, only the fine prickles are jointed as in *Centroceras*, and are visible already with the aid of a common lens.

700. *Leptothrix lamellosa*, Kg. = *Oscillatoria labyrinthiformis*, Ag.—In the hot waters of the Tjikundal on the Gedé, at about 7000 feet elevation. It was already discovered by Vandelli in the time of Linné, in the hot water springs of Abamo near Padua.

1207. *Phycoseris reticulata*, Kg. ; Singapore ; (very frequent in the Indian ocean and in the Red Sea).

VII.—*Contributions towards Vernacular Lexicography*, No. 1.—*By* Pratápachandra Ghosha, B. A. (Abstract.)

Lexicography as a science is quite unknown in the literature of Bengal. Dictionaries, in the true sense of the term, are not to be found in Bengali. The few that pass under that ostensible name, partake more of the nature of Vocabularies than of Dictionaries. They appear to have been compiled without any reference to the etymology or orthography of vernacular words. And as long as a real boundary line of the language is not marked, such works cannot be anything else than Sanscrita Dictionaries in Bengali characters. Some compilers have, however, augmented the size of their work by interpolating all the modifications and distortions of Sanscrita words to which corrupt pronunciation of the illiterate, and erroneous spelling of the negligent, have given rise.

In this, the first of a series of papers, it is attempted to lay the foundation on a sound principle, for a better and complete Dictionary of the Bengali language. Etymology of several vernacular words and their present application, as distinguished from that of the original Sanscrita words, from which they evidently have been derived, form the subject of this paper. The Bengali language derives more than nineteen-twentieth of the bulk of its words from the Sanscrita, and in many instances the original Sanscrita form has been so fully preserved, that the words of the two languages are, in

every respect, excepting the slight modifications of the case-affixes, identical. Almost all the words derived from the Sanscrita, have retained their orthography in writing, but in common conversation some of them are so far modified, that at first sight they defy identification. Hence arises that difference in the written and spoken language of the country, offering serious difficulties to foreigners in acquiring fluency of speech in the Bengali. In Romanising Bengali words, the same discrepancy has been observed, and it becomes almost impossible to the uninitiated to put in Roman characters a conversation conducted between two natives of the country. The vowels are so indistinctly pronounced, and the different *S's* and *N's* confounded and interchanged, that in transcribing them, the ear always misleads the pen. These peculiarities of pronunciation, not being observed in writing, have given rise to a serious question, whether such corrupt forms are to be considered as distinct words or not.

Excepting the case-terminals and certain very awkwardly distorted words which have to be traced to the Prákṛita and the Gáthá for an explanation of the mode of their formation, almost all Bengali corruptions from the Sanscrita are not permanent types. Such, however, as পীরিত, মরম, পিয়ারী, corruptions of the Sanscrita প্রীতি, মর্ম্ম, and প্রেয়সী are permanent modifications, and though they are now and then rejected by the pedantic as vulgar, they are to be seen in many authors. The word পিয়ারী, however, has been so extensively used both in literary compositions and as a proper name, that the most strict defender of the purity of the language finds it difficult to eliminate it. Supporters of the converse theory, however, would retain such forms as, কম্ম, ধম্ম and মম্ম; they are used in common conversation even by the learned, though never in writing.

For the sake of euphony many Sanscrita words have been corrupted. Several such corruptions have been traced in this paper, and the rules of the substitution, elimination or interpolation of letters in Bengali and Prákṛita have been given, and lists of words so derived have also been added. The paper concludes with a list of Bengali words derived from the Sanscrita either direct or through the Prákṛita. The Prákṛita forms have been placed side by side for comparison.

VIII.—*Notes on Arabic and Persian Inscriptions in the District of Húgli,—by* H. Blochmann, Esq., M. A., *Calcutta Madrasah.* (Abstract).

Mr. Blochmann said—

I have collected fourteen Arabic and four Persian inscriptions from Tribení, Paṇḍuah, Sátgáṇw, and Dínánát'h. The Arabic inscriptions are all in large *Ṭughrá* characters with the letters much interwoven, which renders the reading extremely difficult, and is very likely the reason why these inscriptions, though so near our metropolis, have never been collected. Another source of difficulty is this, that the greater part of the inscriptions does not belong to the places where they now lie. Thus the tomb of Khán Muhammad Zafar Khán at Tribení contains two inscriptions imbedded in the side of the sarcophagus referring to the building of a Madrasah, and the second inscription (published by Mr. D. Money in J. A. S. B. Vol. XVI, p. 397) which only forms the concluding portion of the sentence, is put first. The public buildings in Sátgáṇw and Tribení decayed in the course of time, and vanished altogether, but pious hands have rescued their inscriptions and stored them up round about the hallowed spots of Zafar Khán's tomb, and Fakhruddín's enclosure, or even fixed them into the tomb walls at the time of repairs, as if these spots were the museums of inscriptions of the Húglí District.

Seven of the Arabic inscriptions collected by me add to our scanty knowledge of Bengal History and Geography. The earliest (Tribení) inscription gives the year A. H. 698, or 1298 A. D.; the latest (of Sátgáṇw) A. H. 936, or 1530 A. D.

The following geographical names occur on the inscriptions—

1. *The town of Husainábád the Great.*

This is evidently Husainábád in the Murshidábád district. A village of the same name lies between Sátgáṇw and Tribení, not far from the spots where tradition still points to the site of the royal horse and camel stables; but its foundation, according to the tradition, belongs to the times of Husain Sháh the Good.

2. *The town of Sirhat.*

This is the *Sarhat* of our maps in Birbhúm. It was the birth-place of Ruknuddín Rukn Khán, who, according to the inscriptions at Tribení commanded a good portion of Western Bengal in 698 A. H. His name and time coincide with those of the Ruknuddín (Kai Káús), mentioned by Mr. E. Thomas and Bábú Rájendra Lála Mitra (*vide* Journal Asiatic Society of Bengal, 1867, *p.* 40.)

3. *The District of Sájlá Mankhbád* (عرصهٔ ساجلا منکهباد).
4. *The T'hánah of Láoblá* (لاوبلا).

This name occurs on the Tribení Inscription of 698 A. H.; but the Sátgánw inscription of 861 mentions the *town* of Láoblá.

5. *The District and town of Hádígar* (هادیگر)
6. *The town of Simlábád* (سملاباد).
7. *The T'hánah of Mihrbak* (محربک).

I should be glad if any member could assist me in identifying the last *five* names.

Tribení itself is called by Muhammadans *Tripání*, or *Tripaní-Sháhpúr*, or *Fírúzábád.* They refer the latter name to a Dilhí Fírúz; but it is more natural to refer it to the Fírúzsháh of Bengal, whose name occurs in the Tribení inscription of 713, and on Mr. Thomas' coins (Journal A. S. B., 1867, *p.* 45).

Two inscriptions of the year 698 A. H. mention no king, but only the names of Khán Muhammad Zafar Khán, and Ruknuddín Rukn Khán, the latter of whom gets high sounding titles, as *Ulugh Majlisulmajális, Majlis i Ikhtiyár*, &c.

The inscription from Zafar Khán's Madrasah, completed on the 1st Muharram 713, gives the name of *Shamsuddín Abul Muzaffar Fírúz Sháh Sulṭán.*

The name of this king is not given in the Histories of Bengal. Mr. E. Thomas was the first that assigned him his proper place. His coins refer chiefly to the years 715 to 722 A. H.; one perhaps belongs to 702. The Tribení inscription gives 713, at which time he must have been firmly established.

The next (Sátgánw) inscription gives the date 861, and mentions the king *Náçiruddín Abul Muzaffar Husain Sháh*, and a Bengal grandee *Tarbiyat Khán.*

Our imperfect lists of Bengal kings call this king *Náçir Sháh ;* but 'Husain Sháh (I.)' would be the proper name.

The next inscription mentions *Barbak Sháh, son of* Mahmúd Sháh, *the Sulṭán,* as in Marsden II., *p.* 573. The year is expressed by

في تاريخ الحادي من المحرم و ستين و ثمانمائة

the meaning of which, on account of the *wáw* before *sittín,* is not quite clear ; and if it be *Muharram* 861, it would be at variance with the preceding inscription.

The next inscription from *Sátgáṇw* mentions *Jaláluddín Abul Muzaffar Fath Sháh Sulṭán, son of Mahmúd Sháh Sulṭán,* and the date, *4th Muharram* 892. *Vide* Marsden II, 574.

Thus Fath Sháh would be Barbak's brother. But their father *Mahmúd Sháh Sulṭán* has not yet received a place among the kings of Bengal.

The last inscription of importance gives the name of *Sulṭán Nuçrat Sháh, son of Husain Sháh Sulṭán,* and the year A. H. 936, or 1529-30, A. D.

Whether he was called 'Naçíb Sháh' (*Abulfazl, Firishtah*) or not, there is no doubt that on inscriptions he is called 'Nuçrat Sháh' (نصرة شاه).

I take this opportunity to state that the Bahrám Saqqá, mentioned in my last paper on 'Historical places in the District of Húglí,' to judge from the inscriptions on his shrine in Bardwán, lately received by me, turns out to be the poet of the same name, whose biography will be found in the Second Book of the *Áín.*

Mr. Ball said, I would venture to suggest to Mr. Blochmann the neighbourhood of Rájmahál as well worthy his attention, should he determine to extend the limits of his investigations regarding the ruins and monuments which mark the early progress of the Muhammadans in Bengal.

Between Rájmahál and Colgong (K'halgáṇw) there are a number of ruined masjids, palaces, and forts. The latter, but more especially the one at Tilagurhi (Talyágaḍhí) being so situated as to command the passes through the hills.

Considerable quantities of cut stone, trap, granite, and gneiss have been used in the buildings.

On the small granite islands in the Ganges at Colgong, there are wedge marks shewing where huge monoliths have been split off from the mass of rock. In some cases, the operations were not successful, the stone having broken off short. On one of the islands there is a remarkable *Durga* carved on the rock *in situ.* At Putturgutta there are cave temples cut in the sandstones on the sides of the hill. When recently visiting these localities I saw four traces of inscriptions.

A short discussion followed as to the historical importance of the Rájmahál District, and the desirability of securing some of the valuable inscriptions which lie about unprotected at Sátgáṇw and other places.

The following paper was received :—

IX.—*On the Normal Rainfall of Bengal,*—by H. F. Blanford, Esq., F. G. S.

The reading of this paper was postponed for the next Meeting.

LIBRARY.

The following additions have been made to the Library since the last meeting—

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society, No. 117.—THE ROYAL SOCIETY OF LONDON.

Bulletin de La Société de Géographie, Mars, 1870.—THE GEOGRAPHICAL SOCIETY OF PARIS.

Anthropological Review, No. 29.—THE ANTHROPOLOGICAL SOCIETY.

From Calcutta to London, by the Suez Canal.—THE REV. C. H. DALL.

Materials for a Monograph of the *Lepetidæ*, by C. H. Dall.—THE AUTHOR.

Ueber den Löss, von Eduard Suess.—DR. F. STOLICZKA.

Description d'une espéce nouvelle du genre *Argiope* du terrain Oligogéne inferieur du Nord de l' Allemagne, par J. Bosquet.—THE SAME.

Notice sur deux nouveaux Brachiopodes, par J. Bosquet. :—THE SAME.

Mémoire sur les Fossiles de Montreuil Bellay, par M. Hórbert :—THE SAME.

Beiträge zur Paläontologie der Jura-und Kreide—Formation im Nordwestlichen Deutschland von Dr. U. Schloenbach :—THE SAME.

Die Fossile Fauna der Silurischen Diluvial-Geschiebe von Sadewitz in Nieder-Schlesien. Eine Palæontologische Monographie, von Dr. F. Rœmer :—THE SAME.

Bághbaṭṭa Ashtánga Hridaya :—COL. G. B. MALLESON.

Professional Papers on Indian Engineering, April 1870 :—THE EDITOR.

Rahasya Sandarbha, No. 58 :—THE EDITOR.

Selections from the Records of Government, No. LXXV :—THE GOVERNMENT OF INDIA.

Narrative of the Course of Legislation by the Council of the Governor-General during the official year 1868-69 :—THE SAME.

Report on the Result of the Administration of the Salt Department, during 1868-69 :—THE GOVERNMENT OF BENGAL.

Selections from the Records of Government, Vol. III, No. 11 :—THE GOVERNMENT OF N. W. PROVINCES.

Exchange.

Nature, Nos. 25 and 26.

Athenæum, February and March, 1870.

Purchase.

Gould's Birds of Asia, part 22 :—Ibn-El-Athiri chronicon, Vol. IV. :—Revue des Deux Mondes 1 and 15 Mars :—Revue Archéologique, Mars, 1870 :—Revue et Magasin de Zoologie, No. 2, 1870 : Comptes Rendus, 8-11 :—Reise der Œsterreichischen Fregatte Novara, *Crustaceen.*

On the Relation of the Uṛiyá to the other Modern Aryan Languages,—by JOHN BEAMES, ESQ., B. C. S., *Balasore.*

[Received 6th April, 1870; read 4th May, 1870.]

A book has recently been published by Bábú Kántichandra Bhaṭṭácháryya, a Pandit in the Government School at Balasore, under the title উড়িয়া স্বতন্ত্র ভাষা নহে "Uṛiyá not an independent language." This little work, though profoundly destitute of philological arguments, has created some stir among the natives of the province, who are somewhat disgusted at finding their native language treated as a mere corruption of Bengali. The local excitement on the subject, has led me to look into the question more closely than I had before, though in the course of reading for my "Comparative Grammar of the Modern Aryan Languages" I had come upon many peculiarities, both of phonetics and inflection, which had caused me long ago to make up my mind as to the right of the Uṛiyá to be considered a language *per se.* It may not be uninteresting to others to see an attempt made to analyze the structure of this little known form of speech; and at the risk of anticipating statements which would give to my grammar an air of greater novelty, I venture to put down a very brief outline of my views.

At whatever period in the history of the world the Aryan race entered Orissa, it must be admitted as highly probable that those who did so, formed the vanguard of the immigration. Improbable as it seems to one who looks on the effeminate and apathetic Uṛiyá of to-day, his ancestors must necessarily have been the pioneers of their race. In folk-wanderings, however, it is not the hardiest or most enterprizing race that moves first. On the contrary, when the ancestral home got too full of people to be able to support them all, and it became evident that some must go elsewhere, the difficulty would be to determine who should be the victims; and that difficulty would naturally be solved by kicking out the weakest first. They being pressed on from behind by continually fresh-issuing swarms from the parent hive, would in the end be driven further and further, till they reached the extreme limits of the habitable area at their disposal. This is the history of the Celts in Europe and the Uṛiyas in India. Having reached the head of the Bay of

Bengal, and being driven on constantly by Bengalis in their rear, finding the eastern regions closed to them by fierce non-Aryan tribes, it must have been to them a great relief to find on the south that long narrow strip between the Hills and the Sea which they reached across the forests of Midnapore and Hijli. This land they named the "outlying strip" (उत out, कल a strip*), or उत्कल देश. If the above suppositions be admitted, as I think they will readily be, it follows that the Uṛiyas could not have, as our Pandit assumes, borrowed their language from Bengali, because at the time they passed through Bengal, it was uninhabited, at least by Aryans; and the Bengalis were behind them, and did not come into Bengal till the Uṛiyas had left it. It is certain that as early as the 8th century, Hemachandra knew the *Utkalí* or *Oḍra* to be a separate form of Pṛakrit from the *Gauri* or Bengali; and we need not at present seek a higher antiquity than this to establish an independent language.

I am not, however, desirous of laying much stress on the historical side of the argument; that derived from the internal structure of the language seems to me conclusive.

In the first place to mention is to refute the argument that because in any modern printed work in Uṛiya sixty words out of a hundred are identical with Bengali, therefore they are not two, but one language. The same argument might with equal justice be applied to Maráthí.

That unnecessary parade of learning which goes among us by the name of "pedantry," has never struck the Indian mind as offensive or objectionable. On the contrary, the more long and learned words an author can cram into his work, the greater his reputation. In the search for these *sesquipedalia verba*, the seven nations of the Aryans have divided into two camps. In the one camp are to be found those who draw from Sanskrit, in the other those who have recourse to Arabic and Persian. The former are the Bengali, Uṛiya, and Maráthí; the latter the Hindi,†

* In classical Sanskrit we have only कला fem., but the masculine must also have been in use, as is shewn by numerous forms in the modern languages.

† I use the word Hindi advisedly, to signify that great language which, when borrowing largely from Arabic is called also Urdu, which some misguided people would wish to regard as a separate language.

Panjábi and Sindhi. Gujarati hovers between the two. It is possible to construct a long sentence, nay to write a book even, in Hindi, Persian, Arabic, and Turkish, in which sixty per cent. of the words used should be identical, because borrowed from Arabic; yet no one would conclude that these languages were connected. Similarly a book may be written in Bengali, Uṛiya, and Marathi, with the same proportion of identical words, and yet no argument could be thence derived for or against the connection of the languages.

The fact is that the Sanskrit words so largely employed by pandits in Bengal and Orissa, are not living words at all, they are dead, dead ages ago, and only now galvanized into the semblance of life; they form no part of the real working stock of words of the language. When they died ages ago, their sons inherited their place, and now their grandsons or great-grandsons hold it. In plain English, such Sanskrit words as were used by the Uṛiyas and Bengalis twenty-five centuries ago, have since then undergone the usual fate of words, and have been corrupted, abraded, and distorted, till they often bear no resemblance at all to the original word. And it is these corrupted, or as they are called *Tadbhava* words, that are the real living words of the language, the words that have worn into their present shape by long use in the mouths of the people. These words our fastidious writers reject, and when by going back to the Sanskrit for their words, they have composed a work to their taste, lo! they say Uṛiya and Bengali are one language; for proof, read such and such works. I would suggest rather, let them take a *chása* of Dacca and a *chása* of Gumsar, and see how much they understand of one another's talk.

In the grammatical structure of the Uṛiya language, we see traces of a very well defined Pṛakrit with features peculiar to itself. I begin with the verb as the simplest part of the language, (in this case at least).

There is first a present participle in *u*, as *chalu*, and a past participle in *i*, as *chali;* by means of these two a whole string of compound tenses are formed, thus—

I.	chalu	achhi	I am going
		thili	I was going
		hebi	I shall be going

II.	chali	achhi	I have gone
		thili	I had gone
		hebi	I shall have gone.

Then there is a series of three simple tenses (which ought perhaps to have been put first).

I. mu dekhi, *etc.*, I see
II. mu dekhili, I saw
III. mu dekhibi, I shall see.

The habit of using the plural in speaking respectfully to others, and of one self, has become so inveterate that the original proper singular of the verb and pronoun has been rejected from the high-polite style, and only holds its own among the common people, that is to say, the three millions of uneducated folk, who know no better than to speak their mother-tongue as they find it. In literary compositions, the plural *amhe*, *tumhe*, *semáne* with the plural verbs as *karuṇ*, *kara*, *karanti*, are used for both singular and plural, and in the grammars hitherto published, those forms are given in the text, and the unfortunate singular *karaiṇ*, *karu*, *karaï* is banished to a note as "the inferior style!!" It is to be hoped that this truly præ-scientific treatment of the language will not be perpetuated in any future grammar.

The infinitive ends in *iba*, as *ásibá* to come, and is declined like a noun, just as the Hindi, and all other infinitives in the seven languages.

It has also a good strong form for the conditional. Thus—

Singular.	Plural.
Mu dekhi thánti	Amhe dekhi thántu
Tu dekhi thántu	Tumhe dekhi thantă
Se dekhi thántá	Semáne dekhi thanto

In which, as in the Bengali *dekhitam*, we recognize the verb स्था *sthá*, but in the Uriya in a more perfect form than in the Bengali.

As another instance of the superiority of Uriya in the matter of preservation of the Prakrit and Sanskrit forms, I will put side by side the simple present of the substantive verb.

	Uriya.	*Bengali.*
Sing.	Mu achhaïn (*vulgo* achhi)	Mui áchhi
	Tu achhă	Tui áchhis
	Se achhaï	Se áchhe
Pl.	Amhe achhuṇ	Ámi áchhi
	Tumhe achhă	Tumi áchhă
	Semáne achhanti	Tini áchhen

I suppose the Bengali pandits will deny my right to put down the first three forms *áchi*, *áchhis* and *áchhe* as real singulars, but my time for fighting them on that point has not yet come; any how, it is easy to see that in *achhaï*, *achhanti*, respectively we have pure Prakrit and Sanskrit forms in perfect preservation, whereas the Bengali has in its *áchhe* and *áchhen* gone many steps further down the ladder of corruption. In the Uriya forms achhaïṇ, and achhuṇ we have better representatives of the quasi-Sanskrit forms acchámi and achhámah (for the classical *asmi* and *asmah*) than in the Bengali, which has only an ill-defined feebly terminated *achhi* for both singular and plural. In fact Bengali is singularly behind all the other six languages in its verbal terminations, which are not sufficiently definite or clearly marked, and rejoice in short indistinct vowels.

The Uriya verb in its general scheme approaches more closely to the Hindi, and holds a respectable place among its sister languages, not being too luxuriant like the Gujarati, nor too scanty like the Panjabi; and with a regular system of terminations, in which respect it is superior to the Marathi and Sindhi, in neither of which do any two tenses exactly harmonize, and in which the troublesome and unnecessary element of gender is introduced. As might be expected from the comparative peace that Orissa has enjoyed, and its long immunity from foreign aggression, the verb has preserved tones and traces of much greater antiquity than any other language of the group.

This air of antiquity which is so striking and pleasing a feature of the language, is well illustrated by the pronouns which may be compared to advantage with any of the others. Thus *amhe* is pure Prakrit, and retains the *h*, which has been dropped in Bengali. The Hindi here inverts the position of the *h*, and drops the final *e*.

Marathi, though retaining the *h*, lengthens the first vowel and changes the *e* to *i*, giving *ámhí*. Gujarati *ame*, or *hame*, is intermediate between Uriya and Hindi ; Panjabi and Sindhi *asín* though older, inasmuch as they retain the ष of Skr. *asmah*, yet are less perfect, inasmuch as they drop the *m*.

Without going through the whole line of pronouns which would take too much space, I would here merely call attention to the facts that of all these forms, Uriya is not more closely allied to Bengali than to any of the other sister languages ; that the Uriya form is quite as genuine a descendant of the Sanskrit as any of them ; and lastly that the Uriya form having retained elements which the Bengali has lost, it is absurd to say that the former is derived from the latter. I merely give the second person as an illustration without comment.

	n.	g.	acc.		n.	g.	
Uriya Sing.	tu,	tor,	tote, etc.	Pl.	tumhe,	tumhăr,	&c.
Hindi	tu,	tera,	tujh, etc.	Pl.	tum,	tumhárá,	&c.
Bengali	tui,	tor,	toke	Pl.	tumi,	tomár,	&c.
Marathi	túṇ,	tujhá,	tuj	Pl.	tuhmi,	tumchá,	&c.
Panjabi	túṇ,	terá,	tainúṇ,	Pl.	tusin,	tusáḍhá,	&c.
Sindhi	túṇ,	tuṇhujo,	tokhe,	Pl.	taváiṇ,*	tahvanjo,	&c.
Gujarati	tun,	taro,	tune,	Pl.	tame,	tamáro,	&c.

In the noun, we observe the usual transition from the synthetical to the analytical formation. Here too there is considerable approximation to Bengali in some respects, though it will be seen that there is equally close approximation to the other languages.

The accusative proposition *ku* is nearer to Hindi *ko* than to Bengali *ke ;* and the likeness is strengthened by the fact that, as in Hindi, *ku* does duty for the dative as well.

The instrumental exists only with a periphrastic form *dwárá*, and the system of *prayogas* or constructions has not here received that full and perplexing elaboration that constitutes the difficulty of Hindi, and in a still greater degree of Marathi.

The ablative is formed by the postposition *tháru* (sthán ru) or simply *ru* "from," which is evidently connected with the sign of

* Also tahiṇ, avhiṇ, áṇíṇ &c. The want of a good literary standard of spelling is felt very strongly in all the seven languages, notably so in Sindhi.

the locative *thâre* or *re* "in;" and has nothing at all resembling it in the other tongues, unless we adduce the Bengali *re* of the dative, which, however, is probably a relic of the Sanskrit genitive *asya*, like the Marathi dative in *ás*, and dates from the Prakrit which habitually confuses the two cases. I think it probable that in the Uriya *ru*, we have the Sanskrit ablative *át*, which becomes in Prakrit *ádo*, and *ádu*. It appears to have been cerebralized into *aḍu*, whence *ru*. The locative *re* may be a corruption of the Prakrit termination सीं, where the *s* has been changed to *r* as in Bengali, but this I do not feel sure about.

The genitive ends in *ar* after a consonant, or *r* after a vowel, and closely corresponds to the Bengali in this, its only truly inflectional case.

The plural is formed by the added syllable *mán*, or *máne*, (*i. e.* "number"), just as in Hindi *log* or in Bengali *gaṇ*. Here the genitive comes out in greater clearness as *mánangkăr*, where the syllable *ang* (*a* with anuswára originally, though now written मानङ्कर) is the sign of the neuter of a Prakrit form मानं; this shews us that the sign of the genitive is properly *kar*. And this leads to a curious and unsuspected connection. In an article on the Bhojpuri dialect of Hindi,* I shewed that there was reason to believe that the *ka* of the Hindi genitive was corrupted from a form कर, or perhaps क्र, that the loss of the र gave us the Hindi form, while on the other hand, the rejection of the क gave us the Marwari रा, र, री, and the Panjabi दा, दे, दी, both the *k* and the *r* are found in the Bhojpuri pronominal genitive करा, as in *ikará okerá* (iská, uská). Now here again we have from the other side of India, a genitive plural in *kar*, the *k* of which is rejected in the singular, but retained in the plural. We must thus again dissociate Uriya from its neighbour Bengali, and tighten the links which connect it with its western congeners, leaving Bengali, till further research shall have been made, as the solitary instance of an inflectional genitive.

There is thus on the whole very little in the declension of the noun in common between the Uriya and its fellows. It may be interesting to give here in one view all the seven declensions. It will

* Journal R. A. S. vol. III, p. 483.

then be seen that Uriya is a perfectly self-contained and independent member of the family.

	Hindi.	Panjabi.	Sindhi.	Gujaráti.	Marathí.	Uríya.	Bengali.
Genitive,	ká, ke kí,	dá, de. di, diáṇ,	jo, je ja ji, je, ji já, júṇ jyúṇ, jini etc.	no, ní, núṇ	chá, chi, cheṇ. che, chyá, chíṇ.	ar, r	er, r
Dative,	ko	nuṇ	khe	[mate, ar-the sáru]	-á, -ás, -álá.	ku	-ere, -re
Accusative,	ko	nuṇ	khe	ne	—	ku	-ke
Instrumental,	ne	nai	-á	-e	neṇ, -eṇ, siṇ.	[dwárá]	-te
Ablative,	se, par	-te	kháṇ, te, auṇ, etc.	thí, thakí	hûn -ûn	tháru, ru	háite
Locative,	meṇ	vich	meṇ.	máṇ	-án -îṇ	tháro, re	te

All the genitives, except Uriya and Bengali, are declined to agree with the governed noun; in Sindhi, the number of forms arises from a desire to enable the governing noun to agree with each case and gender of the governed; which is not thought necessary in the other languages.

If we pass on to the question of the phonetics of the language, we find some more curious particulars.

Geographical position seems to have some influence here. While Panjabi and Sindhi in the extreme west exhibit a tendency to employ always short vowels and closed syllables, Bengali in the extreme east prefers long vowels and open syllables, while Hindi in the centre holds a middle place, neither too prone to lengthen nor to shorten; and this is a standard by which to measure the other languages. Marathi again, which lies due south of Hindi, and is also somewhat central, being neither very far to the west, nor to the east, exhibits the same centrality as Hindi with which it generally agrees in the quantity of its vowels. Gujarati is more prone to shorten than Marathi, and less so than Sindhi. Thus we get in fact a regular gradation from west to east. The more westerly a language is in situation, the greater its tendency to short vowels and closed syllables, and as you go further east by

degrees, the long vowel and the open syllable become more and more prominent, till they reach their extreme developement in Bengali. Now in this scheme, Uriya holds exactly the place we should expect. Lying in the same parallel of longitude as Behar, its phonetic system precisely corresponds with that of eastern Hindi, and is consequently less prone to long vowels than Bengali. North and south have no influence in this matter, it is only west and east that we have to consider, and Orissa though south is also entirely west of the Bengali area. A few examples may be given:

Skr. भद्र good, becomes in all the languages भल्ल; as in H. P. M. and S. भल्ला G. भलो, ल्लो, ल्लुं but B. भाल्ल. Here U. has भल्ल as in H. and the rest.

Skr. बुभुक्षु hungry. Here as compensation for the loss of the ष, the क is aspirated to ख, and the preceding vowel lengthened into *ú* in all the languages except P. and S., which exhibit भुखा and बुख्खा respectively. Uriya here has a guna form भोक, concerning which I shall speak below.

Skr. दंश to sting. All the other languages retain the short vowel, though they cerebralize the initial द, Bengali alone lengthens it to डांस. Uriya in दंशन retains the vowel in its proper quantity.

Skr. सप्त, Prakr. सत्त; as compensation for rejecting one त, the other languages lengthen the vowel and have सात P. and S. stick to the short vowel and have सत.

So in तम्बू a tent, the derivation of which is obscure, Bengali alone has ताम्बू. Uriya agrees with the others in retaining the short vowel.

तीक्ष्ण bitter, becomes in all तीखा except P. S. and G. which have तिक्खा तिखो and तिखु respectively.

In another point, Uriya is in a different camp from Bengali. The three southern languages Gujarati, Marathi and Uriya delight in guna vowels, in places where the other languages use the pure vowels.

Again the Uriya agrees with Marathi in preferring a dental to a cerebral, whereas the western languages and peculiarly Sindhi cerebralize the Sanskrit dental unnecessarily. This peculiarity rests upon very deep bases and would take a long time to work out. Thus U. G. and M. have थण्डा cold, where the other

languages have डण्डा, and Bengali as usual a डाण्डा (the derivation is not certain, but it is probably from an old part. pass. of स्थल to be firm, meaning congealed as ice or contracted by cold as the human body).

I have done here little more than point out the line of argument which should, in my opinion, be followed in cases of this sort. I wish particularly to urge that no researches into any one of the seven languages can be considered complete or satisfactory which do not embrace the whole seven, because they are so closely connected, and mutually shed such light on each other, that the reasons for their developement and for the forms they exhibit in modern times, depend upon laws, whose operation is universal, cannot be traced in one member only of the group.

Much more may, of course, be said on this subject; in fact a tolerably large book might be written on it. Unfortunately such a book could only be written by a resident of the province, as no respectable grammar or dictionary of the language has yet been published; and as there are few persons in Orissa who are competent to take up the enquiry and work it out fully, we cannot expect to see a good answer to Bábu Kanti Chandra's book yet awhile.

Bábu Rájendralála Mitra offered the following remarks on Mr. Beames' "Notes on the relation of the Uriyá to the other modern Aryan languages."

I happened to be present at a meeting of the Cuttack Debating Club, in December, 1868, when a paper was read on Patriotism. In the discussion which followed, I was asked to take a part, and in the course of my remarks on the injury which false patriotism or an insensate love for every thing that is national, causes to real progress, I pointed out the injury which was being inflicted on the Uriyá race by their attachment to a provincial patois, which they wished to exalt into a distinct language. The view I took of the question was new to the people, and very warm discussion has ever since been kept up in the clubs, newspapers and the official correspondence of the province, and the little brochure which forms the subject of Mr. Beames' paper and the paper itself, are amongst its

most prominent results. Party feeling now runs high, and I am told that more than one libel case has been instituted in connexion with the subject. The main question being purely philological, it is not remarkable that so distinguished a labourer in that field of science as Mr. Beames, should come forward to take a part in its discussion. His paper is highly interesting, and I am delighted to hear of a comparative grammar of the Indian vernaculars from his able pen. I must say, however, that he has done an injustice to the author of his text in describing the little work as "profoundly destitute of philological arguments." No doubt Paṇḍit Kántichandra is not very familiar with the modern European works on philology, and his mode of treating his subject will be found to differ from the course followed in similar cases by European authors, but bearing in mind the language (Bengali) in which he has written the book, and the people for whom he has designed it, I must say that he has displayed considerable tact and talent. My testimony will, perhaps, not be of much worth, I wish, therefore, to give a brief resumé of his work, in order that the meeting may be in a position to judge for itself. The first three chapters of the work treat of the origin of the different vernaculars now current in India, and the causes which have lead to their formation. The author then defines the natural boundary of Bengal and Orissa, and in the next chapter enters upon the main subject of his essay, the similitude between the Bengali and the Uriyá languages. This he does by quoting passages of Uriyá from diverse sources, and comparing then with Bengali. Uriyá vocables form the subject of his next chapter, and he there shews that the ordinary elements of Bengali speech are all current in the Province of Orissa, either intact or under some modification or other. In the eighth chapter is brought under review the grammatical apparatus of Uriyá, its declensions, gender, number, case and conjugation. Chapters next fellow on songs, proper names, manners and customs, dictionaries and alphabets, which go a great way to shew that the bulk of the Uriyá race does not differ from the Bengali; and the work is brought to a conclusion with some very pertinent remarks on the injustice and impropriety of cutting off the Uriyás from the Bengali by artificial barriers under the name of education.

One great mistake which vitiates the whole course of the Paṇḍit's arguments, is the assumption that the Calcutta vernacular of this century is the purest form of Bengali, and every thing that differs from it, is the result of corruption. Mr. Beames makes a similar mistake by instituting his comparison with the Bengali of today, overlooking altogether that the separation between the Uriyás and the Bengalis must have taken place many centuries ago, and that to arrive at a correct conclusion as to the origin of the Uriyá language and its relation to Bengali, we should take up the two languages as they existed at the time of their separation and not as they exist now. Any how, I must say that there is a great deal in the Paṇḍit's book which deserves careful examination, and it would have been of some advantage had Mr. Beames' reply noticed them in detail, instead of dismissing the whole work with a single disparaging remark. It would require more time than I can command at this meeting, to review the historical question as to the manner in which Orissa was peopled by the Aryans, but I shall, with your permission, Mr. Chairman, notice some of the salient points in the philological portion of Mr. Beames' paper.

The first argument of the Paṇḍit is, that Uriyá compositions read so very like Bengali that, a few phonetic peculiarities excepted, they may be mistaken for Bengali, and are easily understood by the people of Bengal, ignorant of the Uriyá language; and such being the case it must, he argues, follow that the two languages are very intimately connected. To prove this, he has quoted passages from some Uriyá works and compared them with Bengali. Mr. Beames accounts for their similitude by assuming that the bulk of the vocables in them, must be the result of pedantry, which make the Uriyá and the Bengali both resort largely to Sanskrit words and terms. He then goes somewhat out of his way to make out that pedantry, "so objectionable and offensive to Englishmen," is an "especial favourite of the Indian mind." Mr. Beames, however, does not appear to be in a position to sit as an impartial judge in the matter. To decide the question of excessive pedantry in any particular set of books, the judge must be familiar with the literature of the language, both modern and ancient in which it occurs, otherwise what may appear pedantry to one, may be the peculiarity

of the language under notice. The *Rambler* alone cannot decide that the language in which it is written is Johnsonèse, and not English. In the same way calisthenic corsets and trichosarons for bodices and hair brushes may appear pedantic to a foreigner like me, but if they occur in the every-day language of fashionable English ladies, they cease to be so. The extracts given by the Paṇḍit are taken from standard books in every-day use in the schools of Orissa, and to dismiss them by branding them as pedantic is, in my humble opinion, altogether to beg the question at issue. It is doubtless true that the predominance of any particular class of words in any piece of writing cannot decide the character of a language, but in the Uriyá over ninety per cent. of its vocables are Sanskrit, or corruptions of Sanskrit, and those corruptions have taken the same turn which corruptions in Bengali have done, and appear to be the results of the same laws of decay and regeneration which have produced the Bengali language.

The crucial test which Mr. Beames suggests is "to place together a *chásá* of Dacca and a *chásá* of Gumsur, and to see how much they understood of each other's talk." The result of this experiment would probably go against the Paṇḍit. But the same experiment tried between a cockney and a farm labourer in Yorkshire would in the same way, I fancy, decide the fate of English in the two places. For my part, though a native of Bengal for the last four and twenty generations, I would be sorry to face a *chásá* from Comillah if the issue was to decide whether we could understand each other through the medium of our common language, the Bengali. The fact is, that local peculiarities of pronunciation do not constitute language, and therefore no notice should be taken of them in deciding questions of linguistic classification. My Lord Dundreary may "thee a thea thowpent thwiming on the buthom of the thea," but no philologist will be bold enough to spy in it a sister language of the English.

The first subject treated by Mr. Beames in regard to the grammar of the Uriyá language, is conjugation, but the comparison having been made with the Bengali as revised and recast by our indigenous writers within the last fifty years or so, the result is very different from what the Paṇḍit has arrived at. The examples he

has quoted, though uncommon in modern Bengali, are not foreign to it; *chalu*, for instance, as a present participle and its compounds are not altogether unknown. But four centuries ago, G o v i n d a D á s a, a Bengali poet, used it and its cognate forms almost to the exclusion of all others. Thus he says—

উঠিচলু সুন্দরী বিঘটল কাণ পিরিত।

Again: সখিগন দধি মন্থন করু তাঁহি।

In another place চৌদিগে-চান্দ হেরি রহি গেল.।

Of the second form *chali*, we have innumerable instances in old works, and even in the poetry of this century. *Dekhi* and *dekhili* are likewise common, and in the mouths of the common people the only forms in use. The Uriyá future *dekhibi* is in Bengali *dekhibe*, but the change is so slight that I do not think it would justify our attributing it to an independant parentage. In the conditional or subjunctive past *dekhi-thánti*, Mr. B e a m e s recognises a more perfect form than the Bengali *dekhitám*, but had he taken up the true Bengali conditional *dekhiyá thákitám*, he would have found that, with the exception of the nasal mark, the two are closely alike, and formed in either case with the help of the auxilliary verb, *sthá*. Of the twelve forms of the verb *achha*, *achchi*, *achhai*, *achho*, *achhis*, *achhe*, *achhi*, *achhen*, &c., nine are Bengali and only three forms, *achhan*, *achhun* and *achhanti*, are new. Of these the last is by far the oldest. It shews a lingering of the Sanskrit affix *anti*. According to the rules of the Prakrit, Sanskrit compound consonants drop one of them and lengthen the preceeding vowel, and accordingly, we find in Bengali the *ti* dropped and the *n* preceded by a long vowel as in *áchhen*=to Uriya *achhanti*. This elision of the *ti* is altogether modern. I think in old Bengali the affix occurs in its full form of *anti*, though I cannot just now recall to memory any instance in proof of it. The Paṇḍit says he too has met with it, but he has given no example. Another marked peculiarity in Uriyá is, the separation of the base from the affix, as in *Karu achhi* and their compounds. In Bengali they are united according to the rules of Sandhi—*Kariáchhi*; but this is not a matter worthy of any remark, so I shall pass it by.

Of pronouns Mr. B e a m e s has given an elaborate analysis, taking his examples from the Bengali, Uriyá, Marhaṭṭá, Hindi, Punjábi, Sindhi and Guzerati; but the result is not satisfactory. He has

taken one example from each language, and that from books, and they are not sufficient for a fair comparison of living, spoken languages. What is wanted is a full survey of the various forms of the pronoun current in each province, and for that purpose a deeper knowledge of the languages, both ancient and modern, and in their colloquial and written forms, is required, than what I can pretend to possess. As regards the Bengali and the Uriyá, however, I may say that in *tu*, *tuï*, *tote*, *tumár*, &c., there is close analogy with Bengali. *Amhe* and *tumhe*, often pronounced *ambhe* and *tumbhe*, are no doubt peculiar; but the change has been brought on in Bengali since its separation from, or rather the birth of Uriyá, and its cause is the peculiar cockneyism of dropping the aspirate.

I shall now notice the declension of nouns. Mr. Beames' survey leads him to the conclusion that five out of the six cases are different. The very reverse, however, appears to me to be the fact. In the Sanskrit, the nominative is formed in most themes by the addition of an *s*. In a sister language, the Latin, the same rule obtains to a great extent, but in the derivatives of the Latin and the Sanskrit, we find the mark in some cases changed to *o*, and in others altogether omitted. In Italian and Spanish we have *o*, as *occhio* and *ojo* from the Latin *oculus*, but in the language of the Troubadours, in Provençal and in French the mark is omitted. In India, the Punjabi and the Marwari retain the *o*, but all the others drop it. The result is, that the nominative is alike both in the Uriyá and the Bengali.

The mark of the accusative singular in Latin and Sanskrit is *m*, but in most of the languages derived from them, it is dropped. So is the case both in Uriyá and Bengali. This rule is, however, not uniformly observed; and sometimes the place of the *m* is supplied by the syllable *ku*, in Uriyá, and *ke*, in Bengali, and to trace their origin, I must refer the meeting to my papers on the Gáthá and the Hindi dialects, where I have shown that to overcome the intricacies of the Sanskrit declension, it was usual with the scalds of ancient India to convert themes of various terminations to one form by affixing an expletive *k*, and to mark the elision of case-affixes, the usual rule was to add a *u*, which together make *ku*. In written Bengali, the *ku* changes into *ke*; but in the spoken language, in some districts, the *ku*

still retains its position, and we need not, therefore, take it to be a serious difficulty in the way of the affiliation of the Uriya dialect.

The dative is in most instances a counterpart of the accusative, and so is it in Uriyá and Bengali.

In Sutton's Uriyá grammar, the sign of the instrumental is *te*. It is the same in Bengali, and that case in the two languages may therefore be taken as identically the same. Mr. B e a m e s, however, does not notice this mark, and gives *deárá ;* but that form occurs more frequently in Bengali than *te*, and consequently the argument is not at all altered.

The ablative in ancient and spoken Bengali, is formed by the addition of *theke*, a compound of the verb *sthá*, with the expletive *k* already adverted to in connexion with the accusative. In Uriyá, it is formed with the same auxiliary verb and the mark of elision u = *tháru :* a later improvement has dropped the verb and retained only *ru*.

Mr. B e a m e s admits the genitive to be alike in Uriyá and Bengali, so I need say nothing about the origin of the sign for that case.

The locative in Sanskrit is *e*, and in Uriyá and Bengali we have exactly the some form—*háte* from *hita* a hand. But there are other forms likewise current, thus we have *te* in *hátete* in Bengali, and *hátare* and *hátere* in Uriyá; but the last is not peculiar. In the *Chandi*, a Bengali book about three centuries old, we find the passage কোথাগো এমন বেসে কোথারে সজনি, and in the dialects of Sylhet and Cachar the *re* form is the only one in use. In the spoken language of Dacca, it likewise occurs very frequently.

The vocative is alike in both the languages; and so we have in seven out of eight cases, the two languages to correspond very closely, and in one only (the fifth) to differ but slightly.

The plural in Bengali is formed very differently under different circumstances; but mostly by the addition of a noun or adjective of multitude; such as, *gaṇa*, *barga*, *chaya*, *sakala*, *sarba*, &c. &c. In Uriyá, there is more fixity in the rule, and the word *mána*, for weight or measure, is generally, though not uniformly, employed: the use of that word, however, is not unknown in Bengali, and the Paṇḍit, whose book Mr. B e a m e s has reviewed, has given several instances of it from old Bengali works. On the other hand, the Bengali plural mark *saba* is also frequently used in spoken Uriyá, and

such phrases *as gachha saba káṭi phelilá ;loka saba thilá*, are very common. These facts, I trust, will shew that the Uriyá, instead of being a "self-contained and independent member of the Aryan Indian vernaculars," is most closely and intimately connected with the Bengali, and the Paṇḍit has very good reasons to take it to be a daughter and not a sister of the vernacular of this province. The exact relationship may be reversed; but even a cursory glance at the old literatures of the two languages shew them to have been at one time one, and their differences to be due to later or modern growth.

Mr. B e a m e s has devoted a good portion of his paper to the discussion of Uriyá phonetics. But they call for no remark. It has not been denied by the Paṇḍit, and no body will venture to gainsay, that Uriyá pronunciation is different from that of Bengal. The question is, are they such as to justify our taking the Uriyá to be an independant language? and I maintain that the phonetics of the two dialects do not suffice to solve it. In an excellent paper on the Bhojpuri dialect, Mr. B e a m e s has shewn that, notwithstanding much graver differences in glossology and grammar—in declension and conjugation,—in pronouns and the degrees of comparison,—in adjectives and conjunctions—than what obtains in Uriyá and Bengali, the Bhojpuri is a dialect of the Hindi; and by a parity of reasoning, I expect he will admit the Uriyá, in a like manner, to be a daughter of the Bengali. Phonetic peculiarities such as he has noticed, and such as may be multiplied *ad infinitum*, do not constitute language, and therefore do not affect the question at issue in any way. I have no doubt that every member here present will bear me out when I say that such peculiarities exist in almost every county in England, but they do not suffice to divide the English language into a number of sister dialects. In the districts of Bengal, we have the same peculiarity in even a more marked degree. I well remember a remark of the late Rájá of Krishnanagar who once told me that his pronunciation must be more correct than mine, because his district was once the seat of government, and he had therefore every right to lay down the law in such cases. To put this more clearly, I beg to draw the attention of the meeting to a comparative table (Vide p. 215) which I once prepared to illustrate the differences of the Orissa, the Calcutta and the Dacca dialects.

The first column in it contains the first two paragraphs of an article in which the editor of the *Utkala Dipiká* condemned my theory about the Bengali origin of Uriyá; they contain just 142 words of which 137 are Bengali or derived from Bengali, and 5 are English. The translation of this in Bengali in the second column contains 144 words, of which none differs radically from the Uriyá, but fifty-six have some phonetic or grammatical peculiarity or other. In the third column is given a version of it in the spoken language of Dacca, prepared by a resident of that district, Bábu Rámakumár Bose, Deputy Magistrate of the 24-Purgunnahs. It contains 146 words, of which 47 are different from the Bengali. Thus it will be seen that the Dacca dialect differs nearly as much from the Bengali as the Uriyá does, in sound. If I had time to get translations of the Uriyá extract prepared in the spoken dialects of Comillah, Sylhet, Assam or Coch Behar, I could have easily shewn that they differ fully as much from the Bengali in their phonetics and grammar, as does the Uriyá. But I suppose they are not wanted. The table, as it stands, shews clearly enough the relation which the Uriyá bears to Bengali. No one who knows the language of the middle column, can read the other two without the conviction that they contain Bengali matter badly written. And such being the case, I cannot but repeat the assertion, that the Uriyá is more closely related to Bengali than the other vernaculars of India, and that the relationship most probably is that of mother and daughter and not of two sisters. And if this be admitted, it must follow that, as in Comillah, Assam, Sylhet, and Coch Behar, so in Orissa, education should be conducted in Bengali and not in Uriyá. As I have already said, every county in England and Scotland has its dialectic peculiarity, and yet education is not carried on through the medium of separate sets of books, prepared with special regard to the dialectic peculiarities of each county, but in one common English. In France almost every department, in the same way, has its peculiar dialect, but as yet there has not been a vernacularist hot-headed enough to suggest that each district should have a separate language; and the French of the Institute of France is the only recognised medium of education. The same circumstances obtain in Germany including Aus-

tria and Prussia, but nowhere is language divided on the ground of provincial peculiarities of pronunciation. In Hindustan Proper, there are at least a dozen kinds of Hindi differing from each other much more remarkably than Uriyá does from Bengali, and none knows this better than Mr. B e a m e s, who has so carefully studied them in all their different phases; but none has yet ventured to recommend that separate sets of school books should be got up in each of those different dialects. I see no reason, therefore, why a different policy should be adopted in Bengal. To the Uriyás this is a question of the most vital importance. According to the last census, they number only a little over two millions in the three districts of Balasore, Cuttack and Puri, and a million may be added for those who live in Ganjam, Sambhalpur and the Tributary Mahals. But on the other hand, we must deduct at least five lacs for foreigners, Muhammadans, Kyáns, Madrasis, Bengalis, and others, who want not and care not for the Uriyá language, so that we have only about 2½ millions for whom a distinct literature has to be created. The three districts under the Cuttack Commissioner yield to Government in the way of revenue under 17 lacs a year, and the zemindars at 37 per cent. get about 11 or 12 lacs. This sum is divided among 3881 persons, of whom only 26 get above ten thousand a year each, and of them 16 are Bengalis, mostly non-resident, who are not likely to offer any especial encouragement to the Uriyá language. The people are mostly agriculturists, and having very little trade, are generally very poor. How it is possible for such a small community, and under such circumstances to create a literature in their vernacular, and maintain it, I cannot conceive. Our vernacularists maintain that the vernaculars of India should be so improved as to suffice for a University Course for the B. A standard, if not for Honors. This would imply that each of them should include the whole course of Algebra and Geometry, and considerable portions of Astronomy, Chemistry, Natural Philosophy, and other sciences, besides translations from Newton's Principia, Grote's Greece, Gibbon's Roman Empire, Mill's Logic, and Abercrombie's Mental Philosophy. To suppose that such a thing is possible for a poor community of 2½ millions of Uriyás to accomplish, is to suppose an impossibility. To suppose that the whole or a majority of the people who speak the

one hundred and one vernaculars which, according to a little work on Philology by Mr. Beames, are now current in India, is so utopian or absurd, that I need not wait to notice it. It has been said that if the Uriyás themselves cannot get up a literature, the Government will help them. This is, however, very unlikely. Vast no doubt are the resources of the British Government in India, and vaster still is its earnestness to ameliorate the condition of the people under its sway, but I doubt very much of they will ever suffice to create a hundred and one literatures, and keep them *au courant* with those of Europe, even if such a thing as a "deficit" was never known to our financiers. Admitting, however, for the sake of argument, that Government would assist to a very large extent in furthering the education of the people, I would ask, would it be fair, would it be just, would it be politic, on its part to do so by multiplying languages? Had our Government been guided by that narrow, jesuitical, unholy and unchristian doctrine of *divide et impera*, it would perhaps have been expedient. But the liberal and noble-minded gentleman who represents Her Britannic Majesty in this country and his council, would scorn such a policy, and, I am satisfied, would not deliberately lend themselves to uphold it. The main object of language is to unite mankind by one common bond of speech, but to foster a hundred and one languages within the boundary of a single country like India, would not be to promote that all-important object, but to raise a tower of Babel to disunite and disperse the native races. It is not my intention, however, to advocate, at present, a single language for all India, but to plead for the Uriyás, and on the ground of unity of religion, race, and language, to take them amongst us, and to place at their disposal a fair share of all we possess, and may hereafter obtain. In Orissa they cannot publish a single book without adventitious aid, while in Bengal book-making has already become a profitable trade, and many have their manors placed behind their publishers' counters. We already publish more than five hundred books every year, and hope ere long to multiply the number manifold. As a note-worthy instance, I may mention that a few years ago I prepared a map of India in Bengali, and it brought me a profit within one year of over six thousand rupees. The same map was subsequently trans-

lated into Uriyá, but even the School Book Society could not venture to undertake it on their own account, and the Government at last had to advance, I think, some two or three thousand rupees to help the publication. The map, however, fell still-born from the press, and almost the whole edition is, I believe, now rotting in the godowns of its publisher. Let but Government introduce the Bengali language in the schools of Orissa, and the Uriyás, instead of seeking grants-in-aid from Government and private individuals for occasionally bringing out solitary new books, will have the whole of our Bengali publications at their disposal without any cost, and would be united with a race of thirty millions with which they have so many things in common.

Nor is the fusion of their language into ours at all impracticable. The experiment has already been tried and found to be completely successful. Some twenty years ago when the district of Midnapur was transferred from the Commissionership of Cuttack to that of Burdwan, the language of the courts there and of the people was Uriyá. The new Commissioner, for the sake of uniformity in all his districts or some other cause, suppressed Uriyá, and introduced the Bengali language, and nearly the whole of Midnapur is now become a Bengali speaking district, and men there often feel offended if they are called Uriyás. That similar measures in Balasore, Cuttack and Puri would effect a similar change, I have no reason to doubt.

I fear I have already occupied the time of the meeting a great deal too long, but I must crave your indulgence, Mr. Chairman, for one more remark. It has been said that if the Uriyá, like the other vernaculars, is not fit for a University Course, it would suffice for the elementary education of the people, and that is what is most urgently needed. To support this view, it has been pointed out by a learned gentleman, himself a university scholar, that elementary mass education is preferable to high class education, and inasmuch as the cost for every boy in a Government College would suffice for 40 boys in a vernacular school, we should prefer to have 40 to 1. The education in the Colleges, it is needless to say, is at least 40 times superior to that in the vernacular schools, but the latter nevertheless is said to be more desirable. The gentleman has evidently

no faith in the adage which aptly describes the merit of imperfect learning, or perhaps he patronises the homœopathic doctrine of "the greater the dilution the higher the potency." On that principle the paper of Mr. Beames (I say this without meaning any offence to that gentleman) would prove more effectual if it were torn into forty parts, and each handed to a separate member, than if the whole were understood by one man. But, however, that be, nothing could bring a greater misfortune upon the Uriyás than the enforced introduction of such a principle into their country. I yield to none in my earnestness for the elementary education of the poorer classes, but for the sake of truth, I must confess, even at the risk of laying myself open to much obloquy, that I have no faith whatever in mass education by itself, independent of higher education, as a means for the material, moral and intellectual amelioration of a nation, however much it may recommend itself by virtue of its apparent philanthropy: to me it has a smack of sickly sentimentalism which I cannot but condemn. Elementary mass education alone, without a higher education, can do but little good to any race of people. It implies a soupçon or suspicion of the three *Rs*, which is utterly worthless as an element of intellectual improvement. In Japan, we learn from Mr. Bernard, every grown up person, whether man or woman, is proficient in elementary reading and writing; but the Japanese are not, on that account, a whit better than the nations of Europe. In England mass education has extended much more than in India, but less so than in France or Prussia, but is England at all inferior on that account, morally, physically or intellectually, to those countries? One unhappy result of defective scraps of instruction miscalled education I shall advert to, it is that while the bulk of English thieves formerly were ignorant men, the relative proportion of educated to ignorant thieves has of late become as 68 to 32; that is, for every person who has become a thief from want of education, two have taken to the profession of larceny with the full benefit of the kind of education which is now become so fashionable a theme of praise. That it has in any way helped to raise England above other nations, I have every reason to doubt. But let us suppose, as a great Frenchman once did, that fate by some mortal stroke of cholera or plague was to carry off from Eng-

land fifty of her greatest mathematicians, fifty of her highest astronomers, fifty of her ablest chemists, fifty of her most distinguished geologists, fifty of her foremost physicists, fifty of her profoundest statesmen, fifty of her best writers, fifty of her wisest doctors, and fifty of her most proficient engineers, and to compensate the loss by a small modicum of reading, writing and cyphering in every man, woman and child, and that such a thing as a cross mark in the marriage register, of which we have now near thirty per cent. was never to be. The loss in such a case would not amount to five hundred persons,—mere "tulips and exotics" as they have been poetically described by the gentleman whom I have just alluded to, of no essential value to English society,—and the gain would be education in five millions of sturdy corn-growers. Would not England nevertheless be two centuries behind hand of France? England would still retain many of her third class astronomers, mathematicians and scientific men, but they would not suffice to uphold her prestige as an intellectual nation. In Orissa there is no man learned in the sciences, and the doctrine of mass education to the exclusion or supersession of higher education, would remove the chance of her ever getting one. It would chain her down to one dead level of intellectual poverty from which she will have no prospect of rising. It may convert her sons into indifferent copyists, or bad substitutes of Babbage's calculating machines; but not into intellectual, sturdy, self-reliant men. May the wisdom of our rulers avert from her so dire a calamity!

URIYA DIALECT.

Utkala Bháshára Unnatiprati Byágháta.

Utkala bháshára unnati pakshare bartamána gabarnamenṭa o dés'íya lokamáne yerúpa yatna karu-achhanti tánhira símá náhi. Alpakála madhyare utkalare jemanta bidyálaya sthápana o utkala bhásháre pushtaka mudrita kárya heu-achhi ihá dekhi samastankara biswása huãi ye achire utkala bháshára unnati heba, tathácha amhemáne bodha karun ye abadhi prakrita upáyara anusarana hoï náhin e bháshára unnati bipakshare eka gurutara pratibandhaka rahi-achhi.

Ethira parichaya debá purbara amhemáne keteka lokara bhrama sañsodhana karibára uchita bibechaná karu-achchhun. Páṭhakamánanka smarana thiba ye gata di-

CALCUTTA DIALECT.

Utkala Bháshára Unnatiprati Byágháta.

Utkala bháshára unnati pakshe bartamána gabarnamenṭa o dés'íya lokerá yerúpa yatna karitechhen táhára símá náhi. Alpakála madhye utkale yemata bidyálaya sthápana o utkala bhásháya pustaka mudrita kárya haiáchhe ihá dekhiyá samasta (lokera) biswása hayitechhe ye achire utkala bháshára unnati haibe. Tathácha ámará bodha kari ye abadhi prakrita upáyera anusarana ná haya e bháshára unnatira pakshe eka gurutara pratibandhaka rahiáchhe.

Ihára parichaya debára purbe ámará kataka lokera bhrama sansódhana kará uchita bibechaná kariáchhi. Páṭhakadigera smarana thákibe ye gata dísembara máse

DACCA DIALECT.

Utkala Bására Unnatira prati Byágáta.

Utkala bására unnatira pakke battamána gabaranmenṭa o des'iya lokerá jerúpa yatna karitechena táhára símá náhi. Alpakála madye utkale yemata bidyálaya thápan o utkala básáya pustaka mudrita kárya haiteche táhá dehiyá samasta lokera biswása haiteche je abilambe utkala bására unnati haibek. Tatácha ámará boda kari je jábat prakrita upáyara anusaran ná haya tábat ai bására unnatira pakke eka brihat pratibandaka tákibek.

Ihára parichaya debára pubbe ámará kataka lokera brama sansodana kará uchit bibechaná kariyáchi. Pátakdigera sarana tákibek ye gata disembara máse Kalikátá nibási subikkáta bábu Rájendralála Mi-

URIYA.

sambara másare Kalikátá báshi subikhyáta bábu Rájendralála Mitra e pradesaku ási kaṭaka dibeṭiñ klabare gaṭie baktritá kari-thile. Amhemáne táhánka Ingarájí baktritá karibára khamatáku prasañsá karithilun mátra. Se bidesíya, háṭhata goṭie baktritá karithile boli táhánka matámatara álochaná kari nathilun. Alpakála helá jánipárilun ye táhánka mataku aneka loka utkriṣṭa jnána kari sethira anugámi hoiachhanti, sutarán ete bele táhánka matara bhrama darsáibá ábasyaka helá.

BENGALI.

Kalikátá báshi subikhyáta bábu Rájendralála Mitra e pradese asiyá kaṭaka dibaṭin klabe eka baktritá kariáchhilen, ámará táhánra Ingráji baktritá karibára khamatára prasansá kariyá chhilám mátra. Se bidesíya haṭhát ekaṭá baktritá kariáchhila baliá táhára matámatera álochaná kariá chhilám ná. Alpakála haila jánite páriláma ye tánhára matake aneka loka utkrishṭa jnána kariyá táhára anugámi haiáchhen, sutarán ebelá táhánra matera bhrama darsáibára abasyaka haila.

DACCA.

tra e dese ásiyá kaṭaka diveṭin klabe eka baktitá diyáchilen, amará kebala táhán Inreji baktritá karára kamatára prasañsá kariyáchílam. Se bidesí haṭát ekṭá baktitá kariyáchila ei janyá táhán matámatera bibechaná kariyá chilám ná. Alpakála haila jánite páiláma táhán matere aneka loke utkishṭa jnána kariyá táhán paschátgámi haichen, sutarán ebelá táhán matera brama dekánera ábasyaka haila.

Contributions to the subscriptions in aid of Mrs. Piddington.

The Asiatic Society of Bengal,	Rs.	100	Paid.
The Hon'ble J. B. Phear,		50	
R. Taylor, Esq.,		30	Paid.
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PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JULY, 1870.

A Meeting of the Society was held on Wednesday, the 6th instant, at 9 o'clock P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced—

1. From J. G. Delmerick Esq., a number of Buddhist heads and stone tablets with figures, from near Pashâwar.

The President drew attention to the prevalence of the Greek type in these heads. The figures appeared to be of clay, or a composition of clay and other ingredients, very lightly burnt, possibly only sun-burnt. They still retained their original sharpness of definition and were singularly well preserved. Obviously they had been attached to masonry, and no doubt formed part of a subject, worked out in high relief upon the frieze of some building. It was also remarkable that every one of them was unsymmetrical, *i. e.*, compressed or flattened either on the right side or on the left side. The purpose of this must have been to adapt them to being seen with the greater artistic effect from a particular point of view: and it indicated considerable advance in knowledge of the peculiar conditions necessary for the success of sculptural ornament.

A conversation ensued in which several members joined.

2. From the Government of India, Home Department—27 Photographs of Jain and Buddhist ruins in the Buldânah District, West

Barár, together with a copy of an inscription* found near Barsee Taklee.

3. From G. Latham Esq., C. E., a copy of 'India to England, a new Overland Route *via* Turkish Arabia.'

4. From Babu Gopinath Sen, a copy of a Table shewing the mean monthly and mean hourly variations of temperature as determined in the S. G. Office for 1855 to 1869.

5. From the Author, *Prabad Málá*, or the Wit and Wisdom of Bengali Ryots and Women, as shewn in their Proverbs and Proverbial Sayings, by Rev. J. Long.

6. From W. Oldham, Esq., LL.D., C. S., Gházípúr, an Urdú Translation of the Persian *Balwantnámah*, by Khairuddín Muhammad of Iláhábád.

Mr. Blochmann said—

The *Balwantnámah* by Khairuddín Muhammad of Iláhábád is a work of great value. It contains a history of the Názims and Rájahs of Benares, and is full of interesting details referring to the times and transactions of Warren Hastings. The author lived in the end of last century and has written several other Historical works, as the *Jaunpúrnámah*, or Chronicle of the town of Jaunpúr; the *Tazkiratul-'Ulamá*,† or biographical notices of modern Persian writers, chiefly of Audh; the *Kitáb i 'Alamshob*, or History from the time of Nádir Sháh to the death of Mírzá Najaf Khán; the *'Ibratnámah*, a voluminous history of the reign of Sháh 'Alam (II.) with a minute account of the doings of the notorious Ghulám Qádir; the *Gwáliárnámah*, or History of Fort Gwaliár; and several other works on law, rhetoric, and grammar.

His last work appears to have been the above mentioned *Tazkirat ul-'Ulamá*, which was written, like the *Balwantnámah*, at the suggestion of Abraham Welland, Judge of Jaunpúr, and dedicated to the Marquis of Wellesley. It contains additional matter for a History of Jaunpúr, and biographies of learned men chiefly of such as lived at Jaunpúr. He often praises the officers of the East India Company, because "they prefer a learned man of another religion

* The copy of the inscription is unfortunately so faulty as to convey no sense. THE EDITOR.

† Called in the Catalogue of Persian MSS. of the Society *Nadrat ul'Ulamá*. THE EDITOR.

to a fool of their own." The books also contains a history of his life and a list of his works, from which it appears that the proper title of the *Balwantnámah* is *Tuhfah i Tízah*, a copy of which, I find, is in the Society's Library.

Khairuddín was born December, 1751. The *Tazkiratul 'Ulamá*, the latest of those of his works which are known to me, was written in A. H. 1216, or A. D. 1801.

His works deserve the attention of all who wish critically to study the times of the decline and fall of the Mughul empire and the early period of the E. I. Company.

The best thanks of the Society are due to Dr. W. Oldham for his valuable present.

The following gentlemen duly proposed and seconded at the last Meeting were balloted for and elected Ordinary Members—

E. Lethbridge, Esq., M. A.

A. B. Miller, Esq.

The following gentlemen are candidates for ballot at the August Meeting—

R. H. Wilson, Esq., C. S., and A. M. Broadly, Esq., C. S., proposed by W. W. Hunter, Esq., LL.D., C. S., seconded by the Hon'ble J. B. Phear.

The President on the part of the Council reported that a donation of Rupees one thousand had been received by the Society through the Government of Bengal from the Kundu family of Dacca, in aid of the annual grant made to the Society by the Government for the conservation and cataloguing of Sanscrit MSS. in India.

The President was sure that the Society in undertaking at the request of Government to dispose of the Rs. 1,000 according to the intention of the donors, would recognize the high motives, which had led these gentlemen to make so handsome a donation for public purposes. He trusted that this honorable example would not be lost, and that the Kundu family might be able to boast of a long list of imitators.

The President then proposed a vote of thanks to the donors, which was carried unanimously.

The President, in the capacity of Chairman of the Grote Portrait Fund Committee, then stated that he had been directed by the Committee to offer the Portrait of Mr. A. Grote to the Asiatic Society for its acceptance, upon condition that the picture be hung in the meeting-room of the Society. The likeness was unmistakeable. It almost brought back their old friend into their midst again. No place could be so fitting for the reception of the picture, as the walls of the room in which Mr. Grote had so long and so ably presided over their Councils.

Mr. Woodrow said :—" I have been asked to respond to the offer, probably because I am the oldest member of the Society present. It is more than twenty years ago that I was admitted a member of this Society, and so far as I can judge, no Calcutta member laboured throughout this time more steadily and continuously than did Mr. Grote for the good of the Society. Whether as member, office-bearer, or President, Mr. Grote's labours were unwearied. As President, his office was no sinecure. I have often wondered at the patience and courtesy he shewed. Through his wide correspondence with friends in all parts of India, he was able to bring before every meeting some interesting information that he had himself obtained. The Asiatic Society will accept with sincere thanks the portrait of Mr. Grote, one of its most valued friends."

The proposal to accept the offer was carried with applause ; and the President pointed out a position in which the picture might advantageously be hung.

The President then exhibited a stone implement brought by Mr. W. Theobald from Prome.

Mr. Theobald said—

The Celt exhibited this evening, is remarkable for its size, which though not greater or even equal to many Indian Celts, is greater than that of any Celt which has hitherto been found in Birmah, with a single exception I shall presently advert to. Its general type is that of the Birmese Celt, the cutting edge being formed by grinding down one side only (as in a plane), whilst all Indian Celts are, I believe, formed by grinding or chipping away both surfaces, so as to produce the ordinary form of a cutting edge (as in an

axe). It differs, however, from most Birmese celts which have come under my observation, in wanting the shoulders generally present, and in being made of a somewhat unusual material, a hard tough argillaceous sandstone, almost conglomeratic in structure. The Celt was picked up in the bed of a stream in my presence some 35 miles N. W. of Prome, and a very similar rock to that of which it is fashioned, is met with in the neighbourbood.

Its extreme length is $7\frac{3}{4}$ inches.
Width at top, 2 ,,
,, at bottom, $4\frac{1}{2}$,, (making a little allowance for rolled corners). Average thickness a trifle over 1 inch.

The form of this Celt, that is, the absence of shoulders, and its great size and weight, incline me to think that it was used in the hand and not fixed in any handle, as was almost certainly the case with the smaller ones.

The only other Birmese Celt approaching this in size was one purchased by me in the Prome District some years ago. It was of basalt, well smoothed, much longer and narrower than the present one, and with the cutting edge ground into a curved not a straight line. It was figured in the Plate of stone weapons from Birmah, Proceeding, A. S. July, 1869, Pl. III. fig. 1-1*a*, and is precisely similar in general proportions and type to a celt in the Christy collection, labelled "from Sumatra."

The following table will exhibit the contrast between the present Celt and the ordinary forms met with in Birmah The Celts themselves can be seen and studied in the Geological Museum, where they are now displayed in connexion with a fine series from India.

	Length.	*Top.*	*Bottom.*	*Weight.*	
				lb.	oz.
No. 1.	$7\frac{3}{4}$	2	$4\frac{1}{2}$	2	$11\frac{1}{4}$
2.	$3\frac{1}{2}$	$1\frac{5}{8}$	$2\frac{3}{4}$	0	$4\frac{3}{8}$
3.	$2\frac{3}{4}$	1	$2\frac{1}{2}$	0	$2\frac{7}{8}$
4.	$2\frac{1}{8}$	$\frac{7}{8}$	$1\frac{7}{8}$	0	$2\frac{3}{8}$
5.	$1\frac{1}{4}$	$\frac{7}{8}$	$1\frac{3}{4}$	0	$0\frac{5}{8}$
6.	4	$\frac{7}{8}$	$1\frac{3}{8}$	0	$2\frac{1}{2}$

No. 1. Large Celt. Exhibited.
2. Largest Celt of ordinary type (flat).
3. Smaller do. do. (do.).
4. Ordinary do. (high shouldered type).
5. Smallest do. (do.).
6. Chisel (figured A. S. Proceedings, July, 1869. Plate III. [Fig. 2-2*a*.)

The following letter was read—

From Mr. E. H. Steel to W. T. Blanford, Esq., dated Revenue Survey Camp, Suddia (Assam), April 11th, 1870.

'Knowing the interest you take in such matters, I send you a few notes of an earthquake felt here to-day. If it has been felt with violence in Calcutta and neighbourhood, which I doubt from the direction of the wave, it may be of interest to learn that it extended as far as here, especially as I have the exact time, taken by observation of the time on purpose. Our Longitude is nearly 96°, our Latitude 27° 52′; Calcutta Longitude is 88° 25′, Latitude 22° 33′. The difference of time will be about 32 minutes or less; this I have not subtracted from the times in the following record. I regret that I had no barometer the time, as we had a rare wind, easterly, the direction from which the wave came, and which rose suddenly after the shocks, died away soon after, and then was renewed for four hours again.

April, 11th. 10. 49 A. M., three moderate shocks rapidly succeeding one another, 2 sec. interval about.

10.51. Got up a 6 in. Theodolite. Lower level E. and W., upper N. and S. Direction of wave from E. to W., plainly evident. Continued wave motion, every 3 or 4 sec., until

10.59, when it became slighter and oscillation slower.

11.04. Still slighter and slower.

11.09. Scarcely perceptible and ceased.

Wind at first moderate and easterly, rose rapidly. Due east.

Weather fine, a few clouds. Sunny.

Thermo. 75°, at 11 A. M.

12 A. M., wind moderated a little, though it afterwards increased a good deal and died away at sunset.

There was no noticeable rise or fall in the water of the river Brahmapootra, 20 yards from my office. Men bathing in it, did not notice the shock, though all on land did.

Animals did not seem to notice it. Office clock placed nearly east and west, did not stop.'

In reference to Mr. Steel's letter, the President remarked that the writer seemed to speak very positively with regard to the direction of the vibration. It would be well to know in what mode Mr. Steele ascertained this, for it was certainly matter most difficult of direct observation. Probably a pool of water by the wave oscillation of its surface afforded the most obvious and distinct indication of the direction of the disturbance; but he (the President) could say, from his own experience, that even when the waves were large and well marked, it was not easy to form a very definite conclusion on the point by the aid of this phenomenon. He would be disposed to imagine that observations of rock masses, however extensive, would fail to give any certain result. Perhaps a view from a height upon a generally level mass of forest foliage would be more successful.

Mr. Westland mentioned that in one instance he had been easily able to detect the direction of the earthquake wave by the violent oscillations of a single tree; but the President pointed out that probably it was only one component of the tree's motion which would be thus observed, namely that at right angles to the line joining the spectator and the tree.

The following papers were read—

I.—*On the Normal Rainfall of Bengal.—By* H. F. Blanford, Esq., F. G. S.

Mr. Blanford read his paper, which will shortly appear in No. III., of Part II, of the Journal.

After a few words on the interesting nature of Mr. Blanford's inquiries, the President said it seemed to him that the paper just read, condensed itself into the statement of a law something as follows, namely, that in monsoon rains with continuity of the same conditions of earth surface, the rainfall diminished gradually from windward to leeward; for instance in the delta of Bengal, the rain-

fall diminished from a maximum along the line of sea coast to a minimum at the foot of the Hills; and again the rainfall diminished from another maximum at the first crest of the Hills to a smaller amount further in upon the corresponding plateau. And it was easy to see why this should be so; the vapour-bearing air masses continually parted with their freight as they went on, and so less and less rain was the result, until some new element was introduced into the conditions which had the effect of increasing the degree of saturation. At the Hills this was brought about by a simple mechanical process; the advancing stream of air and vapour under the influence of its own velocity, and the pressure from behind slided up the escarpment, and was thus with comparative suddenness carried to an elevation, which at once gave rise to very great rarifaction and consequent disappearance of heat. Also the low temperature of mountain surfaces maintained by active radiation conduced to the same end. In this way, the charge of vapour in the air brought up from below became excessive in relation to the heat available for the purposes of maintaining it in a state of suspension and large quantities were precipitated. He did not know whether the great rainfall along the coast line had been ascertained to be a true maximum or not. It would not be easy to make very accurate observations on the amount of rainfall at sea: but he was prepared to learn that this rainfall was really a maximum, and if so, he was inclined to attribute it to a cause in some sense the reverse of that which effected the saturation at the mountain top, *i. e.*, an increase in the quantity of vapour instead of a diminution of the temperature. Having regard to the fact that the delta was literally sown with shallow tanks, khals, and pieces of water of every sort and size, he thought it very possible that the surface soil heated by a tropical sun might, under these circumstances, yield a more plentiful supply of vapour than the sea itself. In truth this arrangement of land and water bore no slight resemblance to the general form of contrivances for multiplying the heating surface for the generation of steam in boilers.

With regard to the occurrence of a rise in the barometer at Cherrapoonji immediately before a heavy fall of the monsoon rains, this might be caused by increase in the vapour-flow from

below ending in a downfall of rain, but until actual precipitation took place, simply effecting an augmentation of the material of the superincumbent atmosphere. It might be likened to the increase of depth in a stream of water caused by increase of supply from its source. If this were so, the like phenomenon ought to be observed on similar sites, such for instance along the Western Ghats.

Mr. W. G. Willson said,—With reference to the observed rise in the barometer at Cherrapoonjee before rainfall, I would remark that, as the same phenomenon has not been noticed at other Hill stations, it can hardly be explained by any increase of pressure which might be caused by the vertical displacements of the aerial currents as they are forced upwards, coming in contact with the sloping sides of the mountains.

Nor does it seem probable, *à priori*, that the forcing of masses of air over an elevated region would increase the atmospheric pressure, in that region, above its normal condition; since the equilibrium could be maintained by the lateral distribution of what otherwise might cause an excess of atmosphere.

We will probably have to look for the explanation of the phenomenon of the increase of atmospheric pressure before rain (if such be the case) in the same local configuration which causes the enormous rainfall for which Cherrapoonjee is celebrated.

As I understand, Cherrapoonjee is situated at the head, or focus, of a system of valleys, wide at their entrances, but narrowing up and converging as they approach their common focus.

The prevailing winds force atmospheric masses up the sides of these valleys. These masses are *horizontally* compressed as they are forced, from the much wider, to the narrower limits converging to Cherrapoonjee.

It is possible that this horizontal compression *alone* may be sufficient to saturate the region about Cherrapoonjee, and thus be a cause of excessive rainfall, as well as increased atmospheric pressure before rain.

Dr. Oldham said, he thought the peculiarity of position of Cherrapoonjee, and the effect which this had on the fall of rain there and on the atmospheric pressure, had scarcely been fully appreciated.

The station of Cherra was not only, as it had been described, placed not far from the southern face of a range of hills, which rise nearly perpendicularly from the plain of Sylhet, the face of the scarp being nearly at right angles to the prevailing winds, but it was also encompassed on either side by huge glens or valleys which have been cut down to the depth of several thousand feet, and which extend from the plains well into the hills, and curving round on either side, leave but a very limited area between. Now not only was the surcharged atmosphere which had floated over the plains driven by the prevailing winds against the face of the hills, but it was also driven up these gorges or glens, and the various currents of saturated air met just over the station of Cherra. Rolling up from either side the thick fog-like mist meets in a dense mass above the station, and as he had expressed it some sixteen years since, the saturated sponge, as it were, was suddenly squeezed, and the moisture which it previously held, deposited. This also readily accounts for the greater atmospheric pressure at these times.

II.—*Notes on Samarqand. By* MONSR. DE KHANIKOF. *(From the Russian.) Communicated by* T. O. FORSYTH, ESQ.

(Extract.)

Twenty-six years ago on the $\frac{2}{14}$ September, 1841, I saw for the first time the celebrated capital of Timurlang from an elevated spot on the road leading from Bukhárá to Samarqand, where I arrived exhausted by the heat and covered with dust.

Vast ruins scattered over the country immediately surrounding the city, plainly indicated that its glory had passed away. Nevertheless in spite of its decrepit state, it presented an imposing aspect when viewed from a distance. I must confess that the pleasure with which I contemplated the landscape, was considerably enhanced by the recollection, that since the 8th September, 1404, the day on which Gonzales Clavijo, Ambassador of Henry III. of Castile, entered Samarqand, no European had penetrated that celebrated town.

About three o'clock, I was informed that Ibráhím Dádkhwáh, the governor of Samarqand, had sent his horses and farráshes, and wished to see me.

His Sepoy guard was ranged in two lines under the deep dark gateway of his castle, dressed in loose gowns and pointed cloth hats bordered with sheepskin. Their equipments were as varied as they were fantastical; one could imagine they had been armed for the occasion with weapons borrowed from some Museum of the Middle Ages. There were guns, spears, clubs, axes, and even bows, and quivers full of arrows. After crossing one or two courts, we entered a vaulted passage, also filled with soldiers. It terminated in a large court with a fountain in the centre, and a spacious *Aiwán*, or roof, supported with wooden pillars.

Ibráhím Dádkhwáh was not there, but I had scarcely seated myself on a small carpet spread for me, when he appeared and sat down on a cushion in the middle of the Aiwán. Seeing that my place was so far removed from the governor's, I rose and heedless of Chaurí ágási's frantic signals, seated myself within half a yard of him.

This conduct, which the Bukháris evidently considered very bold, made a different impression on the old Uzbak with whom my business was; for he addressed me very cordially in the Tartar language.

The day following, which, in accordance with some foolish point of Bukhárian etiquette, I was obliged to spend at home, that I might rest from the fatigues of the journey, a numerous party came to visit me. They were natives of Marw, and therefore descendants of the inhabitants of that town who, in the reigns of Sháh Murád and his son Amír Haidar, had been carried away by force and settled in Samarqand. They brought me quantities of peaches, and received in exchange several yards of cloth and a few *tangas*, the small silver coin of the country worth about ten pence. I gathered from their conversation that they were bitter, though secret, enemies of the Bukhárian government. The invasion of Nádir Sháh and the conquest of Bukhárá by the Persians had made a deep impression on their memories, and they still cherished a firm hope of one day seeing a repetition of those events, the more so as they can foresee no better termination of their sufferings. This leads me to think that although the present generation was born on the soil of Bukhárá, and is obliged

to profess the Sunní religion, yet the greater portion remained Shí-'ahs at heart, and this of course was an additional cause of hatred towards their oppressors.

I was informed by my visitors as well as by my host, who seemed to be thoroughly acquainted with the statistics of the district, that Samarqand comprises, under the present governor, five tumáns or cantons, yielding on an average 70,000 batwans of corn of various sorts, that is to say, about 9,168,320 kilogr. of grain, of which 30 per cent., or about 2,750,000 kilogr., are levied by the government as *khiráj*, or land tax. On every field of corn of one 'ṭanáb,' equal to 3,098 hectares, the government levies a tax of 18 *tangas* or francs, and 6 tangas for each ṭanáb sown with grass. This revenue ought to suffice the governor for his own subsistence; for the pay of his servants and officers, and for the wages and support of 250 *naukars*, or sepoys, that form the garrison of the province in time of peace. The rest is sent to the Amír as 'peshkash' or present for the New Year's day on the 21st of March. For instance, in 1841, he sent the sum of 150,000 tangas by his son to Bukhárá. This does not include the revenue which is sent direct to Bukhárá to the Zakátchí Báshí, an official totally independent of the governor. The tax levied on the flocks of sheep, comes under a different administration and is brought to the Amír every spring, by officers specially employed for the purpose. I could not gain exact information as to the value of these two last duties; but the customs of Samarqand can yield but an inconsiderable sum; for the duties are only levied on caravans from Kokán and Bukhárá.

On the 4th, 5th, and 7th of September, I visited all the objects of interest in Samarqand, of which there are but few; but before describing them, I must say a few words about the town in general. The topographer, Yakovlef, who accompanied Messrs. Lehman and Bogoslofski, has drawn up a plan of Samarqand, which I have enclosed in my description of the Khánát of Bukhárá, published in 1843.

The wall of the town was in very good condition, when I visited it. The whole forms an almost perfect square, or rather trapezium; for the northern side is longer than the others. The most irregular wall is that on the west, where the fort projects. This wall

corresponds exactly with that of Bukhárá in height and in thickness, as well as in its battlements and turrets. It is 13 kilometres, 819 metres, in circumference, and encloses a space of 2533½ ṭanábs.

Samarqand is therefore larger than Bukhárá by 500 ṭanábs. This is occasioned by the number of gardens; for, in point of population, it is decidedly inferior to the latter town. The inhabitants are reckoned at from 30,000 to 35,000 souls. The outer wall has six gates. On the western side, it has but one gate, the Darwázah i Bukhárá; there is also one on the eastern side called Qalandar Khání. The south and north sides, have each two gates; those in the former are called Paikobák [Kaiqubád ?] and D. Cháh i Zindah; the others D. Sozan-giráni and D. Khwájah Ahrár. The last takes its name from the venerable saint of Samarqand, who is buried close to this gate. The ruins which surround the town lead one to suppose that it was formally of much greater importance than it is at present, or when it was rebuilt after one of its numerous catastrophies, it must have been enlarged towards the south-east. The ground to the west, more especially that northwards* of the wall, which bears the name of Qal'ah Afrásiáb is more thickly covered with ruins than the rest. This, however, cannot have taken place very recently. Since the time of Timur, his ancient capital has not altered in form. One thing is certain that in the height of its prosperity, the environs of Samarqand were in a much better state of cultivation than they are now, and vestiges of gardens still remain where, by Timur's order, his wives entertained Clavijo so magnificently. The town is supplied with water by three rivulets descending from the northern declivity of Mount Azalyk. The first enters Samarqand a little to the eastwards of the Khwájah Ahrár gate; having skirted the eastern and northern sides of the Fort, it leaves the town and waters the fields to the north of the Bukhárian road. The second water-course entering the town near the gate of Sozan-giráni quits it on the eastern side and unites with the third which skirts the same sides, both together flowing into the Áb i Mashhad, as the people call it. This stream washes the base of the northern wall of the town. Such an abundance of water admits of every house being well supplied, and contributes greatly to the salubrity of the town.

M. Struve, in our Geographical Report on Central Asia, fixes the latitude of Samarqand at 39° 38′ 45″, and its longitude 64° 38′ 12″, E. of Paris.

III.—*Notes on a Trip across the Patkoi Range* from Assam to the Hookoong Valley.—By* H. L. JENKINS, ESQ.

Last year I was unable to get beyond the Nongyang Lake, partly from want of provisions, and partly owing to my having started late in the season, the Singfoos were too busy reaping their crops to accompany me. I attempted to start much earlier this season with my friend, Mr. A. J. Peal; but some of the Singfoos who had agreed to show the road were unfortunately detained by a lawsuit. Waiting for them, we lost several days, and ultimately did not leave the last village on the Namroop till the 6th December. Following the path described last year up the Namroop river, and then up the Nambong and Nunkee streams, we reached the summit of the Patkoi about 2 o'clock on the 8th December. To our great disappointment on examining the barometer we found it broken and useless. Water boiled at a temperature of 208, giving an altitude of about 2,140 feet. The air was very clear, and it was plain to see that the Patkoi, which is here only a single ridge, could be crossed five or six hundred feet lower by making a slight bend to the westward of the present path. That night we descended some three or four hundred feet and camped near a small spring of water.

Continuing the descent very gradually the next day in an easterly direction we crossed the stream from the Nongyang Lake about noon, and then ascended the Digoom hill and stopped at the first water we could find on its eastern slope. We estimated the distance travelled that day at fifteen miles. The path lay through thick forest; we lost it several times during the day, and were obliged to halt whilst the Singfoos dispersed themselves in all directions to find it.

Early on the following day we came on a small stream, also called Digoom, and went down its bed, for some hours occasionally

* For a Map *vide* Mr. Jenkins' first paper published in Proceedings Asiatic Society, Bengal, for 1869, pp. 67 to 74. THE EDITOR.

skirting the water through dense wet jungle. About noon we struck off from the right bank over a low hill to the Loglai, a shallow but very rapid stream about eighty yards broad. It seemed advisable to camp early, in order to construct better shelter than usual, as rain threatened; so we halted for the night on the sand on the bank of the Loglai about half a mile below a large poong, or salt-ooze. Distance this day about ten miles.

During the whole of the next day our course lay down the bed of the Loglai, and we made very slow progress at first over the enormous boulders and rocks of sandstone; but the river became larger as we advanced, receiving much additional water from numerous small streams flowing into it on either side. Towards evening large rocks and boulders were less frequently met with, and we got on faster over the sand and shingle; we stopped at the mouth of a little stream called Kysoo, having travelled eleven or twelve miles. Here the Loglai is navigable for canoes, and the extreme width of its bed exceeds a hundred yards.

On the 12th leaving the Loglai we ascended the Kysoo for two hours, then crossing a low hill came on the Namlip, a stream similar to the Kysoo, and travelled down its bed till evening, camping on its bank. Distance about sixteen miles. The path during the whole day was good. The beds of both streams are composed of shingle and gravel with few large rocks. The forest, as on the Assam side, is composed of very large trees, and the undergrowth of jungle is impenetrably thick.

On the morning of the 13th, we found there was barely rice enough in the camp to give each man one meal, so it was necessary to force the pace, in order to get into a village as soon as possible.

Following the Namlip for about an hour we reached its confluence with the Yoongsoom, a stream of the same size. For four hours the path led up the Yoongsoom, occasionally skirting the water through very heavy and extremely wet jungle until that stream became so small as to be untraceable, when crossing a piece of high lying forest land we came on the Yoongmoi, a somewhat larger stream than either of the two former. About two hours' walk down the bed of the Yoongmoi brought us to the Namyoong, a river not much inferior in size to the Loglai, but deeper and less

rapid. We held on our way up this river until it became dusk when we were glad to learn that the Namyoong village was close at hand. Our guides told us that it would be highly improper for a party of strangers to enter a village after night-fall, so we camped on the sand on the bank of the Namyoong and sent off two men to the village for food. In about an hour the men returned bringing with them a good supply of rice and some fish, and they also brought us back our money. On hearing of our necessity, the people of the village had gone round from house to house collecting rice, and with the contributions they sent a message to say that they were not jackals but human beings, and could take no payment from hungry travellers. The Gham, or Chief, sent us an invitation to enter his village in the morning. Distance this day about twenty-four miles.

On the 14th, we went up the river to the Namyoong village, about a mile above our encampment. This was the ninth day since we left the last Assam village, and during this time we had seen no cultivation, not even a bit of clearance, and the sight of the large open rice-fields gave us no small pleasure. Making our encampment on the side of the river opposite to the village, we were soon surrounded by the inhabitants, about two hundred in all. They brought presents of fowls, rice, eggs, fish. It is the Singfoo custom to present a guest with food as soon as he enters the house, and the Gham's wife brought us a small quantity of cooked rice neatly tied up in plantain leaves and some "Sahoo," a sort of whiskey distilled from rice. This spirit was very acceptable, as our own stock was nearly exhausted. It is very strong, and not unpalatable when one becomes used to it.

The Gham, whose name is Ningroo Menoh, was very civil, and told us to apply to him for everything we wanted. After chatting some time, he told us that a messenger had arrived with a letter for us from the Chiefs of the large Singfoo village on the Denai, and he was good enough to say that the letter should be delivered the next day. We asked for the letter, and to see the messenger at once, but were gravely reproved for wishing to transact business on the very first day of our arrival; and as our own Singfoos agreed that our request was most unceremonious, we were obliged to appear contented.

Early the next morning we made enquiry for the letter, but were again told that our haste was ill-mannered. "The Gham," they said, "eats first, and after that he is at liberty to pay attention to matters of less importance." About noon we obtained possession of the letter, which was written in Shan, the Singfoos having no written character of their own. A Kamptee boy, who came with us from Assam, read out the contents, of which the following is a translation :—

"Sibbom Gham and Seroj Gham having consulted all the other Ghams send this. Jenkins Sahib is not permitted to visit our villages. No European has ever come this way. If the Sahib wishes to see our country, he should come through Burmah. The Ghams will not allow him to come by the Patkoi. He must return."—By Legandoi messenger.

Ningroo Menoh then handed us another slip of paper conveying to him the following instructions :—

To Ningroo Menoh.

"Detain the Sahib at your village till you hear from us. If you are unable to detain him or turn him back, send us a message, and let your messenger travel day and night." From Sibbom and Seroj Ghams.

On questioning Legandoi, the bearer of these letters, he at first laid the whole blame on the Burmese Woon or Governor of Magong, who, it appears, though he does not attempt to govern the Singfoos, is supposed to exercise political control over them to a certain extent. It would seem, however, that the influence this officer possesses in Hookoong at present is little more than nominal; for the messenger explained that when the Ghams are agreed amongst themselves as to any particular line of conduct, they ignore the existence of the Woon. Burmese authority, he told us, was maintained by the excitement of dissensions amongst the different clans—no single Chief who has any cause of disagreement with his neighbours dares incur the displeasure of the Woon, lest the Chiefs with whom he is at variance should be invited to burn and plunder his village.

Whatever the cause may be, it is certain that the Burmese are heartily detested by the Singfoos.

As our Assam Singfoos refused to go on with us until the prohibition was removed, we determined to send a remonstrance and to wait in the neighbourhood of Namyoong for a reply.

We wrote to the Ghams of the Denai villages, that we considered it hard to be detained, reminding them that their people had full liberty to go into Assam whenever they please, and that their traders travelled all over Upper Assam unmolested, and we begged them to give us permission to go forward and see them.

On the morning of the 16th we sent off three of our own people with Ningroo Doo, the younger brother of Ningroo Menoh, with our letter and with presents for Sibbom Seroj and four other Ghams of note.

We received no reply till the 25th when Ningroo Doo returned. He told us that the Ghams after much discussion had not come to any agreement up to the time of his leaving them as to whether we should be allowed to go forward or not, and that, as the small-pox had broken out in some of their villages, the people were averse to any travellers being allowed to move about, wishing to prevent the disease from spreading; he had returned to let us know that there was little probability of our being allowed to go on immediately. It was hardly to be expected, perhaps, that isolated tribes like the Singfoos unaccustomed to European visitors would give up their seclusiveness at the first call without some hesitation; but we had lost so much time at the commencement of the journey that neither of us could afford to wait longer, especially as the chance of being allowed to proceed on a very early day seemed to be small.

So on the 26th we commenced our return journey through the Mosang Naga country, as we wished to examine the pass by which Griffith, and Bayfield crossed the Patkoi in 1837.

This route has already been fully described by Griffith, so it does not seem necessary to say much regarding it. There are four steep ridges crossed by this path rising 3,000 to 4,000 feet, besides the main range itself, on which we boiled water at a temperature of 202, the temperature of the air at the time being 63, giving an altitude of about 5,500 feet above the sea level. It is much to be regretted that Griffith chanced to take this route; for it is doubtless owing to his description that a general impression has arisen

that the Patkoi Range is a formidable barrier erected by nature to prevent communication between India and the countries lying to the east.

Whilst at Namyoong village, which he found from observation to be about 26.30 lat, we had several opportunities of conversing with the people of the Meeroo tribe who inhabit the mountain range to the east between Hookoong and the Irrawaddy.

From the description given by the Meeroos there would appear to be several passes of no great elevation through this range. The Meeroos wear Chinese ornaments, and bring articles of Chinese manufacture to Hookoong for sale. Besides these ornaments and their pipes we noticed earthenware cups, copper cooking vessels, wrought-iron ploughshares, and cast-iron pans, all undoubtedly of Chinese make. Neither the Singfoos nor the Meeroos make any use of copper as a circulating medium. In the larger transactions they use lumps of silver obtained from Yunan and from the Shans of about half a pound weight, and these lumps are unhesitatingly chopped into small pieces and weighed out when it is requisite to measure the price of articles of small value. They have some rupees in circulation, but these coins are looked on with suspicion on account of the impurity of the silver. The dearness of salt was most remarkable. A coarse black salt was selling at about the rate of a shilling a pound. We met with several people who had traded in the Pansee country, and one of the routes they described strikes the Irrawaddy at Mainlah, a large Shan village, situated on the left bank of the Phoongmai at its confluence with the Irrawaddy.

In a little map attached to Dr. Clement Williams's book on Upper Burmah, Mainlah is placed at the mouth of a large river in lat. 26, or about 130 miles above Bhamo.

Dr. Williams does not give the name of this river; but it is well known to the Singfoos and Meeroos as the Phoongmai Kha.

We were informed that a man carrying a load could reach the nearest Pansee villages from Mainlah in two days' march.

The Singfoos divide the Chinese into two classes—those who eat pork, and those who do not eat pork. The pork-eaters, they said, used formerly to come down the Phoongmai in great numbers and

cross to Hookoong for jade and amber, but of late years, owing to war between the two classes, the trade has been restricted to the abstainers from pork. It is to be remembered that the route across the Patkoi by the Nongyang Lake is no new scheme now brought to notice for the first time. Thirty-five years ago, attention was directed to this same route by Captain Charlton, then commanding the troops on this frontier, who is known to fame as the first man to discover the tea plant in British India. Captain Charlton writes—his letter will be found in the *Journal of the Asiatic Society* for January 1835—"What a pity there is no means of communication between Suddya and Yunnan. A good land road, and there are no natural obstacles of any consequence to prevent it, would afford an outlet for British merchandise into the very heart of China." As the Singfoos of Hookoong trade with Yunan and with Assam, it cannot be disputed that Captain Charlton was right in asserting that no physical obstacle exists to prevent a thoroughfare from being established the whole way.

It has been urged with some plausibility that the Singfoos are so poor and so simple in their habits, that they do not want better communication with other countries, because they could reap no benefit from freer intercourse. It is true that their wants are few; but some of these wants are very ill-supplied, as in the case of salt for instance, which is very bad in quality and very dear throughout Hookoong; besides, the bulk of the population engage in some kind of barter when not occupied in cultivating, and a people of this kind would not be likely to oppose the opening of a road, because they are capable of seeing that the measure would prove to their advantage.

But whilst the people themselves may be trusted not to oppose their own interests, it must be admitted that some difficulty lies in the fact that nearly all their Ghams are large slave-holders, and suffer heavily and constantly from the escape of their slaves across the border into British territory. All the Chiefs feel a great deal of irritation against us on account of the extreme abolitionist policy that has been adopted of late years. Still, considering the magnitude of the question, it will hardly be said that the cost of indemnifying a score or so of petty Chiefs for the loss of their slaves

would be a heavy impost, and it would seem to be no more than fair to give the Ghams the means of purchasing that amount of labour from their servants, which they have been accustomed to obtain by force, if we interfere to prevent the exaction.

As there is now a British officer resident at Bhamo, it might be possible to send a party up the Irrawaddy to explore and make a rough survey of the river as far as Mainlah. In all probability, a party starting from Assam would be able to reach Mainlah; for since we have returned, a letter has been received from the Denai Ghams, inviting us to meet them next year at Serojmo.

Serojmo is said to be only six days from Mainlah.

The 16*th January*, 1870.

IV.—*A Contribution to Malayan Ornithology.—By* Dr. F. Stoliczka.

(Abstract.)

The paper contains notes on about one hundred species of birds which have been collected chiefly in the Wellesley Province, the country East of Penang Island. Although the geographical situation of this Province is intermediate between that of Malacca and Tenasserim, the fauna bears a greater relation in identity of species to the former than to the latter. A number of the species recorded are also found at Malacca, Sumatra, and Java, and do not appear to extend further North; others are also met with in the Tenasserim and Burmese Provinces; and a few are common to India generally. In several cases intermediate forms between those occurring in Burma, or North Eastern India and those found on Sumatra, Java and the other islands have been noticed.

Dr. Stoliczka drew the attention of the meeting to the marked difference which exists between the fauna of North Eastern India and Burma, and that of South-Western and Southern India. The former extends from the central Himalayas about Darjeeling through Assam, Cachar, Burma into the true Malayan Provinces, and is characterized by a very large number of peculiar Malayan types; the latter has a strong admixture of African forms. The first appears to have travelled from South East towards North West and the other from South West towards North East, and both appeared to have been stopped in their further pro-

gress partially by the intervening Bengal Provinces which at the time of the migration were probably open sea, partially by the Himalayan range in the North, though this could not have had formerly the gigantic dimension and altitude which it now possessed. In the South of India and on the Malabar coast Malayan species again occur.

Mr. W. T. Blanford endorsed the views expressed by Dr. Stoliczka, and mentioned some of the peculiar African types which are to be found in the fauna of Central India. He said a list of birds collected in a district West or South-West of Nágpúr contains almost as many African types as it does of Indian.

The reading of the following paper was postponed—

On the Capture and Death of Dárá Shikoh.—By H. BLOCHMANN, ESQ., M. A.

The receipt of the following communications was announced—

1. *Gond Words and Phrases.—By* REVEREND J. DAWSON, *Chindwárah.*

2. *Second List of Birds from the North-Eastern Frontier.—By* MAJOR H. H. GODWIN-AUSTEN.

The meeting then broke up.

LIBRARY.

The following additions have been made to the Library since the last Meeting.

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society, Vol. XVIII, No. 118.—THE ROYAL SOCIETY OF LONDON.

Report of the Committee of the Bengal Chamber of Commerce, 1869-70.—THE BENGAL CHAMBER OF COMMERCE.

Catalogus Musei Botanici Lugduno-Batavi, digessit F. A. Guil. Miquel. Pars Prima, Flora Japonica.—THE UNIVERSITY OF LEYDEN.

Annales Musei Botanici Lugduno-Batavi, edidit F. A. Guil. Miquel. Tom. IV, Fasc. 6-10.—THE UNIVERSITY OF LEYDEN.

The Journal of the Chemical Society, for February, March, April, 1870.—THE CHEMICAL SOCIETY OF LONDON.

Monatsbericht der Königlich-Preussischen Akademie der Wissenschaften zu Berlin. January to April, 1870.—THE BERLIN ACADEMY OF SCIENCES.

Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, 1867-68. THE KÖNIGL. AKADEMIE DER WISSENSCHAFTEN, BERLIN.

Actes de L'Académie Impériale des Sciences, Belles-Lettres et Arts de Bordeaux, 3e Série, 30e année.—THE BORDEAUX ACADEMY.

Bollettino della Societá Geographica Italiana, Fascicolo 4°.—THE ITALIAN GEOGRAPHICAL SOCIETY.

Schriften der Königlichen Physikalish-Œkonomischen Gesellschaft zu Königsberg, 8th and 9th vols.—THE KÖNIGSBERG ACADEMY.

Notes of a Visit to Gujrát in December, 1869, by J. Burgess, M. R. A. S., F. R. G. S.,—THE AUTHOR.

From Calcutta to London by the Suez Canal, by the Rev. C. H. Dall.—THE AUTHOR.

Balwantnámah (Urdu MS.).—W. OLDHAM ESQ., LL. D., C. S.

Report on Sanscrit MSS., submitted to the Goverment, by Rájendralála Mitra.—THE AUTHOR.

Prabad Mala, or Bengali Proverbs in English.—REV. J. LONG.

Professional Papers on Indian Engineering, May 1870.—THE EDITOR.

Nuskhah i dil-kushá, Vol. I., by Janmejaya Mitra.—BABU RA'JENDRALA'LA MITRA.

Records of the Geological Survey of India, Vol. III. Part II.—THE SUPERINTENDENT GEOLOGICAL SURVEY.

Selections from the Records of the Government of India, Home Department, No. LXXIV.—THE GOVT. OF BENGAL.

Selections from the Records of the Govt. of Oudh.—THE SAME.

Selections from the Records of Govt. N. W. Provinces, Vol. III., No. 2.—THE SAME.

Selections from the Records of the Govt. of the Panjab, No. VI.—THE SAME.

Selections from the Records of the Govt. of Madras, No. XI.—THE SAME.

Sections from the Records of the Bombay Govt., No. CXV.—THE SAME.

Report of the Meteorological Reporter to the Government of Bengal, Meteorological Abstract for 1869.—THE SAME.

Sanitary Report for Oudh, 1868-69.—THE SAME.

Report of the Sanitary Administration of the Panjab, 1868.—THE SAME.

Report of the Police of the Lower Provinces of the Bengal Presidency, for 1868, Vols. I. and II.—THE SAME.

Annual Report of the Madras Medical College, 1868-69.—THE SAME.

Report on Madras Civil Dispensaries, 1867.—THE SAME.

Report on Popular Education in the Panjab, for 1868-69.—THE SAME.

Report on the Administration of Civil Justice in the Province of Oudh, 1868.—THE SAME.

Annual Report of Criminal and Civil Justice, Rangoon, 1868.—THE SAME.

Report on the Administration of Civil Justice, Panjab, 1868.—THE SAME.

Exchange.

Nature, Nos. 27—31.

Athenæum for April, 1870.

Purchase.

The Annals and Magazine of Natural History, Nos. 28—30.—The London, Edinburgh, and Dublin Philosophical Magazine, Nos. 261-262.—The Ibis, Vol. VI. No. 22.—Revue et Magasin de Zoologie, No. 3.—Revue des Deux Mondes, Avril, Mai.—The Westminster Review, April.—The Edinburgh Review, April.—The Quarterly Review, April.—The North British Review, April.—Comptes Rendus, Nos. 13—16.—Exotic Butterflies, parts 73-74.——Leçons sur la Physiologie, par H. Milne Edwards, Tom 9, part II.—Schmarda's Neue Turbellarien, Rotatorien und Anneliden.—The Classification of the Sciences, by H. Spencer.—Duncker, die Geschichte der Arier.—Jenyns' Observations in Natural History.—Johnston's Chemistry of Common Life, 2 Vols.—The Year Book of Facts, 1861, 1862, 1864, 1867.—Intellectual Observer, Vols. I.—IX. and Nos. 43, 46, 48—51, 55—62, 64—70.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR AUGUST, 1870.

A meeting of the Society was held on Wednesday, the 3rd instant, at 9 P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected Ordinary Members—

R. H. Wilson, Esq., C. S.

A. M. Broadley, Esq., C. S.

The following gentleman is a candidate for ballot at the September meeting—

R. F. St. A. St. John, Esq., Superintendent of North Arracan, Akyab, proposed by the Hon'ble J. B. Phear, seconded by H. Blochmann, Esq.

The following gentleman has intimated his desire to withdraw from the Society—

W. L. Willson, Esq.

A letter from A. C. Lyall, Esq., Commissioner of West Berar, forwarding copies of inscriptions found in the district, was laid on the table (*vide* Proceedings for July).

The following letter from Major F. W. Stubbs, enclosing a Sanscrit inscription and several drawings, was read—

Attock, 20*th May*, 1870.

"I send you drawings of an inscription and some curious rude carvings, both on rock, which I copied from the originals near this the other day. The Post Master here, Imám 'Alí, told me,

there was an inscription on a well of which he had long heard, but had never seen; so we made an expedition together on the 10th instant, and visited the place. This you will see by the sketch map I send, is not far off. We drove out a little beyond the old fort near Mala Mançúr, where the Tahçíl used to be kept in the days of the Mughuls, and the revenue realized from the district (a much more fertile one than in the Sikh rule, or since) deposited. Its name *Jamgáh* is not found on any of the Government maps. From thence, we rode along a short cut towards Kámilpúr, leading for a distance up the bed of the Kaneyr river. About a couple of hundred yards off the road to the right, our guide stopped, and pointed to a small quartzite boulder imbedded in the ground close to a small depression, which he said had once been a well. The inscription is on a flat worn surface of the stone. Unfortunately a large part has been broken off from the corner, and more than half the first line, and part of the next three, are thus lost. I could not trace any mark of violence on the stone; but the fracture must have been caused by violence. Along with a facsimile, I send a copy which I took in pencil, in order that you may compare both. The original rubbing I send in a second packet with some others. The letters appear to be of the ninth century. I hope the lost part will not prevent the general meaning from being read.

From thence the guide took us to another place, where he told us there was a rock carved all over with letters which no one could read. Going down the dry bed of the Kaneyr and a little way up that of a small confluent, we found a large block of reddish brown clay slate on a flat, somewhat worn cleavage surface of which, about 6 feet broad by 4½ deep, were a number of curious looking characters, that at first puzzled me much. Without any order of position or regularity of shape, slightly indented with the blunt point of an instrument, rather than engraved on the rock and very time-worn, it was difficult to make out what it was that had been scratched upon the slate. With the aid of a slanting light, however, I was able to recognize a stag, and soon the lines resolved themselves into a curious collection of animals with here and there something intended to represent a man. I send drawings of the

three plainest, as also the rubbings I took. In two of the latter which I have put down separately, I have marked in colour the animal intended to be represented, a cow and perhaps a doe-antelope. Having done this, you know all I do of these curious relics. There were no letters on the rock. I thought at first there were certain Aryan characters, but closer examination showed nothing resembling a letter. There are no local traditions respecting either this or the well inscription; but the place may yield something else to further search. If so, I will try and get all I can.

The colouring of the drawings is as rude as the carving of the original. It does not represent the colour of the rock which is a dark blue brown, tinged with red."

Babu Rájendralála Mitra said—

"The letters of Major Stubbs' inscription are unmistakeably Sanskrit, so is its language. In the first line, the words *Sri Vishnu* are clearly legible.* The second I read *pada pari paṭṭaka*, "impression of the feet," and the third, *pakti prá bhuta kaustubha* "jewels (named *kaustubha*) arranged in a line," and infer therefrom that the monument was inscribed by some pious Hindú to record the dedication of a block containing an impression of Vishnu's feet; but a portion of the right hand side of the stone being broken and missing, I cannot be positive."

The following letter from H. James Rainey, Esq., *Zemindar of Khulna, Jessore, addressed to* Henry F. Blanford, Esq., was read:—

Khulna, the 25th June, 1870.

"I have the honor to bring to your notice the occurrence in the Districts of Backergunge and Jessore, and even as far north as Furreedpore, I believe, periodically during the prevalence of the

* *Transcript of Major Stubbs' inscription in Deva Nágarí.*

श्रीविष्णु प्र * * *
पदपरिपट्टक क * *
पक्तिभूतकौस्तुभ ध * *
पठेवदच्छरदाचिणि *
अडिकंर। *

S. W. monsoon and rainy season, of certain peculiar noises from the south and south-east directions, or seaboard, resembling the report of cannons or loud explosions, usually heard distinctly after a *heavy fall of rain, or cessation of a squall, generally whilst the tide is rising*, and to solicit your being good enough to investigate this physical phenomenon, with the view of discovering the cause thereof, as there most decidedly exists a profound ignorance on the subject by the public at large, and more particularly as it may prove of some interest to scientific research."

"In the *Englishman* Newspaper, a correspondent under the signature of *Barisal*, has lately noticed these singular noises, as you may have casually observed, with the avowed intention of obtaining an authoritative explanation of it; but judging from the futile effects of numerous previous similar attempts, I do not think, he is likely to meet with better success, which is my only apology for troubling you on the subject, though it may be hardly needed, as I venture to think, you will be sufficiently interested in the enquiry, to enter into it *con amore*." * * *

In inviting discussion, the President remarked that the subject was not quite new to the Society. It was brought forward several years ago, and a paper upon it was to be found in a volume of the Journal to which his memory did not at the moment enable him to refer. The better opinion at that time appeared to be, that the sounds were attributable to breakers on the sea coast. Phenomena of a similar kind, undoubtedly due to this cause, were met with elsewhere. In Devonshire and Cornwall, along the northern face of which at times a very heavy swell rolls in from the Atlantic, the booming of the surf is heard at considerable distances.

Mr. Westland said:—

"As to the actual occurrence of these unexplained sounds, there can be no doubt; they have been heard by very many persons and are perfectly well-known in those parts of country where they are heard. I have myself heard them, or at least have heard sounds agreeing in description with these "Barisal guns," to which I could not assign any known cause. About March 1865, a paper was read before the Society, by Babu Gour Das Bysack, in which he referred

to the sounds, and mentioned the theory of their being caused by surf breaking upon the shore of the sea, and he stated also that an expedition once started southwards to discover their origin, but after going a certain distance southwards, had to return.

As for the origin of the sounds, which are heard forty or fifty miles from the seashore, it does not appear to me that any reliable theory has been started. The opinion that they proceed from the operation of the sea and the rivers in the formation of islands, it is impossible to accept; for if the process of island-formation had been going on so violently and so frequently as would be indicated by the nature, and frequency of occurrence of these sounds, the Bay of Bengal would have been by this time half-filled with islands."

Mr. Dall remarked that his attention was first called to these mysterious sounds, during the month of September, twelve or fourteen years ago, at Furreedpore. He did not hear them, but was made aware that the attention of the European residents there, had been drawn to them, and not a little effort made to discover their cause. The idea, that they were echoed surf sounds from a distant shore, was never named or thought of. They did not appear to come from the direction of the sea side; which was also at too great a distance from Furreedpore, to be looked to as the place for sounds, that answered rather to the loud discharges of artillery three or four miles away. Mr. Dall was at the time the guest of Mr. Ravenshaw, (since made Commissioner of Cuttack), and he said that he had been occasionally awaked from a sound sleep, at midnight by these "guns." Such as he had heard, seemed to come from the east, and Mr. Ravenshaw had been told of a boating party crossing the waters from Furreedpore towards Dacca, who had first heard the "guns" in advance, and afterwards in their rear, westwards. Slight earthquake movements being by no means uncommon throughout Lower Bengal, most thinkers thereabout were inclined to ascribe the sounds to explosive gases stirred by some sort of volcanic action, and escaping to the surface through the waters, which, at that season, flooded the country in every direction, rendering *the place* of explosion difficult of observation by reliable witnesses. Native observation of the disturbance of the

waters (if Mr. Dall remembered rightly) had been occasionally reported, but hardly believed. The only other solution suggested at Furreedpore was, that the noises were caused by the falling in of large masses of earth from the sides of rivers which are every year changing their beds. The "guns" were heard, occasionally, in tolerably quick succession; and sometimes three or four in the course of an hour; and again weeks would pass without their being heard at all. But of this the speaker was not very definitely informed. He was sure that careful and intelligent observers, like Mr. Ravenshaw, would give the Society all they knew on the subject if applied to by the Secretary.

Mr. Blanford said, that to enable the meeting better to appreciate the nature of the phenomenon described by Mr. Rainey, and the explanations that had been hazarded respecting it, he would first read the brief notice of the Barisal guns that had already appeared in the pages of the Society's Journal. After reading an extract from a paper by Babu Gour Das Bysack, published in Part 1 of the Journal for 1867, (Vol. XXXVI) he pointed out that of the causes suggested, one only could be considered a *vera causa* and worthy therefore of attention, *viz.* that suggested by Mr. Pellew in the extract he had read, and again this evening by the President of the Society. Subterranean and volcanic agencies, &c., in the absence of any corroborative evidence, must be classed with the '*electricity*' which, at the present day, is popularly appealed to, as the cause of every ill-understood phenomenon, precisely as '*sulphur*' was appealed to in earlier times, under similar circumstances. A thick alluvial formation such as the Delta, would be but ill-fitted for conveying a sound wave under any circumstances, and did any such sound as that described proceed from subterranean volcanic action, it is difficult to conceive that it should be unaccompanied by any tremour of the ground. But none such is spoken of.

The conditions under which the sounds were heard, were all such as to point to the breaking of the surf as their cause. They are heard during the S.W. monsoon, especially in the lull after a squall when the surf therefore is highest. To clear up every supposed difficulty, much closer observation was doubtless required, than had hitherto been given to the matter. But as far as

present evidence goes, the beating of the surf seems a probable cause, and it is the *only* definite cause that has been assigned.

Mr. Westland said—"I hardly venture to differ in opinion with Mr. Blanford on a matter of this nature, but it seems to me that there is one very great difficulty in accepting the surf theory, which I shall try to explain.

In the first place, it must be remembered that these sounds are heard some forty or fifty miles from the sea shore. This is a distance over which the sound of cannon even rarely travels so as to be distinctly perceived, and even in the case of accumulated discharges of cannon, such as in firing salutes, or in the case of a battle, the instances of their being heard over such long distances, are sufficiently rare to be regarded as unusual phenomena. Now in the case of these "Barisal Guns" the noises are heard not rarely, but frequently, over these long distances, and after forty or fifty miles travelling from the sea, if they really come thence, they are still sharp and well-heard sounds. If they are produced by the breaking of surf, it is clear that to produce a sound loud enough to be heard so well over such a long distance, it will require, not the breaking of a wave at any one point, but the breaking of waves over a considerable extent of shore.

It is possible to imagine a wave breaking simultaneously over a long line of shore, but unfortunately sound does not travel simultaneously. The travelling of sound is very slow indeed over such a long distance as forty miles, and the concussion produced by the breaking of one part of the wave would necessarily reach the observer's ear long before that produced by the breaking of another part; the sound of this simultaneously breaking wave would, to the distant hearer, be scattered over a little space of time, and be therefore imperceptible through its being so scattered. The sound as it is actually heard, however, is sufficiently sharp to be compared, as it is by every one, with that of a gun.

It is not therefore by a simultaneously breaking wave, that the sound can be produced, but it can only be (on the wave-breaking hypothesis) by a number of waves, or what is the same thing, different parts of the same wave, breaking at different parts of the coast, their moments of breaking being so arranged, that the sound starting at these different moments from these differently distant

points, will reach the observer's ear at one instant of time, so that the concussions, though separately imperceptible, form, by their cumulative effect, a single perceptible concussion, producing the sound as of a gun. It is possible to imagine the occurrence, once in a way, of this exact arrangement of so many different waves, but it is a concurrent arrangement of so many elements as to form, even in a single occurrence, a wonderful coincidence. But that the same coincidence should occur, with respect to the same observer, over and over again at intervals of ten minutes or so, during a single night, is to me quite inconceivable; and I cannot at present accept a theory which requires me to believe in the frequently repeated occurrence of such an extremely unlikely event.

The chief argument in support of the surf theory, lies in the allegation that the sounds are heard most frequently in a lull following a storm, when the waves might be expected to be loudest. But this is a fact somewhat vaguely stated, and without more extended and more exact observation, it cannot be accepted as the basis of any conclusion.

Another remark I would make on the surf theory is this. We see the production of the noise depends upon the existence of certain conditions as to the comparative distances from the observer's ear of the various points where the waves break. Now to two observers distant from each other by even ten miles, these distances are necessarily quite different, and the same series of waves which combine to produce a perceptible sound upon the ear of one observer, cannot so combine with reference to the other observer. The various concussions will not meet at his ear, but will be scattered over a short space of time, and thus be dissipated.

If therefore we could find as a matter of fact that the sounds were simultaneously perceived by two distant observers, we could deduce from that fact the conclusion that they are not produced by the breaking of waves, or in fact by any other cause which is not strictly confined to one spot, but depends for its effect upon accumulation from a number of partial causes (such as the breaking of different waves, or different parts of the same wave) spread over a certain extent of space. The breaking of a wave two or three miles long, might be conceived so to take place as to produce at

any given point a simultaneous sound preceded and followed by silence, but the conditions necessary for it to produce that effect, would render it impossible that its sound should be heard as a simultaneous sound at any other point even slightly distant from the first.

The first step, as it seems to me, towards making any deduction whatever as to the origin of the sounds, is one which might easily be taken, and has not yet been taken, namely the investigation whether the nights when the sounds are frequent at one place, are the same as those in which they are frequent at another somewhat distant place. From a few comparisons bearing on this point, we could at least discover whether the cause was a general one, or only a purely local one.

Bábu Rájendralála Mitra thought that though the surf theory seemed to be viewed with great favor, it did not meet all the requirements of the case. There was no question that sound was audible from great distances under particular conditions of the atmosphere; but it has yet to be shown how, in travelling, it undergoes such transmutation, as to change the dull roaring of the surf into distinct detached sounds of the booming of a gun, and how that booming is heard eight or ten times successively, and then is followed by a lull. Heavy surf, besides, was common wherever the sea rolled over a low shelving beach, but it was not always followed by the peculiar booming. If it be said that the estuaries of the Delta favoured the transmission of sound, still the difficulty would remain unexplained; for the Deltas of the Iráwati, the Mahánaddí, the Danube, the Mississippi and the Amazon, had similar estuaries, but they did not produce the "Barisal guns." At Púrí, too, they were never heard. Even at the base of the Gangetic Delta, they were not common every where, but confined to one locality, and it was probable therefore that some other agency was at work besides the surf to produce them.

Mr. Blanford said that he could not agree with Bábu Rájendra lála Mitra that the conditions of the Mahánaddí Delta bore any great resemblance to those of that part of the Ganges Delta, where the Barisal guns are heard, with regard to the supposed conditions of the phenomenon. The shore line of the Mahánaddí Delta is very

similar to that of other parts of the Orissa and Madras coast. There are no estuaries with expanses of sand banks which are dry at low water and exposed to the full brunt of the S. W. wind, and the direction of the wind in the S. W. monsoon is more or less parallel to the coast. There is therefore but one line of breakers, and the sound they produce is not so likely to be heard far inland. He could not therefore attach much weight to Babu Rajendralala Mitra's objection.

In reply to Mr. Blanford, Bábu Rájendralála Mitra said that it was true that the position of the Mahánaddí running towards the east was not favorable to a particularly heavy surf, but the Iráwatí opened to the south, and the rush of the tidal wave from the Southern Hemisphere marched on its coast with great force, but yet the peculiar booming sound was there never produced.

The President thought that Mr. Westland had over-estimated the force of two of the objections which he proposed to Mr. Blanford's explanation. In the first place, he felt sure from his own experience, that under favourable circumstances, the report of heavy ordnance might be heard at distances comparable with those of which Mr. Rainey wrote; in the part of Suffolk, with which he was familiar, it was not an uncommon thing to hear the guns of the Harwich redoubt, say twenty miles off, and probably these were all pieces of small calibre. And on some occasions, the sounds of firing at Sheerness or elsewhere in the neighbourhood of the mouth of the Thames, reached the same place, and must have traversed not less than fifty miles. Also he thought that if they reflected for a moment upon the behaviour of a roller as it broke upon the shore, they would perceive a reason, why its sound might at a distance be nothing more than a single report. The mass of water in motion, constituting one of these rollers, was during the swell, which succeeded a storm in the bay, exceedingly large. As the lower part was checked in its advance over the shallow flats of the coast, the crest of the wave gained upon its base, until it was left without support, and then an enormous volume of water endued with considerable horizontal velocity, fell from some height with a very great shock; this occurred first at the point of the roller where the mass and the elevation was the greatest; the shock was sudden, be-

cause it succeeded tranquillity, and it was violent. The process of breaking then ran along the length of the roller, but it was very different in result from the first crash; the fall of each succeeding element was in some degree stayed by its predecessors. All present who had been at the sea-side would remember how markedly the sound of the first blow of a great breaker prevailed above the continuation of the roar. On the shore itself, and for some distance inland, no doubt the whole sound, more or less prolonged and confused, would be heard; but he, the President, supposed it might well happen, that further inland still, the minor sound would be so weakened in intensity, as to be lost and only the greater, that which results from the first shock, would remain. If so, the phenomenon would be reduced, almost precisely, to that of a single distant explosion.* Also in the breaking of surf upon a beach, there always occurred maximum breakers at intervals of greater or less duration. Thus the explanation to which Mr. Blanford gave his support, seemed to be fitted to account for these so-called Barisal guns in all respects. But the matter should not be left to conjecture. A little careful observation ought to suffice to clear it up, and he thought the Council might readily effect the organization necessary for the purpose.

The following papers were read—

I. *On the Capture and Death of Prince Dárá Shikoh.*—By H. Blochmann, Esq., M. A.

(Abstract.)

Mr. Blochmann exhibited a rare (Delhi) MS., the property of the Government, bearing on the fly leaf an autograph of Dárá Shikoh. He said, the MS. was a copy of a religious poem by Baháuddín Sulṭán Walad, son of the great Çúfi-poet Mauláná Jalál-uddín i Rúmí, and was of great value as being in the handwriting of the author himself (A. H. 697, or A. D. 1297-98.)

The religious views of Dárá Shikoh, like those of the emperor Akbar, present many points of interest. He was the author of the

* *Prof. Tyndall* in his *Lectures on Sound*, says (p. 55)—"The roar of the breaking wave itself is mainly due to the explosion of bladders of air. The President.

Safinat ul-auliá, a work containing biographical notices of Muhammadan Saints, and of a treatise on Mysticism (*Taçawwuf*). MSS. of these two works are very rare, and the copies in the Government collection of Delhi MSS. are perhaps unique. The Persian translation of the Upanishads which was made at Dárá's cost, was mentioned by most Historians.

The writer then mentions the two battles which Dárá Shikoh lost against Aurangzíb, his younger brother. The first was fought on the 6th Ramazán, 1068 (28th May, 1658, A. D.) at Samogar, nine miles east of Ágrah, in the Parganah of Fathábád; and the second at Deorá, 3 *kos* south of Ajmír, on the 27th and 28th Jumáda II, 1069, or 12th and 13th March, 1659, A. D.

After the last battle Dárá fled to Ahmadábád, and from thence over Kachh to Bhakkar and crossed the Indus. He passed the territory of the Chandí tribe (Dehríkot, Long. 67° 34′, Lat. 27° 38′), that of the Magasís, and reached at last Dádar (Long. 67° 41′, Lat. 29° 26′), a town which enjoys the notoriety of being the hottest inhabited place on earth. The Zamíndár of the place, Malik Jíwan, received Dárá hospitably; but no sooner had the prince left Dádar for Qandahár than Malik Jíwan, or his brother, fell upon him, took him, and his son Sipihr Shikoh, prisoners, and handed them over to Aurangzíb's officers.

Dárá Shikoh was killed, at Aurangzíb's orders, by Nazar Beg Chelah at Khizrábád (Delhi) on the 21st Zí Hajjah 1069, or 31st August, 1659, and was buried in Humáyún's Tomb.

The writer then mentions the discrepancies between the *'Álamgírnámah*, *Maásir i Álamgíri*, *Kháfi Khán*, the *Tazkiratussalátín i Chaghtái*, and European Histories, as Bernier, Elphinstone, Marshman, &c. Elphinstone places the capture of Dárá Shikoh in *Eastern* Sindh, instead of near Qandahár, and gives instead of 'Malik Jíwan, Zamíndár of Dádar' merely the 'Chief of Jún or Jiún' (which lies in Eastern Sindh, between T'hat'hah and Amrkot). Marshman increases the confusion, by calling this Afghán Zamíndár 'a Rájah;' but Malik Jíwan could not have been a Hindú, because he subsequently received from Aurangzíb the title of Bakhtyár *Khán*,—a title never conferred on Hindús. It would appear that Elphinstone, or the sources from which he copied,

read مالك جيون *málik i jiún*, for ملك جيون *mălik jiwan;* and *málik*, owner, having been translated by 'chief,' 'Jíwan' was arbitrarily changed to '*Jiún* OR *Jún*,' to suit the 'owner.' But the name of the town in Eastern Sindh, which Elphinstone meant, is *Jon*. It is now quite unimportant; but it was formerly, up to the times of Akbar, renowned for its beautiful gardens.

A short discussion followed the reading of the paper as to whether the title of *Khán* had ever been conferred on Hindús or not. Several Members mentioned examples of Hindús bearing this title. Mr. Blochmann thought, they might have *assumed* the title; but he had not met with a single instance in the Histories of India, from the Memoirs of Bábar to the *Tazkiratussaláṭín* and *Kháfí Khán*, that the Mughul Government ever *conferred* the title of *Khán* on a Hindú.

II.—*Notes on the Archæological Remains on the Assia, Alti, and Darpan Hills (Orissa).—By* BÁBU CHANDRA SEKHARA BANERJEA.

(Abstract.)

The antiquities noticed are met with on the summits of three hills, two of which are situated in the centre of the Kaṭak District, and the other on its western border. The names which the natives give to them are Assiagiri (marked Assiah on the maps), Náltigiri, and Bárunibánṭá or Mahábináyaka. The first of these has four peaks, on one of which the Prophet is fabled to have alighted for prayer on his aerial journey, and left his foot-print; there is a mosque built on a spot 2500 feet above the level of the surrounding country, by Shujá'uddín Muhammad Khán, in the year 1132 of the Hijrah. The second peak is called Udaya Giri. The sea is said to have once touched its foot, though it has now receded to a great distance. The most remarkable objects on it are a collosal figure of Buddha, nine feet in height, and a báolí, or well, lined with stones, a sculptured gateway, and remains of two temples. At the foot of the third peak are to be found the ruins of a large fort, and at that of the fourth peak, called *Achuta basanta*, there is a small building, once the abode of a hill chief. Close by is a place called Amarabáṭi, which was at one time the capital of one of the

Gangavansa kings. There was a large fort built of laterite, which has lately been entirely demolished, and its materials used for the repair of the Trunk Road. A magnificent tank, twenty acres in area, and some broken pillars are all that now remain to attest its former greatness. The Mahábináyaka hill stands by the side of the high road to Kaṭak, and is covered by a dense forest. It has a small temple and a perennial fountain which are held in great reverence by the people, and the place is reckoned to be one of the four most sacred spots in Orissa.

The receipt of the following communications was announced—

1. *Notes on the Mondar Hill.—By* BABU RASHBEHAREE BOSE, *Banka.*

2. *A Gondi Vocabulary* (enlarged).—*By* REV. J. DAWSON, CHINDWARA.

3. *The Vástu Yága, and its bearings upon Tree and Serpent-worship in India.—By* BÁBU PRATAPA CHANDRA GHOSHA, B. A.

4. *Notes on some Reptilia and Amphibia from Central India,—by* W. T. BLANFORD, ESQ., F. G. S., C. M. Z. S., &c.

(Abstract.)

The writer has been mainly induced to collect and note the localities of Reptiles by finding that the provinces into which Dr. Günther proposed, in his 'Reptiles of British India,' to divide the Peninsula, differ to a very important extent from those which appeared probable from a study of the land Mollusca, the birds, and mammals. It appears that Dr. Günther was to some extent misled by the imperfect evidence at his disposal; for the Reptilia appear to agree in distribution with the other animals mentioned.

The following are the Zoological sub-divisions, into which the writer proposes to divide India proper. He especially restricts this name to the country to which it was originally applied, and excludes the regions east of the Bay of Bengal, which are entirely different in climate, inhabitants, zoology, and botany.

1. The Panjab province. This is the eastern extension of the great desert province.

2. The Indian province proper, thus sub-divided—

a. Gangetic sub-province.

b. Deccan sub-province.

c. Bengal sub-province.

d. Madras sub-province, including Northern Ceylon.

3. The Eastern Bengal province. This belongs in a great measure to the Indo-Chinese fauna.

4. The Malabar province—Southern Ceylon and all the Western Coast of India, with the so-called Western Ghats, as far north as Bombay. Part of the fauna peculiar, the rest Indo-Chinese and Malay in its affinities.

A few of the Reptiles characteristic of each province, are mentioned.

The writer proceeds to notice some reptiles and frogs collected in parts of Central India in S. E. Berar, Chanda, Ráipúr, Biláspúr, Udaipúr, and Chota-Nágpúr. They are the following—

1. *Emys* [*Pangshura*] *tectum*, Bell, var. intermedia. A form intermediate in character between *Pangshura tectum*, Bell, and *P. tentoria*, Gray, and apparently connecting the two. It cannot be distinguished as a separate species.

2. *Emyda vittata?* Peters.

3. *Trionyx gangeticus*, Cuv.

4. *Cabrita Leschenaultii* (M. Ed.).

It is shewn that writers have hitherto probably been in error in confounding *Cabrita brunnea* of Gray with *Lacerta Leschenaultii*, M. Ed. They differ from each other in the character of the nasal plates.

5. *C. Jerdoni*, Bedd.

The characters of the nasal plates are again distinct from those of the other two species, being similar to those in *Eremias*. The three, however, appear to form a good genus.

6. **Ophiops [Gymnops] microlepis**, n. sg. and sp.

The new sub-genus *Gymnops*, is characterized by having the nostril between two swollen shields, one above, the other below, with a small post-nasal. There are no eyelids.

O. microlepis has the head shields smooth, not rugose, the anterior frontal single, post-frontals without any intervening plate, occipitals small, each nearly equal to the fourth part of a post-

occipital in size; chin shields, six or seven on each side, the first two or three pairs meeting; dorsal scales, minute, carinated; two large shields in front of the anus, the posterior the larger; tail, elongate, sub-quadrate in front, rounded behind, more than double the length of the body. Colour grey in the middle of the back, under-parts white, sides with two white lines, the upper much the longer, the lower not seen behind the shoulder, and with dark spots. Length, 7·2 inches, of which the tail is 5·1. A single specimen only found at Korba in Bilaspúr.

7. **Euprepes innotatus,** sp. nov.

Small, resembling *Euprepes macularius* in size and form, but with the centre of the lower eyelid transparent. Scales in 32 longitudinal series, those of the back and sides with five keels. Back olive, sides purplish brown, a white line running back on each side from the superciliary ridge to the middle of the back.

8. *E.* [*Tiliqua*] *carinatus,* (Schneid.) var. (*E. rufescens,* auct.) This species has usually five keels on the scales in India.

9. *E.* [*Tiliqua*] *macularius,* Blyth, var.

A variety is common in Chatisgarh, Chota-Nágpúr, &c. It appears probably different from *T. multicarinata,* Kuhl.

10. **E. [Tiliqua] septemlineatus,** sp. nov.

A small species, blackish brown in colour, above with seven white lines, three on the back, two on each side, under-parts, white; scales three-keeled, in thirty longitudinal rows; one specimen only about four inches long.

11. *Riopa Hardwickii,* Gray.

12. *R. albopunctata,* Gray.

13. *Hemidactylus maculatus?* Dum. et Bibron.

14. **H. gracilis,** sp. nov.

Near *H. reticulatus,* Bedd. It is small, slender in form, the body less depressed than is usual in the genus, back with elongate sub-tribedral tubercles, six inguinal pores, none beneath the thighs; tail, smooth, elongate, scarcely depressed at the base and not at all behind; colour, grey with dark spots forming bands on the back and dark lines on the sides and belly. Length three inches, of which the tail is 1¾. S. E. Berar and Ráipúr.

15. **H. marmoratus,** sp. nov. Back minutely granulate, a very

few small flat tubercles at the sides and loins, tail depressed, ringed with three elongate scale-like tubercles at the side of the hinder part of each ring, sub-caudal shields large. Femoral pores about twelve on each side with a considerable interval between them; all the fingers and toes with claws. Colour, grey above marbled with dusky, whitish below. Length of body, 1·85 inch, of tail (renewed in part) 1·5″.

16. *Calotes versicolor*, (Daud.).

17. *Sitana Pondiceriana*, Cuv.

18. *S. Deccanensis*, Jerd. Appears doubtfully distinct from the last.

19. *Charasia dorsalis*, Gray.

20. *Typhlops braminus*, (Daud.) var. *pammeces*.

21. *Tropidonotus quincunciatus*, Schleg.

22. *Rtyas mucusus*, (L.).

23. *Zamenis ? brachyurus*, Günther.

24. *Dendrophis picta*, (Gm.).

25. *Passerita mycterizans*, (L.).

26. *Lycodon aulicus*, (L.).

27. *Naja tripudians*, Merr.

28. *Bungarus cœruleus*, (Schneid.).

29. *Daboia Russellii*, (Shaw.).

30. *Rana cyanophlyctis*, Schneid.

31. *R. gracilis*, Wieg.

32. *Pyxicephalus breviceps*, (Schneid.).

33. *Callula pulchra*, Gray.

34. *Polypedates muculatus*, (Gray.).

5. *A fourth List of Bengal Algae,* determined by* Dr. G. v. Martens, *communicated by* S. Kurz, Esq.

(Continued from Proceedings for January, 1870.)

2662. *Dictyonema fuscescens*, Martens.—Filis heteromorphis, primariis ad $\frac{1}{300}$ lin. cum vagina crassis, obscure fuscis, articulis distinctis plerumque binatis, diametro æqualibus, vaginis rugosis, crassis, coloratis; filis secundariis $\frac{1}{600}$ lin. tantum crassis, pallidioribus,

* In this List the species which have been already published as occurring in Bengal, are omitted.

articulis subobsoletis viridescentibus.—Calcutta, natans in aqua stagnante horti botanici. January, 1870.

2663. *Oscillaria amphibia*, Ag.—Howrah District, very frequent, forming slippery layers of about $\frac{1}{8}$ lin. thickness on brick stairs leading to tanks, etc., also submerged or near the surface of the water.

2664. *Oscillaria Cortiana*, Menegh.—Howrah District, in tanks, etc. on the upper surface of waterplants.

2665. *Oedogonium scutatum*, Kg.—Howrah District, in tanks, on leaves of a species of *Cryptocoryne*. January, 1870.

2666. *Mastigonema granulatum*, Martens.—Filis fasciculatis, basi coalitis, diametro $\frac{1}{250}$ ad $\frac{1}{200}$ curvatis, sensim attenuatis, vaginis hyalinis arctis, articulis inferioribus diametro duplo brevioribus, pulchre granulatis, superioribus obsoletis fusco-ærugineis.—Howrah District, in tanks and slowly running waters, on the stems of plants, especially of grasses. January, 1870.

2667. *Lyngbya solitaris*, Kg.—Howrah District, frequent in tanks on dead or living plants.

2671. *Rivularia Lens*, Menegh.—Howrah District, very frequent in tanks on the leaves of *Vallisneria*.

2672. *Conferva bombycina*, *β. crassior*, Martens, articulis diametro ($\frac{1}{110}$ ad $\frac{1}{120}$ lin.) duplo ad quadruplum longioribus.—Calcutta, Botanic Gardens, in tanks. January, 1870.

2673. *Mastigonema caespitosum*, Kg.—Calcutta, Botanic Gardens, on dead submerged stems of *Sesbania paludosa*. January, 1870.

2674. *Leptothrix subtilissima*, Kg.—Howrah District, on moist walls of buildings. (Grows, for instance, on the damp walls in the Library Room of the Herbarium-building, Botanic Gardens.)

2675. *Scytonema Vieillardi*, Martens. Strato compacto nigro, filis subsimplicibus flexuosis acuminatis, cum vagina $\frac{1}{300}$ ad $\frac{1}{250}$ lin. crassis, ærugineis, vaginis luteis crassis.—Howrah District, on walls, especially of waterworks, very frequent.

X2. *Oscillaria limosa*, Ag.—Howrah, frequent in tanks. January, 1870.

2024. *Hypoglossum Bengalense*, Martens. Fronde tenui purpurea sesquilineam lata, alterne decomposito-pinnatifida, segmentis linearibus denticulatis, axillis acutis, denticulis obtusiusculis; costis

segmentis conformibus e multiplici serie cellularum elongatarum compositis, cellulis frondis sexangularibus $\frac{1}{60}$ lin. crassis; spermatiis in superficie sparsis.—Lower Bengal, Mutlah, tidal. December, 1868.

2026. *Rhizoclonium Antillarum*, Kg.—Lower Bengal, Mutlah, brackish water. December, 1868.

2687. *Fischeria tenuis*, Martens. Filis ramisque primariis subtorulosis tenuioribus, ramulis $\frac{1}{450}$ lin. crassis, acuminatis; articulis superioribus diametro duplo longioribus.—Calcutta, Botanic Gardens, on damp walls of the northern faces of buildings. Dull orange-coloured, when fresh. January, 1870.

Nearly allied to *Fischeria thermalis*, Schwabe, which grows on walls exposed to the hot vapours of hot springs, as, for instance, at Carlsbad, Bohemia.

2705. *Protococcus cohaerens*, Kg.* Calcutta, very common on walls of buildings, exposed to the weather. February, 1870.

2707. *Cladophora simpliciuscula*, Kg.—Hooghly river near Kidderpore, Calcutta, on old tidally submerged brickwalls. February, 1870.

2708. *Hypoglossum Lepricurii*, Kg.—Calcutta, occurring with the last.

2709. *Scytonema aureum*, Menegh.—Calcutta, on muddy banks of the Hooghly river at the Botanic Gardens. February, 1870.

2710. *Chthonoblastus salinus*, Kg.—Calcutta, Hooghly river near Kidderpore, on an old brickwalls. February, 1870.

2711. *Hormosiphon coriaceus*, Kg.—Hooghly river along the Botanic Gardens, Calcutta. February, 1870.

2712. *Conferva bombycina*, Kg.—Calcutta, Hooghly river near Kidderpore. February, 1870.

2713. *Oscillaria tenuis*, Lyngb.—Calcutta, Botanic Gardens, in tanks.

2714. *Oscillaria antliaria*, Martens.—Calcutta, on muddy banks of the Hooghly river, Botanic Gardens. February, 1870.

2715. *Oscillaria tenuis* γ *formosa*, Bory.—Calcutta, Botanic Gardens, in tanks.

* This Alga is very frequent in Bengal; hardly are the walls of buildings white-washed, when they again turn first green and then black, being covered by this *Pretococcus*.

Gloeocapsa rupestris, *β. pallida*, Martens.—On walls in the Botanic Gardens, Calcutta. January, 1870.

1006-6. *Polysiphonia rufo-lanosa*, Harvey.—Calcutta, Botanic Gardens, on submerged branches occurring together with *Catenella Opuntia*, Grev, along the Hooghly river.

At the close of the meeting, Mr. N. A. Belletty presented to the Society four Jynthia coins.

Bábu Pratápa Chandra Ghosha, Assistant Secretary, has since sent the following note regarding these coins.

"They are silver Jayanti coins. As usual, they bear no names of kings.

Area I.—শ্রীশ্রীশিবচরণ কমল মধুকরস্য

Of the Honey-worker of the lotus at the foot of the most glorious *Siva*.

Area II.—শ্রীশ্রীজয়ন্তী পুর পুরন্দরস্য শাকে ১৬৫৩

Of the illustrious sovereign of Jayanti-púra. *Sáke*, 1653 or A. D. 1741.

Area I, bears rude figures of a musket and a long knife and the *yantra*. On the top of the inscription in the margin is a half-moon, and below it a leaf, perhaps meant for that of the *Bel*. In Marsden's work (MCCXVI-MCCXVII) the coin is figured and described; but his date is 1683.

The second coin is a duplicate of the first. It bears an impression on the margin of a punched stag.

The other two are exactly alike. They are a little larger than the two above described, and the metal appears to be a little more alloyed.

The legends on both areas are identical with those of the above, excepting the date, which is 1712 *Saka*, or A. D. 1790. The margin, as in the above three coins, is decorated with a string of beads."

LIBRARY.

The following additions have been made to the Library since the last Meeting.

Presentations.

*** Names of Donors in Capitals.

Report of the thirty-eighth meeting of the British Association for the advancement of Science; held at Norwich in August 1868. —THE BRITISH ASSOCIATION.

Catalogue of Scientific Papers, Vols. II and III.—THE ROYAL SOCIETY OF LONDON.

Philosophical Transactions, Vols. 158, 159, part I.—THE SAME.

Proceedings of the Royal Society, No. 119.—THE SAME.

Materials for a Fauna and Flora of Swansea and the neighbourhood, by L. W. Dillwyn, F. R. S.—THE SAME.

Proceedings of the Royal Physical Society of Edinburgh, for 1855-66.—THE ROYAL PHYSICAL SOCIETY OF EDINBURGH.

The Transactions of the Linnean Society, Vol. XXVI, parts 2 and 3.—THE LINNEAN SOCIETY OF LONDON.

Journal of the Linnean Society, Botany, Vol. X, parts 48 and 49, and Vol. XII, Zoology, Vol. X, parts 43-46.—THE SAME.

Proceedings of the Royal Institution of Great Britain, Vol. IV, parts V and VI.—THE ROYAL INSTITUTION.

Annales des Sciences Physiques et Naturelles d'Agriculture et d'Industrie, 3e Série, Tome XI.—THE IMPERIAL SOCIETY OF AGRICULTURE, &c., OF LYON.

Actes de L'Académie Imperiale des Sciences, Belles-Lettres et Arts, de Bordeaux, 3e Série, 31e Année, 1er Trimestre.—THE IMPERIAL ACADEMY OF BORDEAUX.

Bulletins de L'Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique, 2me Sér. Tome XXV, XXVI.—THE ROYAL ACADEMY OF BELGIUM.

Annuaire de L'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique, 1869.—THE SAME.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Math.-Naturhist. classe, Band LVII, Abth. 1, Hefte IV-V; Abth. 2, Hefte IV-V; Band LVII, Abth. 1, Hefte. I-V; Abth. 2. Hefte I-V; Band LIX. Abth. 1, Hefte 1-2, Abth. 2, Hefte 1-3.—Philos-Hist. Classe, Band LIX. Hefte 1-4, Band LX, Hefte 1-4, Band LXI, Heft. 1.—THE IMPERIAL ACADEMY OF SCIENCES OF VIENNA.

Register zu den Bänden 51 bis 60 der Sitzungsberichte der Philosophisch-Historischen classe der Kaiserlichen Akademie der Wissenschaften, VI.—THE SAME.

Jahrbuch der Kaiserlich-Königlichen Geologischen Reichsanstalt, Band XVIII, No. 4, Band XIX, No. 1.—THE IMPERIAL GEOLOGICAL INSTITUTE OF VIENNA.

Verhandlungen der K. K. Geologischen Reichsanstalt, 1869, No. I.—THE SAME.

Archive für Osterreichische Geschichte, Band XL, Hälfte. I-II. —THE SAME.

Fontes Rerum Austriacarum, Osterreichische Geschichts Quellen, Band XXVIII, Abth. 2, Band XXIX, Abth. 2.—THE SAME.

Die Porphyrgesteine Osterreich's aus der Mittleren Geologischen Epoche, von Dr. Gustav Tschermak.—THE SAME.

Tabulae codicum manuscriptorum præter Graecos et Orientales in Bibliotheca Palatina Vindobonensis asservatarum, edidit Academia Caesarea Vindobonensis, volumen II.—THE SAME.

Reise der Osterreichischen Fregatte Novara um die erde, in den Jahren 1857-58-59. Anthropologischer Theil, von Dr. F. Müller. —THE MINISTER OF FOREIGN AFFAIRS, VIENNA.

Abhandlungen der Mathematisch-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften, Band X. Abth. 2.—THE ROYAL ACADEMY OF SCIENCES OF BAVARIA.

Abhandlungen der Historischen Classe der Königlich Bayerischen Akademie der Wissenschaften, Band XI. Abth. 1.—THE SAME.

Abhandlungen der Philosophisch-Philologischen Classe der Königlich Bayerischen Akademie der Wissenschaften, Band XI, Abth. III.—THE SAME.

Denkschrift auf C. F. P. v. Martius, von C. F. Meissner.—THE SAME.

Ueber die Entwicklung der Agrikulturchemie.—THE SAME.

Zeitschrift den Deutschen Morgenländischen Gesellschaft, Band XXIII Heft. IV. THE GERMAN ORIENTAL SOCIETY, LEIPZIG.

Nyelretudományi Közlemények, Kiadja a Magyar Tudományds Akadémia Nyelretudományi Bizottsága, Szerkeszti Hunfalvey Pál, Hatodik Kötet.—THE HUNGARIAN ACADEMY OF SCIENCES, PEST.

Magyar Tudományos Akadémia Ertesíöje, A. M. T. Akadémia Rendeletéböl, szerkeszti Rónay Jaézint.—THE SAME.

Aarboger for Nordisk oldkyndighed og Historie udgirene af Det Kongelige Nordiske oldskreft-Selskal, 1869 :—THE NORTHERN ARCHEOLOGICAL SOCIETY OF COPENHAGEN.

Mémoires de la Société Royale des Antiquaries du Nord, 1868. —THE ROYAL SOCIETY OF NORTHERN ANTIQUARIES, COPENHAGEN.

Mémoires de L'Académie Impériale des Sciences de St. Petersbourg, Tome XII, XIII.—THE IMPERIAL ACADEMY OF SCIENCES OF ST. PETEESBOURG.

Bulletin de L'Académie Impériale des Sciences de St. Petersbourg, Tome XIII.—THE SAME.

Journal of the Ceylon Branch of the Royal Asiatic Society 1867-70. Parts 1 and 2.—THE CEYLON ASIATIC SOCIETY.

Ramayana, Vol. 2, part 2 by Hemachandra Bhuttacharya.—THE EDITOR.

Rahasya Sandarbha, No. 59.—BABU RAJENDRALALA MITRA.

List of Birds in Alaska, by W. H. Dall, and M. M. Bannister. —W. H. DALL, ESQ.

Ausführliches Lehrbuch der Hebraischen Sprache des Alten Bundes, von H. Ewald.—THE AUTHOR.

Eléments de la Grammaire Assyrienne, par Jules Oppert.—THE AUTHOR.

Racines et Eléments simples dans le Systeme Linguistique Indo-Européen per A. Hovelaque.—THE AUTHOR.

La Théorie Spécieuse de Lautverschiebung.—THE AUTHOR.

Les Etudes Indiennes dans l'Italie Septentrionale, le Mahabharata, Dora d'Istria.—THE AUTHOR.

Note sur la pronunciation et la transcription de deux Sifflantes Sanskrites.—THE AUTHOR.

Die Papageien, monographisch bearbeitet, von Dr. Otto Finsch, Band 2, Hälfte 1-2.—THE AUTHOR.

Fragmenta Historicum Arabicorum, Tomus Primus, continens partem tertiam operis Kitábul-Oyún wa 'l-hadáík fi akhbári l'-hakáik, ediderunt M. J. de Goeje et P. de Jong.—THE AUTHORS.

Indische Streifen, von A. Weber, Band 2.—THE AUTHOR.

Comparative Dictionary of the Non-Aryan Languages of India and High Asia, by W. W. Hunter, Esq.—THE GOVT. OF INDIA.

Selections from the Records of the Govt. of India, For. Depart. No. LXXIX.—THE SAME.

Narrative of the Course of Legislation by the Council of the Governor-General during the official year 1868-69.—THE SAME.

Administration of the Punjab and dependencies for 1868-69.—THE SAME.

Dispensary Report, Punjab, 1868.—THE SAME.

Report on the Administration of the N. W. Provinces for 1868-69.—THE SAME.

Selections from the Records of the Government North-Western Provinces, Vol. III, No. 3.—THE GOVERNMENT N. W. PROVINCES.

Indebtedness of the Cultivators of Oudh.—THE GOVT. OF BENGAL.

Selections from the Records of the Govt. of Oudh, Groves.—THE SAME.

Statistical Committee, forms to accompany the Annual Report of the Province of Oudh, 1868-69.—THE SAME.

Report of the Administ. of the Madras Presy. 1868-69.—THE SAME.

Selections from the Records of the Madras Government. Civil Dispensaries, 1868-69.—THE SAME.

Administr. Report on British Birma for 1868-69.—THE SAME.

Report on Public Health, 1868 (B. Birma).—THE SAME.

Report on Hospitals, 1868 (B. Birma).—THE SAME.

Report on Vaccination, 1868 (B. Birma).—THE SAME.

Administr. Report of the Bombay Presy., 1868-69.—THE SAME.

Report of P. Instruction in Lower Bengal for 1868-69.—THE SAME.

Report on Revenue Administration of Oudh for 1869.—THE SAME.

Report on the Topograph. Survey of India for 1868-69.—THE SAME.

Report of the Committee of the Landholders and Commercial Associations, for 1869.—THE SAME.

Exchange.

The Athenæum, May, 1870. The Nature, Nos. 32 to 35.

Purchase.

Müller's Zoologia Danica.—Gould's Birds of Australia, 2 Vols. —The L. E. D. Philosophical Magazine, No. 263.—The American Journal of Science, Nos. 145-46.—The Ibis, No. 21.—Revue de Zoologie, No. 4.—The Annals and Magazine of Natural History, No. XXX.—The Quarterly Journal of the Geological Society, No. 102.—Revue Linguistique, April, 1870.—Revue Archéologique, No. V.—The Numismatic Chronicle, part I, No. 1.—Revue des Deux Mondes, May and June.—Journal des Savants, April.—Comptes Rendus, Nos. 17-21.—The Calcutta Review, July.—The North British Review, April.—Nonnelles suites à Buffon, Histoire Naturelle des Poissons, Tome 2nd.—Dr. Paley's Vedánta Sára.—Dr. Pratt's Etymolog. Forschungen der Indo-Germanischen Sprachen, Bd. 2. Abth. 2.—Fauchés Mahábhárata, Vol. X.—Courteillé's Dictionnaire Turk.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR SEPTEMBER, 1870.

A meeting of the Society was held on Wednesday, the 7th instant, at 9 P. M.

The Hon'ble J. B. Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced—

1. From the Chief Commissioner of Mysore, two copies of the classified Catalogue of Sanscrit MSS. in the Sarasvati Bhandáram, Mysore.

2. From Mons. L. Lafont,—A table shewing the results of Meteorological Observations made in St. Xavier's College Observatory, during the first six months of 1870.

3. From the Author—A copy of Main Results of the Modern Vaidic Researches by R. Ghosha.

The following gentleman duly proposed and seconded at the last meeting, was balloted for and elected an Ordinary Member :—

R. F. St. A. St. John, Esq.

Captain J. Forsyth has intimated his desire to withdraw from the Society.

The following letters addressed to the Secretary were read :—

1. From A. O. Hume, Esq., C. S., Agra.

"In a former letter to you I have stated that *Cypselus tectorum*, Jerdon, of Major Godwin-Austen's list, which appeared at p. 91 of J. A. S. for 1870, was probably *C. infumatus*. I have now one or two more corrections to make to that list.

The bird described by Major Austen as *Rhyticeros plicatus*, Lath., is really the female of that species. The description given of the naked space on the throat settles this.

In the male *plicatus* the gular pouch is bright yellow, and in fact the bird mentioned by Major Austen as *Aceros?* sp. ind.

No. 146, b, is pretty clearly the male of *Rhyticeros plicatus*. Dr. Cantor states that in this species the male has the bill (greenish or yellowish) white, iris pale crimson, gular pouch rich gamboge yellow, feet blackish, while the female has the iris golden vandyke, eyelids brick colour, pouch dirty azure with two transverse black lines, &c.

The male *plicatus* has the medial part of the crown, the occiput and nape, a sort of rufous bay, the sides of the head and neck and front of the latter glistening white, more or less tinged with yellow.

The female has the head and neck black, and is smaller in size.

There can be no doubt, I believe, that Major Austen's No. 146*a*. and 146*b*, are female and male of the same species.

Then his No. 231*a*, *Anthreptes?* is unmistakeably *Chalcoparia Singalensis*, Gm., *Anthreptes phœnicotis*, Blyth, one of the very commonest of the *Nectarinidæ*, in Tippera, whence I have received very numerous specimens.

Major Austen says, he obtained two specimens of *Serilophus rubropygius*, one having a fine colour of shining white. One would almost suspect that this latter must be *S. lunatus*, Gould. I have had at least 20 specimens of each species before me, at one time or another, and so far as my experience goes, Gould is quite correct in saying that *rubropygius* is distinguished from *lunatus* (amongst other things) "by the almost total absence of the lunate mark on the sides of the neck," and again in stating that in *rubropygius* "the lunate mark on the sides of the neck is obsolete in some individuals, and is not very conspicuous at any time in the adult."

The specimen of the so-called *Ephialtes Lempigi* does, if correctly described, most certainly *not* belong to that species, which is *never*, *I* believe, *chestnut*. Temminck's Pl. Col. 99 is a very fair representation of *Lempigi*, which is doubtless often *rufous*, but always a brown and not a chestnut rufous. The wing also is too small. Probably, this specimen belonged to *E. Mautis*, Bon., a species which does occur in Burma, and which is generally confounded with *Lempigi*, although Bonaparte points out the leading distinctions clearly enough in the Conspectus.

Henicurus nigrifrons is of course nothing but the young of *Henicurus Scouleri*.

The *Carpophaga* species not determined, appears to be nothing but the immature, or female, *insignis*. In the old female, there is *never* much coppery gloss, and in the immature birds of both sexes and in some apparently adult females, there is absolutely none. I have a female *insignis* from Tippera, which appears to correspond exactly with Major Austen's description, and I have little doubt, that this was what his birds were."

2. From Lieut. E. H. Steel, Dibrughar.

"During my stay in Assam, I have both had in my possession and seen various Celts which have been found in the hill ranges to the S. E. of Dibrughar. I think that perhaps sketches and descriptions of them might be of interest to the members of the Asiatic Society, and in this hope I am induced to send them to you.

No. 1, (pl. III.), is a Celt of Jade stone in the possession of W. Haly, Esq., and he procured it, I believe, from the Namsang Nagas. I sketched it some little time ago. The stone is of a greenish hue, somewhat mottled, and in parts presents the appearance of being rust-stained: the edge is perfect, and shews but little mark of having been used: it is larger by far than most of the Celts found in the same locality, and of a more symmetrical shape, and presents an appearance of high finish.

No. 2, (pl. IV.) is in the possession of Lieut. W. Barron, B. S. C., who kindly allowed me to copy it. It is far smaller than No. 1, and of a lighter green hue; in fact, looks a piece of pure jade stone. It bears marks of having been used, both on the edge and on the head.

No. 3, (pl. IV.) is of a very different shape, as will be seen by the sketch, and the stone is also of a very different character, being of a soft white friable substance, of a brownish yellow on the outside, in fact looks as if it had been calcined after its manufacture. I am unable to determine what stone it is.

Besides these three of which I send sketches, I had one in my own possession which I sent to England, and which Sir John Lubbock pronounced an undoubted Celt, but at the same time he regretted that it had not been found by some reliable person, *in situ;* this Celt was exactly similar in shape and size to Lieut. Barron's, and of the same hued jade.

All of these Celts were found among the Namsang Nagas, a tribe to the S. E. of our frontier station of Typore.

I read some time ago in the Society's Journal that in Burma specimens of the sort marked 1 are considered spurious and *dead*, and those of No. 3 authentic. Exactly the reverse opinion obtains up here among the Nagas: No. 1 is a *live* stone; No. 3 a *dead*.

I have seen an exceedingly fine collection of Celts from the Danish shell mounds; they all seemed highly finished like the celts found here, and I see no reason why these latter may not also be considered genuine.

I also hardly think it possible that the Nagas would manufacture objects they hold in such awe merely for sale, especially as they are so unwilling to part with the few specimens that they possess."

Mr. Ball said—

"The Assam Jade Celt to which Lt. Steel alludes was described by Sir John Lubbock, in the *Athenæum* for June 22nd, 1867.

"There is at present in the Geological Museum an implement made of soft shale, which was brought from Assam by Mr. Medlicott. (Proc. A. S. B., Sept. 1867, p. 152).

"I take this as a favourable opportunity for making a few remarks on stone implements which have been discovered in Singhbhúm. In July, 1868, I exhibited to the Society some chert flakes, and at the same time read a communication from Capt. Beeching of the 10th M. N. I. which described their mode of occurrence near Chaibassa and Chukerdharpur in the Singhbhúm district. Since that time, I have visited the localities and obtained what I believe to be strong evidence of the human origin of the flakes. Those at Chukerdharpur must have been transported at least three miles as the nearest source of the material of which they are made is situated at that distance. It is difficult to believe from the nature of the case, that the transporting force can have been other than human.

"Besides these flakes which I found in many parts of Singhbhúm, I have been fortunate in discovering a beautifully made Celt, which I now exhibit, in another part of Chota-Nágpúr. It lay on the surface at the foot of a small hill near the village of Buradih, S. E. of Gomaria in Iamar. It is, I think, the best-formed weapon yet obtained in S. W. or Lower Bengal."

Col. Hyde then made the following observations on the effect produced by a thunder storm on a self-registering indicator—

"While testing the qualities of the coal from the Raneegunge field, I wished to ascertain the amount of draught in the chimney in use, and the regularity with which it was maintained.

"For this purpose an ordinary self-recording indicator was constructed, and fixed as follows.

"At the floor line of the Mint, a hole was bored into the chimney from the Engine room; in this hole an iron tube one inch internal diameter and six feet four inches long was carefully set in mortar. The tube projected three inches into the chimney and left sufficient outside for the convenient fixing of the indicator. On the outside end of the tube was fixed a tap $\frac{5}{8}$ inch bore, and this was connected by means of an air-tight junction with one stem of a tube of U form, fixed in a block of wood, so that it might stand upright.

"The diameter of this U tube was $2\frac{3}{16}$ inches, and it was filled about half way up with water. Thus one stem of the U tube is open to the inside of the chimney, while the other is open to the room in which it is fixed.

"Within the stem that is open to the room is placed a light copper ball float, which sits on the surface of the water, and follows the oscillation of the water. A thread is attached to this float, and from it passes over a small wheel to a pencil that is free to travel on the line of the axis of a cylinder driven by a clock, after the manner of an ordinary indicator, (*Vide* Pl. V., diagram No. 3,) so that any motion in the water in the U tube will be truly indicated by a line drawn on the paper of the revolving cylinder.

"On the top of the stem of the U tube that opens to the chimney and in the junction is placed a small screw, so that by closing the tap and opening this screw, both stems of the U tube can be opened to the room, and the water in both stems brought to a level. With the float in this condition the cylinder is turned round, and an equilibrium atmospheric line is traced on the paper. The tap is then opened to the chimney, and the screw closed; after which any diminution of pressure consequent on the current within the chimney is indicated in amount and duration on the paper.

"It will be seen that the fall of the float and the diagram No. 1

drawn on the paper only indicates half the total disturbance, *i. e.* half the difference between the pressure of the atmosphere outside and inside the chimney, so that when it is desired to give a diagram showing the true difference, it is necessary to double the vertical scale as has been done in diagram No. 2.

"This indicator was at work on the 5th August last. At 5 minutes past 2 P. M., a small but severe thunder storm passed directly over the Mint, and two remarkable flashes of lightning occured, one following almost immediately after the other. There was loud thunder.

"When the diagram was examined, it was found that a very marked diminution of pressure had been indicated, as having occurred in the chimney at 2-5 P. M., the time of the thunderstorm.

"The diagram, with an enlargement to shew in tenths of an inch the actual amount of disturbance, is given. It will be seen that two distinct falls in pressure in the chimney are indicated, and that after the disturbance had ceased, the pressure within the chimney remained somewhat less than it was before the storm.

"The height of the chimney is 80 feet and the inside diameter 5 feet."

The President said that, assuming the phenomenon described by Col. Hyde to be attributable to the passage of the thunder storm, one explanation only occurred to him. The storm was distinguished by a thunder clap, which caused the windows of houses to rattle. He thought it possible that the concussion thus apparently produced by the impact of the sound wave might have a very appreciable effect upon the barometrical column. Col. Hyde's apparatus measured the difference between the simultaneous atmospheric pressures on the two legs of the indicator, inside the chimney and outside the chimney, respectively, and it was obvious that the sound wave would travel more slowly through the heated and rarified air of the chimney than through the outside air : therefore the outside leg would be affected by the concussion before the inside leg. He pointed out that if this happened, the consequence would be just such a disturbance in the uniformity of the diagram drawn by the self-acting register, as Col. Hyde had exhibited. He had not the data relative to the actual pressures, temperatures, densities, and

the height of the chimney, requisite to a calculation of the amount of the disturbance upon this basis; but he admitted that he did not think the amount which would result from such a calculation would be nearly so large as that in the diagram. The explanation was, therefore, no doubt insufficient.

Col. Hyde said—"Some time since, I observed the water in the open stem of the U tube oscillating, thinking that this might, perhaps, be due to the concussion of the atmosphere in the room, where two powerful air pumps, driven by a 30 H. P. Engine were delivering air, I made a careful experiment, by closing the open mouth of the U tube, so as to leave only a very small hole open to the room. There was not the slightest alteration in the oscillations, and it was evident that these oscillations were unaffected by the air pumps, and were solely caused by the action of the chimney draught. It would seem also that the length 6′-4″ of tube 1″ diameter, and the contraction caused by the ⅝ tap would effectually negative the supposition of any sudden motion (such as is indicated in the diagram) being given to the water in the U tube by concussive action on the open stem, and the diagram I think clearly indicates a diminution of pressure within the chimney in relation to the pressure in the room at the base.

"The most probable cause seems to be a sudden local diminution in the temperature of the storm space or cloud passing over the top of the chimney. The duration of the disturbance within the chimney is about three minutes as shewn by the time lines, and the extent of the disturbance amounts to ⅜ of an inch in diminution of pressure.

"The diagram indicates an occurrence that caused a sudden increase in the velocity of the current up the chimney, a recurrence, and then a return to nearly the original condition, and its shape, I think, shews an exhausting action through a contracted orifice.

"I have not any record of the temperature or of the reading of the barometer at the time of the storm; but the height of barometer and the temperature of the air and of the inside of the chimney were recorded at 1.38 and at 2.38 P. M. as follows:—

1.38 P. M. Barometer, 29.74, air temp. 86, chimney temp. 220.
2.38 P. M. ,, 29.82, ,, 84, ,, 245."

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The following papers were read—

I.—*Note on Three Species of Batrachia from Moulmein,—by* DR. F. STOLICZKA.

[Received and read 7th Sept., 1870.]

The two known species of *Oxyglossus*, and one new of *Ixalus*, have been lately obtained, in the same locality, by Mr. W. Theobald on the Ataran river, east of Moulmein (Tenasserim Province). Both genera characterize the Malay fauna. The discovery of the *Oxyglossi* is particularly interesting in point of geographical distribution.

O. lævis has up to this only been recorded from the Philippines and is stated by Günther to be "confined" to these islands.

O. lima occurs in Java, China, Camboja and Siam, and is said to have also been found in Bengal. The last locality was considered doubtful, but, through the discovery of the species at Moulmein, it receives more probability, though specimens in our neighbourhood must be of extreme rarity. They are not represented in any of our collections, while *O. lævis* is.

The discovery of the *Oxyglossi* so far north is further interesting in connection with the fossil species, *O. pusillus*, which I have described from the upper tertiary frog-beds of Bombay, (vide Mem. Geol. Survey of India, vol. vi, part III, p. 387). And, since I had the opportunity of examining the two recent species, I am confident that the generic determination of the fossil one is correct. This fact, though as yet almost single, clearly indicates that the Malabar coast had its Malayan fauna,—which is so considerably different from that of Central India,—already at an earlier period than the present one. It remains to be shewn, how far this observation will be supported by the study of the fauna of the upper tertiary deposits of the Indian Peninsula. Good materials for this are, however, as yet a desideratum. Every fragment of a bone and every shell must be collected and carefully examined, before we can speak with any confidence on this important subject.

The genus *Ixalus* includes a number of small tree-frogs without vomerine teeth. The species chiefly occur in Ceylon, South India (Nilgheris) and the islands of the Philippine and Indo-Malayan Archipelago, but none have as yet been reported as far North as Moulmein.

OXYGLOSSUS LÆVIS, Günther.

Batrachia salient. Brit. Mus., p. 7, pl. I, fig. A.

A small specimen, the body measuring 1½ inch, which length is equal to the distance between the anus and metatarsal tubercle; the 4th toe is half an inch long; tympanum very indistinct, smaller than the eye. Skin with a few scattered tubercles, more numerous posteriorly, laterally between fore and hind-limbs conspicuously extended. Color above, pale vinaceous, or ashy brown, lighter on the limbs, all over with darker fine marblings and spots; a somewhat indistinct very narrow band between the eyes, which are very prominent; upper lip spotted with white; a short, thin flexuous fold extends from the upper edge of the eye to the shoulder; another much less distinct short fold crosses obliquely the angle of the mouth and is white. Below, yellowish white, on chin and throat marbled and reticulated with dusky, farther on uniform white, with little tubercles, these becoming most distinct on the median hinder side of the femora. There is a distinct fold of the skin on the inner side of the lower two-thirds of the tarsus, and a very thin fold also on the fifth toe, which Günther does not notice.

Four specimens of this species exist in the Asiatic Society's collections. They are about equal in size to the Moulmein specimen and quite similar to it in coloration; all without a pale median dorsal streak. Very probably they are also from Burma. All the specimens agree in their structural characters so perfectly with Günther's description and figure, that there can be hardly any doubt as to the identity of both, but the Burmese form appears to be constantly smaller than the Philippine one.

OXYGLOSSUS LIMA, Tschudi. Var.

Günther, Reptiles of India, p. 401. Dum. and Bibron, VIII, Erpetologie gen., vol. p. 334.

Body, above, covered with small, sub-equal, pointed tubercles, obsolete on the front part of the head; below, with numerous interspersed large tubercles of which two longitudinal rows on the middle of the chin and throat are especially conspicuous on account of their regularity; the large tubercles do not extend on the loins, but are very marked on the lower belly. Snout short,

rounded, with the nostrils swollen and oblique, directed upwards ; eyes large prominent ; tympanum quite indistinct, a thin fold runs from the upper edge of the eye to the shoulder ; no distinct fold on the side of the body, which measures $1\frac{3}{16}$ inch, the length being very nearly equal to the distance between the anus and the inner metatarsal tubercle ; length of 4th toe very nearly half inch ; total length of hind limb $1\frac{9}{16}$ inches. Fingers thin, free and elongated ; toes entirely webbed up to the tip ; metatarsus with two tubercles, the inner considerably larger (but not as large as in *O. lævis*), than the outer, the former being laterally compressed with an obtuse edge, the latter tubercular and pointed. The tarsus has on the upper hinder end a small tubercle, and on the side of the lower inner half a thin fold ; this and the other tubercles are yellowish. Tongue moderately narrow, elongated, terminating posteriorly in a long point.

Greenish brown above, some of the slightly enlarged tubercles being black and forming, especially on the limbs, small irregular dark spots, a pale median dorsal streak, an other much less distinct on each side of the middle portion of the body ; lower eyelid and a short streak above the arm yellow ; the thin fold behind the eye and the fore limb in front blackish brown ; each femur behind with three dark longitudinal bands, separated by two light coloured ones, the upper one of these is very narrow and yellowish, the lower much broader and with a distinct orange tinge, the lowest dark band is purer black than the two upper ones ; hinder side of tarsus blackish, this color continuing on the fifth and the adjoining toe ; extreme edge of upper lip pale. Below, yellowish white with two sub-parallel longitudinal brown bands, extending from the midle of the lower lip to the belly, the sides of the body and the front side of the femora uniform pale yellow ; hind-limbs greenish pale brown, finely marbled and punctated with darker brown and with two somewhat irregular brown spots in the bent between the belly and the femora.

Although differing in some points from Günther's description, it is most probable that the specimen which I have just described, does not differ specifically from *O. lima*, at least there is no sufficient ground for a specific separation from the materials before me.

Günther does not state all the details of coloration which I have given, his specimens in spirit did probably not shew them sufficiently clearly, but in the principal points, the coloration of the fresh Moulmein specimen well agrees with his account, and so does also the general structure of the body.

IXALUS CINERASCENS, n. sp.

Body, small, stoutish, moderately depressed, above with a few scattered tubercles, below on chin and throat smooth, on the belly, and the lower side of the femora, very densely and coarsely tuberculated, the tubercles being flattened and more or less distinctly polyhedral. Snout, short, obtuse, shorter than eye, but equal to the length of the exposed pupil, or to the distance between the eyes which are very prominent; nostrils rounded, very slightly swollen and somewhat laterally placed below the indistinct canthus rostralis; tympanum quite indistinct; a fold runs from the upper eyelid posteriorly to the shoulder. Length of body $\frac{13}{16}$ of an inch, slightly shorter than the femur and tibia together; total length of hind limb $1\frac{3}{16}$ inches, length of fourth toe not quite $\frac{5}{16}$ inch. Fingers, quite free, elongated with well developed swollen discs, which are only slightly smaller than those on the toes, the latter being barely half webbed; metatarsus with a small inner tubercle and a very indistinct one at the base of the fourth toe; no fold on the tarsus. Tongue broadly oval, distinctly notched behind; eustachian openings small and very wide apart.

Color—above, olive ashy, very minutely freckled with dark, paling at the sides; a broadish somewhat indistinct band between the eyes, one irregular band on each side of the back—in one specimen represented by a mere elongated spot, three bands across the lower arm and a few spots on the fingers, three cross-bands across each femur and tibia, the middle band being in each case broadest and most distinct; a spot on the knee, a few small spots on the tarsi and toes, and a large spot round the anus are dark ashy, often encircled with a more conspicuous enlarged black line; shoulder fold, a few small spots on the lips, one spot on the side of the posterior belly, followed, and partially encircled, by a silvery yellow tinge, the inner basal half of the femora and,

to a great extent, also their hinder side, and the toes internally are blackish. Below, pale brownish white, somewhat purer on chin and throat, and all over finely speckled and punctated with dark.

The specimens examined appear to be quite full grown; the largest measures only $\frac{3}{4}$ of an inch. The structure and coloration are peculiar, and distinguish the present species from any as yet known from the Philippines, Ceylon, or South India.

II.—*On the Method of assaying silver as conducted in the Indian Mint.*—*By* DR. H. E. BUSTEED, OFFG. ASSAY MASTER. (Abstract.)

The method of assaying Silver, as now in use in H. M.'s Indian Mints is one peculiar to them; it was introduced into the Calcutta Mint about the year 1850, and thence extended in course of time to those of Bombay and Madras.

It has been favorably reported on and described more or less in detail as an official duty by various assay officers, to local Mint authorities in India, but beyond this, it would appear, that no attempt has been made towards giving publicity to the practical working of the process, or to making generally known the laboratory details of this method of assay.

It has been suggested to the writer that some such attempt now would be not only interesting but useful, as after 20 years' experience of it, the assay offices in the Indian Mint must be in a position to assign its true value to a method which has been used for the assay of an immense importation and coinage of silver bullion. To render it more generally intelligible, and to show wherein the process about to be explained contrasted with those in more general use, Dr. Busteed very briefly adverted to the principles on which those processes depend for their results, omitting details and technicalities. In modern acceptance, the principal duty of an assayer is to ascertain the proportion of the precious metals present in any sample of mixed metal submitted to him for examination, so that from the result of his investigation, the proper value may be assigned by calculation to the mass which the sample is supposed to represent.

This the assayer effects by separation of the precious metals from the coarser ones. The most ancient means of effecting this was, by

the method of *cupellation.* He explained the principle of this method, what skill and experience it required on the part of the operator, and how it still fell short of accuracy in its results.

Its shortcomings led to the invention of another process by Gay Lussac, known as the volumetric, or humid, method, which is much more accurate, and is now practised very generally on the Continent. Its principles were briefly glanced at. Its introduction, however, into the Indian Mints was not considered desirable by their assay officer, for certain reasons, a few of which were given. The method of cupellation, therefore, being not accurate enough for the purposes of buying and selling bullion, and that by the French process being considered not well suited to Indian Mints, it became necessary to look out for, and introduce into the Mints of this country, a process more likely to answer all the ends in view.

This object was attained by the adaptation and introduction of the process now in use, *viz.*, the "Chloride process of assaying silver." Hitherto it had never been resorted to, except on a very small scale. Assayers appear to have shrunk from the manifest difficulties of manipulation in collecting, drying, and weighing the precipitated chloride of silver. The credit is due to Mr. James Dodd, a former Assay Master of the Calcutta Mint, of having so simplified, modified, and systematized the details of this method, as to render its application to the assaying of silver on a large scale easy and accurate. The principles and an outline of the details of the process were then given, an understanding of some of the chief appliances and steps in the manipulations being assisted to by suitable photographs. The system of weights in use and the quantity of the sample taken for assay were also explained, as well as the points wherein this system might fairly be considered better suited to a Mint in India than the other methods.

In conclusion, Dr. B. alluded to the vast amount of silver bullion which this process enabled the assay officers of the Indian Mints to deal with confidently and accurately, during the past 15 years. In one year alone, that of 1865-66, the importation of silver bullion reached to the immense amount of over 14 millions sterling,—so putting to a crucial test the system of assay used for its valuation.

III.—*The Vástu Yága and its bearings upon Tree and Serpent-worship in India.—By* BABU PRATÁPACHANDRA GHOSHA, B. A.

(Abstract.)

The Vástu Yága and various other forms of Serpent and Tree-worship are traceable as much to a feeling of fear as to other causes. It is evidently a sacrifice, invented by the ancient Aryan conquerors with a view to propitiate the aborigines or primeval owners of the land. Vástu is the principal god, and though the aborigines themselves are not worshipped by name, the Nága is no doubt the ostensible object of worship. The several gods, properly *pitris* (ancestors, predecessors, former owners) that occupy the several *maṇḍalas*, are also the names of Nagas. The Vástu is the God Earth, quite distinct from Dhará (Terra) and in the prayer he is represented as the supporter of the world.

The Vástu Yága, therefore, appears to be a memorial of the foundation of the new Aryan home and of the Nágas, a powerful race of aborigines. In the ceremony for dedicating a tank, a stick is planted on its banks. This stick is the *Nága-yashti*, or the Nága-pole. The application of the term Nága to the reptile class is without doubt of comparatively recent date, and since that time may be noted the double meaning of the word applied to the Nága aborigines as well as to the Nága serpents. Ananta is worshipped not as a snake, but as a form of Vishṇu. It literally means eternity. The *Anantachaturdas'i*, *Nágapanchami*, and such other minor vratas, though connected with the Nágas, have nothing to do with the actual reptile.

The aborigines of India bore a peculiar relationship to the first Aryan settlers. Many of the aborigines were held in high estimation, and in a legend the goddess Sarasvati is described as imparting the art of music to two of the Nágas (*Kamvala* and *As'vatara*,) and the name of Karkotaka, another Nága, is enjoined to be uttered every morning. There are again several fruits, trees, and things which are named after the Nágas, and these are all derived from the N. E. frontiers of India.

From the above, it would appear that the Nágas as a race of powerful aborigines were respected for their prowess and also hated for

their barbarous habits. The eminent among them were soon identified with some Hindu gods, and ultimately the Nágas, as a race, became a class of gods. Serpent-worship, in the true sense of a creature-worship, was never prevalent in India, and though, under peculiar circumstances, this worship may be seen at the present day among the several hill tribes, still such a practice does not obtain among the Aryans. The serpent, as an emblem of eternity, is respected, but it is the worship of Vishṇu and not of the reptile. Serpents have crept into our mythological legends, but in whatever form they appear, they are put down as enemies of Vishṇu. Ráhu is darkness, and its stellar form is a snake. Sun = Hari = Vishṇu, the destroyer of Ráhu, the first destroys as darkness, the second as snake, and the third as death.

Figures of Nágas occur in sculptured stones, but only for ornamentation.

Several trees are described in later Puránas as forms of Vishṇu and other gods, but they are cherished with a degree of care because of their extreme usefulness in the tropical country. For instance, *Tulsi* as an aromatic herb, the *Durvá* as a fodder on which the cattle live, the religious fig tree as offering cool shelter, the cocoanut as a refreshing fruit. Some trees again are noted as obnoxious when planted near dwelling houses, because in a Hindu hygienic point of view, they are considered injurious to health. The papaya plant is one of those that no Hindu would like to have near his house.

IV.—*Analysis of a new Mineral from Burmah.—By* D. Waldie, Esq.

During the period extending from November, 1863, to the end of 1864, I had various samples of metallic ores sent to me for analysis by Mr. O'Riley, the Deputy Commissioner of Martaban, Burmah. They were mostly samples of Galena, but one of a different kind particularly attracted my attention as of rather unusual composition, so that I suggested to him, that it might be desirable to publish it. To this proposal he assented, suggesting that it should be presented to the Journal of the Society. Circumstances at the time prevented me from carrying my proposal into effect, but recently I resumed the investigation which had been lying long incomplete.

The analysis of the sample first sent by him on 24th July having been unsatisfactory on one point, and the specimen having been exhausted, I wrote to Mr. O'Riley for another sample, in order to settle this point. In reply he said that he had only a small specimen left, but sent me another small piece from the same range of hills, bearing a strong resemblance to the first, which he thought might probably be the same. I have no information of the locality whence they were got: Mr. O'Riley's letters were all dated from Shoaygyeen, except one in February 1864, from the Karen country. In a subsequent letter, he mentioned that the samples referred to were from the same range of hills as a sample of ore he was then sending me, which turned out to be a double sulphide of copper and iron. This is all the information I can give of their source, as some time afterwards Mr. O'Riley died.

The following is the result of my analysis of the first sample sent on 24th July.

Copper,	17·000
Silver,	·096
Iron,	36·470
Antimony,	1·150
Arsenic,	32·700
Sulphur,	1·360
Deficiency and loss,	10·624
Earthy matter,	·560
Total,	100·000

The silver is equal to 31½ ounces, troy, per ton.

The unsatisfactory point which I wished to clear up was the deficiency of 10·624, which I supposed might be oxygen combined with the metals. But this did not appear a very probable solution of the difficulty, and it might rather be owing to errors in analysis. The determinations had all been carefully made according to the usual methods. The arsenic and antimony were separated from the other metals by Hydrosulphate of Soda, and the arsenic determined as Arsenate of Magnesia and Ammonia, and there was no reason to doubt the correctness of the process. But I had some fear that arsenic might have been lost during the operations preparatory to

its separation from the other metals, and an experiment made on the second sample by conducting the analysis in the same way gave support to this view, as by this plan only 31·5 per cent. of arsenic was obtained, instead of the 37 per cent. indicated below by another process. Probably arsenic had been volatilised as chloride.

The second sample sent by Mr. O'Riley, 11th October, was similar in appearance to the first, but differed somewhat in composition, as will be seen presently. No particular note had been taken of the physical properties of the first sample. The second one was in the form of a flattened piece about ⅝th of an inch (or 1·2 centimetres) thick, with a dull, blackish, earthy looking surface. When broken, it presented an uneven fracture of a laminated structure, somewhat cellular, of a steel grey colour with a purplish tint and metallic lustre. In general appearance it is like mispickel, but of a redder shade. Minute specks of brownish green matter could be seen here and there on the surface, particularly between the lamellæ, when these presented themselves to view edgeways. It gives no streak on paper but a dark grey one on unglazed porcelain. Hardness, 5·5.

Specific gravity at 81° F. (27° C.)

In small pieces, 7·343

In powder, 7·428

The pieces were boiled in the bottle, but no doubt still retained air in some interior cells.

It is easily soluble in Nitric and Nitro-Hydrochloric acids with evolution of Nitrous fumes. One portion was dissolved slowly by diluted Nitric acid containing 3 per cent. its volume of Nitric acid of 1400 and the solution completed somewhat more rapidly by a solution containing 5 per cent. its volume. Hydrochloric acid at atmospheric temperature dissolved it partially by standing some time (two or three days,) to the extent of about 10 or 11 per cent., and by repeated boiling about 13 per cent. more, but there appeared no definite limit to the action. Acetic acid dissolves a portion, evidently oxidised matter.

Ignited in a platinum crucible it caked together, lost its metallic lustre and became of a brownish colour, but whitish at the edges where it adhered to the crucible and was removed with some diffi-

culty, having slightly attacked the platinum. By this ignition, it increased nearly 2 per cent. in weight. Ignited in a small glass tube by the blow-pipe till the glass softened, it did not appear to yield any arsenic.

In the analysis of this sample, the arsenic (with a little antimony) was separated from the other metals by fusing with Nitrate of Potash, and Carbonate of Soda (Potassium Nitrate and Sodium Carbonate,) or by passing Chlorine into the mineral mixed with solution of Potash. As in this case, however, the action was very slow, the mineral was first oxidised by a little nitric acid, then mixed with solution of Potash in excess and Chlorine passed through it. This plan answered very well. The results of two analysis for the three principal constituents, agreeing very well, were as follows :—

Copper,	13·28
Iron,	43·88
Arsenic,	37·03

A complete analysis was made by digesting a portion for about twelve hours with diluted Hydrochloric acid and thus removing the oxidized matters. The results were as follows.

Soluble in Hydrochloric acid, dilute.		
Oxide of Copper,	1.21	
Protoxide of Iron,	1.97	
Oxide of Lead,	1.89	
Arsenious Acid	1.12	
		6.19
Insoluble.		
Copper,	12.13	
Iron,	42.12	
Arsenic,	38.45	
Antimony,	.54	
Earthy Matters,	.12	
		93.36
		99.55
Loss,		.45
		100.

In one small piece I found 2. 67 per cent. of matters insoluble in nitro-muriatic acid, but generally it was very small.

It will be observed that this sample differs from the first in the smaller proportion of what may be considered accidental constituents, and is a purer specimen of the essential constituents, arsenic, iron, and copper. The inside pieces contained no sulphur: the outside crust yielded a trace probably in the state of earthy sulphate. And while the first sample contained a notable quantity of silver, this did not appear to contain any, or at least so little that I could not detect it in the amount of material at my disposal. The quantity of antimony was also less than half that of the first sample.

I have not been able to find in any book on Mineralogy I have had access to a description of such a mineral. The nearest are Arsenical Iron Pyrites (Mispickel) and Axotomous Arsenical Iron. But it differs from the former in the total absence of Sulphur, and from both in the presence of a considerable quantity of Copper, as well as in the larger proportion of Iron; and it differs still more in the proportion of the two basic metals together to the Arsenic, the latter being small in proportion to the former.

The constituents approximate, though not very closely, to 2 equivalents of Arsenic, 6 of Iron and 1 of Copper; rather more than 6 of iron and less than 1 of copper. This can scarcely be reduced to any probable atomic formula; but if the proper metallic nature of Arsenic be admitted it may be considered as an alloy, and alloys are not limited in their composition to definite formulæ. The excess of basic metals in its composition gives it a fixity under the action of heat not very usual in arsenides or unoxidised arsenical compounds.

I would venture to propose for this mineral the name of O'Rileyite in honor of the gentleman who sent it to me, whose services have unfortunately been lost to the Indian Government by an untimely death. This notice may perhaps lead explorers of these districts to discover additional specimens of this or analogous minerals.

V.—*Notes on Charaka Sanhitá.*—*By* DR. MAHENDRA LAL SIRCAR.

(Abstract.)

Charaka Sanhitá has not yet been examined by scholars either of Europe or America. The account of Charaka in Bœhtlinck and Roth's Dictionary publishing at St. Petersberg is taken from the *Sabdakalpadruma*, in which we have a fabulous account of the author, taken from *Bhaba Prakasa*, a very modern work on Medicine.

It appears, there is a MS. in Wilson's Collection, about which Dr. Roth writes to Mr. Hœrnle, Professor, Jayanáráyan College, Benares, as I learn from a letter from the former to Bábu Rájendra Lála Mitra, who did me the honor of referring to me on the subject, and very kindly sent me Mr. H.'s letter to him.

According to Dr. Roth, there are 11 parts or sections in the Charaka of Wilson's Collection, which are called *Sthánas.*

Now in the MSS. in my possession, one of which is a careful transcript from a very old and reliable MS. in possession of one of the Kavirájas of Berhampore, made (purposely for myself) under the order of the late Rájá Prasanna Náráyana Deva Báhádur, as well as in other MSS. in possession of other Kavirájas, which I have seen, there are eight parts or sections or *Sthánas.* Dr. Wise, the only European writer who gives any correct account of Charaka, mentions only eight parts or *Sthánas*, the names of which exactly correspond with those in our MSS. Besides, the additional parts mentioned by Dr. Roth are but *adhyáyas* of one or other of the eight Sthánas.

All our MSS. thus agreeing, I conclude, the original Charaka Sanhitá consists of eight Sthánas or Sections. The following list shows the names of these sections, and the number of the chapters or adhyáyas they severally contain :—

१ सूत्रस्थानं	...	...	...	३०	अध्यायानि।
२ निदानस्थानं	...	...	...	८	,,
३ विमानस्थानं	...	...	...	८	,,
४ शारीरस्थानं	...	...	...	८	,,
५ इन्द्रियस्थानं	...	...	...	१२	,,
६ चिकित्सास्थानं	...	...	...	३०	,,
७ कल्पस्थानं	...	...	...	१२	,,
८ सिद्धिस्थानं	...	...	...	१२	,,

Charaka is not the original author of the work which goes by his name. That author was Agnivesha, who, along with five other rishis, Bhela, Jatukarna, Parásara, Hárita, and Ksháripáni, received instruction from Bharádvája, who himself was taught by Indra. Indra had received the science from the twins Ashvini Kumáras; Ashini Kumáras from Prajápati, to whom the science (Áyurveda) was revealed by Brahma, the supreme creator.

But Charaka does not pretend to the authorship of the work. At the end of every sthána, nay at the end of each Chapter or Adhyáya, we have the admission:

अग्निवेशकृते तन्त्रे चरकप्रतिसंस्कृते।

from which it appears that he gives the authorship to Agnivesha, and takes credit to himself only for revision and correction.

In the fabulous account of Charaka in Bhabaprakasha, quoted in Rájá Rádhá Kánta's *Sabdakalpadruma*, and alluded to above, he is said to have compiled from the works of the six disciples of Bharadvaju. This is very probable, but he does not say so himself.

As to the antiquity of the work, it is impossible to fix the date when it flowed from the lips of Átreya, or issued from the pen of Agnivesha, and when it was revised and edited by Charaka. All that we can say, at the present stage of our inquiry, is, that it seems to us to be anterior to Sushruta, the only other ancient Hindu work on medicine extant. Sushruta calls himself the son of Vishvá Mitra, who was the contemporary of Ráma, and claims to have derived his knowledge of medicine from Dhanwantari. Now, Dhanwantari is a mythological personage, but the Dhanwantari from whom Sushruta received instruction in Áyurveda was he who was called Dibodása and was king of Kási, which is now our modern Benares. It is singular that neither of these works makes any allusion to the other. Both make Áyurveda of divine origin, and they agree in tracing this origin from above downwards as far as Indra. But after that they diverge. Charaka, as we have seen, makes Bharadvája derive his knowledge from Indra, whereas Sushruta makes it Dhanwantari. We are inclined to think Sushruta to be a later work, inasmuch as his preceptor is a later personage than Bharadvája.

Besides the above, we have other grounds for believing Sushruta to be a later work. Though not so full and copious, it is more

systematic and more logical in its classifications than Charaka. It is more precise and accurate in its anatomy. Sushruta does not make any mention of beef as an article of diet, which Charaka does. Hence, Sushruta could not have flourished at an age when beef was still an article of food. Again, both Bagbhatta, and Misrabhava, the author of Bhabaprakasha, by far the most ancient of the modern class of medical writers, both these authors, we say, agree in giving priority and superiority to Átreya (or Bharadvája), the preceptor of Agnivesha, the author of the work which now goes by the name of Charaka.

Hence, if we take Sushruta to have flourished about the time of Ráma, the illustrious contemporary of his father Vishvá Mitra, we must claim for Charaka a date anterior to that of Sushruta.

But Charaka could not have flourished in the pre-Pauránic age, inasmuch as Indra is called in the work, बलहंतारं (the slayer of a demon called Bala, mentioned only in some of the Purânas).

Such being the antiquity of Charaka Sanhitá, it must possess very unusual interest, not only for the historian of medicine, but no less for the philologist and the historian in general, and the philosopher. As for its value in a medical point of view, this is not the place to dilate upon it. This much, however, I must say, that its pathology apart, I have found it to contain excellent and sound remarks on therapeutics, dietetics, and hygiene.

The history of any period should now be deemed incomplete, unless we had an insight into the nature of the diseases which prevailed in that period. In this point of view, we have no doubt, the study of Charaka would throw much light on the history of the time in which it was written. From it, we shall be able, in a great measure, to decypher the mental characteristics, the various occupations, the mode of living, and various other circumstances, connected with life and its preservation which prevailed in that age.

The receipt of the following communications was announced—

1. *Descriptions of New Land Shells from the Shan States and Pegu.—By* W. THEOBALD, ESQ.

2. *On the Land Shells of Bourbon with descriptions of new species.—By* G. NEVILL, ESQ., C. M. R. S.

3. *Descriptions of new species of Mollusca from Ceylon.—By* MESSRS. G. and H. NEVILL.

LIBRARY.

The following additions have been made to the Library since the last meeting :—

Presentations.

*** Names of Donors in Capitals.

Tillæg til Aarboger for Nordisk Oldkyndighed og Historie. Aargang, 1866, 1867.—THE ROYAL SOCIETY OF NORTHERN ANTIQUITIES, COPENHAGEN.

Aarboger for Nordisk Oldkydighed og Historie, udgivne af det Kongelige Nordiske Oldskrift-Solskab, 1866, 1867, 1868.—THE SAME.

Mémoires de la Société Royale des Antiquaries du Nord, 1866, 1867.—THE SAME.

Bijdragen tot de Taal-land-en Volkenkunde van Nederlandsch Indie, 4th vol., 3rd part.—THE ROYAL INSTIT. OF NETHERLAND INDIA.

Journal Asiatique, Nos. 55, 56.—THE ASIATIC SOCIETY OF PARIS.

Bulletin de la Société de Geographie. April and May, 1870.—THE GEOGRAPHICAL SOCIETY OF PARIS.

Proceedings of the Royal Society, Vol. XVIII, No. 120.—THE ROYAL SOCIETY OF LONDON.

Proceedings of the Royal Geographical Society, Vol. XIV, No. 2.—THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

The Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. IV, part 2.—THE ROYAL ASIATIC SOCIETY OF GREAT BRITAIN AND IRELAND.

Bollettino della Societá Geographica Italiana, fas. 5.—THE ITALIAN SOCIETY OF GEOGRAPHY.

Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin, Mai 1870.—THE ROYAL GERMAN ACADEMY OF SCIENCES.

Verhandlungen der K. K. Geologischen Reichsanstalt, Nos. 10—17.—THE GEOLOGICAL INSTITUTE OF VIENNA.

Jahrbuch der Kaiserlich-Königlichen Geologischen Reichsanstalt, Nos. 34,—THE SAME.

The first Annual Report of the American Museum of Natural History, January 1870.—THE AMERICAN MUSEUM OF NEW YORK.

Original Sanscrit Texts, Vol. V, by Dr. J. Muir.—THE AUTHOR.

Main Results of the modern Vaidik Researches, by R. Ghosha. —THE AUTHOR.

Professional Papers of Indian Engineering. No. 28.—THE EDITOR.

Rámáyaṇa, Vol. II, No. 3, edited by Hemachandra Bhattáchárya.—THE EDITOR.

Memoirs on the History, Folk-lore, and Distribution of the races of the North-Western Provinces of India, by the late Sir H. Elliot. Edited by J. Beames Esq., C. S., 2 Vols.—LADY ELLIOT.

Sástra Prakásá, Kalki Purána, No. I.—KEDARANATHA BANERJI, PUBLISHER.

Archives Paléographiques de l'Orient et de l'Amérique par Léon de Rosny, parts 12.—MAISONNEUVE AND CO., PUBLISHERS.

Records of the Geological Survey of India, Vol. III. part 3.—THE SUPERINTENDENT, GEOLOGICAL SURVEY OF INDIA.

A classified Catalogue of Sanscrit works in the Sarasvati Bhándáram Mysore.—THE COMMISSIONER OF MYSORE.

Hunter's Comparative Dictionary, Part I.—THE GOV. OF INDIA.

Drury's Hand-book of the Indian Flora, 3. Vols.—THE SAME.

Selections from the Records of the Madras Government, No. 14; Survey and Settlement of the Chellumbrum and Manergoody Talooks, No. 15, Report on Public Instruction in the Madras Presidency for 1868-69.—THE SAME.

Report on Meteorology, Museum and Horticultural Gardens in the Province of Oudh, 1869-70.—THE SAME.

Report on the Administration of Civil and Criminal Justice, Oudh, 1869.—THE SAME.

Census of Oudh, 2 Vols.—THE SAME.

Sanitary and Vaccine Reports, Oudh, 1869.—THE SAME.

Dispensaries and Lunatic Asylum, Oudh, 1869.—THE SAME.

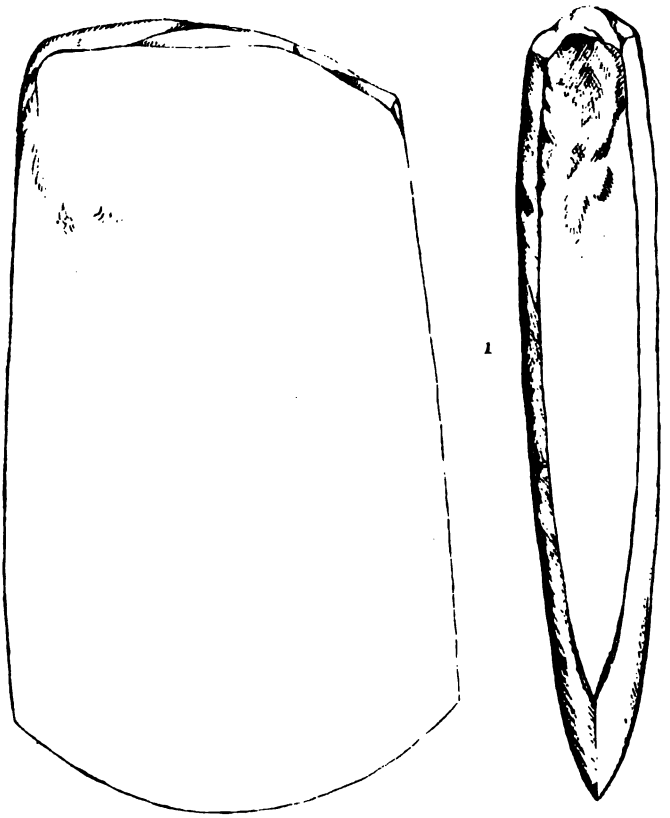
Progress of Education, Oudh, 1869.—THE SAME.

Purchase.

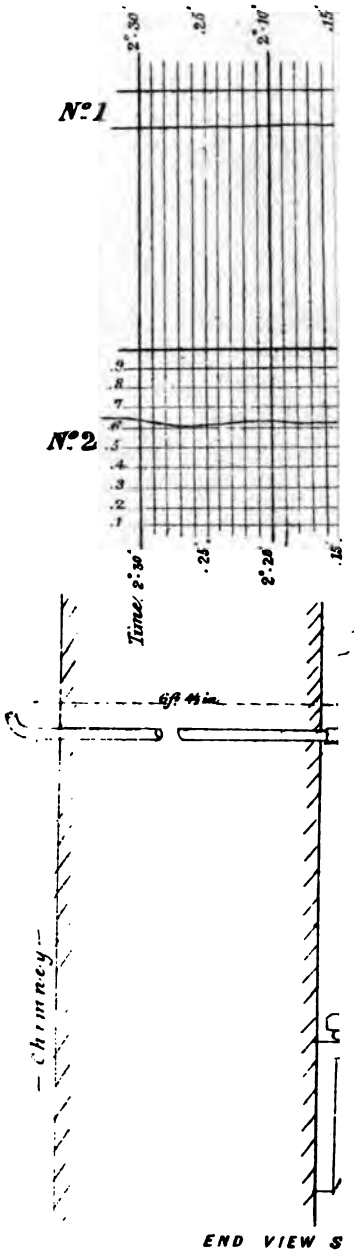
Conchologia Indica, by Hanley and Theobald Part 1:—Westminster Review, July:—Quarterly Review, July:—Revue des Deux Mondes, July:—Revue Archéologique, Juin:—Revue de Zoologie, Nos. 5 and 6:—The Annals and Magazine of Natural History, July:—The Philosophical Magazine, July:—Journal of the Statistical Society, June:—Comptes Rendus, Nos. 23—26:—Journal des Savants, May and June:—Zenker's Dictionary, part XV:—Böhtlingk's Dictionary, part 43:—Chronique de Tabari, 2nd Vol.—The Indian Medical Gazette, September:—Paspati's E'tudes sur les Tchinghianés ou Bohémiens de l'Empire Ottoman.

Exchange.

The Nature, Nos. 36—40:—The Athenæum, June.



Celt found among the Namsang Nagas



Pipe: 6ft 4½in long;

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR NOVEMBER, 1870.

A meeting* of the Society was held on Wednesday the 2nd instant, at 9 P. M.

T. Oldham, Esq., LL. D., Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

The following presentations were announced :—

1. From R. F. St. John, Esq., A note on the antiquities of Thatone.

2. From Capt. A. Bloomfield, Bálághát, six ancient copper coins. They are old Hindu copper coins. On some of them the figure of an elephant may be seen. They are all square.

3. From Lieut. J. Butler, Commissioner, Naga Hills, A spear of an Angami Naga, a coat of the same, and a pair of ear ornaments.

The following gentleman is a candidate for ballot at the next meeting :—

A. Rogers, Esq., Solicitor, Calcutta, proposed by L. Schwendler, Esq., seconded by Col. H. Hyde.

The following gentlemen have intimated their desire to withdraw from the Society :—

Captain H. R. Thuillier, J. M. Ross, Esq., and C. Lazarus, Esq.

The following letters were read :—

1. From Fleetwood H. Pellew, Esq., on the 'Barisal Guns.'

'In regard to the "Barisal Guns," my notion was that waves of a

* There was no meeting on the first Wednesday in October, as the members present did not form a quorum.

length of a mile or two each, advancing obliquely from the S. S. W. would break successively on the coast from W. to E. To a person close by, the sound of each wave would be somewhat continuous; but to a person 40 or 50 miles off, if the wave broke simultaneously, the sound would be a boom like that of a gun, because both extremities of the wave would be nearly at the same distance from the hearer as the centre.

'I have at Pooree, when the S. W. Monsoon has lulled, seen far to the south a very lofty wave break with a distinct booming noise, a second or two after another nearer, then one opposite to me, and then others towards the north as far as one could see. Even to one standing on the beach, the noise of these waves (except the nearest) was so like that of guns that we used to remark on the resemblance. When the wind was blowing strongly, the wave was turned over by the force of it, before it attained its full height; but when there was no wind, or a slight breeze from the shore, whilst the swell was still high from the effect of the monsoon, this phenomenon often occurred, the wave rising to an immense height and breaking over a mile or two of beach at one moment.

'I may remark that the wind blows very obliquely on to the Pooree coast and would not take the sound so far inland as at Backergunge.

'The great difficulty about the Barisal guns arose from the fact that the Musalmans at Perijpore and round the Kocha River celebrate their marriages chiefly in September and always fire off earthen bomb shells, and it is almost impossible to tell the sound of these from the Barisal guns. I should never have believed in them at all, if I had not once, when in the Saplenja river in the Sundarban, with nothing but forest to my south, heard them distinctly on four or five different occasions in one night. Of course, we may have been mistaken, but the sound to our senses was undoubtedly from the south, and much louder than I ever heard it before. It woke me up from sleep, we were then about 30 miles from the coast.'

2. From H. J. Rainey, Esq., Zamindar Khulná, Jessore, on the same subject.

'One incident, and a prominent one too, I have, I find, inadvertently omitted to mention in my last letter, which is, that the direction of the sounds appears to travel invariably along the course of the streams that discharge themselves into the Bay. This circumstance I have carefully observed for a series of years, and hence I indicated the noises as coming from the sea-board; *e. g.* the sub-division of Khulná is situate on the confluence of the rivers Bhoirab and Rupsá (the latter a local name for the continuation of the Pasar), which run respectively N. and E. of it, and when I was residing there, I noticed that the sounds appeared to come from the S. E., while now that I am living across the Rupsá, on the west side of it, the noises are heard from the S. W. Again, I lived about a year at a place called Nali, *alias* Schillerganj, on the Baleswar River, and to the east of it, when the detonations, for such I may call them, were distinctly heard from the S. W. No European has, I believe, resided lower down the Baleswar River in the Sundarban than Schillerganj, which is distant about a tide only from the open sea, and the sounds heard by me there were decidedly louder than those I hear here, while below that place, and I have heard them very close to the sea, as far down the Huranghátá river as a boat could well venture out during the S. W. monsoon. They were audible with even still greater precision; but the reports were quite as distinct there from one another as they were elsewhere, which would not appear to bear out the surf theory or hypothesis originally propounded by Mr. Pellew, and which appears to have found much favour.'

3. From C. A. Elliott, Esq., *Offg. Secy. to the Govt. of the N. W. P.*

'I am directed to forward for the information of the Asiatic Society, copy of a Report dated 7th July, by the Civil Engineer of the Allahabad Circle, relative to the Monolith at Kosumbha in the Allahabad District.'

Report.

"I have the honor to report that in conformity with the orders of Government, dated 22nd April, 1870, I proceeded to "Kosim" on the 19th May, and under my personal supervision commenced the work of excavating the Monolith alluded to in

the above orders. The position and dimensions of the exposed portion of the shaft as I found it, has been so minutely and accurately described by Col. Cunningham in his report (*vide* Journal of the Asiatic Society, for 1865, Vol. 34, Part I.), that it needs no repetition at my hands.

"The small excavation made by Col. Cunningham and partially refilled by him was in the first instance cleared out and a more extended area subsequently embraced, so as to enable me to reach the bottom of the Monolith with the least possible amount of labour.

"The excavation was uninterruptedly carried down to the depth of 16 feet, exposing the shaft for a length of 26 feet from the top, but without exhibiting any appearance of approaching the base; at this depth, however, it became necessary to cut away a portion of the underlying bank against which the column rested, to admit of its circumference being accurately measured, and during this operation a joint running parallel with the axis of the shaft in the direction of its base was discovered on the underlying side; and as it was popularly believed and strongly asserted by a respectable body of natives collected on the spot that it was a secret recess concealing treasure, operations were suspended and circumstances verbally reported to you on the 25th May, together with my view of the matter, that it would most probably be found to be a piece let into the base of the Monolith, to replace a flaw in the original stone of which it was formed. But there being a possibility of doubt on the subject, Mr. Chalmers, Assistant Magistrate, was deputed to accompany me and witness the opening of the recess. However, owing to an unfortunate accident (my horse falling and rolling over me) I was unable to witness the further development of the Monolith, although I was in camp in the vicinity. The remainder of the operations was carried out under Mr. Chalmers' superintendence and the recess opened in his presence, and the supposed repository of treasure resulted, as I had anticipated, in being nothing more than a piece carefully let in to replace a flaw in the original stone. The piece measures 8 feet long, and is about $\frac{1}{3}$ the area of the column at its base.

"Owing to the accident above mentioned and the intense heat of the weather, I was at this stage of the proceedings reluctantly

compelled to suspend work till the ensuing cold weather or until the receipt of further orders.

"The Monolith, as now exposed, measures from top to base 34 feet having a circumference of 7′ 10″ feet at top, and ten feet at bottom, which taken together with the two pieces lying in its vicinity gives a total length of 40′ 9″, and this in my opinion does not fully represent the full height of the original column, as the top portion exhibits a broken suface without a trace of the capital or any means of connecting it with the Monolith, had it ever existed even in a separate piece.

"Colonel Cunningham in his report is of opinion that the column retains its original position although overturned; the result of the excavations prove the contrary, as the lower portion of it was found imbedded in pure clay without a particle of brick or stone intermixed. I naturally expected to find some traces of a basement of some description, but all vestiges of brick and stone disappeared at the depth of 16 feet from the surface, the base of the Monolith resting in dark stiff clay; it is therefore my opinion that it has never been erected on the site it now occupies, and its original position will more likely be found amongst some one of the many very remarkable mounds surrounding it. On some of these the foundations of immense palatial buildings can be distinctly traced, and I would beg to suggest for the consideration of Government whether it might not be in the interest of Archeological science to have the more remarkable of them thoroughly examined during the next cold season.

"During the excavations no object of interest beyond the remarkably large bricks described by Col. Cunningham was discovered.

"In conclusion I may add that the cost of removing the Monolith into Allahabad will most probably fall very little short of Rs. 10,000. There being no road of any description between "Kosim" and "Serai Akil" (9 miles), a smooth track will have to be made over this portion, and from the latter place to Allahabad, several nullahs will have to be temporarily filled in, and the immense size of the column will require special contrivances for moving a weight of 15 tons (about) across country."

(Signed) H. K. Nesbitt, *Civil Engineer.*

In reply to a letter from the Secretary of the Society, regarding inscriptions on the Monolith, Mr. Nesbitt writes as follows :—

"In reply to your letter No. 533 of the 12th instant, I have much pleasure in informing you that there are many inscriptions on the "Kosim Monolith," and they are almost in as many various characters as there are inscriptions, the most remarkable and apparently the most ancient of them being of a peculiar shell-shaped pattern.

"I shall endeavour to procure the "rubbings" you require as soon as possible, but at present I am myself unable to get out to Kosim (30 miles), owing to press of work in the station.

"The Government having taken a favourable view of my suggestion to explore some of the most remarkable mounds alluded to in my report, I entertain hopes of making some interesting discoveries during the ensuing cold season. I may add that whilst excavating a tank a few miles from Kosim, two white marble figures in good preservation were discovered. One is called by the natives whom I consulted "Mahabeer," and the other "Nundhea." They are now both deposited in the Allahabad Museum."

The President then exhibited two inscriptions received from Babu Rashbihari Bose, Banka.

The first inscription is taken from Col. Franklin's 'Inquiry concerning the site of Ancient Palibothra, Part II.' The second is a Bengali Inscription taken from a Hindu Temple on the Mondar Hill.

Bábu Rájendralála Mitra said, that not having Franklin's work at hand, he could not say whence the first inscription had been taken; but judging from its character and subject, he was satisfied that it was a Buddhist record, and commemorated the dedication of a statue or a chatya. The character was intermediate between the Gupta and the Kutila, and had been inscribed probably in the sixth century of the Christian era. The fifth letter of the third line was doubtful, so were the last two letters of the last line. He read the record as follows :—

परमभट्टार-
क महाराजाधिरा

ज श्रीउग्रभैर-
वस्य देयिचय—or देयधर्म्म

"The highly venerated, the great king, the king of kings Sri Ugrabhoirava + dedicated this."

The second inscription was from a modern temple on the Mondar Hill, built about 270 years ago, by a zemindar of Subbalpur. It was written in the old Bengali character of the Tirhut type and in the Sanskrit language. The temple was intended to supply the place of an older one, dedicated by a Chola Rájá, which, according to the local legend, had been demolished by Kálápahár, and the remains of which are still visible. The following are its transcript and translation :—

चन्द्रः पञ्च मनोजवाणधरणीत्यङ्काङ्किते वत्सरे
शाके पुण्यमहीतले द्विजवरे दुःशासने पूजके ।
चक्रे श्रीमधुसूदनस्य विजयागारं वरं निर्म्मलं
श्रीमच्छत्रपतिः सदाशुभमतिः श्रीवासुदेवात्मजः ॥
शाके १५२१.

"The well-disposed, and auspicious Chhatrapati, son of the auspicious Váísudeva, dedicated this pure and noble place of victory on earth for S'rí Madhusúdana, in the S'aka year 1521, when the noble Bráhmáṇa Duhs'ásana was the officiating priest. S'aka 1521.—[A. D., 1597.]

The following papers were read—

I.—*On the Funeral Ceremonies of the Ancient Hindus.—By* Babu Ra'jendrala'la Mitra. (Abstract.)

The paper opens by adverting to two articles which have already been published on the subject, one by H. T. Colebrooke on the modern ritual, and the other by Max Müller on the ancient ritual; and then notices in detail the cremationary and sepulchral ceremonies described in the Áraṇyaka of the Black Yajur Veda. Some of the rites noticed are remarkable. The first ceremony was the removal of the dead from the house to the burning ground, and this was done on a cart drawn by two bullocks, or by aged slaves. The procession was headed by the eldest of the party, and included an old black cow. This

animal was carried to the burning ground, and its fat, flesh, and organs were placed on the corpse, which was subsequently enveloped in the raw hide of the animal. The wife of the dead was made to lie by the corpse, and was thence removed by a younger brother, a fellow disciple, or a servant of the dead, who offered to marry her. The ceremony of burying the bones was performed on the 3rd, 5th, or 7th day; and on the 10th day the mourners assembled together, and after certain oblations, offerings, and prayers, raised a circle of stones, and then retired to the house of the chief mourner to feast on kid's flesh and barley.

The concluding portion of the paper is devoted to a consideration of the object and meaning of the mantra which was first quoted by Colebrooke as the Vedic authority for the performance of Suttee, and has since been frequently noticed. According to the *Aranyaka*, it should be recited when the women put on collyrium on the tenth day of the mourning, immediately before putting up the stone circle.

A conversation ensued in which most members took a part.

II.—*Coins of the Sharqí Kings of Jaunpúr.*—*By* Rev. M. A. Sherring, *Benares.*

Mr. Blochmann said—

The paper will shortly appear in the Journal. Mr. Sherring has not met with any silver or gold coins of the Sharqís, nor with copper coins prior to the reign of Ibráhím Sháh. The first Jaunpúr king, Malik Sarwar, Sultán ushsharq, does not appear to have struck coins; nor does he seem to have assumed the title of *Sháh.* The beginning of his reign is variously given in the Histories. Firishtah, who copied his extracts from the *Táríkh i Mubárak Sháhí*, gives 796 A. H., and makes him reign six years. The *Aín* has 16 years, which would remove his *julús* ten years earlier. The Lucknow Edition of Firishtah has 776, A. H. There are also slight discrepancies between Firishtah and the *Aín* in the length of the reigns of the other kings.

Mr. Sherring confirms Marsden's remark that the Jaunpúr coins exhibit the name of the Egyptian Khalífah Abulfath, who appears to have conferred the *taqlíd*, or right of sovereignty, on the Sharqís, long after the Khalífah's demise.

The most important point revealed by Mr. Sherring's paper is, that coins were struck in the name of Husain Sháh, the last Sharqí, long after 881, the year in which, according to the Muhammadan Historians, Jaunpúr lost its independence, and even after 905, the year in which Husain Sháh is said to have died.

Marsden also has a Husain Sháhí of 886, A. H.

III.—*Notes on the Bonhara Temple near Omarpore, Behar.—By* Babu Rashbihari Bose, Sub-Divisional Officer, Banka.

IV.—*An Account of Copilmoonee, Jessore, and its Antiquities, in connection with the Fair held there in March,* 1868.—*By* Babu Rashbihari Bose.

The Secretary read extracts from both papers, which will be published in the forthcoming number of the Journal. He said—

Babu Rashbihari Bose has since favoured the Society with an excellent facsimile of the inscription of the Bonhara Mosque. The inscription is in Arabic and runs as follows :—

قال النبي صلى الله عليه و سلم من بنى مسجدا لله بني الله له قصرا
مثله فى الجنة. هذا المسجد الجامع للسلطان علاؤ الدنيا و الدين ابو المظفر
حسين شاه سلطان خلد الله ملكه و سلطانه في ذى القعدة سنه (٩٠٨)
ثمان و تسعمائة .

'Thus says the Prophet (may God's blessing rest upon him !)—He who builds a mosque for God, shall have a castle like it built for him by God in Paradise. This is the Jámi' Masjid (erected) by Sulṭán 'Aláuddunyá wa-ldín Abul Muzaffar Husain Sháh, the King. May God perpetuate his reign! Zul Qa'dah 908, A. H.' [June, 1502, A. D.]

The inscription commences with a well-known passage from the Muhammadan Tradition, and is almost identical with the inscription on the Cheran Mosque published in our Proceedings for April, 1870 (p. 112). The characters being *Ṭughrá*, present considerable difficulties in deciphering. The Arabic inscriptions on the slabs which lie about in Tribení and Sátgánw are in the same character, and several of them belong to Husain Sháh.

'Aláuddín Husain Sháh reigned over Bengal from 1498 to 1521.

His numerous mosques, and the part which he plays in Bengal legends, have been referred to in the Proceedings for April.

The Cheran inscription and the inscription before the meeting are of historical interest. Bihár during the greater part of the 15th century formed part of the Sharqí kingdom of Jaunpúr. Husain Sháh, the last king of Jaunpúr, was deprived of his kingdom by Buhlúl and Sikandar Lodí, and Jaunpúr was reannexed to Dihlí, Husain Sháh taking refuge in Bihár, and ultimately in Bengal. He is said to have died in 905 A. H. (1499-1500, A. D.). The two inscriptions go to shew that Bihár was not annexed to Dihlí, but to Bengal, and thus confirm the histories.

The following communication was announced—

List of Reptilian Accessions to the Indian Museum, Calcutta, from 1865 *to* 1870, *with a description of some new species.—By* J. ANDERSON, ESQ., M. D., F. S., F. Z. S., *Curator, Indian Museum.*

LIBRARY.

The following additions have been made to the Library since the Meeting held in September last:—

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society, Vol. XVIII, No. 120.—THE ROYAL SOCIETY OF LONDON.

Proceedings of the Royal Geographical Society, Vol. XIV, No. 2.—THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

The Journal of the Chemical Society, Vol. VIII, May, June, and July.—THE CHEMICAL SOCIETY OF LONDON.

Bulletin de la Société de Géographie, June, 1870.—THE GEOGRAPHICAL SOCIETY OF PARIS.

Journal Asiatique, No. 57.—THE ASIATIC SOCIETY OF PARIS.

The Journal of the Royal Asiatic Society, Vol. IV, Part 2.—THE ROYAL ASIATIC SOCIETY OF GREAT BRITAIN AND IRELAND.

Report by Baron von Richthofen on the Provinces of Hunan, Hupeh, Honan., and Shansi.—F. VON RICHTHOFEN.

Rámáyana, Vol. 2nd, No. 4, edited by Hemachandra Bhattáchárya.—THE EDITOR.

Jahresbericht des Physikalischen Central Observatoriums der Akademie für 1869, abgestattet von H. Wild, Director.—THE IMPERIAL ACADEMY OF SCIENCES, ST. PETERSBURG.

Anecdota Syriaca, collegit, edidit, explicuitque J. P. N. Land, Tom. III.—THE EDITOR.

The Central Provinces Gazetteer, ed. C. Grant, 2nd edition.—THE CHIEF COMMISSIONER, CENTRAL PROVINCES.

Selections from the Records of the Government of the N. W. Provinces, Vol. III, No. 4.—THE GOVERNMENT OF BENGAL.

The Annals of Indian Administration in 1868-69.—THE SAME.

Selections from the Records of the Bombay Government, No. CXVII.—THE SAME.

Report on the Charitable Dispensaries under the Government of Bengal for the year 1869.—THE SAME.

Exchange.

The Nature Nos. 41—48.

Purchase.

Journal des Savants, July 1870 :—Comptes Rendus, Tom. LXXI. Nos. 1-6 :—Revue Archéologique, No. VII :—Revue de Linguistique, Tom 4, fasc. I :—The Numismatic Chronicle, 1870, part II :—Otto Kistner's Buddha and his doctrines :—Max Müller's Outline Dictionary :—Asher's Study of Modern Languages :—Moffat's Standard Alphabet Problem :—Gray's Hand-List of Birds, part I :—Fergusson's History of Modern Architecture, Vol. III :—Wallace's Theory of Natural Selection.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR DECEMBER, 1870.

A meeting of the Society was held on Wednesday the 7th inst., at 9 o'clock P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced:

1. From Bábu Rádhicáprasáda Mukerjí—five copies of a plan of the Temple of Jagannath at Purí.

2. From W. Talbort, Esq.—a crystal head, a ring and a charm, and three earthen figures dug up at Dera Ismail Khan.

3. From Rev. J. Long—six Gujrati books.

4. From the author—a copy of Revision of the Mollusca of Massachusetts by W. H. Dall, Esq., and on the genus *Pompholyx* and its allies, with a revision of the *Limnæidæ* of authors, by W. H. Dall, Esq.

Mr. J. Wood Mason exhibited some cocoons of Hymenopterous insects *(Ichneumonidæ)*, found in a garden in the neighbourhood of Calcutta, and made some remarks on the habits of these insects.

Mr. Blochmann exhibited a silver coin, belonging to Mr. G. Nevill. He said, the coin was struck by an old king of Bengal, called Ghiásuddín Bahádur Sháh. It was described and figured in Mr. Thomas' Initial Coinage of Bengal (Journal, Asiatic Society, Bengal, 1867, p. 50, and Pl. I., No. 5); but specimens are rare.

Unfortunately the margin was cut away, and no trace was left of the date and the name of the mint.

A. Rogers, Esq., duly proposed and seconded at the last meeting were balloted for and elected an ordinary member.

The following gentlemen are candidates for ballot at the next meeting :—

F. C. Daukes, Esq., C. S., Mirzapúr, proposed by W. Oldham, LL. D., C. S., seconded by Mr. H. Blochmann.

R. S. Brough, Esq., Assistant Superintendent, Government Telegraph, Alipore, proposed by L. Schwendler, Esq., seconded by Mr. H. Blochmann.

Isaac Newton, Esq., Officiating Superintendent General of Vaccination, Panjáb, proposed by B. Smith Lyman, Esq., seconded by Dr. F. Stoliczka.

Bábu Ganendranátha Thákara, proposed by H. Blochmann, Esq., seconded by Dr. F. Stoliczka.

The following gentlemen have intimated their desire to withdraw from the Society :—

Capt. E. W. Trevor, C. Campbell, Esq., Lieut.-Col. Briggs, Lieut. J. Butler, Col. F. P. Layard, H. Reinhold, Esq.

The Council reported that on a recommendation of the Philological Committee they have sanctioned the publication of the following Sanscrit works in the Bib. Indica :—

1. Tatvachintámáni.
2. Aphorisms of Pingala.
3. Sulapáni.
4. Hemádri.
5. Tribháshyaratna.
6. Baudháyana Sútra.

The following letter regarding counterfeit coins has been received from Major F. W. Stubbs.

Attock, 19*th November*, 1870.

"It is not often probably that one meets with a counterfeit gold mohur of obsolete Muhammadan mintages, and therefore it is as well to be on one's guard against such forgeries. Accordingly I send you the following description of one brought me a day or two

ago, clearly a *die-struck* imitation of the rupee of Ghiásuddín Tughluq Sháh, described as No. 78, page 47, Thomas's Coins of the Patan Sulṭáns of Hindústán. Were it not for the mistakes made by the engraver of the die, I do not think it would have been possible to have detected the forgery.

The legends were as follows :—

Obv. Al-Sulṭán al Ghází Ghiás ud dunyá wa-l dín Abul-Muzaffar.

Rev. Tughluq Sháh al-Sulṭán *námín* (السلطان نامين) amír ul múminín ۴۲۱

Margin. hazihi-l-sikkah ba Hazrat Dihlí fi sanat tis'a wa 'ishrín wa sab'a iat—

in which the six mistakes are evident :—

1. *Námín* instead of *náçir*.
2. Date in figures impossible.
3. Difference of dates in words and figures.
4. The word *zuriba* omitted.
5. *M* of *miat* omitted.
6. The usual forms of the letters *alif*, *lám*, *ṭoe*, had thick clavate shapes: in this coin they have the more elegant form, first introduced on his coins by Sher Shah.

I had a gold mohur of this king of the type described at page 7 of the Supplement to Thomas' Patan Coins with a legend similar to No. 76 of his series, (but perhaps not the same mint), which I consider to be a cast; but Colonel Guthrie, in whose possession it now is, thinks it genuine. Both came from the same place, Rawal Pindee, a nest of coiners. This notice may be of use to collectors."

The following papers were laid before the meeting :—

I. *Descriptions of the species of Alycæinæ, known to inhabit the Khasi Hill ranges*, by Major H. H. Godwin-Austen, F. R. G. S.,

Major Godwin-Austen's recent researches in the Khasi hills have increased the number of species of *Alycæi* from those hills to 16, of which 7 are new, and of several species, previously described, interesting varieties have been noticed. The present list does not include all the species from the Assam valley. Beautifully executed figures accompany the descriptions.

II. *On some undescribed species of Camptoceras, and other land-shells*, by H. F. Blanford, Esq.

In addition to the only known species of the interesting genus *Camptoceras* (*C. terebra*, Bens.), Mr. Blanford describes two others, lately discovered by Major Godwin-Austen in the Mymensingh jheels. Besides these the author describes one *Alycæus*, one *Diplommatina*, two *Glessulæ* and two species of *Helicarion*, all from Darjeeling.

III. *On some new or imperfectly known Indian Plants*, by S. Kurz, Esq.

This is a continuation of Mr. Kurz's very valuable notes on various Indian plants (including those from Burma and the Malay Archipelago), published in our Journal for this year. The present paper contains a large number of new species described from Burma, chiefly from the collection of Dr. Brandis.

IV. *Note on Onchidium verruculatum*, Cuv., *from Ceylon*, by H. NEVILL, ESQ., C. S., Ceylon.

Animal ovoid, thick, solid, roughly tuberculated, especially down the centre of the back; tubercles irregular, very retractile; dotted at times with cells or points; sometimes elevated, containing a black matter, occasionally dendritically filamented on the posterior slope.

Mantle, above, dark olive, rough, thickened; beneath, yellowish at the outer edge, shading into dark olive grey at the junction with the foot. Foot pale greenish white, soft, semi-pellucid. Tentacles grey; head and its appendages very dark above.

Length 2 inches, breadth 1½ inches, height in centre 1 inch.

This species was originally described and figured in Napoleon's 'Expedition to Egypt' under the name of *Onchidium Peronii*, a Mauritian species. Cuvier subsequently called the Red sea form *O. verruculatum*, and it is interesting to find it in Ceylon.

It has been considered to represent one of the typical species of *Peronia*, but it has afforded a singular confirmation of the views expressed by Dr. Stoliczka in the Journ. As. Soc. Beng. Vol. XXXVIII, Part II, No. II, 1869, where, after an account of the anatomy of the genus, he proceeds, (page 99,) to show the probable identity of the so-called genera *Onchidium*, *Onchidiella*, and *Peronia*

It would appear from the evidence brought forward there, that the only true grounds for separation of *Onchidium* and *Peronia*

are the filamentous appendages to the mantle of the latter; intermediate forms appearing unknown.

Now the present species presents at certain times these filaments developed from its mantle; and also presents on those parts of its body where the tubercles want these filaments, the singular black "cells of pigment," noticed by Dr. Stoliczka.

A careful examination of several living specimens has afforded me the following additional data on the subject:

That in the present species, the tubercles, when plain, are studded with black points, in varying number.

That when the tubercles develop filaments, these occur similarly to the black points.

That the black points sometimes show a tendency to become raised on stalks.

That the filaments disappear in confinement, or in alcohol; and that they only occur partially, and in some specimens only, while others at the same locality and season want them.

Not being able to keep vivaria I have not ascertained whether the filaments disappear permanently or temporarily, how they so disappear and whether they are replaced by black points; but I think enough is noted to establish the fact that the black points or cells become developed at seasons, or in specimens, into filaments; and thence *Peronia* cannot be separated from *Onchidium*, unless on characters distinct from those already quoted.

V. *Extracts from a Diary written on the occasion of a visit to K'harakpúr and Munghír.* By Ba'bu Rashbeha'ry Bose.

Several extracts from the paper were read referring to the Mosque of Lak'hinpúr, the conversion to Islám of one of the Rájahs of Kharakpúr, and the legend of the Five Virgins who threw themselves from the hill, which in remembrance of them is called 'Pánch Kumárí.'

The paper will be published in the first number of the Journal for next year.

Mr. Blochmann said—I have collected from Mughul Historians a few notes on the History of the Rájahs of Kharakpúr. Kharakpúr is the name of an old town and Parganah, south of Mungér

(Monghyr). The river Mán traverses the district and flows east of Mungér into the Ganges.

At the time of the conquest of Bihár and Bengal by Akbar, (A. D. 1574-75), there were in Bihár three powerful Zamíndárs—Rájah Gajpatí of Hájípúr (Patna), Rájah Púran Mall of Gidhor (S. W. of Kharakpúr), and Rájah Singrám of Kharakpúr. Gajpatí was totally ruined by the Imperialists whom he opposed; but Púran Mall and Singrám wisely submitted and assisted Akbar's generals in the wars with the Afgháns. When the great Mutiny of Bihár and Bengal broke out, Singrám, though not perhaps very openly, joined the rebels, but submitted again to the Mughuls, when Akbar's general Shahbáz Khán marched against him. He was so anxious to avoid coming in open contact with Akbar, that he handed over to Shahbáz the strong fort of Mahdá.* But he never paid his respects personally at Court, where his son, apparently as hostage, was detained, and remained submissive till Akbar's death (1605). The accession of Jahángír and the rebellion of Prince Khusrau inclined him to make a final attempt to recover his independence and to collect his forces which, according to Jahángír's Memoirs, consisted of about 4000 horse, and a large army of foot-soldiers. Jahángír Quli Khán Lálah Beg, governor of Bihár, lost no time in opposing him, and Singrám whilst defending himself, was killed by a gunshot (1606).

Singrám's son, whom Jahángír calls a favourite of his, was not immediately installed on his father's death; but had to wait till 1615, when on his conversion to Islám he was allowed to return to Bihár. Like several Rájahs, he retained after his conversion the title of his ancestors, and is known in Muhammadan histories as *Rájah Rozafzún.*† He remained devoted to the service of the emperor, and was in 1628, when Jahángír died, a Commander of 1500 (brevet rank), and 700 horse.

On Sháhjahán's accession (1628), Rájah Rozafzún entered active service. He accompanied Mahábat Khán to Kábul in the war with Nazr Muhammad Khán, king of Balkh, and served later in the expedition against Jhujhár Singh Bundelah. In the 6th year of Sháh-

* *Mahdá*, مهدا. I cannot find the fort on the maps.

† *Roz-afzún*, daily increasing, growing in power.

jahán's reign he served under Prince Shujá' in the siege of Parendah, and was promoted in the beginning of the 8th year (1044 A. H., or A. D. 1634-35) to a Command of 2000 (brevet), 1000 horse. (*Pádisháhn.*, I., *b.*, 67). He died soon after in the same year.

His son was Rájah Bihrúz.* He served in the siege of Qandahár, and was in the 30th year of Sháhjahán's reign a Commander of 700, with 700 horse. In the beginning af Aurangzíb's reign, he assisted the emperor against Prince Shujá', and in the (second) conquest of Palámau in 1072, or A. D. 1661.

Rájah Bihrúz died four years later, in the 8th year of Aurangzíb's reign.

He is evidently the Rájah whom Bábu Rashbiháry Bose calls *Rajah Beroje.*

On referring to the Survey maps, I find in the Parganah Sikharábádí, which forms the Eastern boundary of Kharakpúr, two villages of the name of Bihrúzpúr, evidently so called in memory of Rájah Bihrúz.

The story of the Lak'hinpúr saint whose tooth-pick shot forth green branches, resembles that of Sayyid Sháh 'Abdullah Kirmání of Bírbhúm. Sháh 'Abdullah left, it is said, when young, Kirmán in Persia, his native country, and visited Sháh Arzání, at whose request he went to Bengal. On departure, Sháh Arzání, gave him a tooth-pick of chambelí wood, and told him to remain at that place where the tooth-pick would become fresh and green. Sháh 'Abdullah arrived in Bírbhúm, and stayed at Baṛgáon, near Bhadia, where he performed several miracles *(karámát)*. But as the tooth-pick remained dry, he went to Khushtigrí, another village in Bírbhúm. One night he put the tooth-pick into his pillow, and awaking he found it was fresh and green. He then planted it, and it soon became a large tree, which is still seen.

Sháh 'Abdullah is especially renowned for the power which he had over serpents, and now-a-days in Bírbhúm his name is repeated in formulas of enchantment. His *dargáh* is in the hands of his descendants, and is visited by numerous pilgrims.

Sháh 'Arzání, whom I mentioned, is a Muhammedan saint who died during the reign of Sháh Jahán at Patna, in A. H. 1040, or 1630.

* *Bihrúz*, literally a man whose day is good.

LIBRARY.

The following additions have been made to the Library since the meeting held in November last.

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society, November, 1870.—THE ROYAL SOCIETY OF LONDON.

Philosophical Transactions of the Royal Society of London for the year 1869. Vol. 159, part II.—THE ROYAL SOCIETY OF LONDON.

Proceedings of the Royal Irish Academy, Vol. X, parts 1-3.—THE ROYAL IRISH ACADEMY.

The Transactions of the Royal Irish Academy, Volume XXIV, Science, parts 9-15; Antiquities, part 8; Polite Literature, part 4. —THE ROYAL IRISH ACADEMY.

Proceedings of the Royal Society of Edinburgh, 1868-69.—THE ROYAL SOCIETY OF EDINBURGH.

Transactions of the Royal Society of Edinburgh, Volume XXV, part II.—THE ROYAL SOCIETY OF EDINBURGH.

Proceedings of the Royal Geographical Society, Volume XIV, Nos. 1-4.—THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

Journal of the Royal Geographical Society, Volume XXXIX.—THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

Proceedings of the Zoological Society for 1869, parts 1-3.—THE ZOOLOGICAL SOCIETY OF LONDON.

Transactions of the Zoological Society, Volume VII, parts 1-2—THE ZOOLOGICAL SOCIETY OF LONDON.

Journal of the Anthropological Society, October, 1870.—THE ANTHROPOLOGICAL SOCIETY OF LONDON.

Annuaire de L' Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique, 1870.—L' ACADE'MIE ROYALE DES SCIENCES, &c., DE BELGIQUE.

Bulletins de L'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique, Tom. XXVII, XXVIII.—L'ACADE'MIE ROYALE DES SCIENCES, &c. DE BELGIQUE.

Annales Météorologiques de L'Observatoire Royale de Bruxelles, 1869.—L'ACADE'MIE ROYALE DES SCIENCES, &c., DE BELGIQUE.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, Band XXIV, Hefte 1-II —THE GERMAN ORIENTAL SOCIETY.

Atti della Reale Accademia delle Scienze di Torino, Vol. IV, Disp. 1—7.—R. ACCADEMIA DELLE SCIENZE DI TORINO.

Bollettino Meteorologico ed Astronomico del Regio Osservatorio dell' Università di Torino.—R. ACCADEMIA DELLE SCIENZE DI TORINO.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Math-Naturwissenschaftliche Classe, 1866, Mærz—Juli; und der Philos-Historischen Classe, 1869, Februar—Juli.—K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Denkschriften der Kaiserlichen Akademie der Wissenschaften, Math-Naturwissenschaftliche Classe, Band XXIX, Philos-Historische Classe, Bænde XVI-XVIII.—K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Archiv für Osterreichische Geschichte, herausgegeben von der zur Pflege vaterländischer Geschichte aufgestellten Commission der Kaiserlichen Akademie der Wissenschaften, Band XLI, Hälfte 1-2.—K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Almanach der Kaiserlichen Akademie der Wissenschaften, 1869. —K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Die Temperatur-verhältnisse der Jahre 1848-1863 an den Stationen des Österreichischen Beobachtungsnetzes, von Dr. C. Jelinek. —K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Atlas der Hautkrankheiten, Text von Prof. Dr. F. Hebra, Lieferung VII.—K. AKADEMIE DER WISSENSCHAFTEN ZU WIEN.

Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien, Band XIX.—K. K. ZOOLOGISCH-BOTANISCHE GESELLSCHAFT.

Bulletin de l' Académie Impériale des Sciences de St. Pétersbourg, Tom XIV, No. 1-6.—L'ACADE'MIE IMPE'RIALE DES SCIENCES DE ST. PE'TERSBOURG

Mémoires de L'Académie Impériale des Sciences de St. Pétersbourg, Tom XIII, Nos. 8, Tom XIV No. 1-9, Tom XV, No. 1-3. —L'ACADE'MIE IMPE'RIALE DES SCIENCES DE ST. PE'TERSBOURG.

Proceedings of the Academy of Natural Sciences of Philadelphia, 1869, January,—December.—THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Journal of the Academy of Natural Sciences of Philadelphia, N. S., Vol. VI, part IV.—THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Extinct Mammalian Fauna of Dakota and Nebraska, by J. Leidy, M. D., LL.D.—THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Transactions of the Connecticut Academy of Arts and Sciences Vol. I, part I.—THE CONNECTICUT ACADEMY OF ARTS AND SCIENCES.

Journal of the Boston Natural History Society, Vol. II.—THE BOSTON NATURAL HISTORY SOCIETY.

Proceedings of the Boston Natural History Society, Vols. II-III. —THE BOSTON NATURAL HISTORY SOCIETY.

Abstract of English and Colonial patent specification relating to the preservation of Food &c.—THE REGISTRAR GENERAL, MELBOURNE.

Patents and Patentees for 1865 to 1866, Vols. 3.—THE REGISTRAR GENERAL, MELBOURNE.

Abhandlungen für die Kunde des Morgenlandes, Band V. Ueber das Saptaçatakam de Hala, ein Beitrag zur Kenntniss des Prákrit von A. Weber.—THE AUTHOR.

Il Brahui studio di Etnologia Linguistica di F. Finzi.—THE AUTHOR.

Description of new Land and Fresh-water Molluscan species collected by Dr. J. Anderson, in upper Burma and Yunan, by W. T. Blanford, F. G. S., C. M. Z. S.—THE AUTHOR.

On the species of Hyrax inhabiting Abyssinia and the neighbouring countries, by W. T. Blanford, C. M. Z. S.—THE AUTHOR.

On the Geology of a portion of Abyssinia, by W. T. Blanford Esq., F. G. S. &c.—THE AUTHOR.

Observations on the Geology and Zoology of Abyssinia, made during the progress of the British Expedition to that country in 1867-68, by W. T. Blanford.—THE AUTHOR.

Repertorium für Meteorologie, von Dr. H. Wild, Band I, Heft I—DIRECTOR OF THE METEOROLOGICAL OBSERVATORY AT ST. PETERSBURG.

Annales de L'Observatoire Physique Central de Russie, publiées

par H. Wild.—Le Directeur de l'observatoire Physique Central, St. Pe'tersbourg.

Commelinaceæ Indicæ, Imprimis Archipelagi Indici, C. Hasskarl.—The Author.

Sunti dei Lavori Scientifici letti e dicussi, nella classe di Scienze Morali, Storiche e Filolologiche della R. Accademia delle Scienze di Torino.—G. Gorresio.

The Calcutta Journal of Medicine Vol. III, Nos. 1-4 edited by Dr. M. Sircár.—The Editor.

Rashasya Sandarbha, Vol. VI, No. 61, edited by Babu R. Mitra.—The Editor.

Annual Report of the Secretary of War 1866. The Secretary of War of the U. S. America.

Memoirs of the Geological Survey of India, Palæontologia Indica, Vol. III, Nos. 1-4.—The Superintendent of the Geological Survey of India.

Memoirs of the Geological Survey of India, Vol. VII, part II.—The Superintendent of the Geological Survey of India.

Records of the Geological Survey of India, Vol. III, part 4.—The Superintendent of the Survey of India.

Selections from the Records of Government N. W. Provinces, Vol. IV, No. 1.—The Government of the N. W. Provinces.

Report of the Sanitary Administration of the Panjab, 1869.—The Government of Bengal.

Report of the Revenue Survey Operations of the Lower Provinces, 1868-69.—The Government of Bengal.

Annual Report of the Insane Asylums in Bengal 1869.—The Government of Bengal.

Exchange.

The Athenæum, September, 1870.

The Nature, Nos. 49—52.

Purchase.

Annals and Magazine of Natural History Nos. 33 and 34:—London, E. and D. Philosophical Magazine, Nos. 266 and 267:—The American Journal of Science, Nos. 147 and 148.—The Quarterly Journal of Science, No. 28:—Comptes Rendus, No. 10:—The

Westminster Review, October, 1870:—Revue Archeologique Aout 1870:—Revue des Deux Mondes, 1 and 15th September:—Hewitson's Exotic Butterflies, Nos. 75 and 76.

Nederlandsch Tijdschrift voor de Dierkunde, Jaargang II, Aflevering 1-12.

Sanscrit Manuscripts.

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APPENDICES.

APPENDIX A.

List of papers submitted to the Society during the year* 1870, *with dates when they were received, and how they were disposed of.*

[* Short communications and abstracts, chiefly printed in full in the Proceedings are not included in this list, but referred to in the general Index.]

Authors.	Titles of Papers.	When received.	How disposed of.
Avdall, J., Esq.	A covenant of Ali, fourth Caliph of Baghdád, ...	23rd Sept., 1870.	Printed in Journal, Pt. I, for 1870, p. 60.
Anderson, J., Esq., M. D. ..	List of Reptilian accessions to the Indian Museum, Calcutta from 1865 to 1870, with a description of some new species,	28th Oct. 1870.	To be printed in Journal Pt. II, for 1871.
Ball, V., Esq., B. A.	Notes on the Geology of the Vicinity of Port Blair, Andaman Islands, ...	3rd Mar., 1870.	Printed in Journal Pt. II, for 1870, p. 231.
Ditto ditto, ...	Notes on Birds observed in the neighbourhood of Port Blair, Andaman Islands, during the month of August 1869,	2nd Mar., 1870.	Printed in Journal Pt. II, for 1870, p. 240.
Ditto ditto, ...	Brief Notes on the Geology and on the Fauna in the neighbourhood of Nancowry Harbour, Nicobar Islands, ...	20th Oct., 1869.	Printed in Journal Pt. II, for 1870, p. 25.
Bayley, E. C., Esq., C. S., C. S. I.	Memorandum on and tentative reading of the Súe Vihár Inscription from near Bháwalpúr, ...	....	Printed in Journal Pt. I, for 1870, p. 65.

Blanford, H. F. Esq., ...	On certain protracted irregularities of Atmospheric pressure in Bengal, in relation to the Monsoon rainfall of 1868-69, ...	17th Feb. 1870.	Printed in Journal for 1870, Pt. II, p. 123.
Ditto ditto, ...	On the Normal Rainfall of Bengal, ...	27th May 1870.	Printed in Journal for 1870, Pt. II, p. 243.
Ditto ditto, ...	On some undescribed species of Comptoceras and other land shells, ...	2nd Dec. 1870.	To be printed in Journal for 1871, Pt. II.
Blanford, W. T., Esq.	Contributions to Indian Malacology No. XI, Descriptions of new species of Paludomus, Cremnoconchus, Cyclostoma and Helicidæ from various parts of India, ..	25th June 1870.	Printed in Journal for 1870, Pt. II, p. 9.
Ditto ditto, ...	Notes on some Reptilia and Amphibia in Central India, ...	2nd Aug. 1870.	Printed in Journal for 1870, Pt. II, p. 335.
Busteed, Dr. H. E.	On the Method of assaying silver as conducted in the Indian Mints, ...	7th Sep. 1870.	Printed in Journal for 1870, Pt. II, p. 377.
Chandrasékhara Bánurji, ..	Notes on the Antiquities of the Nalti, the Assi and the Mahabináyaka hills of Cuttack, ...	3rd Aug. 1870.	Printed in Journal for 1870, Pt. I, p. 158.
Day, Surgeon F.....	Notes on the genus Hara, ...	10th Feb. 1870.	Printed in Journal for 1870, Pt. II, p. 37.
Dawson, The Rev. J.	Gondi Words and Phrases, ...	7th June 1870.	Printed in Journal for 1870, Pt. I, p. 108.

Authors.	Titles of papers.	When received.	How disposed of.
Dawson, The Rev. J.....	Additional Gondi Vocabulary, ...	7th June 1870.	Printed in Journal for 1870, Pt. I, p. 172.
Delmerick, J. G., Esq.	Notes on Archæological Remains at Shâh ki Dheri, and the site of the ancient city of Taxila,.....	18th April 1870.	Printed in Journal for 1870, Pt. I, p. 89.
Elmslie, W. J., Esq., M. D.	List of words and phrases to be noted and used as test words for the discovery of the radical affinities of languages and for easy comparison, drawn up by Mr. Justice Campbell, ...	....	Printed in Journal for 1870, Pt. I, p. 95.
Foulkes, The Rev. T.....	Notes on Three copper Sasanams, discovered in the Vizagapatam District, ..	3rd Aug. 1870.	Printed in Journal for 1870, p. 153.
Fuller, Major A. R. (late),	Translation from the Tarikh Firuz Shahi,	....	Printed in Journal for 1870, Pt. I, p. 1, continued from No. 4 of Journal, Pt. I, for 1869.
Godwin-Austen, Major H H.....	List of Birds obtained in the Khasia and North Cachar hills, ...	1st Jan. 1870.	Printed in Journal for 1870, Pt. II, p. 91.

Ditto ditto, ...	Second List of Birds obtained in the Khasi and North Cachar Hill ranges, including the Garo Hills and country at their base in the Mymensing and Sylhet Districts, ...	23rd June 1870.	Printed in Journal for 1870, Pt. II, p. 264.
Ditto ditto, ...	Description of the species of Alycæinæ known to inhabit the Khasi Hill ranges,	2nd Dec. 1870.	To be printed in Journal, Pt. II, for 1871.
Growse, F S., Esq., C. S...	Rejoinder to Mr. Beames, ...	....	Printed in Journal for 1870, Pt. I, p. 52.
Hume, Allan O., Esq., C. B.	Additional Observations regarding some species of Birds noticed by Mr. W. T. Blanford in his "Ornithological Notes from Southern, Western and Central India,"	11th Jan. 1870.	Printed in Journal for 1870, Pt. II, p. 113.
Kurz, S., Esq.....	Gentziana Jæschkei re-established as a new genus of Gentzianaceæ, ...	5th April 1870.	Printed in Journal for 1870, Pt. II, p. 229.
Ditto ditto, ...	On some new or imperfectly known Indian plants, ...	2nd Dec. 1870.	To be printed in Journal Pt. II, for 1871.
Michell, R., Esq., F. R. G. S.	Statistical Data on the Area of Asiatic Russia compiled by Mr. W. Venuikof; translated from No. III 1865, of the Notes of the Imperial Russian Geographical Society,.....	13th Feb. 1870.	Printed in Journal for 1870, Pt. II, p. 41.

Authors.	Titles of papers.	When received.	How disposed of.
Nevill, G., Esq.	Land shells of Bourbon with descriptions of new species, ...	7th Sept. 1870.	Printed in Journal for 1870, Pt. II, p. 403.
Nevill G. and H., Messrs. .	Descriptions of new species of Mollusca from Ceylon, ...	7th Sept. 1870.	To be printed in Journal, Pt. II, for 1870.
Phayre, Col. Sir A.	Note on a Circle of Stones situated in the District of Eusufzye,.....	....	Printed in Journal for 1370, Pt. I, No. 1, 1870, p. 58.
Pratápachandra Ghosha, Babu, B. A.....	Contributions towards Vernacular Lexicography, No. 1,.....	19th May 1870.	Printed in Journal for 1870, Pt. I, p. 131.
Ditto ditto, ...	The Vastu Yagá and its bearings upon Tree and Serpent worship in India,....	29th July 1870.	Printed in Journal for 1870, Pt. I, p. 199.
Rashbihari Bose, Bábu, ..	Notes on the Bonhara Temple near Omarpore, Behar, ...	....	Printed in Journal for 1870, Pt I, No. 3, 1870, p. 232.
Ditto ditto, ...	An account of Copilmoonee, Jessore and its antiquities in connection with the Fair held there in March 1868, ...	....	Printed in Journal for 1870, Pt. I. p. 235.

Ditto ditto, ...	Extracts from a diary written on the occasion of a Visit to Khorucpur, Mungir,..	22nd Nov. 1870.	To be printed in Journal for 1870, Pt. I.
Rajendralála Mitra, Bábu,	Notes on Sanskrit Inscriptions from Mathura, ...	2nd Sept. 1870.	Printed in Journal for 1870, Pt. I, p. 117.
Ditto ditto, ...	On the Funeral Ceremonies of the ancient Hindus, ...	2nd Nov. 1870.	Printed in Journal for 1870, Pt. I.
Stoliczka, Dr. F.	Observations on some Indian and Malayan Amphibia and Reptilia, ...	6th April 1870.	Printed in Journal for 1870, Pt. II, pp. 134, 159.
Ditto ditto, ...	Note on the Kjökkenmöddings of the Andaman Islands, ...	5th Jan. 1870.	Printed in Proceedings for January, 1870.
Ditto ditto, ...	A Contribution to Malayan Ornithology,	6th July 1870.	Printed in Journal for 1870, Pt. II, p. 277.
Theobald, W., Esq.	Descriptions of New Land shells from the Shan States and Pegu, ...	7th Sept. 1870.	Printed in Journal for 1870, Pt. II, p. 395.
Tremlett, J. D., Esq.	Notes on old Delhi, ...	12th Mar. 1870.	Printed in Journal for 1870, Pt. I, p. 70.

APPENDIX B.

List of Donations (not including Books, or other publications, and MSS., these being acknowledged in the monthly library lists).

[Objects marked with an asterisk have been transferred to the Trustees of the Indian Museum].

Donors.	Donations.
Bloomfield, A., Esq.	*Eight pieces of silver and seventeen pieces of copper utensils found near the village Gungeria.
Bloomfield Captain, A., ...	Six ancient copper coins.
Butler, Lieut. J.	A spear of an Angami Naga, a coat of the same, and a pair of ear ornaments.
Chandrasikhara Banerji, Babu,	*A rectangular piece of garnetiferous gneiss with the Buddhist formula "Ye Dhammahétu, &c. &c. &c., found in the Alti Hills.
Committee of Grote Portrait Fund	A portrait of A. Grote, Esq., C. S.
Delmerick, J. G., Esq.	*A number of Buddhist heads and stone tablets with figures from near Peshawar.
Ditto ditto, ...	Specimens of moulds used in counterfeiting coins.
Ferrar, M. L., Esq., C. S.....	Copper coins dug up near Partabgarh.
Gastrell, Col. J. E.....	*A specimen of Macrocheira Kaempferi from Japan and a specimen of a large Ostrea.
Hexter, H. Esq.....	*A specimen of Chamæleo vulgaris from Bughodeer.
Rainey, H. J., Esq.	Two modern copper coins bearing the inscription "Island of Sultana" in English, and the coat of arms of the E. I. Company.
Saxton, Col., G. H.	*A set of Iron implements &c. found in a cromlech on the Nilgiris.
Stoney, R. V., Esq.	*A piece of a calcareous tuffa taken out of a Sisú tree near Cuttack.

INDEX.

APPENDIX.

LIST OF MEMBERS

OF THE

ASIATIC SOCIETY OF BENGAL,

ON THE 31ST DECEMBER, 1869.

LIST OF ORDINARY MEMBERS.

The * distinguishes Non-Subscribing, and the † Non-Resident Members.

N. B.—Gentlemen who may have changed their residence, since this list was drawn up, are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alterations may be made in the subsequent edition.

Gentlemen who are proceeding to Europe, with the intention of not returning to India, are particularly requested to notify to the *Secretaries*, whether it be their desire to continue as members of the Society.

Date of Election.		
1847 June 2.	*Abbott, Major-Gen. J., R. Artillery.	Europe
1860 Dec. 5.	Abdullatíf Maulvi.	Calcutta
1867 June, 5.	Abhayacharana Mallik, Bábu,	Calcutta
1868 Sept. 2.	†Adam, R. M., Esq.	Sambhar Lake via Jeypúr
1869 Jan. 20.	Adley, C. C., Esq., C. E.	Dum Dum
1860 July 4.	†Ahmad Khan, Saied, Bahádur.	Allighur
1860 April 4.	†Aitchison, J. E. T., Esq., M. D.	Láhor
1859 Feb. 2.	*Alabaster, C., Esq.	China
1866 Jan. 17.	Allan, Lieut.-Col A. S.,	Calcutta
1869 Oct. 6.	Allardyce, A., Esq.	Serampore
1852 July 7.	*Allan, C., Esq., B. C. S.	Europe
1867 Aug. 7.	†Amery, C. F., Esq.	Amritsar
1860 Oct. 3.	Amir Ali Khán Bahádur, Múnshi,	Calcutta
1861 May 1.	*Anderson, Dr. T., F. L. S.	Europe
1865 Jan. 11.	Anderson, Dr. J., F. L. S.	Calcutta
1843 Sept. 4.	*Anderson, Lieut.-Col. W., Bengal Artillery.	Europe
1864 Dec. 7.	*Anderson, W., Esq.	Europe
1861 Sept. 4.	*Asghur Ali Khán Bahádur, Nawáb,	Europe
1869 Feb. 3.	Ashton, The Rev. J. P.,	Calcutta
1861 July 3.	*Asphar, J. J. T. H., Esq.	Europe
1855 July 4.	Atkinson, W. S., Esq., M.A., F.L.S.	Calcutta
1869 Feb. 3.	†Attara Singh Bahádur, Sirdár,	Bhaddur
1826 Sept. 6	Avdall, J., Esq.	Calcutta
1835 Oct. 7.	*Baker, Col. W. E., Bengal Engineers.	Europe
1859 Aug. 3.	Baláichánda Singha, Bábu,	Calcutta

Date of Election.		
1865 Nov. 1.	†Ball, V., Esq., Geol. Survey.	Geol. S. Office.
1860 Nov. 7.	Banerji, The Rev. K. M.,	Calcutta
1869 Dec. 1.	†Barker, R. A. Esq., M. D.	Serampore
1864 May 4.	*Barry, Dr. J. B.,	Europe
1862 Aug. 6.	†Basevi, Capt. J. P., Royal Engineers.	Utácamund
1860 July 4.	Batten, G. H. M., Esq., B. C. S.	Calcutta
1838 Jan. 3.	*Batten, J. H., Esq., B. C. S.	Europe
1859 May 4.	Bayley, E. C., Esq., B. C. S.	Calcutta
1861 Feb. 6.	†Bayley, S. C., Esq., B. C. S.	Patna
1868 May 6.	*Baynes, J., Esq.	Europe
1869 Feb. 3.	†Baxter, J. B., Esq., M. R. C. S.	Port Canning
1849 June 6.	*Beadon, The Hon'ble Sir Cecil, B. C. S.	Europe
1864 Sept. 7.	†Beames, J., Esq., B. C. S.	Balasore
1841 April 7.	Beaufort, F. L., Esq., B. C. S.	Calcutta
1861 Sept. 4.	*Beavan, Lieut. R. C., Bengal Staff Corps.	Europe
1847 Aug. 4.	*Beckwith, J., Esq.	Europe
1867 July 3.	†Belletty, N. A., Esq., Civil Assistant Surgeon.	Mymansing
1869 Jan. 20.	†Bellew, Dr. P. F.,	Madras
1830 Sept. 1.	*Benson, Lieut.-Col. R.,	Europe
1862 Oct. 8.	†Bernard, C. E., Esq., B. C. S.	Nágpúr
1862 June, 4.	†Bhau Daji, Dr.,	Bombay
1864 Nov. 2.	Bhudeva Mukerjea, Bábu,	Chinsurah
1840 July 15.	*Birch, Major-General Sir R. J. H., K. C. B.	Europe
1846 Mar. 4	*Blagrave, Major T. C., 26th Regt., B. N. I.	Europe
1859 Sept. 7.	Blane, Col. Sir S. J.,	Calcutta
1857 Mar. 4.	Blanford, H. F., Esq., A. R. S. M., F. G. S.	Calcutta
1859 Aug. 3.	†Blanford, W. T., Esq., A. R. S. M., F. G. S., Geol. Survey.	Geol. S. Office
1864 April 6.	Blochmann, H., Esq., M. A.	Calcutta
1857 Aug. 2	*Bogle, Lieut.-Col. Sir A., Kt.	Europe
1869 June 2.	Bonnerjee, W. C., Esq.	Calcutta
1866 June 6.	Bourke, W. M., Esq.	Calcutta
1859 Oct. 12.	†Bowring, L. B., Esq., C. S. I., B. C. S.	Mysore
1868 Jan. 15.	†Boxwell, J., Esq., C. S.	Puri
1854 Nov. 1.	*Boycott, Dr. T., B. M. S.	Europe
1860 Mar. 2.	Brandis, Dr. D.,	Calcutta
1860 Oct. 3.	*Brandreth, The Hon'ble J. E. L.,	Europe
1862 Jan. 15.	†Briggs, Lieut.Col. D., Staff Corps.	Behár
1866 April, 4.	*Broderick, H. C., Esq., M. D.	Europe

Date of Election.		
1847 June, 2.	*Brodie, Capt. T., 5th Regt., B. N. I.	Europe
1866 Jan. 17.	*Brown, Col. D.,	Europe
1866 Nov. 7.	†Browne, Lieut. Col. Horace A.,	Prome, Burma
1666 June, 6.	†Brownfield, C., Esq.	Kámrúp
1868 June, 3.	†Buck, E. C., Esq., C. S.	Cawnpur
1866 June, 6.	†Buckle, Dr. H. B., C. B.	Dacca
1856 Sept. 3.	Bashiruddin, Sultán Mohammad,	Chinsurah
1867 Sept. 4.	Butler, Lieut. J.,	Nágá Hills
1869 Jan. 20.	†Cadell, A., Esq., B. A., C. S.,	Mozaffernagar
1860 June, 6.	†Campbell, C., Esq., C. E.	Jabalpúr
1859 Sept. 7.	*Campbell, Dr. A.,	Europe
1863 June, 3.	*Campbell, The Hon'ble G.,	Europe
1860 Jan. 3.	†Carnac, J. H. Rivett, Esq., B. C. S.	Nágpúr
1865 Nov. 1.	†Carnegy, P., Esq.	Faizábád
1867 Dec. 4.	†Chambers, F. J., Esq.	Lucknow
1868 Aug. 5.	†Chandramohana Gosvámi, Pandita	Gowhátí
1863 Aug. 5.	†Chandranátha Ráya, Rájá.	Nátor
1868 Feb. 5.	†Clark, Major E. G., Bengal Staff Corps.	Baraitch, Oudh
1863 April, 1.	*Cleghorn, Dr. H.,	Europe
1869 July, 7.	†Coats, J. M., Esq., M. D.	Házáribágh
1861 Sept. 4.	†Cockburn, J. F., Esq., C. E.	Karharbári Colliery
1868 Nov. 4.	†Cole, Lieut. H. H., Royal Engr.	Siálkot
1862 April, 2.	*Colles, J. A. P., Esq., M. D.	Europe
1851 Mar. 5	*Colvin, J. H. B., Esq., B. C. S.	Europe
1868 Dec. 2.	†Cooke, J. E., Esq.	Haidarábád
1860 Dec. 5.	*Cooper, F. H., Esq., B. C. S.	Europe
1857 Mar. 4.	*Cowell, E. B., Esq., M. A.	Europe
1868 May, 6.	†Coxhead, T. E., Esq., C. S.	Sáran
1866 May, 2.	*Cox, W. H., Esq.	Europe
1866 Jan. 17.	Crawford, J. A., Esq., C. S.	Calcutta
1861 July, 3.	*Crockett, Oliver R., Esq.	China
1867 Aug. 7.	†Curran, R. H., Esq., L. R. C. S., L. K. R C. P.	Port Blair
1868 Sept. 2.	Cutsem, E. Ch. Van, Esq.	Calcutta
1866 Feb. 7.	†Daly, N., Esq.	Mayanoung, Burmah
1862 April, 2	*Dalrymple, F. A. E., Esq., C. S.	Europe
1847 June, 2.	†Dalton, Col. E., T., C. S. I., Staff Corps.	Chhotá Nágpúr
1861 Mar. 6.	*Davey, N. T., Esq., Revenue Surv.,	Europe
1865 May, 3.	†Davies, C., Esq.	Rahtásghar
1861 Nov. 6.	†Davies, R. H., Esq., C. S. I., B. C. S.	Lucknow
1869 April 7.	†Day, Dr. F., F. L. S., F. Z. S.	Madras

Date of Election.		
1869 Oct. 6.	†Delmerick, J. G., Esq.	Ráwal Pindi
1864 July, 6.	Devendra Mallika, Bábu,	Calcutta
1856 June, 4	DeBourbel, Major R., Bengal Engrs.	
1861 June, 5.	*Denison, His Excellency Sir W., K. C. B.	Europe
1863 Feb. 4.	†Deva Narayana Singha, The Hon'ble Rájáh,	Benares
1861 Mar. 6.	*Devereux, The Hon'ble H. B., B. C. S.	Europe
1862 May, 7.	†Dhanapati Singha Dughar, Ráya Bahádur.	Azimganj
1853 Sept. 7.	*Dickens, Lieut.-Col. C. H.,	Europe
1859 Sept. 7.	*Douglas, Col. C.,	Europe
1869 Feb. 3.	†Drew, F., Esq.	Jammú
1864 Dec. 7.	*Dunlop, H. G., Esq.	Europe
1867 June, 5.	†Duthoit, W., Esq., C. S.	Mírzápúr
1861 May, 1.	*Earle, Capt. E. L., Bengal Artillery.	Europe
1857 May, 6.	*Eatwell, Dr. W. C. B.,	Europe
1868 Oct. 7.	†Eddowes, W., Esq., M. D.	Erinpúr
1840 Oct. 7.	*Edgeworth, M. P., Esq., B. C. S.	Europe
1863 May 6.	†Edgar, J. W., Esq., B. C. S.	Cachár
1865 Feb. 1.	*Egerton, Ph., Esq., B. C. S.	Europe
1846 Jan. 7.	*Elliott, Sir Walter, late M. C. S.	Europe
1859 Nov. 2.	†Elliott, C. A., Esq., B. C. S.	Farruckábád
1856 Mar. 5.	*Ellis, Lieut.-Col. R. R. W., 23rd Regt., B. N. I.	Europe
1854 Nov. 1.	*Elphinstone, Capt. M. W., 4th Regt., B. N. I.	Europe
1868 Sept. 2.	Ernsthausen, Baron O.	Calcutta
1861 Jan. 9.	*Erskine, The Hon'ble C. J., Bombay C. S.	Europe
1856 Aug. 6.	*Erskine, Major W. C. B.,	Europe
1863 Oct. 7.	Ewart, Dr. J.,	Calcutta
1862 Aug. 6.	*Eyre, Col. Vincent, C. B.	Europe
1865 June, 7.	Fawcus, Dr. J.,	Calcutta
1851 May, 7.	Fayrer, Dr. J., C. S. I.	Calcutta
1863 Jan. 15.	†Fedden, Francis, Esq., Geol. Survey.	Hinganhát
1869 April, 7.	†Ferrar, M. L., Esq., B. A., C. S.	Rái Bareli, Oudh
1868 May, 6.	*Field, C. D., Esq., C. S.	Europe
1859 Oct. 12.	*Fisher, A., Esq.	China
1869 Sept. 1.	*Fisher, J. H., Esq., C. S.	Mattrá
1860 Mar. 7.	†Fitzwilliam, The Hon'ble W. S.,	Europe
1865 April, 5.	†Fleming, Dr. J. M.,	Khundwá, Nimár

Date of Election.		
1867 April, 3.	*Ford, Lieut.-Col. B.,	Europe
1859 Oct. 12.	†Forlong, Major J. G. R., Madras Staff Corps.	Ábú, Rájputá-ná
1861 Feb. 6.	†Forest, R., Esq., Civil Engineer.	Etáwah
1863 Dec. 2.	†Forsyth, Capt. J., Bengl. Staff Corps.	Nimár
1863 June, 3.	*Forsyth, T. D., Esq., C. B.	Europe
1868 April, 1.	*Frederic of Schleswig Holstein, H. R. H. Prince,	Europe
1860 Mar. 7.	*Frere, His Excellency Sir H. Bartle, K. C. B., B. C. S.	Europe
1869 Sept. 1.	†Fryer, Capt. G. E.,	Amherst
1859 Dec. 7.	Futteh Ali, Maulavi.	Calcutta
1867 Sept. 4.	Fyfe, The Rev. W.,	Calcutta
1849 Sept. 5.	†Fytche, Major Genl. A., C. S. I., Chief Commissioner of Burmah.	Rangún
1864 Aug. 11.	†Garrett, C. B., Esq., C. S.	Sháhábád
1859 Aug. 3.	Gastrell, Col. J. E., 13th Regt., N. I, Supdt., Rev. Survey.	Calcutta
1867 Dec. 4.	Gay, E., Esq.	Calcutta
1867 Sept. 4.	Gauvain, Capt. V.,	Calcutta
1868 Nov. 4.	*Geddes, J. C., Esq., C. S.	Europe
1859 Sept. 7.	Geoghegan, J., Esq., B. C. S.	Calcutta
1865 June, 7.	†Giles, A. H., Esq.	Krishnagar
1842 Sept. 2.	*Gladstone, W., Esq.	Europe
1867 May 1.	Glover, The Hon'ble F.,	Calcutta
1861 Feb. 6.	†Godwin-Austen, Major H. H., Topographical Survey.	Cherrá Punjí
1869 Oct. 6.	†Gomes, A. D. B., Esq.	Calcutta
1859 Sept. 7.	*Goodeve, E., Esq., M. D.	Europe
1862 July, 2.	*Gordon, J. D., Esq., C. S.	Europe
1869 July, 7.	†Gordon, Robert, Esq., C. E.	Henzaday, Burma
1864 Dec. 5.	†Gurucharana Dása, Bábu,	Jámu Kándi
1862 Feb. 5.	†Gauradása Basáka, Bábu,	Khulna
1863 Nov. 4.	†Gowan, Lieut.-Col. J. G.	Morar, Gwalior
1859 Dec. 7.	*Grant, Sir J. P., K. C. B.	Europe
1860 Jan. 4.	Grant, T. R., Esq.	Calcutta
1867 Aug. 7.	Granville, W. L., Esq.	Calcutta
1869 Oct. 6.	†Gray, B., Esq., M. B.	Láhor
1867 June, 5.	†Gregory, Capt. J., Depy. Commr.	Debrughar
1860 July, 4.	Grey, The Hon'ble W., B. C. S., Lieut.-Governor of Bengal.	Calcutta
1866 June, 6.	†Gribble, T. W., Esq., B. C. S.	Sáran
1861 Sept. 4.	†Griffin, L. H., Esq., B. C. S.	Láhor
1860 Nov. 7.	†Griffith, R. T. H., Esq., M. A.	Benares

Date of Election.		
1869 Feb. 3.	†Giriprasáda Singha, Thákur,	Allighur
1861 Feb. 6.	†Growse, F. S., Esq., B. C. S.	Mainpuri
1869 May, 5.	Gubboy, R. A., Esq.	Calcutta
1862 Feb. 5.	*Guthrie, Col. C. S., Bengal Engrs.	Europe
1867 July, 3.	†Hacket, C. A., Esq., Geol. Survey.	Geol. S. Office
1869 April, 7.	†Hæberlin, The Rev. C.,	Chhotá Nágpur, Ranchee
1847 June, 2.	*Hall, F. E., Esq., M. A., D. C. L.	Europe
1866 Jan. 17.	†Hamilton, Major T. C.,	Rangoon
1863 June, 3.	*Hamilton, Col. G. W.,	Europe
1855 Mar. 7.	†Hamilton, R., Esq.	Wurdah
1847 May, 5.	*Hannyngton, Col. J. C., 63rd Regt., N. I.	Europe
1859 Oct. 12.	*Hardie, Dr. G. K.,	Europe
1866 Nov. 1.	Harendra Krishna Bahádur, Kumár.,	Calcutta
1862 Oct. 8.	*Harington, The Hon'ble H. B.,	Europe
1861 Feb. 6.	†Harrison, A. S., Esq., B. A.	Bareilly
1859 Oct. 12.	†Haughton, Lieut.-Col. J. C, C. S. I.	Cuch Behár
1862 Aug. 6.	†Heeley, W. L., Esq., B. A., C. S.	Rájsháhí
1866 April, 4.	*Henry, N. A., Esq.	Europe
1853 July, 6.	†Herschel, W. J., Esq., B. C. S.	Dacca
1854 Mar. 1.	*Hichens, Lieut. W., Bengal Engrs.	Europe
1868 Aug. 5.	†Hobart, R. T., Esq., C. S.	Chunár
1863 July, 1.	*Horne, C., Esq., C. S.	Europe
1860 Mar. 7.	Hovenden, Major J. J., Bengal Engineers.	Calcutta
1863 Jan. 15.	†Howell, M. S., Esq., C. S.	Dehra Dhoon
1867 Sept. 4.	†Hughes, A. J., Esq., C. E.	Dariábád
1867 Aug. 17.	†Hughes, T. H., Esq., A. R. S. M., F. G. S., Geol. Survey.	Geol. S. Office
1867 Aug. 7.	†Hughes, Lieut. W. G.,	Tounghoo, B. Burmah
1868 Nov. 4.	†Holroyd, Capt. W. R. M.	Láhor
1866 Feb. 7.	Hoyle, G. W., Esq.	Calcutta
1867 May, 1.	*Hyatt, Dr. B. N., Civil Surgeon.	Europe
1868 April, 1.	Hyde, Lieut.-Col. H., R. E.	Calcutta
1869 Sept. 1.	Hyde, E., Esq.	Calcutta
1866 Mar. 7.	†Irvine, W., Esq., C. S.	Goruckpur
1860 Jan. 4.	†Innes, Lieut.-Col. J. J. McLeod, R.E.	Láhor
1862 Oct. 8.	†Irwin, Valentine, Esq., C. S.	Tipperah
1853 Dec. 7.	†Isvariprasáda Singha Bahádur, Rájah	Benares
1864 Sept. 7.	Jackson, The Hon'ble E.,	Calc-
1841 Mar. 5.	*Jackson, W. B., Esq., B. C. S.	Er

Date of Election.		
1861 Dec. 4.	*James, Major H. R., C. .B	Europe
1864 Sept. 7.	*Jardine, R., Esq., C. S.	Europe
1845 Dec. 3.	†Jerdon, Dr T. C.	Dacca
1866 Feb. 7.	†Johnson, W H., Esq.	Siálkot
1847 June, 2.	*Johnstone, J., Esq.	Europe
1862 Mar. 5.	*†Johnstone, Capt. J. W. H., Assistant Commissioner.	Sháhpúr
1867 Dec. 4.	†Johnstone, Capt. J.	Keonjas viâ Bhadrack
1859 Sept. 7.	*Jones, R., Esq.	Europe
1865 June, 7.	†Jayakissen, Dása Bahádur, Rájah,	Allighur
1869 April, 7.	Kabiruddin Ahmad, Moulavie,	Calcutta
1858 Feb. 3.	Káliprasanna Singha, Bábu,	Calcutta
1863 July 1.	*Kane, H. S., Esq., M. D.	Europe
1868 Feb. 5.	†Kavanagh, J., Esq.	Goond, Oudh
1850 April, 3.	*Kay, The Rev. W., D. D.	Europe
1861 Dec. 15.	†Kempson, M., Esq., M. A.	Berilli
1867 Dec. 4.	†King, G., Esq., M. B.	Najíbábád
1867 Mar. 6.	†King, Capt. H. W.	P. & O. Co. Office
1862 Jan. 15.	*King, W., Jr., Esq., Geol. Survey.	Europe
1867 Mar. 6	†Knox, G. E , Esq., C. S.	Meerut
1869 May, 5.	Kurz, S., Esq.	Calcutta, Botanical Gardens
1839 Mar. 6	*Laidlay, J. W., Esq.	Europe
1861 Mar. 6.	*Laing, The Hon'ble S.,	Europe
1863 Sept. 2.	Lane, T. B., Esq., B. C. S.	Calcutta
1869 Sept. 1.	Latham, G., Esq , C. E.	Calcutta
1851 Dec. 3.	*Layard, Col. F. P.,	Europe
1868 Sept. 2.	Lazarus, C., Esq.	Calcutta
1869 May, 5.	†Leeds, R. J , Esq., C. S.	Mírzápúr
1852 April 7.	Lees, Lieut.-Col. W. N., LL. D.	Calcutta
1868 Feb. 5.	†Lees, L. H., Esq., M. D.	Simla
1868 July 1.	†Leitner, Dr. G. W.,	Láhor
1859 Dec. 7.	†Leonard, H., Esq., C. E.	Calcutta
1869 June 2.	†Leupolt, J. C., Esq , C. S.	Azimgarh
1865 June 7.	*Lewin, Capt. T. H.,	Europe
1856 Feb. 6.	*Liebig, Dr. G. von	Europe
1860 Jan. 4.	Lindsay, E. J., Esq.	Calcutta
1862 Dec. 3.	Lobb, S., Esq., M. A.	Calcutta
1864 Nov. 2.	Locke, H. H., Esq.	Calcutta
1869 April 7.	†Lockwood, E. D., Esq., C. S.	Tipperah
1866 May. 2.	*Lovett, Lieutenant B.,	Ispahán
1866 Jan. 17.	†Low, James, Esq., G. T. S.	Almora

Date of Election.		
1854 Nov. 1.	*Lushington, F. A., Esq., B. C. S.	Europe
1869 July 7.	†Lyall, C. J., Esq., B. A., C. S.	Balandshahr
1868 Dec. 2.	†Macauliffe, M., Esq., B. A., C. S.	Multan
1866 June 6.	Macdonald, Major J., Staff Corps.	Calcutta
1848 April 5.	†Maclagan, Col. R., F.R.S.E.	Láhor
1866 Jan. 17.	†Macgregor, Major C. M., Staff Corps.	Simla
1853 April 6.	*Macrae, Dr. A. C.,	Europe
1867 July 3.	Mackenzie, S. C., Esq., M. D.	Calcutta
1867 July 3.	Macnamara, Dr. C.	Calcutta
1863 Jan. 15.	*Maine, The Hon'ble H. S.,	Europe
1867 April 3.	†Mainwaring, Lieut.-Col. G. B.,	Darjeeling
1860 Jan. 4.	*Mair, D. K., Esq., M. A.	Europe
1865 Mar. 1.	†Malleson, Lieut.-Col. G. B.	Mysor
1862 Sept. 3.	*Mallet, F. R., Esq., Geol. Survey.	Europe
1860 July 4.	†Man, E. G., Esq.	Rangún
1852 Nov. 3.	Manickjee Rustomjee, Esq.	Calcutta
1861 June 5.	†Mána Singh Bahádur, Mahárájah,	Oudh
1867 Mar. 6.	Markby, The Hon'ble W.,	Calcutta
1869 July 7.	†Markham, A. M., Esq., C. S.	Bijnour
1864 Aug. 11.	*Marks, The Rev. J. Ebenezer,	Europe
1868 July 1	*Marshall, Lieut. C. H. T.,	Europe
1850 Jan. 2.	*Marshman, J. C., Esq.	Europe
1863 Nov. 4.	*McClelland, D. J.,	Europe
1837 Oct. 4.	†McLeod, The Hon'ble Sir D.F.,C.B., K. C. S. I., B. C S.	Murree
1860 Mar. 7.	†Medlicott, H. B., Esq., F. G. S., Geol. Survey.	Geol. S. office
1861 Feb. 6.	*Melville, Capt. A. B., Staff Corps.	Europe
1855 Nov. 7.	*Middleton, J., Esq.	Europe
1867 June 5.	Milman, D. D., The Right Rev. Lord Bishop of Calcutta, R.,	Calcutta
1850 April 3.	*Mills, A. J. M., Esq., B. C. S.	Europe
1867 April 3.	Mahendralála Saracára, Dr.,	Calcutta
1847 April 7.	*Money, D. J., Esq., B. C. S.	Europe
1856 Feb. 6.	†Money, W. J., Esq., C. S. I.,B.C. S.	Mymansing
1867 Mar. 6.	†Montgomerie, Major T. G., R. E.	Dera
1865 July 5.	†Morland, Lieut.-Col. J.,	Meerut
1854 Dec. 6.	†Morris, G. G., Esq., B. C. S.	Backerganj
1837 July 5.	*Muir, J., Esq.	Europe
1854 Oct. 11.	†Muir, The Hon'ble Sir.W.,K. C.S. I., B. C. S.	Alláhábád
1862 July 2.	*Napier of Magdala, Lord R., General, G. C. S. I., K. C. B.	Europe
1869 May 5.	Nevill, G., Esq., C. M. Z. S.	Calcutta

Date of Election.		
1869 May 5.	†Newall, Lieut.-Col. D. J. F., R. A.	Mean Meer
1865 Feb. 1.	†Newul Kishwar, Múnshi,	Lucknow
1852 Sept. 1.	*Nicholls, Capt. W. T., 24th Regiment, M. N. I.	Europe
1863 Jan. 15.	Norman, The Hon'ble J P.,	Calcutta
1869 July 7.	†Nursing Rao, A. V., Esq.	Vizagapatam
1851 June 4.	Oldham, T., Esq., LL. D., F. R. S., Geol. Survey.	Calcutta
1869 April 5.	†Oldham, W., Esq., L. L. D., C. S.	Ghazipur
1867 Aug. 7.	†Oldham, R. A., Esq., C E.	Dehree,on Sone
1866 July 4.	†Ormsby, M. H., Esq., C. E.,L. L. D., Geol. Survey.	Geol. S. office
1837 June 7.	*O'Shaughnessy, Sir W. B.,	Europe
1847 Feb. 10.	*Ousely, Major W. R.,	Europe
1864 Mar. 2.	*Palmer, Dr. W. J.,	Europe
1868 Nov. 4.	†Pearson, C., Esq.	Rawul Pindi
1862 May 7.	Partridge, S. B., Esq., M. D.	Calcutta
1869 July 7.	Pell, S., Esq.	Calcutta
1867 Feb. 6.	*Paul, J., Esq.	Europe
1860 Feb. 1.	†Pearse, Major G. G.,	Kampti
1867 Mar. 6.	Pearimohana Mukarji, M. A., Bábu.,	Uttarpárah
1864 Mar. 2.	*Pellew, F. H., Esq., C. S.	Europe
1865 Sept. 6.	†Peppe, J. H., Esq.	Gayá
1868 May 6.	†Peterson, F. W., Esq.	Bombay
1867 Nov. 6.	*Petit, Mons. Eugene,	Europe
1835 July 1.	†Phayre, Col.,Sir A.P., K.C.S.I., C.B.	Simla
1864 Nov. 2.	Phear, The Hon'ble J. B.,	Calcutta
1869 Feb. 3.	†Pickford, J., Esq.,	Madras
1868 May 6.	Pirie, A., Esq.	Calcutta
1867 Sept. 4.	*Place, Mons. V.,Consul-Gen., France	Europe
1862 Oct. 8.	†Pulinavehári Sen, Bábu,	Berhampur
1868 April 1.	†Pramathanátha Ráya, Kumár,	Digápati
1869 Feb. 3.	Pratápachandra Ghosha, B. A.	Calcutta
1839 Mar. 6.	Pratt, The Ven'ble Archdeacon J.H., M.A.	Calcutta
1860 Jan. 4.	Priyanátha Setha, Bábu,	Calcutta
1825 Mar. 9.	*Prinsep, C. R., Esq.	Europe
1853 April 6.	Rádhánátha Sikdára, Bábu,	Calcutta
1849 Sept. 5.	Rájendra Datta, Bábu,	Calcutta
1856 Mar. 5.	Rájendralála Mitra, Bábu,	Calcutta
1868 Jan. 15.	†Rakhaldass Haldára, Bábu,	Chhota Nágpúr
1864 May 4.	Ramánátha Vasu, Bábu,	Calcutta

Date of Election.		
1837 Feb. 1.	Ramánátha Thákura, Bábu,	Calcutta
1866 Jan. 17.	†Rattray, A., Esq., Asst. Commr, Hill Tracts.	Chittagong
1869 June 2.	†Rawlins, T. W., Esq., C. S.	Alláhábád
1860 Mar. 7.	†Reid, H. S., Esq., C. S.	Alláhábád
1868 June 3.	Reinhold, H., Esq.	Calcutta
1864 Dec. 7.	†Richardson, R. J., Esq., C. S.	Sháhábád
1857 June 7.	*Riddell, The Hon'ble H. B., B. C. S.	Europe
1868 April 1.	Robb, G., Esq.	Calcutta
1868 July 1.	†Roberts, The Rev. J.,	Panjáb
1863 April 1.	*Robertson, C., Esq., C. S.	Europe
1865 Feb. 1.	Robinson, S. H., Esq.	Calcutta
1847 Dec. 1.	*Rogers, Capt. T. E.,	Europe
1866 Dec. 5.	Ross, J. M., Esq.	Calcutta
1869 July 7.	†Ross, Lieut. J. C., R. E.	Meerut
1861 Dec. 4.	†Saunders, C. B., Esq., C. B., B. C. S.	Haidarábád
1864 June 1.	Saunders, J. O'B., Esq.	Calcutta
1854 Dec. 6.	†Saxton, Col. G. H., F. G. S., Madras Staff Corps.	Canúr
1854 May 2.	*Schiller, F., Esq.	Europe
1869 Feb. 3.	†Schwendler, L., Esq.	
1860 Feb. 1.	*Scott, Col. E. W. S.,	Europe
1866 Jan. 17.	†Seaton, Capt. W. J.,	Rangún
1869 Aug. 4.	Selbach, W., Esq.	Calcutta
1860 July 4.	†Shelverton, G., Esq.	Waltair, near Vizagapatam
1866 Sept. 5.	*Sherer, Major J. F.,	Europe
1867 April 3.	†Sheriful Omrah, Nawab Sir, Bahádur, K. C. S. I.	Madras
1845 Jan. 14.	*Sherwill, Lieut.-Col. W. S., 66th Regiment, B. N. I., F. G. S., F. R. G. S.	Europe
1868 Oct. 7.	Shircore, Dr. S. M.,	Calcutta
1863 April 1.	†Showers, Lieut.-Col. C. L.	Murree
1869 June 2.	Schroeder, J., Esq.	Calcutta
1866 June 6.	†Sime, J., Esq. B. A.	Agra
1864 Sept. 7.	*Sladen, Major E. B.	Europe
1866 June 6.	†Smart, R. B., Esq., Rev. Survey.	Rajpúr, Central Province
1865 July 5.	†Smith, D. Boyes, Esq., M. D.	Simla
1868 April 1.	†Smith, McLaren W., Esq.	Berhampúr
1868 July 1.	Smith, W., Esq., C. E.	Calcutta
1856 Feb. 6.	*Smith, Col. J. F.,	Europe
1854 Sept. 6.	*Spankie, The Hon'ble R., B. C. S.	Europe
1864 Mar. 2.	†Spearman, Capt. H. R.,	Rangún

Date of Election.		
1867 May 1.	†Steel, Lieut. E. H., R. A.	Debrughar
1843 Sept. 4	†Stevens, W. H., Esq., C. E.	Darbhánga
1867 Dec. 4.	*Stephen, Major J. G., 8th N. I.	Europe
1863 Sept. 2.	Stewart, R. D., Esq.	Calcutta
1864 April 6.	*Stewart, J. L., Esq., M. D.	Europe
1861 Sept. 4.	Stokes, Whitley, Esq.	Calcutta
1863 Nov. 4.	Stoliczka, F., Esq., Ph. D., F. G. S., Geol. Survey.	Calcutta
1868 Sept. 2.	†Stoney, R. V., Esq.	Angul viâ Cuttack
1843 May 3.	Strachey, Col., The Hon'ble R., F. R. S., F. L. S., F. G. S., C. S. I., C B	Calcutta
1869 Feb. 3.	Strachey, The Hon'ble J.,	Calcutta
1859 Mar. 2.	†Stubbs, Major F. W., Ben. Artillery.	Attock
1858 July 7.	*Sutherland, H. C., Esq., B. C. S.	Europe
1864 Aug. 11.	Swinhoe, W., Esq.	Calcutta
1863 Sept. 3.	Syámácharana Saracára, Bábu,	Calcutta
1866 Jan. 17.	Tagore, G. M., Esq.	Calcutta
1865 Sept. 6.	Tawney, C. H., Esq., M. A.	Calcutta
1865 April 5.	Taylor, R., Esq.	Calcutta
1860 May 2.	Temple, the Hon'ble Sir R., K. C. S. I., B. C. S.	Calcutta
1859 Mar. 2.	†Theobald, W., Jr., Esq., Geological Survey.	B. Burma
1869 Feb. 3.	†Thomas, T., Esq.	Lucknow
1869 Oct. 6.	†Thomson, A., Esq.	Faizábád
1860 June 6.	*Thompson, J. G., Esq.	Europe
1863 Mar. 4.	*Thompson, Major G. H., Bengal Staff Corps.	Europe
1863 June 4.	†Thornton, T. H., Esq., D. C. L., C. S.	Láhor
1847 June 2.	Thuillier, Col. H. L., F. R. G. S., Royal Artillery.	Calcutta
1863 May 6.	†Thuillier, Capt. H. R.,	Faridpúr
1862 July 2.	*Thurlow, The Hon'ble T. J. H.,	Europe
1865 July 5.	†Tolbort, T. W. H., Esq., C. S.	Dera Ismail Khan
1865 July 5.	Tonnerre, Dr. C. F.,	Calcutta
1862 Feb. 5.	*Torrens, Col. H. D.,	Europe
1861 June 5.	†Tremlett, J. D., Esq., M. A., C. S.	Delhi
1863 Mar. 4.	*Trevelyan, The Right Hon'ble Sir C., K. C. B.	Europe
1841 Feb. 3.	*Trevor, The Hon'ble C. B., B. C. S.	Europe
1864 Mar. 2.	†Trever, Lieut. E. A., Royal Engr.	Haidarábád
1861 Sept. 4.	Tween, A., Esq., Geological Survey.	Calcutta
1863 May 6.	†Tyler, Dr. J.,	Mynpuri

Date of Election.		
1869 June 2	Udayachánda Datta, Bábu,	Purulia, Manbhúm
1860 May 2.	†Vanrenen, Major A. D., Ben. Staff Corps.	Bijnour
1864 Feb. 3.	†Verchere, A. M., Esq., M. D.	Jallandar
1864 April 6.	†Vijayaráma Gajapati Ráj Munniá Sultán Bahádur, Máharájah Mirza,	Vizianagaram
1869 Augt. 4.	Wáhid Ali, Prince Jahán Qadr Muhammad, Bahádur.	Garden Reach
1865 Nov. 1.	Waldie, D., Esq., F. C. S.	Calcutta
1861 May 1.	†Walker, Col., J. T., Royal Engrs., Bombay.	Dera
1863 Dec. 2.	†Walker, A. G., Esq., C. S.	Onao, Oudh
1863 May 6.	*Wall, P. W., Esq., C. S.	Europe
1869 Dec. 1.	Wallace, Lieut. W. E. A., R. E.	Calcutta
1863 Oct. 7.	Waller, W. K., Esq., M. B.	Calcutta
1862 Jan. 15	†Ward, G. E., Esq., B. C. S.	Muzaffarnagar
1852 July 7.	*Ward, J. J., Esq., B. C. S.	Europe
1859 July 6	*Warrand, R. H. M., Esq., B. C. S.	Europe
1865 May 3.	Waterhouse, Lieut. J., Royal Artillery.	Calcutta
1854 July 5.	*Watson, J., Esq., B. C. S.	Europe
1847 Nov. 3.	*Waugh, Major-General Sir A. S., C. B., F. R. S., F. R. G. S.	Europe
1869 Sept. 1.	†Westland, J., Esq., C. S.	Jessore
1867 Feb. 6.	†Westmacott, E. V., Esq., B. A., C. S.	Dinajpur
1862 Oct. 8.	Wheeler, J. T., Esq.	Calcutta
1867 Aug. 7.	†Wilcox, F., Esq., Bengal Police.	Purulia, Manbhúm
1864 Mar. 2.	Wilkinson, C. J., Esq.	Calcutta
1861 Sept. 4.	†Williams, Dr. C., H. M.'s 68th Regt.	Rangún
1867 Jan. 16.	†Williamson, Lieut. W. J.	Garrow Hills
1867 Mar. 6.	Willson, W. G., Esq., B. A.	Calcutta
1859 Sept. 7.	†Willson, W. L., Esq., Geol. Survey.	Geol. S. office
1859 Aug. 3.	*Wilmot, C. W., Esq.	Europe
1865 Feb. 1.	†Wilmot, E., Esq.	Delhi
1866 Mar. 7.	*Wise, Dr. J. F. N.,	Europe
1867 July 3.	†Wood, Dr. J. J.,	Ranchi
1851 May 7.	*Woodrow, H., Esq., M. A.	Europe
1859 Mar. 2.	*Wortley, Major A. H. P.,	Europe
1862 Aug. 6.	*Wylie, J. W., Esq., Bombay C. S.	Europe
1869 Sept. 1.	Yadulála Mallika, Bábu,	Calcutta
1868 June 3.	Yatindramohana Thákura, Bábu,	Calcutta

Date of Election.		
1867 Mar. 6.	†Yogendranátha Mallika, Bábu,	Andul
1858 April 4.	*Young, Lieut.-Col. C. B.,	Europe
1856 July 2.	*Yule, Col. H., R. E.	Europe

LIST OF HONORARY MEMBERS.

Date of Election.		
1825 Mar. 9.	M. Garcin de Tassy, Membre de l'Inst.	Paris
1826 ,, 1.	Sir John Phillippart.	London
1829 July 1.	Count De Noe.	Paris
1831 ,, 7.	Prof. C. Lassen.	Bonn
1834 Nov. 5.	Sir J. F. W. Herschel, F. R. S.	London
1834 ,, 5.	Col. W. H. Sykes, F. R. S.	London
1835 May 6.	Prof. Lea.	Philadelphia
1842 Feb. 4.	Dr. Ewald.	Göttingen
1842 ,, 4.	Right Hon'ble Sir Edward Ryan, Kt.	London
1843 Mar. 30.	Prof. Jules Mohl, Memb. de l' Instit.	Paris
1847 May 5.	His Highness Hekekyan Bey.	Egypt
1847 Sept. 1.	Col. W. Munro.	London
1847 Nov. 3.	His Highness the Nawab Nazim of Bengal.	Murshidábád
1848 Feb. 2.	Dr. J. D. Hooker, R. N., F. R. S.	Kew
1848 Mar. 8.	Prof. Henry.	Princeton, United States
1853 April 6.	Major-Gen. Sir H. C. Rawlinson, K. C. B., F. R. S., D. C. L.	London
1854 Aug. 2.	Col. Sir Proby T. Cautley, K. C. B., F. R. S.	London
1858 July 6.	B. H. Hodgson, Esq.	Europe
1859 Mar. 2.	The Hon'ble Sir J. W. Colvile, Kt.	Europe
1860 ,, 7.	Prof. Max Müller.	Oxford
1860 Nov. 7.	Mons. Stanislas Julien.	Paris
1860 ,, 7.	Dr. Robert Wight.	London
1860 ,, 7.	Edward Thomas, Esq.	London
1860 ,, 7.	Dr. Aloys Sprenger.	Germany
1860 ,, 7.	Dr. Albrecht Weber.	Berlin
1865 Sept. 6.	Edward Blyth, Esq.	Europe
1868 Feb. 5.	Genl. A. Cunningham.	London
1868 ,, 5.	Prof. Bápu Déva Sástri.	Benares
1868 ,, 5.	Dr. T. Thomson, F.R.S., F.L.S., F.G.S.	London
1868 Sept. 2.	A. Grote, Esq., C. S.	London

LIST OF CORRESPONDING MEMBERS.

Date of Election.		
1844 Oct. 2.	Macgowan, Dr. J.,	Europe
1856 June 4.	Kramer, Herr A. von,	Alexandria
1856 ,, 4.	Porter, The Rev. J ,	Damascus
1856 ,, 4.	Schlagintweit, Herr H. von,	Bavaria
1856 ,, 4.	Smith, Dr. E.,	Beyrout
1856 ,, 4.	Tailor, J., Esq.,	Bussorah
1856 ,, 4.	Wilson, Dr.,	Bombay
1857 Mar. 4.	Neitner, J., Esq.,	Ceylon
1858 Mar. 3.	Schlagintweit, Herr R. von,	Giesen
1859 Nov. 2.	Frederick, Dr. H.,	Batavia
1859 May. 4.	Bleeker, Dr. H.,	Batavia
1860 Feb. 1.	Baker, The Rev. H.,	E. Malabar
1860 ,, 1.	Swinhoe, R., Esq., H. M.'s Consul,	Amoy
1860 April 4.	Haug, Dr. M.,	Punah
1861 July 3.	Gosche, Dr. R.,	Berlin
1862 Mar. 5.	Murray, A., Esq.,	London
1863 Jan. 15.	Goldstücker, Dr. T.,	London
1863 July 4.	Barnes, R. H., Esq.,	Ceylon
1866 May 7.	Schlagintweit, Prof. E. von,	Munich
1866 ,, 7.	Sherring, The Rev. M. A.,	Benáras
1868 Feb. 5.	Foucaux, M. F. H.,	Paris
1868 ,, 5.	Holmboe, Prof.,	Christiania

LIST OF ASSOCIATE MEMBERS.

1835 Oct. 7.	Stephenson, J., Esq.,	Europe
1838 Feb. 7.	Keramut Ali, Saied.,	Hugli
1843 Dec. 6.	Long, The Rev. J.,	Calcutta
1865 May 3.	Dall, The Rev. C. H. A.,	Calcutta

ELECTIONS IN 1869.

Ordinary Members.

C. C. Adley, Esq., C. E.	Dum Dum
Dr. P. F. Bellew.	Madras
A. Cadell, Esq., C. S.	Mozaffarnagar
Sirdár Attar Sing Bahádur.	Bhaddur
Dr. J. B. Baxter.	Port Canning
The Rev. J. P. Ashton.	Calcutta
F. Drew, Esq.	Jammú
Thákura Griprasáda Sing.	Allighur
J. Pickford, Esq.	Madras
Bábu Pratápchandra Ghosha.	Calcutta
The Hon'ble J. Strachey.	Calcutta

L. Schwendler, Esq.	Calcutta
T. Thomas, Esq.	Lacknow
Dr. F. Day.	Madras
The Rev. C. Hæberlin.	Chhota Nagpur
M. L. Ferrar, Esq., C. S.	Oudh
E. D. Lockwood, Esq., C. S.	Tipperah
Moulavie Kabiruddin Ahmad.	Calcutta
R. A. Gubboy, Esq.	Calcutta
R. J. Leeds, Esq., C. S.	Mirzápur
S. Kurz, Esq.	Botanical Garden, Sibpúr
G. Nevill, Esq., C. M. Z. S.	Calcutta
Lieut.-Col. D. J. T. Newall, R. A.	Mean Meer
W. Oldham, Esq., LL. D., C. S.	Ghazipur
J. Schroeder, Esq.	Calcutta
J. C. Leupolt, Esq., C. S.	Azimghar
T. W. Rawlins, Esq., C. S.	Allahabad
Bábu Udayachánda Datta.	Purulia, Manbhum
W. C. Bonnerjee, Esq.	Calcutta
J. M. Coates, Esq., M. D.	Hazáríbágh
Robert Gordon, Esq., C S.	Henzaday, British, Burmah
C. E. Lyall, Esq., C. S., B. A.	Bulandshahr
A. M. Markham, Esq., C. S.	Bijnour
A. V Nursing Rao, Esq.	Vizagapatam
S Pell, Esq.	Calcutta
Lieut. J. C. Ross, R E.	Meerut
Prince Jahán Qádr Mirzá Muhamad Wáhid-áli Bahádur.	Calcutta
W. Selbach, Esq.	Calcutta
Capt. G. E. Fryer.	Amherst British Burmah
J. H. Fisher, Esq., C. S.	Muttra
E. Hyde, Esq.	Calcutta
Bábu Yadulála Mallika.	Calcutta
Geo. Latham, Esq., C. S.	Calcutta
J. Westland, Esq., C. S.	Jessore
A. Allardyce, Esq	Serampore
J. G Delmerick, Esq.	Rawul Pindí
A. D. B. Gomes, Esq.	Sundarbans
B. Gray, Esq., M. B.	Lahor
A. Thomson, Esq.	Faizábád
R. A. Barker, Esq., M. D.	Serampore
Lieut. W. J. A. Wallace, R. E.	Calcutta

LOSS OF MEMBERS DURING 1869,

By retirement.

The Hon'ble C. P. Hobhouse.	Calcutta
A. Anderson, Esq.	Fyzabad
Col. H. Hopkinson.	Assam
J. Agabeg, Esq.	Calcutta
Capt. A. Pullan.	Dera Dhun
Bábu Kedáranátha Mukarjea.	Calcutta
T. Martin, Esq., C. E.	Midnapur
Lieut.-Co., P. S. Lumsden.	Simla
Capt. W. J. W. Muir.	Abu, Rajputana
A. E. Russell, Esq., C, S.	Burdwan
A. Mackenzie, Esq., C. S.	Calcutta
E. B. Harris, Esq., C. E.	Burdwan
G. W. Clive, Esq., M D.	Nagpur
E. Bonavia, Esq., M. D.	Lucknow
The Rev. J. Barton.	Calcutta
Bábu Bholánátha Chandra.	Calcutta
W. A. D. Anley, Esq.	Chapra, Sáran
J. B. N. Hennessy, Esq.	Mussuri
Bábu Digámvara Mitra.	Calcutta
N. S. Alexander, Esq., C. S.	Fureedpur
Dr. C. R. Francis.	Sagor
D. R. Onslow, Esq.	Calcutta

By the election being cancelled.

H. E. Perkins, Esq., C. S.	Hoshyárpur, Panjáb
J. W. Chisholm, Esq.	Bilaspur
Major W. A. Ross.	Simla
R. H. Renny, Esq	Goalpara

By death.

Lieut. Col. C D. Newmarch, R. E.	Oudh
C. Oldham, Esq.	Madras
J. B. Nelson, Esq.	Calcutta
J. G. Hicks, Esq.	Lahor
Rájá Satyasarana Ghoshála, C. S. I.	Bhumkailás
Bábu Sáradáprasáda Mukarjea.	Baraset
The Rev. M. D. C. Walters.	Calcutta

[APPENDIX.]

ABSTRACT STATEMENT

OF

RECEIPTS AND DISBURSEMENTS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR

THE YEAR 1869.

STATEMENT

Abstract of the Cash Account

RECEIPTS.

				1869.			1868.		
Admission Fees.									
Received from New Members, ... Rs.	1,632	0	0						
				1,632	0	0	1,280	0	0
Contribution.									
Received from Members,... ..	9,180	12	0						
				9,180	12	0	9,771	12	0
Journal.									
Sale proceeds of Journal and Proceedings of the Asiatic Society, ...	639	15	0						
Subscription to ditto, ...	917	0	0						
Refund of Postage Stamps, ...	36	14	0						
Ditto of Freight, ...	9	0	0						
Commission received from the Baptist Mission Press on the printing charges, ...	33	12	6						
				1,636	9	6	1,425	2	3
Library.									
Sale proceeds of Books, ...	491	4	0						
Ditto of Mahabharata, Vol. III. ...	16	0	0						
Ditto of a Copy of Index to ditto, ...	3	0	0						
Refund of Postage Stamps, ...	4	2	0						
Ditto of Freight, ...	23	0	0						
Received from the Indian Museum Sale proceeds of a Teakwood Almira &c., ...	215	0	0						
				752	6	0	479	11	6
Secretary's Office.									
Refund of Packing Charges, ...	1	2	6						
Ditto of Postage Stamps, ...	1	1	0						
Ditto of Paper supplied to Pandita, *(Consvn. of Sans. MSS.)*	1	10	0						
Ditto from Cashier, his excess of Salary for August last, ...	5	0	0						
				8	13	6	15	2	0
General Establishment.									
Received fine, ...	1	6	0						
				1	6	0	1	11	3
Vested Fund.									
Received Interest on the Government Securities from the Bank of Bengal for one year at 5½ per cent. on Rs. 2000, ...	110	0	0						
				110	0	0	110	0	0
Museum Catalogue.									
Refund from the Indian Museum of half the amount of a Bill for Rs. 791-10-9 for drawing out an inventory of the collections,... ...	395	13	4						
				395	13	4			
Carried over, Rs.				13,717	12	4			

No. 1.

of the Asiatic Society for 1869.

DISBURSEMENTS.

		1869	1868
CONTRIBUTIONS.			
Refund of Contribution to Major H. R. Thuillier, ... Rs.	60 0 0		
Fee for getting a Money Order for the above, ...	0 12 0		
Commission on Collecting Subscription bills, ...	44 4 0		
Refund of Contribution to S. Lobb, Esq., ...	24 0 0		
		129 0 0	50 5 3
JOURNAL.			
Freight for sending Journal and Proceedings to Messrs. Williams and Norgate, ...	76 0 0		
Lithographing and Engraving charges &c., ...	124 6 0		
Printing charges, ...	6,433 14 0		
Purchase of Postage Stamps, ...	148 2 0		
Commission on the Sale of Books, ..	73 4 0		
Packing charges, ...	4 8 0		
Binding a Book for the stock of the Journal, ...	4 6 0		
Petty charges, ...	5 15 6		
		6,870 7 6	7,807 8 9
LIBRARY.			
Salary of the Librarian, ...	840 0 0		
Establishment, ...	120 0 0		
Commission on Sale of Books, ...	42 7 3		
Purchase of Books, ...	1,052 10 0		
Landing charges on parcels received from Europe, ...	20 0 6		
Book binding, ...	201 4 0		
Salary of a Ticca writer for arranging the Library, ...	28 0 0		
Ditto of a Ticca Duftory for do. do. —	9 8 0		
Printing charges, ...	4 0 0		
Bearing postage, ...	1 14 0		
Petty charges, ...	9 0 9		
		2,328 12 6	2,830 8 11
SECRETARY'S OFFICE.			
General Establishment, ...	294 0 0		
Secretary's Office Establishment, ...	1,468 0 0		
Purchase of Postage Stamps, ...	49 14 2		
Ditto of Stationery, ...	23 2 0		
Insufficient postage, ...	3 11 0		
Bearing postage, ...	0 10 0		
Binding Letter files, &c.	10 0 0		
Purchaseof a Sheet Almanac, ...	2 0 0		
Ditto of Army List, ...	25 0 0		
		1,876 5 2	
Carried over, Rs.		9,328 4 0	

RECEIPTS.				1869.			1868.		
Brought over, Rs.				13,717	12	4			
MISCELLANEOUS.									
Refund of Banghy expenses from the Indian Museum on a box of agate and flint implements, ...	8	2	9						
Ditto ditto on a box of specimens, ..	7	8	8						
				15	11	0			
INDIAN MUSEUM.									
Refund of the amount paid for the Coral case as per Higgs and Halder, Bill No. 110 on the 15th February last, ...	300	0	0						
				300	0	0			
POSTAGE STAMP ACCOUNT.									
Received from Wallieoolah Syed, being the Balance of Postage Stamps, ...	21	13	4						
				21	13	4			
COMMISSION ACCOUNT.									
Received commission on purchase of Postage for Rs. 25-0-0 at ½ anna per Rupee, ...	0	12	6						
				0	12	6			
MESSRS. WILLIAMS AND NORGATE.									
Sale proceeds of a Copy of Matapari-kshá, ...	0	8	0						
Received from Syed Kerámatáli being the price of 2 Copies of Kamil, Vol. III and IV.	6	0	0						
Received by transfer to the Library and Miscellaneous account as per their order on Messrs. Gillanders, Arbuthnot and Co. paid on the 28th August 1869, £100 at 1-10-¾ per Rupee, ...	1,054	15	0						
				1,061	7	0	2,132	11	8
O. P. FUND.									
Refund of the amount paid for printing charges to the Baptist Mission Press on the 16th July 1868, ...	5	0	0						
Ditto ditto paid on the 30th June 1869, ...	54	5	9						
Received by transfer to Messrs. Williams and Norgate, Sale proceeds of Bibliotheca Indica, . 765 0 0									
Less paid them for freight, advertising charges and commission, ... 394 12 0									
	370	4	0						
				429	9	9	489	12	8
Rev H. A. Jäschke's, sale proceeds of his Thibetan Grammar, .	31	15	0						
				31	15	0			
Carried over, Rs.				15,579	0	11			

DISBURSEMENTS.				1869.			1868.		
Brought over, Rs.				9,328	4	0			
...	1,876	5	2						
Ditto of Directory, ...	12	0	0						
Printing charges, ...	563	9	6						
Petty charges, ...	11	15	0						
				2,463	13	8	2,037	14	0
VESTED FUND.									
Pd. Commission to the Bank of Bengal for drawing Interest on the Government Securities, ...	0	4	4						
				0	4	4	0	4	4
CONSERVATION OF SANSCRIT MSS.									
Salary of the Travelling Pandita, ...	106	0	0						
Ditto for Compiling Catalogue of Sanscrit MSS.	87	0	0						
Travelling allowance, ...	61	8	6						
Transcribing the Ekámvara Purána from Uria to Nagri, ...	32	0	0						
Stationery, ...	31	15	0						
Printing 2000 Copies of Sanscrit Tabular Form, ...	70	0	0						
Copying MSS.	40	0	0						
Binding Sanscrit MSS.	11	10	9						
A Japanned Paper Box, ...	11	3	9						
Postage for sending letters &c to Travelling Pandita, ...	4	4	6						
Banghy Expenses for sending MS. ...	3	0	0						
				458	10	6			
MISCELLANEOUS.									
Salary of the Mali, ...	57	0	0						
Meeting Charges, including Oil, &c., ..	200	10	3						
Advertising Charges, ...	27	8	0						
Railway Charges on a Box of agate and flint implements, ...	8	2	0						
Ditto ditto on a Box of Specimens, ...	7	8	3						
Purchase of a Petty Charges Book,	1	2	0						
Repairing the Clock, ...	30	0	0						
Fee for Stamping 25 cheques, ...	1	9	0						
Proportional Exchange on a Bill of £100, ...	54	15	0						
Petty charges, ...	27	14	9						
				416	5	3	577	4	0
INDIAN MUSEUM.									
Pd. Higgs and Halder for supplying, a Teakwood polished Coral case, ...	300	0	0						
				300	0	0			
CATALOGUE OF PERSIAN MSS.									
Pd. Munshi Abdul Hakim his Salary, for Cataloguing the Persian and Arabic MSS. in November last, ..	30	0	0						
				30	0	0			
ZOOLOGICAL GARDEN.									
Pd. Printing Charges, ...	12	0	0						
				12	0	0			
Carried over, Rs.				13,009	5	9			

RECEIPTS.		1869.	1868.
Brought over, Rs.		15,579 0 11	
C. HORNE, ESQ.			
Refund of the amounts paid on the 15th July 1867 and 16th July 1868,	7 9 0	7 9 0	
BÁBU RÁJENDRALÁLA MITRA.			
Refund of the amount paid on the 8th December 1868 and 1st June 1869,	8 0 0	8 0 0	
DR. A M. VERCHERE.			
Refund of Postage Stamps paid for sending Library Books, ...	0 9 0	0 9 0	
MOULVI ABDUL LUTEEF KHAN.			
Refund of the amount paid on the 11th December 1868, ...	1 8 0	1 8 0	
THE SECRETARY OF THE ELPHINSTONE INSTITUTION.			
Refund of the amount paid on the 30th April 1869, ...	2 0 0	2 0 0	
BÁBU UDAYACHÁNDA DATTA.			
Refund of Postage Stamps paid for sending Library Books, ...	0 11 0	0 11 0	
E. C. BAYLEY, ESQ.			
Refund of Banghy Expenses and Postage &c., for sending Books, ...	11 1 0	11 1 0	
H. BLOCHMANN, ESQ.			
Refund of the amount paid on the 10th September 1868, ...	2 0 0	2 0 0	
PRASANNA CUMÁRA THAKURA.			
Refund of Freight paid for sending Books to England on the 8th December 1868, ...	12 8 0	12 8 0	
J. G. DELMERICK, ESQ.,			
Received in deposit, ...	6 6 0		
Refund of Postage Stamps for sending Library Books, ...	1 2 0	7 8 0	
GOVERNMENT NORTH WESTERN PROVINCES.			
Refund of Freight for sending Journal and Proceeding of 1868, ...	12 11 0	12 11 0	
G. SHELVERTON, ESQ.			
Refund of the amount paid for cashing his draft, ...	0 5 9	0 5 9	
W OLDHAM, ESQ.			
Refund of the amount paid for on the 31st May, ...	2 11 0		
Ditto of Freight, ...	4 0 0	6 11 0	
Carried over, Rs.		15,652 2 8	

DISBURSEMENTS.				1869.	1868.
Bronght over, Rs.				13,009 5 9	
Building.					
Pd. Assessment, ...			456 0 0		
Ditto Lighting rate, ...			96 0 0		
Ditto Police rate, ...			144 0 0		
Ditto Petty charges, ...			1 12 0	697 12 0	1,136 8 3
Messrs. Williams and Norgate.					
Paid Book Postage for sending 14 parcels of Books, ...			8 8 6		
Do. Messrs. Gillanders, Arbuthnot and Co. as per their order £100 at 1 *s.* 10¾ *d.* per Rupee, ...			1,054 15 0		
Do. by transfer on account of Sale of Bibliotheca Indica,	£76 10 0				
Deduct freight, advertising & Commission charges, ...	£39 9 6				
	£37 0 6	Rs. 370 4 0			
Do. do. on account of Sale of Library's Books and Journal Asiatic Society £5-5-10 at 2s.	52 14 0				
Deduct 10 per cent. commission, ...	5 4 0	47 10 0	417 14 0	1,481 5 6	1,955 0 0
O. P. Fund.					
Paid on Loan, ...			79 3 0	79 3 0	
Bábu Rájendralála Mitra.					
Paid to the Baptist Mission Press for printing charges, ...			2 0 0	2 0 0	
Bábu Udayachánda Datta.					
Paid Postage Stamps for sending Library Books, ...			0 11 0	0 11 0	
E. C. Bayley, Esq.					
Paid Postage and Banghy expenses for sending Books, ...			11 1 0	11 1 0	
Carried over, Rs.				15,281 6 3	

RECEIPTS.				1869.			1868.
Brought over, Rs.				15,652	2	8	
CURATOR OF THE RIDDELL MUSEUM.							
Received in deposit, ...	12	0	0				
				12	0	0	
F. S. GROWSE, ESQ.							
Refund of the amounts paid on the 31st January 1867 and 31st January 1869, ...	1	0	0				
				1	0	0	
DR. G. W. CLINE.							
Refund of the amount paid on the 30th June 1868, ...	0	3	0				
				0	3	0	
M. MACAULIFFE, ESQ.							
Refund of the amount paid on the 30th November 1868, ...	0	3	0				
				0	3	0	
MAJOR F. W. STUBBS.							
Received in deposit, ...	1	12	0				
				1	12	0	
G. NEVILL, ESQ.							
Refund of the amounts paid on the 7th July and 1st September 1869,...	2	6	0				
				2	6	0	
MAJOR MCMAHON.							
Received in deposit, ...	0	6	0				
				0	6	0	
R. H. WILSON, ESQ.							
Received in deposit, ...	1	7	0				
				1	7	0	
S. KURZ, ESQ.							
Refund of the amount paid on the 7th July 1869, ...	4	4	0				
				4	4	0	
W. L. HEELEY, ESQ.							
Refund of the amount paid on the 31st May 1869,—	1	8	0				
				1	8	0	
DR. J. FAYRER.							
Refund of the amount paid on the 1st June 1869, ...	6	8	0				
				6	8	0	
A. S. HARRISON, ESQ.							
Received from him for Books supplied	11	2	0				
				11	2	0	
B. QUARITCH, ESQ.							
Received in deposit, ...	0	9	0				
				0	9	0	
CAPT. M. W. CARR,							
Received in deposit, ...	4	2	0				
				4	2	0	
S. LOBB, ESQ.							
Received in deposit, ...	6	6	0				
				6	6	0	
Carried over, Rs.				15,705	14	8	

DISBURSEMENTS.				1869.			1868.
Brought over, Rs.				15,281	6	3	
H. Blochmann, Esq.							
Paid freight for sending Books to England, ...	0	10	0				
Do. to the Baptist Mission Press for printing charges, ...	3	0	0				
Do. Books purchased through A. S. Harrison, Esq., ...	6	7	0				
				10	1	0	
J. G. Delmerick, Esq.							
Paid Postage for sending Library Books, ...	1	2	[illegible]				
Refunded the amount by Postage Stamps received on the 10th September, 1869, ...	6	6	0				
				7	8	0	
Government North Western Provinces.							
Paid freight for sending Journal and Proceedings for 1869, ...	18	2	0				
				18	2	0	
G. Shelverton, Esq.							
Paid discount for cashing his draft, ...	0	4	0				
				0	4	0	
W. Oldham, Esq.							
Paid Postage and freight for sending Library Books, &c., ...	7	7	0				
				7	7	0	
F. S. Growse, Esq.							
Paid Postage for sending Library Books, ...	0	15	0				
				0	15	0	
Dr. G. W. Cline.							
Paid by transfer to the Asiatic Society,	10	0	0				
				10	0	0	
Major F. W. Stubbs.							
Paid Bullock-train hire and packing charges for sending Library Books,	5	2	3				
				5	2	3	
G. Nevill, Esq.							
Paid to the Baptist Mission Press for printing charges, ...	2	6	0				
				2	6	0	
S. Kurz, Esq.							
Paid to the Baptist Mission Press, for printing charges, ...	4	4	0				
				4	4	0	
W. L. Heeley, Esq.							
Paid Banghy expenses for sending Library Books, ...	1	8	0	1	8	0	
Dr. J. Fayrer.							
Paid to the Baptist Mission Press, for printing charges, ...	6	8	0				
				6	8	0	
Carried over, Rs.				15,355	7	6	

RECEIPTS.				1869.			1868.
Brought over, Rs.				15,705	14	8	
H. F. Blanford, Esq.							
Refund of freight paid for sending 44 Parcels of Books to England, ..	14	0	0				
				14	0	0	
Walliullah Syed.							
Received by transfer the Postage Stamp, ...	39	9	2				
				39	9	2	
Dr. T. Oldham.							
Refund of the amount paid on the 5th October, 1868, ...	5	5	0				
				5	5	0	
Carried over, Rs.				15,764	12	10	

DISBURSEMENTS.		1869.	1868.
Brought over, Rs.		15,355 7 6	
H. F. Blanford, Esq.			
Paid freight for sending 44 parcels to England, ...	14 0 0	14 0 0	
Walliullah Syed.			
Paid Postage expenses for current expenditure, ...	119 12 10	119 12 10	
Dr. T. Oldham.			
Paid to the Baptist Mission Press, for printing charges, ...	5 5 0	5 5 0	
Lt.-Col. A. S. Allan.			
Paid by transfer to the Asiatic Society on account of contributions, ...	7 4 0	7 4 0	
W. Stokes, Esq.			
Paid proportional freight and postage for sending Books, ...	0 5 0	0 5 0	
Major H. H. Godwin-Austen.			
Paid Postage for sending a parcel received from London, ...	0 1 0	0 1 0	
Dr. F. Stoliczka.			
Paid to the Baptist Mission Press, for printing charges, ...	8 12 0	8 12 0	
W. T. Blanford, Esq.			
Paid to the Baptist Mission Press, for printing charges, ...	2 0 0	2 0 0	
Madras Club.			
Paid discount for cashing Madras Currency note, ...	0 4 0	0 4 0	
G. E. Knox, Esq.			
Paid Postage for sending Library Books, ...	0 12 0	0 12 0	
Col. C. L. Showers.			
Paid exchange to the Uncovenanted Service Bank on his draft for Rs. 72,	1 0 0	1 0 0	
W. A. Byrne, Esq.			
Paid Madan Mistry for making two Insect Boxes, ...	4 8 0		
Do. freight for sending do. ..	2 12 0	7 4 0	
Rev. H. A. Jaeschke.			
Refunded the amount to Messrs. Schroeder, Smith and Co., ..	34 5 0	34 5 0	
Carried over, Rs.		15,556 8 4	

	RECEIPTS.			1869.			1868.
	Brought over, Rs.			15,764	12	10	
BALANCE OF 1868.							
In the Bank of Bengal, ...	...	2,261	10	9			
Cash in hand, ...	...	92	9	7			
				2,354	4	4	
	Rs.			18,119	1	2	

DISBURSEMENTS.				1869.			1868.
Brought over, Rs.				15,556	8	4	
DR. J. MUIR.							
Paid Rev. K. M. Banerjea, ...	101	6	0				
				101	6	0	
LT. H. A. SPEARMAN.							
Paid freight and packing charges for sending Journal, ...	7	8	0				
				7	8	0	
W. THEOBALD, ESQ.							
Paid freight and packing charges for sending Library Books, ...	7	12	3				
				7	12	3	
W. DUTHOIT, ESQ.							
Paid Banghy expenses and packing charges for sending Books, ...	2	14	0				
				2	14	0	
COL. E. T. DALTON.							
Paid Banghy expenses for sending Photographs, ...	0	10	3				
				0	10	3	
COL. E. T. DALTON, ETHNOLOGY OF BENGAL.							
Paid Banghy expenses and packing charges for sending Photographs, ..	3	0	0				
				3	0	0	
JAMES BEAMES, ESQ.,							
Paid Banghy expenses for sending Library Book, ...	1	6	0				
				1	6	0	
				15,681	0	10	
BALANCE.							
In the Bank of Bengal account Dr. J. Muir, 898 10 0							
Do. do. Asiatic Society, 1,411 4 7							
	2,309	14	7				
Cash in hand, ...	128	1	9				
				2,438	0	4	
Rs.				18,119	1	2	

Examined,
Sd. PRATÁPACHANDRA GHOSHA.
Asst. Secry.
Asiatic Society, Bengal.

Errors and Omissions excepted,
Sd. BUDDINATH BYSACK,
Cashier,
Asiatic Society, Bengal.

Audited and found correct,
R. TEMPLE, K. C. S. I.
D. WALDIE, F. C. S.

STATEMENT

Abstract of the Cash Account

RECEIPTS.

				1869.			1868.		
ORIENTAL PUBLICATION.									
Received by Sale of Bibliotheca Indica,	2,798	12	6						
Ditto by Subscription to do. ...	143	14	0						
Ditto by Sale of Sranta Sutra, ...	57	0	0						
Refund of commission on Sale of Books from P. Ghosha, ...	2	8	0						
Ditto of postage and packing charges,	74	12	0						
				3,076	14	6	2,938	7	8
GOVERNMENT ALLOWANCE.									
Received from the General Treasury at 500 Rupees per month, ...	6,000	0	0						
				6,000	0	0	6,000	0	0
Ditto ditto additional grant for the publication of Sanscrit works at 250 Rupees per do. from April to November 1869, ...	2,000	0	0						
				2,000	0	0			
VESTED FUND.									
Received Interest on the Government Securities the Bank of Bengal, ...	212	8	0						
Ditto by Sale of Government Security,	1,500	0	0						
Ditto Premium by Sale of ditto, ...	136	14	0						
Ditto Interest by Sale of ditto, ...	15	10	0						
				1,865	0	0	4,410	6	1
CUSTODY OF ORIENTAL PUBLICATIONS.									
Refund from the Cashier his excess Salary for August 1869, ...	2	8	0						
				2	8	0	14	7	0
AIN I ÁKBARI.									
Received from the Right Hon'ble the Secretary of State for India for the additional Grant to the Asiatic Society towards the publication of the Ain i Akbari, ...	5,000	0	0						
				5,000	0	0			
Asiatic Society of Bengal, ...	79	3	0						
Maha Raja Pertap Sing, ...	55	0	0						
V. B. Soobiah, Esq., ...	8	9	0						
K. Roghu Nath Row, ...	35	0	0						
Kálidása Mookerjea, ...	2	5	0						
Challapali Rangaiya, ...	11	13	0						
Thakura Giriprasád, ...	36	2	0						
Damura Vallabha, ...	6	0	0						
V. M. Pundit, ...	0	10	0						
F. Samasa Charyar, Esq., ...	0	2	0						
Babu Brajabhushana Dása, ...	30	0	0						
J. Pickford, Esq., ...	0	2	0						
Desia Santgram Sivakram, ...	50	0	0						
Kesavachandra Acharji, ...	11	15	0						
	326	13	0						
Carried over, Rs.				17,944	6	3			

No. 2.

Oriental Fund for 1868.

DISBURSEMENTS.

				1868.			1867.		
Oriental Publications.									
Paid commission on the Sale of Books,	280	12	6						
Freight, ...	296	12	0						
Packing charges, ...	61	3	0						
Purchase of Postage Stamps, ...	199	13	6						
Advertising charges, ...	247	0	0						
Paper for printing Bibliotheca Indica,	38	1	0						
Petty charges, ...	12	10	6						
				1,136	4	6	1,179	11	9
Vested Fund.									
Paid commission to the Bank of Bengal for drawing interest on the Government Securities, ...	0	8	6						
Ditto on selling the Government Security, ...	4	2	1						
Ditto Brokerage for do.	1	14	0						
Ditto fee for renewing the Government Security, ...	2	0	0						
				8	8	7	14	0	10
Custody of Oriental Works.									
Paid Salary of the Librarian, ...	360	0	0						
Establishment, ...	626	12	9						
Book binding, ...	30	12	0						
Binding 2 Stock Books with papers, ...	52	8	0						
Fee to the Bank of Bengal for stamping cheques, ...	3	2	0						
Stationery, ...	67	7	0						
Printing charges, ...	98	8	0						
Repairing 2 Book cases, ...	183	0	0						
Preparing charges, ...	19	9	6						
24 Tin Boxes for sending Bibliotheca Indica, ...	7	10	0						
Ticca Duftory for arranging Bibliotheca Indica, ...	14	8	0						
Cart and cooley hire for removing do.,	22	10	6						
Petty charges, ...	28	2	6						
				1,514	10	3	1,518	5	0
Library.									
Purchase of MSS. and Books, ...	484	4	6						
Fee for getting 4 Money Orders at 100 Rs. each, ...	4	0	0						
Kharooah cloth and piece board and tape &c., for binding MSS. ...	15	3	9						
				503	8	3	603	7	0
Copying MSS.									
Copying charges for Persian MS., ...	71	0	0						
Papers for copying do.	6	0	0						
				77	0	0	37	3	0
Carried over, Rs.				3,239	15	7			

RECEIPTS.				1868.			1869.
Brought forward, Rs.	326	13	0	17,944	6	6	
Tárini Charana Chackravartí, ...	10	10	0				
Rámakrishna G. Bhudakar, ...	0	12	0				
A. Cadell, Esq., ...	3	14	0				
J. H. Lloyd, Esq., ...	3	11	0				
A. S. Harrison, Esq., ...	1	8	0				
Capt. Valadeva Pant, ...	1	14	0				
P. Swaminatha Jyer, ...	3	4	0				
H. D. Hawkins, Esq., ...	0	1	6				
Ramswami B. Eaider, ...	12	8	0				
Pundit Rumgoo, ...	6	12	0				
				371	11	6	
Carried over, Rs.				18,316	2	0	

DISBURSEMENTS.		1869.	1868.
Brought forward, Rs.		3,249 15 7	
Ain i Akbari.			
Paid Salary to Munshi, ...	390 0 0		
Ditto printing charges, ...	2,133 3 0		
Ditto 16 plates for the Ain i Akbari,...	334 0 0		
Ditto Engraving a plate for ditto, ...	8 11 3		
Ditto Lettering on stones of 2 plates,	4 0 0		
Ditto 2 copies of Ain i Akbari, ...	87 8 0		
		2,957 6 3	2,074 13 0
Alamgir Námáh.			
Paid for preparing the Index and Preface of do.	80 0 0		
		80 0 0	
Tarikhi Bádaoni.			
Paid Editing and printing charges, ...	761 0 0		
Ditto extra work in composing the Preface of do.	30 0 0		
		791 0 0	2,113 0 0
Mimánsa Darsana.			
Paid Editing and printing charges, ...	331 2 0		
		331 2 0	
Taittiriya Bráhmana.			
Paid Editing charges, ...	144 0 0		
		144 0 0	224 0 0
Grihya Sutra of Aswaláyana.			
Paid Editing and printing charges, ...	613 4 0		
		613 4 0	672 0 0
Secundar Námá Behari.			
Paid Editing charges, ...	75 0 0		
		75 0 0	
Taittiriya Upanishada.			
Paid Editing and printing charges, ...	762 0 0		
Ditto Banghy expenses for sending 2 parcels of do.	5 0 0		
		767 0 0	820 9 0
Taittiriya Sanhita of the B. Y. Veda.			
Paid Editing and printing charges, ...	280 12 0		
		280 12 0	364 14 0
Umar i Kheyani.			
Paid copying charges of MS. ...	15 0 0		
		15 0 0	
Muntákháb Al lubáb of Kháfi Khán.			
Paid Editing and printing charges, ...	2,088 10 0		
Ditto advance for do. do. Vols. XL & XII.	500 0 0		
		2,588 10 0	876 0 0
Tándya Máhá Bráhmana.			
Paid Editing and printing charges, ...	328 3 0		
		328 3 0	
Bátsáyan Cani Sutra.			
Paid Transcribing charges, ...	6 3 0		
		6 3 0	
Vaya Purana, ...	1 8 0		
		1 8 0	
Poems of Chand, ...	6 2 3		
		6 2 3	13 8 0
Carried over, Rs.		12,225 2 1	

RECEIPTS.				1869.			1868.
Brought forward, Rs.				18,316	2	0	
BALANCE OF 1868.							
In the Bank of Bengal, ...	...	115	15	8			
Cash in hand,... ...	...	0	0	0			
				115	15	8	
Rs.				18,432	1	8	

DISBURSEMENTS.				1869.			1868.		
Brought forward, Rs.				12,225	2	1			
Asiatic Society of Bengal, ...	424	9	9				489	12	8
Babu Tarinicharana Chackravarti, ...	10	10	0						
Babu Brajabhusana Dása, ...	26	1	0						
F. Samasa Charyar, Esq., ...	0	2	0						
Captain Valadeva Pant, ...	2	5	0						
Challapali Rangaiya, ...	11	13	0						
Damura Vallabha, ...	1	13	0						
Ramswami B. Eaidor, ...	12	8	0						
Thakura Griprasad Sing, ...	31	0	0						
V. B. Soobiah, ...	18	9	0						
J. W. McCrindle, ...	30	8	6						
J. H. Lloyd, Esq., ...	3	11	0						
				573	10	3			
				12,798	12	4			
BALANCE OF 1869.									
In the Bank of Bengal, ...	5,559	8	1						
Cash in hand, ...	73	13	3						
				5,633	5	4			
Rs.				18,432	1	8			

Examined,
Sd. PRATÁPACHANDRA GHOSHA.
Asst. Secry.
Asiatic Society, Bengal.

Errors and Omissions excepted,
Sd. BUDDINATH BYSACK.
Cashier,
Asiatic Society, Bengal.

Audited and found correct,
R. TEMPLE, K. C. S. I.
D. WALDIE, F. C. S.

STATEMENT, No. 3.

Showing the Assets and Liabilities of the Asiatic Society of Bengal.

ASSETS.		1869.	1868.
Cash.			
In the Bank of Bengal, viz. :—			
Account Dr. J. Muir, Rs. 898 10 0			
Account Asiatic Society, ...	1,411 4 7	2,309 14 7	2,261 10 9
Cash in hand, ...		128 1 9	92 9 7
Government Securities, ...		2,000 0 0	2,000 0 0
		4,438 0 4	4,354 4 4
OUTSTANDING.			
Subscription, ...		6,266 5 8	6,369 5 8
Admission fees, ...		256 0 0	416 0 0
Library—Sale of Books, ...		426 8 0	310 12 0
Journal—Subscription, ...		980 12 0	906 9 0
Ditto, Sale ditto, ...		481 8 9	274 12 9
Conservation of Sanscrit MSS. ...		458 10 6	0 0 0
Sundries, ...		96 5 0	0 0 0
Rs.		8,966 1 11	8,277 7 5

LIABILITIES.		1869.	1868.
Salary and Establishment,	Rs.	234 14 8	260 0 0
Baptist Mission Press, ...	...	1,000 0 0	3,781 5 3
Dr. J. Muir, ...	...	898 10 0	1,000 0 0
Messrs. Williams and Norgate,	...	600 0 0	642 0 0
Plates for Journal and Proceedings (of 1869), ...	...	367 10 6	0 0 0
O. P. Fund, ...	...	104 0 7	0 0 0
	Rs.	3,205 3 9	5,683 5 3

Examined.
Sd. PRÁTAPACHANDRA GHOSHA.
Asst. Secry.
Asiatic Society, Bengal.

Errors and Omissions Excepted,
Sd. BUDDINATH BYSACK,
Cashier,
Asiatic Society, Bengal.

Audited and found correct,
R. TEMPLE, K. C. S. I.
D. WALDIE, F. C. S.

STATEMENT, No. 4.

Shewing the Assets and Liabilities of the Oriental Publication Fund of 1869.

ASSETS.		1869.			1868.		
In the Bank of Bengal,	Rs.	5,559	8	1	115	15	8
Cash in hand, ...	...	73	13	3	0	0	0
Government Securities,	...	3,500	0	0	5,000	0	0
Bibliotheca Sale and Subscription, ...		792	7	3	672	6	9
Government allowance for December 1869, ...	...	750	0	0	500	0	0
Asiatic Society of Bengal,	...	104	0	7	0	0	0
Total, Rs.		10,779	13	2	6,288	6	5

LIABILITIES.		1869.			1868.		
Salary and Establishment for December, 1869, ...	...	77	13	4	90	0	0
Printing charges, ...	...	100	0	0	0	0	0
Total, Rs.		1,077	13	4	0	0	0

Examined.
Sd. PRÁTAPACHANDRA GHOSHA,
Asst. Secy.
Asiatic Society, Bengal.

Errors and Omissions Excepted,
Sd. BUDDINATH BYSACK,
Cashier.
Asiatic Society, Bengal.

Audited and found correct,
R. TEMPLE, K. C. S. I.
D. WALDIE, F. C. S.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

EDITED BY

THE HONORARY SECRETARIES.

JANUARY TO DECEMBER,

1871.

CALCUTTA.

PRINTED BY C. B. LEWIS, BAPTIST MISSION PRESS.

1871.

CONTENTS.

ERRATA.

Page	*Line*	*For*	*Read*
2,	9,	H. W. Seevens,	H. W. Stevens.
36,	16,	Hootoone,	Hootoom.
56,	14,	M. S. Howell,	A. P. Howell.
„	16,	Filgatte,	Filgate.
„	22,	Bourn,	Bourne.
82,	3rd from below,	Insert,	A. P. Howell, Esq.
84,	2,	possess,	possesses.
„	7,	This,	It.
106,	23,	'tail 0″.6.'	'tail, 1″.2.'
107,	2,	*Cynonycterus*,	*Cynonycteris*.
„	„	$\frac{1}{4}$,	$\frac{4}{4}$.
131,	17,	'sun a moon's limb.'	'sun and moon's limb.
„	29,	'3′-2″.7‴,'	'—3′-2″.7‴.'
„	30,	'4′-11″,'	'—4′-11″.'
134,	„	*after* In. $\frac{2\text{-}2}{6}$,	*insert* C. $\frac{1-1}{1-1}$.
225,	10,	Prákria,	Prákrita.
„	11,	Vyakuranam,	Vyákaranam.
247,	3,	Hálim,	Hátim.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JANUARY, 1871.

The monthly meeting of the Society was held on Wednesday the 4th instant at 9 o'clock P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced.

1. From the Government of India, Home Department, 5 photographs of the temples and inscriptions at Barsee Taklee and Pinjar.

2. From the Author—Rückblick auf die Jahre 1845 bis 1870, Schreiben von W. R. von Haidinger an Herrn E. Döll.

3. From Dr. Newman—five silver coins.

4. From H. v. Schlagintweit-Sakünlinsky—a revolving scalo for measuring curved lines on maps, &c.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected ordinary members.

Isaac Newton, Esq.
R. S. Brough, Esq.
F. C. Daukes, Esq.
Bábu Ganendranátha Thákura.

The following gentlemen are candidates for ballot at the next meeting.

T. F. Harkness, Esq., C. S., proposed by A. M. Markham, Esq. seconded by Col. A. D. Vanrenen.

Col. J. F. Tennant, proposed by Col. H. Hyde, seconded by Dr. F. Stoliczka.

Dr. W. Waagen, proposed by Dr. F. Stoliczka, seconded by Mr. H. Blochmann.

G. C. Farr, Esq., proposed by Mr. E. Hyde, seconded by Col. H. Hyde.

The following gentlemen have intimated their desire to withdraw from the Society, C. F. Amery, Esq., Capt. J. P. Basevi, R. E., T. Thomas, Esq., H. W. Seevens, Esq.

The Council reported on the progress which has been made in the collecting and preservation of Sanskrit MSS., and communicated the subjoined correspondence on the subject.

In laying this correspondence on the table the President observed, that inasmuch as the measures proposed and subsequently undertaken for the conservation of Sanskrit MSS., and the preparation of Catalogues, were communicated to the Society, in May 1869, the Council thought it right to inform the Society of the progress which had since been made in the matter. He referred to the original instructions of the Government, and the few alterations which have been suggested by the Society. The task was entrusted to Bábu Rájendralála Mitra, whom the Government had recommended for it. One instalment of the "Notices &c." had been published and was on the table before them. It would be seen that this was not in the tabular form which the Government at first contemplated, but the deviation from it had been sanctioned by the Government of Bengal in their letter, dated 22nd May, 1869, and whether or not every one would consider it judicious, there were certainly very substantial reasons to be urged in support of it. When these "Notices" were submitted to Government, no objection was taken to the form of the publication, but it appears that the advisers of the Government considered that it was defective in certain important points. The President quoted a passage to this effect from an official letter of the Government of India. He could not better explain the error into which the Government had here fallen, than by reading the answer which the Secretary of the Society had written in behalf of the Council. In conclusion

he said it was almost incomprehensible, how the blunder came to be committed, not only in the Secretariat to the Government of India, but also by a scholar like Mr. Chalmers, to whose very positive but mistaken observations the President referred. These gentlemen must have penned their strictures without having read the Sanskrit, and yet it was in Sanskrit, that the Government letter directed the principal matter of the lists, inclusive of the very matter in question, to be published.

No. 395.

Asiatic Society's Rooms, Calcutta, 27th June, 1870.

From F. STOLICZKA, ESQ. PH. D.,

Honorary Secretary, Asiatic Society of Bengal,

To the HON'BLE ASHLEY EDEN,

Secretary to the Government of Bengal.

SIR,—Referring to the correspondence, noted at margin, regarding the conservation of records and purchases of Sanskrit Manuscripts in native libraries, I am desired by the Council of the Asiatic Society to forward a copy of Bábu Rájendralála Mitra's report on the subject, explaining the operations which have been instituted by the Society for that purpose, in accordance with the orders of the Government of Bengal.

No. 5557 dated 23rd Nov., 1868 Govt. of Bengal.
" 309 " 1st May, 1869 As. Soc "
" 1949 " 22nd " " Govt. "

A specimen copy of No. 1 of the "Notices of Sanskrit MSS." is herewith enclosed, as well as copies of the lists noted in para. 8th of Bábu Rájendralála Mitra's letter.

The slight alteration in the arrangement of printing has also been explained by Bábu Rájendralála Mitra, and the Council of the Society hopes that this change will be advantageous.

The expenses incurred by the Society for the above object of collecting MSS. during the latter half of the official year, 1869 and 1870, are detailed in the accompanying bill, and in submitting the same for the consideration of the Government of Bengal, I am desired by the Council of the Asiatic Society of Bengal to request that the Society may be sanctioned to draw a quarterly or half yearly advance, equal to one fourth or one half of the annual grant sanctioned for the purpose. A detailed statement of the half

yearly expenses will be prepared and submitted to the Government of Bengal, if desired.

Bábu Rájendralála Mitra expects to publish annually 3 or 4 numbers of the Notices of Sanskrit MSS.; of No. 1 of these Notices 150 copies have been printed, and they are now at the disposal of the Government of Bengal.

With regard to the distribution of the Notices, I am desired by the Council of the Asiatic Society to submit a list* of names to whom copies could be sent, for the favourable consideration of the Government of Bengal. The spare copies of these "Notices," the Council would suggest, may be sold to the public at one Rupee per number.

From BA'BU RA'JENDRALA'LA MITRA,

To the Secretary, Asiatic Society of Bengal.

Dated, Chitpur, 24th May, 1870.

SIR,—I have the honor to submit the following report on the operations carried on during the last official year for collecting information regarding Sanskrit MSS. extant in native libraries.

2. The final orders of Government on the subject were received in May 1869. I happened to be unwell at the time, and nothing was done until my arrival at Benares in the middle of June following, when I commenced to collect lists of such rare MSS., as were available in that city. Although some ultra orthodox pandits were averse to allow their collection to be examined and analysed for the information of Europeans, I had no difficulty in inducing several persons to allow me access to their Libraries for the purpose of taking notes and copies of such MSS. as I liked, and obtained much valuable information from some of the professors of the local Sanskrit College. Two native gentlemen of the city, Bábu Harischandra and Sitalprasád, very obligingly placed the whole of their collections, each containing upwards of two thousand works, at my disposal, and Pandit Vináyaka S'ástri brought me a few rare MSS. of the Kalpa sutras and of the Sikshás. The Rájguru of Benares and several other pandits also offered me assistance, and I soon had a total of upwards of five thousand MSS. at my disposal. Owing, however, to the delicate state of my health at the time, and my

* This list is omitted in the present communication.

stay at Benares having been limited to seven weeks only, I could not examine more than about half of them. These were mostly works of which the Asiatic Society possesses copies. The few that appeared to me to be new have been included in the accompanying volume of "Notices."

3. The principle on which the notices have been drawn up has already been explained in my minute of April 1869.* I have taken the Catalogue of the Society's Library for my guide, and described only such works as were not included in it, except when better MSS. were met with than are to be found in Calcutta.

4. The plan of quoting the initial and the concluding sentences, as also the epigraphs, which was first suggested by me and approved by Government, rendered a departure form the tabular form originally proposed unavoidably necessary; but none of the heads of information recommended by Mr. Stokes has been omitted, and on the whole the form adopted will, I believe, be found to be in every respect convenient. It has greatly economised space, and obviated the necessity of printing, in narrow columns, long extracts, mostly in verse, and other matter not fit to be tabulated.

5. Among the works noticed I would draw the attention of the Committee to the Upanishads, most of which are rare, and have hitherto been known only through Duperron's translation of the Persian version of Dárá Sekoh. From three to five copies of each of them have now been obtained, and placed at the disposal of Professor Rámamaya Tarkaratna for publication in the Bibliotheca Indica. The little treatises on Vedic Phonetics (Nos. 132 to 136) are also rare, and of considerable interest. Professor Max Müller, in his history of Sanskrit literature notices only one of them—that of Nárada—and the others, therefore, I imagine, will be new to many scholars in Europe. The commentary of Súres'vara on the Brihádáryaṇaka Upanishad and that of Sankaránanda on the Atharva Upanishads are also worthy of note. Most of the dramatic works noticed are not included in the list annexed to Professor Wilson's Hindu Theatre; some of the medical works are also valuable, and the Mahábháshya is remarkable for age and accuracy. Altogether 204 works have been noticed, of which 69 are portions of

* Proceedings, Asiatic Society, Bengal, for May, 1869, p. 127 *et seq.*

the Vedas or commentaries thereon, 26 are treatises on Vedic ceremonials, and 8 parts of the Vedangas; 11 are on the Vedanta, 8 on the Nyáya, and 2 on astronomy, one of them being an exposition of Arabic terms borrowed by the Brahmans. Of grammatical treatises 2 only are included in the list, and of medical compilations 5; but law, rituals, poetry and the drama, are represented in it by 6, 12, 28, and 14 codices respectively.

6. On my return to Calcutta, a pandit was employed on a salary of Rs. 30 a month, and travelling allowances, to proceed to the mofussil. He commenced operations at Krishnagar and in five months collected the names and short descriptive accounts of about four hundred MSS. new to the Society. Among these are included a number of Tantras belonging to the Rájá of Krishnanagar; but few of them are of any great antiquity. Notices of these have been drawn up in the prescribed form, and will be sent to press in the course of next month.

7. In March last, advantage was taken of the Rev. J. Long's trip to Dacca to send the pandit to that district, and he has since been employed there. The field, however, does not seem to be promising, and no work of any value has yet been met with. I have, therefore, asked the pandit to return to Krishnagar, where and in the neighbouring town of Nuddea, the most renowned seat of the Nyáya school in Bengal, there remains yet much to be done.

8. In July 1869, two MS. lists were obtained from the Home Office, one containing the names of 2744 works said to be owned by Pandit Rádhákrishṇa of Lahore, and the other of works supposed by the Nepalese pandits to be rare in the Nepalese Libraries at Khatmandu. Both these have been printed, and copies are herewith submitted for inspection. The first contains the names of a great number of scarce works, but it has been much swelled out by inserting the same treatises under different names in different places. The Nepalese list contains nothing of any value.

9. Nominal lists have likewise been obtained from the renowned Pandit Rangáchári Svamí of Brindaban, and from different parts of Bengal, extracts from which will ere long be published.

10. Much has not been done in the way of purchasing MSS. At

Benares I could obtain only 9 codices, and three have since been purchased in Calcutta, making in all 12 as per margin.*

Purchases.

*Tattvánusandhána.
Tattvaprakásiká.
Baudháyana Sutravirtti.
Baiyásikádhikaranamálá.
Srautapráyaschittachandriká.
Darshapurnamásaprayachittakáriká.
Prayogasára, by Keshada.
Baudháyanás' somayága, incomplete.
Dig-drisya vivaranum ákhyá.
Átmapurána.
Ahitágnere Anteshṭiprayoga.
Chayanapaddhati.
Ekámra Purána.
Ekámra chandrika.
Pingala chhanda sutra with the commentary of Haláyudha.
Sánkhyáyana Grihya Sutra.
Kapila Sanhitá.
Hiranya kesi sutra.
Káma sutra.
4 Sikshás.

Eleven MSS. have likewise been copied. An opportunity lately offered for securing a copy of Sáyaṇa's commentary on the Árchikas of the Sáma Veda, but as the Sciety has resolved to print that work in the Bibliotheca Indica, I did not deem it necessary to avail myself of it.

The following is an abstract of the expenditure incurred by the Society on account of Government for collecting lists of MSS. and preparing copies for press, as also for revising the proofs of the Sanskrit portion of the Notices.

Salary of Travelling Pandit from 14th August 1869 to February 1870 @ 30 Rs., ...	196	0	0
Travelling allowance for ditto for the period ending March 1870,.....	145	5	9
Stationery, postage and stamps for letters, Banghy expenses and Contingencies,.....	85	1	6
Printing charges of forms for collecting materials for Catalogue, ...	70	0	0
Copying MSS. with paper, &c., ...	121	11	6
Salary of Pandit for preparing, copying and correcting catalogues for the press, ...	147	0	0
Purchase of Sanskrit MSS., ...	64	0	0
Rs. ..	829	2	9

No bill has yet been presented for printing the Notices.

The cost will probably amount to Rs. 250 making a total of Rs. 1,079-2-9 against the Government grant of Rs. 3,200. The saving is due to the circumstance of no measures having been taken to commence operations until after the rains of last year. The ex-

penses during the current year will, it is believed, take up the whole of the amount sanctioned.

No. 2017.

From H. S. BEADON, ESQ.,

Offg. Under-Secretary to the Govt. of Bengal

To the Hony. Secy. to the Asiatic Society of Bengal.

Fort William, the 11*th July* 1870.

SIR,—I am directed to acknowledge the receipt of your letter No. 395 dated the 27th ultimo, with its enclosures, reporting the operations carried out by the Society in view to giving effect to the wishes of Government for the discovery and preservation of records of ancient Sanskrit literature, and in reply I am to request that you will convey to the Society an expression of the Lieutenant-Governor's thanks for the trouble they have taken in the matter. His Honor also desires me to acknowledge the services rendered by Bábu Rájendralála Mitra in this undertaking. A copy of your letter and Bábu Rájendralála Mitra's report will be transmitted to the Government of India, and will also be published in the supplement to the *Calcutta Gazette.* A copy of the "catalogue of Sanskrit MSS." and of "notices of Sanskrit MSS." will also be furnished to the Government of India.

2. With reference to paragraph 4 of your letter the Lieutenant-Governor is pleased to sanction the payment of the bill submitted, amounting to Rs. 1,079-2-9, for expenses incurred by the Society in collecting MSS. during the second-half of the financial year 1869-70. The Accountant-General will be instructed accordingly, and will also be addressed in regard to advancing the Society funds to carry on future expenses, subject to adjustment half-yearly, as suggested by you.

3. The Lieutenant-Governor approves of the list proposed by you of persons and institutions to be supplied with copies of the "Notices of Sanskrit MSS.," but desires that the Cambridge University and the Coondoo* family of Bhagyokul, in Dacca, may be added to the distribution list. The number of copies thus to be distributed is seventy-five, and I am to request that of the balance, fifty-five copies may be forwarded to this Government for

* *Vide* your letter No. 281 dated the 10th May 1870.

use and transmission to the Government of India, the remaining twenty copies being sold to the public at 1 Re. per copy.

No. 2734.

From H. S. Beadon, Esq.,

Offg. Under-Secy. to the Govt. of Bengal,

To the Honorary Secy. to the Asiatic Society of Bengal.

Fort William, the 19*th September* 1870.

Sir,—With reference to my letter No. 2017, dated the 11th July 1870, the subject of the discovery and preservation of records of ancient Sanskrit literature, I am directed to forward for the information of your Society the accompanying copy of a letter* from the Government of India in the Home Department, containing the views of His Excellency the Governor-General in Council on the operations of the Society in this undertaking.

* No. 3963 dated the 29th ultimo, and enclosure.

2. It will be seen that the catalogues ["Notices of Sanskrit manuscripts"] are considered incomplete in some points, which tend materially to lessen their value and usefulness, especially to European scholars, and the Government of India accordingly desire the insertion in the "Notices" of the names and addresses of the persons to whom the manuscripts belong, the places in which they are deposited, the number of pages in each manuscript, the number of lines in each page, and the peculiarities of the manuscripts, in order to afford a ready means of identifying them hereafter. The directions can be easily followed in all "Notices" that may be published hereafter, but this is of course not possible in the volume already printed. I am, however, to suggest that effect might be given to the wishes of the Government of India by adding a supplementary list of the manuscripts drawn up numerically with the additional information.

3. The Government of India, it will be noticed, desire to add† sixteen names to the list of persons and Societies to whom copies of the "Notices" are to be circulated, and point out several typographical errors in the names in the list of the Society.

† The Cambridge University has already been included, *vide* paragraph 3 of my letter above quoted.

4. In conclusion I am to invite attention to the suggestion made by the Government of India in paragraph 5 of their letter regarding the use of better paper and type in printing the "Notices."

From E. C. Bayley, Esq., C. S. I., Secretary to the Government of India, Home Department, to the Officiating Secretary to the Government of Bengal, General Department,—(No. 3963, *dated Simla, the* 29*th August*, 1870.)

SIR,—I am directed to acknowledge the receipt of your letter No. 2018, dated the 11th ultimo, and the enclosed correspondence, showing the operations carried on by the Asiatic Society of Bengal in regard to the discovery and preservation of records of ancient Sanskrit literature.

2. In reply I am directed to state that the efforts that have been made by the Asiatic Society to give effect to the wishes of the Government for the discovery and conservation of these Sanskrit manuscripts are satisfactory. I am, however, to point out that the catalogues received with your letter are incomplete in some points, which tend materially to lessen their value and usefulness, especially to European scholars.

3. It is very desirable that the names of the persons to whom the manuscripts belong should be inserted in the notices, as should also the places in which they are deposited. This might still be done by adding a supplementary list of the manuscripts drawn up numerically, with the names of the owners and their addresses opposite. The number of pages in each manuscript, the number of lines in each page, and the peculiarities of the manuscripts, should also be given in the catalogues, as a means of identifying them hereafter.

4. The list of persons and Societies to whom it is proposed to distribute the notices may be also considerably enlarged, and there are some inaccuracies in that list. A corrected copy of the latter is enclosed, (here follows a list of institutions, &c., &c.).

From DR. F. STOLICZKA,

Hon. Secretary to the Asiatic Society of Bengal,

To H. S. BEADON, ESQ.,

Offg. Under-Secretary to the Government of Bengal.

SIR,—I have the honor, by direction of the Council of the Asiatic Society of Bengal, to acknowledge the receipt of your letter No.

2734, dated the 19th September last, forwarding copy of a letter from the Secretary to the Government of India, Home Department, No. 3963, dated Simla, the 29th August, 1870, and stating that the Notices of "Sanskrit Manuscripts" lately submitted by the Society "are considered incomplete in some points, which tend materially to lessen their value and usefulness, especially to European scholars," and that the Government of India accordingly desire the compilation of a "supplementary list of the manuscripts drawn up numerically" with the additional information.

2. In reply, I am directed to state that in the blank form, annexed to the Government of India letter No. 4353, dated 3rd November, 1868, which was forwarded to the Society for its guidance, there are nine columns: 1st for number; 2nd for name, in Devanagari; 3rd for ditto, in Roman character; 4th for subject matter and name of author; 5th for number of pages; 6th for number of lines in each page; 7th for substance on which is written and character; 8th for names of place where and of person with whom found, and 9th for remarks regarding accuracy and peculiarities. Of these, information under the heads 5, 6, 8, 9, it is now said, is wanting in the 'Notices.' On reference, however, to the Sanskrit text it will be seen that the required details regarding the 5th, 6th and 9th heads are given in the second para., and that regarding the 8th in the third para. under each name. The editor has likewise added (10th) the extent of the work calculated according to the Indian method in stanzas of 32 syllables each; 11th, the date of writing whenever available; 12th, the initial words or stanza; 13th, the concluding words; 14th, the colophon which in Sanskrit works serves the purpose of the title page, and 15th, a full description of the work, its contents, history, and literary notices. The Council of the Asiatic Society fail, therefore, to perceive how it has been made out that information under some of the heads had not been supplied, and are driven to suppose that the Sanskrit portion of the "Notices" has been entirely overlooked by the Government of India. From a reference to those Notices, it is clear that more information of an useful character has been supplied than was asked for.

3. It might be said that if all the information had been given in English, it would have proved more convenient. But the word-

ing of the original order of Government left no option to the Society in the matter. It is there distictly laid down that "all procurable unprinted lists of Sanskrit MSS. in native Libraries should be printed uniformly in octavo, in the Nagari character," and the editor could not depart from that positive injunction without laying himself open to censure. The scheme contemplated no quotations or extracts, and the Nagari character could not, therefore, be limited to any one particular part. It may be added that those who will hereafter wish to identify the MSS. noticed, will be men conversant with the Sanskrit literature, and to them the Sanskrit part of the Notices will prove more useful than the English part, while to Indian scholars, at the suggestion of one of whom the work has been undertaken by Government, the Sanskrit will be the only part of use, and for years to come the English will be of no avail. It is scarcely likely that those who know nothing of Sanskrit will interest themselves much in tracing old MSS. in that language.

4. Better paper will be used for the printing of the future Nos. of the "Notices."

The following copy of a minute relating to the cataloguing of Sanskrit MSS. has been received from the Secretary to the Government N. W. Provinces.

"NOTICES OF SANSKRIT MSS. by *Rájendralálá Mitra.*

(1.) "These Notices are most unsatisfactory. The editor states that he has taken "the catalogue of the Asiatic Society's Library for his guide, and has noticed only such works as are not to be found in it."

(2.) "He carefully avoids all mention of where the MSS. he comments on are to be found. He does not state who they belong to, what their value is, or whether Government should endeavour to purchase them.

(3.) "Whenever he gives a sensible notice it seems to be taken from Max Müller's Sanskrit Literature.

(4.) "A catalogue of this kind to be practically useful should contain a report of the places searched for MSS. and the place where each MS. is to be found.

(5.) "It should also mention whether the book is available or not to European scholars. The catalogues of the Bodleian, India Office and Berlin Libraries would shew this.

Sd. J. CHALMERS."

Minute of Bábu Rájendralála Mitra on the above [in a letter addressed to the Secretary].

Mr. Chalmers' criticisms are founded on the same imaginary shortcomings on which the Government of India commented on my unfortunate "Notices;" I have therefore only to refer to the reply lately forwarded to the Government of Bengal on the subject.

The 1st para. of the critique contains a general observation, the value of which depends on what follows. I need not therefore notice it.

The 2nd para. accuses me of having (1) carefully avoided all mention of where the MSS. commented upon are to be found; (2) whom they belong to; (3) what is their value; (4) and whether Government should endeavour to purchase them or not. The first three charges are, as you are aware, entirely unfounded—due either to the critic's not knowing the Sanskrit language, or to his having failed to qualify himself for the task he has assumed, by reading the Sanskrit portion of the Notices which would have at once shown him that the required information has been duly furnished. The last charge cannot be fairly brought against me. I am required by Government to print lists, and nothing but lists, in order that Sanskrit scholars in Europe and India may point out what MSS. should be purchased. The words of the Government letter are: "To print uniformly all procurable unprinted lists of Sanskrit manuscripts in Indian Libraries, and to send them to the various learned Societies of Europe, and to individual scholars in Europe and India, with an intimation that the Government will carefully attend to their suggestions as to which of the manuscripts therein mentioned should be examined, or transcribed." I have quoted this part of the letter in my Preface, and as Mr. Chalmers has read it, he should have suggested what MSS. are worth having, and not found fault with me for not doing what he as a

scholar and others are required to do. Sanskrit scholars in Bengal are exceedingly averse to sell MSS., but when opportunities do offer I never fail to take advantage of them, and purchase for Government whatever, in my humble opinion, appears valuable.

The 3rd para., without directly charging me with having cribbed from Max Müller's ancient Sanskrit Literature, insinuates that I have done so. I cannot but take this as unfair. I have given the name of Max Müller whenever I have quoted from him, and shall be glad to be shewn an instance to the contrary.

The 4th para. repeats the first charge of the 2nd, and therefore calls for no further remark.

The 5th contains a suggestion, but the published portion of the "Notices" should have shewn to Mr. Chalmers that it was uncalled for. I have quoted from Aufrecht's Catalogi codicum manuscriptorum Bibliothecae Bodleianae, and from Weber's Verzeichniss der Sanskrit-Handschriften, the only Berlin catalogue accessible to me. Mr. Chalmers seems not to be aware that no catalogue of the India House Library has yet been published, and therefore it is impossible to quote from it. I have lately got a MS. list of the contents of that Library through the kindness of Dr. Rost, and intend to notice it when necessary.

The real cause of the misunderstanding lies in the expectation that the Notices should serve the purpose of a catalogue raissonè which they do not profess to do, nor were they originally required to do. The Society undertook to supply only lists in the Nagari character of MSS. still extant in the country, with brief notes of their contents, in order that future scholars in Europe may be enabled to compile a complete catalogue of Sanskrit literature, and not to supply that desideratum now. The Government is of opinion that the time has not yet come for a comprehensive scheme of this kind, and if this be borne in mind, the "Notices" will not be found to be so defective as they are said to be.

The President placed on the table diagrams exhibiting the diurnal oscillations of the barometer observed by him at Dalhousie during a portion of last October. He did so, not on account of the merits of these curves, for they were only rough approxima-

tions to the truth, but in order to press on the attention of members of the Society the importance of observations of this kind in India. He mentioned the part which, according to a very generally received theory, the presence of vapour had in effecting the double maximum, and pointed out that this country seemed to afford extraordinary opportunity for the complete investigation of this subject.

Col. the Hon'ble R. Strachey begged to differ altogether from the views put forward by the President, and characterized the doctrine which attributes the daily oscillations of the barometric pressure solely to the influence of vapour in the atmosphere as a dogma. The actual tension of vapour at any place does not represent the portion of the total atmospheric pressure, due to the pressure of the vapour, and the difference between the total pressure and the vapour tension is not the pressure of the dry air. The very numerous barometric and hygrometric observations which he (Col. Strachey) had made in the plains of India and in the Himalayas, up to elevations of between 18 and 19000 feet, speak entirely against this view—which he thought had first been put forward by General Sabine,—inasmuch as the same fluctuations in the total pressure, which are to be observed in the plains, are equally marked at high elevations in Tibet, where there is extremely little moisture in the atmosphere. Col. Strachey referred to a paper which he had published on the subject some years ago in the Proceedings of the Royal Society on the distribution of vapour in the atmosphere, in which the data for the above conclusions of his were given at length. He said that the day maximum and minimum are unquestionably connected with the heating of the air by sun, and can be explained by the dispersion of the air over that part of the earth's surface where the temperature is highest, and its accumulation to the east and west of the most heated area. That this is the true cause of the phenomenon is also indicated by the fact, proved by observation, that the time of day maximum and minimum change according to the hour at which the sun rises and sets in different localities. The explanation of the nocturnal maxima and minima is more difficult, but they are probably secondary results of the diurnal changes of temperature.

Colonel Strachey noticed certain modifications of the usual daily maxima and minima in the atmospheric pressures, to be observed in the hills. These must be considered as purely local, and are to be explained as caused by certain disturbances of the planes of equal pressure in the air, due to the unequal expansion of the variable depth of air over the plains and mountain slopes, which again are followed by currents of air between the plains and the hills. During the day, the air is heated over the plain and forms a superior current toward the mountain, at night the converse takes place and gives rise to an inferior current towards the plain. These changes are quite analogous to the daily sea and land-breeze.

Dr. Stoliczka observed that he was struck with the great regularity with which the maxima and minima in the atmospheric pressure return at high elevation. He had made observations for two successive years on the elevated plains of Tibet, between 15 and 20,000 feet, and found that as a rule the maxima fell about the hour of 10 A. M. and 11 P. M., the minima between 3 and 5 P. M. and about 3 A. M. Certainly the regular oscillations of the atmosphere in these regions could not be attributed to the existence of vapour, for there is almost none whatever present. The annual rain fall scarcely amounts to half an inch.

In reply to remarks which fell from Col. Strachey, the President said that nothing could be further from his mind than any intention to set up or maintain the "dogma" which Col Strachey attributed to him. In truth he had brought the matter forward solely for the purpose of urging that observation and research were still needed, and that the peculiar facilities of India in this respect were neglected. We had it in our power to make observations, with variations of condition as to elevation, humidity and temperature, such as could hardly be secured elsewhere. We could almost be said to be able to experiment in this subject, so great were our opportunities of making simultaneous observations at different heights in pretty nearly the same vertical line, and at variously situated stations, distributed over a largely extended surface of the earth. The advantages offered by the character, and position of the country for analysis of the elements of the problem and comparison of results seemed to be in a great measure unheeded. They could only

be effectively made use of by combined action, and of this at present it could hardly be said that there was any.

The following papers were brought before the meeting.

1. Notes on the district of Dera Ismail Khan, by T. W. H. Tolbort, Esq., C. S.

This paper contains notes on the history, archæology, and natural productions of the district; it will shortly appear in the Journal of the Society.

2. On the antiquity of Indian Architecture, by Bábu Rájendralála Mitra. (*Abstract.*)

The oldest remains that have come to light are the pillars of As'oka, and they are not of a greater age than the middle of the third century before Christ. Hence an opinion is gaining ground that the ancient Aryans were not proficient in the art of building substantial edifices with stones and bricks, and that the primitive Hindus were dwellers in thatched huts and mud houses. Mr. Fergusson, who has adopted this opinion, adds that the Hindus learnt the art of building from the Grecians who came to India with Alexander, and that the oldest specimens of architecture in the country appear to be in the first stage of transition from wood to stone. The author combats these opinions by a number of quotations from the Rig Veda—a work generally believed to be of the same age with the Mosaic chronicles—in which allusions are made to fortified towns, large palaces, three-storied dwellings, bricks, pillars and other objects which could not have existed without masonry works of some kind or other. Quotations are also given from Pánini, the Rámáyana and the Mahábháratha to prove the existence of masonry houses at a very early period of Indian history. It is denied that the Buddhist religion—a mere reformation of the old Hindu faith—could have any influence in originating architecture, and the invasion of Alexander, is compared to the recent British expedition to Abyssinia, in which very little impression was produced on the domestic arts of the Abyssinians. It is difficult to believe that Alexander brought any large number of quarriers, masons, and architects to leave some behind for the education of the people of

the country in architecture, and it would be absurd to suppose that a king, like As'oka, who is presumed to have originally lived in thatched huts, would of his own accord send for architects and quarriers from Greece to build him a palace. In reply to the argument founded on the ornaments of old Indian architecture being copied from wooden originals, it is contended that they do not suffice to indicate the exact age when the transition first took place, inasmuch as there is a spirit of conservatism, a mannerism or a survival of custom in architectural ornamentation, so strong that it preserves intact forms long after the lapse of the exigencies which first lead to their production, and such evidence, therefore, cannot be accepted as conclusive.

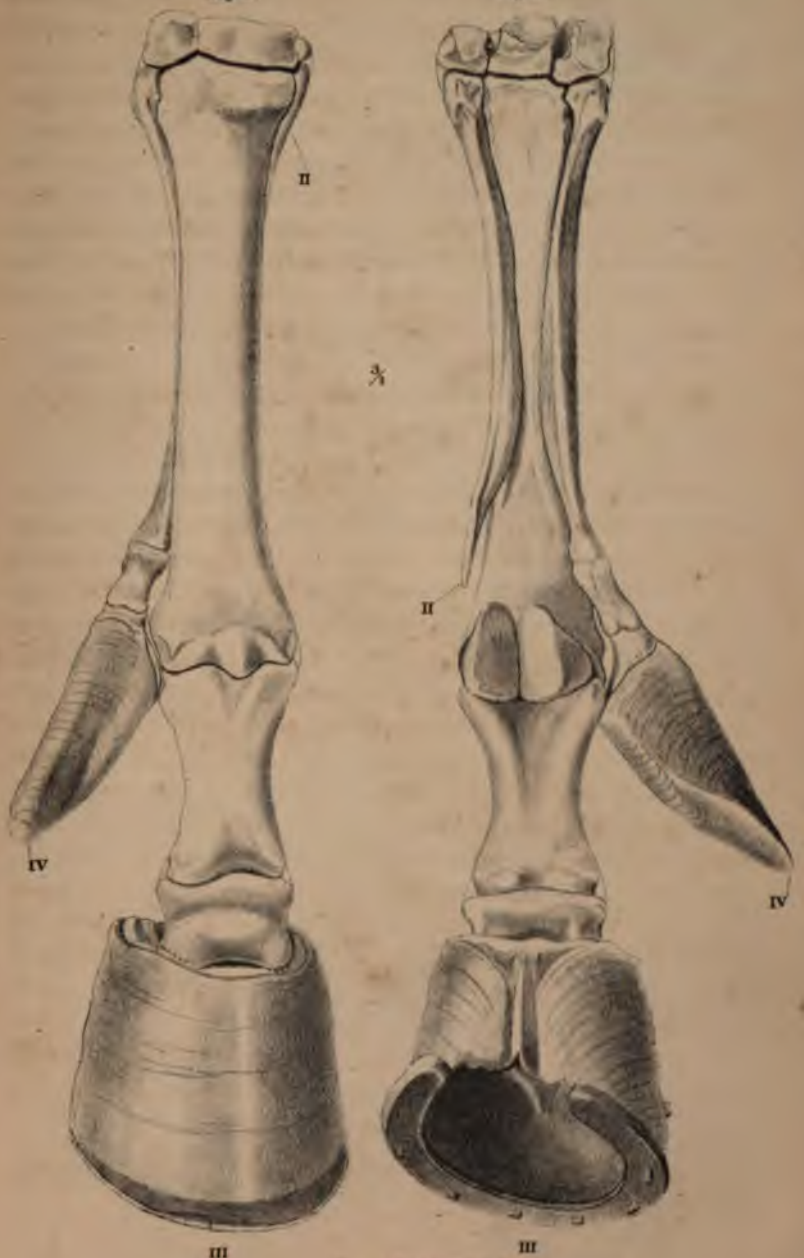
Rev. K. M. Benerjea made some observations in support of the views expressed by Bábu Rájendralála Mitra.

Mr. Wood-Mason exhibited an interesting case of polydactylism (see pl. I), in a horse from Bagdad, and remarked that the splint-like rudiments of the metacarpals of the fourth toe on each fore-foot (iv. in figs. 1 et 2 of pl. I) had given rise to a supernumerary digit provided with the regular number of phalanges and encased in an asymmetrical hoof; the asymmetry of which was such, that the presence of another of the same shape internally to it would have formed a symmetrical pair, like the cleft hoof of a ruminant. The metatarsals of the fourth toe on each hind foot were by the law of correlation similarly affected, but the supernumerary hoofs of these were stouter and more irregular in shape. He next mentioned the fact that M. Arloing in a recent contribution* to our knowledge of the organization of the foot of the horse had described a polydactyle horse with the extra digits developed from the rudiments of the second toe (ii. in figs. 1 et 2); the hoofs of these only differed from those of the principal digits in their smaller size. He next distinguished between those monstrosities† that had resulted from injuries received by the embryo *in utero* or in the egg, between those which might be said to be due to the "anomalous retention of embryonic

* Ann. des sc. nat. (zool.), 5e Sér., vol. viii, pp. 55 et seqq., pl. 1.

† For full information on the subject of monstrosities *vide* Darwin's "Animals and Plants under domestication."

Fig. 1. Fig. 2.



For reference see p. 18

characters," and those that took the form of the re-development of visible rudiments of digits, or other structures, normally present in some remote ancestors of the group to which the individual affected belonged. This explanation applied to the polydactyle foot figured on the accompanying plate (I.). The resemblance to the extinct *Hipparion** would have been perfect if the two outer toes on each foot had been developed. In illustration of these remarks, he traced the Horses back in time to their three-toed progenitors, *Hipparion* and *Anchitherium*, whose remains abounded in the miocene deposits of Europe, India (in the Sewalik-hills), and America : in *Hipparion* the two outer toes of each foot possessed the same number of phalanges as the principal toe, but were reduced to mere dewclaws and did not touch the ground ; in *Anchitherium*, on the the other hand, they were nearly equal in size to it. The figures sufficiently showed the great length and breadth of the "splints" (ii. et iv. in figs. 1 et 2), and the obtuseness of their distal extremities as compared with the slender, finely pointed character of these same structures in an ordinary horse.

Explanation of Plate I.

Fig. 1. Front view of right carpus (*minus* the proximal series of carpal bones) of a polydactyle horse ; ½ nat. size.

Fig 2. Posterior view of same.

The Roman numerals ii, iii, iv refer to the 2nd, 3rd and 4th digits respectively in both figures.

The following papers were received.

On terrestrial Mollusca from the neighbourhood of Moulmein, Tenasserim Provinces, by Dr. F. Stoliczka.

Monograph of the Indian *Cyprinidæ*, Pt. I, by Dr. F. Day.

LIBRARY.

The following additions have been made to the Library since the meeting held in December last.

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Institution of Great Britain, Vol. V. Part VII.—THE INSTITUTION.

Journal of the Chemical Society, Sept., 1870.—THE SOCIETY.

* *Vide* the magnificent memoirs of M. Gaudry and Dr. Leidy, and in connexion therewith Prof. Huxley's Presidential address to the Geolog'cal Society of London, February, 1870.

Journal of the Royal Asiatic Society of Bombay, Vol. IX. No. 26.—The ROYAL ASIATIC SOCIETY OF BOMBAY.

Monatsbericht der K. Akademie der Wissenschaften zu Berlin, Juli, 1870.—AKAD. DER WISSENSCHAFTEN ZU BERLIN.

Zeitschrift der deutschen Morgenlændischen Gesellschaft, Band XXIV, Heft 3.—THE EDITOR.

Rahasya Sandarbha, No. 62.—THE EDITOR.

The Pali Text of Kachchayano's Grammar, by F. Mason.—THE EDITOR.

Professional Papers of Indian Engineering, No. 29.—THE EDITOR.

Memoir of Dwarkanath Tagore, by Kissory Chand Mittra.—THE AUTHOR.

Memoirs of the Geological Survey of India, Palæontologia Indica, Vol. III. Nos. 1—4.—Icones Plantarum India Orientales, by Major H. Beddome, parts 4-6.—Flora Sylvetica, by Major H. Beddome, parts 3—5.—Selections from the Records of Government, Home Department, No. 80, Foreign Department, No. 81.—THE GOVERNMENT OF INDIA.

Records of the Geological Survey, Vol. III, Nos. 3-4.—THE GOVERNMENT OF BENGAL.

Purchase.

The Kamil, part 7.—Zenker's Turc-Arabe-Persian Dictionary part 16.—Lond. E. and D. Philosophical Magazine, No. 268.—Annals and Magazine of Natural History, No. 35.—Comptes Rendus, No. 9.—Museum Heineanum by Cabanis, Theil I—IV.

Exchange.

The Nature, Nos. 53—57.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR FEBRUARY, 1871.

The annual meeting of the Society was held on Wednesday, at 9 P. M., 1st February, 1871.

The Hon'ble Mr. Justice Phear, President, in the chair.

The President called upon the Secretary to read the annual report of the Council.

ANNUAL REPORT FOR 1870.

The Council of the Asiatic Society of Bengal, in presenting their annual report for the year 1870, have again to congratulate the members on the healthy condition of activity which the Society has maintained.

During the year under review, there were 28 ordinary members elected, while in the same period, the Society sustained a loss of 57 members. Of this latter number 45 are due to death or resignation, and 12 have been removed from the list for non-compliance with the rules of the Society. The somewhat large number of resignations appears to be partially due to the introduction of the revised rules of the Society, by which members, leaving for Europe, are particularly requested to state, whether they wish that their membership should continue or not. Formerly information on this point was rarely given, and it was greatly on this account that the member list had grown to unnatural dimensions.

At the close of the year, the number of ordinary members was 414; of these 266 were paying members, and 148 absent. A marked decrease in these numbers is to be observed, when the

present year is compared with the past, and even with several of the preceding years, as will be seen from the subjoined table :—

	Paying.	*Absent.*	*Total.*
1861	225	55	280
1862	229	82	311
1863	276	79	355
1864	228	92	380
1865	267	109	376
1866	293	94	387
1867	307	109	416
1868	294	133	427
1869	304	138	442
1870	266	148	414

The Council regret to announce the death of the following ordinary members :—J. Kavenagh, Esq., R. Jardine, Esq., Lieut. R. C. Beavan, Bábu Rádhánátha Sikadára, M. H. Ormsby, Esq., LL. D., Bábu Káliprasanna Siṇha, J. Avdall, Esq., Major J. J. Hovenden, Rájá Sir Deonáráyana Siṇha, Bahádur, K. C. S. I., Dr. T. Anderson, F. L. S.

Although it might at first sight appear that the decrease in the accession of new members, and the somewhat numerous resignations are due to a diminishing appreciation of the scientific efforts of the Society on the part of the public, the Council take pleasure in remarking that such is far from being the case. On the contrary, the Council feel themselves justified in asserting that the interest of the scientific public in the working of the Society has in the last twelve months sensibly increased in India as well as abroad. This is particularly shewn by the largely increased demand for the publications of the Society, the sale of the Journal and Proceedings having been greater than in any previous year, and the Society having also received several offers of various foreign scientific institutions for an exchange of their publications. In no less a degree have the members themselves evinced their interest in the Society by the regularity of their contributions, both in the way of subscriptions and of scientific communications. The actual income of the Society has exceeded the estimate by an appreciable amount.

The numerous communications, forwarded to the Society,—chiefly by its members,—equally shew that the scientific interest in the Society are largely increasing. More than 50 valuable contributions in various branches of science and literature have been received, and this does not include many of the shorter papers printed in our Proceedings.

Museum.

During the past year, the Council of the Society, in accordance with the provisions of Act XVII of 1865, and their previous practice, have continued to transfer all the donations received in the Natural History and Archæological Departments, to the Trustees of the Indian Museum. A detailed statement of these donations has been published in the December Proceedings for last year.

The Council of the Asiatic Society feel it their painful duty to express, at this opportunity, their great regret, that the Government of India will not be able to provide in the new Museum building at the appointed time—23rd March, 1871,—the necessary accommodation, which the members of the Society had a right to expect for their valuable collections. The Council, however, entertain the hope, that the delay in carrying out the provisions of the Museum Act will be only temporary, and that the Government will spare no efforts to give to the public and the Society at the earliest possible moment, the benefits which it is the purpose of that Act to bring about.

Coin Cabinet.

The Society's collection of Coins received an increase of 14 Copper coins, presented by Captain A. Bloomfield, M. L. Ferrar, Esq., and H. J. Rainey, Esq. A set of 17 silver coins has been purchased.

Library.

Within the past year, the Library received an addition of 776 volumes, or parts of volumes. Many of these were obtained in exchange for the publications of the Society, others were purchased, and for a considerable number the Society is indebted to private individuals and to the Government of India. Detailed lists of the monthly accessions to the Library have been regularly published in each number of the Proceedings. In the collection of manu-

cripts, valuable additions have also been made; there were 94 Sanscrit manuscripts purchased or copied, and 6 Persian works were purchased.

The Council regret that it has been beyond their power to make the Library as useful as the members have a right to expect it to be, and as the Council would earnestly desire to make it. The difficulty lies principally in the inadequate space now available for the books. It was chiefly on that account that the new contemplated edition of the Library catalogue has not been completed. The Council will, however, endeavour to remedy this growing evil at the earliest possible opportunity, but they cannot take any effective steps until the Natural History collections are removed from the Society's house.

The collection of MSS. has also been examined during last year. Maulavi Abdul Hakim, under the Secretary's superintendence, checked the Arabic, Persian, and Hindústáni MSS., and Pundit Premchandra Choudhari examines at present the Sanscrit MSS. The Catalogue of the Pundit is to be a catalogue *raisonnè*; he has analyzed about 500 works on grammar, lexicography, prosody, prose and poetry, rhetoric, mathematics, astronomy, and medicine.

All MSS. received since the preparation of the old catalogues have been entered into the MS. catalogues of the Society.

A list of the Societies and other scientific institutions, with which exchanges of publications have been made, is appended further on.

PUBLICATIONS.

The Council have anxiously bestowed continued attention upon the publications, as these constitute the truest indicia of active life in the Society, and they have now the satisfaction to announce that the 49th volume of the Journal will very shortly be completed, and one volume of Proceedings was issued; both will extend over more than 1200 pages, accompanied by 36 plates. It has been the aim of the officers of the Society not only to insure the regularity of issue of the various numbers of the Journal and Proceedings, but also to introduce an improvement in the illustrations accompanying the papers. The value of the improvements effected is clearly indicated by the increasing applications for the various numbers of the Journal and

Proceedings. The sale of these has been during the past year larger than in any previous year, amounting to Rs. 1903.

There have been issued for the year 1870, eleven numbers of Proceedings, equal to 347 pages, (exclusive of appendices), and 5 plates. Of the Journal, part I, (Philology, Archæology, &c., &c., 3 numbers were issued and the 4th is ready for issue ; the part will extend over 304 pages and 13 plates. Part II, Natural History, &c., was issued in 4 quarterly numbers, and includes 432 pages and 18 plates, and in addition 98 pages of Meteorological Observations. Each of these parts can form a separate volume, for each is separately paged, and provided with a special index, &c. &c.

BIBLIOTHECA INDICA.

During 1870, forty-seven fasciculi have been issued of Oriental works, *viz.*, 2 Arabic, 12 Persian, 30 Sanscrit, and 3 fasciculi of English Translations, *viz.*, 1 from the Persian, and 2 from the Sanscrit.

Arabic Works.

Maulavi 'Abdul Hai has issued 2 fasciculi of the Içábah, or Biographical Dictionary of Persons who knew Muhammad. The work was commenced by Dr. A. Sprenger, and continued by Maulavi 'Abdul Haq, whose death temporarily interfered with the progress of the book.

Persian Works.

Of Kháfí Khán's History, Maulavís Kabiruddín and Ghulám Qádir, of the Calcutta Madrasah, have issued six fasciculi. Another fasciculus will complete this important history of the Mughul Emperors of Delhí. Maulaví Ághá Ahmad 'Alí has issued 3 fasciculi of the Maásir i 'Álamgirí, a history of the reign of Aurangzíb. Of the Quarto Text edition of the 'Áín i Akbarí, Mr. Blochmann has issued two fasciculi ; and one fasciculus of the English Translation.

Maulaví Zulfaqár 'Alí, of the Calcutta Madrasah, has brought out one fasciculus of the Critical Persian Dictionary, entitled 'Farhang i Rashídí,' by Maulavi 'Abdurrashíd of Tattah.

Ághá Ahmad 'Alí's introduction to the Sikandarnámah i Bahrí is nearly completed and will shortly be issued.

Sanscrit Works.

In consequence of the additional grant of Rs. 3000 *per annum*, made by the Government of India for the publication of Sanscrit works, announced at the last Annual Meeting, the Sanscrit series has made considerable progress. No less than 30 fasciculi have been issued during the past year, against 9 in 1869 and 5 in 1868.

Bábu Rájendralála Mitra has issued 2 fasciculi of the Taittiriya Bráhmana of the Black Yajur Veda, and one of the Áranyaka. Both works are now almost completed, and an index is in the course of preparation. Pandita Ánandachandra Vedántavágisa has published 10 fasciculi of the Táṇḍya Mahábráhmana, and eight fasciculi of the Srauta Sútra of Látyáyana. The Council have entrusted the publication of the Sáma Veda Sanhitá to Pandita Satyavrata Sámasramí who has already issued the first fasciculus of the same with the Commentaries of Sáyana. Pandita Harachandra Vidyábhushana has published three fasciculi of the Agni Purána, and one of the Gopatha Bráhmana of the Atharva Veda. He has also issued the Gopala Tapani of the same Veda, with the commentary of Visvesvara. Pandita Rámamaya Tarkaratna of the Sanscrit College, Calcutta, has published one fasciculus of the Nrisinha Tápaní with Sankara's Commentary; another fasciculus will complete the work. Pandita Mahesachandra Nyáyaratna has issued one fasciculus each of the Mimánsa Darsana and the Sanhitá of the Black Yajur Veda. Pandita Chandrakánta Tarkálankára is now editing the Gobhila Sútra, and a fasciculus of the same is soon to be issued.

During 1870, Bábu Rájendralála Mitra issued the first number of Notices of "Sanscrit Manuscripts," and a second number has just been published. Bábu Rájendralála's annual report on the work done by the travelling pandit will appear at the end of the official year.

Professor E. B. Cowell issued his translation of the Maitri Upanishad, and Rev. K. M. Banerjea the first fasciculus of his translation of the Brahma Sutra.

The following is a detailed list of works published during 1870.

Old Series, Arabic.—A Biographical Dictionary of Persons who knew Muhammad, by Ibn Hajár, edited in Arabic by Maulavi Abdul Hái, Nos. 225, 226, Fasc. VIII and IX of Vol. IV.

New Series, Persian.—The Muntakhab al Lubab of Khafi Khan, edited by Maulavis Kabir al Din Ahmad and Ghulam Qadir, Nos. 178, 180, 186, 192, 204, 205, Fasc. XIII to XVIII.

The Ain i Akbari by Abul Fazl i Mubarak i Allámi, edited by H. Blochmann, M. A., Nos. 193, 211, Fasc XI, XII.

The Maasir i 'Alamgiri of Muhammad Sáqi Must'aidd Khán, edited by Maulavi Ágha Ahmad Ali, No. 195, 210, Fasc. I, II.

The Farhang i Rashidi by Mullá Abdur Rashid of Tattah, edited and annotated by Maulavi Zulfaqár Ali, No. 200, Fasc. I.

Old Series, Sanscrit.—The Taittiriya Bráhmana of the Black Yajur Veda, with the commentary of Sáyanácharya, edited by Bábu Rájendralála Mitra, Nos. 222, 223, Fasc. XXIII, XXIV.

The Sanhitá of the Black Yajur Veda with the commentary of Mádhava Áchárya, edited by Mahesachandra Náyaratna, Vol. III; No. 224, Fasc. XXIII.

New Series, Sanscrit.—Tándya Mahábráhmana with the commentary of Sáyana Áchárryya, edited by Anandachandra Vedantavagisa, Nos. 179, 182, 188, 190, 191, 199, 206, 207, 212, 217, Fasc. IV to XIII.

The Srauta Sutra of Látyáyana, with the commentary of Agniswami, edited by Anandachandra Vedantavagisa, Nos. 181, 184, 185, 187, 196, 198, 202, 213, Fasc. I to VIII.

Gopála Tápani of the Atharva Veda, with the commentary of Visvesvara, edited by Harachandra Vidyábhushana and Visvanátha Sastri, No. 183.

The Agni Purána, a system of Hindu Mythology and Tradition in the original Sanscrit, edited by Harachandra Vidyábhushana, No. 189, 197, 201, Fasc. I to III.

The Taitteriya Áranyaka of the Black Yajur Veda, with the commentary of Sáyanácharaya, edited by Rájendralála Mitra, No. 203, Fasc. IX.

The Mimánsá Darsana, with the commentary of Savara Swamin, edited by Pandita Mahesachandra Nyáyaratna, Nos. 208, 209, Fasc. IX and X.

Gopatha Bráhmana of the Atharva Veda in the Original Sanscrit, edited by Harachandra Vidyábhusana, No. 215, Fasc. I.

The Nrisinha Tápani with the commentary of Sankara Áchárya, edited by Rámamaya Tarkaratna, No. 216, Fasc. I.

English Translations.—The Ain i Akbari of Abul Fazl i Allami. Translated from the Persian by H. Blochmann, M. A., No. 194, Vol. I, Fasc. IV.

Old Series, Sanscrit.—The Maitri Upanishad with the commentary of Rámátirtha, edited with an English Translation by E. B. Cowell, M. A.

New Series, Sanscrit.—The Brahma Sutras, with the commentary of Sankarácharya translated into English by Rev. K. M. Banerjea, No. 214, Fasc. I.

FINANCE.

The Council has already had occasion to remark that the financial condition of the Society is satisfactory. The expenditure has been as much as possible kept within the estimated limits of the various items, regulated by the income. The actual income has exceeded the estimated income by Rs. 745, while at the same time a saving of Rs. 582 was effected in the estimated expenditure, thus making a total surplus of Rs. 1,327, which, added to the balance of Rs. 1,540,* left to the credit of the Society at the close of 1869, makes a grand total of Rs. 2,867. The reserved funds of the Society in Government Securities, amounting to Bs. 2000, remained the same as in the previous year.

The Council were anxious to secure this surplus for the benefit of the Society, because they expect that in a short time a considerable outlay will be required for the repairs of the building, and they are equally alive to the necessity of increasing the amount, to be devoted for the proper accommodation and arrangement of the library, as soon as sufficient room for it can be obtained.

An abstract of the accounts for the year 1870 is shewn in the subjoined table :—

INCOME.

		Actual 1870.		
Admission fees, ...	Rs.	864	0	0
Subscriptions, ...	..	8,812	10	0
Publications, ...	..	1,903	1	3
Library, ...	..	752	14	0
Coin Fund, ...	..	0	0	0

* Excluding Rupees 898-10-0, held in trust for Dr. J. Muir.

Secretary's Office, ...				287	6	0
Vested Fund, ...				110	0	0
Miscellaneous, ...				914	4	10
				13,644	4	1
Col. E. T. Dalton's Ethnology of Bengal, ..				5,000	0	0
Conservation of Sanscrit MSS., ...				3,703	2	9
				22,347	6	10
Balance of 1869, in the Bank of Bengal :						
Dr. J. Muir, ...			898 10 0			
Asiatic Society, ..	1,411	4 7				
Cash in hand, ..	128	1 9				
			1,539 6 4			
				2,438	0	4
			Rs.	24,785	7	2

EXPENDITURE.

Publications, ...Rs.	5,239	13	5
Library,....	2,472	3	3
Secretary's Office,.....	2,585	2	3
Building, ...	910	10	3
Coin Fund,.....	13	6	4
Vested Fund,.....	0	4	4
Miscellaneous, ...	1,633	7	10
	12,854	15	8
Ethnology of Bengal, ...	5,000	0	0
Conservation of Sanscrit MSS., ...	1,527	6	6
	19,382	6	2

Balance of 1870, in the Bank of Bengal.

Dr. J. Muir, ...	898	10	0
Conservation of Sanscrit MSS., ...	1,653	1	9
	2,551	11	9

Asiatic Society, ...	2,725	6	0						
Cash in hand, ...	125	15	3						
				2,851	5	3			
							5,403	1	0
							Rs. 24,785	7	2

Your Council desire to place on record, that they have had under their consideration the very important question of reduction of the subscriptions now contributed by members, whether resident or non-resident. They have calculated the immediate loss of annual receipts which this would produce, and carefully estimated how far and how soon they could justly anticipate that the income of the Society would recover itself. They are confident, that such a reduction of the subscriptions would lead to a future increase of income, by bringing to the Society a considerable increase in the number of members, and would at the same time render that income less fluctuating by placing it on a wider and more secure basis. They felt strongly also that these benefits should be granted to the members of the Society at the earliest possible date: and seeing that the time is now near at hand (23rd March, 1871), when the Society under their contract with the Government of India will become entitled to such permanent addition to their income, as may be realized for the use of the building which they now occupy, (and which is valued and assessed at 400 Rs. per month), they were disposed to recommend to the Society the immediate reduction of the subscription of resident members by one-third, and of non-resident members by one-sixth of their present contributions. Any immediate reduction of income, resulting from this action, would have been more than recouped by the rent of their premises. After a full consideration, however, they have for various reasons resolved to leave this very important question until the time shall have actually arrived, when the Society will become entitled to realize this addition to their permanent income. They confine themselves, therefore, to expressing the hope, based on their conviction of the importance of the matter, that their successors in office may be enabled to satisfy the wishes and just expectations

of the members of the Society by carrying out at an early date this important change.

Rejecting, therefore for the present, the consideration of this question as affecting the income of the Society, the Council beg to submit the following estimate of the probable receipts and expenditure.

	Income.			Expenditure.		
Admission fees,.....Rs.	900	0	0	0	0	0
Subscriptions,.....	8,500	0	0	0	0	0
Publications, ...	1,500	0	0	5,000	0	0
Library, ...	600	0	0	2,600	0	0
Coin Fund,.....	0	0	0	100	0	0
Secretary's Office, ...	0	0	0	2,800	0	0
Miscellaneous, ...	1,000	0	0	1,000	0	0
Building,.....	0	0	0	1,000	0	0
Rs.	12,500	0	0	12,500	0	0

Officers.

The general duties of the Secretary, including the publication of the monthly Proceedings, have been, as likewise in the previous year, carried on by the Honorary Secretaries, Mr. H. Blochmann and Dr. F. Stoliczka. The Philological Part (I.) of the Journal has been edited by Mr. Blochmann, and the Natural History Part (II.) by Dr. Stoliczka.

Colonel H. Hyde carried on the duties of Financial Secretary and Treasurer.

The Council desire to record their satisfaction with the good services which Bábu Pratápachandra Ghosha has rendered to the Society as Assistant Secretary and Librarian; they also favourably report on the services of Bábu Manilala Bysack, and Maulavi Sayyid Waliulla, assistants in the office and library.

List of Societies and other Institutions with which exchanges of publications have been made during 1870.

Batavia :—Société des Sciences des Indes Nederlandses.

Berlin :—Royal Academy.

Bombay :—Royal Asiatic Society.
Boston :—Natural History Society.
Bordeaux :—Bordeaux Academy.
Buenos Aires :—Public Museum.
Bruxelles :—Academie Royale des Sciences &c. de Belgique.
Cherbourgh :—Société Imperiale des Sciences Naturelles.
Calcutta :—Agricultural and Horticultural Society of India.
——— :—Tattvavodhini Sabhá.
——— :—Geological Survey of India.
Christiania :—University.
Dacca :—Dacca News and Planters' Journal.
Dera :—Great Trigonometrical Survey.
Dublin :—Royal Irish Academy.
——— :—Natural History Society.
Edinburgh :—Royal Society.
Germany :—Oriental Society.
Lahore :—Agricultural Society of Punjab.
London :—Royal Society.
——— :—Royal Asiatic Society of Great Britain and Ireland.
——— :—Royal Institution.
——— :—Royal Geographical Society.
——— :—Museum of Practical Geology.
——— :—Zoological Society.
——— :—Statistical Society.
——— :—Geological Society.
——— :—Linnean Society.
——— :—Athenæum.
——— :—Anthropological Society.
——— :—Nature.
Lyon :—Agricultural Society.
Moscow :—Société des Naturalistes.
Münich :—Royal Academy.
Madras :—Government Central Museum.
Manchester :—Literary and Philosophical Society.
New York :—Commissioners of the Department of Agriculture.
Netherlands :—Royal Society.
Paris :—Ethnographical Society.

Paris :—Geographical Society.
——— :—Asiatic Society.
St. Petersburgh :—Imperial Academy of Science.
Vienna :—Imperial Academy of Science.
——— :—Anthropological Society.
——— :—Zoological and Botanical Society.
——— :—Imperial Royal Geological Institute.
Washington :—Smithsonian Institution.

It was proposed by D. Waldie, Esq., and seconded by H. H. Locke, Esq., that the report be adopted.—Carried.

The President requested Mr. H. H. Locke, and Mr. J. Wood-Mason to act as Scrutineers.

During the time that the balloting lists for the election of officers and members of Council of the Society were examined, the President addressed the meeting.

PRESIDENT'S ADDRESS.

GENTLEMEN,—It will be seen from the report of the Council that the administration of our finances during the past year has been effected with care, and has been such as to exhibit very satisfactory results. For this, in great measure, we have to thank our excellent Financial Secretary, Colonel Hyde. The diminution of income, however, which appears to be imminent as a consequence of an apparently growing loss of members, will seriously cripple the Society, unless the current can be turned and our numbers be speedily augmented by new accessions. Unfortunately, the position in which the Society has for some time been, and still is, kept by reason of the non-completion of the New Museum building, is one of grievous embarrassment and disadvantage. The greater part of our house space is taken up by the Museum Trustees under statutable powers for the purpose of displaying the collections to the public. Our valuable library is rendered practically useless, for want of standing ground whereon to range the cases. And we have no room in which we can properly set out the current literary

and scientific periodicals for inspection and daily reference on the part of our members. Thus it has on this account alone become matter of public concern, that the existing state of things should not be prolonged. Moreover, by the Museum Act of 1866, the Council of the Society was in a manner charged with the duty of seeing that the building to be erected by the Government under the terms of that Act for the reception of the Collections should be fit and proper for its object. And the period prescribed by the Legislature for the completion of this building extended only to 23rd March, 1871. When, then, in the early part of the past year it was seen that the Museum building works remained at a stand still, and no sign was given by the Government of any immediate intention to resume them, it became incumbent upon the Council, as well on account of the interests of the Society as by reason of their statutable obligations, to press the exigency of the case upon the attention of Government. Actuated by this double motive, honourable alike, I venture to think on either part, the Council wrote to the Government of India, and received in reply a letter, which appearing as it does to ignore or set aside the original agreement made with the Society, has been to your Council matter of grave concern and regret. I will not, however, dwell upon this unpleasant incident, for after all, it may have been less due to design than to gaucherie and maladroitness in the State Secretariat.

I am sorry to say that the correspondence between your Council and the Government has led to nothing definite. The Council, in their reply to the communication of which I have spoken, while they remonstrated against the attitude which the Government assumed towards them, expressed their readiness to do all in their power to assist the Government out of its difficulties. To this no answer has been returned to us. And the matter therefore stands thus: The Government is under a statutable contract with the Society to complete the Museum building by the 23rd of next month, so far as to render it fitted to receive the extensive natural history and archæological collections which should then be transferred to the Museum Trustees. By the same contract, on the completion of the building, the Society is to have a portion thereof

for its own accommodation, and for the reception of its Library and other property. Our present house would thus, on the Government fulfilling its undertaking, become an additional source of revenue to us. These advantages to the Society were the consideration for the transfer to the Government on behalf of the public of our exceedingly valuable, and in many respects, unique collections. And so far as the public are concerned, this transfer took effect from the time of passing the Act, for it was one of the terms of the Act, that the collections of the Society and the additions thereto (subsequently to be made) should, until the building was so far completed, as to be in a condition to receive them, remain in the Society's house under the care of the Museum Trustees, and should be open to all persons desirous to view the same under rules to be established by the Trustees. This term in the contract has been fully complied with. And the result has been, that for some time past, the Society has been in the situation of need, and embarrassment which I have already described. I do not wish to exaggerate the difficulty which the Council now experiences in merely maintaining the existence so to speak of the Society. It is enough to say that it is very great, and increases every day. By our contract with the Government no doubt we were bound to bear this burden for a time, and we have no right to complain that it has proved to be more heavy than we anticipated. But we are entitled to expect that the Government will perform its side of the bargain, at any rate to the extent of enabling us to get free of the most heavy of our obligations at the appointed date. I wish to assume that it will do so. Although it is plainly impossible that the Museum building should be completed on the 23rd March, we have reason to believe, indeed I may say we know, that the works will be resumed almost immediately, and will be carried on to some sort of completion at, perhaps, no very distant date. It will, however, be a very serious matter to us, if we should be compelled to remain in our present situation until the building be made fitted in any degree to receive the collections. And there is no reason, why we should be called upon to suffer in this way. There is certainly a choice of modes for the Government in which it can afford us relief, and I do not even now doubt that it will adopt one or the

other of them. It is nevertheless much to be deplored that the Government has not yet, at the eleventh hour I may say, made us acquainted with the course which it proposes to pursue.

The Society has, I regret to state, sustained the loss of several valuable members by death during the past year. The names are all given in the Report of the Council, and I will only repeat one or two of them here.

Of these, Mr. Avdall was our oldest member. He was elected so long ago as the year 1826, and always maintained a strong interest in the welfare of the Society. He contributed several papers to the Journal.

Babú Kaliprosona Singh, although at the time of his death still a young man, had distinguished himself by his Bengali translation of the Mahabharat in 18 volumes. He had also translated some Sanscrit Dramas, and was known as the author of Sketches by Hootoone.

Mr. Ormsby, was for a short time one of the Honorary Secretaries of the Society.

And Lt. Beavn was a naturalist of considerable promise.

I have already spoken of the success which has attended the administration of our funds during the year, just terminated and have acknowledged how much we owe to Colonel Hyde for his exertions in this department. We are not the less indebted to our other Honorary Secretaries, Mr. Blochmann and Dr. Stoliczka, who by their unwearied labours, and the application of their great literary and scientific acquirements have brought our Journal, in the Philological and Natural History parts respectively, to a high pitch of excellence. Also both Bábu Rájendralála Mitra and Mr. Blochmann have done great public service by most ably editing, and superintending the publication of the Sanscrit and Persian works which we have been able to issue under the Government grant for that purpose; and the other learned pundits, engaged in the undertaking, have done their work in a manner deserving our best commendation.

The salaried staff of the Society, with Bábu Protapachandra Ghosha at their head, have performed their several duties to the entire satisfaction of the Council.

If I strictly conformed to the custom which generally regulates the character of the presidential addresses in Societies such as this, I should, at this point, endeavour to set out in some detail the more remarkable steps of advance which have been taken in science during the past year. I refrain, however, from following the usual course for two reasons. Firstly, because our table is now so amply supplied with the Journals and Proceedings of the principal scientific bodies of the West, that any of our members can, by a glance at a few title pages, acquire a fuller knowledge of that which has lately been, and is now being done by the Savants of Europe and America, than I could convey to him with the labour of many hours, at the risk after all of passing over his particular subject of interest. Secondly, and indeed I may say chiefly, because I wish to avail myself of this opportunity for the purpose of pressing upon your notice with earnestness, though at no great length, a topic which I conceive to be of considerable moment to the interests of meteorological science throughout the world.

Let me first, however, offer a few words of preface, for I do not assume that all, whom I desire to address, are conversant with the meteorological facts relevant to my object.

We most of us know in a more or less general way that nearly all the more important atmospheric currents, *i. e.* the persistent winds, gales and storms, owe their origin to the vertical displacement of air which, by reason of the sun's action, is continually taking place over a certain equatorial belt of the earth's surface. I need not now describe the process (though it is well to remember that it is not perfectly simple) by which the air over this belt becomes rarified and is caused to ascend. It is enough for my present object to remind you that the immediate consequence of this upward movement is a calm or rather comparative absence of horizontal motion in the air over the belt in question, an *inflow* of air along the earth's surface from the direction of each pole towards and up to this belt and a corresponding *outflow* above, of the risen air from the belt towards the poles.

The rotation of the earth introduces an apparent modification of these simple phenomena. If the surface of the earth were perfectly smooth, the relative course upon it of a free heavy particle, sup-

posed to be approaching the equator and to be moving under the influence of an initial velocity, would in consequence of the rotation, be such as to cut the successive parallels of latitude at continually diminishing angles on the eastern side; and the case would be reversed for a particle receding from the equator. Or to state the same proposition somewhat differently, a particle starting with a given velocity, in passing from the smaller circles of latitude to the larger would, as it went on, seem to observers at each successive point in its course to be coming from a more and more easterly direction, while conversely in passing from the larger circles to the smaller its apparent direction would grow to be more and more westerly. It is true that the earth's surface cannot be considered smooth even as regards its action upon such a mobile fluid as the atmosphere. The horizontal motion of masses of air over the earth is much checked by friction along the surface of contact or more correctly by the obstruction which is afforded by the earth's inequalities of surface. Still the effect of this disturbing cause is upon the whole of a subordinate character; and speaking generally without regard to special localities or occasions, I may say that the law which expresses the motion of a free particle relative to the earth, also gives with some degree of approximation the course of moving portions of the atmosphere. The flow of polar air towards the equatorial belt, of which I have spoken, thus becomes an easterly wind in both hemispheres, while the upper outflow or anti-trade current is westerly and in both cases with a certain exception the longer the course by which the current has reached a given point, the greater is its deviation from a polar direction. This explanation of the trade winds and of the intervening belt of calms was developed, more than a century ago, by Halley and all observations since made have served most fully to demonstrate its truth.

It is comparatively lately, however, that Dove and others have shown that the atmospheric phenomena of the trade and inter-trade regions are but simple cases of the air-movements which take place outside those limits. For instance, the well known veering of winds in the temperate zone is now held to be referable to precisely the same cause as is the peculiar constant direction of the trade-

currents. There is not much difficulty in perceiving one great reason why the problems furnished by the extra-tropical parts of the globe are of especial complexity. The volume of vapour-bearing air which, rising from the equatorial belt and escaping away northwards and southwards, constitutes the anti-trades, must, so to speak, shrink in volume as it proceeds towards the poles. It advances or flows away from the place of ascent in consequence of the superiority of the horizontal pressure which is represented by the sum of its own tension and that of its contained vapour at the height, where the lateral escape occurs over that of the adjacent portion of atmosphere. And it is enabled to pass into and fit itself to the gradually lessening spherical space which, as the result of gravitation, corresponds to the higher latitude of the terrestrial globe, because it gradually cools by radiation on its journey and as it cools contracts. The necessary result of this process is, that the onward flowing mixture of air and vapour comes to be at some point specifically heavier than the comparatively dry air which feeds the trades below it, and which is itself undergoing a converse process. Consequently the upper stream falls, or rather (for it is of course at any considerable distance from the equator generally moving with a high relative velocity) drives through the lower stratum, and makes its appearance on the earth's surface as a steady southwest wind in the northern hemisphere and as a northwest wind in the southern hemisphere. The downcoming in this way of the anti-trades determines the outside edge of the belt, over which the trades prevail, so that on the polar side of this edge the atmospheric phenomena are the resultants of a totally new order of things, namely, a conflict of currents of equatorial westerly winds on the one side with currents of polar easterly winds on the other, the currents constantly shifting beds *inter se* and always varying greatly in hygrometrical condition. We, therefore, see ample reason here for the complexity and variableness of the atmospheric phenomena in the extra-tropical zones.

I have so far entered upon these details, notwithstanding that every one present is probably more or less familiar with them, simply by way of leading the members of this Society and indeed through them, persons outside our body to consider the singular ad-

vantages which India offers for meteorological observation and research. The great peninsula covering as it does scarcely less than twenty-eight degrees of latitude is in various respects so special in its character, that the periodic shiftings of the equatorial wind belts of which I have spoken, have a greater range above its surface or in its neighbourhood than any where else probably in the whole circuit of the globe. Not only does the southern trade belt come up to and over it in the period of the southwest Monsoon, but in the other half of the year the polar edge of the northern trades lies far to the south of the Himalayas, thus bringing some of the principal phenomena of the extra-tropical region well within the observation of the Indian Meteorologist. So low as Calcutta we not unfrequently get warm equatorial breezes and showers of rain about Christmas time. Also neither of the trade winds preserves its normal character in our region. The belt of highest temperature does not, where it transverses this part of Asia in the summer months, mark the locus of minimum atmospheric pressure: observation appears to have shown that this minimum prevails at that time over an extensive area in Central Asia, while there are comparatively small spots of relative minimum within the peninsula itself. On the other hand in the winter months there seems commonly to exist in the northern part of the peninsula a locus of relative maximum pressure. The consequence of these conditions is, that instead of a trade-wind in the ordinary sense of the term, *i. e.* an atmospheric movement effected in approximately parallel currents towards an annulus which is coincident with the diurnal locus of maximum surface temperature, we have as long as the sun is on the north of the equator a *monsoon* converging towards a local focus of low pressure which lies outside that annulus; and at the opposite period of the year we perceive that the wind constantly inclines away, and often apparently blows directly, from a centre in the upper part of India. These recurring phenomena appear to present such a particular case of a general law as is especially valuable for the purposes of scientific inquiry.

Again a consideration of the possible causes which give rise to a separation between the simultaneous positions of places of minimum pressure and of maximum heat respectively, leads us to see another reason for rating highly the importance of

India as an area of meteorological observation. The height at which the mercury of the barometer stands, indicates to us something more than the mere amount of atmospheric pressure on the surface of the mercury in the bowl of the instrument. It gives us the weight of the whole superincumbent column of air and this necessarily varies with the composition of that column. Now with us in India during a great part at least, if not the whole of the year, the vertical atmospheric column is made up of two radically distinct portions, a lower and an upper, the one polar, comparatively cool, dry and dense, the other equatorial warm, vapour-bearing and specifically light. The barometer is immediately affected by any alteration of the relations between these portions. Also the heating of the surface soil has the effect, in an interval of time more or less short, of *diminishing* the air-material in the column which is vertically above it, and of contemporaneously increasing the vapour therein as long as a source of vapour remains at the base. These two changes are, it is manifest, diametrically opposite in character, and it would be impossible to say, *a priori* which would at any given hour prevail over the other. As a matter of fact, almost universally over all zones of the earth's surface, the barometric column exhibits regular diurnal oscillations in its height. In the temperate zones these oscillations are comparatively speaking, small. But in the tropical and subtropical regions the case is different. There, the barometer discloses considerable and, well marked periodic changes of atmospheric pressure during the twenty four-hours, constituting in the whole two distinct oscillations. At different times, various theories have been put forward to account for this phenomenon. I need not now endeavour to specify them in detail. I will, however, very shortly refer to two, in order to indicate the veil of uncertainty which still obscures the subject, and which we cannot hope to pierce except by the force of exhaustive observation. One explanation, which has been very extensively accepted, is based on the particular solar agency of which I have just spoken. The pressure at a given point in the atmosphere (in accordance with a well known law of pressure in elastic fluids) is taken to be the sum of two separate pressures, namely, the tension of the vapour at that point under the conditions

throughout India would have for science generally, and as means for the solution of this question in particular, under careful analysis and comparison? Every condition affecting the supply of vapour through the action of heat at the earth's surface, is a cause which influences the local atmospheric pressure in a direction contrary to that in which the heat alone operates, and we find such conditions existing in notable opposition of extreme throughout the countries which are immediately subject to Her Majesty's Indian Government. Need I contrast the maritime and the continental tracts, the deltas and the inland plateaux, the plains and the mountain peaks which I may say are paired against each other from the Himalayas to Point de Galle (more than the breadth of the northern tropic) and from the west coast of Malabar to the Salween. In truth we possess in India almost unrivalled opportunities for examining and analysing the atmospheric column in all its parts.

Doubtless the daily periodic changes of pressure, by their very nature, are ineffective to cause anything more than very limited oscillatory local movement of air masses. These movements, however, are not always insignificant in themselves, as for instance the land and sea breezes of our coast districts, the winds on the outer flanks of mountain ranges and in mountain valleys and the diurnal modifications of the Monsoon which we experience in Calcutta. But the daily phenomena of this class are especially important, because they are both the type and the material of those annual variations which are serious enough to be the governing forces in regard to the winds of this portion of the globe. We may in this matter liken the year to one long day with the solstices for midnight and noon. The gradual increase of temperature which takes place over the greater part of the earth's surface from a minimum in the winter months to a maximum in the summer months is (as in the case of a day of 24 hours and probably for a common reason) generally speaking accompanied by a double oscillation of the atmospheric pressure. In places of western Europe near the sea, where I may remark the source of vapour is unlimited, both sets of maxima and minima are I believe invariably strongly marked, the summer maximum which is attributed to the vapour, being commonly

the absolute maximum. But with advance into the interior of the continent, the phenomena change. For instance at St. Petersburgh, the summer maximum divides itself into two subordinate maxima. Further on, as at Moscow, these two relative maxima are still found, but their absolute magnitudes are diminished and the sinking between them increased; and finally on this side of the Ural the summer maximum disappears altogether. The explanation which is commonly given, is that which I first referred to in accounting for the diurnal oscillations of the barometer. It is argued with much force that the rise towards a maximum goes on as long as the additions of vapour which are lifted up by the action of the heated surface continue to be more than sufficient to compensate for the increase of rarifaction brought about by the same agency. But as soon as the supply for any reason which may locally obtain falls below this amount, the process of rarifaction prevails to diminish the material in the atmospheric column and consequently to lower the pressure. Thus it would happen that all places which are in this way affected by, so to speak, a deficiency in the supply of vapour are surrounded by places where the atmospheric pressure at the same time stands relatively at a maximum. There is an element, which I have not yet mentioned, and which is more than any other influential as a cause affecting the efficiency of the earth's surface as a heating agent, and therefore affecting the density of the superincumbent atmospheric column. I refer to the activity of terrestrial radiation. This not only depends upon the material condition of the surface itself, but also upon the circumstances of the local situation. We all know the striking difference in this respect between the plains and a hill station. Professor Tyndall is of opinion that the presence of invisible vapour in the air operates to check the radiation from the earth's surface, and so is a principal ingredient in the varying circumstances upon which surface temperature depends.

That loci of maximum and minimum pressure do periodically manifest themselves as a consequence of the recurrence of the same local conditions is certain, as also that periodic winds or modifications of winds are the result. I will repeat that we seem to have especial advantages in this country for working out the problem

of the causes of this class of phenomena. One locus of such places of minimum pressure for the northern hemisphere in the hotter months appears to be a large tract of central Asia, extending down into, or rather having what I may call outliers in, our own Indian peninsula. I have already referred to this in mentioning the cause of our Monsoons. The part which this region of low barometer plays in governing the course of the periodic winds is only vaguely ascertained; and its possible influence as an element in the generation of our circular storms has not yet, I believe, been made the subject of serious inquiry. It would appear probable that the barrier to horizontal motion which is presented by the Himalayas must to a large extent exclude the barometrical condition of the atmosphere over Central Asia from being any significant element in the motion of the lower strata of the atmosphere over the peninsula of India, at any rate over those tracts which are comparatively close to the hills. The Himalayan range, if assumed to be of the effective height of 10,000 feet only, (probably the effective height is almost double this), would in truth be a dam to at least one-fourth of the whole material of the atmosphere, and to much more than that proportion of the therein contained vapour. For strata above this height, no doubt, any difference which might exist between the northern and southern pressures would become active; but it may, perhaps, be questioned whether there is much difference at a high level in any degree proportional to that which is found to obtain near the earth-surface; for assuming the relative smallness of weight in the trans-Himalayan atmospheric column to be in any considerable degree due to the absence of vapour, it is probable that this element affects the density of the lower part of the column especially. If, however, in consequence of the existence of the Himalayan mountain range, there is at one period of the year, so far as regards the Gangetic trough and the higher part of the Bay of Bengal, a motive force operative upon the upper strata of the atmosphere which has no effect or comparatively little effect upon the lower, there must thus arise by a sort of torsion such a divergence of currents in the body of the atmosphere as would be favorable to the formation of local centres of minimum pressure and consequent vorticellary

movement. This last consideration leads me to notice the remarkable mechanical effect which is produced upon the course of the lower streams of air in our regions by the physical configuration of the land. The peninsula of India acts as a wedge to divide the advancing stream of the southern trades into two branches, one of which slides up the Malabar coast, the other passes along the eastern side of the peninsula; a portion of the latter crossing the Bay of Bengal is headed by the highlands of Burma and by them diverted northward and westward along the flanks of the Himalayas. The angular space marked out by this last deflection lies on the left side of the stream, and therefore by an experimental law which the illustration of the free moving particle above given perhaps goes some way towards explaining, but which has also been otherwise ingeniously explained by Dove, the atmospheric pressure within the bend will be commonly less than that on the outside, and thus we here again meet with a cause tending to produce periodically in the neighbourhood of our shores a locus of relatively low barometrical pressure, and so to originate a rotatory motion of the air. And finally we have the periodic occurrence of warm currents in the eastern portion of the Bay of Bengal, to which Mr. Blanford in his valuable paper published in the Proceedings of the Royal Society attributes the generation of these low pressure centers.

It is I think apparent from the facts stated in the hasty sketch which I have just made, that India proper, the Bay of Bengal and Burma together, constitute a region which, for the purposes of one branch at least of meteorological science, demands to be taken and treated as a whole. It is a most happily situated field of view, singularly complete in itself, of distributed phenomena which are mutually inter-dependent and which cannot be separated without destruction of their value. It is rich in the data of the highest problems of the science. Within it are to be found in the simplest form those materials for inquiry and investigation which almost certainly contain the clue to further great advances in knowledge. If this valuable mine of scientific information is to be worked at public cost for the public advantage, is it not evident that the organization for the purpose should, if possible, be uniform for the whole area and subordinate in all its parts to one centre of manage-

ment? I am happy to say that the hypothesis of this question does not need to be argued out by me. The Government of this country has already satisfied itself that the regular observation of meteorological phenomena is work proper to be done at public expense. It is, therefore, I assume, desirous that the best available results should be arrived at. Now I do not hesitate to say, having regard to the peculiar circumstances of situation which I have mentioned, that a carefully prepared system of observations carried on throughout this tract, under the direction of one competent head, ought to yield results of the highest scientific importance to the whole world. Need I point out that in any system which is to be effective, the disposition of the stations must be matter of considered arrangement, with a view to combined work. The observations should be made in conformity with well devised directions adapted to secure results as complete as possible. The instruments upon the accuracy and uniformity of which everything depends should be issued from one central station after comparison and adjustment with standards there kept and maintained in efficiency. They should also from time to time be readjusted by reference to these same standards. Every station should be furnished with the means of keeping correct local time at least. And above all, the results of the local observations should be reduced and tabulated for publication and reference, under the instruction and superintendence of one directing head. Unless this be done, they are useless for comparison with the results of observations made with different instruments and under different circumstances, *i. e.* useless for the whole body of scientific men. As it is what have we?

British India for administrative and other purposes is divided into eight principal districts or provinces, *viz.*, Bengal, Madras, Bombay, N. W. Provinces, Oude, Panjab, Central Provinces and Burma; and in each of these, excepting Burma, is a separate local system of meteorological observation with its own independent head. It is remarkable, too, that the gentlemen who are at the head of these different systems, possess as little community of character and situation as can well be conceived. They are, in Bengal and the N. W. Provinces officers of the Educational Department, in the Panjab a member of the Medical Service, in Madras the

Government Astronomer, all specially salaried for this extra work; in Bombay, the Superintendent of the Observatory, in Oude the "Scientific officer," and in the Central Provinces the Sanitary Commissioner, under an obligation to do this work ex-officio. There are no official relations between these provincial officers, and as a matter of fact, I believe, if one of them requires the registers, or results of a neighbouring province for comparison with his own, or for the purposes of scientific inquiry, he experiences great difficulty and delay in obtaining them.

Then again, in regard to organization, the systems seem to vary considerably in the different provinces. In the Panjab, I am informed, the officers who keep the registers are all volunteers; and they seem to be somewhat irregular in the matter of observing, for according to the published reports out of 19 stations, from 2 only have continuous registers extending over 2½ years been furnished; from most of the other stations registers covering a few months only, or for interrupted periods, are forthcoming. In Bengal and Madras there is a paid observer at each station and also a superintending officer (generally the Civil Surgeon) who receives an allowance for supervising the work.

As to the instruments, the kinds in use are very diverse. The head of the system in each province, (except Madras, and from a recent period Bengal) gets them whence and how he can. For instance, barometers of several sorts, standards or aneroids, are employed indiscriminately, and consequently the registers of observations effected by them are of little value whenever small differences are important, as for example in the comparison of range in the daily oscillations of atmospheric pressure, inasmuch as no data exist by which due allowance can be made for the instrumental irregulaties, and these are of the same order as the differences in question. In Bengal and Madras, the barometers are compared with a provincial standard at the Presidency towns. And those of two stations in the N. W. P. have been compared with the Calcutta standard. Whether or not in the other provinces any comparison is effected with a local standard I cannot say positively, though I have heard that it is not; but certainly no attempt has yet been made to compare the local standards if there are any, with one as-

[illegible] [illegible] Meanwhile the division of the meteorological work [illegible] has been determined by existing [illegible] of Bengal. I need hardly remark that registers of observations which are subject to such drawbacks as these are [illegible] in value.

The division yet indispensable work of reducing the observations is not [illegible] performed. Only in Bengal and perhaps in Bombay, is the reporter furnished with a staff competent to relieve him of this purely mechanical duty. The result is that most of the registers give the observations in their crude unreduced state: and therefore are generally available as data in extended investigations.

In Burma there is no established system of observation at all. Observers at Akyab and Port Blair send registers to the reporter for Bengal; but the most important of these registers is kept up solely by the voluntary exertions, and activity of the Civil Surgeon, who might at any moment leave his post and so extinguish the station as a place of meteorological record.

In Bengal again, curiously enough, the central Meteorological Observatory is quite independent of the Local Reporter, who is thus not only powerless in regard to the principal station of his own province, but is also reduced to the alternative of either testing his instruments himself personally, or of entrusting them for this object to officers, over whom he has no control. He is, moreover, in this way deprived of the means of carrying out any special experimental inquiry, however important it may be for the regulation of his own work.

I may add that, at Calcutta, even to this day, as our Council knows too well, for one reason or another we have nothing that we can offer to the scientific Societies of the West in exchange for their publications in meteorology. The so-called Observatory in Park Street, *lucus a non lucendo*, is so placed that no effective observation of the sky can be had from it. I need hardly say that oftentimes the forms and behaviour of the clouds give most important information relative to movements and even to the constitution of air masses at high altitudes. One or two especial instances of this [illegible] vo occurred lately, but our official observers have literally been [illegible] ble to notice them.

Experiments of such a character as those which would be necessary to test Tyndall's theory in regard to the cause of the azure colour of the sky, or to measure the retardative operation of invisible vapour on terrestrial radiation, are, I believe, scarcely thought of as falling within the work of any meteorological station in India. And I do not know that a single spectroscope has yet been introduced into our official collections of instruments.

It seems to me that the state of things which I have just described is most discreditable. I should scarcely go too far if I said that it represents a good deal of money thrown away : certainly it is very remote from that which ought to be. Surely the time has come when in the place of this infirm and unsatisfactory system (or more properly want of system) a well planned simple organization inspired and directed by a man of real scientific power and acquirements should be put into action.

If anything that I have said to-night should help to hasten such a reform as this, my object will have been attained.

The scrutineers announced the following elections:

President.

The Hon'ble Mr. Justice Phear.

Vice-Presidents.

Th. Oldham, LL. D.
Bábu Rájendralála Mitra.
Lord Napier of Magdala, G. C. S. I., G. C. B.

Secretaries.

Col. H. Hyde, R. E. (Financial Dept.)
H. Blochmann, M. A. (Philological Dept.)
F. Stoliczka, Ph. D. (Natural History Dept.).

Members of Council.

The Hon'ble Mr. Justice Phear.
T. Oldham, Esq., LL. D., F. R. and G. S.
Bábu Rájendralála Mitra.
Lord Napier of Magdala, General, G. C. S. I., G. C. B.
Col. H. Hyde, R. E.
Bábu Devendra Mallika.
J. Ewart, Esq., M. D.

F. Stoliczka, Esq., Ph. D., F. G S.
H. Blochmann, Esq., M. A.
Col. H. Thuillier, R. A., F. R. S., C. S. I.
H. F. Blanford, Esq., F. G. S.
W. S. Atkinson, Esq., M. A.
F. W. Innis, Esq., M. D., C. B.
E. Gay, Esq., M. A.
W. W. Hunter, Esq., LL. D.

It was proposed by D. Waldie, Esq., seconded by Maulavi Abdullattif Khán, Bahádur, and carried unanimously—

That the marked thanks of the Society be given to the Secretaries for their earnest attention to the duties of their office during the past year, from which the regularity in the issue and the value of the Journal, as well as the very satisfactory financial condition of the Society, have largely resulted.

Messrs. L. Schwendler and J. Wood-Mason were appointed auditors of accounts for the past year.

The meeting then resolved itself into an Ordinary Monthly meeting.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced—

1. From the Govt. of India—A copy of Antiquities of Kashmir, by Lieut. H. H. Cole, R. E.

2. From the Government of India, Home Dept.—nine photographs of the ancient temples in West Berars, and twenty-one photographs of ancient architectural structures in Mysore.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected ordinary members.

Col. J. F. Tennant.
Dr. W. Waagen.
G. C. Farr, Esq.
T. F. Harkness, Esq., C. S.

The following gentlemen have been announced as candidates for ballot at the next meeting:

C. B. Clarke, Esq., M. A., Botanic Gardens, Calcutta, proposed by the Hon'ble J. B. Phear, seconded by W. S. Atkinson, Esq.

James Wilson, Esq., Cathedral Mission College, Calcutta, proposed by H. F. Blanford, Esq., seconded by H. Blochmann, Esq.

Bábu Dvijendranátha Ṭhákura, proposed by H. Blochmann, Esq., seconded by Bábu Rájendralála Mitra.

Bábu Harachandra Chaudhuri, Zemindar, Sherepúr, Mymensing, proposed by H. Blochmann, Esq., seconded by Bábu Rájendralála Mitra.

Bábu Govindachandra Chaudhuri, Zemindar, Sherepúr, Mymensing, proposed by H. Blochmann, Esq., seconded by Dr. F. Stoliczka.

A. Gough, Esq., Queen's College, Benares, proposed by W. Oldham, Esq., seconded by H. Blochmann, Esq.

Nawáb Ziauddin Ahmad Khán, Bahádur, Chief of Luharú, Delhi, proposed by Maulavi Kabir uddin, seconded by H. Blochmann, Esq.

Walter Abbey, Esq., Civil Surgeon, Mergui, proposed by S. Kurz, Esq., seconded by Dr. F. Stoliczka.

E. Benedict, Esq., C. E., Calcutta, proposed by L. Schwendler, Esq., seconded by Col. H. Hyde.

T. S. Isaac, Esq., Supt. Engineer, Presidency Circle, proposed by T. Oldham, Esq., seconded by H. H. Locke, Esq.

The Hon. Sir W. Grey, and L. B. Bowring, Esq., have intimated their desire to resign the membership of the Society.

The receipt of the following communications was announced—

1. Arrangements for the discharge of long overland telegraph lines, by L. Schwendler, Esq.

2. Associations connected with various places situated in the sub-division Banka, Bhagulpúr, by Bábu Ráshbihari Vasu.

3. Mondari Vocabulary, by Bábu Rakhaldas Haldar.

LIBRARY.

The following additions have been made to the Library since the last meeting held in January last.

Presentations.

*** Names of Donors in Capitals.

The Report of the British Association for the advancement of Science, for 1869.—THE BRITISH ASSOCIATION.

Proceedings of the Royal Society of London, Vol. XIX, No. 123.—THE ROYAL SOCIETY.

Bullettins della Societá Geografica Italiana, fasc. 5°.—THE GEOGRAPHICAL SOCIETY OF ITALY.

Bulletin de la Société Impériale des Naturalistes de Moscow, 1870, No. I.—THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW.

The Quarterly Journal of the Geological Society, No. 104.—THE GEOLOGICAL SOCIETY OF LONDON.

Journal of the Statistical Society, September, 1870.—THE STATISTICAL SOCIETY OF LONDON.

The Numismatic Chronicle, No. 39.—THE NUMISMATIC SOCIETY OF LONDON.

The Smithsonian Report for 1868; Smithsonian Miscellaneous Collection, Vols. 8 and 9; Smithsonian Contributions to knowledge, Vol. 16.—THE SMITHSONIAN INSTITUTION.

Cowell's Lectures on Hindu Law.—THE UNIVERSITY OF CALCUTTA.

Ramayana, Vol. 2, No. 5, edited by Hemachandra Bhuttacharya. —THE EDITOR.

Illustrations of Ancient Buildings in Kashmir, by Lieut. H. H. Cole; Deaths of Madras, during 1868.—THE GOVERNMENT OF INDIA.

Griffin's Panjab Chiefs.—THE GOVERNMENT OF THE PANJAB.

General Report of Public Instruction in Bengal during 1869-70; Annual Report of the Administration of the Bengal Presidency for 1869-70.—THE GOVERNMENT OF BENGAL.

Purchase.

Helfenstein's Comparative Grammar of the Teutonic Languages: —Etude sur le rituel du respect social dans l'état Brahmanique, par C. Schœbel.—Vuller's Grammatica Linguæ Persicæ:—Das Jatapatala, von Dr. G. Thibaut:—Ueber die Entstehung und Verwendung der im Sanskrit mit R. anlautenden Personalendungen, von Th. Benfey:—Dr. A. Bastian's Sprach-vergleichende Studien:—V. von Strauss' Laò-tsè's Taò tè Kīng:—B. Gachet's Œuvres de Koutsa et de Hirayastoupa.—Dr. Stickel's Handbuch zur Morgenländischen Münzkunde, 1 Heft:—Deutsches Wörterbuch, 14 Band:—Dr. C. Semper's Reisen im Archipel der Philippinen, 1-2 Heft.—Philosophical Magazine, No. 269.—Calcutta Review, January, 171:—Reeve's Con. Iconica, parts 284, 285:—

Exchange.

The Nature, Nos. 58-61. The Athenæum, November, 1870.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR MARCH, 1871.

The monthly meeting of the Society was held on Wednesday, the 1st instant, at 9 o'clock, P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced—

1. From the author—A copy of a pamphlet entitled: A revision of the *Terebratulidæ* and *Lingulidæ*, with remarks and description of some recent forms, by W. H. Dall, Esq., Smithsonian Institution.

2. From the author—a copy of Tatvávali, a treatise on Vaishasika Philosophy in Sanscrit verse, with notes by the author, Pandit Chandrakánta Tarkálankára;—also Pravída Sataka by the same.

3. From the author—General report on the Punjab Oil Lands, by Benj. Smith Lyman.

4. From Rev. C. H Dall—Three Nepal coins bearing on the obverse in a square compartment the legend in Nágari characters श्रीश्रीनेपालसर्कार and on the reverse श्रीश्रीसुरेन्द्रविक्रमार्कदेव, and at the lower margin on the reverse the date १७८९ 1789.

Legend I. Srí Srí Srí Nepála Sarkára, the Government of Nepal.

„ II. Srí Srí Srí Surendra vikramárka Deva (the name of the prince).

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected ordinary members.

C. B. Clarke, Esq., M. A.

J. Wilson, Esq.

Bábu Dvijendranátha Thákura.

„ Harachandra Chaudhuri.

„ Govindacumára Chaudhuri.

A. Gough, Esq.

Nawab Ziauddin Ahmad Khán, Bahádur.
W. Abbey, Esq.
E. Benedict, Esq., C. E.
J. S. Isaac, Esq., C. E.

Benjamin Smith Lyman, Esq., has expressed his wish to become a life member of the Society, in conformity with rule 14 of the Bye-laws of the Society.

The following gentlemen are candidates for ballot at the next meeting:

Dr. F. N. Macnamara (for re-election), proposed by the Hon'ble J. B. Phear, seconded by D. Waldie, Esq.

Oscar Trefftz, Esq., Calcutta, proposed by H. Blochmann, Esq., seconded by Dr. W. Waagen.

M. S. Howell, Esq., proposed by Col. Hyde, seconded by Dr. Stoliczka.

Captain A. J. Filgatte, R. E., proposed by Col. Hyde, seconded by Dr. Stoliczka.

Major J. M. Graham, proposed by Col. Hyde, seconded by Col. Tennant.

Col. F. H. Rundall, R. E., proposed by Col. Hyde, seconded by Dr. T. Oldham.

T. M. Bourn, Esq., Mining Engineer, proposed by F. Fedden, Esq., seconded by Dr. T. Oldham.

W. J. Curtoys, Esq., proposed by the Hon'ble J. B. Phear, seconded by H. H. Locke, Esq.

W. E. Ayrton, Esq., proposed by the Hon'ble J. B. Phear, seconded by Col. Hyde.

Walter Bourne, Esq., C. E., proposed by Dr. T. Oldham, seconded by Dr. Stoliczka.

Mr. W. C. Bonnerjea has intimated his desire to withdraw from the Society.

J. Schroeder, Esq., and Lt.-Col. C. Macgregor have resigned their membership on their leaving India.

The following letters were read:—

1. From the Secy., Trustees Indian Museum, forwarding a correspondence on the earthquake felt in Sind on 28th October, 1870.

This correspondence is a copy of one forwarded by the Bombay Govt. to the Secy. of State for India.—The Collector of Shikarpore reports that a severe shock of an earthquake was felt about a quarter to 3 P. M. on the 28th October, 1870; it lasted for about a minute. The earthquake was especially felt at Naushera, Larkhana, Lubdurza, Mehur and Kukur, and the shock is stated to have been more severe in the hills than in the plains. A second but slighter shock was again felt at Nusseerabad, Teje, Mehur and Kukur on the 1st November, 1870.

Another report from the Commissioner in Sind says that a slight shock was experienced at Jacobabad and Thoole at about 2-30 P. M. on the 28th October, 1870.

A third report records a severe shock of an earthquake at Dadoo, lasting for about 5 minutes, at 2 P. M. on the 28th October, 1870; and a second slighter shock, lasting for about one minute, was felt about 3 P. M. on the same day. The earthquake appears to have been experienced throughout the Talooka Dadoo, as various reports state that shocks have also been felt at different times of the day and night on the 27th, 28th and 29th October, 1870. No serious damage appears to have been done.

2. From Mr. J. H. Samuells — addressed to, and communicated by, Col. Dalton.

Mr. Samuells reports that the temples near Harchoka in Chang Bhokar are very extensive, but unfortunately some of them are almost entirely in ruins and the destruction by the annual floods in the rainy season goes on so rapidly, that in another 100 years many will have probably altogether disappeared. The inscriptions are very much worn off, but what remained preserved, Mr. Samuells had taken rubbings of, and also executed plans of the different temples. The inscriptions appear to be in very old Nagari character.

The Council notified (in conformity with rule 13 B. of bye-laws) that the names of the following gentlemen have to be struck off the list of members for non-compliance with rule 13 of bye-laws.

A. G. Walker, Esq.

C. J. Wilkinson, Esq.

Dr. C. Williams.
C. B. Garrett, Esq.
F. J. Chambers, Esq.
Bábu Nundolala Bose.
J. C. Whishaw, Esq.
H. Duhan, Esq.
R. L. Martin, Esq.
J. W. Sherer, Esq.

And that the election of Sir Sherif úl Omara, Bahádur, be cancelled for non-payment of admission fee —

Also that Rs. 1203 due from the above gentlemen, together with Rs. 204, due to the Society from Kaliprasanna Sinha, dead, and Rs. 57 from Ramanarayana Tarkalankara, dead, and Rs. 5-10, due to the Oriental Publication Fund from the last named, be written off.

The Council reported that they have elected the following gentlemen to serve in the several Committees* during the ensuing year.

Finance.

T. Oldham, Esq., LL. D.
E. Gay, Esq., M. A.
Col. A. Allan.

Library.

T. Oldham, Esq., LL. D.
Col. A. Allan.
Bábu Rájendralála Mitra.
Dr. J. Anderson.
J. Wood-Mason, Esq.
Dr. Mohindralal Sircar.
G. Nevill, Esq.
Col. J. F. Tennant.
E. Gay, Esq., M. A.

Philological.

E. C. Bayley, Esq., C. S. I.
Bábu Rájendralála Mitra.
C. Tawney, Esq.

* The President and Secretaries of the Society are *ex-officio* members of all Committees.

W. W. Hunter, Esq., LL. D.
Rev. J. Long.
Rev. K. M. Banerjea.
Dr. Mohindralal Sircar.
Maulavi Kabiruddin Ahmad.
Maulavi Abdul Latif Khán.

Natural History.

T. Oldham, Esq., LL. D.
Dr. J. Fayrer, C. S. I.
Dr. J. Ewart.
H. F. Blanford, Esq.
W. T. Blanford, Esq.
W. S. Atkinson, Esq.
V. Ball, Esq.
H. B. Medlicott, Esq.
Dr. J. Anderson.
D. Waldie, Esq.
J. Wood-Mason, Esq.
G. Nevill, Esq.
Dr. Mohindralal Sircar.

Physical Science.

Lord Napier of Magdala, G. C. B., G. C. S. I.
Col. H. L. Thuillier, C. S. I.
T. Oldham, Esq., LL. D.
Col. J. F. Tennant.
H. F. Blanford, Esq.
D. Waldie, Esq.
L. Schwendler, Esq.

Coins.

E. C. Bayley, Esq., C. S. I.
Bábu Rájendralála Mitra.
Major F. W. Stubbs.
Rev. M. A. Sherring.
J. G. Delmerick, Esq.

Col. the Hon'ble R. Strachey made a communication to the effect, that the Government of India have lately resolved to place 4 lacs of rupees in deposit, which sum should be available for completing the new Museum building. He regretted the delay which has been caused in the construction of the building and stated that it was greatly due to the financial difficulty in which the Government of India found themselves a short time ago. Col. Strachey mentioned that the original approximate estimate amounted to about 3½ lacs of rupees. This sum had been sanctioned by Government, and the work for the new building was commenced. Subsequently the regular estimate came up and it amounted to about 7 lacs. After about 4 lacs had already been spent, a revised estimate was called for, and this rose up to about 10 lacs. It was, therefore, not surprising that the Government stepped in and enquired into the whole matter carefully, and this caused such delay that it became impossible to complete the Museum within the appointed time, 23rd March, 1871. However he (Col. Strachey) hoped that the present action taken by Government in the matter would bring the building to its desired completion at as early a date as possible.

Col. Strachey's communication was most favorably received by the meeting.

Mr. H. F. Blanford exhibited several barometric and other meteorological curves and made the following observations:

The diagrams that I have to lay before the meeting this evening, will, I think, be interesting to the Society, as they exhibit in a graphic and readily appreciable form certain important features of our local Meteorology. Beyond this, there is no especial connexion between them; each illustrates certain special points, some of which have recently been discussed in the Society, and they must be regarded as materials which have been generalized up a certain point; representing facts which may be of important service in any future scientific treatment of our Meteorology.

The first sheet shews the mean diurnal variation of some of the principal Meteorological elements at Calcutta for each month of the year, as deduced from the hourly observations recorded for 16 years at the Surveyor General's Office. These elements are (1) the

total atmospheric pressure, (2) the temperature, (3) the vapour pressure, (4) the curve of saturated vapour pressure corresponding to that of temperature, and (5) the curve of humidity. The first shews the variation of the diurnal barometric tides for each month of the year, and I will draw attention to the great regularity of the wave curve which is one of double curvature, having an absolute maximum about 10 A. M. and an absolute minimum about 4 P. M. with a secondary maximum and minimum at 10 P. M. and 4 A. M. The hours of absolute maximum and minimum vary a little during the year, the former being about an hour earlier and the latter about an hour later in the hot months then in the cold. The difference of the morning and evening maximum is greatest in the driest months and least in the rains. In the latter this difference is comparatively small, the two crests having nearly the same height; but the afternoon minimum is always considerably lower then that of 4 A. M. The explanation of the double tide is a subject on which great diversity of opinion exists. The explanation found in most of our treatises is that originally suggested, I believe by Dove, and adopted by General Sabine and Sir John Herschell, *viz.* that the curve is compounded of two distinct elements, one of the dry air pressure which taken by itself has a maximum at about 4 A. M. and a minimum at 4 P. M., the other a curve of vapour pressure which has two maxima and two minima at or about the periods of the maxima and minima of the total pressure curve. Col. Strachey* who, as you are aware has given much attention to this subject, has long since pointed out the insufficiency of this explanation in the case of the barometric curves in India, or rather the failure of verification when the curve of observed vapour pressure is superimposed on a supposed dry air curve of a single periodic variation. And you will see that no composition of the vapour pressure curve of Calcutta with any such supposed curve will give a curve approaching in form or regularity to that of our tidal curve of total pressure.

The curves of vapour pressure exhibit great variations in the different months of the year. In the months of the rains, the pressure is almost unvarying, or there is but a slight increase during

* Similar objections have been raised by Mr. Broun, Professor Lamont of Munich and others.

the daytime and decrease towards early morning, forming a curve of single variation. From September to May the curve is more complicated. It presents a rise for an hour or two after sunrise; then in most months a rapid and deep depression to a minimum about 3 or 4 P. M., after which the rise is very rapid to 7 or 8 P. M. and thereafter (in the hot months) gradual to midnight. From this hour it falls again to sunrise. In December and January, the absolute minimum is at sunrise, in the other months in the afternoon, and it is deepest in March, (the driest month). The absolute maximum is in the evening or at midnight from October to March, and in the morning in April, May and June. The curve generally for all these months may be described as one conforming to that of temperature, but with a deep notch cut out of it during the warmer hours of the day, thus producing two crests, of which the earlier is the higher in the hottest months the later in the remainder. This form of curve is well known as characterizing a continental climate, and something similar, but much less in the relative and absolute magnitude of the afternoon depression, obtains at certain stations in the interior of Europe during the summer months. The curves of saturated vapour pressure are given for comparison, and the ratios of the two are shewn by the humidity curves which are almost an exact inversion of those of temperature. The temperature curves are of the same general form throughout; differing chiefly in the absolute magnitudes of their ordinates which are greatest in March, the driest, least in July and August the dampest months.

The next set of curves that I have to exhibit are the diurnal barometric curves for Simla, deduced from Major Boileau's hourly observations for 3 years. They are as regular and shew nearly as great a range of tidal pressure as those of Calcutta, but with this marked difference, that in all months except July and August the morning (4 A. M.) is the absolute minimum of the day. This peculiarity of the barometric curve has been noticed by Plantamour in the case of the Great Saint Bernard, and is stated to be characteristic of mountain stations situated on ridges, as distinguished from stations on plateaux and plains. The explanation given, I believe, by him is that the lower strata of the atmosphere being heated, lift a larger proportion of the upper atmosphere above

stations in the positions of Simla and the St. Bernard, and so diminish relatively the loss of pressure due to overflow in the highest regions of the atmosphere. Plantamour's law of the difference between stations on ridges and those on table-lands is borne out by our local experience, in so far that while Darjeeling, a ridge-station, in several months of the year has, like Simla, an absolute minimum at or about 4 A. M., both Shillong (4,800) feet and Huzaribaugh (2000 feet) which are on table-lands, have, like Calcutta, an absolute minimum in the afternoon.

The next sheet to which I have to direct attention is one shewing the mean curves of pressure and temperature for the year, as given by the mean daily values of these elements at Calcutta for 15 years. The temperature curve exhibits great irregularities, as if there were a tendency to rapid changes at certain periods. Father Secchi has noticed a similar result on discussing the Roman registers for a much longer period, and Mr. Buchan has pointed out that the registers of Scotland show a tendency to the recurrence of warm and cold days at certain periods of the year. It would, however, be premature to draw any such conclusion from the registers of only 15 years.

I have here two sheets that shew the variation of the mean daily pressure at a considerable number of stations, for the years 1869 and 1870. The northernmost station is Roorkee, the southernmost Port Blair. The chief noticeable feature that these curves present is the almost exact coincidence of all their irregularities, these being greatest at Roorkee and least at Port Blair. This correspondence of the barometric waves and the decrease in the amount of their variations in proceeding from north to south, was first pointed out in the case of European stations, many years ago, I believe, by Professor Daniell; and the explanation of the phenomenon given by Professor Dove is, that the alternations of the crests and troughs forming these irregular waves, depends on the prevalence of Polar and equatorial currents, the trade and antitrade currents which cross and alternate with each other in the Temperate Zone. These curves shew that the same phenomenon is presented here in the Monsoon region at all periods of the year, the variations being absolutely less, however, than in Europe, and decreasing in like manner as the stations are in lower latitudes

Finally I have to bring to the notice of the Society a set of curves shewing the mean diurnal variation of the wind for each month of the year at Calcutta. These have been drawn up from a discussion of 10 years' observations at the Surveyor General's Office. The observations are recorded only to eight points, *viz.*, N. NE. E. SE., &c., and I may remark how this very rough method of observation suffices (when so long a period as 10 years is considered), to shew a regular variation, even when in some months it amounts to little more than one point of the compass. The diurnal variation of the wind appears at first sight somewhat anomalous, since Calcutta is at no very great distance from the sea, and it might be expected that as at coast stations, there would be a tendency to a southerly or sea breeze during the latter part of the day and a land breeze at night. The case is, however, precisely the reverse. The land wind at Calcutta, *i. e.*, a WNW. wind prevails strongly during the day, in the cold and hot weather months, and even in the rains, when the variation is very small, the westerly tendency is still manifest; while the southerly or sea breeze prevails or tends to prevail during the night. When the mean of the whole year is considered, it appears that the WNW. wind tends to set in about 10 A. M., and to increase in force and steadiness up to about 4 P. M., after which the wind veers round rapidly to south, and a little east of south, in which quarter it continues till midnight or 1 A. M. It then diminishes in force and there is a tendency to calm until about sunrise. The coincidence of the prevalence of the westerly wind with the period during which the barometric gradient is from west to east, owing to the advance of the afternoon minimum from the eastward, suggests the cause of this phenomenon. It is true that this gradient is absolutely small, and the *loci* of maximum and minimum are separated by a quadrant of the earth's circumference; but the effect to be accounted for as the diurnal oscillation, when deduction is made of the mean monthly or annual component, is also small, being a predominance of 12 or 13 per cent. only, and is probably not greater than may be accounted for by the cause suggested, which must have *some* effect.

Colonel the Hon'ble R. Strachey said that he thought the Society, and indeed all persons interested in the progress of science, were much

indebted to Mr. Blanford for the manner in which he was taking up the study of the Meteorology of India, and of Calcutta in particular. It was an indisputable fact that there was no country in the world that had such great advantages as India, to offer to a student of Meteorological Science, if such a term could be used in the present state of our knowledge or rather ignorance. Here the great motive force of all atmospheric phenomena, the Sun, acted with an intensity and regularity that led to a corresponding intense and regular development of those phenomena, would render their study in a corresponding degree easy. The great plains of India presented vast areas of land over which the action of the atmosphere was remarkably little disturbed by local causes, and which thus offered special facilities for watching the principal phenomena attending that action. The mountains on the north of India, in like manner, gave advantages for enquiries into the condition of the atmosphere at great heights above the earth's surface, not equalled in any other part of the globe. The great ocean that surrounded the Peninsula, again, offered similar opportunities for observing the special phenomena due to the peculiarities of a marine surface, and to the juxtaposition of land and sea. On the whole he had no hesitation in saying that India was the country of all others in which meteorology could best be studied, and to which we should look for the investigations which could rescue meteorology from its present somewhat discreditable position, and advance it to that of a real Science.

Col. Strachey said he would offer a few comments on the chief topics of Mr. Blanford's instructions and observations.

First as to Vapour. He had on a former evening stated generally his objections to the suggested dependence of the double diurnal tide of pressure on the variations of the vapour pressure. It was impossible for any one who had looked at the facts to have a moment's doubt on this point, and it was obvious that, after having made the suggested allowance for the variations of vapour pressure, the double tide remains in the Bombay, Madras and Calcutta observations just as plainly marked as before, though somewhat altered in form.

As he had before said, to subtract the vapour pressure, as indicated

by a hygrometer, from the total pressure, indicated by the barometer, was to commit an act of folly. It meant nothing. It represented no physical fact. The vapour tension at the earth's surface was not the result of the pressure of the particles of vapour in the upper strata of the atmosphere, but of something quite different. It was the measure of the resistance offered to the passage of the vapour particles in an upward direction by the air particles, and the superincumbent vapour particles together; and the condition of the vapour in the upper strata proved that this resistance of the air particles was very great, so that, roughly speaking, the vapour tension was commonly about four times as great at any place as the pressure from above of the vapour particles. Of course there were great local variations from any such rough general average, but the average might be mentioned to show how senseless was the subtraction of the observed vapour tension from the observed total pressure.

Referring next to the local variations of vapour pressure at Calcutta, Col. Strachey remarked, that the only satisfactory way of considering such phenomena was in connexion with their physical causes, and that most of the apparent peculiarities, such as those noticed by Mr. Blanford, might readily be explained when viewed in this manner. He (Col. S.) had not had the means of critically examining the variations of vapour tension at Calcutta, but he remembered enough of the results of such an examination made by him of the phenomena at Madras, to be able to indicate to the Society the kind of analysis of these facts that he had suggested. Thus it was observed at Madras that at a certain hour of the day a very sudden increase occurred in the quantity of vapour. This was at once explained by the fact that at this hour the sea breeze became established. As the heat of the day increased, the wind blowing from over the sea brought in more vapour, and a maximum occurred in the afternoon. As the temperature fell, and the wind veered landward, the vapour became less, and when the land wind was thoroughly established, the vapour became much less, and a minimum was arrived at somewhere near the minimum of temperature. But certain subsidiary complications of this general rule were also observable. After the sun rose, the heat, radiated to the earth,

caused the rapid evaporation of any water, either a deposit of dew or pools of water &c., exposed to the rays of the sun. Thus a rapid development of vapour began. But soon the air became heated, and its capacity for vapour increased more rapidly than the process of evaporation could supply vapour. This caused the air to become relatively drier. Like operations in the converse sense took place in the evening. Such results were more or less visible in the observations made at various places that had come under his notice, but necessarily each locality would have its own peculiar conditions, and would show a special set of changes. It was, he thought, in some such manner as this that all Meteorological phenomena should be looked into, with the intention of ascertaining as far as possible the precise physical causes of their component elements. A mere record of facts such as was commonly put forward as a discussion of the Meteorological phenomena of any locality, could only be of use in a scientific point of view so far as it was thus treated, and he hoped that all observers would bear this in mind.

The variations of the pressure of the atmosphere were next referred to. Col. Strachey said that he had little doubt that the double tide was simply the result of the heating power of the sun on the atmosphere, though we did not distinctly know how the result was brought about. He remarked that the explanation of the phenomenon involved the solution of a very difficult problem in hydrodynamics, and that he believed that it was only by the aid of mathematical science that any precise explanation could be given. He regretted his own want of mathematical knowledge and hoped that some of the mathematicians of India or Europe might be led to investigate the problem. It was, to ascertain the effect produced, (on an elastic vapour atmosphere covering a sphere), by a source of heat gradually moving round the sphere. The necessary result of such a process could be generally stated with great ease, but its precise mathematical expression was quite a different thing. The Sun, the source of heat, certainly caused the expansion of the portion of the atmosphere between the meridians say of 8 o'clock A. M. and 5 P. M., and a general overflow of the upper parts of the atmospheric columns so expanded must take place to the east and the

west, causing a dispersion of air and consequent reduction of pressure, near the centre of the heated space, and a heaping up of air and increase of pressure at its two margins. This he believed to be the most likely explanation of the two maxima and the intervening minimum of pressure. At the same time he must guard himself by saying that the above was a very coarse and imperfect explanation of the phenomenon, not intended to be put forward as scientifically precise. As a fact the movement of the air particles which caused the diurnal tide of pressure was a *wave* movement, and not a real permanent movement of translation. This was proved by the circumstance that the tide of air pressure moved round the earth with the Sun and quite independent of the actual motion of the mass of the atmosphere at the place of observation. Col. S. referred to various peculiarities in the form of the curve of diurnal pressure at various places, and offered comments on some of them. He particularly suggested the propriety of making careful observations at some small island, in an extensive sea area within the tropics, as a means of ascertaining the normal diurnal curve in its simplest form. He noticed the well known mechanical law of the possible co-existence of any number of waves in a fluid body, and said that, no doubt, many of the local peculiarities of the barometrical curves, daily or other, were due to such superimposed waves, and that what the scientific observer had to do was to separate these and indicate their several causes.

Col. Strachey pointed out how the diurnal variation of pressure was most marked when the diurnal variation of temperature was greatest. Also how the daily tide was best marked near the equator, and gradually faded away towards the poles. He suggested as a sufficient explanation of this, that at the equator the force, exerted by the sun in creating the wave action in the atmosphere, continued constantly parallel to the actual motion of the air particles, forming the atmospheric wave as they revolved with the earth on its axis, and that consequently the impulse was accumulated in an intense degree, and a true accelerating force developed. As we leave the equator this parallelism is departed from, the actual direction of the air particles of the atmospheric wave being forced into a small circle of latitude, so that the impulse caused by the

heat is not accumulated, and at length at the pole no force at all can be exerted.

The gradual disappearance of the *regular* daily variations of pressure, as we recede from the equator, was pointed out to be a phenomenon analogous to the corresponding disappearance near the equator of the *irregular* variations of pressure, so strongly marked near the pole. The steadiness of the pressure in India which is most marked, and the change that takes place from the cold season of greatest pressure to the hot season of least pressure, were referred to as phenomena readily explained in the manner suggested in the case of the daily variations. The constancy of the pressure over large areas, and the propagation of what may be called the irregular variations, from day to day, over the whole of India, were phenomena which had been noticed by the late Mr. James Prinsep, and some very instructive diagrams exhibiting this had been published in the Society's Journal, Col. Strachey thought, in 1836. The subject had long ago attracted Col. S.'s notice, and he invited attention to it as well worthy of special examination, in connexion with what he had said regarding the superimposing of waves in a fluid mass. These great fluctuations, extending over half the continent of Asia, were manifestly in the nature of great waves, and the smaller fluctuations affecting smaller areas, were smaller waves, or so to speak ripples, breaking into the general fluid surface. This part of the subject was one of much interest, in which very little had yet been done, and he hoped that Mr. Blanford might be able to throw more light upon it.

The curves of temperature to which Mr. Blanford had directed attention were noticed by him as indicating certain *irregularities* of importance. Col. Strachey wished to say that in his opinion the first thing to do was to attend to the *regularities*. If we were ever to make a Science of Meteorology we must do it by supplying physical explanations of the observed phenomena. The *regular* phenomena were without any doubt those at the present time best deserving attention. When we had thoroughly mastered them, and were able to give a satisfactory explanation of their peculiarities, we should be in a reasonable position to advance to the irregularities. It certainly cannot be said that any such command has yet been ob-

tained over the laws of the ordinary diurnal change of temperature, and to the study of these, he would express a hope, that Indian observers would apply themselves. The primary causes of these changes were simple enough. On the one side, the Sun during the day added to the heat of the air and the earth, and on the other the air and the earth during the night threw off their heat into celestial space. Very little was yet known of how these operations took place, or why it was that special laws of increase and decrease of temperature governed each season or each locality. One of the causes of such variations he might refer to, (as before, rather in illustration of the general scope of his advice, than as an attempt to deal exhaustively with the subject), was the quantity of vapour in the air, by reason of which its power of transmitting radiant heat varied. As the air was dry, it transmitted more; as it was filled with vapour, it transmitted less heat. Thus the diurnal variations both by day and night would increase in extent as the air was drier, and vice versâ. Col. Strachey had examined the Madras observations with a view of ascertaining how the matter was, after the suggestion had been made by the researches of Professor Tyndall, and the result, as above stated, quite corroborated the laboratory experiments.

The diurnal winds of Upper India were very well known to all persons acquainted with that part of the country. That they were due to the daily variation of the pressure he had little doubt. They were not confined to India at all, and in truth extended all over Southern Asia up to the Caspian. The correctness of this theoretical explanation of these diurnal westerly winds, was, he thought, quite confirmed by the circumstance that during the months of dry westerly wind a faint easterly wind was common early in the morning, showing that the high pressure to the east of the place of observation had a similar effect to that produced to the west of it. Of course as the actual course of the crest of the wave of pressure was east to west, and the great fall of pressure was to the east of the crest, the westerly wind must be the best marked.

It is important, Col. S. said, always to bear in mind that wind is nothing more than a *consequence of inequality of pressure*, and, therefore, commonly, if not always, more or less directly of *changes*

of temperature. It is a vulgar error to drop out of view the essential change of pressure as the direct cause of wind, which should be studiously avoided in Col. Strachey's opinion by every scientific Meteorologist. The study of the winds, with the view of obtaining the precise explanation of their mechanical causes, is much to be recommended, but here, as in all other like enquiries, the observer must seek for true physical forces, and not permit himself to be blinded by the vague generalities which afflict this section of meteorology as they do all others.

Closely connected with the winds is the subject of rain, but on this he (Col. S.) would not venture to say anything excepting that, of all the phenomena with which meteorology affected to deal, this was least understood, and most involved in all sorts of misconceptions of the grossest description of the physical forces that were operative in its production.

In conclusion Col. Strachey said, he would earnestly exhort every one who desired to assist the progress of meteorology, to treat it in some such spirit as he had explained, to abandon the misleading dogmatism that had hitherto obstructed all real progress, and to seek for the precise, true, physical and mechanical forces which produce the phenomena that he studies.

The President briefly alluded to a few of the most important meteorological questions noticed by Col. Strachey, and expressed a hope that the time may soon arrive when it will be possible to carry out the many valuable suggestions which Col. Strachey has brought forward.

The following papers were read :—

On a practical method for detecting bad insulators on Telegraph Lines,—*by* Louis Schwendler, Esq.

One of the many practical measures, and certainly not one of the least important, introduced during the last few years with a view of increasing the efficiency of the Telegraph

is the establishment of a scientific system of testing all materials and instruments employed on the line. Many practical results have already been obtained therefrom, but it is not the object of the present communication to enter into the details of this most interesting subject; I will, only point out one important fact that has been established.

A great many lines in India contain electrically defective insulators; some to such an extent as to lower the insulation to a degree which is fatal to the direct and regular working of long lines.

Why such insulators could creep in, notwithstanding the care taken in England to secure efficient Telegraph Stores for India, is a question with which I cannot deal at present, but which may perhaps form the subject of a *future* paper, when more data have been collected.*

The very fact that electrically defective insulators, showing nothing externally, do exist and are distributed over lines of such vast extent, has created the necessity of having a reliable method by which such insulators can be detected, and other perfect ones substituted with the least possible expense.

It is clear that such a method, if practicable, must be very simple, and the instruments used portable and handy.†

After some searching in this direction, the following method was found to answer the purpose most satisfactorily.

The principle of the method is to produce magneto-electric currents through the resistance of the insulator under test, and to measure these currents by the effect they have on the body of the tester.

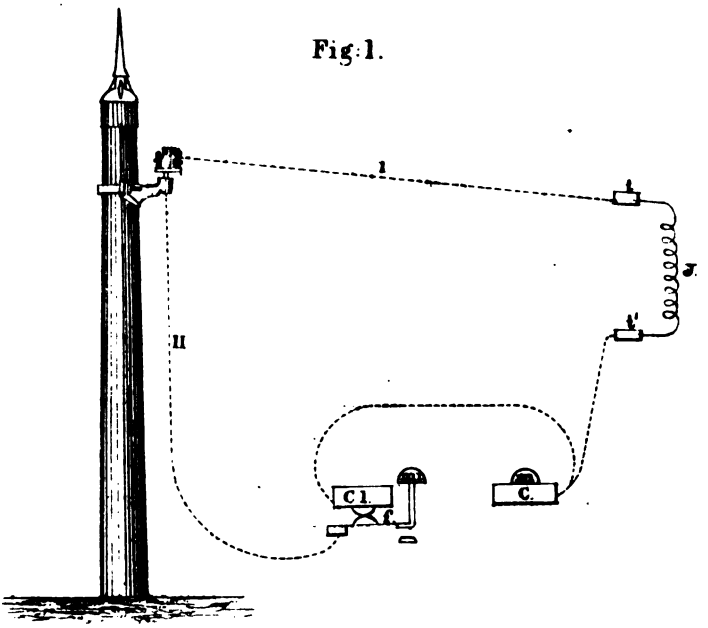
* The cause for the low insulation of insulators seems to be the porous state of some porcelain, through which a minute quantity of water diffuses itself in time. When heating an imperfect insulator, it becomes always perfect, but immerging it a sufficiently long time in water, it becomes again imperfect.

The leakage seems to be invariably in this part of a porcelain which is cemented in the iron hood.

† To use a deflection method is out of the question, because the still comparatively high resistance of insulators, which have to be detected, would necessitate a high electromotive force, and a very delicate Galvanometer, which arrangements could not be made easily portable, as it is required when the tester proceeds along a line.

The subjoined diagram shews the connections readily :—

Fig. 1.



J is a magneto-electric machine, the two terminals *t* and *t'* of which are insulated from each other and from the ground.

t is in permanent contact with a perfectly insulated leading wire *I*, long enough to reach the insulator, to the iron hood of which it is to be hooked.

t' is in permanent connection with the clamp *c* to which is fixed a small platinum knob, *m*, and both the clamps, *c* and *c'*, are permanently connected with each other. A good insulated leading wire, *II*, which is to be hooked on to the bracket of the insulator under test, is in contact with the moveable platinum knob *m'* which, however, is insulated from *c'*, when pressed down, but which in its position of rest, (or when not pressed down short), closes the circuit between *c* and *c'* at *f*.

The whole arrangement is constructed light but strong, protected from rain and can be carried along the line by one man only.

The tester proceeds as follows :—

After having cleaned the insulator carefully, he removes temporarily the line from the insulator and hooks the leading wire No. I to the iron hood and leading wire No. II to the bracket of the insulator. He then turns the handle of the magneto-electric machine with one hand, while one finger of the other is resting on the knob *m* of clamp *c*.

As soon as he touches with the other finger the knob *m'* of clamp *c'*, at the same time pressing it down, the metalic circuit between *c* and *m'* is opened, and the positive and negative magneto-electric currents have to pass from one finger to the other, and consequently, if strong enough, will give the tester sensible shocks, by which he is at once informed that the insulator under test is defective, and much under the fixed standard of insulation.

If the tester does not feel any current through his fingers, (a comparatively rough galvanoscop), he has only to repeat the experiment by placing his tongue on the knob *m*, while his hand still presses the knob *m'* down. If no current is felt by the tester through this most delicate galvanoscop, the tongue, he can rest assured that the insulator is perfect for all practical purposes.

By opening and closing the circuit alternately at the knob *m'*, the tester has it in his power to allow at short interval *currents* to pass through his tongue, and consequently will be able to detect the slightest induction currents.

The following experiments were made with insulators of known resistance to ascertain the highest limit by which the tongue is still able to detect induction currents.

The currents in these experiments were produced by one of Siemen's well known dial instruments, the revolving bobbin of which had a resistance = 1577 S. U.

The absolute resistance of each insulator was first carefully measured in the ordinary manner, without water in the porcelain cups, and the insulator afterwards tested by the method above described.

No. of Insulator.	Resistance in *mills.* S. U.	Strength of magneto-electric currents as indicated by the human body, through the resistance of the insulator under test.
1.	0.11	Strong shocks felt by fingers.
2.	0.13	Ditto ditto.
3.	0.145	Ditto ditto.
4.	0.19	Ditto ditto.
5.	0.75	Slight shocks felt by fingers.
6.	2.30	No shocks felt by fingers, but good shocks through tongue.
7.	5.70	No shocks felt by tongue, but a strong acid taste.
8.	7.1	Distinct, but slight acid taste.
9.	8 2	Ditto ditto.
10.	82.0	Nothing felt by tongue.
11.	189.0	Ditto ditto.
12.	615 0	Ditto ditto.
13.	2520.0	Ditto ditto.
14.	8	Ditto ditto.

From these experiments it follows that all insulators offering a resistance up to about 1 mill. S. U. can be detected by the fingers, and those above 1 mill. and under 8 mills. can be unmistakably detected by the tongue. It appeared also that tongues of different persons were equally sensitive, since several persons, Europeans and natives, acknowledged the known acid taste, even through the insulator No. 9, having 8.2 mill. S. U. resistance.

The highest limit of the method could of course be increased by filling the revolving bobbin of the magneto-electric machine with much finer wire and increasing the number of permanent magnets; however, this will be scarcely necessary, because it seems to be a fact that if an insulator has more than about 8 mills., the resistance is generally so high as to be practically infinite and, therefore, a

greater sensitiveness of the instrument would only complicate the method.

As it is intended that the tester himself should turn the handle of the magneto-electric machine, he has it entirely in his power to regulate the strength of the induction currents by turning faster or slower, and as, besides this, he always begins the testing by at first sending the currents through his fingers, no severe shocks can occur to him in the subsequent operation.

The method has also a safeguard in itself against carelessly rejecting good insulators, because the tester will certainly be careful in having the insulator properly cleaned before testing it, in order to avoid severe shocks.

There can also be scarcely any doubt that the tongue is the best detector in this particular case, because it is sufficiently sensitive, never comes out of order and indicates almost momentary currents ; it is besides the cheapest instrument that could be used.

[*Note*]. This method may also with advantage be used for detecting bad joints in a telegraph line. It is then only necessary to connect the two ends of the joint to the two terminals of the magnetoelectric machine, in such a way that the body of the tester acts as a shunt to the joint.

A joint which offers a resistance of not less than 5 S. U. allows a current to pass sufficiently strong to be detected by the tongue; but if the joint has a resistance of more than 200 S. U. the current passing is strong enough to be felt already by the fingers of the tester.

Mr. W. E. Ayrton observed, that there is one point of excellency in Mr. Schwendler's arrangement for detecting bad insulators which, as Mr. Schwendler has not mentioned it, he should like to say a few words about. Testing insulators by passing a current through them is not new, but the current used for this purpose has up to the present time been that obtained from a galvanic battery, and to observe such a current a most delicate galvanometer is required. Now both a galvanic battery and a delicate galvanometer are in themselves most unportable, the battery because it must be

very large, and also because by being shaken its effect is greatly diminished, and a delicate galvanometer requires most careful adjustment each time before it is used after being moved. To obviate the use of a galvanic battery, Mr. Schwendler has suggested a magneto-electric machine which is much more portable and also has the same power as a very large battery. An ordinary magneto-electric machine, however, sends (rapid) reverse currents which would produce no effect on the needle of a galvanometer, even although the galvanometer were very delicate, because the rapid reverse currents produce a quick succession of opposite effects on the needle, or practically no effect at all. This, it is true, may be obviated by attaching to the magneto-electric machine a particular kind of reversing arrangement, but this is liable to get out of order. Consequently what is required is a delicate portable galvanometer affected by reverse currents, and such a galvanometer Mr. Schwendler has found in the human tongue, which is most delicate and certainly is most portable and is affected by reverse currents, therefore is most suitable to be used with the magneto-electric machine.

Mr. Schwendler exhibited the apparatus for testing the resistence of insulators and explained in detail the advantages of the practical method. The experiment, as described in the above paper, was tried by several members.

The President noticed that Mr. Lethbridge has brought an interesting communication relating to the old Dutch records in Chinsurah. It will be brought to the notice of the Society at the next meeting. There were also two other papers on the list.

On a new genus of bats, with description of a new species of Kerivoula, *by* G. E. Dobson, B. A., M. B., *Asst. Surgeon H. M. British Forces.* (Abstract.)

The new genus, described in this paper, is characterised by the presence of a *single phalanx in the 4th finger*, two in the 3rd and three in the 2nd. The single, terminal phalanx of the 4th finger, and second or terminal phalanx of the 3rd are rudimentary, so minute as to be scarcely discernible, and, therefore, do not add appreciably to the length of these fingers.

The typical number of phalanges in the 2nd, 3rd and 4th fingers of a bat is two in each digit; this number is often exceeded in many genera of Insectivorous bats by the addition of another short phalanx, but in no genus, hitherto described, is the number less than two. As the greatest breadth of a bat's wing is usually found by measuring along the 4th finger, it follows that, in this typical species where we find the terminal phalanx of the 4th finger rudimentary, and the homologue of the 1st phalanx only in other bats, (the 2nd and 3rd phalanges being suppressed), the wing must be comparatively extremely narrow. On account of this remarkable narrowness of the wing, the author suggests to call the new genus "*Stenopterus.*" The type species is from Darjeeling.

The new *Kerivoula* differs from other allied species by certain peculiarities in the shape of the head, of the ears &c. The specific name *aurata* is proposed for it.

On Indian and Malayan Telphusidæ, by J. Wood-Mason, Esq.

The receipt of the following communication was also announced.

Notes on birds observed in the neighbourhood of Nagpúr, Kamptí, Central Provinces, Chikalda and Akola in Berar, by Lt.-Col. A. C. McMaster, Madras Staff Corps.

LIBRARY.

The following additions have been made to the Library since the meeting, held in February last.

Presentations.

*** Names of Donors in Capitals.

Philosophical Transactions of the Royal Society of London for 1870, vol. 160, part I.—Royal Society Catalogue of Scientific papers, vol. IV.—THE ROYAL SOCIETY OF LONDON.

Proceedings of the Royal Geographical Society, vol. XVI, No. 5.—THE R. GEOGRAPHICAL SOCIETY OF LONDON.

Journal of the Linnean Society, Zoology, Nos. 47 and 48, Botany 53 and 54.—Transactions of the same, vol. XXVI, part 4, XXVII, parts 1 and 2.—THE LINNEAN SOCIETY OF LONDON.

Geschichtliche Ergebnisse der Aegyptologie.—Die Entfaltung der Idee des Menschen durch die Weltgeschichte.—Sitzungsberichte 1869, II. Heft iii-iv; 1870, I. Hefte i-iv.—Abhandlungen der Phi-

losophisch-Philologischen Classe, Band XII; Abth. II; der Mathematisch-Physikalischen Classe, Band X, Abth. III.—BAYERISCHE AKADEMIE DER WISSENSCHAFTEN zu München.

Fossile Mollusken des Tertiær-Beckens von Wien, von Dr. M. Hörnes.—K. K. GEOLOGISCHE REICHSANSTALT, Wien.

Mémoires de la Société Impériale des Sciences Naturelles de Cherbourg, Tom. XIII and XIV.—SOCIETE IMPERIALE DES SCIENCES NATURELLES DE CHERBOURG.

Monatsbericht, Novr. 1870.—Abhandlungen, 1869.—AKADEMIE DER WISSENSCHAFTEN ZU BERLIN.

Bulletin, Tom XV, Nos. 1, 2.—Mémoires, Tom XV, Nos. 5-8.—ACADEMIE IMPERIALE DES SCIENCES DE ST. PETERSBOURG.

Tatvávali.—Pravoda Sátaka, by Chandrakánta Tarkálankára.—THE AUTHOR.

A revision of the *Terebratulidæ* and *Lingulidæ*, with remarks on and description of some recent forms, by W. H. Dall.—THE AUTHOR.

La Langue et la Litterature Hindoustanies en 1870, par M. Garcin de Tassy.—THE AUTHOR.

General Report on the Panjab Oil-lands, by B. Smith Lyman, with 11 plates.—THE AUTHOR.

Ueber das Rámáyana, von A. Weber.—THE AUTHOR.

Journal of a Voyage up the Irrawaddy to Mandalay and Bhamo, by J. T. Wheeler.—THE AUTHOR.

Rahasya Sandarbha, No. 63.—BABU RAJENDRALALA MITRA.

Annual Report on the Convict Settlement of Port Blair for 1869-70.—THE GOVERNMENT OF INDIA.

Annual Report on the Administration of the Bengal Presidency for 1869-70.—Report of the Administration of the N. W. Provinces for 1869-70.—Report of the Administration of the Registration Department in Bengal for 1869-70.—The Cooch Behar Select Records, No. III.—THE GOVERNMENT OF BENGAL.

Report on the Meteorology of the Panjab, for 1869.—THE GOVERNMENT OF THE PANJAB.

Exchange.

The Athenæum, for December, 1870.

The Nature, Nos. 62-65.

Purchase.

Reisen in China von Peking zur Mongolischen Grenze, von Dr. A. Bastian :—F. Bopp's Vergleichende Grammatik :—The L. E. D. Philosophical Magazine, No. 270 :—Annals and Magazine of Natural History, No. 37 :—Zenker's Dictionnaire Turc-Arabe-Persan, Heft XVII :—Böhtlingk und Roth' Sanskrit-Wörterbuch, Bogen 51-60.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR APRIL, 1871.

The monthly meeting of the Society was held on Wednesday the 5th instant at 9 o'clock P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed

Presentations were announced :—

1. From Col. T. C. Hamilton — a large round Gold coin, very thin, somewhat more than an inch in diameter.

Col. Hamilton writes that he received the coin from Mr. W. H. Pattisson, District Superintendent in Ramree, who obtained the same on the island Cheduba. In an account which Mr. Pattisson published in the Arracan News of 1871 (p. 27) regarding his trip on Cheduba island, the same officer states to have been informed that the inscription on the coin is in Cingalese, and that the coin was struck during the reign of Maha Paramat, king of Ceylon in the year of religion 446. This would nearly correspond with the year 1086, A. D. Since the publication of the account, just alluded to, Mr. Pattisson, however, believes to have ascertained that the inscription is in old Siamese character.

2. From G. Latham, Esquire — two charts of the Harbour of Bombay.

3. From Major J. M. Graham — a group of rudely moulded brass figures, representing "Lushais" and their social habits.

The following memorandum accompanied the donation :

"The group was presented by one of the 'Lushai' chiefs of the tribe of 'Nuttun Pooea' to Major Graham, then Deputy Commis-

sioner of the Hill parts of Chittagong. It consists of a great number of small brass figures and two trees, arranged on a wooden block, nearly ten inches square and about 1½ inch thick."

"Amongst the figures will be found men engaged in acting, which consists in representations of fights, attacks on, or by, wild beasts, the proceedings of war parties, &c. Their singing is a low monotonous, buzzing chant, often accompanied by the music of drums, small gongs, and of a wind instrument which in appearance, and sound, strongly resembles the bagpipe. Liquor making, dancing, fishing, shooting, smoking &c. are also shown."

"On the trees are figures of birds, and animals, such as the Toucan, and the long-armed black ape or 'Hooluck.'"

"The method of fastening the bison, (*Bos Gaurus*), which animal is domesticated by the Lushais, will also be observed."

"The Bison is kept for the sake of his flesh and, as he represents a description of Lushai currency, he is much used in barter. It is also worthy of remark that, while the Lushais will eat almost anything under the sun, they will not touch milk, which they consider to be excrement."

4. From Lieut. W. Miller, M. N. I.—an egg of *Megapodius Nicobariensis* from Kamorta island and the carapace of a remarkably shaped Pagurid Crab from one of the small Nicobar islands.

From Capt. J. V. Falle,—a skin of the great Albatross, *Diomedea exulans*, Linn., shot off the Cape.

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

Dr. F. N. Macnamara, (re-election).
Oscar Trefftz, Esq.
Capt. A. J. Filgatte, R. E.
Major J. M. Graham.
Col. F. H. Rundall.
T. M. Bourn, Esq.
W. J. Curtoys, Esq.
W. E. Ayrton, Esq.
W. Bourne, Esq., C. E.

The following gentlemen are candidates for ballot at the next meeting:

Bábu Káliprasanna Ghosha, proposed by Bábu Rájendralála Mitra, seconded by Mr. H. Blochmann.

Capt. B. Rogers, B. St. C., proposed by Mr. J. Wood-Mason, seconded by Col. H. Hyde.

C. F. Bligh, Esq., proposed by G. Nevill, Esq., seconded by J. Wood-Mason, Esq.

Ch. Sanderson, Esq., proposed by the Hon'ble J. B. Phear, seconded by H. H. Locke, Esq.

The following members have intimated their desire to withdraw from the Society.

Dr. S. C. Mackenzie.

R. J. Leeds, Esq.

Letters were read—

1. From Mr. St. John — On some North Arracan Celts.

Mr. St. John gives outlines of several celts in his collection. One large form is from Upper Burma and, in having a short abrupt shoulder, resembles the Burmese celts described and figured by Mr. Theobald in the Proceedings of the Society for 1869, p. 181 &c., pls. iii and iv. Two other celts are from the hills in North Arracan and are in form and size very similar to those figured in the Proceedings for 1870, pls. iii and iv. One of them has the lower edge sharpened from both sides, the other only from one. A fourth outline represents a long iron hatchet, of the shape of a broad chisel; it is still in use by the Arakanese in being simply put through a hole at the end of a stick of a male bamboo.

2. A letter was also read from Mr. E. C. Bayley, C. S. I., regarding a Goldmuhur, struck by Firúz Sháh Zufar in A. H. 791. The coin appears to be unique. A drawing of it will appear in the philological part of the Journal together with Mr. Bayley's notes.

The following papers were read—

1. On Indian and Malayan Telphusidæ, by J. Wood-Mason, Esq. (Abstract.)

The author gave a general sketch of the organisation of *Telphusa indica* and noticed its relation to the two other known species of the genus, *T. Leschenaultii* and *Guerini*. He also referred to the descriptions of 15 new species of which two belong to Milne-Edwards'

subgenus *Paratelphusa*, occurring in Eastern Bengal, which province possess a decided Malayan character in its fauna. Some remarks on the distribution of the various species were also made.

Dr. Stoliczka observed that the results at which Mr. Wood-Mason arrived regarding the geographical distribution of the Indian land-crabs are particularly interesting, because they were obtained independently of the examination of other groups of animals. This was chiefly due to Mr. W. T. Blanford in having pointed the distinctions existing between the Indian and Malayan fauna within the geographical area which we usually designate India. Many of the details on the subject are given in Mr. Blanford's paper on the Central Indian Reptiles, published in last year's Journal. It is, Dr. Stoliczka stated, natural enough that Burma, Eastern Bengal, stretching along the slopes of the Himalayas up to Nepal, should possess a fauna very closely allied to that of the Malayan peninsula and the neighbouring islands, but it is difficult to explain how the same Malayan forms have come into existence on nearly all the higher ranges of hills in South India, along the Malabar coast, and even on some perfectly isolated hills, while the intervening part of the lower country possesses an Indian fauna with a prevalence of African types. Reliable data regarding the distribution of the animals, particularly in India, are as yet very scanty, and carefully drawn up lists of those observed in various districts are much needed, that we may be able to explain the peculiar phenomenon of the isolation of the Malayan fauna in some parts of Southern India.

It does not appear improbable that the fauna of India was at some remote period chiefly, or altogether, Malayan, and that it had been more or less destroyed in those parts which were affected by the enormous volcanic eruptions, characterized as the trappean formation of Central and N. W. India. It must have been somewhere about that time when a communication was established between India and Africa, and when African forms were enabled to travel eastwards and attain a firm hold in India. The immigration from the West must have been considerable, for it seems to have greatly checked the further development of the Malayan fauna, which remained preserved only on the more elevated hills, chiefly those consisting of gneissous and other metamorphic rocks. It is also

highly probable that the overflow of the traps produced a great change in the climate of India, particularly in the less elevated country, and that this climate was more favorable to the development of African than of Malayan forms.

2. On some old Dutch records of the settlement of Chinsura; by E. Lethbridge, Esq., M. A.

A short time ago I accidentally discovered that some of the old records of the Danish settlement of Serampore, or Frederiksnagar, and some of those of the Dutch settlement of Chinsura, were preserved amongst the archives of the Judge's Court at Hooghly. By the permission of the Judge of Hooghly, I was allowed to examine these records; and I expected to open up a rich mine of antiquarian wealth, for Dutch records, at all events the European ones, are generally considered to be more full and detailed than any others, except Venetian records. The documents still preserved at Hooghly are contained in a large almira, and are covered with the dust of years. As I believe is the case with all the record repositories in India, there are absolutely no modern scientific appliances for the preservation of these papers; and consequently most of them are worm-eaten and decaying, and many are in a state of inseparable cohesion. I was somewhat disappointed to find that most of the Dutch papers which I examined were of only local importance; a large number were merely *protocoles* or *registers of the wills* of the old Dutch residents, and hardly any of them of any general scientific value at all. Fortunately, however, the records of the Court supplied me with a very good explanation of this fact; I found that in 1853 all the Dutch *records of any historical and scientific* value had been handed over bodily, and without even any proposal to retain copies of them in this country, by the Government of India, to the Government of the Netherlands' India; and by the latter had been doubtless at once transferred to the Royal Archives at the Hague. I have been fortunate enough to discover the list of these documents, made by the order of Mr. Torrens (the then Judge of Hooghly) at the time of the transfer; and a copy of this list I beg to be allowed to submit to the notice of the Society, (vide Appendix, p. 89).

To this list should be added (as is evident from certain remarks of Mr. Torrens) a complete series of the minutes of the Governors of Chinsura. Mr. Torrens says—"The latter must undoubtedly, I think, have been of very considerable historical importance;" and I venture to believe that the Society will agree with me that some of the series described in the accompanying list may probably be found to be of very high scientific value. The Government of His Majesty the King of the Netherlands is well known for its liberal encouragement of science; and it is very probable that, if the Society should think the matter of sufficient importance to warrant its being mooted, copies of the more important documents transferred from Chinsura, might be obtained without much difficulty from the Record Department at the Hague.

It may be worth while here to add a brief account of the circumstances of this transfer—an account which I have gleaned from the Records of the Judge's Court at Hooghly. It may be remembered that, at the time when Chinsura and other Dutch possessions on the Continent of India were exchanged for the British settlements in Sumatra, in 1824, a Dutch Officer (named the Fiscal) at Chinsura was, under the terms of the Treaty, taken into British employ, apparently to protect the interests of former Dutch subjects. Many of the old Dutch Records were retained in his custody; possibly *all* were so retained, but on this point I have not been able to obtain certain information. On the death of this officer in 1852, the Government of Netherlands' India expressed a wish "to be furnished by an early opportunity with the Dutch Records appertaining to the late office of the Fiscal of Chinsura." After some correspondence, the Governor-General ordered, on the 31st Dec. 1853, that all records possessing any general historical interest should be sent to Calcutta to be handed over to the Dutch authorities; all records having only local importance, and generally all those in Bengali, being retained in the Judge's office.

With regard to the contents of the more important records enumerated in the appended list:—

No. 57 is a book containing a Note of Warren Hastings on the capture of the Fort and Town of Chinsura in 1781. This may very possibly prove to be merely a copy of, or an extract from, a

Record of the Calcutta Foreign Office, which was established in 1783.

No. 42, contains 21 volumes of Journals and Minutes of the administration from 1773 to 1805; this would in all probability furnish materials for a fairly complete history of Netherlands' India for that period.

No. 12 is a packet containing copies of 5 firmans permitting the Dutch to trade in the provinces of Oudh, Allahabad, and Agra. The dates are not given.

No. 8 is a packet containing documents respecting transfer of some premises at Dacca from the French authorities to the Dutch in 1674. This is, I fancy, the earliest mention that we have of the French being settled in Bengal. The India House Records (calendared by Mr. Bruce) mention the arrival of a French fleet under Admiral de la Haye, in the Bay of Bengal in 1673; and Stewart says that the French settled here about 1676.

No. 6 contains two Perwanas under the seal of Vizier Sadoolah Khan respecting a house at Patna.

No. 4 contains documents respecting the acquisition of land at Baranagore by the Dutch in 1680.

No. 3 contains copies of grants respecting lands at Pipley and Balasore, in 1676.

In conclusion, I may perhaps be pardoned, if I venture to call the attention of the Society to a fact which must have frequently attracted the notice of many of its members:—I mean, the immense historical value of many of our Mofussil Records (especially those preserved at places of historical note like Hooghly, Burdwan and Dacca,) which are yearly crumbling away and becoming lost to science for ever, through lack of the most ordinary precautions for securing their preservation. I believe that in no other country in the world, possessing a civilised Government, is so little care bestowed on the preservation of the materials for its history; and in no country is there a greater need for such precautions as can be devised by the skill of the archivist. With regard to accessibility, our Mofussil Records are practically, for all purposes requiring extensive research, absolutely closed to the student; for whilst they are scattered in scores of remote and insecure hiding-places, with-

out indexes or calendars worthy of the name, and in the custody of record-keepers of no scientific skill and comparatively little intelligence, the search for a single fact would not unfrequently involve the waste of years, and years of hard labour. Moreover, he annual destruction of valuable documents that must go on in a climate, like that of Bengal, must be enormous. A memorandum, written by the late Mr. Piddington, is noted by Mr. Torrens, (then Secretary of the Asiatic Society), as a paper of very great value, and is printed in the Journal of the Society for July 1846. It indicates some of the peculiar dangers to which documents are exposed in India, owing to the deleterious nature of some of the ingredients of the ink generally used, and to other causes. The dangers resulting from the dampness of the climate; from the ravages of white-ants, rats, book-worms, and other vermin; from decay; from mutilation, inflicted either intentionally, or through ignorance or carelessness; from fire &c.—all these are sufficiently obvious. It will be within the recollection of the Society that a valuable collection of Oriental manuscripts, the property of Government, was recently damaged by rain; when a circular was issued by the Home Department, ordering that in all annual reports made by officers in charge of public libraries, museums, or collections, it should be specially stated whether or not the whole of the property is safe and in good condition. The present methods adopted in the preservation of all Mofussil Records are of such a nature that it is impossible that any documents can long remain in good condition. I believe that it was found, a short time ago, that the Collectorate Records at Jessore had been so extensively tampered with by interested parties, that the evidence of any of these documents was held to be almost worthless; and I have heard many district officers of experience state their belief that a similar state of things exists in many, if not in most of the Mofussil Record-Offices. It was stated last week in *the Pioneer* that the Records of the cutcherry at Ermakulam are at present inaccessible, owing to the number of the venomous serpents that have taken up their abode amongst them.

The Records are generally placed in common wooden almiras fastened by ordinary padlocks, and placed in rooms of more or less

general resort. The insecurity of such custody may perhaps best be illustrated by a very brief description of the method of custody which is found necessary even in England, where the climate is much less injurious, and the fear of mutilation smaller. As soon as any sets of Records have been taken into the custody of the Master of the Rolls (who is ex-officio head of the English Record Department), they are cleaned, sorted, bound or mended as far as may be necessary and practicable, and placed in boxes for subsequent arrangement. Then a catalogue or general descriptive list is drawn up; and afterwards the more important documents are indexed, and the *most* important are ultimately calendared. When the work of arrangement is complete, they are placed in iron presses in the room assigned to their class. Every room in the building is separately fire-proof, being cased with iron and furnished with an iron-door which is thief-proof. Water can be turned on at a moment's notice in any room for the extinction of fire. Hot-air pipes are placed around every room, so that an equal temperature is preserved throughout the year; and by this means damp is excluded and rot arrested. Every part of the building being thus protected by every means that science can devise, the whole is constantly watched night and day, both by the Department (an Officer and an office-keeper being resident in an adjacent house) and by the Police; a police patrol is on duty throughout the night in the building. The perfect accessibility of all records is also well provided for.

Appendix.

List of Dutch Records likely to be of any historical value.

No. 1. 1 packet of papers or documents of Dutch Government, during the administration of C. Van Citter, Governor of Chinsura, dated the 29th April, 1795.

2. 1 packet of papers, dated the 8th July, 1771, in Dutch and Persian respecting the right of the Dutch Authorities at Peply in some parcels of ground at Balasore.

3. 1 packet of original documents in Persian, and copies of grants relating to the Peply Factory at Balasore, dated in 1084, Hidgree.

4. 1 packet containing documents in Persian respecting transfer of some land in Buranagore, by one Ramepur Mozoomdar to the Dutch authorities in 1088, Hidgree.

5. 1 packet containing documents in Persian respecting the purchase of a parcel of ground, Cassimbazar, dated 19th January, 1750.

6. 1 packet containing documents in Persian respecting the purchase of two houses at Patna, and copies of two Purwanahs with seal of Vizeer Sadoollah Khan, awarding possession of the houses to a Dutch General, (no name mentioned).

7. 1 packet containing document in Persian, respecting the proprietory title of a house at Dacca, which formerly belonged to one Mehdee Alli Khan (date and year not mentioned).

8. 1 packet containing documents, dated the 25th September, 1674, in Dutch and Persian, relative to the making over garden land with premises at Dacca, by the French Authorities.

9. 1 packet containing documents in Persian, and Bengalee, respecting purchase of some land in Beestoopore, zillah Moorshedabad, dated the 23rd December, 1772.

10. 1 packet containing documents in Dutch, Bengalee and Persian, respecting transfer of a water-course at Kalkapore to the Dutch Government.

11. 1 packet containing a deed of sale and a pottah in Persian and Bengalee, of a certain quantity of land at Cassimbazar, granted to Mr. T. M. Ross on the 21st instant, 1181, B. S.

12. 1 packet containing copies of 5 Firmans permitting the Dutch to trade in the provinces of Oude, Allahabad, and Agra, dated 1st February.

13. 1 packet containing documents respecting a house at Balasore.

14. 4 Prothocoles in Dutch, marked A, B, D and E respective to Patna and Cassimbazar from 1763 to 1785.

15. 1 Prothocole in Dutch, during the incumbency of W. F. Van Citters from 1817 to 1818.

16. 2 ditto in Dutch of the Resident for 1823 and 1824.

17. 1 Diary in Dutch from 1818 to 1823.

18. 1 Order book in Dutch from 1820 to 1822.

19. 1 Account-current book in Dutch, 1793-4.

20. 1 Journal book in Dutch, 1793-4.

21. 1 packet containing in Dutch rules for prosecuting actions in Europe Courts.

22. 1 Book of certificates in English regarding sale of Japan Copper, &c., commencing from 28th August 1818 to 7th Feb. 1820.

23. 1 Register of certificates in Dutch and English respecting purchase of a ship and other property by a Dutch gentleman named L. Christianson on the 7th January, 1822.

24. 1 Batavia, account-current book in Dutch for 1794-5.

25. 1 Ditto ditto ditto ditto.

26. 1 Ditto ditto ditto ditto.

27. 1 Ditto ditto ditto ditto.

28. 1 Amsterdam ditto ditto ditto.

29. 1 Ditto ditto ditto ditto.

30. 1 Register of Pensioners in Dutch.

31. 1 Regulations respecting Batavia in Dutch for 1819.

32. Register of Minutes respecting Batavia in Dutch from 1820 to 1825.

33. 1 Book containing orders for the Police in Dutch for 1817.

34. 1 Widow Fund Regulation Book in Dutch for 1817.

35. 1 Military Widow Fund Book in Dutch for 1817.

36. 1 Ditto ditto ditto for 1822.

37. 1 Civil Widow Fund Book in Dutch for 1820.

38. 1 Ditto ditto ditto for 1822.

39. 1 Book containing receipts in English of Despatches addressed to the Governor-General of Balavi.

40. 1 Instruction Book in Dutch (date and year not mentioned).

41. 21 Principal Ledgers in Dutch from 1773 to 1806.

42. 21 Journals and Minutes in Dutch from 1773 to 1805.

43. 8 Orphan Account Books in Dutch from 1818 to 1825.

44. 12 Books containing letters received and copies of letters sent in Dutch from 1775 to 1821.

45. 7 Books containing orders respecting Batavia in Dutch, 1718-19 to 1825.

46. 4 Sequestratic or Account Books in Dutch from 1789 to 1814.

47. 8 Gastors or expense books in Dutch from 1799 to 1814.

48. 3 Regulation Books in Dutch from 1750 to 1766.

49. 2 Books containing statute for Batavia in Dutch from 1664 to 1669.

50. 1 Chinsura Police Regulation Book in Dutch for 1761.

51. 1 Memorial of the Residents of Chinsura, in Dutch, from 1819 to 1822.

52. 1 Book containing Proceedings in English and Dutch of the Dutch Court at Chinsura from 1815 to 1817.

53. 1 Memoir Book in Dutch.

54. 3 Books containing copies of letters in Dutch on various subjects.

55. 2 General Muster Rolls in Dutch shewing the names of officers appointed by the Dutch Government of Chinsura.

56. Correspondence on various subjects in Dutch and English between the Dutch authorities and English Commissioners.

57. One Book containing extract from the Proceedings of the Hon'ble Warren Hastings, Governor-General, relative to the capture of the Fort and Town of Chinsura, 1781.

58. 1 Book containing letters and receipts in Dutch from 1797 to 1798.

59. 2 Books containing letters of Colonel Van Citters in Dutch.

60. 2 Books containing copies of correspondence between the Dutch Governors of Chinsura and Batavia from 1792 to 1795.

61. 2 Registers of letters in Dutch and English of the 2nd Resident on various subjects, 1817.

62. 6 Various account Books in Dutch.

63. 20 Registers of letters in Dutch on various subjects.

64. 1 Batavia account-current book in Dutch.

65. 3 Account Books in Dutch from 1817 to 1821.

66. 1 Register of letters and accounts in Dutch and English relative to the old Church at Chinsura.

3. ON A QUANTITATIVE METHOD OF TESTING A "TELEGRAPH EARTH," by W. E. Ayrton, Esq. (Abstract.)

The method used up to the present time for testing a telegraph earth has been *qualitative* only. As, however, the electrical condition of every "earth" is of great practical importance, it is

necessary that some accurate *quantitative* method should be devised, in order that every telegraph office may ascertain whether the resistance of their earth is higher or lower than the maximum resistance allowed. The principal difficulty met with is that, if the resistance between two earths be measured successively with positive and negative currents, the same result is not obtained. Consequently the ordinary law for a Wheatstone's Bridge, or Differential Galvanometer, would not hold true. This difficulty, however, has been overcome in this paper, and formulæ are developed suitable for a Wheatstone's Bridge, a Differential Galvanometer, or simply for a Galvanometer of which the law of the deflections is known.

The details of some experiments are also given, and a particular instance is mentioned in which a much better "earth" was obtained by burying the plate in the upper stratum of soil than by burying it much deeper, on account of a bed of sandstone that existed at about fifteen feet below the surface.

Mr. Ayrton's paper will be printed in full in the natural history part of the Journal.

The following paper was received:

Notes on the Country of Braj, by F. S. Growse, Esq., M. A., B. C. S.

This paper will be published in the first number of the philological part of the Journal which will appear shortly.

Library.

The following additions have been made to the library since the meeting held in March last.

Presentations.

*** Names of Donors in Capitals.

Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin, December 1870:—Akademie der Wissenschaften zu Berlin.

Selections from the Records of the Government of India, Home Department, No. LXXVII; Papers relating to the Nicobar Islands: —Govt. of India, Home Dept.

Rahasya Sandarbha, Vol. 6, No. 64 :—BABU RAJENDRALALA MITRA.

Rámáyana, Vol. II, No. 6, edited by Hemachandra Bhattáchárya :—THE EDITOR.

Records of the Geological Survey of India, Vol. IV, part I :—THE GEOLOGICAL SURVEY OF INDIA.

Report on the Revenue Survey operations of the Lower Provinces, for 1869-70 :—General Report of the Revenue Survey operations of the Bengal Presidency upper circle, 1869-70 :—THE SURVEYOR GENERAL OF INDIA.

General Report on the operations of the Great Trigonometrical Survey of India, 1869-70 :—SUPERINTENDENT OF THE G. T. SURVEY OF INDIA.

Report on the Revenue Survey operations in British Burma, 1869-70 :—Selections from the Records of the Government of India, Home Department, No. LXXII :—Selections from the Records of the Bengal Government, P. W. D. No. I :—Report on the Administration of the Salt Department 1869-70 :—Palæontologia Indica, Vol. III, Nos. 1-8 :—THE GOVERNMENT OF BENGAL.

Flora Sylvatica, by Major R. H. Beddome, part VI :—Sanitary and Medical report on the settlement of Port Blair, Andamans, for 1869 :—THE GOVERNMENT OF INDIA.

Purchases.

Grimm's Deutsches Wörterbuch, Band XV. Lieferung 10 :—The Calcutta Review, April 1871 :—Hewitson's Exotic Butterflies, part 77 ;—The Annals and Magazine of Natural History, No. 38 :—The American Journal of Science, January 1871 :—The L. E. and D. Philosophical Magazine, No. 271 :—The Ibis, January, 1871 :—Conchologia Indica, part 2.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR MAY, 1871.

The monthly meeting of the Society was held on Wednesday, the 3rd instant at 9 P. M.

The Hon. Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced :—

1. From T. R. Lewis, Esq., M. B.—a copy of a Report on the Microscopic Objects found in Cholera Evacuations, &c.

2. From E. Blyth, Esq.,—several copies of a Note on the controversy between Mr. W. Theobald and Dr. Gray.

Mr. Blyth records his belief that the skull of *Testudo Phayrei*, which was transferred from Dr. Falconer's collection to the British Museum, belongs to a specimen of the same tortoise in the Society's collection; it was originally sent to the Calcutta Museum by Sir A. J. Phayre from Arracan. The fact was first noticed by Mr. W. Theobald, but its correctness was disputed by Dr. J. E. Gray in one of the late numbers of the Athenæum.

3. From S. E. Peal, Esq.,—a few notes on the cultivation and manufacture of Tea.

4. From Akshayacumára Datta,—a copy of The Religious Sects of the Hindus.

5. From His Highness Thákura Giriprasáda Sinha, Rájá of Besma, Allyghur, — a copy of Vedárthapradípa, Commentary of White Yajur Veda, Fasc. I, in Braj Bháshá.

6. From W. H. Dall, Esq., through Rev. H. Dall,—A Preliminary Sketch of a natural arrangement of the Order *Docoglossa*,

(Extract from the Proceedings of the Boston Society of Natural History); and Note on transversely striated muscular fibre among the *Gastropoda*, (from the American Journal of Science and Arts, Vol. I, February 1871).

7. From Rev. H. Gundert,—a copy of prospectus of a Malayalam and English Dictionary.

8. From Bábu Rájendralála Mitra—a dried specimen of a new species of *Scincus*. (For a description of the species see p. 115).

This specimen was obtained by Bábu R. Mitra from a Kashmír merchant, who stated that he brought the same from Arabia. The lizard is largely used medicinally in various diseases, and is particularly highly valued as an aphrodisiac by the Muhammadans. It is commonly known under the names of *regmáhi*, or the sandfish, *regzádah*, or the descendant of sand, and *suqunqúr*, which word is said to be of Greek origin. Scincs, and also the common green European lizards, had been formerly largely used by mediæval European physicians, who attributed to them most wonderful medicinal virtues in all kind of diseases.

In India the scinc is taken in the form of a paste mixed with saffron, cardamum and other spices, or in the form of a powder with beetle leaf, but it is never prescribed by Hindu physicians.

The following gentlemen were elected ordinary members :—

A. P. Howell, Esq.
Babu Káliprasanna Ghosha.
Capt. B. Rogers, B. S. C.
C. F. Bligh, Esq.
Ch. Sanderson, Esq.

The following gentlemen are candidates for ballot at the next meeting :—

Capt. C. Stewart Pratt, Adjt. 34, N. I., Morar, proposed by Mr. Wood-Mason, seconded by Col. H. Hyde.

Moulaví Habíburrahmán, proposed by Mr. Blochmann, seconded by Bábu Rájendralála Mitra.

J. W. Alexander, Esq., proposed by Dr. T. Oldham, seconded by Dr. F. Stoliczka.

Bábu Gangáprasád Siñha, proposed by Mr. H. Blochmann, seconded by Maulaví Kabíruddín.

Bábu Rámakrishna Dása, proposed by Mr. H. Blochmann, seconded by Moulaví Kabíruddín.

The President reported that the Council had elected Dr. F. Stoliczka as a Trustee of the Indian Museum, on behalf of the Society, in place of Dr. S. B. Partridge who has resigned his trusteeship on leaving India.

The President also communicated a proposition of the Council that Ch. Darwin, Esq., be elected an honorary member of the Society.

The President said that according to the provisions of Rule 6 of the Bye-laws of the Society, the Council should, in the case of a proposition for the election of an honorary member, state the grounds on which the recommendation is based.

In the present case, the President thought it would scarcely be necessary to say anything more in support of the proposition of the Council, than to recall the very great influence which the works of the author of the 'Origin of species,' 'Animals and plants under domestication' and the 'Descent of Man' had upon the study of natural history in every one of its branches. Few can claim such a thoroughly philosophical treatment of natural history, as Ch. Darwin, who is justly styled the naturalist of the day.

The ballot will take place at the next meeting of the Society.

The following letters were read :—

1. From Major Stubbs—on a Muhammadan coin.

Mr. Blochmann said :—The coin of which Major Stubbs has sent a rubbing, is a most curious one. It was struck in A. H. 1202, (A. D., 1788) by Muhammad Bedár Bakht, whom the notorious Ghulám Qádir, on the 22nd Shawwál, 1202 (26th July, 1788) placed upon the throne of Dihlí. The reign of this puppet king, who was a son of Ahmad Sháh, was of short duration. When he was first brought forward, Sháh 'Álam (II.) was still upon the throne. Ghulám Qádir, sword in hand, made him descend, and sent him to his apartments, and three days later made the new emperor inflict corporal punishment upon his venerable predecessor. He used to lounge on the throne, side by side with Bedár Bakht, whom he covered with abuse and ridicule,

ganj from Qádir 'Alí, Afzúnganj from Afzún, and Iqbálganj from Iqbál 'Alí.

3. There are at present no Rájahs of Kharakpúr in the district, all their estates including the jágírs granted by the emperor having been sold a few years ago by Mr. Latour by public auction, which led to long and harassing litigation. There are some illegitimate children of the last Rájah still surviving. I may as well mention here the remaining Rájahs of Kharakpúr subsequent to the table given above. Faiz 'Alí succeeded Muzaffar 'Alí, and was succeeded by Qádir 'Alí, who was succeeded in his turn by Iqbál 'Alí, who again was succeeded by Rahmat 'Alí, with whom the line became extinct."

The following papers were read :—

I.—STYLE OF DRESS IN ANCIENT INDIA, by Bábu Rájendralála Mitra,—(Abstract.)

Buchanan Hamilton, in his "Eastern India," first started the opinion that the ancient Hindus knew not the art of preparing needle-made dresses ; and it has since been adopted by Dr. Forbes Watson, Mrs. Manning, Dr. John Muir and others. The premises, however, on which this opinion is founded, appear to be untenable. Mention is made of the needle and sewing in the Rig Veda, which dates from twelve centuries before the Christian era according to the lowest computation, and the existence of those words in the language cannot be accounted for, except on the supposition that the people who used them knew and had what they meant. It is also argued that it is very unlikely, that the heroes of the Vedic age, who were able to forge, and were in the habit of using, armour and mail coats, never came to the idea of fashioning their clothes into made dresses. References are likewise made to the Rámáyaṇa, the Mahábhárata and other ancient Sanskrit works to show that they allude to dresses which could not have been other than needle-made and shaped. The most overwhelming proofs on the subject are, however, met with in sculptures. Though the bulk of the human figures at Sánchi, Amarávati and Orissa are nudes or semi-nudes, still there are some which bear unmistakeable evidence of the antiquity of Indian made dresses. Among the Sánchi bas-reliefs there are several figures dressed in tunics which could never

have been fashioned without the aid of needles; those of the two archers, one of them the Buddhist King, Piliyuk of Benares, figured in Mr. Fergusson's 'Tree and Serpent Worship,' (plate xxxvi) are particularly remarkable, inasmuch as the chapkans there shown are peculiarly Hindu, and the like of them has nowhere else been seen. On a Buddhist rail-post from Buddha Gayá which probably dates from a time earlier than the Sánchi rail, and which is now preserved in the Indian Museum, there are two figures fully dressed from the neck to the middle of the leg in a garment which appears strongly like the *jámá* of the present day. At Amarávati, there are also several figures dressed in tunics which owe their shape to the tailor's art. (Vide Fergusson's plates lxvi, lxxxiv). The Orissan sculptures offer even more positive proofs. In the Queen's palace (Rani Nour), among the rock-rut caves of Khandagiri there is a statue 4′—6″ in height, cut out of the solid rock, which is dressed in a close fitting chapkan, with the skirts hanging down four inches below the knee, and having sleeves down to the wrist. Over the chapkan there is a haubert or coat of chain mail, the sleeves of which reach the elbow. A light scarf is wrapped round the waist, and its ends hang on the sides, holding on the left side a short sword. The head is partially mutilated, but there are traces on it of a twisted turban. The legs and the feet are enclosed in thick high boots or buskins. The age of the figure is supposed to be the third century before Christ, and the existence of chapkan, chain mail and boots at the time, it is believed, must be accepted as the most conclusive evidence on the subject. The dress differs so entirely from the chiton, the chlamys, the himation, and such other vestments as the soldiers of Alexander brought to India, that they cannot be accepted as Indian modifications of the Grecian dress, even if it were possible, which it is not, to suppose that such a foreign dress would at once be imitated in stone many hundreds of miles away from the place where it was exhibited in India. The dress reappears on some of the Amarávati bas-reliefs. Among the sculptures on the temples of Bhuvanesvara there are representations of coats, kilts, boddices, *ghágrá*, *páyajámá*, and other articles of needle-made dress, some of them on gods and goddesses, and they cannot but be accepted as

indigenous. Among the Ajanta frescoes there are also traces of flowing dresses with sleeves, and they all tend to show that the Hindus knew, and did use, made dresses long before the advent of the Muhammadans in India.

In reply to the remark of Capt. Meadows Taylor, in which he says that the Hindus had no tailors among them, and that there is no word in their language for tailors, it is shown that in the Vocabulary of Amara Siñha, which dates from before the Christian era, there are two words for tailors, one, *tunnaváya*, applying to darning, and the other, *sauchika*, to general tailoring: the derivation of the last word is given in Panini's rules. The profession of the latter was of sufficient importance to necessitate the establishment of a separate tribe, and a mixed class, the lawful issue of Vaisyas by Sudra women, was, according to the ancient law-book of Usanas, destined to live by it, and bear the distinctive title of needle-men, *suchika*.

Sanskrit words are next quoted to show the names which various kinds of made dresses bore in ancient times; the most remarkable of these being *kanchuka*, *kanchulika*, *kurpása*, *angika*, *cholaka*, *chola*, *nivi*, *&c.* The first indicated the modern *jámá*, and warders, guards, and the personal attendants of kings generally dressed themselves in it. Kings, princes, chiefs and warriors, when they did not put on chain mail, wore a tunic, something closely like a chapkan. While ordinary people contented themselves with the simple *dhuti* and *chadar*, not unoften supplemented by a turban. Among women, the boddice was in general use, the body clothes consisting of either a *sári* or a *ghágrá*; the former predominating. When respectable women went out of their houses, they generally wrapped themselves in a chudder thrown over their ordinary dress.

Sculptures, however, do not, in all cases, support the above deductions, and nudity is the prevailing character of the bas-reliefs of Sánchi, Amarávati, and Orissa. The question is, therefore, raised as to how far those sculptures may be taken as evidences on the subject. On the one hand, it is difficult to reject the testimony of authentic graven stones; on the other, the ancient records of the Hindus and the Buddhists, equally authentic, are in direct conflict with them. The former represent queens, princesses and ladies of rank in perfect

deshabille; while the latter insist upon decency, modesty and covering of the person as of the utmost importance. Looking, however, to the facts that in many instances clothing is represented on females, but not to cover their modesty; men and even children are clothed, but wives and mothers are left without any covering; horses are covered with housings, but female beholders of the highest rank, standing in the verandas of two-storied houses and decked with a profusion of rich jewels, are made to content themselves with the raiment of the atmosphere; it is concluded that the prevailing character of the bas-reliefs and statues of Sánchi and Amarávati is due, not so much to ethnic or social causes as, to the exigencies of art. No doubt the scantily clad Tamulian aboriginal races formed the great bulk of Buddhist congregations, and were more freely and plentifully represented on the monuments of their co-religionists than the Aryans, but their presence alone does not suffice to account for all the peculiarities noticed. It is supposed, therefore, that a conventional rule of art, such as has made the sculptors of Europe prefer the nude to the draped figure; or a prevailing desire to display the female contour in all its attractiveness; or the unskilfulness of early art; or the difficulty of chiseling drapery on such coarse materials as were ordinarily accessible in this country; or a combination of some, or all, those causes exercised a more potent influence on the action of the Indian artist than ethnic or social peculiarities in developing the human form in stone. There was likewise, it is to be presumed, a longing for variety, and a pruriency of imagination and design, which made the males appear in dresses of diverse kinds and the females in a state of nature. At Bhuvanes'vara a religious sentiment, that of veneration for the creative energy or phallic worship, was evidently also brought to bear upon art, and to produce an effect highly offensive to good taste. But whether so or not, it would, the author of the paper is of opinion, be as effectual to draw our conclusions regarding the costumes of the ancient Indians solely and exclusively from the sculptures they have left behind them, as it would be for the New-Zealander of Macaulay to do the same with reference to the Europeans of the 19th century from the collection of modern statuary in the Crystal Palace at Kensington or the Louvre.

II.—A HISTORY OF THE GAKK'HARS, by J. G. Delmerick, Esq., Rawul Pindee.

(Abstract.)

Mr. Blochmann read extracts from the paper, which is to be published in the forthcoming number of Part I, of the Journal, for 1871. He said—The historical notes collected by Mr. Delmerick are most interesting, and comprise nearly every notice of the tribe found in the Muhammadan Historians of India. Mr. Delmerick mentions above forty chiefs who ruled over the tribe from the time of Mahmúd Ghazní till our age. The present chief, Karam Dád Khán, receives from the Government a small pension as a sort of compensation for the losses suffered by his family during the Síkh Rule. For the early history of the tribe, the author has used traditional information obtained by him on the spot, and there is no doubt that the principal facts are reliable. The *Akbarnámah* places the final settlement of the Gakk'hars in the Ráwul Pindí District somewhat later than local traditions.

Mr. Blochmann also mentioned that among the historical MSS. of the Society, there was a short history of Gakk'hars, presented some time ago by Major Pearse, who, on various occasions had contributed to the collections of the Society. There was a note on the fly-leaf of the MS. by the donor, according to which the work is "an extract from a larger work found at Rohtás." Mr. Delmerick, to whom the book had been sent, says regarding it—

"I consider it an original production from the brain of Donee Chand, the grandfather of Ráizádeh Ratan Chand of Goliana, zillah Ráwul Pindí, the head of the ancient Qánúngo family. I had already seen a copy of it. I believe the few historical facts contained in it have been scraped together from various histories, and chiefly from the legends or tales related by the *bháts* of the country, particularly from the family bhát of the Gakk'hars, at Kúrí, zillah Ráwul Pindí. The work was compiled by order of Major James Abbott, Deputy Commissioner of Hazára, and as Major Pearse was an Assistant Commissioner there for some time, he must have procured a copy of it from the Deputy Commissioner. It is perfectly worthless."

Mr. Lethbridge observed that, with regard to the occupation of Tibet by the Gakk'hars, it may be interesting to note the similarity between certain forms of the names of the chief towns of the Gakk'hars (which are properly Dangáli and Pharwála), and of those of Tibet, which are Lassa and Putala. De Laët, writing in 1631, speaks of "Kakares, whose chief towns are *Dankaler* and *Purhola*, a very broad and mountainous region, divided from Tartary by the ridges of the Caucasus." Mandelsloe calls the district "Kakires, with the chief towns Dankalen and Binsola." Rennell tells us, that the Tibetan capitals are sometimes called *Baronthala* and *Putala*, and sometimes *Tonker* and *Putala*.

III.—On some new species of Malayan bats from the collection of Dr. Stoliczka,—*by* G. E. Dobson, B. A., M. B., *Assistant Surgeon H. M.'s British Forces.*

Mr. Dobson said—I have the pleasure of bringing to the notice of the members of the Society four new species of Malayan bats from the collection of Dr. Stoliczka who, knowing what an interest I take in this order of Mammals, kindly placed at my disposal, for examination and description, the specimens collected by him at Penang, Moulmein, the Nicobar and Andaman Islands. Of these new species two belong to the frugivorous and two to the insectivorous divisions of bats, and represent four genera namely *Cynopterus*, *Macroglossus*, *Phyllorhina*, and *Asellia*. For these species I propose the following names :—

1. *Cynopterus brachysoma.*
2. *Macroglossus spelæus.*
3. *Phyllorhina Nicobarensis.*
4. *Asellia Stoliczkana..*

As full descriptions of these bats will be published with illustrations, in the natural history part of the Journal, the following short diagnoses of the species will suffice for the present :—

1. *Cy. brachysoma*, Dobson.

Head, broad, triangular ; body very short ; tail short and slender ; fur bicoloured, slatey-blue with a greyish or silvery tinge ; tips of the hairs sooty-brown.

Length: head and body 2″.9; head 1″.25; forearm 2″.2; 2nd finger 4″.0.

2. *M. spelæus*, Dobson.

Head long; muzzle narrow, pointed; tongue very long; index finger *without* a claw; a prominent, subcutaneous gland on each side of the anal opening; fur short, dark-brown.

Length: head and body 4″.2; tail 0″.45; head 1″.55; forearm 2″.75; 2nd finger 4″.6.

3. *Phyllorhina Nicobarensis*, Dobson.

Head long; muzzle obtuse; nose-leaf with three small points on its anterior margin, the transverse portion erect, forming an arc of a circle, rolled back on itself and overhanging the concave base which is divided into *two cells* by a single longitudinal fold. Wing membranes attached to base of metacarpal bone of outer toe.

Length: head and body 3″.0; tail 1″.7; forearm 2″.5; tibia 1″.0.

4. *Asellia Stoliczkana*, Dobson.

Ears acutely pointed, outer edge doubly emarginate immediately below the tip; nose-leaf large, transverse portion erect, upper part of crest tri-acuminate, in form like an isosceles triangle with an obtuse vertical angle, having its apex divided into three points by two narrow incisions, perpendicular to the base. Fur pure white, with purplish-brown tips, beneath dirty-white.

Length: head and body, 1″.6; tail 0″.6; forearm 1″.52; 2nd finger 2″.6.

The discovery of the new species of *Macroglossus* leads to the necessity of an important change in the classification of the Pteropine bats, as proposed by Dr. Peters of Berlin.

Dr. Peters has devoted, perhaps, more attention to the examination of this interesting order than any other living naturalist, and his generalisations have, accordingly, been, I believe, very extensively accepted. In the Vol. of the monthly Proceedings of the Berlin Academy for the year 1867, page 865, he arranges the genera of the Pteropine bats (with the exception of *Pteropus*, of which he enumerates the species in a former paper in the same volume)—thus:—

A. *Index finger with a claw.*

2.	*Cynonycterus,*	D. $\frac{3.2}{3.3}$,	$\frac{1}{1}$,	$\frac{-}{4}$,	$\frac{1}{1}$,	$\frac{2.3}{3.3}$.	
3.	*Cynopterus,*	D. $\frac{2.2}{2.3}$,	$\frac{1}{1}$,	$\frac{4}{4}$,	$\frac{1}{1}$,	$\frac{2.2}{3.2}$.	
3*a*.	*Ptenochirus,*	D. $\frac{2.2}{2.3}$,	$\frac{1}{1}$,	$\frac{4}{2}$,	$\frac{1}{1}$,	$\frac{2.2}{3.2}$.	cauda distincta.
4.	*Megaerops,*	D. $\frac{2.2}{2.3}$,	$\frac{1}{1}$,	$\frac{4}{2}$,	$\frac{1}{1}$,	$\frac{2.2}{3.2}$.	cauda nulla.
5.	*Harpyia,*	D. $\frac{2.2}{2.3}$,	$\frac{1}{1}$,	$\frac{2}{0}$,	$\frac{1}{1}$,	$\frac{2.2}{3.2}$.	
6.	*Epomophorus,*	D. $\frac{1.2}{2.3}$,	$\frac{1}{1}$,	$\frac{4}{4}$,	$\frac{1}{1}$,	$\frac{2.1}{3.2}$.	
6*a*.	*Hypsignathus,*	D.					
7.	*Macroglossus,*	D. $\frac{3.2}{3.3}$,	$\frac{1}{1}$,	$\frac{4}{4}$,	$\frac{1}{1}$,	$\frac{2.3}{3.3}$.	

B. *Index finger without a claw.*

8.	*Cephalotes,*	D. $\frac{3.1}{3.3}$,	$\frac{1}{1}$,	$\frac{2}{2}$,	$\frac{1}{1}$,	$\frac{1.3}{3.3}$.
9.	*Notopteris,*	D. $\frac{2.2}{2.3}$,	$\frac{1}{1}$,	$\frac{1-1}{1-1}$,	$\frac{1}{1}$,	$\frac{2.2}{3.2}$.

It will be thus seen that the genus *Macroglossus,* according to Prof. Peters, comes under the head of the first division, or those bats provided with a claw on the index finger, and this generalisation was perfect so long as *M. minimus,* remained the type of the genus, but the above noticed new species, of which two spirit specimens are before you, has not the slightest trace of a claw on the index finger. That this is a true *Macroglossus* is sufficiently evident, if the form of the head, and the number, character, and arrangement of the teeth be compared with the same parts in *M. minimus,* the points of difference consisting in the possession or absence of a claw on the index finger, the place of attachment of the wing membrane to the foot, and the comparative length of the tail. These differences would, perhaps, warrant the formation of a new sub-genus for the reception of this species, which, however, I hesitate to do till the discovery of other species requires it.

The differences referred to would, no doubt, be of great importance in separating the species and placing them in different genera, were there associated with them correspondingly important differences in the form of the head, and the character, number and

arrangement of the teeth. But when we come to examine and compare these parts in the specimens of the two species, we are at once struck by the almost complete similarity of the specimens in these respects, the relative importance of which it is unnecessary to dwell upon.

Therefore that part of Prof. Peters's classification which depends on the presence or absence of a claw on the index finger must be abandoned, and some other generalisation, based on a more constant and important character, substituted, but I have not yet examined a sufficient number of species to enable me to indicate this character.

Among the bats obtained by Dr. Stoliczka at the Nicobars three specimens of *Miniopteris Australis*, Tomes, occur. Mr. Tomes in describing this species* says "the name under which I have described this species was given under the impression that it was exclusively a native of Australia. It was not until after I had arranged and named the specimens in the British Museum and in some other collections, that I found it to be an inhabitant of Timor (and probably of other islands of the Indian Archipelago), as well as of Australia, and that the name of *Australis* was not strictly appropriate. But to avoid the confusion which might possibly arise from a change of name, I have thought it desirable that it should remain unaltered." I believe this is the first time *M. Australis* has been recorded from the Nicobars, and in so recording it, I not only add a species to the fauna, but also a fresh locality to the species placed nearly as far north of the equator as its first locality was south of it, so that Mr. Tomes's surmise has proved correct, though I believe in a far wider sense then he expected, and taking the name *Australis* literally, he might with almost equal justice have called the species *septentrionalis*.

IV.—NOTES ON THE ANATOMY OF CREMNOCONCHUS SYHADRENSIS, by Dr. F. STOLICZKA.

A peculiar amphibious shell, living on the moist precipitous rocks of the Western Ghats near Bombay, was described by Mr.

* Annals and Mag. Nat. Hist. 1858, Vol. II. p. 161.

W. T. Blanford as *Cremnobates Syhadrensis*, in Ann. and Mag. N. H. for September, 1868, vol. I. In this paper Mr. Blanford noted the species as representing, in some respects, a connecting link between the LITTORINIDÆ and CYCLOSTOMIDÆ, but he inclined to its classification in the former family, although he was not able to discover the presence of gills.

In Ann. and Mag. N. H. for May 1869, vol. III, p. 343, Mr. Blanford proposed to substitute the generic name *Cremnoconchus* for *Cremnobates*, the latter having been preoccupied by Dr. Günther in Ichthyology. In Journ. Asiat. Soc. Bengal, Vol. XXXIX, p. 10, &c., Mr. Blanford added a new species to the genus, *C. conicus*, with the variety *canaliculatus*, and classed Layard's *Anculotus carinatus*, in the same genus. All three forms occur at Mahableshwar in similar localities, as the first named species; they appear to me to be only varieties of Layard's *carinatus*.

Prof. Troschel obtained a specimen of *Cremnoconchus Syhadrensis* with the animal dried in, but all he could examine were detached portions of the radula; these, however, agreed so well with those of *Littorina*, that no doubt remained as to the Littorinoid character of the species in question (vide Archiv für Naturgesch., 1867, pt. I, vol. XXXIII, p. 90).

In my review* of the genera of the family LITTORINIDÆ I have classed *Cremnoconchus* in the sub-family LACUNINÆ, but it appears that the species now known to constitute the genus shew rather more affinities to *Littorina* than to *Lacuna*. I shall return to this subject of classification again.

Considering the very great importance which attaches itself to the discovery of every form, representing a link between two others, now widely separated, I was glad to receive several specimens of *Cremnoconchus Syhadrensis* through Mr. Fairbank from the Mahableshwar cliffs. The following notes will give an outline of the principal anatomical characters of the species, in addition to those already noticed by Mr. Blanford and Prof. Troschel.

* Monograph of cretaceous Gastropoda, Palæont. Indica, II, 1867-68, p. 262.

Cremnoconchus Syhadrensis, W. Blf.

1. Side view of a male specimen, partially protruding out of the shell.
2. View from below of another specimen, shewing the sole of the foot.
3. Anatomy of a female specimen :

r—radula,	*k*—kidney,	*li*—liver,	*o*—vagina.
g—gill,	*h*—heart,	*m*—shell retractor,	*f*—foot.
ng—obsolete plume,	*i*—intestines,	*ut*—uterus,	*pr*—muzzle.
sg—salivary glands,	*st*—stomach	*ov*—ovary,	*a*—anus.

4. 2 series of teeth of the radula. 5. side view of the centre tooth.

The animal (figs. 1-2) of *C. Syhadrensis* has a short rather stout body, with a thick subcylindrical foot, posteriorly with the operculum attached by a slight lobe, just above the base ; mantle-edge very slightly crenated and somewhat thickened ; muzzle short, thick, with the oral opening at the end, which is not lobed ; tentacles subulate, of considerable length, rather far apart, pointed at the end, with large, black eyes on their outer swollen bases ; sole of foot roundish or oval, with an indistinct median groove. Sexes distinct : male with a large, flatly depressed penis, perforated at the end, without any appendage.

General colour pale whitish grey, slightly darker on the back, and with a few irregular darker spots at the sides of the foot, tentacles usually blackish ; the muzzle appears reddish on account of the red colour of the buccal parts.

The sexes appear slightly to differ in size ; at least none of the males were as large as the females. The shell of the largest speci-

men of the latter measured : larger diam. 8, smaller diam. 7·5, total height 8 m.m.

The internal anatomy (fig. 3) does not essentially differ from that of other Prosobranchiate Gastropoda. The buccal parts in the mouth are soft, fleshy, with the usual cartilaginous valves internally. I have not observed a trace of a separate jaw. The œsophagus passes through the nervous ring, beyond which the salivary glands are situated. Stomach large, black ; it had vegetable matter inside, the animal having apparently been living on minute algæ. Intestines very long. The uterus in the female is disc-like, large, flattened, of a greyish colour ; the ovarium very large, occupying the greater portion of the middle and also mostly of the posterior surface, and of the inner or collumellar side of the body. In a full grown female, (examined in March) the eggs were somewhat more than one half millim. in diameter, yellow, with a large transparent, excentric, nucleus, enclosing a minute nucleolus.

In the male, the testis is situated, similarly to the ovary in the female ; it is generally of a pale yellowish colour and the spermatozoa are rather short, extremely thin, gradually thickened towards one end. In some specimens the testis occupied the whole of the surface of the terminal 1½ whorls. The vas deferens lies along the ventral (or columellar) side and is of very great length ; it was filled with well developed spermatozoa.

The kidney is large, elongately ovate, grey, situated behind the gills. The liver is greenish, consisting of two anterior smaller lobes while a larger, much subdivided, lobe occupies the terminal portion of the body.

The gills consist of a single rather narrow plume, composed of thin fillets which are grown to the upper side of the gill-cavity. The fillets are on the right side very finely prolonged and partially become branched, resembling in this respect the breathing organ of pulmoniferous Mollusca ; the same form is already indicated in several of the more terrestrial than aquatic *Littorinæ*. To the right of the gill is a narrow thickening, which is generally stated to be a rudiment of a second plume ; it is barely indicated in this species.

The radula is narrow, very long, from 10-14 m.m. ; the greater

portion of it lies rolled in on the right side behind the mouth. It is composed of between 260-280 transverse rows of tænioglossate teeth, the formula being 3 . 1 . 3. (see fig. 4). The centre tooth is somewhat longer than broad, rounded above, strongly emarginate at the sides, and less so at the base. The upper edge is very strongly inflected, with 7 denticles of which the median one is the largest, (see fig. 5). Along the concave sides runs a very thin, raised lamella, and the projecting corners of the base are also bent upwards. The lateral teeth follow below each other under a rather steep angle; all have the upper edges strongly inflected, each having the median denticle the strongest and obliquely projecting, the outer 3 denticles on each side decreasing in size; on the outermost tooth the latter are sometimes hardly traceable. The general shape of the first lateral tooth is obliquely qradrangular, posteriorly deeply emarginate and with the posterior half of the upper edge thinner and a little longer. The bases of the two outer lateral teeth are obliquely, and more or less obtusely, pointed.

The teeth of *C. carinatus*, and its varieties, are perfectly similar to those of *Syhadrensis*, except that the median denticles of the teeth are a little stronger and more pointed, as compared with the adjoining lateral denticles.

When we compare the general anatomy of *Cremnoconchus* with that of *Littorina*,* we find that both are almost perfectly identical. Prof. Troschel, in the above noted communication (p. 94), characterized *Cremnoconchus* as possessing an umbilicated shell and the median teeth of the radula without laterally raised lamellæ, while *Littorina* has, according to the same author, a non-umbilicated shell and the median teeth with lateral lamellæ. The statement relating to *Cremnoconchus*, is, however, evidently an oversight on the part of Prof. Troschel. The median teeth of *Cremnoconchus* have, as already noticed, laterally raised lamellæ, and the shell is either umbilicated or not; as is clearly shewn by *Cremnoconchus carinatus*, and its varieties. In the two points alluded to, the genus, therefore, perfectly agrees with *Littorina*, and it is indeed not easy to find out sufficiently distinctive characters between the two.

* I have examined in connection with this subject *Littorina melanostoma*, and two other species very closely allied or identical with *undulata* and *intermedia*.

The form of the shell of both is so variable that no importance can be attached to it, the only difference being, that the one of *Cremnoconchus* has a peculiarly thin texture, and that it is covered with a very distinct olivaceous epidermis. As to animals, *Cremnoconchus* differs from *Littorina* by the subcylindrical foot, the sole of which is only indistinctly grooved, and by the males having the penis destitute of an appendage. There is no peculiar difference in the form of the teeth, except that each has 7 denticles, while in *Littorina* there are usually only 5 present. The operculum is also in both very similar, paucispiral and horny, only in most specimens of *C. Syhadrensis* it becomes in time quite testaceous.

For these reasons I believe, therefore, that *Cremnoconchus* can be regarded only as a subgenus of *Littorina*, and should be classed next to *Risella* (= *Bembicium*), the relative position of the lateral and central teeth being very similar in both. Of *Risella* two species occur on the Arracan coast, at the Andamans, and Nicobars, Penang, &c.

In my Monograph of the South Indian Gastropoda, (Palæont. Indica, II, p. 259, et seq.), I have divided the LITTORINIDÆ into three sub-families, FOSSARINÆ, LACUNINÆ and LITTORININÆ. Subsequent researches make a thorough change in the classification of the family necessary.

In the first named sub-family only *Risella* can be regarded as a true Littorinid, and must be placed near *Littorina*. *Fossar* and its allies must be excluded from the present family. In the LACUNINÆ have provisionally to remain: *Lacuna*, *Modulus*, *Stenotis*, and *Lacunaria*, while *Lithoglyphus* is to all appearance a Rissoid form, and must be classed near *Bythinia* and *Amnicola*. The LITTORININÆ include *Cyclonema*, *Spironema*, *Amberleya*, *Echinella*, *Hamus*, *Risella*, *Cremnoconchus*, *Neritoides*, and *Littorina*. Researches in fossil conchology may increase this list considerably.

With regard to the relation of *Cremnoconchus* to *Cyclostomus*, *Cyclophorus*, and some of their allies, it is worth while drawing attention to the many points of similarity which exist between the *Littorinæ* in general and these operculated landshells. The animals, and their dentition, are in both often extremely similar, with the exception that the former have the end of the muzzle truncate, while the CYCLOPHORIDÆ have it lobed. The operculum in *Cyclo-*

stomus is similar, paucispiral, but testaceous, while it is horny in *Littorina*. *Cremnoconchus*, however, having occasionally a testaceous operculum, indicates a link between the two genera and it also inclines to the latter by the males not possessing an appendage to the penis. The gills of some *Littorinæ*, and particularly those of *Cremnoconchus*, equally indicate a passage to the form of the lungs of true PULMONATA. Further, the foot is grooved along the middle of the sole in *Littorinæ*, it is equally so in the *Cyclostomi*, only the two parts of the sole are in the latter genus still more developed on account of the arboreal habitat of the species, though very probably this will not be found to be so much the case in the purely terrestrial ones, and in *Cyclophorus* and others the groove has entirely disappeared. The *Littorinæ* have no jaw, at least none distinctly developed, neither have the *Cyclostomi*, but the *Cyclophori*, which may be said to be more terrestrial, than the former, possess a well-developed jaw, like the HELICIDÆ and other PULMONATA.

Considering these numerous points of structure which I have just noticed, it can be scarcely doubted that there exists an intimate relation between *Littorinæ* and *Cyclostomi* and their associates; and that the origin of the latter may be looked for in the explanation of certain slight changes in the organisation of the former. *Cremnoconchus*, as already stated, shews in several points a still greater inclination to *Cyclostomus*, than do the common *Littorinæ*. Mr. Blanford's general remarks on this subject were, therefore, perfectly justified, though he was not in possession of all the details upon which he might have been able to base more definite conclusions.

In point of general classification, the comparison of the anatomy of *Littorinæ* and *Cyclostomi* indicates, that among the different organs, the structure of the breathing organ seems to be subjected to a greater variation, or change, than are for instance the generative or digestive parts, or the radula, &c. Therefore, *it is not advisable to use the breathing organ as an important character in the principal classification of the Mollusca, in the way* in which it has been introduced for such a purpose in the systems of Cuvier and others.

I could quote other examples in support of this view, as for instance that of *Cerithidea obtusa*, where the gills have entirely disappeared, and become replaced by true lungs, while no one

will at the same time deny the close relation existing between the marine *Cerithia*, the brackish *Potamides* and the species of *Cerithidea* above referred to.

V. Description of a new species of Scincus,—*by* Dr. J. Anderson.

Scincus Mitranus, n. sp.*

Head rather small and much pointed ; tail short and thick at the base. Snout contracted behind the nostrils and dilated in front of them, sharp, spatulate and fossorial. Nasal crescentic, occupying the place of a first superior labial, but with the lateral portion of the rostral below it, in contact with the rostral, first labial, anterior loreal, large supranasal and small internasal. The supranasals large, not contiguous, pentagonal, four of their sides large and one very small, in contact with the internasal. Internasal small, rounded, lying between the rostral, nasal and supranasal. Rostral with a broad, rounded, sharp anterior margin ; its sides much convergent; its posterior end forming only a narrow suture with the frontal ; its under surface broad and slightly shelving upwards ; its posterior margin a crescentic, cutting ridge, defined from the surface anterior to it, by a deep groove. The frontal large, conical from behind forwards, and pointedly unguiform, forming sutures with the rostral, supranasal, anterior loreal, and contiguous by its hinder margins with the post frontals. Post frontrals large, pentagonal, broad in front, pointed behind, forming a broad suture together. Vertical of moderate size, rather narrow, its anterior margins forming an obtuse angle; lateral margins concave and slightly convergent; abruptly truncated posteriorly. Two pre-occipitals rather small, oblongly pentagonal, placed obliquely, and contiguous. Occipital considerably smaller than the vertical and wedge-shaped from before backwards : two rather large scales placed transversely along its external margin. Two small postoccipitals. Five large superciliaries with an internal line of four small plates, the first of which equals the length of the three succeeding ones. Four rather large scales form the lower margin of the eye, the anterior scale as long as the two behind it. Loreal region concave. Two elongated loreals one before the other, the anterior shield in contact with the supranasal, nasal and three lower labials. Eight upper labials, the two below the

* I have named this lizard in honour of my learned friend Bábu Rájendralála Mitra who obtained it under the circumstances mentioned on page 96.

eye the largest. Eight lower labials: a large shield behind the mental succeeded by three pairs of large shields, separated from each other by a median, longitudinal, row of three smaller shields. External ear completely hidden. Twenty-nine to thirty rows of smooth, imbricate scales round the middle of the body. Two large preanal scales.

Colour of dried specimen yellowish buff above, each scale with a white spot in the centre of its free margin with a brown spot on either side of it. Ten vertically elongated, or more or less rounded, deep red-brown spots along the side from the middle of the neck to above the thigh, the last spot reduced to little more than a speck. Sides and under surface yellowish. Snout to vent 4″ 12‴; vent to tip of tail 2″ 5‴; snout to posterior margin of occipital 8‴; anterior limb 1″ 1‴; posterior limb, 1″ 2‴.

The nails of this scinc are flat and broad, and rather concave on the under surface: the toes are laterally extended by the outward elongation of the dorsal scales, an arrangement which gives the foot great breadth, and suggests the idea that it is specially modified to a fossorial habit of life.

The specimen from which this description is drawn, was obtained by Bábu Rájendralála Mitra from a Kashmír merchant, who stated that it came from Arabia and that it was the El-adda of the Arabs. It is extremely likely that this term is a generic one applied to a number of nearly allied scincs, inhabiting Arabia, Syria, Egypt and Abyssinia, (see antea, p. 96).

The present species is distinguished from *S. officinalis*,—if the descriptions and drawings of that lizard are correct,—by its more markedly fossorial snout and by the number, form and disposition of its cranial plates, and by its peculiar coloration. Another species from Arabia is the *Sc. meccensis*, Hemp. and Ehr.

The reading of the next paper was postponed.

Notes on several Arabic and Persian inscriptions, by H. Blochmann, Esq., M. A.

The following communications have been received:—

1. *Legends and Ballads connected with persons deified, or held in great veneration, in Bhagulpúr and the neighbouring districts*, by Bábu Rashbihári Bose.

2. *List of birds, collected, or observed in the Wardha Valley and its vicinity near Chanda*, by W. T. Blanford, Esq.

LIBRARY.

The following additions have been made to the Library since the meeting held in April last :—

Presentations.

*** Names of Donors in Capitals.

Quarterly Journal of the Geological Society of London, Vol. XXVII, Part I :—THE GEOLOGICAL SOCIETY OF LONDON.

Transactions of the Royal Society of Edinburgh, Vol. XXVI, Part I ;—Proceedings, Session 1869-70 :—THE ROYAL SOCIETY OF EDINBURGH.

Journal of the Chemical Society of London, Vol. VIII, November and December ; Vol. IX, January :—THE CHEMICAL SOCIETY OF LONDON.

Journal Asiatique, No. 58 :—THE SOCIE'TE' ASIATIQUE, PARIS.

Monatsbericht der K. Preussischen Akademie der Wissenschaften, January 1871 :—K. PREUSSISCHE AKADEMIE DER WISSENSCHAFTEN ZU BERLIN.

Atti della Reale Accademia delle Scienze di Torino, Vol. V, Disp. 1-7 ;—Vol. IV, Appendice ;—Notizia Storica dei lavori fatti dalla classe di Scienze Fisiche e Matematiche, 1864-1865 ;—Observation de L'Essaim des E'toiles Filantes du 12-14. Novembre, 1869 ;—Bollettino Meteorologico ed Astronomico del Regio Osservatorio dell' Universita di Torino, 1869 :—REALE ACCADEMIA DELLE SCIENZE DI TORINO.

Kongliga Svenska Vetenskaps-Akademiens Handlingar, Ny-Följd, 1864-67 ;—Meteorologiska Iakttagelser i Sverige utgifna af Kongliga Svenska Vetenskaps.—Akademien, anställda och bearbetade under inseendé af Er Edlund, 1864-66.—Lefnadsteckningar öfver K. Svenska Vetenskaps Akademiens, efter Ar 1854 aflinda, Ledamöter, Band I, Hälfte I ;—öfversigt, 1865—68.—Die Thierarten des Aristoteles von den Klassen der Säugethiere, Vögel, Reptilien und Insekten von Carl. J. Sundevall ;—Conspectum Avium picinarium, edidit, Carl. J. Sundevall ;—Hemiptera Africana descripsit Carolus Stäl, Tom 1-4 :—KONGL. VETENSKAPS-AKADEMIE, STOCKHOLM.

Mémoires de la Société Royale des Sciences de Liége, 2me Série, Tom 1-2 :—SOCIE'TE' ROYALE DES SCIENCES DE LIE'GE.

Journal of the Agricultural and Horticultural Society of India, Vol. II, Pt. II :—THE AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA.

Archivo per L'Antropologia e la Etnologia, pubblicato per Dr. P. Mantegazza, Dr. F. Finzi ;—THE AUTHORS.

Brahma und die Brahmanen, von Dr. M. Haug :—THE AUTHOR.

Derivative Hypothesis of Life and Species, by Prof. Owen :—THE AUTHOR.

Preliminary Sketch of a Natural Arrangement of the Order *Docoglossa*, by W. H. Dall.—Note on the transversely striated muscular fibre among the Gasteropoda, by W. H. Dall :—THE AUTHOR.

The Religious Sects of the Hindus, by Akshayacumára Datta :—THE AUTHOR.

A Report on the Microscopic Objects found in Cholera evacuations, by T. R. Lewis :—THE AUTHOR.

Rámáyana, Vol. II, No. 7, Edited by Hemachandra :—THE EDITOR.

Rahasya Sandarbha, November, 1865 :—THE EDITOR.

Flora Sylvatica, Part VII ;—Icones Plantarum Indiæ Orientalis, Part VII ;—General Report on the Topographical Surveys of India, 1869-70 ;—General Report on the operations of the Great Trigonometrical Survey of India, during 1869-70 ;—General Report on the Revenue Operations of the Bengal Presidency, 1869-70 :—THE GOVERNMENT OF INDIA.

Vedárthapradipa No. 1 :—H. H. THA'KUR GIRIPRASA'D SINHA.

Exchange.

The Athenæum for February, 1870.

Nature, Nos. 65-75.

Purchase.

Revue des deux Mondes, 15th October, 1870 :—Journal des Savants, September, October, November, December 1870 :—Comptes Rendus, Nos. 11-19 :—American Journal of Science, February 1871 :—Annals and Magazine of Natural History, March 1871 :—L. E. and Dublin Philosophical Magazine, No. 272 :—Thorell's Remarks on Synonyms of European Spiders, No. 1 :—Thorell on European Spiders :—Gould's Birds of Asia, Part XXIII :—Ferguson's History of Architecture, Vols. I and II :—Cunningham's Geography of Ancient India, Vol. I. :—Tyndall's Diamagnetism :—Galton's Hereditary Genius :—Beale's Disease Germs :—Jacolliot The Bible in India :—Bhagavatgita in Persian verse, (MS.) by Feizi.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JUNE, 1871.

The monthly meeting of the Society was held on Wednesday the 7th instant, at 9 o'clock P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The Proceedings of the last meeting were read and confirmed.

Presentations were announced,—

1. From Bábu Rámadása Sena, a Bengali MS., entitled Pas'upás'amokshaṇam, by the late Rádhámohana Sena.

2. From the author.—A copy of 'Remarks on the anatomy of the genus *Siphonaria*,' by W. H. Dall, Esq., and a copy of 'Materials towards a monograph of the *Gadiniidæ*,' by W. H. Dall, Esq.

3. From the author.—English Legislation for India, by A. M. Broadley, Esq., C. S.

4. From Rev. M. E. Lafont.—2 copies of 'Meteorological Observations made in the St. Xavier's College Observatory from July to December, 1870.'

5. From M. L. Ferrar, Esq., C. S., 2 silver and 6 copper coins, dug up at Qanouj.

The copper coins present no particular points of interest. They are a copper coin of Fírúz Sháh III. of Dihli, two copper coins of Ibráhím Sháh of Jaunpúr, one copper coin of Husain Sháh of Jaunpúr of A. H. 887, two defaced Bactrian copper coins, and fragments of two silver coins.

6. From the author.—A copy of Memoir of the Ghazeepoor District, by Wilton Oldham, LL. D., B. C. S.

7. From the author.—The Topography of the Mogul Empire, as known to the Dutch in 1631, &c., by E. Lethbridge, Esq., M. A.

8. From the Society.—Six copies of Abstract of Proceedings of the Muhammadan Literary Society of Calcutta.

Ch. Darwin, Esq., proposed by the Council at the last meeting of the Society was balloted for and elected an Honorary Member.

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

Capt. C. Stewart Pratt.
Maulaví Habíburrahmán.
J. W. Alexander, Esq.
Bábu Gangáprasád Sinha.
Bábu Rámakrishna Dása.

The following gentlemen are candidates for election at the July meeting :—

J. R. Reid, Esq., C. S., Azimghur, proposed by W. Oldham, Esq. LL.D., C. S., seconded by H. Blochmann, Esq.

J. Smith, Esq., C. S., Ghazípúr, proposed by W. Oldham, Esq., LL.D., C. S., seconded by H. Blochmann, Esq.

E. W. Oates, Esq., C. E., proposed by S. Kurz, Esq., seconded by Dr. F. Stoliczka.

Col. Octavius Hamilton, proposed by the Hon'ble J. B. Phear, seconded by Col. H. Hyde.

C. T. Buckland, Esq., C. S., proposed by Col. H. Hyde, seconded by Dr. F. Stoliczka.

Khalífah Sayyid Muhammad Hasan, Prime Minister to His Highness the Mahárájah of Patiálah, proposed by Maulaví Abdool Luteef Khán Bahádur, seconded by the Hon'ble J. B. Phear.

Capt. R. D. Osborn has intimated his desire to withdraw from the Society.

The President said that, acting on the request of Dr. Neil, Meteorological Reporter of the Punjab, he must ask the attention of the meeting for a few moments to a short correspondence which had passed between Dr. Neil and himself. It had happened un-

fortunately that a passage in the Presidential Address, delivered before the Society in March last, was so couched as to lead Dr. Neil to consider that it conveyed an incorrect representation of the state of Meteorological Observations in the Punjab, and accordingly that gentleman wrote to the President in the following terms:—

Lahore, May 11th, 1871.

'DEAR SIR,—I was somewhat surprised to find you stating, in your Presidential Address at a recent meeting of the Asiatic Society, that "according to the published reports out of 19 stations,* from 2 only have continuous registers extending over two and a half years, been furnished," &c. I must ask you to contradict this statement, as it disagrees entirely with facts, and in doing so, I trust you will give the same publicity both to your contradiction and to this letter, as has already been given to your address.'

'From Multan alone I have records of continuous registrations from 1862 to the present time. From Lahore, Syalkote, Dera Ismael Khan, Rawalpindi, continuous registrations have been kept up since May 1866. Since January 1869, observations have been registered at Ludianah, and for three and a half years continuous registrations are on record at Shahpoor.'

'At present registrations of—Barometric pressure, Hygrometry, Solar Temperature, Max. and Min. ditto., Direction of Wind, Rainfall,—are being recorded in Lahore, Multan, Dera Ismael Khan, Rawalpindi, Ludianah, Dhurmsala and Murree, at all of which places the observers are *paid*. The observations are recorded on the plan recommended by Glaischer; the instruments are all good, the barometers being, in the cases of those at Lahore, Ludianah, Dera Ismael Khan, Dhurmsala and Murree, mercurial which have been compared with a standard. In other stations, registrations which do not include records of atmospheric pressure are kept as in Umritsur, Gurdaspore and Dalhousie. In some of the stations I have had anemographs erected for the continuous registration of the direction of the wind. A hiatus will occasionally occur in a register from such accidents as breakage or disorder of instruments. Out of three barometers (Adie's Mercurial) which I ordered recently

* In the Panjab.

only one reached me which is destined for Ladakh. That embassy has already cost Government three barometers and myself one.'

The remaining portion of Dr. Neil's letter did not bear upon the particular matter of complaint, and therefore for the moment he, (the President), would abstain from reading it. He at once replied to Dr. Neil as follows :—

19*th May*, 1871.

'DEAR SIR,—Your letter, dated the 11th May, reached me late in the evening of the 17th. I regret much to learn from it that you consider you have occasion to complain of a statement lately made by me in the course of an Address to the Asiatic Society. You quote from the Address the following words, "According to the published reports, out of 19 stations in the Punjab, from 2 only have continuous registers, extending over two and a half years been furnished," and you say that this statement disagrees entirely with facts.'

'You will observe that in this passage, I do not refer to your records of registration, as to which I have indeed no information. I merely speak here of the published reports. And at the time when I delivered my address there were, I believe, but three of these, namely, the reports for 1866, 1867 and 1868. The report for 1869 was (if I am not mistaken) not then published. At any rate, I was certainly not aware of its existence.'

'The monthly abstracts in these three Reports for 1866, 1867 and 1868, appear to me to cover a period of almost exactly two and a half years. I have just now in consequence of your letter, carefully looked through these again, and I must confess I am quite unable to discover on this review that my original statement in reference to this period is in any degree erroneous. In regard to all excepting 2 out of the 19 stations, there seem to be breaks of greater or less extent in the continuity of every abstract. I take for instance your own-principal station of Lahore, I find there are no observations, or results of observations given, for the months of May, June, July, August and September 1868. I need hardly say, however, that I am nevertheless most ready (if you still wish me to do so) to comply with the request, which you make to the effect, that I should give the same publicity to your letter as was given to my address; and,

accordingly, unless I hear from you to the contrary I will take care that your letter is read at our next meeting, which will take place on Wednesday, 7th June, and is also published in our Proceedings.'

'I thank you very much for your kind words of courtesy towards myself.'

I am yours very faithfully
J. B. PHEAR,
Pres. of As. Soc. Bengal.

To A. NEIL, ESQ., M. R. C. S. L.
Lahore.

To this letter he received the following answer :—

Lahore, 23rd May, 1871.

'DEAR SIR,—Your reply to my letter is, as I of course expected it to be, quite satisfactory. My Report for 1869 was out about the end of last year, but was not distributed till some time after. I should like my letter to be published, however, in the next issue of the Journal, not so much in reference to your remarks about my Reports, as because it contains my views, in great part at least, regarding the method of conducting Meteorology in this country, and what ought to be done in order to have a combined plan of registration. I believe Col. Strachey has for some time had the matter under consideration, and I wrote to him about the same time as I addressed you, but I have not as yet heard from him in reply.'

'The hiatus, which you note in the Lahore Register for part of 1868, was owing to my having had to leave the station for another, and some time elapsed before I could get a proper system of registration re-established. The breakage and damages that so often occur to inspections are a source of continual anxiety to me. Barometers are an especial source of grief and annoyance. Thanking you very much for your letter,'

'I am, dear Sir, Yours very faithfully,
A. NEIL.'

'As an explanatory footnote to my letter, I should like to say,'—

'I have since learnt from the President of the Society that he had not seen my last Report (for 1869) before he delivered his ad-

dress. This of course explains the mistake which would necessarily find its way into most people's minds, that up to the time of his delivering his address, two and a half years of complete registration had been made in only 2 stations. The Registration of Meteorological Phenomena was only commenced in the middle of 1866.'

A. N.

Had it not been for the especial request made in this second letter of Dr. Neil, he, (the President), should have considered himself justified in laying before the meeting only that portion of Dr. Neil's first letter which he had already read, as being seemingly sufficient to satisfy Dr. Neil's purpose. He felt himself, however, under the circumstances constrained to read the remainder, although before doing so he must premise that one passage, at least, in it appeared to him to have a much greater tendency to discredit the Punjab observations, than any words employed by him in his address could possibly have. The remainder of the letter was as follows:—

'I gather from your address that you are of opinion that the whole Meteorological Registration of India should be under one directing head. I am quite of opinion that it should be as much as possible conducted upon one system, but that the entire management, with any regard to useful result, is within the mental capacity of one human being, is a question which hardly merits being argued. One definite system is requisite and necessary, and the simpler the system the better and more accurate will be the results. This most desirable starting-point would, I conceive, be best obtained by a conference of the present staff of Meteorologists. Each should have his own province to manage upon the defined system, and each should interpret the data with which he is supplied according as his better knowledge of his own province will guide him. My field of observation is, you will admit, a tolerably large one. It embraces about 10 parallels of Latitude by about an equal number of degrees of Longitude. Within this area there is much for the Meteorologist to consider. He has to do his best to interpret the laws which regulate the climatic phases of a country, part of which has an elevation of only a few hundred feet above sea level, while immense tracts have an altitude as high as any

known inhabited tract on the globe. To expect, therefore, that one directing head could so expand his powers of observation, however profound his knowledge of the general laws of Meteorology might be, as to grasp and interpret the masses of Meteorological facts which would pour in upon him from all the Provinces and Presidencies of India, is to expect a manifest impossibility. Our first and greatest necessity, I conceive to be the correct registration of barometric and wind phenomena. The form of barometer which pleases me most is Gay Lussac's syphon, read by two Verniers. Some object to the bother of reading two Verniers, but to this I always say—there is not so much trouble in reading two Verniers as there is in making all the troublesome corrections for capillarity, temperature, reduction to sea level &c. &c.* The anemograph which I have in use gives a pencil tracing of the direction of the wind for 24 hours. I enclose one for your inspection. It only gives the direction you will perceive. The force can be obtained as required by a separate instrument—such as Robinson's anemometer. I can generally form an idea whether the wind has been blowing high or gently, or even whether it has not been an absolute calm (we do not often have an absolute calm in the Punjab) by the *straightness* or otherwise of the tracing.'

'I have noted with great pleasure the evident interest which you take in the progress of Meteorological Science. We can no more foretell what the patient pursuit of this Science may disclose, than could the past generation have anticipated the wonderful and glorious revelations of geology, microscopy and electricity.'

I am, yours faithfully,

A. Neil.

Profr. of Anatomy and Surgery, Lahore Medical School,
Meteorological Reporter for the Punjab.

The Hon'ble Mr. Phear,
President of the Asiatic Society of Bengal.

If the Meteorological Reporter of the Punjab really entertains the persuasion, as he seems here to intimate that he does, that by taking the two readings of a syphon barometer, he gets observations, which

* As in Fortin's barometers.

are such as to free him from the obligation to reduce them by such corrections as correction for temperature and for the height of the place of observation above the sea-level before publishing, then it is hardly too much to say that his letter discloses that which makes his own tables altogether untrustworthy.

The following papers were read :—

I.—NOTES ON SEVERAL ARABIC AND PERSIAN INSCRIPTIONS RECEIVED FROM MEMBERS OF THE SOCIETY,—*by* H. BLOCHMANN, ESQ., M. A., CALCUTTA MADRASAH. (Abstract.)

Mr. Blochmann said,—

The inscriptions which I lay before the meeting were received by the Society in the course of last year. Some of them were forwarded in the shape of rubbings, others were decyphered, by various members as Dr. W. Oldham, C. S., Gházípúr; Mr. J. G. Delmerick, Ráwal Pindí; Mr. A. Cadell, C. S., Muzaffarnagar; Mr. A. S. Harrison, Bareilly College, and Mr. A. Carllyle, Ágrah, to whom the Society owes several most costly contributions. One inscription I obtained from Burdwan.

I trust the members of our Society will continue to favour us with inscriptions and rubbings. These inscriptions, if not always of historical importance, are yet interesting, and help historians to correct dates and verify events, or settle boundaries, or fill up gaps—and this is especially the case with old Bengal inscriptions—in the lists of kings.

1. *An inscription received from Dr. W. Oldham.* It refers to the building of a mosque in A. D. 1527 by a Bengal Amír, who lived under Nuçrah Sháh, the same king of Bengal whose name occurs in the inscriptions at Sátganw. It is on black basalt, and was found at Sikandarpúr, zil'ah 'Azimgarh. The locality is here of importance.

2. *Two inscriptions from Mr. Delmerick.* One refers to the building of Fort Aṭak by Akbar in 1583 (991, A. H.); the other to the construction of the Margalah Pass by Aurangzib, when the emperor was at Hasan Abdál. Its date is A. D. 1672 (A. H. 1083).

3. *From Mr. A. S. Harrison.* An inscription from the Mausoleum of the famous Rohílah Chief Háfiz Rahmat, and from two mosques. Also an inscription from a mosque in the Mírzái Mahallah, Barelí, built by Hakím 'Alí of Gílán, a personal friend of Akbar, in 1579 (or A. H. 987), when the Hakím was Faujdár of Sambhal.

4. *From Mr. A. Cadell.* Two interesting inscriptions from the Mausoleums of two Bárha Sayyids of the Kundlíwál branch, S. Mahmúd and S. Chhajhú, who served under Akbar. The latter died in 1559-60 (A. H. 967), the former in 1574 (A. H. 982).

A peculiar interest attaches to the Bárha Sayyids, who up to the present time form an important element in the population of the Muzaffarnagar District. They trace their origin from one Sayyid Abul Farah who in the beginning of the Muhammadan rule immigrated from Wásiṭ into India. The clan has received much attention from historians. Sir H. Elliot in his Glossary, and Mr. C. Elliott in his 'Chronicles of Onáo,' speak of them. Mr. R. J. Leeds has a lengthy note in his Report on the Castes and Races of the Muzaffarnagar District, and Mr. Cadell has forwarded together with the inscriptions several valuable genealogical trees.

The Bárha Sayyids first served under Akbar, and though praised in the histories for their valour and firmness in battle, they were sneered at for their boorish manners. But under Jahángír they became more refined, and in the following reigns their influence was very great, as may be seen from the fact that they made Farrukh Siyar, Rafí'uddaraját, Rafí'uddaulah, and Muhammad Sháh emperors; they dethroned and killed Jahándár Sháh and Farrukh Siyar, whom they had blinded; and they blinded and imprisoned Princes A'azzuddín, 'Alí Tabár, and Humáyún Bakht.

5. *From Mr. A. Carllyle.* Several inscriptions from tombs in the old cemetery at Ágrah. They do not refer to persons historically known, but are distinguished by their elegant verses. Also an inscription from the Ajmírí gate in Ágrah. It refers to the building of a mosque by one Hájí Sulaimán, in 1031 A. H., or A. D. 1622.

I draw the attention of the meeting to the beauty of the letters; Mr. Carllyle is a master in taking rubbings.

6. The last inscription I have received from Bardwán. It stands over the tomb of a Persian poet, Bahrám Darvísh Saqqá. Our library has a copy of his works. He was a faqír, and wandered about the streets of Ágrah as a bhishtí dispensing water among the poor. Hence also his nom-de-plume, *Saqqá*, a bhishtí. He is mentioned in works in Persian literature, and it is stated that he died on his way to Ceylon. His tomb was discovered at Bardwán by the Persian writer Khushgo. From the inscription it appears that Saqqá died at Bardwán in A. D. 1574, or A. H. 982. Poeple often pray at his tomb.

Within his shrine is also the tomb of Sher Afkan, Jágírdár of Bardwán in A. D. 1606, whom Jahángír had killed, in order to marry his beautiful wife, Mihrunnisá, to whom he gave the title of Núr Mahall, and later that of Núr Jahán.

The tombs of Bahrám Saqqá and Sher Afkan are the historical sights of Bardwán.

MEMORANDUM ON THE TOTAL ECLIPSE OF DECR. 11.12, 1871,—*by* LIEUT.-COL. J. F. TENNANT, R. E., F. R. S.

In December of this year we have a Total Eclipse visible in Southern India. The duration is short, but in some respects the circumstances are very favourable, as the Line of central Eclipse passes over the Nilgherry Hills, where I understand fine weather may be confidently expected. In order to be prepared, I have computed carefully the Central Line across India, and have added the extent to which errors of the Tabular place of the moon may be expected to shift it. In the following Table $\Delta\alpha$ represents the excess of the Moon's time above the Tabular Right Ascension in time, and $\Delta\delta$ the excess of the Tabular above the true S declination.

I hope to have before the Eclipse a knowledge what errors may be anticipated in the Tables and thus be in a position to choose a central spot, if it is worth making a change. The figures, however, show that this is not probable, the principal result of an error in Right Ascension being to shift the Centre of the Shadow along its path the deviation from which would be corrected by a small error in the declination which could hardly be foreseen.

Greenwich Mean Time.	Places of Centre of Shadow.	
	North Latitude.	East Longitude.
m. m. 14 25.0	13° ,, 20′ ,, 9″ − 1225″.5 Δα + 71″.75 Δδ	73° ,, 19′ ,, 38″ + 2939″.8 Δα − 12″.13 Δδ
25.5	12 ,, 50 ,, 52 − 1124.7 + 69.35	74 ,, 15 ,, 43 + 2719.8 − 8.57
26.0	12 ,, 23 ,, 37 − 1043.6 + 68.13	75 ,, 5 ,, 19 + 2538 9 − 6.34
26.5	11 ,, 58 ,, 3 − 1001.8 + 67.34	75 ,, 52 ,, 23 + 2408.6 − 4.63
27.0	11 ,, 33 ,, 50 − 920.5 + 66.64	76 ,, 36 ,, 10 + 2275.5 − 3.24
27.5	11 ,, 10 ,, 49 − 871.8 + 65.95	77 ,, 17 ,, 27 + 2171.5 − 1.85
28.0	10 ,, 48 ,, 50 − 829.7 + 65.39	77 ,, 56 ,, 21 + 2081.3 − 0.76
28.5	10 ,, 28 ,, 10 − 792.8 + 64.91	78 ,, 32 ,, 48 + 2004.0 + 0.17
29.0	10 ,, 7 ,, 28 − 757.7 + 64.45	79 ,, 8 ,, 58 + 1925.5 + 1.05
29.5	9 ,, 47 ,, 52 − 728.8 + 64.06	79 ,, 42 ,, 56 + 1869.2 + 1.79
30.0	9 ,, 28 ,, 56 − 701.7 + 63.72	80 ,, 15 ,, 32 + 1812.0 + 2.38

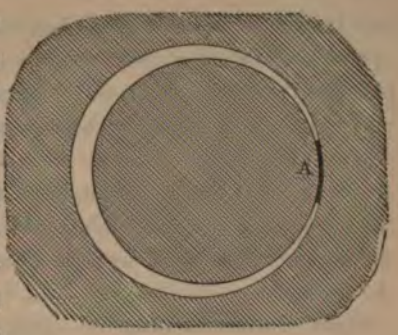
The duration of the Eclipse will be small. At the Nilgherries it will be about 2 minutes, but this cannot, so far as I know, be as yet accurately predicted from uncertainty as to the real diameters of the sun and moon, when free from the enlargement by irradiation. If the value of the moon's diameter deduced by Oudemans from Eclipses, be used with that of the Sun obtained in the Greenwich Transit Circle, then I find the duration in the Nilgherries just 2 minutes. The data of the Nautical Almanac give 2 minutes 7 seconds, and if I may judge from the result I got in 1868 the real duration will fall between these.

Short as this time is, it is enough with an adequate preparation to produce some results of value. It is long enough to allow Photographs to be taken of the Corona, as to whose structure there is more to be discovered. There seems now no sort of doubt that the Corona is not only a Solar appendage, but is, as I stated in

my Report on the Eclipse of 1868, the comparatively cold atmosphere of the Sun. This should be farther spectroscopically examined. Observers have differed about the number and position of the faint bright lines they have seen, but it does not seem that any one has connected the variations with the position of the part examined. To do this appears urgently necessary, and there have been additions made to the spectroscope which will allow more than one portion of the Corona to be examined, and its lines recorded during the short time it is visible.

There is another subject too of spectroscopic examination. Kirchhoff in his theory of the solar constitution supposed it surrounded by an extensive atmosphere consisting of metallic and other vapours, as well as gases, by the absorption of which the dark Fraunhofer lines were produced. It has long been clear that there was no such extensive atmosphere and some physicists have been satisfied that there is none such. Mr. Lockyer and his collaborateurs, though they have detected a greater number of bright lines at the bases of the prominences, have never approached, so far as I know, the number of even the conspicuous dark lines, whose explanation has, therefore, not been satisfactorily made out. At the Eclipse of December 22, 1870, however, Professor Young at the moment of obscuration, and for one or two seconds later, saw as far as he could judge every atmospheric line reversed, and this was confirmed by Mr. Pye. I have but the scant information of this point given in the Royal Astronomical Society's Council Report, but it is sufficient to show me why this has not been seen before by observers looking out for it, and also to make me feel the importance of verifying the observation.

To understand why it has not been seen before, it must be considered that the image of a bright object in the focus of a Telescope when relieved against comparative darkness is enlarged by a phenomenon known as irradiation; the light encroaches on the darkness. The sun thus appears larger and the moon smaller than the real size. This continues till the real contact of the Limbs internally; at this moment the thread of light, which previously had considerable width, appears suddenly broken and vanishes in a Total Eclipse: while in the Transit of a Planet or Annular Eclipse



there appears the "black drop" of the observers of the Transit of Venus in 1769. At A in this figure I have endeavoured to give some idea of this phenomenon in an Annular Eclipse, and at page 16, Vol. XXIX, of the monthly notices of the Astronomical Society will be found some figures illustrating this in a Planetary Transit. When we are dealing with so thin a stratum surrounding the true Photosphere, we cannot see it in sunshine, as it is lost in the irradiation, (it *may* be partly visible in very large Telescopes where the irradiation is very small), and we are very apt to lose it at the moment when the sun disappears, for it is found only between the places where a moment before the Sun a Moon's limb appeared, so that the observer following either of them might well miss it.

In the search for, and verification of this important observation, the duration of Total phase can matter little.

I have been in communication with the Home Secretary on the subject of observations of this Eclipse, and my views I may say have been most cordially received. I am not yet in a position to submit a proposition officially, but I have great hopes of being able to do so in a few days.*

P. S.—I may just mention that in plotting the Shadow Track on a map it is necessary to allow for the error of its zero of Longitude, a precaution often forgotten. The Longitudes of the G. T. Survey require a correction of 3′-2″. 7″, and those of the Atlas of India one of 4′-11″ to adjust them to the accepted Longitude of Madras.

The President was very glad to learn from Col. Tennant that the Government is likely to sanction a scientific expedition to the Nilgherries on the occasion of the Total Eclipse in December next. The objects to which Col. Tennant proposed to direct observation were, he need hardly say, of very great scientific interest and importance. The spectroscopic analysis of the Corona, so far

* This has since been done.

as it had yet been effected, had been productive of no very certain results. The matter could not, however, be in better hands than those of Col. Tennant. He only wished to suggest that those members of the Society, who might have the requisite leisure and opportunity, should, even with the unaided eye, endeavour to observe as carefully as possible the exact apparent shape and characteristics of the Corona. He believed that data of very considerable value might be thus obtained by persons, who knew how to observe.

Later in the evening Col. Tennant kindly consented to draw up some short directions which might serve as a guide to members of the Society who might visit localities of the Total Eclipse.

III.—NOTES ON THREE INSCRIPTIONS FOUND IN CHUTIA' NA'GPU'R, *by* BA'BU RAKHAL DAS HALDAR.

Mr. Blochmann read extracts from the paper, which will be published in the second number of the philological part of the Journal. The inscriptions are in Sanscrit and Hindí, of the years A. D. 1665, 1668, and 1737. In one of them (A. D. 1665), a Chutiá Nágpúr Rájah of the name of Raghunáth is mentioned.

Mr. Blochmann said—Bábú Rakhal Das Haldar remarks on the absence of authenticated historical information regarding Chutiá Nágpúr. Muhammadan historians certainly give very little to enable us to verify the details of the family history of the Rájahs. I have, however, collected the scattered notices which are found in the historical works of the Mughul period, not only regarding Chutiá Nágpúr, but also Pacheṭ and Palámau, and trust they may throw some light on the history of these districts.

The notices are taken from the *Akbarnámah* (Lucknow edition, III., pp. 491, 641), the *Tuzuk i Jahángírí* (Sayyid Ahmad's edition, p. 155); the *Pádisháhnámah* (I., b., p. 317; II., pp. 248 to 250, and 356 to 361); and the *'Álamgírnámah* (pp. 649 to 660, and p. 972). A few additional notes may be gathered from Sarishtahdár Grant's essay on Bengal and Bihar Finances in the Vth Report.

The extracts will be published in the Journal. They refer to the first invasion of Chutiá Nágpúr (or Kokrah, as it is called,) under Shahbáz Khán Kambú, one of Akbar's generals, in A. D

1585, when Mádhú Singh was zamíndár of Kokrah, and to the second invasion, in 1616, under Ibráhím Khán Fath-jang, governor of Bihár, who defeated Rájah Durjun Sál. There are also some notes on the diamond washings as then carried on in the River Sank.

Regarding Pacheṭ we have a short notice of Rájah Bír Naráin, who died in A. H. 1042-43, or A. D. 1632-33.

The extracts regarding Palámau refer to the invasions, in A. D. 1641 and 1643, by Sháistah Khán and Zabardast Khán, when Prataáb, son of Balbhadr, the Chero, and Tíj Rái, his usurping uncle, were Rájahs. Prataáb was afterwards reinstated, and was still alive in 1647. The *jama'* of Palámau was then R. 250,000, and the *peshkash* which the Rájahs had to pay to Sháhjahán's treasury, was fixed at a lac of rupees. The *'Álamgírnámah* says that the the Rájahs did not regularly pay the peshkash; and in 1661, the fourth year of Aurangzíb's reign, Dáúd Khán, governor of Bihár, was ordered to invade the district. Of this expedition we have ample details. The result was that the forts Deokan, Koṭ'hí, and Kundah, were occupied, and Palámau itself was taken by storm on the 14th December, 1661, when the then Rájah, whose name is not given, had to submit to the appointment of an imperial Faujdár. The first Faujdár, Manklí Khán, remained at Palámau for a few years.

IV.—On some new species of Persian bats, *by* G. E. Dobson, B. A., M. B. *Assistant Surgeon H. M.'s British Forces.*

(Abstract.)

Mr. Dobson introduced to the notice of the Society two new species of Persian bats. One of the species is the type of a new genus of *Rhinolophine* bats, and its discovery leads to the necessity of forming for its reception a new group, as the characters given by Dr. Gray of the four groups into which he divides the *Rinolophidæ** do not admit of its being placed in any one of them.

The nasal appendages are very complicated, the anterior portion of the nose-leaf is horse-shoe shaped, consisting of two

* Proc. Zool. Soc. 1866.

laminæ; the upper, overlying lamina deeply emarginate in front, the opposite sides of the emargination turned upwards, and supporting the anterior portion of a broad, flat, longitudinal crest which ends in a triangular head above and between the nostrils. The hinder portion of the nose-leaf arises from a thick root immediately behind the nostrils; the base is hollow containing a single cell, the opening to which is guarded by a lanceolate process of membrane. The crest is trident shaped, consisting of a central, lanceolate process, similar to that below, but longer, and two lateral and somewhat broader projections, parallel to it, and nearly equal to it in length. On each side of this hinder nose-leaf are six cells of which one is situated behind and at its side, immediately above the eye, occupying the position of the minute pores observed in nearly all the animals of Gray's 2nd group.

The form of the ears, and the place of attachment of the outer margin are also remarkable, as well as the peculiar shape of the bones of the arm in the neighbourhood of the elbow joint.

For the new genus Mr. Dobson proposes the name *Triænops*, and for the species *persicus*.

Dentition.—In. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$; pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Length of head and body 2″.25; tail 1″.2; forearm. 2″.0.

The second new species belongs to the genus *Pipistrellus*, Gray. It approaches *P. serotinus*, but differs from it in the shape of the tragus, colour of the fur, &c.—Ears large, triangular, outer margin faintly hollowed out below the tip, and emarginate opposite the base of the tragus, terminating by forming a small lobe; tragus rather long with subacute, rounded tip, and almost straight inner margin; fur above dirty buff, beneath pale buff.

Dentition.—In. $\frac{2-2}{6}$; pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$

The minute upper pre-molar, placed inside the line of the teeth, so commonly seen in the species of the genus to which this bat belongs, is not discernible in either of the two specimens brought from Persia.

Length of head and body 2″.8; tail 2″.0; forearm 2″.2.

The specimens were obtained at an elevation of 4750 feet near Shiraz in Persia; Mr. Dobson accordingly proposes for the new species the name "*Shiraziensis.*"

A full account of these new species, with notes on some others from the same region, will appear in Part II, of the Journal.

V.—NAMES OF BIRDS &C. IN FOUR OF THE ABORIGINAL LANGUAGES OF WESTERN BENGAL, *by* V. BALL, *Esq.*

This paper gives a list of names of a great number of birds and other animals in four of the languages which are spoken by the different aboriginal tribes in Western Bengal. A comparison of the names shews that, as a rule, there is a great difference in the designations of wild animals in the various languages noticed, while on the contrary the names of the domesticated animals are, as in most other languages, derived from the same root. This paper will be published in the Philological part of the Journal for the current year.

The receipt of the following communications was announced.

On the Death of Humáyún, by C. J. Rogers, Esq.

Legends and Ballads of the District of Bhágalpúr, by Bábu Rash Behari Bose.

Antiquities of Jájpúr, by Bábu Ch. Sikhur Bannerjí, Tumlook.

An account of the antiquities of Jesar-Ishwarípúr, by Bábu Rash Behari Bose, Banka.

LIBRARY.

The following additions have been made to the Library since the meeting held in May last:—

Presentations.

*** Names of donors in Capitals.

Proceedings of the Royal Society, vol. XIX, No. 126.—THE ROYAL SOCIETY OF LONDON.

Proceedings, parts I-II, for 1870:—Transactions, vol. VIII, parts III-V.—THE ZOOLOGICAL SOCIETY OF LONDON.

Monatsbericht, Febr., Mærz, 1871.—K. AKADEMIE DER WISSENSCHAFTEN ZU BERLIN.

Sitzungsberichte, 1870. Heft I-IV :—Denkschrift auf Christ. Erich Hermann von Meyer, von Carl. A. Zittel.—KÖNGL. BAYER. AKADEMIE DER WISSENSCHAFTEN ZU MÜNCHEN.

Discorso del Commre Negri Cristoforo.—SOCIETA GEOGRAFICA ITALIANA.

Historical and Statistical Memoir of the Ghazeepoor District, by W. Oldham, B. C. S., LL. D, part I.—THE AUTHOR.

The Topography of the Moghul Empire as known to the Dutch in 1631, by E. Lethbridge.—THE AUTHOR.

English Legislation for India, by A. M. Broadley, C. S.—THE AUTHOR.

Gulzár-i-Kashmír, by Kripárám.—THE AUTHOR.

Materials towards the monograph of the *Gadiniidæ*, by W. H. Dall :—Remarks on the Anatomy of the Genus *Siphonaria*, by W. H. Dall.—THE AUTHOR.

Pas'upás'amokshaṇam, by Rádhámohana Sena.—BA'BU RA'MADA'SA SENA.

Memoirs of the Geological Survey of India, vol. VII part 3 :—Palæontologia Indica, vol. III, Nos. 5-8.—THE SUPERINTENDENT OF THE GEOLOGICAL SURVEY OF INDIA.

Abstract of Proceedings of the Muhammadan Literary Society of Calcutta.—THE M. LITERARY SOCIETY.

Report on the Land Revenue Administration of the Lower Provinces, 1869-70.—THE GOVERNMENT OF BENGAL.

Records of the Geological Survey of India, vol. IV, parts I-II.—The Leepeedeepeeka.—General Report on the Administration of the Bombay Presidency, 1869-70.—THE GOVERNMENT OF INDIA.

Purchase.

The Westminster Review, April 1871.—The Annals and Magazine of Natural History, No XL.—The L. E. & D. Philosophical Magazine, No. 273.—Revue des Deux Mondes, Janr, Fevr., Mars, 1871.—Comptes Rendus, Nos. 1-12.—Hewitson's Exotic Butterflies, part 78.—Reeve's Conchologia Iconica, parts 286, 287.—Cheref-Nâmeh, vol. I, part II.—Ibn-El-Athíri vol. V.

Exchange.

The Athenæum for March, 1870.

The Nature, Nos. 76—79.

Errata in the two last numbers of 'Proceedings.'

On page 106, line 23 from above read 'tail, 1″.2' for 'tail 0″.6.'

,,	,,	107,	,,	2	,,	,,	,,	*Cynonycteris* for *Cynonycterus.*
,,	,,	,,	,,	,,	,,	,,	,,	$\frac{4}{2}$ for $\frac{1}{2}$.
,,	,,	131,	,,	17	,,	,,	,,	'sun and moon's limbs' for 'sun a moon's limb.'
,,	,,	,,	,,	29	,,	,,	,,	'— 3′-2″.7‴' for '3′-2″.7″.'
,,	,,	,,	,,	30	,,	,,	,,	'— 4′-11 ' for '4′-11 .'
,,	,,	134,	,,	30	,,	,,	,,	*after* In. $\frac{2\cdot2}{6}$ *insert* C. $\frac{1-1}{1-1}$.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR JULY, 1871.

The monthly meeting of the Society was held on Wednesday the 5th instant, at 9 P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced—

1. From Rev. J. Long,—A copy of 'Historical Notice concerning Calcutta in the days of Job Charnock.'—A copy of the 'Holy Bible in short-hand.'—A copy of 'Outlines of Amharic,' by the Rev. C. H. Blumhardt.—A copy of a 'Manual of Geography in Maharatti,' vol. II, by Major T. Candy.—A copy of the Parsee Acts, by Sarabjee Shapoorjee Bengalee.—A copy of the Phonetic Journal for 1864.

2. From Rev. C. B. Lewis,—A copy of the Christian Spectator, Vol. I., No. I.

The Council reported that they have elected Col. J. F. Tennant as Member of Council and Financial Secretary, in place of Col. H. Hyde, proceeding on leave.

Also, that Mr. J. Beames, C. S., has resigned the task of editing Chand's poems.

The following gentlemen proposed and seconded at the last meeting were elected Ordinary Members—

J. R. Reid, Esq., C. S.

J. Smith, Esq., C. S.

E. W. Oates, Esq., C. E.

Col. O. Hamilton.

C. T. Buckland, Esq., C. S.

Khalifah Sayyid Muhammad Hasan, Prime-Minister to H. H. the Mahárájah of Patiálah.

The following is a candidate for ballot at the next meeting—

Bábú Ganga Prasád, Deputy Collector of Morádábád, proposed by Maulaví Abdullaṭíf Khán, Bahádur, seconded by Bábu Rájendralála Mitra.

Lieut. W. A. J. Wallace has intimated his desire to withdraw from the Society.

The following communications were read:—

I.—OBSERVATIONS ON A PERSIAN MS. ON THE LIVES OF THE TWELVE APOSTLES, BY JEROME XAVIER,—*by* H. BLOCHMANN, ESQ., M. A., CALCUTTA MADRASAH.

At the meeting held in May last year, I laid before the Society a rare and curious Persian MS., entitled *Mirát-ul Quds*. It was a life of Christ, written by Jerome Xavier, nephew to the renowned Francis Xavier, and dedicated by him to the Emperor Akbar.

The sequel to this work has now turned up. The MS. before the meeting is a history of the lives of the twelve apostles by the same author. The copy belongs to the Serampore College Library, and seems to be unique. From a remark in the book, it appears that it was composed in 1608 A. D., the third year of Jahángír's reign. The first chapter, however, the life of St. Peter, was evidently written earlier, as the Latin translation of it by the celebrated Ludovicus de Dieu of Leyden speaks of it as a distinct work, and mentions A. D. 1600 as the year in which it was written.

In point of style, both works exhibit the same features. The sentences run smoothly and are occasionally elegant. We may, therefore, conclude that Mauláná 'Abdussattár of Láhor, who assisted J. Xavier in the *Mirát-ul Quds*, also superintended the translation of the sequel.

In the preface, J. Xavier dedicates the work to Jahángír. He says—

"As the history of the life of Christ was written during the reign of his late Majesty 'Arsh-áshyání Jaláluddín Akbarsháh, and was dedicated to him, receiving from him the title of *Mirát-ul Quds*, so, from motives of gratitude, has this history of the twelve apostles * * * * been written in honour of his Majesty the present

emperor, the successor in power and dignity, the true son and heir of the late emperor, the light of the dynasty that rules over the ideal and worldly kingdoms, the *Çáhib-qirán* (Lord of the auspicious conjunction), and will, I hope, meet with his approval, and receive a name from his Majesty, the shadow of God on earth."

Thus we see that the title of the former work, the *Mirát-ul Quds* was given by Akbar; but there is no record to show that Jahángír, whose indifference to everything, save superstition, is well known, conferred a title upon the lives of the twelve apostles.

The work itself calls for no further remark. The Rev. C. B. Lewis has lately written a review of it in the Christian Spectator, July, 1871. J. Xavier's life of St. Thomas contains nothing new. His mission to king Gondapherus of Hindústán and the establishment of the Nestorian Christians in the south of India are related in several works. The name of the king has been compared to that of king Gondophares who occurs on Bactrian coins. (Prinsep's Antiquities by Thomas, II, p. 214).

We know from Muhammadan historians (Badáoní) that Akbar's sons received lessons in the Christian religíon; and the Dutch traveller De Laët (*De Imperio Magni Mogolis*, p. 271) tells us that Jahángír ordered the sons of his younger brother Prince Dányál to be baptized and instructed in Christianity, not because he cared for the religion, but because *he wished his nephews to appear despicable in the eyes of his Muhammadan courtiers.**

Copies of both Persian works by Jerome Xavier have been made for the Library of the Society.

* Jam ante retulimus Regem quum majorem natu filium Gousro [Khusrau] minori suo filio Sultano Gorm [nunc Xa Ziahan, *i. e.* Sulṭán Khurram, now Sháhjahán] committeret, unâ commississe fratrii sui Dhan Cha [Dányál Sháh] qui Barampore discesserat filios, Xa-Ethimorem et Xa-Hossen [Sháh Ṭahmúras and Sháh Hoshang], quos in ipsa pueritia Jesuitis commiserat baptizandos et Christiana religione imbuendos, non quod Christianae religioni faveret, sed ut pueros Mahometanis invisos faceret; et eadem levitate a fide Christiana rursus abstraxerat.

I may mention that a notice of the first part of De Laët's work (the geographical portions) lately appeared in the Calcutta Review by Mr. Lethbridge of the Húgli College. The second part of De Laët's work, the historical portion, is also interesting and valuable, and deserves to be translated His remarks on Jahángír's Mançabdárs and their Mançabs, on Khusrau's murder by Sháhjahán, the last fight with 'Usmán, on Abulfazl's death at the hand of Rájah Bir Singh Bundelah (wrongly called in nearly all printed histories *Nar* Singh) deserve the attention of historians.

II.—NOTES ON THE ALLAH UPANISHAD,—*by* BA'BU RA'JENDRALA'LA MITRA.

(Abstract.)

After adverting to the imitation of the Yajur Veda prepared by the Jesuit missionaries of Madras, during the last century, with a view to prove, by Vedic evidence, the authenticity of the Bible and the divinity of Jesus Christ, the author describes in detail a forgery which was committed about three centuries ago, to establish the divinity of Allah as described by the Emperor Akbar. A copy of this spurious document has lately been received from Bábu Harischandra of Benares. It bears the titled of "Allah Upanishad," and professes to be a chapter of the *Pippaláda Sákhá* of the Atharva Veda.

As the Sákha in question is no longer extant, and has ceased to be so for several centuries, it has been appealed to by at least half a dozen apocryphal Upanishads, and notably by the *Gopála Tapání*, to serve for their parentage, and the author of the work under notice, probably aware of the circumstance, has availed himself of it to escape detection. It opens in the usual Hindu style with a salutation to Ganesa, and then describes Allah to be both Mitra and Varuna; that he is the bestower of all blessings, and the supporter of the Universe. He is the Lord of all the gods (illah), and manifest in his own light. He is addressed as the Allah of the prophet (*rasúl*) Muhammad Akbar, and gloried repeatedly by being called "the great God" in the Arabic phrase *Alláhu Akbar*. It terminates with a prayer for the preservation of men, cattle, lions and aquatic animals, in the course of which a female divinity, the destroyeress of demons (*asura sañhárini*) is invoked with the Tantric mystic formulæ *hrum*, *hriñ* and *phat*, which form the *víja mantra* of one of the manifestations of the goddess Durgá.

The language of the MS. is very obscure, apparently so made with a view to imitate the Vedic style, but the imitation is neither happy nor grammatically correct. A plural verb has been twice used for a singular nominative, and the adjectives do not always

From a cursory perusal of De Laët's work on Persia, I am inclined to think that it contains no original matter, but is a compilation from other works on Persia. Even in his work on India, there is much that is copied from others. His topographical notes on Bihar and Bengal are worthless, and often misleading.

correspond with their nouns. The collocation is also defective. The work nevertheless, when first published, met with great success, and many Hindus even now maintain its authenticity. The late Sir Rájá Rádhákánta was so far taken in by it that, on its authority, he introduced in his great lexicon the words Alla and Illa as Sanskrit vocables.

The use of Akbar's name suggests the idea that it was got up in the time of that emperor by one of his courtiers to give currency to his new faith among his Hindu subjects, but who it was, it is impossible now to determine. It is said in the *Ain i Akbari* that Badáoní, the author of the *Muntakhab uttawáríkh*, was a great Sanskrit scholar, and was employed by Akbar in translating the Atharva Veda in Persian, but as he was a devout Muhammadan who looked with horror upon the new faith of his master, and freely stigmatized it in his history of Akbar's reign ; it is not at all likely that he would be guilty of calling Akbar a prophet, and Allah the God of Muhammad Akbar and not that of the Arabian prophet, unless we believe it was done with a view to ridicule the religion of Akbar, which is scarcely probable. A writer in the *Oudh Akhbar*, a Hindústání newspaper of Lucknow, says it is the work of the *Khánkhánán* of Akbar, but as there were several such officers during the long and prosperous reign of that monarch, it is not possible to ascertain which of them was the author of this gross religious imposition.

Mr. Blochmann said—

Bábu Rájendralála Mitra mentioned that the Allah Upanishad was ascribed to one of Akbar's Khán Khánáns. Akbar had three, Bairám, Mun'im Khán, and Mírzá 'Abdurrahím, son of Bairám. If any of the three had written the Allah Upanishad, it could only be the last. Bairám was a bigotted Shí'ah, and Mun'im a brave, pious soldier, anything else but a writer. Besides, the book could only have been written after A. H. 986, from which year Akbar had commenced to abjure Islám ; but Bairám died in 969, and Mun'im at Gaur in 983. Consequently, Mírzá 'Abdurrahím, the Khán Khánán *par excellence* of Akbar's reign, could be the only one to whom the imputation could refer. But he, too, was a most unlikely man to undertake the edition of a Hindú work. People

took him for a Shí'ah in Sunní garb, and nowhere does Badáoní, the censor of Akbar's age, make the slightest allusion to Hindú tendencies in the Khán Khánán.

The imputation therefore falls to the ground.

In connection with this subject, I may mention that the Society lately received from Allahabad a copy of a metrical Persian translation of the *Bhagavat Gítá*, the title page of which mentions Faizí as the author. A few weeks ago, I examined the book, and though some passages in it, especially the beginning, are well written, there are in it so many Hinduized Persian phrases and occasionnl slips in rhyme and metre, that I cannot bring myself to believe that Faizí is the author.

Maulaví 'Abdullaṭíf observed that Faizí was known to have been the first Muhammadan that studied Sanscrit, and as the Upanishad had been referred to Akbar's times, he might be the author of it.

Mr. Blochmann said that this was a mere supposition; the statement of Faizí being the first Muhammadan that learned Sanscrit was an exploded error [Elliot's Index, p. 259], and there was, besides, no evidence whatever that the great poet knew Sanscrit.

Maulaví 'Abdullaṭíf thought that under these circumstances Faizí resembled the many Europeans who got their Munshís to print works, putting their own names on the title page.

Mr. Blochmann said that Muhammadan historians invariably represent the translations which appeared during the reign of Akbar, as having been made from Hindí, and not directly by the Maulavís from the Sanscrit. Some of the translators, as Naqíb Khán, knew even so little of the vernacular, that they had to get help in reading the Hindí versions.

III.—MEMORANDUM ON THE THUNDER-STORM WHICH PASSED OVER CALCUTTA ON THE 8TH JUNE, 1871,—*by* J. O. N. JAMES, ESQ.

About 9 P. M. I first observed dark masses of cloud rolling up from the south, although the direction of the wind at the time was from the N. E. Gradually these clouds spread over from S. E. to West and N. W., and I then observed distant thunder with occasional flashes of lightning to S. W. and S. By 11 P. M. the entire

sky was overcast with heavy black clouds and about this time, I experienced a peculiar sensation of uneasines which prevented me from sleeping. I got out of bed and walked into my verandah which faces the south, and had not been there above ten minutes, when I was startled by a regular crash of thunder on the west. Several crashes followed in quick succession on the north and N. W., and all, as far as I could possibly observe, came from clouds overhanging the northern portion of the city. This drew my attention to the north and I then walked out to an open terrace on the north of my house. It was now midnight, the wind had veered to south, and I distinctly observed black masses of cloud coming up from the south, while others seemed rushing towards them from the N. W. and north. The clouds from the south were apparently lower than those coming from the N. W. and N. On these clouds meeting or crossing each other, the first severe claps of thunder and vivid flashes of lightning were observed by me. At times the flashes of lightning followed with barely an interval of a second between each, while the roar of thunder was continuous for nearly 30 or 40 seconds at a time.

Rain coming on, I returned to the south verandah ; this was about 1 A. M. I now experienced a sensation very similar to that I had often felt when overtaken by storms in the higher Himalayas, *viz.*, an irritation about the surface of the skin caused by my hair turning, and felt sure that the storm was close in my neighbourhood. I now took up my position so as to watch the lightning conductors and observatory on the Surveyor General's Office, distant from my house about 150 yards :—

At 1-20 A. M. the large masses of black clouds seemed to me to be traversing over the southern portion of the city from W. to E., wind N. W. The lightning was extremely vivid and the thunder deafening, and I now first noticed, sparks (as it appeared to me) shooting in and out of the conductor over the anemometer at top of the S. G. O. observatory.

The appearance of the conductor is given in fig. 1, plate II. The portion of the conductor from A to A was alive with sparks, flashing to and from it. Suddenly there was a streak of lightning from a cloud overhead which almost blinded me, followed on the instant

by a detonation which made me shudder. The observatory appeared a mass of fire, there was a sound of metal striking metal, and I observed the large conductor on the east of the Surveyor Generals Office looking as if it was red hot. This was momentary, and as I was anxious to observe all I possibly could, I again watched the observatory. Again the conductor over the anemometer was alive with sparks along the same portion of it from A to A, but not a spark seemed to touch the point. This seemed extraordinary to me, so I watched more closely to see if any other portions of the conductor were similarly affected, and now noticed that the horizontal portion of it from the observatory to the back stair case was similarly affected, as roughly shewn in fig. 2, on pl. II; horizontal portions of the conductor from A to A and B to B receiving and emitting sparks.

About ¼ to 2 A. M. the lightning and thunder was incessant, at each flash and explosion the masses of cloud seemed to recede from each other, rise and then fall lower towards the earth than before. While watching this, there was a flash of lightning and I distinctly saw a stream of electricity, from a cloud overhead, discharged upon the Office, which shot back again into the cloud, and then flashed off towards the East end of Park Street; this discharge I believe struck No. 22, Park Street.

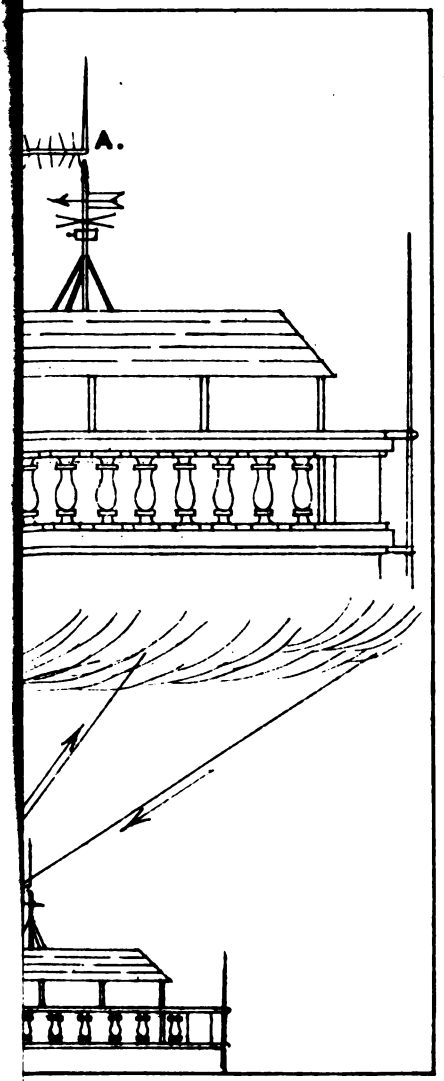
What I witnessed will be best understood from the drawing given in figure 3, of plate II.

The conductor above the anemometer (A) and the one on the east of the Office (B) again appeared red hot, and the horizontal portions emitted sparks for an instant only. After this there was a perfect lull for nearly 10 minutes and then followed a succession of flashes and detonations, all overhead, and from W. to S. over Chowringhee and Park Street and south towards the Martiniere, which I can only describe as a blaze of lightning and a terrific roar of thunder.

This first portion of the storm seemed to me to pass away to the South and East, and then turn round by east to north or N. East.

Throughout this storm, for nearly 4 hours, I closely watched the streams of electricity discharged towards this city and really fancied that nearly every house must have been struck. From Government

Plate II.



Zincographed at the Surveyor General's Office Calcutta.

House northwards and westwards towards Howrah, there appeared to me an almost continuous discharge of the electric fluid, and as the storm advanced Southwards and Eastwards, I observed the same phenomena extending, as nearly as I could ascertain, in a circle from the Fort up Park Street to the Martiniere and over towards the General Hospital.

Mr. H. Blanford, in reading Mr. James' note, suggested that the appearance of sparks given off by the horizontal part of the conductor might perhaps be due to a discharge towards the falling rain drops. The zigzag flash returning from a struck object to the clouds and then back again to the earth may be ascribed to an optical deception.

Mr. Ayrton, said :—

Mr. James' paper is certainly a vivid description of an Indian thunderstorm. It is, however, I think, to less startling displays that we must look for our physical information about atmospheric electricity. Not only during visible storms, but at all times there occur in the air phenomena which instruments electrically more delicate than our senses are able to see and measure. The best kind of such instruments, electrometers as they are called, require, however, that the air inside them should be kept artificially dry; and unfortunately the season when observations of atmospheric electricity would be most interesting, viz. during the monsoon, is the very time when it is most difficult to maintain an artificially dried atmosphere. This difficulty, however, can be overcome when sufficient attention and time can be devoted to the management of the instrument ;—observations too of this kind are only valuable when made regularly. Therefore, I think that observations of atmospheric electricity can only be carried on with any practical benefit, when they are in the hands of a man who can devote his time to meteorological registration. I would, therefore, strongly recommend to those who have the management of the Meteorological Department at Calcutta, that arrangements should be made similar to those already existing at Greenwich and Kew for the registration of the electric potential of the air.

The only steps that have, I believe, been taken to register atmospheric electricity in this country consisted in two portable elec-

trometers being sent out about two years ago to the Indian Telegraph Department, but from an error in packing they were both so damaged as to be unserviceable. These instruments too were more suited for making rough measurements at different places while travelling, than for making delicate measurements at an observatory. The instruments at present in use in Europe for this purpose are very perfect, and give on sensitive paper a photographic curve showing the electric state of the atmosphere.

As an example of the importance of observations of atmospheric and terrestrial currents I may mention that from tests made partly on the 10th, partly on the 11th, and partly on the 12th of February of this year, it appeared that very strong positive natural currents were flowing through the telegraph lines in the directions Deesa to Agra, Indore to Agra, Allahabad to Agra, Agra to Umballa, Calcutta to Raneegunge and Calcutta to Sahibgunge, in all cases in the same direction from southward to northward. In the cases where the line ran nearly due north and south the current was such as could have been produced by the insertion of about 8 galvanic cells in the line. In the other cases it varied from about 8 to 2 cells, depending partly on how nearly the line ran due north and south. On the 16th of February the earthquake occurred at Calcutta. Now I do not for a moment conclude from this solitary instance, that natural electric currents have necessarily any connection with Earthquakes, still as we know very little about either of these phenomena, it is just possible that they may be connected.

And if in the observatories in Europe and Australia it is thought worth while to carry on a regular system of observations of atmospheric electricity mainly for the purpose of endeavouring to connect the results of these observations with the weather, so that the electric state of the air may act as a barometer to foretell the weather, how much more important is it that such a system of observations should be established in a country like India, visited as it is by thunderstorms doing such a vast amount of damage.

Mr. Woodrow observed that he heard several persons stating that they saw the conductor of a house appearing red hot during the late storm.

Mr. H. F. Blanford mentioned that he had been informed by Mr. James of a very striking instance of this kind. At Bunnoo, which was frequently visited by severe thunderstorms, he was informed that an observatory erected for the G. T. Survey was protected by a lightning conductor, which was described as a thick iron rod. This rod was, as Mr. James assured him, subsequently found on the ground as a fused mass of iron, and having been removed was in another year found to have been fused like the former, and in a like condition. This effect was ascribed to lightning.

The President said they were indebted to Mr. James for a very graphic description of a thunderstorm. Some of the phenomena mentioned did not appear to be easy of explanation. The mode in which Mr. Blanford accounted for the manifestation of sparks or coruscations on the horizontal portion alone of the conductor was ingenious, but did not seem altogether satisfactory. Falling drops would, he supposed, pass in just as close proximity to the vertical portion of the rod as to the horizontal. Without any disparagement to Mr. James, it might perhaps be doubted whether he had been able to possess himself of the actual phenomena with complete accuracy. No class of phenomena was so difficult of precise observation, as that with which Mr. James had to deal, both on account of the extreme shortness of their duration, and the absence of a standard of comparison and measurement. In one particular, Mr. James had evidently been misled. The mutual recession and approach of two clouds upon the passage of a flash of lightning between them, of which he spoke, was illusory. The flash merely illumined and so revealed an interval between two cloud masses, which before were not separable from a back ground connecting them, and when the light disappeared again, the apparent connection was resumed. The mental impression produced by this rapid succession of events gave rise most naturally to the idea of relative motion of the two cloud masses. But actual motion to the same angular extent of oscillation as that which is, in this way, apparent in the instant of the flash would be something truly enormous!

The storm was evidently one of the ordinary type prevalent here at this time of the year. A lower vapour-bearing current

was passing over from the S. W. and S. This encounters, or is crossed by, the course of a condensing cause coming up from the N. W. The latter is no doubt a relatively colder and generally swifter moving current, somewhat above the first, often perhaps partially driving through it. The result is a curious movement *en echelon :* while the lower clouds appear to be coming from the S. W., the heavy storm masses as a whole gather first in the N. W. and seem to traverse the sky as if coming from that quarter. Also the two atmospheric currents in highly contrasted meteorological condition give rise to violent electrical disturbance. In the normal course of the monsoon rains, when the vapour-bearing current is not interfered with by a differently conditioned cross current, the precipitation of water, however heavy the downfall may be, is seldom found to be accompanied by any great manifestation of thunder and lightning. He, (the President,) was afraid that little confidence could be placed upon the correctness of the path attributed to the lightning flashes. Many causes of deception existed with regard to this. And he might make the same remark with regard to the behaviour of the clouds spoken of by Mr. James towards the east after the bulk of the storm had passed. It was always matter of much nicety to determine the true motion of a cloud mass. Indeed this could scarcely ever be done with much accuracy except for a limited region near the zenith. The apparent angular motion of a portion of a surging mass at a low altitude did not afford sufficient data for the purpose. It was then almost impossible with the eye alone to form even an approximate estimate of the geometrical dimensions. With regard to the alleged heating of the conductor to the extent of making it luminous, he would suggest by way of test for the future that a collar of wax or resin be kept continually surrounding the rods of all the principal buildings in the town.

Somewhat later in the evening Mr. Ayrton observed—

The explanation has just occurred to me of the phenomenon observed by Mr. James of sparks appearing to issue from the horizontal, but not from the vertical portions of the lightning discharges, so if it be not contrary to the rules of the Society, I will refer again to that subject.

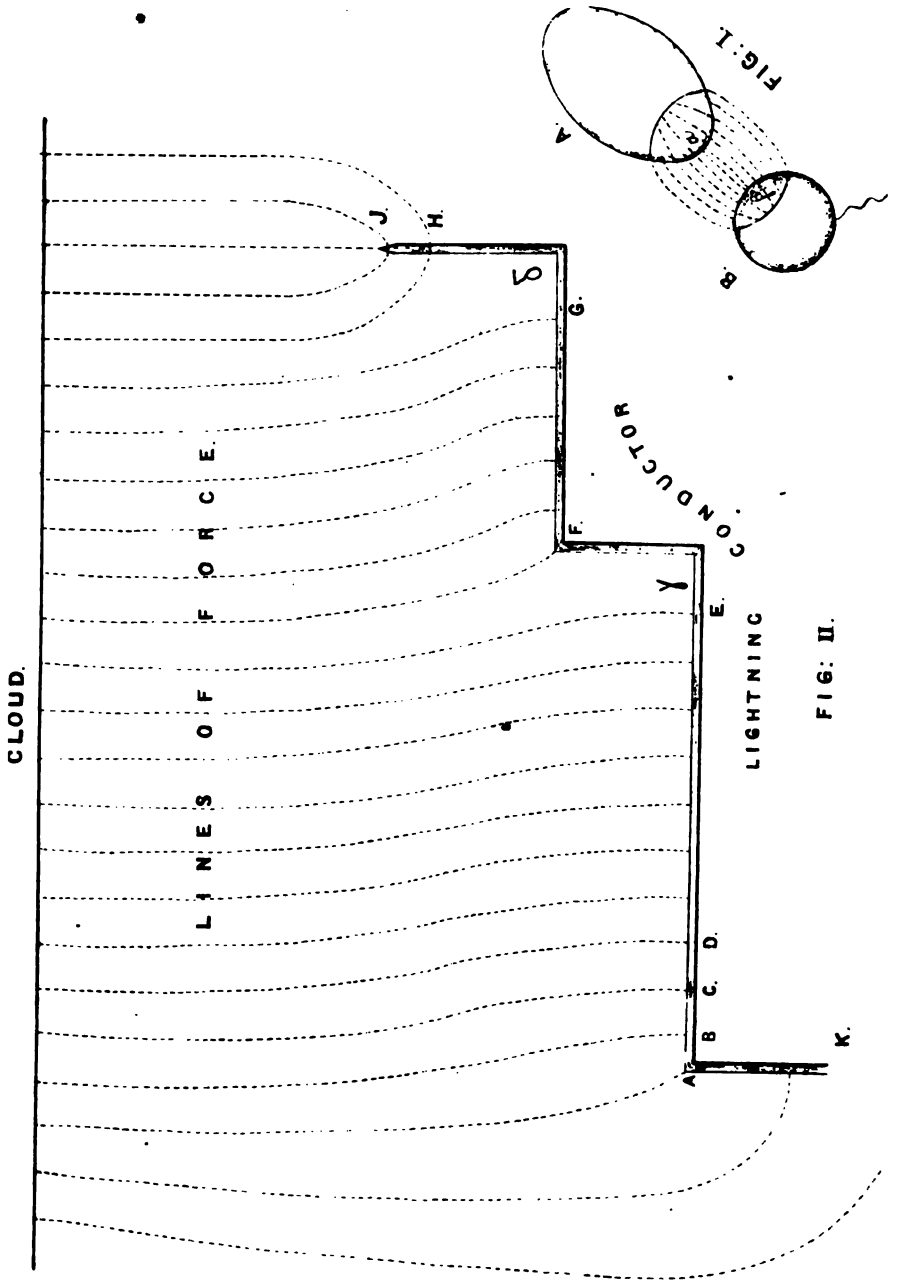


FIG: I.
A
B
CLOUD.
LINES OF FORCE.
CONDUCTOR
LIGHTNING
FIG: II.
A
B
C
D
E
F
G
H
J
K

Faraday in his Experimental Researches arrived at the following law, a law which has also been proved from entirely Mathematical considerations, that when a charged insulated body A (See figure i on plate III) acts by static electric induction on an uninsulated body B, the amount of electricity on any area α on the surface of one of the bodies is equal and opposite to the amount on the area β, marked out on the surface of the other body by the lines of force which also mark out the area on the surface of the first body.*

Now let us consider the state of the lightning conductor before any discharge takes place. Let it be acted upon by a horizontal cloud, uniformly charged. Draw lines of force, marking out equal areas of the surface of the cloud, or, what is the same thing, since the cloud is uniformly charged, marking out areas containing equal amounts of electricity.

Then since the lines of force must be perpendicular both to the cloud and the lightning conductor, and also since they can have no very sudden bends we shall, if we suppose a vertical plane drawn through the conductor, obtain as a section a figure somewhat like the accompanying figure ii on plate III.

* See *Cambridge and Dublin Mathematical Journal* November, 1854, or *Philosophical Magazine*, 1854, second half year, in which the proof is given somewhat as follows :

Let S be any closed surface, containing no part of the electrified bodies in side it, which we may conceive to be described between A and B ; let P be the component in the direction of the normal, of the resultant force at any point of the surface S, and let ds be an element of the surface at the same point. Then it may be easily proved that

$$\iint P ds = 0 \qquad \text{(I)}$$

the integrations being extended over the entire surface. Now let S be supposed to consist of three parts ; the portion α, of the surface of A ; the area β projected by lines of force, on the surface of B ; and the surface generated by the curved lines of projection. The value of P at each point of the latter portion of S will be nothing, since the tangent at any point of a line of projection is the direction of the force. Hence, if $[\iint P ds]$ and $(\iint P ds)$ denote the values of $\iint P ds$, for the portions α and β of S, the equation (I) becomes

$$[\iint P ds] + (\iint P ds) = 0.$$

But if ρ be the electric density at any point on the surface A or B, we have, by Coulomb's theorem,

$$\rho = \frac{P}{4\pi}.$$

Hence $$[\iint \rho ds] + (\iint \rho ds) = 0,$$

which is the theorem quoted in the text.

Now by Faraday's law the portions of the conductor AB, BC, CD &c. each contain equal quantities of electricity, therefore those portions EF, GH which are longest contain least electricity, *per unit of length.* The electricity, therefore, will be most concentrated at the point J of the conductor and least concentrated at the angles γ, δ, and along the vertical portion KA. But the resultant pressure on the air, or tendency to produce discharge at any point near a charged body, is directly proportional to the electric density or the amount of electricity per unit of area at that point, therefore the discharge will be greatest at the point J, next greatest along the horizontal portions AE, FG, and least along the portions EF, GM and the vertical portion KA. The only difference being that at the point J the discharge although greatest will most probably be a silent one, whereas along the length of the conductor it will be disruptive or in the form of sparks. We may, therefore, expect to see *with the eye* no discharge along EF, GH, KL or at the point J, but sparks issuing from the horizontal portions AE and FG.

IV.—*Suggestions for Visitors to the Total Eclipse on 12th December, 1871, by Lieut.-Col.* J. F. TENNANT, F. R. S.

At the last meeting of the Society after the conclusion of my Memorandum the President suggested, that all who might have the opportunity should visit the Neilgherries, and should endeavour to contribute their share to the result, and that those having spectroscopes should use them. There is in fact no difficulty in seeing during the Total Phase of an Eclipse lines of light varying more or less in number and brightness with a spectroscope directed nearly to the sun; nor would it be impossible that any one so armed should see some lines of light or darkness which he believed to be unseen by others, but this would not be of any use. The light falling on the slit of a spectroscope at this time comes partly from the Corona and partly from the Protuberances, while there is of course such faint diffused light as is about. We know that this mixed light must vary with the point which happens to be in the prolongation of the line of vision of the spectroscope, but unless we can distinguish the objects which emit each ray we are really gaining little knowledge.

An amateur (in one sense we are all so) then, must before making up his mind to such a proceeding consider what he loses: I venture to say that he will entirely lose the great sight. In order to see with the spectroscope, he must deliberately shut himself out from this. He may then see what others have seen before, but he can, without special means, add no material fact to what is known, and it is far more likely that he will lose the real sight without seeing so much. If he is in any degree anxious or nervous, it is pretty certain that he will have no clear idea of what he sees in the instrument. The case of a man who having carefully made up his mind to objects and methods of examination, provides himself with adequate apparatus, and deliberately gives up the sight for the chance of being of use, is of course quite different. I could not recommend any one going down to the Eclipse-line without due preparation; to lose one of the most magnificent sights he can see, and to miss the opportunity of appreciating how much it has been given to man to penetrate into the mysteries of nature. I purpose, however, now, in pursuance of a promise to the President, to offer some suggestions to visitors who are not content with this.

Any person possessing a chronometer and the means of finding its error, will do a service if he will simply *note the four moments of contact of the Sun's and Moon's Limbs.* As I explained before, the first contact is especially difficult to note, but the other three are comparatively easy. He has then only to mark his place accurately on the Atlas of India, or some good map, and deduce his Latitude and Longitude and height above the Sea. These data will help towards the problem of determining the Solar and Lunar diameters and, if accurate, they cannot be too numerous.

As Totality comes on; if he does not mean to take the moment of the Sun's disappearance, I would advise him to lay aside his Telescope, and look for the strange fringes of colour or light and shade which mark the commencement of this Phase. I quote some accounts of this from Grant's History of Physical Astronomy.

In 1842, M. Fauvelle gives the following from Perpignan. "At "the moment when the Eclipse was about to become Total, I per- "ceived the ast rays of the sun to *undulate with great intensity and*

"*rapidity* on a white wall of one of the Military Establishments of "the Rampart of St. Dominique. The effect might be compared "with that which is observed when the light of the Sun falls upon "a wall or ceiling after having been reflected from the surface of "water in a state of agitation. The same phenomenon appeared "at the emersion of the sun," the undulations were at first very intense and gradually died away. "M. Arago states that "during the few seconds devoted by his colleagues and himself to "the observation of such phenomena the façades of the great tower "of the citadel of Perpignan appeared illuminated by a *singularly* "*fluctuating light.*" M. Lenthéric at Montpellier says "A little be-"fore the commencement of the total obscuration there were seen "on the ground and on the walls *undulating shadows* composed of a "succession of arcs, 3 or 4 decimetres in length, but of much less "breadth, which seemed *to turn on themselves.* The effect was ana-"logous to that produced by those moveable shadows which are "seen at the bottom of a shallow basin filled with clear water when "the surface, slightly agitated, is illuminated by the sun's rays."

At Seyne, Mr. Savournin says: "There were here and there seen "shadows and luminous patches running after each other, the "effect of which was similar to that produced by the passage of a "succession of small clouds over the sun. These patches *were not* "*all of the same colour, some were red; others yellow, blue or white.* The "children amused themselves running after them, and trying to "put their hands on them. This extraordinary phenomenon was "remarked only a few instants before the complete disappearance "of the sun."

Professor Grant quotes some Swedish observations of 1733, but they do not seem to me to refer to the same phenomenon. The accompanying quoted by him from Delisle, however, clearly refers to this. "The second observation is one which a curi-"ous individual acquainted me with having made by mere "accident. Having directed his attention to a large white wall, "at the moment of the total immersion of an Eclipse of the Sun, "he saw the Moon's shadow pass upon the wall, *tinged with different* "*colours.*"

This phenomenon was also seen and drawn by M. Poulain a

French officer at Goree in 1861, whose attention the Astronomer Royal called to it.

In 1868, I asked Col. Addison of H. M.'s 2nd (the Queen's) Regt. to examine this matter at Aden. I expressed considerable doubt as to the reality of the phenomenon which, save for M. Savournin's statement, that the children ran after these shadows, I think one might have considered (in the absence of evidence to the contrary) as caused while resting a weary eye. Col. Addison had a large sheet hung up and (I quote from memory)* more than one of his officers saw these shadows passing rapidly across the sheet; so rapidly that they could not measure the velocity; in the direction in which the Moon was advancing on the Sun.

Colonel Addison and M. Poulain are the sole persons I know, who have *looked for* this phenomenon, but it was seen again, unless I mistake, in 1869, and I believe that the following description by Mr. Charles Coale refers to it. "The grandest of "all to us, who had no astronomical ambition, or astronomical "knowledge, to gratify, was the effect upon the clouds during "the total obscuration. Those who have had the privilege of being on White Top" (near Abingdon, Virginia and 5530 feet high) "and enjoying the westward scene, will remember the "grand panoramic view of mountains beginning on the north-"ern and southern horizon and stretching away to the west, "till they seem to meet, and will appreciate the scene, which we "now attempt to describe. Stretching along this semicircle of "mountains in long horizontal lines, far below the Sun lay light "and fleecy clouds, as if resting on their wings during the seem-"ing struggle between the orbs above them. At the moment of the "falling of the dark shadow, when naught was to be seen above "but the stars and the circle of light around the moon, these clouds "became arrayed in all the colours of the rainbow, presenting an "indescribable richness with their back ground of sombre moun-"tain. To our vision it was as if bands of broad ribbon of every "conceivable hue had been stretched in parallel lines half round the "universe." One sees here the pen work of the American Journalist: indeed Mr. Coale in another letter remarks that he was

* The papers were [illegible] Royal Astronomical Society.

probably extravagant in giving the clouds all the colours of the rainbow (though he considers this allowable in country journalism) and he proceeds to name "pink, purple, yellow orange, and fiery red," and "a band of lilac," though not green or blue, as being colours he had seen. It is quite impossible notwithstanding exaggeration to compare this, which I take from Mr. Proctor's late work on the Sun; with the descriptions I have quoted from Professor Grant, without seeing that the phenomenon was the same that M. Savournin saw at Seyne. It is eminently fitted for examination by those unaccustomed to use instruments, and, while I believe worth investigation, will not deprive them of the great spectacle. The occasion will, I think, be very favourable.

To those one degree more professional who may possess telescopes on mountings and seek to do some further service, without too great a sacrifice of personal feelings, I would suggest the selection of certain parts of the Corona and their careful scrutiny, so as to enable drawings to be made and descriptions to be written immediately afterwards. The parts I would refer to are those which I have in my Report of 1868 called *flare*. I did not of course *see* them then, but it was quite impossible to examine carefully my original negatives without a strong conviction, that in those places at all events gas, luminous though much less so than the body of the protuberances, was streaming from them into the general light of the Corona. As photography will probably be entirely directed to the general Corona, these brighter parts will be to a great extent lost in detail. Indeed if they are to be done justice to by Photography, it must be by special arrangements allowing large pictures to be rapidly taken in some Eclipse of the future. At present I would call the attention of draughtsmen to these spots, from which, when found, they should not allow their attention to go. Moderate power would alone be necessary, though if the air be steady enough high power would concentrate the attention by limiting the space. It is alleged too that there are nodes and bands of light in the Corona of complicated structure and quite free of the Sun; these too might be noticed, probably the best plan will be to attack the first such object seen and adhere to it.

Lastly, I would urge on those who I trust may be induced to

go to the Eclipse track by curiosity or some hope of adding to knowledge, to remember, that well equipped parties (I hope the Madras Observatory may send one) are not able as a rule to choose better sites, from which views can be got, than many others about, and that there is nothing so injurious to good observation, as the motion, and even the presence, of strangers. Possibly volunteers may be wanted for some work; then, if you accept the position, do that work in perfect silence where it does not require speech; but, if you have no share in the *work*, keep at a distance from those who have, remembering that an involuntary motion or exclamation, may seriously disturb those who are endeavouring to close their minds to the surrounding circumstances, and to concentrate them on the duty they have undertaken. To suffer men who are content to lose all the great sight of the day for work, to do their work without interruption, is in itself a service to science, though one which does not force itself into notice.

V.—*The Antiquities of Jájpúr,—by* Babu Chunder Sekhar Banurji. (Abstract).

Bábú Chander Sekhar Banurjí mentions early notices of Jájpúr, legends connected with the invasion of Orísá by the Afgháns under Kálá Pahár in 1558,* a description of the memorials of the Afghán conquest, the importance of Jájpúr as a place of pilgrimage, and a description of temples and several other works of Hindú sculpture.

The paper will be printed in the second number of Part I. of the Journal.

The receipt of the following communications was announced.

1. Monograph of Indian *Cyprinidæ*, Pt. II, by Surgeon F. Day.

2. Note on Lieut.-Col. MacMaster's list of birds from Nagpore, &c., by W. T. Blanford.

* This is the year mentioned by Stirling. But the Akbarnámah gives A. H. 975, or A. D. 1567. Such as take an interest in the history of Orísá, should read the beginning of the annals of the 37th year of Akbar's reign as given in the Akbarnámah, provided that good MSS. are obtainable. There are most extraordinary differences between Abulfazl's account and that of Stirling, which professes to be taken from the Púrí Vainsavalí. The period of Orísá history in the Akbarnámah extends from about 1500 to the end of the 16th century.—The Editor.

LIBRARY.

The following additions have been made to the Library since the meeting held in June last.

Presentations.

*** Names of donors in Capitals.

Memoirs of the Royal Astronomical Society, Vols. XXXV—XXXVIII; Notices, Vols. XXVIII—XXX; Index to the First twenty-nine volumes of the Monthly Notices.—THE ROYAL ASTRONOMICAL SOCIETY OF LONDON.

Proceedings of the Royal Society, Vol. XIX, No. 127.—THE ROYAL SOCIETY OF LONDON.

Proceedings of the Royal Geographical Society, Vol. XV, No. I.—THE ROYAL GEOGRAPHICAL SOCIETY OF LONDON.

Journal of the Statistical Society of London, March 1871.—THE STATISTICAL SOCIETY OF LONDON.

Journal of the Chemical Society, February, March and April, 1871.—THE CHEMICAL SOCIETY OF LONDON.

Bollettino della Societa Geografica Italiana, volume sesto, 1st Maggio, 1871.—SOCIETA GEOGRAFICA ITALIANA.

Nyelvtudományi Közlemények, Kiadja A Magyar Tudományas Akadémia Nyelvtudományi Dízottsága, szerkeszti, Hunfalvy Pál. Hatodik Kötet, Füzet, elso második, harmadik; Hetedik Kötet, Elso Füzet:—Ertekezések A. Természettudományi Osztály Köréleol. Kiadja a Magyar Tudományos Akadémia As Osztály Rendeleté ból, szerkesgti, Gregurs Gyula, levelezó taq; Tzam 1, IX, XI—XIII:—A Magyar Tudományos Akadémia Jegyzóköny, 1867, Fuzet 1-2, Almanach 1867, 1868, 1869,:—Nyelvtudományi Közlemények, Otödik Kötet, Füzet Elsó, Masodik, Harmadik:—Ertesítóje Elsó Evfolyam, szám 1,— 17: Második Evfolyam, szám, 1—20.—A. MAGYAR TUDOMANYAS AKADEMIA, PEST.

Abstract of Proceedings of the Mahomedan Literary Society of Calcutta, 1871.—THE MAHOMEDAN LIT. SOCIETY OF CALCUTTA.

Historical and Statistical Memoir of the Ghazeepur District, by W. Oldham, B. C. S, LL. D., part I.—THE AUTHOR.

Report on the Hill of Mohendragiri and the native part of Barwah, by C. Palmer, Esq., M. D., Capt. W. G. Murray, and V. Ball, Esq., B. A.—DR. C. PALMER.

A Lecture on the Modern Buddhistic Researches by Bábu Ram Dass Sen.—THE AUTHOR.

Introduction to a Philosophical Grammar of Arabic, by G. W. Leitner.—THE AUTHOR.

The Topography of the Mogul Empire as known to the Dutch in 1631, by E. Lethbridge, M. A.—THE AUTHOR.

English Legislation for India by A. M. Broadley.—THE AUTHOR.

The Calcutta Journal of Medicine, Nos. 7—12.—THE EDITOR.

Uber das Râmâyan von A. Weber.—H. BLOCHMANN, ESQ.

Christian Spectator, No. I.—REV. C. B. LEWIS.

Outlines of Amharic by Rev. C. H. Blumhardt;—Historical Notice concerning Calcutta;—A Manual of Geography by Major T. Candy;—The Holy Bible in Short Hand;—The Parsee Acts by Sarabjee Shapoorjee Bengalee;—Phonetic Journal, Vol. 23:—REV. J. LONG.

Report on the Financial Results of the Excise Administration in the Lower Provinces, 1869—70;—Report on the Cultivation and preparation of Tabacco in India, by Dr. Forbes Watson.—THE GOVERNMENT OF BENGAL.

Selections from the Records of the Bombay Government, Nos. 118, 119.—THE GOVERNMENT OF BOMBAY.

Purchase.

Reeve's Conchologia Iconica, 284—287.—Quarterly Review April 1871.—American Journal of Science, Nos. 3 and 4.—L. E. and Dublin Philosophical Magazine, No. 274.—Comptes Rendus Nos. 15—17.—Feer's Etudes Bouddhiques, pr. serie.—Vámbéry's Uigurische Sprachmonumente und das Kudatker Bilik.—Semper's Holothurien, Band I.—De Gœje Bibliotheca Geographica Arabicorum.—Reise in Hadramaut.—Spiegel's Erânische Alterthumskunde, Band I.—Lexicon Latino-Japonicum.—Darwin's Descent of Man, Vols. 1, 2.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR AUGUST, 1871.

The monthly meeting of the Society was held on Wednesday the 2nd instant, at 9 o'clock, P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

Presentations were announced—

1. From Father M. Lafont,—a copy of Results of Meteorological Observations, made at St. Xavier's College Observatory, during the first half of 1871.

2. From Bábu Prankissen Chatterjí,—a stone seal, found west of Bardwán.

The inscription of the seal has not yet been deciphered.

3. From C. R. Markham, Esq.,—a copy of 'Memoir on the Indian Surveys.'

4. From H. F. Blanford, Esq.,—a copy of Tamil Grammar by Rev. C. T. E. Rhenius,—and a copy of Tamil and English Dictionary by Rev. J. P. Rottler.

Bábu Gungaprasád, duly proposed and seconded at the last meeting, was elected an ordinary member.

The following gentlemen are candidates for ballot at the next meeting.

E. T. Atkinson, Esq., C. S. (for re-election), proposed by Dr. F. Stoliczka, seconded by Mr. H. Blochmann.

Robert Fellowes Chisholm, Esq., Consulting Architect to the Government of Madras, proposed by L. Schwendler, Esq., seconded by Dr. F. Day.

Capt. S. B. Miles, Bombay S. C., Asst. Pol. Agent, Quáder, Makrán, proposed by L. Schwendler, Esq., seconded by Col. J. F. Tennant.

Henry Buckle, Esq., Asst. Commissioner, British Burma, proposed by Dr. T. Oldham, seconded by Dr. F. Stoliczka.

The following papers were read—

I. SOME REMARKS ON THE CONNECTION BETWEEN INERTIA AND TIME, *by* W. E. AYRTON, ESQ.,

The following was written not on account of its actual novelty, but because the ideas contained in it will probably be new to the majority of those present.

Of all the properties of matter inertia is, I think, the one least understood by the general reader. With weight, hardness, friction, elasticity, &c. he is perfectly familiar, but that matter possesses another property as important as any one of those I have mentioned never seems to present itself to him. If you ask an ordinary practical man why it is difficult to set a massive fly-wheel in motion, he will probably say on account of the weight and friction. The friction certainly does in a small degree prevent motion being given, but this can to a great extent be overcome by the bearings of the fly-wheel being well made.

And not only is it difficult to set a massive fly-wheel in motion, but it is difficult to stop such a wheel when in motion. This certainly is not caused by friction, since the friction would itself tend to stop the motion.

The weight too cannot in the least prevent motion being given to, or taken away from, a well balanced wheel, since the action of the earth on each side of the wheel is exactly the same.

There is, therefore, another property that matter possesses—its inability to change its own state of rest or motion. This property which is called inertia is best defined by Newton's law "Every body continues in its state of rest, or of uniform motion in a straight line, except in so far as it may be compelled by impressed forces to change that state." Now, by uniform motion we mean moving through equal spaces in equal times, or rather we should say, we call those times equal during which a body unacted upon by any

force describes equal spaces; for no person has an innate perception of equal times. Nobody can from his inner consciousness say one time is equal to another. Hours and minutes are as arbitrary in their conception, and require just as much explanation as degrees of temperature. By general consent the earth is the standard body that has been selected to determine equal times by its motion, so that according to Newton's law those times are called equal during which the earth describes equal spaces, or better during which any particular meridional plane describes equal angles. In fact when a person speaks of minutes or hours, he is tacidly assuming the fact of the earth's inertia. And for comparing time without the aid of the earth's rotation, clocks are used in which the condition of a body in motion, practically unacted upon by any force, is arrived at by compensating by the action of a compressed spring or otherwise for the inevitable forces of friction.

The earth and moon regarded as a mechanical system possess a certain amount of "energy," or power to do work. This energy is partly potential, that is, energy depending on the relative position of the earth and moon, and partly kinetic, that is, energy depending on the two bodies being in motion. Now the earth's daily rotation produces tides by the mutual attraction of the sea and moon, and as the motion of the sea on the surface of the earth is retarded by tidal friction a certain amount of the energy possessed by the system must be lost in overcoming the friction or in generating heat.

One effect of this loss of energy is to cause the periods of rotation of the earth round its axis and of the moon round the earth to become more and more equal, or in other words to make the period of the earth's diurnal rotation gradually longer and longer. The earth is, therefore, not a true time-keeper, and if a chronometer were set now to keep true sideral time, we should expect, if the chronometer neither gained nor lost, to find at the end of a lapse of years, that it was apparently too fast, if compared with the then true sideral time. Such a chronometer it has been calculated would at the end of a century be apparently 0·44 of a minute too fast.

To compare, therefore, time at one period of the earth's existence with time at another period we require, in addition to the sideral and solar second, a mechanical second which would be defined as the period, or a definite portion of the period of vibration of a body practically quite unacted upon by any force. Such a time-keeper has been made at the University of Glasgow and consists of a spring pendulum truly balanced about its centre of inertia and hermetically sealed in an exhausted glass tube. The vibrations of such a pendulum are of course not in the least affected by the earth, and could only be influenced by the little air that has unavoidably been left in the tube producing some change in the metal of which the pendulum is composed. The number of vibrations of the pendulum per second are carefully counted now, and will be counted again at some future period, when the number will be apparently greater per second than it is now, since a sidereal second then will really be a longer time than a sidereal second now. In this way the actual loss of speed of the earth's diurnal rotation can be practically measured.

Col. Tennant said:—

He did not see how our idea of inertia involved an idea of time. Inertia was the passive power by which change of state was resisted, and when a body was at rest there was no question of time involved; but he had not come prepared to discuss this point in detail. The paper seemed to be mainly leading to the question which had lately been raised as to the effect of the tides in retarding the Earth's rotation on its axis, and he thought some account of this might be interesting.

He (Col. T.) would remark on Mr. Ayrton's statement that an increase in the duration of a revolution of 0.44 of a minute in a century has been found by calculation. The whole tidal problem is of extreme complication, and in its generality cannot be touched by analysis. The motion of the water has been deduced on certain hypotheses which are very far indeed from representing existent facts. Thus we have some knowledge of what the motion would be in a canal surrounding the earth equatorially and of uniform, or great, depth and section, or in similar canals passing through the poles;

also in canals of comparatively short length; and in various cases in canals where the wave is derived from a tide wave in the sea. The last case does not concern this problem greatly, and as regards the former cases the conditions imposed by the necessities of analysis make the results rather representations of the kind of phenomenon, than capable of giving accurate values by calculation. Of course when on any such hypothesis a theoretical result has been obtained, which shows that a retardation would take place in the earth's velocity of rotation, it is easy to assign values to the constants and to deduce a numerical result, but such results should be considered as arithmetical exercises, and not as real deductions proved. It was very much to be regretted, Col. Tennant thought, that mathematicians who calculate such things occasionally give the results without those words of caution which would prevent their being misunderstood.

This matter has of late received a great importance from the strong suspicion that there is a true retardation of sensible amount, and the evidence is quite unconnected with any investigations into the tides. It was found very soon after accurate observations of the Moon were taken, that the time of describing its orbit was less than formerly, it being quite impossible to represent old Eclipses by calculating from the known elements. For long it was found impossible to account for this phenomenon from gravity: at last Laplace deduced a result from this cause which so completely coincided with that necessary to explain the old Eclipses, that he thought himself justified in asserting that the sidereal day had not varied by $\frac{1}{100}$ of a second between the time of Hipparchus and his day. His results were confirmed almost identically by Lagrange, and till very recently were accepted, with their consequence that any action of the tides was rejectaneous. Lately, however, Mr. J. C. Adams in the course of a re-examination of the Lunar Theory was led to a different result. He found that the true theoretical value of the Moon's acceleration only served to explain about half of the observed change in its motion of which the rest had to be explained. This conclusion was hotly disputed. French mathematicians, jealous of the honor of their countryman, upheld his results, but Mr. Adams' reasoning was unanswerable and has prevailed; it is acknowledged now that gravity alone does not produce the

acceleration of the Moon's motion. It has been suggested that the ether supposed to fill space, and whose existence had been considered probable from the peculiarities of the motion of Encke's comet produced a similar though less result on the moon, but Delaunay suggested that the tides should produce a retardation of the Earth's velocity which might account for it.

Since then the theoretical discussion of the result of the tidal action has been in question. Col. Tennant had not been in the way of seeing all the solutions, but the problem is very intricate even on the limited hypotheses which render it analytically possible. The Astronomer Royal has shown that on the supposition of a canal equatorially surrounding the earth, the result of using the first order of small quantities only in the solution is that the friction produces no effect on the velocity of revolution, but that it retards the moon. This is precisely the opposite of the result sought, but he has also found in the terms of the second order one which would retard the earth.

This or any thing similar is very far from giving a trustworthy value of the retardation, however, and he (Col. T.) would caution all to hesitate before giving faith to figures on this subject.

Mr. Ayrton replied:—

With reference to Colonel Tennant's remark that "Inertia is the passive power by which change of state is resisted, and that when a body is at rest there is no question of time involved," it will be obvious that the first half of this sentence related to two things, a body at rest and a body in motion, whereas the second half of the sentence refers only to a body at rest. Now as regards a body in motion, inertia is the property it possesses to move uniformly. What, I ask, is meant by moving uniformly if no reference is to be made to time? Also what is meant by equal times, if no reference is to be made to the inertia of a body in motion? I therefore maintain, as before, that the two ideas inertia and equal times are so intimately connected, that neither can be explained without reference to the other.

What follows in Colonel Tennant's remarks rather tends to show the difficulty of applying direct calculation to the actual motion of

the sea, than to show that a retardation of the earth does not exist or that the rate of this retardation could not be calculated. The calculation to which I have alluded of 0.44 of a minute and to which Colonel Tennant objects so strongly was obtained in the following way by Prof. Thomson, Mr. Adams and Prof. Tait working together. They started with the assumption that the known difference between the acceleration of the moon relative to the earth, as calculated by Mr. Adams, and the actual relative acceleration, as observed by Mr. Dunthorne, was due to tidal friction, and then by allowing for the necessary consequent retardation of the moon's mean motion, and using a certain assumption with regard to the proportion of the retardations due to the moon and sun, they arrived at the result I have given. Now with reference to the general question, independently of any calculation, it appears to me that as long as the sea moves on the surface of the earth there must be tidal friction. Friction must produce heat. Heat produced in any system of bodies must to a certain extent be dissipated unless the heated bodies be surrounded by a perfectly non-conducting thermal envelope, a thing of course quite unknown. Wherever, therefore, heat is produced, there must be a certain loss of energy. And the loss of energy in the case in question must cause a retardation in the earth's diurnal rotation, unless there exists some other cause not yet ascertained which compensates for this loss of energy. The connection, therefore, between tidal friction and the undoubted fact of the earth's retardation possesses, I think, a high degree of probability.

The President understood Mr. Ayrton's remarks on Inertia to be intended to lead up to the principal topic of his short paper. Mr. Adams demonstrated, now many years ago, that Laplace's celebrated explanation of the Moon's acceleration was not nearly so complete as it had been thought to be. It left about one half of the inequality unaccounted for. But, to discover the true cause of this residuum was a task of the greatest difficulty. Any one who had practical experience in dealing with the formulæ of the Lunar Theory would know quite well how complicated the problem was. The best supposition—one he believed that was at this time

generally accepted,—seemed to be that the earth's angular velocity of rotation, an ingredient in the calculation, was not constant as it had always been assumed, but was slowly diminishing. The tide-action on the surface of the globe is considered by many eminent physicists sufficient to bring about such a result. On the other hand, if the earth is contracting in radius by a process of cooling denudation or degradation an acceleration of rotation to some extent would be the consequence. Hence it becomes a matter of interest, if possible, to contrive an accurate time-keeper who should be independent of the earth's rotation, and serve to make its deviation from constancy indisputable. He would be glad if Mr. Ayrton would kindly explain the particular mode in which this end was sought to be attained in the case of the Glasgow instrument.

Mr. Ayrton said:—

The pendulum at the Glasgow University to which I referred is made simply on the principle of the balance wheel of a watch, that is, a certain mass of metal is made to oscillate by the action of a spring, and independently of the action of gravity. The friction, however, of the pivot of the balance wheel is obviated by the wheel and spring being virtually in one. The arrangement can be best understood by imagining a straight flat piece of spring rigidly fixed at one end and having a mass of metal fixed at the other end which mass oscillates in a horizontal plane by the action of the spring. The actual arrangement of the pendulum is really more complicated than this, but the principal of action is as described.

As regards the President's remark that the earth by contracting may acquire sufficient acceleration to compensate for the retardation produced by tidal friction, I would mention that Laplace proved solely from Fourier's theory of the conduction of heat that the acceleration of the earth's diurnal rotation produced by shrinking from cooling could not have amounted to $\frac{1}{300}$th of a second in the last 2,000 years. Sir William Thomson has also shown that the acceleration from this cause must be extremely small compared with the probable retardation produced by tidal friction.

II.—Account of a visit to the Eastern and Northern frontiers of independent Sikkim, with notes on the zoology of the alpine and sub-alpine regions, *by* W. T. Blanford, F. G. S., C. M. Z. S. *(Abstract.)*

Mr. W. T. Blanford gave a brief account of a journey he had made in company with Captain Elwes to the Eastern and Northern frontiers of Sikkim in August, September, and October, 1870. Starting from Darjiling on the 13th August, they crossed the Tísta to Kálingpúng in the Dáling Dúar of Bhútán, and thence marched, by Phyúdong, Rhinok, Chúsáchen and Lingtú, to the foot of the Jelep-lá, a pass leading into the Chúmbi valley of Tibet, considerably to the south of the Yáklá. Their object was, if unopposed, to cross this pass and march up the Chúmbi valley to the Tankrá-lá and to cross that to Láchúng, thus reaching the upper Tísta drainage by a shorter and pleasanter road at this season than the hot and wet Tísta valley. However, they found, their plans were known at Chúmbi where the Rája of Sikkim was staying, and the frontier was guarded. They spent a day near the Jelep-lá which is under 14000 ft. in height, and then marched northwards along the west slope of the Cholá range to Chumanáko near the Cholá. On their road they passed 3 lakes, each 1½ to 2 miles in length, larger than any hitherto mapped in Sikkim and known as the Bidan-tso, Nemi-tso and Tanyek-tso. They also passed, besides the Yáklá, an unmapped pass called the Gnátui-lá.

At Chumanáko they found the Rája of Sikkim, who had come from Chúmbi to meet them, and begged them not to attempt to enter Tibetan territory. They, therefore, had to march round by Tamlúng and the upper Tísta valley to Láchúng. They remained for some days in the Láchúng valley at elevations of from 8000 to 16,000 feet and made a considerable collection of birds. The fauna is distinctly Palæ-arctic, a complete change taking place from the Malay fauna of Sikkim, when pine forests are entered at about 8,000 feet. Læmmergeyers, ravens, crows, choughs, tits, tree-creepers, redstarts, larks, pipits and finches, pheasants and snow partridges are the commonest birds. The mammals are burhel, goral, serow, bears and *Lagomys*.

On attempting to pass from the Láchúng to the Láchen valley by the Donkia pass and the small portion of the upper Láchen valley which is in Tibet, the travellers found themselves again stopped by the Tibetans. After two or three days negotiation, a much higher official, the governor of Kambajong, arrived, and with much politeness said he was obliged to refuse to allow them to pass, as he had just received special orders on the subject from Jigatzi and Lhassa. They were, therefore, compelled again to descend to the hot Tísta valley, and make 10 long marches instead of 2 short ones to reach Kongra Lama pass or Djo-kong-tong, the Tibetan frontier in the Láchen valley. Here they again met the Súbá of Kambajong, who had procured some *Ovis ammon* and goa skins, and 4 live *Syrrhaptes Tibetanus* for them. They obtained from him a little information concerning Tibet, the most interesting of which was the absolute prohibition of all imports of tea from Sikkim.

Around Kongra Lama they obtained a few birds not elsewhere seen, amongst them a new *Montifringilla*. They left the pass on the 5th October and, marching back by the Tísta valley, reached Darjíling again on the 20th. In conclusion, Mr. Blanford briefly described some of the traces of former glaciers which he had seen. None were noticed on the Cholá range below 12000 feet elevation, but in the upper Tísta valley glacial markings descended to between 5000 and 6000 ft. He especially noticed the great moraines of the Láchúng and Láchen valleys, described by Hooker, and expressed an opinion that the plains of Phálúng, four miles long by two miles broad, were entirely composed of moraine accumulations, probably derived from the great glacier which passed down the Láchen valley.

Dr. Stoliczka said—he would not enter into the numerous details of observations made by Mr. Blanford on his interesting tour, but only allude to one or two points noticed by him. Referring to the difficulties which every traveller has at the present time to encounter in crossing the Tibetan frontier, it would appear, as if the Europeans had, so to say, come into discredit with the Tibetans within the last 20 years. Some 30 or 40 years ago, the difficulties

were by far not so great, as several Europeans had been able to enter Tibet through Bhútán, Kumaon and the Sutlej valley. It is remarkable for instance that the two Roman Catholic Missionaries Hue and Gabbet were allowed peacefully to cross the whole of Eastern Tibet and North China, even after they had been expelled from Lhassa. It is by no means likely that a European would be equally well treated at the present time. And still every one who approached any part of the frontier of that vast unknown country will understand the anxiety of a traveller to proceed into the interior of Tibet, where nearly everything is new to the observer. Indian officers had, sometimes under the greatest difficulties, devoted their time to explore the sources of rivers of other countries, while no one has as yet made an earnest attempt, or at any rate not succeeded, to discover the sources of the river from which India derives her name. If his (Dr. St.') memory serves him right, he thought, that the only reliable knowledge we have of the sources of the Indus is a statement by Moorcroft in his travels, that a range of hills separates the sources of the Indus from the Mansarovara lakes, but it is not even perfectly certain whether Moorcroft had seen these sources, or not. A subject of such general interest, as this, would by itself warrant the equipment of an expedition to these unknown regions. It is to be hoped that the endeavours of the Great Trigonometrical Survey to increase our knowledge of the geography of Tibet will sooner or later solve this problem.

With regard to the personal objections which Tibetans make to Europeans, attempting to cross the frontier from the Kumaon and Ladak side, Dr. Stoliczka thought, they appeared to him to be chiefly of a commercial nature. The Chinese as rulers of the country have a monopoly in supplying Tibet with tea, opium and all articles of luxury connected with the Bhudhist religion; and because they are afraid of losing this monopoly, they refuse Europeans access to the country. Naturally there are besides these other reasons, as for instance love for ruling or protection to a co-religionist, &c., but these seem to be of minor importance. The Tibetans themselves are not directly hostile to Europeans; they invariably say that they have orders not to allow Europe[illegible] to cross the frontier, and that if they would allow it, their he[illegible]

would be burned down and they themselves killed or expelled from the country. A European when he goes into Tibet from Kumaon, Spiti or Eastern Ladak is not opposed with force, but he is *starved out*. The success of an expedition into these regions rests, therefore, principally in provisioning a party for a couple of months, which it is certainly not difficult to do.

Another point to which Mr. Blanford alluded was the absence of any large moraines in the lower parts of Sikkim. The absence of any very extensive traces of glacial action in the N. W. Himalaya is equally remarkable, as compared for instance with the Alps. Large moraines and glacial deposits are in the N. W. Himalayas chiefly confined to the central range and to the north of it. In the valleys on the southern side of the N. W. Himalayas traces of old debris may be often seen 3000 and 4000 feet above the present level of the rivers, but these accumulations appear with very few exceptions to be common river deposits.

The following communications have been received:

III. A FIFTH LIST OF BENGAL ALGAE, DETERMINED BY DR. G. v. MARTENS, *communicated by* MR. S. KURZ.

No. 2758. *Oscillaria interrupta*, Martens. On muddy ground of dried-up tanks, Bot. gardens, Calcutta.

2759. *Anabæna mollis*, Kg.—Calcutta Botanic gardens, on mud along the edges of tanks, and in water.

2760. *Hydrocoleum violaceum*, Martens, n. sp.

Cæspite atroviolaceo; vaginis diametro 1/180 ad 1/150 lin., arctis, pellucidis; filis inclusis ternis v. pluribus, flexuosis, 1/360 lin. crassis, pallide violaceis, obsolete articulatis; articulis granulatis, diametro triplo brevioribus.—Calcutta, in stagnant waters of the Botanic gardens.

2762. *Lyngbya cincinnata*, Kg., invested by *Glæotila concatenata*, Kg., and colourless inarticulate filaments like *Leptothrix*, but indeterminable.—Seebpore, Howrah, in swamps and tanks, inhabiting the culms of grasses.

2763. *Nostoc gregarium*, Thuret.—Botanic garden, Calcutta, on inflorescences of a *Fimbristylis*, submerged in a tank.

(Unicum.) *Oscillaria Froelichii*, Kg., with the same *Leptothrix*

filaments, as mentioned sub No. 2762.—Calcutta, Botanic gardens, floating on stagnant waters.

2785. *Glæotila concatenata*, Kg.—Calcutta Botanic gardens, in tanks, floating; August, 1870.

2785 b. *Glæotila protogenita*, Kg.—Rajmahal, floating in tanks; October, 1870.

2792. *Microcystis olivacea*, Kg.—Muhudeepore, ruins of Gour in stagnant pools, with *Diatomaceæ*, *Closterium*, *Euglene*, etc.

2793. *Rhizoclonium Kochianum*, Kg., with single threads of *Lyngbya majuscula*, Harv., *Staurospermum cœrulescens*, Kg., and other *Algæ*.—Rajmahal, floating in tanks near the station; October, 1870.

2798 and 2803. *Chætophora radians*, Kg.—On submerged bricks and dead branches in tanks at Rajmahal station; Oct. 1870.

2800. *Palmella bullosa*, Kg., occurs together with *Chætophora radians*, Kg.—Rajmahal station, in tanks, on submerged brickstones; Oct. 1870.

2801. *Leptothrix muralis*, Kg.—Rajmahal (station), damp walls of the traveller's bungalow; Oct. 1870.

2802. *Hypheothrix subundulata*, Martens, n. sp.

Strato compacto, sordide olivaceo, filis 1/400 lin. crassis, pallide aerugineis, obsolete articulatis, granulatis; vaginis pellucidis, 1/350 lin. crassis, leviter undulatis.—Rajmahal, in tanks, on *Paludina* shells; Oct. 1870.

2804. *Spirogyra subæqua* β., fasciis spiralibus condensatis.—Rajmahal hills, Sahibgunj waterfalls, on rocks; Oct. 1870.

2811. *Spirogyra decimina*, Lk., with *Gomphonema dichotomum*, Kg.—Rajmahal hills, waterfall at the base of the hills near Sahibgunj, on trap rocks; Oct. 1870.

2812. *Protococcus vulgaris*, Kg.—On the ruins of one of the ancient gate-ways of Gour, Rajmahal; Oct. 1870.

2813. *Scytonema ærugineo-cinereum*, Kg.—On walls of buildings, very common in and around Calcutta.

2815. *Scytonema cinereum*, Men.—On a ruined bridge over the Ganges, S. of Rajmahal, on damp brickstones; Oct. 1870.

2817. *Cylindrospermum spirale*, Kg.—Calcutta, Botanic gar floating in tanks.

3037. *Polysiphonia angustissima*, Kg.—Calcutta, salt-lakes; Nov. 1870.

3038. *Polysiphonia polychroma*, Martens, n. sp.

Cæspitosa, pollicaris, pulchre violacea, in rubrum, viridem, pallide fuscum et flavescentem colorem transiens; filis capillaribus, basi 1/20 lin. crassis, radicantibus, superne complanatis; articulis pentasiphoneis, diametro plerumque æqualibus, margine corticatis, supremis brevissimis; ramis divaricatis oppositis alternisque; carpocloniis lateralibus curvatis.—Calcutta, salt-lakes; Nov. 1870.

3039 and 3050. *Hypoglossum pygmæum*, Martens, n. sp.

Fronde tenui purpurea, 3 ad 4 lin. longa, vix semi-lineam lata, repetite dichotoma; cellulis frondis quadrangularibus, costæ elongatis; segmentis linearibus, apice incisis; soris in segmentis terminalibus et sporophyllis axillaribus ad costam aggregatis; cystocarpiis stipitatis urceolatis. Calcutta, salt-lakes, on the culms of *Cyperus* and on submerged branchlets along Balliaghat canal; Nov. 1870.

3040. *Conferva Antillarum*, Kg.—Calcutta, salt-lakes, on submerged culms of *Panicum*. Nov. 1870.

3042 and 3043. *Lyngbya cinerascens*, Kg.—Calcutta, salt-lakes, on an old log of wood, in brackish water.

3044. *Scytonema granulatum*, Martens, n. sp.

Strato olivaceo fusco, tenui, pulverulento; filis simplicibus cum vagina 1/300 ad 1/225 lin. crassis, nunc virescentibus, nunc fuscis, laxe intricatis; vaginis arctis hyalinis; articulis distinctis diametro usque ad duplum brevioribus, duplici serie granulatis.—Calcutta, salt-lakes, on mud-banks. Nov. 1870.

3051. *Catenella Opuntia*, Grev., with *Chthonoblastus Lyngbyei*, Kg., and *Polysiphonia angustissima*, Kg.—Calcutta, salt-lakes; Nov. 1870.

3053. *Chætomorpha chlorotica*, Kg.—Calcutta, salt-lakes, common; Nov. 1870.

3054. *Hypheothrix tenax*, Martens, n. sp.

Strato compacto sordide virescente; filis pallide ærugineis v. lutescentibus, cum vagina 1/300 ad 1/225 lin. crassis, dense intricatis, obsolete articulatis; articulis diametro brevioribus, vaginis distinctis, hyalinis.—*Hyph. investienti* proxima. Calcutta, salt-lakes, on roots, etc. Nov. 1870.

3055. *Oscillaria tenerrima*, Kg.—Calcutta, salt-lakes, on wet mud; Nov. 1870.

3057. *Leptothrix mamillosa*, Menegh.—Calcutta, salt-lakes, amongst *Algae;* on mud, submerged; Nov. 1870.

3058. *Leibleinia Juliana*, Kg.—Calcutta, salt-lakes, on *Najas*, *Potamogeton*, *Ceratophyllum*, etc.; Nov. 1870.

3059. *Oscillaria brevis*, Kg., with some filaments of the handsome *Spirulina oscillarioides*, Turpin.—Calcutta, salt-lakes, covering the mud with a layer of soft green. Nov. 1870.

3060. *Oscillaria versicolor*, Martens, n. sp.

Strato tenui fusco v. violaceo; filis 1/175 lin. crassis, violaceis v. fuscescentibus, interdum viridibus; articulis diametro triplo ad quadruplum brevioribus, ad genicula duplici serie granulatis; apicibus rectis.—Calcutta, salt-lakes, covering wet mud; Nov. 1870.

3061. *Hydrocoleum Lenormandi*, Martens, n. sp.

Vaginis pellucidis arctis, 1/100 lin. crassis; filis internis fasciculatim contortis, 1/600 lin. crassis, obsolete articulatis; articulis diametro æqualibus, subgranulatis.—At first observed in 1866, in the collections of the celebrated botanist, Mr. René Lenormand, at Vire, Dept. of the Calvados, from Java, and now found also by Mr. S. Kurz in the salt-lakes near Calcutta, on submerged grasses.

(Unicum.) *Phormidium Lyngbyaceum*, Kg.—Calcutta, salt-lakes, on an old submerged log of a tree; Nov. 1870.

IV. List of Algæ collected by Mr. S. Kurz in Burma and adjacent Islands, by Dr. G. v. Martens, in Stuttgard.

This paper will appear in the Natural History Part of the Journal.

V. Note on Hemidactylus marmoratus, H. Kelaarti, *Theob.*, and Ablabes Humberti, *by* William T. Blanford.

In the Journal of the Asiatic Society for 1870, Vol. xxxix, Part ii, p. 363, I described a Gecko as new under the name of *Hemidactylus marmoratus*. I have since obtained many specimens of this species, which is not rare on trees, and is occasionally seen on houses, in the lower Godávari valley and neighbouring parts of

the Madras Presidency, and I find that, although the majority resemble the typical specimen in the absence of any enlarged tubercles on the back, a few are occasionally found with such tubercles, and that the form is only a small variety of *H. Leschenaultii*, with uniform or nearly uniform granulations.

The largest specimens I have as yet obtained of *Hemidactylus marmoratus* measure 5.2 inches of which the tail from the anus is exactly one half or 2.6. *H. Leschenaultii* grows to a larger size than this. I find in 4 specimens of the latter that the number of scales across the abdomen are respectively 36, 39, 39, 42, and the upper labials from 10 to 13, (usually 11 or 12,) lower labials 7 to 9, (8 being the prevailing number). In 4 specimens of the variety *marmoratus*, the scales across the abdomen vary from 34 to 42, (the numbers are 34, 38, 39, 42,) the upper labials vary from 10 to 12, the lower from 7 to 9. The femoral pores are quite as constant in number as either the scales across the abdomen or the labials, they are usually 12 in each thigh, but occasionally vary between 10 and 14.

From these differences, it is manifest that *Hemidactylus Kelaarti*, Theobald, must also be considered a variety of *H. Leschenaultii*. As I had, guided by Günther and other eminent herpetologists, attached a higher value to the presence or absence of enlarged tubercles on the back of this group of *Hemidactyli*, than the character deserves, it is probable that some of my other identifications on page 364 (loc. cit.) are incorrect.

I was in error in including *Ablabes Humberti* in the fauna characteristic of the Malabar province. I have found several specimens of a small snake near the lower Godávari which appears to belong to that species, and I find that the same form occurs near Calcutta. The only important difference between specimens from the different localities is in the number of ventral scales, which I find to be 155 in a Malabar specimen sent by Major Beddome to Dr. Stoliczka; about 210 in specimens from Ellore, and no less than 240 in one from Calcutta. This is a remarkable degree of variation certainly, and there is a corresponding difference in length, the snakes from Bengal and Ellore being more elongate. Dr. Günther, I should add, found the number of ventral scales to be 175.

LIBRARY.

The following additions have been made to the Library since the meeting held in July last.

Presentations.

*** Names of Donors in Capitals.

Proceedings Roy. Soc., London, vol. XIX, No. 128.—THE ROYAL SOCIETY OF LONDON.

Monatsbericht, April, 1871—Verzeichniss der Abhandlungen, von 1710-1870, in alphabetischer Folge der Verfasser.—K. AKADEMIE DER WISSENSCHAFTEN ZU BERLIN.

Proceedings Zool. Soc., 1870, part III.—THE ZOOLOGICAL SOCIETY OF LONDON.

Quarterly Journal Geol. Soc., vol. XXVII, part 2, No. 106.—THE GEOLOGICAL SOCIETY OF LONDON.

Bulletin, Année 1870, No. 2.—SOCIE'TE' IMPE'RIALE DES NATURALISTES DE MOSCOU.

Bulletin, Juillet—Décembre 1870, Janvier—Février 1871.—SOCIE'TE DE GE'OGRAPHIE, PARIS.

E'vkönyvei, XI. 10, 11, 12 Darab; XIII. 1, 2, 4 Darab—Nyelvtudomanyi Közlemények, VII Kotet 1. 2. 3 füzet, VIII Kotet, 1. 2. 3 füzet.—Ertekezések, II—X, szam—A Magyar Nyelv Szótára, V kotet, 1. 2. 3. 4 füzet—A Törvény Tudományi E'rtekezések, XII szam—Almanach 1869, 1870—E'rtesítöje, II évfolyam 13-20, szam, III. évfolyam, 1-20 szam, IV. évfolyam 1-12 szam—A Magayar. Tud. Akad. Alapszabályai.—MAGYAR TUDOMANYOS AKADEMIA, PEST.

A Memoir on the Indian Surveys by C. R. Markham.—THE AUTHOR.

Ramayana, edited by Hemachandra, vol. II, No. 9.—THE EDITOR.

Professional Papers on Indian Engineering, Second Series, vol. I, No. I.—THE EDITOR.

Rottler's Tamil and English Dictionary.—Rhenius' Tamil Grammar.—H. F. BLANFORD, ESQ.

Memoirs of the Geological Survey of India, Palæontologia Indica, vol. III. Nos. 9-13.—THE SUPT. OF THE GEOLOGICAL SURVEY OF INDIA.

Selections from the Records of the Government of N. W. Provinces, vol. IV, Nos. iii—iv.—THE GOVERNMENT OF THE N. W. PROVINCES.

Purchase.

The L. E. D. Philosophical Magazine Nos. 275, 276.—The A. and M. of Natural History, No. 42.—Jacut's Wörterbuch, vol. VI part 1.—Dictionnaire Djaghatái-Turc.—The American Journal of Science, No. 50.—The Numismatic Chronicle, 1871, part I.—Revue Archéologie 1870, No. IX.—Revue des Deux Mondes, Jan., 1871.—Calcutta Review, July 1871.—Comptes Rendus, No. 18-22.—Reise der Fregatte Novara, Botanischer Theil, Band I.—Böhtlingk und Roth' Sanskrit-Wörterbuch, 45 Lief.

Exchange.

"Nature," Nos. 80-88.

"Athenæum," April and May, 1871.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR SEPTEMBER, 1871.

The monthly meeting of the Society was held on Wednesday the 6th instant, at 9 o'clock P. M.

The Hon'ble Mr. Justice Phear, President, in the chair.

The minutes of the last meeting were read and confirmed.

The receipt of the following presentations was announced—

1. From Captain W. G. Maitland—Two Thibetan MSS., given to him by an inhabitant of the Naga Hills.

2. From the author—a copy of "Kulu, its Beauties, Antiquities, and Silver Mines, including a trip over the snowy range and glaciers," by J. Calvert, Esq., F. G. S.

The following gentlemen were elected ordinary members—

E. T. Atkinson, Esq., (re-election).
R. F. Chisholm, Esq.
Captain S. B. Miles.
H. Buckle, Esq.

The following gentlemen are candidates for ballot at the next meeting.

J. A. Aldis, Esq., M. A., proposed by the Hon'ble J. B. Phear, seconded by Col. A. S. Allan.

Dr. A. Neil, Lahore, proposed by the Hon'ble J. B. Phear, seconded by H. F. Blanford, Esq.

J. O'Kinealy, Esq., C. S., proposed by Col. J. F. Tennant, seconded by Dr. F. Stoliczka.

J. A. Briggs, Esq., Asst. Supt. Telegraph Dept., proposed by Mr. L. Schwendler, seconded by Mr. W. E. Ayrton.

H. G. Cooke, Esq., C. S., Midnapúr, proposed by Mr. J. Wood-Mason, seconded by Mr. H. Blochmann.

Col. G. E. Evezard, Magistrate of Poona, proposed by Mr. W. T. Blanford, seconded by Dr. F. Stoliczka.

Col. A. D. Dickens has tendered his resignation as a member of the Society.

The following letters were read—

From M. L. Ferrar, Esq., C. S., Seetapore, Audh, regarding the birthplace of Rájah Todar Mall.

"In Fasc. IV, of your translation of the A'ín Akbarí, you record that Rájah Todar Mall was born at Láhor. Would you kindly inform me which of the native Historians gives his biography. I ask this, as the people of *Láharpúr*, a large town of 11000 inhabitants in the parganah of the same name, in this district (Sítápúr) and included in the A'ín Akbarí in 'Sirkár Khairábád' all believe that he was a native of their town. I am inclined to think that they have good grounds for their belief, for in the first place the Rájah was not a mythical personage, like Rám Chandr or king Birát, whose birthplace is claimed by many places—and secondly, hard by Láharpúr is *Rájápúr*, called after the Rájah, and having a yearly melá in his honour. At the present time, there is a large community of K'hatrís (the Rájah's caste) at Láharpúr. I think the point is worth clearing up."

Mr. Blochmann said—

On the receipt of Mr. Ferrar's letter, I looked up several MS. histories, and found that the *Maásir ul Umará* and the *Tafríh ul 'Imárat* call the Rájah a *Lahaurí*. The Maásir must have derived his information from the Akbarnámah, though I have not yet found a passage in that work, where the Rájah's birthplace is given. I then asked Mr. Ferrar, to obtain more particulars regarding Todar Mall's father, who is not mentioned in the histories, as I thought that the Láharpúrí Rájah might be the *Todar Mall Sháhjaháni*, a distinguished Hindú courtier of Sháhjahán's time. But the Láharpúrís evidently mean Akbar's renowned minister of finances. Mr. Ferrar replied—

"I will make more enquiries from the Láharpúr people about Todar Mall, and shall let you know the result of them. Meanwhile, and since my last, I have been informed by a respectable

Bráhman of that place that Todar Mall's father was a 'Panjábí K'hatrí,' and came and married the daughter of a Chápari K'hatrí in Láharpúr, where the son was born. The latter seems to have lived there during his boyhood.

"Láharpúr contained 11000 inhabitants in 1869—and probably 15000 in the Nawábí. It takes its name from Láharí Mall, a Passi, who 500 years ago invaded the surrounding country. Up to then it had been known as 'Tughluqpúr,' having been founded by the Emperor Fírúz Tughluq (1357—1388, A. D.), who passed through there on his way to the Bahráich shrine of Sayyid Sálár. I hope that we may be able to settle the birthplace of such a notable personage as R. Todar Mall was."

Mr. W. T. Blanford exhibited a collection of chipped quartzite implements found about 40 miles west of Bhadráchalam on the Godávarí. The 35 specimens exhibited were all found within a space of about 50 yards square, and at least as many more were rejected on account of being badly made. The place where they were found was in dense jungle, the rock soft sandstone, and the implements, as was usually the case in Southern India, had evidently been chipped from pebbles. Several were formed of white vein quartz, an unusual circumstance. The forms of these implements were those of the kind most frequently found in French and English gravels, and they varied from about 3 to 6 inches in length. That the spot where they were found was a place of manufacture was probable, not only from the occurrence of ill formed implements, but also from flakes, evidently chipped from the quartzite being abundant.

The following communications were read:—

1. Letter from R. L. Forbes, Esq., Assistant Commissioner, Palamau, regarding the Mughul invasions of Palamau. Communicated *by* Col. E. T. Dalton, C. S. I.

(Abstract.)

Mr. Blochmann read the letter, which will be published in the forthcoming number of Part I of the Journal. The particulars of the conquest of Palámau by the Mughuls, and especially of the final

war under Dáúd Khán, Aurangzeb's general, are still remembered by the inhabitants of the district. Mr. Forbes's details prove in a most striking manner the reliability of our Muhammadan historians; the only discrepancies refer to the relationship of several Chero chiefs. His geographical remarks form a valuable commentary on several passages in the *Pádisháhnámah* and the *'Álamgirnámah*, and correct, in one case, a bad reading of the Society's edition of the latter work.

2. NOTES ON AND TRANSLATION OF TWO COPPER-PLATE INSCRIPTIONS FROM CHAIBASSA, SINGBHU'M, *by* PRATAPACHANDRA GHOSHA.

(Abstract.)

The copper tablets were discovered buried in the ground in the village of Bámanghátí. They record grants of several villages Bámanvastí, &c., to two bráhmans by two princes of the Mayurbhanj family, a family still extant in the Kaṭak Tributary Mahalls. The plates are each surmounted by a seal, bearing the name of the donor, and signs such as the bull, the trident, and the crescent moon. Rájábhanja, the son of Ranabhanja, is the donor mentioned in one tablet and Ranabhanja is the donor of the other. The tablet of Ranabhanja bears a date which is supposed to be 56 Samvat.

3. ON TWO SAURIAN GENERA EURYLEPIS AND PLOCEDERMA, BLYTH, WITH A DESCRIPTION OF A NEW SPECIES OF MABOUIA, FITZINGER,—*by* DR. ANDERSON, CURATOR, INDIAN MUSEUM.

In comparing some of the Reptiles in the Indian Museum with the catalogue of that Section prepared by Mr. Theobald for this Society, I have lately made two identifications which it is desirable should be put on record, as they refer to two of Mr. Blyth's genera which have hitherto escaped the notice of Herpetologists. I refer to the two genera *Eurylepis* and *Plocederma*. In Mr. Theobald's Catalogue, no mention is made of either of them, and I can only account for their having been overlooked by the circumstance that they were originally published as foot notes to two consecutive pages of the Journal of this Society for 1854.* The species illus-

* J. A. S. Beng. vol. xxiii, pp. 738-739.

trating the first mentioned so-called genus was referred by Theobald to *Plestiodon* of Dumeril and Bibron, and renamed by him *P. scutatus*, and the other species for which Blyth had suggested the generic term *Plocederma* was placed by Theobald in the genus *Laudakia*, which he regarded as distinct from *Stellio*, and referred to Gray's species *Stellio tuberculatus*.

Before considering the affinities of these two forms I shall first point out the characters of the sub-genus *Eumeces* which Wiegmann, its author, regarded as only a subdivision of his Section *Euprepes*.

In the Catalogue of the Berlin Museum published in 1856* Lichtenstein identified *Plestiodon Aldrovandi*, D. and B., with *Scincus pavimentatus*. P. Geoffroy St. Hilaire†, but justly retained for *P. Aldrovandi*, D and B.‡ Schneider's name *auratum*§ which, even according to Dumeril and Bibron's showing, was entitled by priority to stand for the species to which they had affixed the name of *Aldrovandus*. Prof. Peters‖ was the first after Wiegmann himself to direct attention to the fact that the *S. pavimentatus*, Is. Geoff. St. Hilaire was the type of Wiegmann's sub-genus *Eumeces* and Dr. Stoliczka¶ last year brought Peters' observation to the notice of this Society.

The history of the sub-genus *Eumeces* is as follows: In 1834, Wiegmann** in establishing the genus referred *S. rufescens*, Merr., and *S. punctatus*, Schneider, to it, but in the following year†† he pointed out that these two species did not belong to it. In 1837,‡‡ he indicated that *Eumeces* was intermediate between *Gongylus* and *Euprepes* and that *S. pavimentatus*, Is. Geoff. St. Hilaire, was the only species referable to it, and that it differed from *Euprepes* in the form of its tongue and dentition, but he did not regard these differences as of generic but only of sub-generic

* Nomen. Rept. et Amphib. Musei Zool., Berol., Lichtenstein, p. 19.
† Desc. d l'Egypt, p. 135, pl. 3, fig. 3, pl. 4, fig. 4, 4a.
‡ D. and B. Herpl. Genl. vol. v, p. 701, 704.
§ Schneider, Hist. Amph. Zoo. 11, p. 176. Günther places *S. auratus* in *Mabouia* and records it from Persia.
‖ Monats. der Akad. zu Berlin, 1864, pp. 48, 49.
¶ Journ. As. Soc. Beng. 1870. vol xxxix p. 174.
** Herpet Mex. p. 36.
†† Arch. für Naturgesch. (Wieg.) vol. ii, p. 288.
‡‡ Wieg. l. c. vol. v, p. 132.

value. He states that the nostrils of *S. pavimentatus* are situated in the centre of a small nasal shield, but in his work on the Herpetology of Mexico he writes, "*naris in medio scutello sitæ (scutellis duobus in unum coalitis)*" which would lead me to conclude that he doubted whether the character of a single nasal shield were a reliable and constant feature. At that time he divided the genus into two small sub-divisions: one Section, *A.* containing *S. pavimentatus* and *S. rufescens*, Merr., the latter of which he afterwards referred to *Euprepes*, and another Section *B.* in which he placed *S. punctatus*, Schneider, and which he also afterwards located in *Euprepes*. The characters of the first sub-division were these, "*palpebra superior mediocris : inferior scutellato squamosa : dentes palatini numerosi.*" It is therefore to be understood that the scales of *Eumeces* (*E. pavimentatus*) were smooth the nostril in a single plate resulting from the coalescence of two nasals, the inferior eyelid scaly, and that it had palatine teeth.

In 1839, Dumeril and Bibron* do not appear to have been aware that Wiegmann had corrected his original mistake and had removed *S. rufescens* and *S. punctatus* from *Eumeces*, for they enter into an elaborate criticism of his arrangement of the genus in his Herpetology of Mexico. They regarded Wiegmann's *Eumeces* as not founded on a sufficient basis and they therefore retained his name simply to apply it to the group represented by the type *S. punctatus* of Schneider, which has a transparent eyelid, a double fronto-parietal and a small unilobular ear. They, however, in the same volume described the genus *Plestiodon* which has all the characters of Wiegmann's first section (*A*) of *Eumeces* as represented by *Eumeces pavimentatus*, Geoff., which Professor Peters states is synonymous with *Scincus Schneideri*, Is. Geoff. St. Hilaire, *Plestiodon Aldrovandi*, D. and B., and *Plestiodon cyprius*, Cuv. Under these circumstances *Plestiodon* cannot stand, as *Eumeces* has the prior claim to acceptance.

Blyth's *Eurylepis* has the palatine teeth and palate of *Eumeces*, as described by Wiegmann, and also the scaly eyelid and smooth scales. The nostril, however, is not in a single plate but is placed between an anterior and posterior nasal shield, and not as described

* Herpet. Genl. vol. v.

by Blyth and Theobald in a small separate nasal shield. The head plates are arranged as in *E. pavimentatus* and the ear has from three to two lobes anteriorly. The only character of importance in which it differs from *Eumeces* as defined by Wiegmann, and illustrated by *E. pavimentatus*, is the occurrence of the nostril between two shields) but keeping in view Wiegmann's statement that the single nasal of *E. pavimentatus* results from the union of two, this singular difference can hardly be considered as generic. I therefore regard *Eurylepis* as another synonym of *Eumeces*, Wiegmann. *Eumeces* thus defined would appear to correspond with Fitzinger's* genus *Mabouia* which like *Eumeces* has a single nasal, a scaly eyelid and palatine teeth, and the palatine groove reaching forward to the eye, so that the only generic distinction that exists between them is the character of the nostril, but if I am correct in regarding that character as not of sufficient importance to separate *Eurylepis* from *Eumeces*, it cannot have more force when we compare *Mabouia* and *Eumeces* and I am therefore inclined to group together these smooth scaled skinks with palatine teeth and scaly eyelids under the first proposed term *Mabouia*, Fitzinger. *Scincus* which has palatine teeth is separated from *Mabouia* by its dilated toes and shovel-like muzzle.

There is this peculiarity in the scales of the this new form that led Blyth to term it *Eurylepis*, *viz.*, that the scales on the middle of the back from on a line with the axilla as far back as on a line with the groin, while they have only the antero-posterior breadth of the scales of the sides of the back and sides, are so much transversely extended that each dorsal scale has the breadth of three of the lateral rows of scales. The middle of the back is thus covered, in the area defined, by a single row of narrow, hexagonal much transversely extended scales. The scales, between the occiput and the enlarged dorsal series, are of the same size as those in the sides. Each dorsal scale, large and small, is marked by shallow grooves† from the number of 3 to 10, or 11, the first number being restricted to the small scales and the latter occurring on the large scales or plates : the smaller scales have each a minute pore. If these grooves were brought together in pairs, they would produce

* Neue Class. der Rept. 1826, p. 23. † D. and B. l. c. v. p. 702.

a keeled character in the scale, so that it would appear that they are perhaps modifications of the carinated form of scales. It should be borne in mind, however, that this form notwithstanding its grooved scales, is a truly smooth scaled scink. To revert, however, to the significance of the large dorsal plates in the form under consideration; it does not appear to me to merit generic status, because another and distinct species has recently come under my observation, in which there are two rows of enlarged dorsal shields, each about half the size of the large scales of the type of *Eurylepis*. *Mabouia* with the foregoing facts before us may be defined as follows :—

MABOUIA, Fitzinger.

Head conical, scales smooth and finely grooved; dorsal scales either of uniform size or enlarged. Tail long, round and smooth without spines; lower eyelid scaly. Nostril either in a single plate or between two plates, an anterior and posterior. Teeth numerous, conical, somewhat laterally compressed. Palatine teeth. Palatine notch broad on a level with the eye. Limbs moderately or well developed, rather for apart. Toes, 5, 5.

The species which has given rise to these remarks may be characterized as follows:

MABOVIA TÆNIOLATA, Blyth.

Eurylepis tæniolatus, Blyth, Journ. As. Soc. xxii pp. 739, 740.
Plestiodon scutatus, Theobald, Cat. Rept. As. Soc. Mus. 1868, pp. 25, 26,
Eumeces scutatus, Theob., Jerdon, Proc. As. Soc. Bengal, 1870, p. 73.

Body rather elongated, limbs moderately developed and far apart, the distance between them equalling five times the interval between the shoulder and ear. Tail 1⅔rds of the length between the snout and the vent: cylindrical, regularly tapered. Supranasals transversely elongated forming a suture behind the rostral. Frontal transversely octagonal. Post-frontals pentagonal, broad externally but narrowing towards the common, broad, mesial suture. Vertical elongate, oblong; lateral and posterior margins concave. Two small pre-occipitals not forming a suture together, but separated by the point of the anterior extremity of an azygos, arrow-head-shaped occipital, with a moderately sized exoccipital shield, on either side

of it. Two temporals, one above the other between the exoccipital and the posterior margin of the last upper labial. A postocular between the two last labials, before the temporals, and with a small postocular above and two small shields in front of it. Six superciliaries, the third from before backwards being the largest. A rather large pentagonal præocular below the first superciliary. A vertically oblong loreal with its upper margin wedged in between the præfrontal and postfrontals. An hexagonal postnasal over the suture of the first and second labials. Two rows of very small shields between the upper labials and the scaly disk of the lower eyelid. Two transverse chin shields, one before the other, behind the mental, the hindermost being the largest and succeeded by three pairs of large shields, of which the anterior pair form a suture. Ear of moderate size with three or four strong denticulations on its anterior margin, the two uppermost being double the size of the others. A dorsal line of transversely broad, longitudinally narrow, hexagonal scales from over the shoulder to on a line with the groin. These scales are as broad as the three lines of scales external to them, and are obscurely marked by 10 or 11 fine grooves, while the small dorsal scales have three such fine sulci. Twenty-one rows of scales round the middle of the body. Scales on the under surface of the tail enlarged, those on the upper surface the same as on the side of the body. Two large anals separated by an oblique suture. Anterior limb when laid forwards reaches beyond the anterior angle of the eye ; posterior limb reaches only a short way beyond one-third of the distance between the groin and the axilla. Centre of under surface of the feet covered with small tubercles ; a line of larger tubercles on the hind foot embracing the smaller ones, and curving backwards from the outer to the inner toe. About 8 inter-maxillary, and 28 maxillary teeth in the upper jaw, as a whole ; and five palatine teeth on either side.

The specimens are much faded, but the coloration appears to have been a pale olive grey above with a dark brown band running along the large, dorsal scales, and spotted with whitish. A dark brown band along the side from the eye and partially prolonged on to the tail. This band is ornamented at regular intervals with three longitudinal lines of whitish spots. Tail more or less darkly speckled, the markings tending to form transverse rings.

Length:—snout to vent 3," 8'''; vent to tip of tail 5," 2'''; head 6'''; fore limb 10,''' hind limb 1", fourth toe 4.'''

Hab. Punjáb, Salt Range.

Two specimens were collected by Mr. Theobald in the Salt Range of the Punjab, and presented by him to this Society and described by Mr. Blyth who created the above named genus for their reception. There cannot be a doubt as to their identity, but both, Blyth and Theobald, have fallen into some inaccuracies regarding certain of their characters. The former says that the nostril is pierced in a small, separate, nasal shield, an error repeated by Theobald. Mr. Blyth also states that the lower eyelid has a translucent disk, but Mr. Theobald more accurately describes it as scaly, with a transverse row of large plates. He, however, says the body is surrounded by 23 rows of scales while the two specimens exhibit only 21 in the middle of the body, and Blyth limited them to 19.

If I am wrong in my estimate of the value to be attached to the occurrence of the nostril between two plates, and the presence of the enlarged dorsal plates, then Blyth's *Eurylepis* will stand, but for the reasons stated, I do not regard these characters as generic.

MABOUIA BLYTHIANA, n. sp.

Rostral triangular, hexagonal, in contact with the supranasals. Anterior nasal triangular, rather small; posterior shield subquadrangular. Supranasals transversely oblong, forming a suture behind the rostral. Frontal transversely elongate, its anterior margins forming an obtuse angle. Posterior frontals large, hexagonal, forming a broad suture. Vertical elongate, lateral margins slightly convergent posteriorly, hinder margins forming an obtuse angle. Præoccipitals pentagonal, forming a broad suture behind the vertical. An azygos, wedge-shaped occipital. Exoccipitals of moderate size, pentagonal.* Three rather large temporals between the exoccipitals and the two last upper labials, one anterior to the other two shields which lie one above the other, the former separated from the eye by a chain of small shields running from the anterior angle of the eye, along the upper eyelid and the lower margin of the eye to its anterior third. Six superciliaries, the first and last very small. A small point-

edly quadrangular, and a large, oblong shield along the anterior third of the lower margin of the eye, the former behind the latter, with a large pentagonal loreal in front of them, and a vertically elongated, hexagonal postnasal before the latter, in contact with the 2nd, upper labial, posterior nasal, supranasal, frontal, postfrontal and loreal. Eight upper labials, the seventh and eighth the largest, the anterior margin of the last on a line with the posterior angle of the eye. Seven lower labials, the last but one the largest. Mental like a labial, but more transversely elongated, with a large, azygos, pentagonal plate behind it, with the concavities of its two hinder margins directed backwards and in contact with two pairs of labials. A pair of transverse shields in contact with the second and third labials and forming a suture together behind the azygos plate ; another large pair with a small azygos shield between the plates, succeeded by another pair with a still smaller pair behind the latter. Thirty rows of smooth scales round the middle of the body. Two longitudinal lines, in the middle of the back, of transversely elongated, hexagonal scales considerably larger than any of the other dorsal or lateral scales, and commencing from behind the occiput and diminishing in size on the root of the tail. Ventrals of moderate size with their posterior margins rounded. Two large præanals with a small external pair. Tail rounded, slightly, laterally compressed, long and tapering, one and two-thirds as long as the body. A single row of enlarged sub-caudals. Scales on the upper surface and sides of the tail of uniform size. Ear moderately large, erectly oval, with from three to four strong lobules on its anterior margin, the uppermost the strongest. Under surface of feet covered with tubercles, those of the hind foot embraced by an enlarged series extending from the base of the first to the base of the fifth toe. Limbs well developed, the fore limb reaching to the tip of the snout, and the hind limb when stretched forwards extending to the anterior third of the space between the axil and groin. Seven intermaxillary and 34 maxillary teeth in the whole of the upper jaw, and 36 in the mandible. Seven to eight palatine teeth on either side. Snout to vent, 3″ 5‴ ; vent to tip of tail 6″; head 7‴ ; fore limb 1″ 1‴; hind limb 1″ 6‴ ; fourth toe 6.‴

Olive brown above ; three dark-brown, longitudinal lines along

the back, from the nape to the base of the tail. A broader dark-brown band from the eye over the tympanum, along the side. A broad, pale-yellowish band below it from below the eye through one half of the tympanum along the sides to the groin. A palish dusky band from the angle of the mouth, over the shoulder, and along the side below the yellowish band. Upper surface and sides of tail pale, uniform brownish-olive. All the under parts yellowish.

Hab. Amritzur? Purchased from a Bokhara merchant who stated that he obtained it at Amritzur.

Blyth* in a notice of some Reptiles from the Panjáb writes of the next form which I purpose to consider, "a well marked second species of Dr. Gray's genus *Laudakia*, founded on *Agama tuberculata* of Hardwicke's Ill. Ind. Zool., if not rather a new genus affined to *Laudakia* (in which case this may bear the name *Plocederma*, nobis)." This specimen is still in the Museum and was referred by Theobald to *Laudakia tuberculata*, Gray, which he considered generically distinct from *Stellio*, and which it does not appear to be. The examples of the genus *Stellio* in the Indian Museum agree with Dr. Günther's figure of *S. indicus* which he afterwards referred to *S. tuberculatus*, Gray. There are, however, two well marked species of the genus in India as Dr. Stoliczka has shown me from the rich materials in his possession, and as he is to describe the result of his observations, I shall proceed to point out the characters of the type specimen of Blyth's supposed genus *Plocederma*, but, to enable me to do so, it is necessary for me to remark that the two species recognized by Dr. Stoliczka are distinguished by the size and distribution of the enlarged scales of the dorsal region. One species *S. tuberculatus* has the scales considerably and generally smaller than the other and more numerous, those on the back of the neck being scarcely enlarged, while in the other, larger-scaled form, the scales in that region partake to a certain extent of the nature of the dorsal scales and are prolonged more or less to the occiput. I am inclined to the conclusion that Blyth's *Plocederma* is a young individual of Dr. Stoliczka's large scaled form, but the following are the characters of Blyth's *S. melanurus*.

* Journ. As. Soc. Beng. xxiii, pp. 737,738.

STELLIO MELANURUS, Blyth.

Laudakia (Plocederma) melanura, Blyth, Journ. As. Soc. Beng. 1854, vol. xxiii, p. 737-739.

Laudakia tuberculata, Gray, Theobald, Cat. Rept. As. Soc. Beng., 1868, p. 38.

A short rudimentary crest of enlarged, keeled, tubercular scales. Scales of the back enlarged, imbricate, strongly keeled, with serrated free margins, and with a small apical spine. On the middle of the back, there are 8 rows of the enlarged scales much larger than those external to them which number 7 rows, gradually decreasing from within outwards, the outer row, however, abruptly separated by its greater size from the minute scales of the sides. In the large central rows of scales, the strong keels form longitudinal lines, while in those external to them, the keels form oblique lines, from within outwards. Half way between the middle of the back and the shoulder, the number of rows of enlarged dorsal scales decreases to 16, so that the scales are restricted to a much narrower area than on the back, but before the shoulder there is again a slight augmentation in their distribution, the rows increasing to about twenty, but the scales having diminished in size, the lateral extent covered by them is not much increased. On the back of the neck, there are no enlarged scales besides those of the central crest which begins where the enlarged scales stop, on a line with the shoulder. The scales on the sides of the body are granular, each with a minute apical spine and arranged in transverse lines, and there are no enlarged scales among them. (In this character it differs from *S. tuberculatus*). I count 149 rows of scales round the middle of the body, 53 of which are ventral, smooth and without any trace of keels. The scales on the upper surface of the limbs, with the exception of those on the tail, are the largest, their margins are serrated and each has an apical spine. The scales of the tail are large and arranged in verticils which are interrupted, however, in their curve on the upper surface of the base of the tail. All are keeled and have strong apical spines, with the exception of those in the middle of the under surface of the tail which have no keels, but generally have an apical spine, with a smaller one on each side of it. Nostril above the second

third labials, but separated from them by two rows of scales. Seventeen upper and fifteen lower labials. A median line of slightly enlarged keeled scales behind the snout, and a similarly enlarged plate on the occiput. Two to three rows of enlarged conical, spined scales from below the eye to the tympanum. A group of tubercular, spinous scales at the anterior margin of the ear. A fold at the under margin of the tympanum prolonged to the neck, on the under surface and sides of which there are numerous folds, those in the latter locality being here and there covered with groups of spines. A pit before the shoulder from the upper anterior margin of which a fold is prolonged over the shoulder to the sides of the back with small spines occurring on it at intervals ; a smaller and more indistinct fold between the latter fold and the shoulder with a few large spinous scales. The opening of the ear is very large and patulous. The tail is slightly dilated at its base and depressed, long and slender and more than twice as long as from the snout to the vent. The wrist reaches as far forwards as the snout, and the hind limb just touches the vent. The third finger is nearly the length of the fourth which is the proportion in the corresponding toes. A small callous patch of about 20 scales in the centre of the abdomen, with a præanal series of two rows of callous scales. A deep depression behind the vent. The dental formula of the upper jaw is premaxillary teeth $3 + 3 = 6$; maxillary teeth $13 + 13 = 26$; total 32. Snout to vent 3″ 2‴ ; vent to tip of tail 7″ 9,‴ head 10‴ ; fore limb 1″ 8‴ ; hind limb 2″ 8‴ ; fourth toe 7‴.

Colour in spirit, I quote from Blyth, "Olive grey, probably olive green and changeable when alive ; the head and body speckled over with dark scales, and also with some scales paler than the rest ; the long slender portion of the tail dusky black and the lower parts pale and buffy white, apparently suffused with crimson when alive ; the throat and below the shoulders beautifully marbled with greyish black, probably blue in the living animal."

Blyth states that the locality from whence the specimen was obtained was uncertain, but that he believed it to come from Kashmir. Mr. Theobald, however, who collected the specimen states in his Catalogue that it came from Simla.

4. Notes on some Indian and Burmese Ophidians, *by* Dr. F. Stoliczka.

(Abstract.)

In this paper notes are given of the following species : *Typhlops Horsfieldi*, *T. bothriorhynchus*, *T. braminus* and *T. pammeces*.

T. porrectus, n. sp.—18 longit. rows of scales ; 406-440 transverse rows on body, 11-12 on the tail ; head-shields regular ; eye very indistinct ; circumference $\frac{1}{24}$ to $\frac{1}{27}$ of length of body ; leaden or olivaceous brown above, paler below and on the head ; mouth and below tail pure white. Bengal and N. W. Provinces.

T. Andamanensis, n. sp.—18 longit. rows of scales, about 390 transverse rows on body and 17 on the tail ; head shields above regular ; one separate lower præ-ocular and one sub-ocular ; 4 labials, the third larger than the fourth ; circumference a little less than $\frac{1}{16}$th of total length ; eye indistinct ; blackish brown above, vinaceous on side, grey, checkered with white, below. Andaman islands.

T. Theobaldanus, n. sp.—22 long. rows of scales ; 485 transverse rows on body, 26 on the tail ; circumference $\frac{1}{26}$ of the total length ; head-shields regular ; eyes perfectly indistinct ; uniform light brown ; India.

Simotes bicatenatus.—Ablabes collaris.—Compsosoma Hodgsoni.—Zamenis fasciolatus.—Tropidonotus quincunctiatus. Of this last species a variety is described and figured, with the posterior frontals united into one shield.

T. bellulus, n. sp.—19 rows of small, sharply carinate, scales, head-shields like in the last species, but the anterior frontals more obtuse in front, 9 upper labials of which the 4th, 5th and 6th enter the orbit, 1+2 temporals ; 140 ventrals, 63 subcaudals ; olive brown above with two series of little dark spots along the back, all ventrals black at the base ; Pegu (Mr. S. Kurz).

T. Himalayanus.—T. junceus.—T. subminiatus. A unicoloured large variety is figured and described of the last species.

T. macrops, Blyth, is the same as *T. macrophthalmus*, Günther, and most probably also identical with *T. Sikkimensis*, Anderson.

T. plumbicolor from Qualior.

Psammophis condanurus. The N. W. Sub-Himalayan variety is possibly the same as *P. Leithii* of Günther, from Sind.

Dipsas Forsteni occurs at Pankabaree, base of Sikkim hills.

D. hexagonotus, Bl., is not identical with *D. multifasciata*, Bl., as suggested by Dr. Anderson.

D. bubalina is common in the low valleys of Sikkim.

D. trigonata from Qualior.

Leptorhytaon jara is not considered to be generically distinct from *Lycodon*.

Hypsirhina enhydris has sometimes 23 rows of scales.

Trimeresurus Andersoni of Theobald is quite distinct from *T. monticola* with which it was wrongly identified by Dr. Anderson. It is an Andaman species, and allied to *T. porphyraceus* of Blyth.

[This paper will be published with illustration in the Natural History Part of the Journal for the current year].

5. NOTES ON NEW OR LITTLE KNOWN INDIAN LIZARDS, *by* DR. F. STOLICZKA.

(Abstract.)

After some preliminary remarks, the author gives notes on the following, known or new, species :—

LACERTIDÆ.

Tachydromus sexlineatus, and the allied species *T. meridionalis*, *T. Haughtonianus** and *T. septemtrionalis*.—*Ophiops Jerdoni*, Blyth, = *Pseudophiops Jerdoni* = *Ps. Theobaldi* and ? = *Ps. Beddomei* of

* The naming of this species was the cause of a most unjustifiable attack by Dr. Anderson upon Dr. Jerdon, as recorded by the former in the Proc. of the Zool. Soc. of London for 1871, p. 156. I do not wish to repeat that presumptuous statement, which has justly elicited the indignation of naturalists at home; but a reference to p. 72 of the Society's Proceedings for February 1870 will shew, that it was I who originally gave that information to Dr. Jerdon, as recorded by him (l. cit.). The specimen, for which the new name was proposed, was received during my temporary tenure of the office as Curator of the Indian Museum, and as such I thought it *right* in communicating the information to Dr. Jerdon, whom I knew to be engaged in the preparation of a monograph of the Indian Reptiles. A few points of minor importance in the identification of the species have been afterwards compared by Dr. Jerdon, with the knowledge of one or the other of the officers of the Museum. The name *Haughtonianus* has been adopted by Jerdon on my suggestion.—Of all this Dr. Anderson should, or might, have been aware. But if he wishes to style himself a "Director" of the Museum, why should he be so anxious to apply Dr. Jerdon's statement "with the concurrence of the Curator" to himself? The monopoly of naming and describing specimens in a public Museum, which Dr. Anderson appears to claim as his exclusive right, has fortunately not yet been made law in the Indian Museum at Calcutta.

Jerdon.—*Ophiops* [*Gymnops*] *microlepis*, Blanf., from Kuhurbalee.—*Acanthodactylus Cantoris*, from near Agra, Ambala, Ludiana &c.

GECKOTIDÆ.

In this family the more important species noticed are: Of *Hemidactyli* 15 species are distinguished :

1. *H. triedrus*, from which Jerdon's *H. subtriedrus* is possibly distinct.

2. *H. maculatus*, D. and B. (smaller form).

3. *H. Pieresii*, Kelaart = *H. maculatus*, D. and B., large specimen, ? = *H. Sykesi*, Günther.

4-5. *H. gracilis*, Blf., and *H. reticulatus*, Bedd.

6. *H. frenatus*, (? = *H. punctatus*, Jerdon).

7. *H. Leschenaultii* = *H. Kelaarti*, Theob., = *H. marmoratus*, Blanford.

8. *H. Mortoni*, Theobald; Burma.

9. *H. Coctæi* = *H. Bengaliensis*, Anderson.

10. *H. aurantiacus*, Bedd.

11. *H. giganteus*, n. sp. Similar to *Coctæi*, but much larger, the general size being equal to that of *Gecko guttatus*. First labial not entering the nostril, 18—20 femoral pores on either side of thigh, separate in præ-anal region ; olive grey, marbled and spotted with darker.

Hab. Godávári valley near Badrachalam, on trees; discovered by Mr. W. T. Blanford.

12. *H.* [*Doryura*] *Berdmorei*, Blyth. This species is re-described, and a figure of it given. Burma, Cachar, Sikkim Terai, Tista valley and Kumaon.

13. *H.* [*Doryura*] *Mandelianus*, n. sp. Body long, much depressed, as is also the tail, the latter with sharp lateral subtuberculate edges ; 12—14 upper, 10—12 lower labials ; first larger pair of enlarged chin-shields forms a suture, second smaller, separated from each other and from the labials by smaller scales; 36 long. series of scales on middle of belly. No femoral pores observed. Grey, densely marbled and punctated or streaked with blackish and with intermixed larger pale spots. Paukabaree and Tista valley in Lower Sikkim.

14-15. *H.* [*D.*] *Gaudama* and *H.* [*D.*] *Karenorum*, Theob.

Peripia Cantoris and *Peronii* have generally a distinct minute seta on the inner toe.

Nycteridium platyurus, Schneider, is = *Nyct. Schneiderianum*, Shaw, = *N. Himalayanum*, Anderson.

Gymnodactylus Lawderanus, n. sp. Body covered with small and larger tubercles ; no enlarged scales behind the nostril, 9 upper, 8 lower labials ; first pair of chin-shields forms a suture and is followed by smaller shields ; 32 long. series of scales across belly ; two pairs of femoral pores, close together on præ-anal region ; pale greyish brown, densely spotted with dark brown ; Kumaon ; discovered by Mr. A. Lawder.

G. nebulosus, Beddome, is not = *G. nebulosus*, Blyth, (nomen nudum).

Gym. maculatus, Beddome, 1870, is not = *G. maculatus*, Steind., 1866.

Gym. marmoratus, Beddome, 1870, is not = *G. marmoratus*, D. and B., 1836.

Japalura variegata, may possibly be the same as *J. microlepis*, Jerdon, but is certainly distinct from Jerdon's *planidorsata*, the latter having been wrongly identified by Anderson with the first.

Sitana Ponticeriana extends eastward to the Ganges and northwards to Rúrkí and into the Panjáb.

Charasia Blanfordana, n. sp. = *Ch. dorsalis*, apud Blanford, J. A. S. B., vol. xxxix, 368 ; differs from the latter by its larger scales which are in 80—100 series round the body, &c.

Ch. [*Oriotiaris*] *tricarinatus* (Blyth) = *Oriot. Elliotti*, Günther.

Stellio Dayanus, n. sp., differs from *St. tuberculatus*, = *St. indicus* of Blyth, by the larger scales on the back, these being continuous on the neck ; by having only 40 long. series of scales across belly, and by its longer tail and limbs, &c. Hurdwar ; discovered by Dr. F. Day.

Euprepes [*Tiliqua*] *macularius*, Blyth, quite distinct from the next ; varies very much in coloration.

E. [*T.*] *carinatus* has quite as often 5 as 3 keels on each scale.

Euprepes monticola, from Sahibgunj on the Ganges, has a transparent disc on lower eyelid.

Hinulia indica, Gray, is distinct from *H. maculata*, Blyth and

also distinct from *H. Dussimieri*, D. and B. Characters of the three species accompanied by drawings are given.

Mocoa Sikkimensis is redescribed and is not the same as Günther's *Eum. Himalayanus.*

Mocoa sacra, n. sp. Like *Sikkimensis*, but more slender, with 22 longit. series of scales round the body and 40 transverse series between the limbs; ear denticulate in front; sub-caudals enlarged from near the anus; bronze brown above with a few dark spots, blackish at the anterior side; rest greenish white. Parisnáth; W. Bengal.

A new species of the very rare genus *Ristella*, Gray, has been discovered by Major Beddome in South India. A figure and description of it is given. It is named by Beddome *R. Malabarica.*

Riopa anguina, Theobald. Dr. Anderson has included two different species under this name (see Proc. Zool. Soc. Lon. 1871, p. 159). The measurements and dimensions are mostly those of true *anguina*, but the coloration is taken from a species which Theobald (Lin. Soc. Jour. Zool. p. 26) most probably noted under the name *R. Boringi*, but which is distinct from both these species. It differs from the former by its much longer limbs, but chiefly by its coloration; from the latter by the structure of scales, &c. The specific name *cyanella* is proposed for this new species.

Riopa albopunctata and *Hardwickii.* Notes on the structural affinities as well as on the geographical distribution of these two species are given.

[This paper will appear, with numerous illustrations, in the 1st number of the Nat. Hist. Part of the Journal for the ensuing year.]

6. On Hamilton Buchanan's original drawings of fish in the Library of the Asiatic Society of Bengal, *by Surgeon* F. Day.

In the Library of the Asiatic Society of Bengal exist several volumes of manuscripts and drawings by Dr. Buchanan. In two of these are one hundred and forty-nine original, coloured delineations of fish, and 45 copies. On the former are "the specific names in Buchanan's handwriting, marked under the figures, so as to leave no doubt or difficulty in referring them to corresponding descriptions in the Gangetic fishes." (McClelland.)

In "Chambers' lives of Scotchmen," it is stated, that Buchanan Hamilton on his departure from India was deprived by the Marquis of Hastings of all his extensive drawings and papers relating to every branch of natural history. (McClelland.) Since this period it has been generally admitted that the Indian Government appropriated the private collections of drawings belonging to that officer.

Having been furnished with the original correspondence, I find that Buchanan, on having resigned the office of Superintendent of the Botanic Gardens, sailed for Europe in 1815 in the "Marchioness of Ely," taking with him "collections of natural history, coins and Hindu Manuscripts" which he presented to the Court of Directors of the East India Company.

In a communication from Dr. Hare, a successor to Dr. Buchanan, in the appointment of Superintendent of the Botanic Gardens, to the Chief Secretary to the Government, (dated July 27th, 1816), there occurs the following passage, "In a letter from the Right "Hon'ble the Governor-General of the 5th January, 1815, His "Excellency says: 'by a letter from Dr. Buchanan received here, "'it appears that he proposes to carry to Europe all the drawings "'of animals and plants collected by him during the tour which he "'was employed to make in this country. Dr. Buchanan states "'that it is his object to request the Court of Directors to accept "'this collection as a present from him. Now, I apprehend that "'those drawings are already the property of the Hon'ble Court, "'the service for which Dr. Buchanan was employed and paid "'having specifically been the furnishing Government with a know-"'ledge of the animal and vegetable productions of this country, "'delineations are essentially included in this service.' * * * The "drawings were transmitted to Government with the following "letter, dated 18th February. 'I have been honoured with your "'letter of the 31st ultimo, withdrawing the permission of the "'Hon'ble Vice-President in Council for sending to the Hon'ble "'Court of Directors, such drawings of natural productions as "'have been made at the Public expense, and desiring me to "'deliver them to you which I have accordingly done by the bearer, "'* * * my object in requesting, that I might be permitted to "'present the drawings to the Court of Directors, did not originate

" 'in a view of claiming the merit of making a present to the Com-
" 'pany of its own property, but arose from a conviction that their
" 'being deposited in the collection at the India House was the
" 'most probable means of rendering them useful to science.' " The drawings were kept in India to illustrate Dr. Buchanan's statistical reports on several of the districts, and it was proposed to take copies of the originals, which were subsequently to be transmitted to England.

Some of these drawings have been transferred to the Illustrations of Indian Zoology, General Hardwicke having had them "copied from the drawings of Buchanans Hamilton by that gentleman's* consent." (Richardson.) Others have been reproduced by McClelland in his Memoir on the *Cyprinidæ* of India, R. A. S. of B. 1839.

In the Zoological Record for 1869, p. 127, Dr. Günther observes of these drawings, that they "exist in triplicate, one copy being in the British Museum, where their free use is allowed." He also remarks: "It may be questioned whether it is desirable to utilize drawings, the types of which are lost, in any other way, but as a help to supplement the insufficiently published descriptions." But have the types been lost? In the "Catalogue of the Fishes of the British Museum," Vol. III, p. iv, 1861, the receipt is acknowledged of "6. A collection of fishes from Bengal, believed to contain many typical specimens of Buchanan Hamilton's work, presented by G. R. Waterhouse, Esq."

The first consideration which suggests itself is, how was this collection obtained from Bengal? It does not appear to have existed in the Museum of the Asiatic Society or in the Botanical Gardens, whilst the collections conveyed to Europe by Buchanan were presented by him to the India House.

At page 471 in the same volume, Dr. Günther observes of the *Ophiocephalus aurantiacus*, H. B., "the typical specimen is not preserved in the collection presented by Mr. Waterhouse: and in fact the drawing is taken from the Hardwicke collection." It would appear from this, that Dr. Günther had arrived at the conclusion, probably on good evidence, that Mr. Waterhouse had presented

* More probably with the consent of the Superintendent of the Botanic Gardens in whose charge they remained.

Hamilton Buchanan's *types* to the British Museum; he also observes in several places of specimens "probably types of the species." In short it seems that the original collection, or some part of it, still exists in the national one.

As to the second portion of the sentence, a slight inaccuracy has occurred, because Hamilton Buchanan could not have copied from the "Illustrations of Indian Zoology." He published the "Fishes of the Ganges" in 1822, and died in 1829. General Hardwicke returned to Europe in 1818, and his work was published in 1832 or 1833, several years after Hamilton Buchanan's death. Irrespective of this the original drawing, No. 60, was left in India in 1818, by Buchanan.

I cannot omit questioning whether the British Museum possesses copies of *all* these original drawings. My reasons for doubting are, that some omissions and wrong identifications, besides figures placed to the literary credit of General Hardwicke, instead of Hamilton Buchanan, have found a place in the B. M. Catalogues, which could scarcely have occurred, had Dr. Günther had access to such accurate delineations, as the Asiatic Society of Bengal possesses. I, therefore, propose enumerating the drawings which exist in the Library, the figures marked before each being identical with what I have placed in pencil on those of the collection, for the purpose of future identification.

In examining these drawings in volume marked iv, I have first placed the unpublished names as existing upon them within brackets, next the names as published in the fishes of the Ganges, with H. B. after each of them, and lastly the determinations in the Catalogue of the Fishes of the British Museum, as it is believed that that institution possesses copies of the original drawings, and it is also supposed the remains of the typical collection.*

1. (*Centropomus phulchanda*), $1\frac{7}{10}$ inches long. *Chanda phula*, H. B. = *Ambassis oblonga*, C. and V., B. M. Catal.

* By *reproduced*, it must be distinctly understood that I mean "with the leave of the author" or acknowledged as "obtained from H. B. collection," as M'Clelland observed of the use he made of them: "I have been more anxious to identify Buchanan's species than to describe new ones, and to reserve his names than to substitute others." By *omitted* I of course mean "accidentally" or "overlooked," and I believe due to the drawing in question not being amongst those in the British Museum.

2. (,, ? *bahrul*), $1\frac{2}{10}$ inches long. *C. baculis*, H. B. = A. — ? B. M. Catal.

3. (,, *bogoda*), $2\frac{3}{10}$ inches long. *C. bagoda*, H. B. = *Ambassis bogoda*, B. M. Catal.

4. (*Silurus chaka*), in Fishes of Ganges pl. 28, f. 43. *Platystacus chaca*, H. B. = *Chaca Buchanani*, Günther, B. M. Catal.

5. (,, *kanipabda*), 2 views, each 4 inches long. Probably the omitted first species of *Callichrous*. P. spine serrated. Maxillary barbels reach to the middle of the total length. Anal fin with about 63 rays.

6. (,, *pabda*), *Callichrous pabo*, H. B., pl. 22, f. 48. = *C. pabda*, B. M. Catal.

7. (*Malopterure kazali*), reproduced Ill. Ind. Zool. *Malapterurus coila*, H. B. = *Ailia Bengaliensis*, Gray, B. M. Catal.

8. (*Hypostomus ? sisor*), reproduced, Ill. Ind. Zool. *Sisor rabdophorus*, H. B. = *S. rabdophorus*, B. M. Catal.

9. (*Pimelodus manggoi*), 2 views, each 3 inches long. *Pimelodus mangois*, H. B. = *Amblyceps mangois*, B. M. Catal.

10. (,, ? *nibriundus*), 2 views, each $3\frac{1}{2}$ inches long. *P. telchitta*, H. B. = *Glyptosternum* — ? B. M. Catal. ; also probably *G. trilineatum*, Blyth, B. M. Catal.

11. (,, *batasi*), 2 views, each $3\frac{2}{10}$ inches long. Barbels all shorter than the head (quite different from pl. 23, f. 60, which is *P. carcio*, H. B., erroneously named *P. batasius*). *P. batasio*, H. B. = *Macrones batasio*, B. M. Catal.

12. (,, *hara*), 2 views, each $2\frac{4}{10}$ inches long. *P. hara*, H. B. = *Hara Buchanani*, Blyth, B. M. Catal.

13. (,, *changdramara*), 2 views, each 2 inches long, 2 short nasal, and 4 maxillary and mandibular barbels. *P. chandramara*, H. B. = *Macrones* — ? B. M. Catal.

14. (,, *muri vacha*), 2 views, each $3\frac{7}{10}$ inches long. *P. murius*, H. B. = *Eutropius ? murius* and *Pseudeutropius megalops*, Günther, B. M. Catal.

15. (,, *urua*), 2 views, each $2\frac{3}{10}$ inches long. *P. urua* H. B. = *Pseudeutropius atherinoides*, Bl., B. M. Catal.

16. (,, *auratus*), 2 views, each 9 inches long. *P. nenga*, H.B., reference omitted in B. M. Catal., = *Arius arioides*, C. and V., l. c.

17. (,, *khongta*), 2 views, each 3 inches long. *P. conta* H. B. = *Hara conta*, Blyth, B. M. Catal.

18. (,, *telgagra* and *menoda*), published as *P. corsula*, H. B., pl. 1, f. 72 = *Macrones* — ? B. M. Catal. = *Macrones trachacanthus*, C. and V., l. c.

19. (,, *tenggana*), *P. tengana*, H. B., pl. 39, f. 58 = *Macrones tengana*, B. M. Catal.

20. (,, *kenia*), *P. cenia*, H. B., pl. 31, f. 59, reference omitted in B. M. Catal. = *Macrones itehkeea*, Sykes l. cit., it is a *Hemipimelodus*.

21. (,, *cavasi*), *P. cavasius*, H. B. = *Macrones cavasius*, B. M. Catal.

22. (,, *kurki*), erroneously figured pl. 23, f. 60, as *P. batasius*; it is *P. batasius*, H. B. = *M. tengara*, H. B., in B. M. Catal., the latter name, however, referring to a different species with a long adipose dorsal fin, and therefore *P. batasius* and *P. carcio* must be distinct, and may both be good species, one with long, the other with short barbels.

23. ,, *viridescens*, H. B., pl. xi, f. 56, reference omitted in B. M. Catalogue; it is a *Hemipimelodus*.

24. (,, ? *nangra*), *P. nangra*, H. B., pl. xi, f. 63, reference omitted in B. M. Catalogue; it is a *Macrones*.

25. (,, *rama tenggara*), *P. rama*, H. B., pl. 3, f. 55 = *Rita* — ? B. M. Catal.

26. *Ophisurus boro*, reproduced in Ill. Ind. Zool. *O. boro*, H. B. = *Ophichthys boro*, B. M. Catal.

The gills of this eel are contained in a large cavity on either side of the head, and do not communicate with each other. The fish distends this receptacle with air taken in by its mouth; it appears to be able to respire directly from the atmosphere, or by means of the air contained in the water. On holding its small gill opening firmly closed, it takes in air by its mouth; should its mouth be held closed, it struggles until its head is released, so as to be able to respire. If the gills are exposed by cutting away the gill membrane, and it is placed in water, it slowly moves its branchiæ, and appears to feel no inconvenience in being unable to obtain air direct through its mouth.

27. (,, *rostratus*), perhaps *O. hijala*, H. B., apparently omitted from B. M. Catalogue.

28. (,, *harangcha*), reproduced Ill. Ind. Zool. *O. harancha*, H. B. = *O. boro*, B. M. Catal.

29. (*Muræ̃nophis bazi*), nearly 12 inches long. *Muræna bagio*, H. B. = *Muræ̃nesox cinereus*, Forsk., B. M. Catal.

30. (,, *tilebaim*), $8\frac{3}{4}$ inches long. *M. tile*, H. B. = *Muræna tile*, B. M. Catal.

31. (,, *sathete*), about 15 inches long. *M. sathete*, H. B. = *M. sathete*, B. M. Catal.

32. (*Muræna bamach*), reproduced Ill. Ind. Zool. as *M. Bengaliensis;* the same as *M. maculata*, H. B. = *Anguilla Bengaliensis*, B. M. Catal. H. B's name rejected as "(not *Lacép.*)," whilst no *A. maculata*, Lacépede, finds a place in the Catalogue.

33. (,, ? *rakta boruya*), reproduced in Ill. Ind. Zool. *M. raitaboura*, H. B. = *Moringua raitaboura*, B. M. Catal.

34. A shark is figured, *Squalus carcharias ?* H. B., omitted in B. M. Catal., it is *Carcharias Gangeticus*, B. M. Catal.

35. (*Squallus characias ? Kárntá*). This shark with a sharp nose was not described.

36. (*Trichopodus beje*), *T. colisa*, H. B., pl. 15, f. 40 = *Trichogaster fasciatus*, B. M. Catal.

37. (,, *ruber*), 2 inches long, *T. lalius*, H. B. = *T. fasciatus*, B. M. Catal.

38. (,, *vittatus*), $1\frac{9}{10}$ inches long, *T. chuna*, H. B. = *Trichogaster* — ? B. M. Catal.

39. (,, *fuscus*), $1\frac{7}{10}$ inches long. *T. sota*, H. B. = *T.* — ? B. M. Catal.

40. (,, *cærulescens*), $2\frac{9}{10}$ inches long. *T. cotra*, H. B. = *T. fasciatus*, B. M. Catal.

41. (*Acheiris jibha*), 11 inches long. *Cynoglossus lingua*, H. B. = *C. lingua*, B. M. Catal.

42. (,, *kukur jibha*), D. 100, A. 78, *A. cynoglossus*, H. B. = *Cynoglossus Hamiltonii*, Günther, B. M. Catal.

43. (*Pleuronectes arsi*), $2\frac{8}{10}$ inches long. *P. arsius*, H. B. = *Pseudorhombus arsius*, B. M. Catal., with the following remark, "a coloured drawing of this fish, 31 lines long, is in the collection of

drawings, presented by General Hardwicke to the British Museum."

44. (*Stolephorus balitora*), reproduced McClelland, *Cyprinus balitora*, H. B. = *Psilorhynchus balitora*, B. M. Catal.

45. (,, *sukati*), reproduced McClelland, = *P. sucatio*, B. M. Catal.

46. (*Cobitis geto*), H. B., pl. xi, f. 96 = *Botia dario*, B. M. Catal.

47. (,, *dari*), *C. dario*, H B., pl. 29, f. 95 = *B. dario*, B. M. Catal.

48. (,, *turi*), reproduced McClelland, *C. turio*, H. B. = *Nemachilus turio*, B. M. Catal.

49. (,, *bilturi*), reproduced McClelland, *C. bilturio*, H. B. = *N. botia*, B. M. Catal.

50. (,, *botya*), reproduced McClelland, *C. botia*, H. B. = *N. botia*, B. M. Catal.

51. (,, *pangya*), reproduced McClelland, *C. pangia*, H. B. = *Acanthophthalmus pangia*, B. M. Catal.

52. (,, *khorika*), reproduced McClelland, *C. corica*, H. B. = *N. corica*, B. M. Catal.

53. Unnamed, reproduced McClelland as *C. soaturigina* = *N.* — ? B. M. Catal.

54. (,, *savon khurika*), reproduced McClelland, *C. savona*, H. B. = *N. savona*, B. M. Catal.

55. (,, *ghorgota*), reproduced McClelland, *C. gongota*, H. B. = *Cobitis gongota*, B. M. Catal.

56. ,, *balgara*, H. B., reproduced McClelland = *Lepidocephalichthys balgara*, B. M Catal.

57. (,, *chota kukura*), reproduced McClelland, *C. cucura* H. B. = *Cobitis gongota*, H. B., B. M. Catal.

58. (,, *gunte*), reproduced McClelland, *C. guntea*, H. B. = *Cobitis guntea*, B. M. Catal.

59, 60 and 61 are the originals of *Ophiocephalus barca*, pl. 35, f. 20. *O. aurantiacus*, pl. 23, f. 22, and *O. wrahle*, pl. 31, f. 17 = *O. barca*, *O. striatus*, and *O. gachua* ? in B. M. Catal.

62. *Ageniosus militaris*, outline only.

63. *Pseudeutropius*, unfinished.

64. (*Mugil bongon*). This fish does not appear to have been

described by Hamilton Buchanan, unless as *M. cephalus*? The Bangon in the Calcutta markets is *M. planiceps*, C. and V.

65. Unnamed. *Raia fluviatilis*, H. B. = *Trygon sephen*, B. M. Catal.

66. (*Katchanda*), $3\frac{5}{10}$ inches long, outline of head with intermaxillaries protruded. *Chanda? setifer*, H. B., omitted in B. M. Catalogue, appears to be = *Gerres altispinis*, Günther in B. M. Catalogue, the specimen of which belonged to the Buchanan collection; the species is abundant in Calcutta and Bombay.

67. (*Holocentrus? katkaya*), reproduced in Ill. of Ind. Zool. as *Pterapon trivittatus*, considered *Therapon servus*, Bl., in B. M. Catal., whereas *Coius trivittatus*, H. B., was the original description, and this = *T. trivittatus*, l. c.

68. (*Mugil kaskasiya*) 3 inches long. *M. cascasia*, H. B. = *M.*—?, B. M. Catal.

69. (*Mugil lævis*). *Mugil albula?* H. B., omitted from the B. M. Catalogue, the same species however, appears to be described as *M. nepalensis*, Günther, who records, one skin 8 inches long from the "fresh waters of Nepal" presented by Mr. Hodgson, and in Vol. i, p. 279, another marine fish *Therapon servus*, is thus referred to "Half-grown: stuffed. (Nepal?). Presented by B. H. Hodgson Esq." Both these fish ascend the Hooghly to within or a little above tidal influence, and perhaps the two skins were prepared in Calcutta. As not a single example of the Family *Mugilidæ* is found in Nepal, the designation *M. nepalensis* for this Calcutta fish is, I think, a little inappropriate, and I would suggest its being altered to *M. lævis*, H. B. (MS.). I may remark that I have lately obtained five specimens of it in the Hooghly at Calcutta.

70 and 71. Same as No. 64.

72. (*Cobitis chuno*), $1\frac{3}{10}$ inches. *Gobius chuno*, H. B., omitted in B. M. Catal.

73. (,, *sadanundi*), $2\frac{1}{10}$ inches. *Gobius sadanundio*, H. B. = *G. sadanundio*, B. M. Catal.

74. *Gobius gutum*, H. B., $2\frac{3}{10}$ inches. = *G.* — ? H. B., B. M. Catal., with the remark "a figure of it (No. 272) exists in the collection of drawings of fishes by Hardwicke (MSS. of the British Museum)."

75. (,, *thutkuri*), $\frac{8}{10}$ inches. *G. nunus*, H. B., omitetd in B. M. Catalogue.

76. (*Gobioides squamulosa*), $5\frac{3}{10}$ inches. *G. ruber*, H. B. = *Trypauchen vagina*, B. M. Catal. It is a beautiful drawing of *Amblyopus Hermannianus*,* Lacép., showing most distinctly the crypts in which the scales are imbedded, which is not found in *T. vagina*. As a synonym of *Amblyopus Hermannianus*, *G. rubicundus*, H. B., is given, which latter is an entirely distinct species, delineated in H. B.'s work, and appears to be *Amblyopus tænia*, Günther (B. M. Catal), a common species at Calcutta. I may here remark that in the Proc. Zool. Soc., 1869, p. 518, I considered *Amblyopus cirrhatus*, Blyth, as *Amblyopus cæculus*, Bl.; in the B. M. Catalogue it is *A. brachygaster*, Günther, which is similar to Blyth's species, whose name would have priority should the fish be looked upon as more than a variety. It is not uncommon in Calcutta.

77. (*Makalkar*) 8 inches. *Trichiurus lepturus*, H. B., apparently omitted from B. M. Catalogue.

78. (*Cheilodopterus butibere*) 4 inches, Ill. In. Zool., *C. butis* H. B. = *Eleotris butis*, B. M. Catal.

79. (*Sygnathus kharke*), $4\frac{9}{10}$ inches long. *S. carce*, H. B. = *Ichthyocampus carce*, B. M. Catal.

80. (,, *deokhuta*), $6\frac{7}{10}$ inches long. *S. deocata*, H. B. = *Doryichthys* — ? B. M. Catal.

81. (*Polynemus paradiseus*) 8 inches long. = *idem*, B. M. Catal.

82. (,,) 7 inches long. *P. teria*, H. B. = *P. tetradactylus*, B. M. Catal.

83. (,, *raye*) 12 inches, *P. sele*, H. B. = *P. Indicus*, B. M. Catal.

84. Unfinished drawing of *Serranus*.

85. *Batrachoides gangene*, H. B., pl. 14, f. 8. = *Batrachus grunniens*, Bl., B. M. Catal.

86. (*Cottus ? chaka*), *Calliomorus chaca*, H. B., $4\frac{1}{10}$ inches long, = *Platycephalus insidiator*, Forsk., B. M. Catal.

* Dr. Cantor originally referred the descriptions to these species which probably he would not have done, had he seen the drawings. Should a doubt exist as to whether the *rubee* is a *Trypauchen* or an *Amblyopus*, I cannot imagine how there could be any respecting the latter species.

87. (*Clupanodon ? suborno khorika*), $1\frac{8}{10}$ inches long, reproduced in Ind. Zool. is *Corica soborna*, H. B., omitted from B. M. Catalogue, but under *Clupeoides pseudopterus* is quoted: "The fish which served for the figure of *Corica guborni*, Gray, Ind. Zool., was perhaps similar to *Cl. pseudopterus*,—it is also represented with separate anal finlets."

88. (*Clupanodon moti*), $5\frac{4}{10}$ inches long. *C. motius*, H. B. = *Pellona motius*, B. M. Catal.

89. (,, *chapra*), *C. chapra*, H. B., p. 248, omitted from the B. M. Catalogue. The drawing is reproduced in the Illustrations of Indian Zoology under the name of *C. Indica*, and = *Clupea Indica*, Gray, B. M. Catalogue. Another illustration in the Indian Zoology is considered as *C. chapra*, Gray, (l. c.), unfortunately this sheet is missing from the copy of the Indian Zoology in Calcutta, so I am unable to compare it with H. B.'s drawings.

90. (,, *champil*), $2\frac{8}{10}$ inches long, apparently not described.

91. (*Atherina dhani*), 9/10 of an inch long, reproduced McClelland. *A. danius*, H. B. = *Eleotris*—? B. M. Catal.

92. *Mystus ramcarati*, H. B., 8 inches long, reproduced Ill. Ind. Zool. = *Coilia ramcarati*, B. M. Catal.

93. (*Labrus darki*), $1\frac{2}{10}$ inches. *Labrus badis*, H. B. = *Badis Buchanani*, Bleeker, B. M. Catal.

94. (*Tetrodon kariya phoksa*), $2\frac{1}{2}$ inches long. *T. cutcutia*, H. B. = *T. cutcutia*, H. B., B., M. Catal.

95. (*Esox angulatus*), $4\frac{1}{2}$ inches long, not *E. ectuntio* H. B.

96. (*Cyprinus korikon*), reproduced McClelland. *C. conchonius*, H. B. = *Barbus conchonius*, B. M. Catal.

97. (,, *teripungti*), reproduced McClelland. *C. terio*, H. B. = *B. terio*, B. M. Catal.

98. (,, *pungsi*), reproduced McClelland. *C. pausio*, H. B. = *Labeo*—? B. M. Catal.

99. (,, *jauyali*), reproduced McClelland. *C. joalius*, H. B. = *Labeo*—? B. M. Catal.

100. (,, *loya*), reproduced McClelland. *C. vagra*, H. B. = *Barilius*—? B. M. Catal.

101. (,, *gugani*), *C. guganio*, H. B. = *Barbus*—? B. M. Catal.

102. („ *lati*), reproduced McClelland. *C. latius*, H. B. = *Crossochilus latius*, B. M. Catal.

103. *Cyprinus elanga*, H. B., $6\frac{3}{10}$ inches long = *Rasbora elanga*, B. M. Catal.

104. („ *bukrangi*), 3 inches. *C. morar*, H. B. ?

105. („ *godiyari*), reproduced McClelland. *C. lamta*, H. B. = *Discognathus lamta*, B. M. Catal.

106. („ *sada balitora*), reproduced McClelland. *C. sada*, H. B. = *Crossochilus sada*, B. M. Catal.

107. („ *dyangra gohama*), reproduced McClelland. *C. gohama* H. B. = *Crossochilus gohama*, B. M. Catal.

108. („ *dhenro*), *C. dero*, H. B., pl. 22, f. 78 = *Tylognathus*— ? B. M. Catal.

109. („ *mrigala*), H. B., pl. 6, f. 79 = *Cirrhina mrigala*, B. M. Catal.

110. („ *morala*), H. B., pl. 18, f. 91 = *Labeo morala*, B. M. Catal.

111. („ *chedra*), reproduced Ill. Ind. Zool. *C. chedra*, H. B. = *Barilius cocsa*, H. B., B. M. Catal.

112. („ *khoksa*). *C. cocsa*, H. B., pl. 3, f. 77 = *B. cocsa*, B. M. Catal.

113. („ *morar*), H. B., pl. 31, f. 75 = *Aspidoparia morar*, B. M. Catal.

114. („ *curabati bata*), *C. bata*, H. B. = *Cirrhina*— ? B. M. Catalogue.

115. („ *boga*), H. B., pl. 28, f. 80 = *Tylognathus boga*, B. M. Catal.

116. („ *pangusiya*), reproduced McClelland, *C. pangusia*, H. B. = *Labeo pangusia*, B. M. Catal.

117. („ *bangana*), reproduced McClelland, = *Tylognathus* —? B. M. Catal. ; it appears to be *Cirrhina reba*, H. B.

118. („ *angra*), reproduced Ill. Ind. Zool. = *Labeo*— ? B. M. Catal.

119. („ *kursi*), 10 inches long. L. l. 92, L. tr. 13/?, 14 rows of scales between l. l. and ventral fin. *C. cursis*, H. B. = *Labeo cursa*, B. M. Catal.

120. (,, *nandin*), *C. nandina*, H. B. pl. 8, f. 84 = *Labeo nandina*, B. M. Catal.

121. ,, *tor*, H. B., reproduced Ill. Ind. Zool. = *Barbus mosal*, B. M. Catal.; it is, however, a distinct species.

122. ,, *mosal*, H. B., reproduced Ill. Ind. Zool. = *B. mosal* B. M. Catal.

123. ,, *gonius*, H. B., pl. 4, f. 82. = *Labeo Dussumieri ?* B. M. Catal.; however, it appears to be identical with *C. cursa* and *C. cursis*, H. B.

124. ,, *cursa*, H. B., 11½ inches long. L. l. 62. L. tr. 12/?; 13 or 14 rows of scales between l. l. and base of ventral fin. = *L. cursa*, B. M. Catal.

125. (,, *tilsi*), *C. tileo*, H. B. = *Barilius tileo*, B. M. Catal.

126. (,, *goha*), H. B., reproduced Ill. Ind. Zool. = *Bola goha*, B. M. Catal.

127. (,, *kani punti*), reproduced McClelland, *C. canius*, H. B. = *Barbus gelius*, B. M. Catal.

128. (,, *bimaculatus*), *C. titius*, H. B. = *Barbus titius*, B. M. Catal.

129. ,, *phutunio*, H. B., reproduced McClelland, = *B. phutûnio*, B. M. Catal.

130. (,, *phul chela*), reproduced McClelland, *C. phulo*, H. B. = *Chela phulo*, B. M. Catal.

131. (,, *bhola*), reproduced Ill. Ind. Zool. *C. bola*, H. B. = *Bola goha*, H. B., B. M. Catal.

132. (,, *koswati*), reproduced McClelland, *C. cosuatis*, H. B. = *Barbus cosuatis*, B. M. Catal.

133. (,, *geli punti*), reproduced McClelland, *C. gelius*, H. B. = *Barbus gelius*, B. M. Catal.

134. (,, *barila*), H. B. = *B. barila*, B. M. Catal. and ? *B. morarensis*, Günther, l. c. The figure has been somewhat damaged by termites.

135. (,, *jaya*), H. B., $1\frac{8}{10}$ inches long = *Aspidoparia jaya*, B. M. Catal.

136. (,, *Dyangra anjana*), $3\frac{2}{10}$ inches long. *C. anjana*, H. B. = *Rasbora daniconius*, H. B., B. M. Catal.

137. (,, *phakra*), reproduced McClelland, *C. vagra*, H. B. = *Barilius* — ? B. M. Catal.

138. (,, *balibola*), reproduced McClelland, *C. barna*, H. B. = *B. barna*, B. M. Catal.

139. *Cyprinus laubuca*, H., B. reproduced McClelland, = *Chela laubuca*, B. M. Catal.; it is a *Perilampus*, McClell. = *Cachius*, Günther, and *Eustira*, Günther.

140. (,, *dangila*), H. B., reproduced McClelland, = *Danio dangila*, B. M. Catal.

141. (,, *jongja*), reproduced McClelland. *C. jogia*, H. B. = *Nuria danrica*, H. B., B. M. Catal.

142. (,, *layukuli*). *C. atpar*, H. B., reproduced McClelland, = *Cachius atpar*, B. M. Catal. Much damaged by termites, one figure destroyed.

143. (,, *sutiha*), H. B., reproduced McClelland, = *Nuria danrica*, B. M. Catal.

144. (,, *kirki jongja*), reproduced McClelland. *C. rerio*, H. B. = *Barilius rerio*, B. M. Catal.

145. (,, *cachius*), H. B., reproduced McClelland, = *Cachius atpar*, B. M. Catal.

146. (,, *gora*) H. B. = *Chela gora*, B. M. Catal. The tail is injured by termites.

In Vol. I. of animals are 48 drawings of fish, some of which are duplicates of the foregoing, others copies of some missing figures; they are as follows.

No. 1 unfinished copy of No. 124; 2 = 146; 3 = 70; 4 = 70; 5 = 114; 6 = 86; 7 = 65; 8 = 32; 9 = 27; 10 = 8; 11 = 16; 12 = 140; 13 = 92; 14 = 6; 15 is a larger drawing of 123; 16 = 115; 17 = 28; 18 = 118; 19 = 61; 20 = 14; 21 = 29; 22 = 18; 23 = 78; 24 = 142; 25 = 117; 26 = 120; 27 *Mystus chitala*, H. B., reproduced Ill. Ind. Zool.; 28 = 109; 29 = 122; 30 = 82; 31 = 103; 32 = 126; 33 is a figure $7\frac{3}{10}$ inches long of *Sillago domina*. In fact all the rest are reproductions of the originals now in Vol. IV, except the following:—36, $9\frac{1}{2}$ inches long of *Catla Buchanani*, C. and V.; 39 is a figure $9\frac{1}{2}$ inches long of *Cyprinus chagunio* H. B., the original of which is missing. Dr. Günther

in the Zool. Record for 1869, demurring to my identification of *Barbus Beavani*, Günther, with *Cyprinus chagunio*, Ham. Buch., observes this fish has "large scales and minute barbels." In the figure there are about 41 scales along the lateral line and well developed rostral and maxillary barbels. The species may be readily recognised from the drawing. 48 is *Polynemus Indicus*, 11¾ inches long. This volume iv contains 50 coloured illustrations of fish.

[I would suggest that the numbers I have inserted on the drawings in pencil be recorded in ink, and that the original figures have the Society's stamp on each separate sheet].

7. Monograph of Indian Cyprinidæ, Pt. III, *by Surgeon* F. Day.

This is a continuation of Dr. Day's Monograph published in No. 3 of the Nat. Hist. Part of the Journal; it will appear in No. 4 of the same Part for the current year.

8. Notes on some land-shells from the vicinity of Moulmein, with descriptions of new species,—*by* W. Theobald, Esq.

Mr. Theobald gives notes regarding various species of *Cyclophorus* and *Streptaxis*, and a few other shells, found in the neighbourhood of Moulmein. If illustrations of the newly described species be supplied in time, the paper will appear in the 1st number of Part II of the Journal for the ensuing year, 1872.

9. Notes on the Ornithology of Cashmir,—*by* W. E. Brooks, Esq., C. E., *Etawah*.

Mr. Brooks notices several imperfectly known or new species of birds from Cashmir. His observations on the breeding season, &c., of many of the species are particularly interesting.

The new species noticed in this paper are as follows:

Certhia Hodgsoni,—differs from *C. familiaris* by a much larger bill, less rufous tone on rump and upper tail coverts, and by having 4 plain primaries and the 5th marked with a buff patch on the outer web.

Sitta Cashmirensis.* Coloration very like that of *S. Himalayana*, but the wing is 3·3 inches; no white edgings to the under tail coverts.

* This is very close to *S. cæsia* of Europe, the two being exactly of size. Edit.

Dumeticola major. Similar to *D. affinis*, Hodgs., but much larger; wing 2·28—2·3, tail 2·7, bill at front ·55, mid-toe and claw ·72 inches.

Horites pallidus. Above light olive grey or greyish olive with a slight tawny tinge on the wings; lower back and upper tail coverts lighter; a dull whitish grey supercilium; a pale brown streak through the eye; cheeks and ear coverts brownish; chin to abdomen greyish white, sides of breast and flanks and lower tail coverts pale brownish grey. Total length 5·15, wing 2·2, tail 2·2, bill 0·33, from gape 0·5, tarsus 0·9 inches.

Phylloscopus Tytleri. In plumage resembling *Ph. viridanus*, but of a richer and deeper olive; bill much longer, darker and of a more pointed and slender form than in the last species. Average length 4·75, wing 2·3, tail 1·7, bill at front 0·36, from nostril 0·31, tarsus 0·7 inches.

Motacilla Cashmirensis. Coloration as in *M. Luzonensis*, except that the chin and throat are black, the black extending for 2¼ inches from base of lower mandible; white portion of head as in *personata*, remainder of head and back deep black. Length 7·6, wing 3·55, tail 4, bill at front 0·5, tarsus ·97 inches.

Alauda guttata. Larger than *gulgula* and not so rufous on the breast and with bolder markings; wing 3·7—3·9, tail 2·6—2·8 inches.

Sturnus nitens, Hume. Like *St. unicolor*, but smaller, with shorter wing and brighter colours.

[This paper will be published in full in the 1st number of the Nat. Hist. Part of the Journal for 1872].

10. NOTES ON NINE NEW SPECIES OF INDIAN AND INDO-CHINESE VESPERTILIONIDÆ, WITH REMARKS ON THE SYNONYMY AND CLASSIFICATION OF SOME OTHER SPECIES OF THE SAME FAMILY,—*by* G. E. DOBSON, B. A., M. B., *Assistant Surgeon H. M.'s British Forces.*

The following diagnoses of nine new species of bats are intended as prefatory to more detailed descriptions accompanied with illustrations to be published hereafter.

Sec.—SCOTOPHILINA, Gray.*

* Ann. and Mag. Nat. Hist., 1866.

Genus, *Nycticejus*, Rafinesque, Incisors, $\frac{1-1}{6}$.

Sub-genus, *Nycticejus ;* premolars, $\frac{1-1}{2-2}$. wing-membrane attached to base of toes.

N. EMARGINATUS, Dobson.

Glands of the upper lip largely developed, forming rounded prominences between the nostrils and eyes ; ears nearly as long as the head, with broadly rounded tips ; outer side flatly emarginate beneath the tip causing it to project outwards ; tragus moderately long, slightly curved inwards and obtusely pointed, maintaining almost the same breadth from the base to within a short distance of the tip. Fur, above, tricoloured, at the base dark ferruginous brown, then buff, the tips light yellowish brown ; beneath, dark ferruginous brown at the base, the remaining portion buff.

Length, head and body 2″.9 ; tail 2″.2 ; ear (anteriorly) 0.85 ; forearm 2″.2 ; thumb 0″.45 ; tibia 0″.85. *Loc.* ?

Genus, *Vesperugo*, Keys. Blas. Incisors, $\frac{2-2}{6}$.

Sub-genus, *Vesperus*, premolars, $\frac{1-1}{2-2}$. wing-membrane attached to base of toes.

V. PACHYOTIS, Dobson.

Head flat ; muzzle very broad and short ; glandular prominences of upper lip largely developed, immediately behind them a furrow extends from the anterior corner of one eye to the other in front of which the fur of the head does not pass : ears triangular above with rounded tips, outer side without emargination ; lower portion of the ear from below the level of the tip of the tragus to the termination of the outer margin near the angle of the mouth very thick and fleshy ; tragus short, curved inwards ; teeth very minute, inner incisors bifid at their extremities, much larger and longer than the outer ones. Fur, above, dark brown throughout ; beneath, a lighter shade of the same colour.

Length, head and body 2″.2 ; tail, 1″.6 ; ear (anteriorly) 0.″55 ; forearm, 1″.6 ; tibia, 0″·65.

Loc. Kasia Hills, Bengal.

V. ANDERSONI,* Dobson.

* More detailed descriptions of this and of the next new species will appear in Dr. Anderson's forthcoming account of the Zoology of the Yunan Expedition.

Ears moderate with rounded tips, outer edge with a shallow but wide emargination beneath the tip, then convex and again emarginate opposite the base of the tragus; tragus obtusely pointed, inner margin straight, outer convex upwards; fur, above, dark brown with grayish tips; beneath, light grayish brown for two-thirds its length, the remaining portion ashy. Inner incisors long and bifid; outer incisors very short and acutely pointed, placed in front of the inner ones and lying on their outer sides.

Length, head and body, 2″.6; tail, 1″.9; ear (anteriorly) 0″.75; forearm, 2″.15; tibia, 0″.85.

Loc. Momein, Yunan.

VESPERUS ATRATUS.

Nycticejus atratus, Blyth, Cat. Mamm. Mus. As. Soc. Beng. No. 96.

The following is Blyth's description of this species,—"Like (*Vesp.*) *fuliginosa*, Hodgson, J. A. S., IV, 700, (which Dr. Gray ranks as a *Scotophilus*), but with only one pair of upper incisors. Length of forearm 1¾ in."

I have examined the type specimens thus described; their forearms correspond exactly with the measurement given, but Mr. Blyth has not been equally accurate in stating that they possess only one pair of upper incisors; there are certainly *two pairs* of upper incisors, but the outer ones are, as in many other species of the subgenus *Vesperus*, very small and might easily be overlooked; the inner incisors are remarkably long, but very unlike those which are so characteristic of the genus *Nycticejus*. The necessity, therefore, for changing the genus is apparent. The species is, however, still quite distinct from *Sc. fuliginosus*, Hodgs.

V. PACHYPUS.

Vespertilio pachypus, Temk. Mono. Mamm.
Vesperus pachypus, Wagner, Suppl. Schreber.
Scotophilus fulvidus, Blyth, J. A. S. Beng., Vol. XXVIII, 293.

I have compared the type specimens of *Sc. fulvidus*, Blyth, from Tenasserim with Temminck's description of *V. pachypus* from Sumatra and Java. The measurements agree in every respect with those of the latter species, and the colour of the fur, form of the feet, &c., equally correspond. I think it very probable Mr.

Blyth did not possess a copy of Temminck's Monograph when he described this species as, otherwise, he must, at least, have noticed in his description the close affinity of the species.

Subgenus, *Pipistrellus*, Gray; premolars, $\frac{2-2}{2-2}$; wing-membrane attached to the base of the toes.

P. AFFINIS, Dobson.

Head flat; glands of the upper lip so developed as to cause a deep depression between them on the face behind the nostrils; ears, measured from behind, as broad as long, outer edge without emargination; inner margin of tragus straight, outer convex upwards; tail long, of nine vertebræ, the last free; above, chocolate brown, lighter on the head and neck, tips of the hairs light brown; beneath, dark brown with light brown or ashy tips; on the pubes and along the thighs dirty white or very pale buff. Outer incisors acutely pointed, inner obtuse, flattened at their extremities; first upper premolar minute, placed inside the line of teeth and not distinguishable from without. Length, head and body, 1″.9; tail 1″.65; ear (anteriorly) 0″.6; forearm 1″.55; tibia 0″.6.

Loc. Bhamaw, Yunan.

P. AUSTENIANUS, Dobson.

Ears triangular with broadly rounded tips, outer margin straight above for nearly half its length, then slightly convex to the base; tragus rather broad with a straight inner margin. Fur, sooty-brown throughout with grayish or ashy tips which give the fur on the ventral surface a grayish appearance; cutaneous system black, specimens in spirit appear altogether intensely black.

Incisors nearly equal in length, inner incisors bifid; first upper premolar minute, placed inside the line of teeth but may be distinguished from without.

Length, head and body 2″.0; tail 1″.4; forearm 1″.4; ear (anteriorly) 0″.65; tibia 0″.6.

Loc. Cherra Punji, Bengal.

P. ANNECTANS, Dobson.

Head slightly elevated; face hairy; glandular prominences of upper lip small; ears pointed, outer margin deeply hollowed out beneath the tip causing it to project considerably; tragus long, acute, with a straight inner margin. The colour of the fur of a

specimen in spirit appears to be above, dark brown with lighter tips; beneath, brown with reddish tips. Upper incisors nearly equal in size; first upper premolar minute, placed slightly inside the line of teeth, second premolar nearly equal to canine in size. This species unites the external form of a *Vespertilio* to the dentition of *Pipistrellus;* the form of the ear and tragus is almost precisely similar to those of the next species which is a true *Vespertilio.*

Length, head and body 2″.0; tail 1″.6; ear (anteriorly) 0″.6; forearm 1″.8; tibia 0″.75.

Loc. Naga Hills, Assam.

Sec.—VESPERTILIONINA, Gray.

Gen. *Vespertilio*, (as restricted, Gray).

Dentition,—in. $\frac{2-2}{6}$; c. $\frac{i-1}{1-1}$; p. m. $\frac{3-3}{3-3}$; m. $\frac{3-3}{3-3}$; wing-membrane attached to the base of the toes.

Subgenus, *Vespertilio*, Tomes.*

V. NIPALENSIS, Dobson.

Ears narrow and pointed; outer margin deeply hollowed out immediately beneath the tip causing it to project considerably; tragus long, narrow, and pointed; fur, above, black with brown tips; beneath, black for two-thirds its length, the remaining portion pure white; the whole ventral surface of specimens dried from spirit appears white and the dark portion of the hair is not perceived till the fur is raised. Canines very short; first and second premolars in both upper and lower jaws very small and conical.

Length, head and body 1″.65; tail 1″.35; ear (anteriorly) 0″.48; forearm 1″.35; tibia 0″.6.

Loc. Katmandu, Nipal.

V. BLANFORDI, Dobson.

Outer side of ear with a deep emargination about the middle cutting off the lower portion which resembles very closely the large antitragus of the species of the genus *Rhinolophus;* muzzle pointed: face very hairy; fur, above, on the back, black for three-fourths its length, the remaining portion light yellowish-brown, on the top of the head, black with shining tips; beneath, black for three-

* Ann. and Mag. Nat. Hist. 1857.

fourths its length, remaining portion ashy. The first and second premolars in the lower jaw are very small, in the upper jaw they are still smaller and scarcely distinguishable without a lens.

Length, head and body 1″.7; tail 1″.5; ear (anteriorly) 0″.5; forearm 1″.28; tibia 0″.5.

Loc. Sikkim; Simla; Dalhousie.

Subgenus, *Kerivoula*,* Gray.

K. fusca, Dobson.

Resembles *K. picta* very closely in its general form; on the outer side of the ear there is a wide emargination which forms the tip, and without which the ear would be regularly broadly oval as in *Murina suillus;* fur, above chocolate brown with paler tips; beneath of a somewhat darker shade of the same colour, the hairs tipped with yellowish-brown. This species differs from *K. Hardwickii*, Horsf. which it resembles in some respects, in the form of the ears, and colour and distribution of the fur.

Length, head and body 1″.6; tail 1″.6; ear (anteriorly) 0″.45; forearm 1″.3; tibia 0″.6. *Loc.?*

11. Notes on a collection of birds from Sikkim,— *by* W. T. Blanford, F. G. S., C. M. Z. S.

(Abstract.)

This is a description of a collection of skins made by Mr. L. Mandelli, together with a few notes on birds obtained at low elevations in Sikkim by the writer. Three species are described as new, and two others, *Zosterops simplex*, Swinh. and *Euspiza rutila*, Pall. are added to the fauna of ths Eastern Himalayas. The new species are—

1. *Phylloscopus pallidipes*, sp. nov. Brownish olivaceous above, rump a little more rufescent, lores and a line through the eye to the upper part of the ear coverts dark brown, supercilia white, elongate, quills earthy brown with rufescent olive margins, central tail feathers the same colour as the back, outer ones earthy brown edged with olive. Lower parts silky white, sides of breast olivaceous. Under wing white. Bill dark above, pale below, legs very pale coloured. Wing 2·05 inches, tail 1·7, tarsus 0·76, bill

* As restricted by Tomes, Ann. and Mag. Nat. Hist. 1858.

from forehead 0·4, from gape 0·55. The 5th quill is the longest, exceeding the 1st by 0·87, second by 0·4, and 3rd by 0·15 in.

This species is distinguished from *P. tristis*, *P. neglectus*, and all allied forms by its pale coloured tarsi, and from most of them by its smaller size.

1. *Pellorneum Mandellii*, sp. nov. This is closely allied to *P. ruficeps*, Swains., but differs in its smaller size, approximating in this respect to *P. Tickelli*, Blyth. It is distinguished from both races by the much larger spots on the breast, and by having large spots on the sides and back of the neck, similar to those on the breast. Wing 2·65, tail 2·5, tarsus 0·95, bill from forehead 0·6, from gape 0·75.

3. *Propasser saturatus*, sp. nov. Male with lores, forehead, supercilia and cheeks pale silvery pink, the bases of the feathers brown; head above dark crimson with blackish centres to the feathers, ear coverts and sides of neck a little duller. Back with broad dashes of brown, edges of the feathers paler with a gloss of crimson, rump and upper tail coverts nearly the same colour as the back, wings and tail feathers earthy brown with red edges, and pale rosy spots on the tips of the outer webs of the wing coverts and of the last 3 quills. Chin greyish, throat full rose colour, darker than the cheeks, and with a silvery gloss; the breast deeper and darker red, abdomen pink, all the feathers of both with narrow central stripes; lower tail coverts brown, edged with pink. Length about 6 inches, wing 3·32, tail 2·6, tarsus 0·95, bill from front 0·49, from gape 0·52.

Female earthy brown, feathers of back paler edged, wing coverts and 3 last quills with albescent tips, rump tinged ochraceous. Under parts fulvous, all the feathers with dark centres, broader on the breast, narrower on the abdomen, which has a rufescent tinge.

This is the bird, a female of which was formerly assigned to *P. thura* by Mr. Blyth; the male is darker and richer in colour than its allies, and wants the pink rosy rump of the other Himalayan species.

The birds obtained by the author at higher elevations in Sikkim in 1870, are described in a separate paper.

12. NOTE ON THE ERROR OF THE CALCUTTA STANDARD BAROMETER, COMPARED WITH THOSE OF KEW AND GREENWICH,—*by* H. F. BLANFORD, ESQ.

This short paper will be published in the 4th number of the Journal for the current year.

13. ON A FORM OF GALVANOMETER SUITABLE FOR THE QUANTITATIVE MEASUREMENT OF THE ELECTROMOTIVE FORCE, AND INTERNAL RESISTANCE OF TELEGRAPH BATTERIES,—*by* W. E. AYRTON, ESQ.

(With plate IV.)

The efficiency of a galvanic battery depends on the magnitude of two properties it possesses, its electromotive force, or power to send a current, and its internal resistance, or power to impede a current. The greater the electromotive force the greater the current sent if the whole resistance in circuit remains the same, and the greater the internal resistance of the battery the less the current sent, other things remaining the same.

It is therefore of great practical importance in Telegraphy to be able easily to measure the electromotive force and internal resistance of a battery so as to see from day to day that the former does not diminish, and that the latter does not increase.

I will first examine the way in which this has been practically done up to the present time, and point out the objections there exist to this method.

A galvanometer was employed, on the bobbin of which were wound two coils, one of a comparatively high resistance, called the "intensity" coil, and the other of a comparatively low resistance, called the "quantity" coil. The electromotive force was measured by observing the deflection produced when the coil of high resistance was inserted between the battery poles; and the internal resistance could be found by comparing the deflections produced when the coils of high and low resistance were respectively used. In some instruments the low resistance galvanometer coil was dispensed with and instead the high resistance coil was shunted.

exceedingly unsensitive for small differences, and also with the "intensity" coil 30, 40, or 50 cells all produce nearly the same deflection (90°) so that it is impossible practically with this galvanometer to compare the electromotive forces, or to find the internal resistances of large batteries.

What therefore is required is an instrument which will give independent accurate measurements in *absolute* units of the electromotive force and internal resistance of *any* battery. Such an instrument will be still more valuable if it be simple, portable, and tolerably cheap. All these requirements have been fulfilled in the little galvanometer arranged by Mr. Schwendler, and which therefore I have considered of sufficient interest to bring before the notice of this Society. This galvanometer that I have on the table is a tangent galvanometer the bobbin of which is wound with two coils one of thick wire and having a resistance of about one Siemens' Unit, and the other of thin wire and having a resistance of about 100 Siemens' units. Forming part of this instrument are two resistance coils of 200 and 2000 Siemens' units respectively. The 200 coil can be placed or not at pleasure in circuit with the thick galvanometer coil, and similarly the 2000 resistance coil with the thin galvanometer coil.

To (1) (*see* pl. iv,) is attached one end of each of the coils.

To (2) the other end of the thick coil.

To (3) the other end of the thin coil.

To measure the Resistance of a Battery.

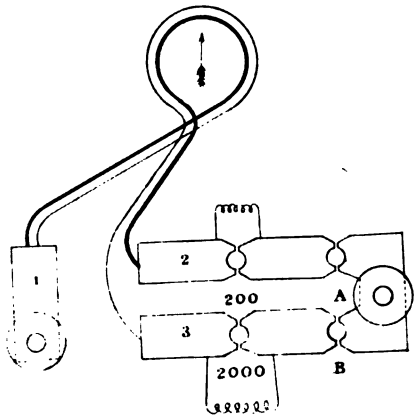
Join the two poles of the battery to the two binding screws respectively of the galvanometer, and make the following observations, in each case the mean of the readings with + and — currents to be taken.

Plug up holes marked A and 200: then the battery, and the thick coil only are in circuit. Let the deflection of the needle be $a°$.

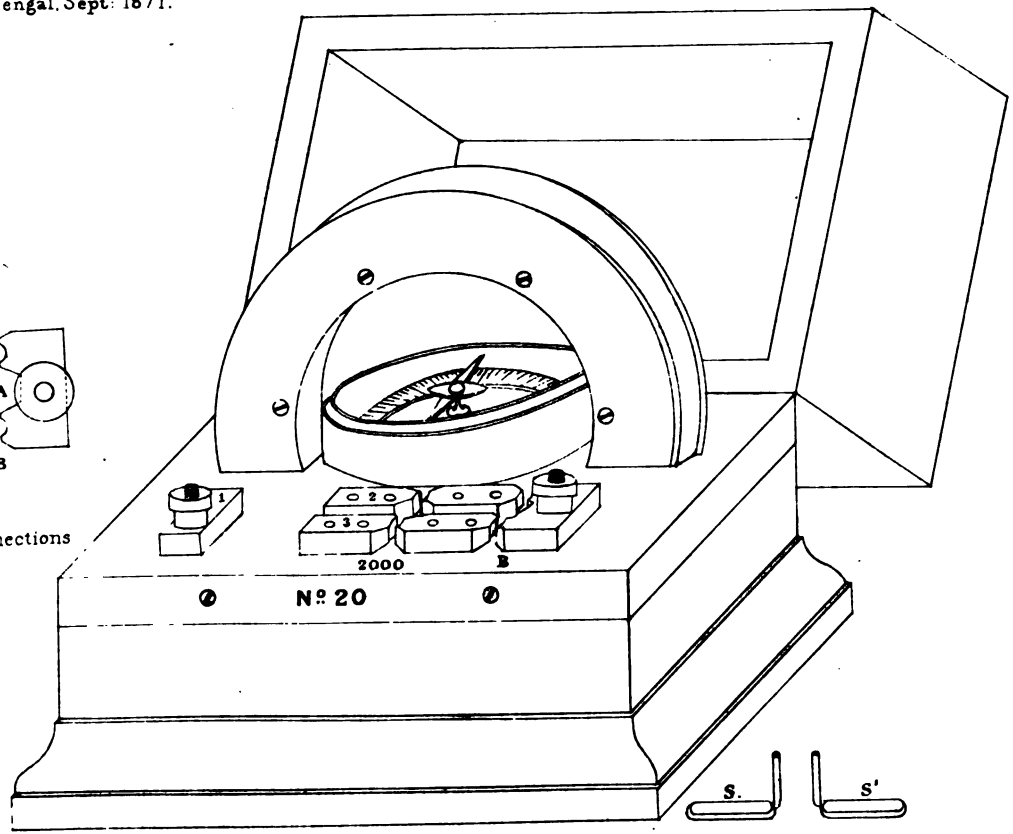
Remove plug from hole marked 200, but leave plug in hole marked A: then the battery, the thick coil, and a resistance of 200 S. U. are in circuit. Let the deflection be $b°$.

Let R be the internal resistance to be found of the battery, then

$$R = \frac{200 \times \tan b°}{\tan a° - \tan b°} - 1 \text{ Siemens' Units.}$$



Symbolical figure showing the connections



FRONT VIEW.

To measure the Resistance of a Non-Electromotor.

Insert this resistance in the battery branch, and repeat the preceding observations obtaining respectively deflections a_1° and b_1° then if r be the resistance to be found

$$R + r = \frac{200 \times \tan b_1^\circ}{\tan a_1^\circ - \tan b_1^\circ} - 1 \text{ Siemens' Units.}$$

Eliminating R from this and the preceding equation we have

$$r = 200 \left(\frac{\tan b_1^\circ}{\tan a_1^\circ - \tan b_1^\circ} - \frac{\tan b^\circ}{\tan a^\circ - \tan b^\circ} \right) \text{ S. U.}$$

The most constant electromotive force that can be practically made use of is that of a new Menotti's cell with clean zinc and copper, a standard cell as it is called. The electromotive force of such a cell is therefore taken as our unit of electromotive force.

To express the Electromotive Force of a Battery in terms of that of Standard cell.

Join the two poles of the battery to the two binding screws respectively of the galvanometer, and plug up holes marked B and 2000: then the battery and the thin coil only are in circuit. Let the deflection be l°.

Remove the plug from hole marked 2000, but leave plug in B: then the battery, the thin coil, and 2000 S. U. are in circuit. Let the deflection be m°.

Repeat these two tests with the standard cell substituted for the battery. Let the two deflections now obtained be p° and q°.

Then if E be the electromotive force of the battery, and e that of the standard cell,

$$E = \frac{\tan l^\circ \times \tan m^\circ}{\tan p^\circ \times \tan q^\circ} \times \frac{\tan p^\circ - \tan q^\circ}{\tan l^\circ - \tan m^\circ} \times e.$$

This galvanometer can also be used as a telegraphic receiving instrument but then the two copper stops, S, S′, shown in the diagram, on pl. iv, should be placed one on each side of the aluminium needle. If well adjusted, signals can be read which are produced by ten Menotti's cells at the other end of a line about 400 miles long consisting of No. 5½ wire and havng an insulation of two millions per mile.

Purchase.

The American Journal of Science, June, 1871—The Ibis, July 1871—The L. E. and Dublin Philosophical Magazine, July 1871—The Annals and Magazine of Natural History, July 1871—The Quarterly Review, July, 1871—The Westminster Review, July, 1871—The Edinburgh Review, July 1871—Revue des Deux Mondes, Juillet, 1871. Comptes Rendus, Nos 23, 24—Journal des Savants, Avril 1871—Hewitson's Exotic Butterflies, part 29.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR OCTOBER, 1871.

The monthly meeting of the Society was held on Wednesday, the 4th October, at 9 P. M.

T. Oldham, Esq., LL. D., Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

The following presentations were laid on the table—

1. From Rája Dhunapati Singh Bahádur—A copy of Prákria Manoramá Vyakuranam.

2. From the author—a copy of Satíparinaya, a Sanscrit poem, by Pandit Chandrakánta Tarkálankára.

3. From Rev. C. H. Dall, Report on the Brachiopoda, by W. H. Dall.

The following gentlemen were elected Ordinary Members—

J. A. Aldis, Esq., I. estr. Neil, J. O'Kinealy, Esq., C. S., J. A. Briggs, Esq., H. G. Cooke, Esq., Col. J. E. Evezard.

J. M. Foster, Esq., M. D., Civil Surgeon, Nazeerah, Assam, proposed by Mr. J. Wood-Mason, seconded by Mr. H. F. Blanford, will be balloted for as a member of the Society at the next meeting.

The Council reported that they have elected Dr. G. King, a member of their body.

The Chairman, briefly referring to the sad loss which the Society had experienced by the cruel assassination of the late Offg. Chief-Justice, stated that the Council of the Society, of which Mr. Norman had for many years been an active and zealous member, had, at their last meeting, recorded their own expression of the pain with which

they had heard of the murder, which had deprived them of a long-esteemed colleague and friend. It appeared also to the Council that probably the Members themselves would prefer, at their general meeting, to put on the records of the Society a resolution expressive of their horror of the deed, which has so suddenly deprived them of one who was beloved by all that had the advantage of his acquaintance, and who had, from a few months after his arrival in the country, been a member of their Society, and a frequent and much-interested attendant at their meetings. If this were so, he would take the opportunity of proposing the following resolution—

'The Society would desire to record the pain and sorrow with which they have heard of the cowardly murder of the late Chief-Justice Norman, in whom they have lost an earnest and truth-seeking supporter, an esteemed member of the Society, and a much respected friend.'

He believed it would, from the feeling of the meeting, be unnecessary that this should be formally seconded, as it would be carried without the slightest opposition.

Carried unanimously.

The Chairman also proposed that the Secretary should send copies of resolutions of the Society and the Council, together with a letter of condolence, to Mrs. Norman, and further, that out of respect to the memory of the late Chief-Justice, the meeting be adjourned.

Carried unanimously.

After announcing the receipt of the following paper, the Chairman adjourned the meeting.

Account of a visit to the Eastern and Northern frontiers of Independent Sikkim with notes on the Zoology of the Alpine and Subalpine regions.—Part II, Zoology.—*By* William T. Blanford, F. G. S., C. M. Z. S. (Abstract.)

This is the second portion of the paper already noticed. It commences with a short note on the Sikkim fauna and remarks on the peculiarity of a belt of country, inhabited by animals with Malay affinities, intervening along the base and lower slopes of the Eastern Himalayas between the fauna of the Indian plains and the Palæarctic region of the higher mountains. The peculiar

paucity, during summer, in Sikkim, of the migratory birds, which visit the plains of India during the winter, is pointed out, and the occasional replacement of those species which cross the Himalayas twice in the year, but do not breed there, by allied forms which never leave the mountains except as occasional stragglers.

The greater portion of the paper is devoted to notes on the range, habits, &c., of mammals and birds noticed by the writer in the Palæarctic regions of Sikkim, with occasional descriptions of the rarer species, or of peculiar phases of coloration or plumage. Two birds are described as new. These are—

Montifringilla ruficollis, sp. nov. Pale umber above with darker streaks, the forehead whitish and the rump rufescent, a dark line from the lores, beneath the eye, and over the ear coverts; the latter and the sides of the neck ferruginous; the outer web of the first primary, a wing band formed by a large spot on the basal portion of the inner web of most of the secondaries, and the greater part of the smaller wing coverts white; all the basal portion of the tail feathers except the two middle ones cinereous, then a little white, and the tips for half an inch brown like the middle feathers. Lower parts white with two black diverging lines on the chin In the female the ferruginous collar is brown behind and appears, to extend across the front of the neck. Length 6 inches, wing 3.75, tail 2.35, tarsus 0.82, bill from forehead 0.42.

The general coloration differs from that of the three other species belonging to restricted *Montifringilla*. That it is not the winter plumage of *M. Adamsi* is proved by that bird having more white on the tail and much narrower brown tips to the outer rectrices than the present species, and by its having the ends of some of the secondary quills white.

Otocoris Elwesi, sp. nov. This is near *O. penicillata*, but distinguished by the white of the sides of the neck intervening between the black of the cheeks and that of the breast. It is smaller than *O. longirostris*, and has a much shorter bill. The black on the head and breast is arranged as in *O. alpestris*, the back is pale fulvous brown with faint dusky streaks and passing into greyish lilac on the nape, back of neck, rump and wing coverts, the quills brown, the first primary with the outer web white, the middle rectrices the same

colour as the back, all the rest blackish, the two outer on each side edged and tipped with white; lower parts white, legs black.

Length 7.75 inches, wing 4.7, tail 3.2, tarsus 0.9, hind toe with its claw 0.75, the claw alone 0.38, bill from the forehead 0.4 from the gape 0.6.

Both these new species were found in the Láchen valley near the Tibetan frontier, in places where *Lepus Tibetanus*, *Leucosticte hæmatopygia*, *Cinclus sordidus*, and other Tibetan animals were met with.

Library.

The following additions have been made to the Library since the meeting held in September last.

Presentations.

*** Names of Donors in Capitals.

Proceedings of the Royal Society of London, Vol. XIX, No. 129.—The Royal Society of London.

Proceedings of the Zoological Society of London, part I, 1871.—Transactions of Do., Vol. VII., part VI.—The Zoolog. Society, London.

Proceedings of the Royal Geographical Society, London, Vol. XV, No. II.—The Royal Geographical Society of London.

Journal of the Royal Geographical Society, London, Vol. XL.—The Royal Geographical Society of London.

Bulletin de la Société de Géographie, 1871, Mai-Juillet.—Socie'te' de la Geographie, Paris.

Bulletins de l'Academie Royale de Belgique, 2me Tome, XXIX, XXX.—Annuaire de l'Academie Royale de Belgique, 1871.—Mémoires de l' Academie Royale de Belgique, Tome XXXVIII.—Mémoires Couronnés et Mémoires des Savants Etrangers, Tomes XXXV, XXXVI.—Academie Royale des Sciences des Lettres et des Beaux-Arts de Belgique.

Mémoires de l' Academie Impériale des Sciences de St. Petersbourg, Tome XVI.—Bulletin de L' Academie, Tome XV.—Academie Imperiale des Sciences de St. Petersbourg.

Actes de l' Academie de Bordeaux; 1869, 3e et 4e trimestres.—Academie des Sciences, Belles-Lettres et Arts de Bordeaux.

Jahrbuch, Band XXI, No. I.—K.K. Geol. Reichsanstalt, Vienna.

Report on the Brachiopoda, by W. H. Dall.—THE AUTHOR.

The Ramáyana, Vol. II., edit. by Hemachandra.—THE EDITOR.

The Christian Spectator, 1871, Octr.—THE EDITOR.

The Calcutta Journal of Medicine, Aug. 1871.—THE EDITOR.

The Bengal Atlas, by Babu Rajendralala Mitra.—THE EDITOR.

Catalogus Codicum Orientalium Musei Britanici, part II, Codices Arabici, 1846-1871.—THE BRITISH MUSEUM.

Pehlavi Grammar, by P. D. B. Sungana.—THE TRUSTEES, SIR J. JEEJEEBHOY'S TRANSLATION FUND.

Prákrita Manoramá Vyákaranam.—RAJA GIRI PRASADA SINGH.

Tagore Lectures on Hindu Law, Vol. II, by H. Cowell.—THE REGISTRAR OF THE CALCUTTA UNIVERSITY.

Exchange.

The Nature, Nos. 89-92.—The Athenæum for July 1871.

Purchase.

Harold's Coleoperologische Forschungen, Heft I-VI.—Burmeister's Handbuch der Entomologie, 1-5.—Candéze, Monographie de E'latérides, 1-10.—Thomas's Pathan Kings of Delhi.—The Annals and Magazine of Natural History, 1871, Aug.—L. E. and D. Philosophical Magazine, 1871, Aug.—American Journal of Science, 1871, July.—The Calcutta Review, 1871, October.—Comptes Rendus, Juillet 1871.—Tenesser, Reisen in den Philippinen, Band II, Theil 2, Heft II.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR NOVEMBER, 1871.

A meeting of the Society was held on Wednesday the 1st of November, 1871, at 9 P. M.

T. Oldham, Esq., LL. D., Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

The following presentations were laid on the table—

1.—From Capt. W. L. Samuells, Assist. Commissioner, Pachumba, Chord line,—Two copper axes.

The following letter accompanied the donation—

'In my letter to you which accompanied the inscriptions, I mentioned to you that some singular looking pieces of copper had been accidentally found by a native of this district in digging for bamboo roots on the top of a hillock. I am sending you the only two specimens I have, and may as well tell you the circumstances under which I came by them.

'On returning to Pachumba this year from the Rewah frontier, I set about making enquiries as to whether there were any known ruins or rock excavations in the neighbourhood, and one day in talking to an old resident of the place on this subject, he mentioned to me that last year a native had brought Mr. Heyne, the Manager of the Bengal Coal Company's mines at Kurhurbaree, some three or four very curious looking pieces of copper, which he had dug out of a hillock on the borders of this subdivision. On enquiry I found that Mr. Heyne had given them all away, but I managed to recover one, which I can't help thinking may have served as a head for a battle-axe. I have mounted it on a handle in true primitive fashion, and I leave you to judge whether a man with such a weapon in his hands could not lay about him with some meaning. Some who have seen it, think that it is made of bronze, others that it is pure copper; but that it has been formed by moulding in

sand, I think there is not a doubt of. At all events, the find was an interesting one, and I was consequently induced a few days ago to start off from here with the intention of visiting the locality, and having further excavations made under my own superintendence. I, therefore, went last Friday to the village where the finder of the articles lived, and on his appearing before me, he produced another piece of copper of the same weight as the supposed axe-head (3½ lbs), but elliptical in shape. What this can have been it is hard to conjecture. The native informed me that he had found five pieces altogether, three of which he gave to Mr. Heyne,* one to Mr. F. Peppé, the manager of the Gawan Estate (District Hazareebagh) and the fifth he that day put before me. He got them all within a cubit's depth of the surface of a hillock which covers an area of about 4 local cottahs (*i. e.*, about 10 or 12 cottahs of the Bengal standard measure), and there are, he says, several other hillocks near it, some larger and some smaller. But he refused to point out the locality, and gave a whole string of frivolous excuses for not doing so; but when I got him to myself he told me the true reason, and I cannot refrain from relating it as it is a curious instance of superstition.

'It appears that this man, whose name is Anúp Telí, cultivated land about this very hillock, and he told me that the night after he found these things, he had a dream in which a *bhút* of terrible aspect appeared before him. He was no ordinary looking spirit, but of prodigious proportions, his skin being red and his clothes black, whilst a profusion of hair hung down his back from his head to his heels, each hair being as thick as a man's wrist. Having dismounted from a tiger which had carried him to Anúp's door, he entered the hut and pointing to the copper pieces, informed Anúp that they were his (the *bhút's*) property. Anúp at once expressed his willingness to give them up, but the *bhút* was for none of them. He wanted in exchange four hairs off Anúp's right knee, and in the bargain offered to relinquish all claim to the treasure which he said lay buried under the other hillocks in that locality. But the much-coveted hairs Anúp would not part with at any price. So the *bhút* mounted his tiger,

* Two of these were taken to Calcutta, by Dr. F. Stoliczka, Palæontologist, Geological Survey of India.

and trotted off in high dudgeon. When the day broke, Anúp proceeded to do a little ploughing before resuming his excavations at the hillock; but as he passed that spot, one of his bullocks dropped down stone-dead, and within a few days the remaining two bullocks which he possessed died also. Upon this he deserted that place, and took up his residence in the village where he now lives. This, he says, happened three years ago, and till last year he concealed these copper pieces, which he believed to be gold; but thinking he might then realise something by them, he carried them off in great secrecy to Mr. Heyne, to whom he imparted the information of where he had found them. But this little indiscretion brought fresh troubles on him; for when he returned home, his little girl sickened and died. For this reason he said he never would tell another soul where the hillocks were and much less would he venture near the locality to point them out.

'I believe the man from his demeanour to have been thoroughly sincere in his belief that evil would befal him, if he disclosed anything further that would lead others to the place; for I used every kind of persuasion without avail, and even offered him Rs. 20 on the spot, but he begged me not to press him and assured me in a whisper that Mr. Heyne knew the exact place, as he had made a note of it in his pocket book. Finding now that such is the case, it is clear that the man had no motives of personal gain, as I at first thought, in withholding the information from me; whilst the fact of his refusing the Rs. 20, being under ordinary circumstances a most unusual trait of native character, proves that his fears were at all events genuine.'

The Chairman, in soliciting any remarks which the members desired to offer on this very interesting find of Captain Samuells, said, that the specimens which he would send round, were, if intended for weapons or implements of any kind, of the rudest form. There could not be a doubt that they were, one entirely so, and the other to the extent of more than half its surface, simply the bloom, derived from the small copper furnaces which were known to have been in use with the old smelters or workers in copper in the country, and of which little smelting pots examples still remained. One, as he said, was entirely so. It bore all the marks of the fine earth or sand into which it was run, a rudely circular or slightly

oval thin plate of copper, just as the melted metal would naturally spread out, if poured out in the semi-viscous state in which such little pots would yield it. On this piece there was not a trace of hammering or of the application of any tool. The second on the other hand, though precisely similar to the first for one half its surface, had the other portion beaten and hammered up to a straight line, the two ends of this being hammered out into two shoulders or two semicircularly curved recesses, which would be admirably suited for the application of a handle formed of a split bamboo or stick, as Captain Samuells has applied it. But the curious part of it is, that is, if these were so intended for the application of a handle,—and with such a handle unquestionably the heavy mass of copper would form a rude, but very effective, axe or club, though not a cutting tool,—I say if this were the intention, it is doubly strange, that those who knew so well how to hammer this part so neatly into shape, should not also have hammered out the edge, so as to form a sharp cutting surface. This edge now remains with all the roughness and thickness of the old bloom just as it flowed from the melting pot.

"I believe the metal has not been examined as yet, so that I am unable to say whether it be pure copper or not, but it looks as if it were so.

"The discovery of any copper implements is of high interest, and while, thanking Captain Samuells for this contribution, it is hoped that the discovery may stimulate others to searching for such evidence of the state of metallurgical knowledge among the ancient dwellers in these lands.

"I may mention that within a few miles of where these copper blooms were found, there is a very large excavation, stretching for nearly half a mile on a local lode of copper ore. In this the ore is probably too diffused to pay for working now, but a very considerable quantity of copper must have been extracted from this place in olden times."

2.—From J. M. Foster, Esq., M. D., through Mr. J. Wood Mason—three Asám small silver coins.

Babu Pratapa Chander Ghoshe, Assistant Secretary, said that the largest of the three coins contains the name of 'Srí Brajanáth Singh, the king,' and the two smaller that of 'Srí Gaurináth.' No years are mentioned.

The President mentioned that he had seen a complete collection of Asám coins with Mr. Leonard.

The following gentleman duly proposed and seconded at the last meeting was balloted for, and elected Ordinary Member—

J. M. Foster, Esq., M. D., Nazeerah, Assam.

The following gentlemen are candidates for ballot at the next meeting.

Capt. W. L. Samuells, Assistant Commissioner, Pachumba, Chord line, proposed by Col. E. T. Dalton, C. S. I., seconded by Mr. H. Blochmann.

S. E. Peal, Esq., Sibságar, Asám, proposed by Mr. J. Wood-Mason, seconded by Mr. H. Blochmann.

The Chairman said he had to report on the part of the Council that they had had under consideration the terms of Rule 29. By this rule, as now worded, it was compulsory on the Society to hold a meeting in each month in the year. Practically, however, it was found that during the months of September and October, it was extremely doubtful whether a sufficient number of members could be brought together to constitute a meeting, and rarely has it been that on one or other of the meeting evenings in these months, there had not been an adjournment, as there was not a quorum. Further than this which is the practical result—it has been felt, that with the seriously increased duties now devolving on the Secretaries, in editing the Journal and the Proceedings, it was not just or fair to those officers, who it must be remembered are purely honorary officers, to keep their time so pressingly occupied during the whole year, without any respite. It certainly is the rule elsewhere for Scientific Societies to have a certain recess during the year, and it is considered that it will be desirable to have such a recess here also. The Council, therefore, recommend that the words, '*excepting in September and October*' be inserted in Rule 29 after the words: "The Society shall meet on the first Wednesday in each month."

This being an alteration in the rules must be referred to the Society at large. Voting papers will be sent out, and as the time re-

quired for the rules will be given by this arrangment, the monthly meeting on the first Wednesday in February will be made the meeting for the discussion of the question.

The following letter was read—

From Capt. W. L. SAMUELLS, *forwarding facsimiles of inscriptions, a plan, and a drawing of a rock cut temple at Harchoka, Chutiá Nágpúr.*

'I send you by dâk banghy a parcel containing facsimiles of some inscriptions which I found cut on the pillars of a rock-cut temple at Harchoka in the Chutiá Nágpúr Tributary Mahál of Chang Bhokar, and which I came across this last season in settling the frontier line between Rewah and Chutiá Nágpúr.

'One inscription (marked R) I got amongst some very interesting remains of rock-cut temples and monasteries near the village of Márá in Rewah. These temples were visited by a Capt. Blunt in 1795, and are mentioned by him in his "Narrative of a Route from Chunarghur to Yartnagoodum" published in 1801 in the 7th volume of the Asiatic Researches. On pages 73 and 74, he mentions having taken sketches of these temples with their measurements, which makes me anxious to know whether your Society is in possession of those sketches, and if so, whether I could be favoured with a view of them ; for my visit to the Márá temples, from press of work, was, I regret to say, a very hurried one. I was therefore unable to make a plan of them as I should like to have done, if I had had the time. But if Capt. Blunt's sketches are to the fore, I should be very much assisted in writing my report on these temples, if I had these sketches to refer to. Capt. Blunt states that he was unable to find any writing or inscription, and as far as the temples and monasteries go, I was similarly disappointed. But I doubt, if he noticed the remains of a stone aqueduct, as no mention is made of it in his narrative. It was in following up the remains and fragments of the aqueduct with a view to ascertaining from whence and for what distance the water had been conveyed by this artificial channel that I came to a spring which issued from a rock in the side of a hill, and found the rock excavated so as to form a grotto of the following dimensions—length 16′ 4″; depth 6′; height 4′. The roof is horizontal with

a plain frieze and cornice along its whole frontage, the former bearing in its centre sculptured figures in relief of Siva and Bhawani with a cobra's hooded head rising above them. The height of the frieze is 2′6″. The shape of the grotto is rectangular, except that at one end the side wall forms an obtuse angle with the back wall from whence the spring of water issues. It was on this side wall that I found the inscription marked R.

'I was for some time puzzled to think what the singular device which is seen on the right was intended to represent, till it struck me that something similar to it might be got by twisting two blades of the long broad jungle grass in a particular way. I therefore cut two strips of paper to be used as a substitute for the grass and put a coloured line along the centre of each to represent the mid rib, and coloured the edges also to mark the lines which would indicate the breadth of the grass when cut in stone. In an envelope attached to the copy of this inscription you will find the paper figure I allude to, and on examining it, you will observe how exactly the directions of the coloured lines on the paper correspond with those shown in the copy of the inscribed device. This may be a mere coincidence, but still it is natural to suppose that the carver of the inscription had something in his mind's eye that suggested to him the device I am alluding to; and, that it was something of the nature suggested by me is, I think, more than probable.

'This *grotto*, as I have termed it, appears to me to bear some resemblance to the primitive wells of Thrace which are described as consisting of arched excavations in the sides of rocks where the water was directly obtainable from springs; with this difference only, that the Márá "well" or grotto, whichever is the more correct expression, has a flat roof instead of an arched one.'

Babu Pratapa Chandra Ghoshe said—

"The inscriptions are in old Nágarí characters, but are so rude, that the characters are identified with much difficulty. The inscriptions, so far as I have read them, are names of perhaps the donors of particular portions of the temple. They bear no date. I suppose they are Buddhistic, but I must not be certain before I read all the impressions sent by Capt. Samuells."

Mr. Blochmann said that Capt. Samuells had kindly promised to forward to the Society explanatory notes which would appear together with two plates in the Journal. The sketches taken by Capt. Blunt could not have been sent to the Society; at least there was no record shewing that they had been received.

The Chairman also exhibited several drawings of celts, received from Mr. J. J. Carey, Executive Engineer, Khangaon, regarding the following notice had appeared as a supplement to the Central Provinces' Gazette, dated 4th September, 1869.

'The stone circles lately found by me near the village of Khaiwarra, about 16 miles east of Arvi in the Wardah district, were opened by desire of Mr. Morris, Chief Commissioner, Central Provinces. The stone circles are on the east bank of a nullah running due north and south, the ground rising very rapidly, 12′ 5″ in 1,400 feet. I should think, there are quite 150 of these mounds dotted about in no regular form, along the edge of this nullah. In outward form they are precisely the same as those illustrated in Captain Meadows Taylor's book, with large stones rather evenly placed round. Numbers of these stones appeared to me to have passed through stone-dressers' hands, they having five sides rudely shaped, which makes me think they were originally intended to have been placed upright, not in the position found; however, nothing was found to indicate that any building was erected here, still it is strange that these five-sided stones should be there, and found lying flat on the ground. I am sure, they were never intended to be placed in that position. The mounds in every case were hollow at the top, making me think that a chamber would be found underneath, that the stones forming the ceiling had probably given way; but, on opening two, nothing was found to guarantee such an idea.

'I commenced digging operations on the principal mound in the place, 40 × 43 in diameter, there being more cut stone surrounding it, and three or four in the centre; very great care was taken in digging and removing stones. The top of one of these five-sided stones was hit upon close to the surface, and in the centre of the mound this was carefully left standing, while operations were going on up to one foot deep. Nothing but loose stones and earth was

removed, until about 15 inches from the surface broken red pottery began to show on the south side. At last some stiff leaden coloured clay was found, fast binding pieces of pottery, and on close examination large quantities of teeth were found, which evidently had been put into a *gurrah* and imbedded in this clay. These bones are, I believe, the back teeth of horses, in very good preservation. This clay then began to be found in patches, in which, as a rule, you always find pottery and other implements, and appeared in no other place than on the south side.

'I was standing one evening looking on, when all of a sudden I saw a "find," and immediately jumped down into the hole, and with the greatest care dug out of the clay, well cemented together, two copper bells, two round copper (in my opinion) ear-rings, and an iron axe; these I handled with the utmost care, vainly hoping that the whole would remain in this solid state; but after a few days, the heat of June soon dried up the clay, and the whole became detached. This and a few iron implements and a gold ring were the only things found. This excavation was carried down about 2·6 feet.

'In the other we went down over three feet from the surface, and nothing but iron was found, very rust eaten. The only implement in good preservation was a kind of saucer for holding oil, which had a handle with a hook to hang by, and a spiral spring, which must I think have been wound round a stick.'

The following papers were read—

I.—*On a new Photo-callographic Printing Process.—By* CAPTAIN J. WATERHOUSE, *Assistant Surveyor General.*

I have the pleasure to bring to your notice this evening a new process of photographic printing, I have lately worked out, which, though it can scarcely be called original, is in some respects new and, as I believe it has never before been worked in India, a description of it may not prove uninteresting to many of the members of this Society, more especially as the new process will be used for the reproduction of photographs and drawings of all kinds for the illustration of our Journal.

The few specimens I have with me, though very imperfect, are sufficient to shew the capabilities of the process. I have hitherto

chiefly practised on subjects in line in order to perfect myself in the manipulations, which were entirely new to me, but I know from the trials I have already made, that the process will also give excellent results in half tone as soon as I shall have been able to master the difficulties of the printing, and to obtain proper appliances. I am, therefore, unwilling to delay the publication of a process by which absolutely permanent photographic reproductions may be made from any class of subject with great perfection and economy by means of appliances which are within the reach of all.

In principle my process is similar to that introduced in 1866 by Tessier du Mothay, which was afterwards modified and improved by Albert of Munich and other Germans, and still further perfected by Ernest Edwards of London, who has brought it into extensive use under the name of Heliotype. Many of the members present may probably have read descriptions of it in some of the English serials, or have seen specimens in a publication entitled "Art, Pictorial and Industrial," which is illustrated entirely by its means.

The distinctive feature of all these processes is, that the printing surface is composed of gelatine, hardened in such a manner that it may stand the wear and tear of printing, and they all depend upon the well known property peculiar to a dried film of gelatine mixed with an alkaline bichromate of becoming insoluble after exposure to light, and repelling water in the parts exposed to light exactly in proportion to the amount of the action of the light upon them, and at the same time of acquiring a corresponding affinity for a greasy substance, such as printing ink. Although this property by itself has been most usefully applied in many photographic processes for the reproduction of subjects in line, it would be quite incapable of giving the required results in the processes now under notice, because the unexposed gelatine remains in a pulpy soft state incapable of withstanding the wear and tear of printing, and moreover it would be liable to dissolve entirely with any rise in temperature, the consequence of which would be the loss of all the lighter tones. It has been found, however, that the chromated gelatine film may be so hardened or oxidised by certain substances, such as the alums, especially chrome alum, tannin, chlorine, bichloride of mercury, permanganate of potash, and other suitable oxidising

agents, that it made quite insoluble in water, though still capable of retaining a certain amount of water, without interfering with its property of attracting greasy ink in the parts exposed to light and repelling it in the unexposed parts, so that if such a film be spread upon a surface of glass, metal, or other suitable material and after exposure to light under a photographic negative, be washed till all the chromic salt is removed, we obtain a printing surface possessing the properties of an ordinary lithographic stone, that is to say, it is absorbent of water in some parts, and absorbent of greasy ink in others, but, as I have mentioned, it also has another most valuable property which is not possessed by the lithographic stone, and which has been most aptly termed "a discriminating power of absorption," so that when it is inked in with a roller, the ink will be thickest on the parts representing the deepest shadows of the picture, and which have received the most exposure to light, the middle tints will take less, the lighter tints still less, while the high lights will take none at all, and be represented by white paper. It will readily be seen that in this way an exact transcript of the original photograph may be obtained, shewing the most delicate delineation of detail with as perfect gradation of tone as in a proof produced by the ordinary process of silver printing, but possessing the great advantages of a lithograph or engraving over a silver print in respect of undoubted permanence, cheapness and rapidity of production.

The above is the principle upon which these processes depend—the practice though presenting some difficulties of manipulation is very simple. A mixture of gelatine and bichromate of potash, with one of the hardening or oxidising substances I have mentioned, and also a little glycerine, sugar or other substance, capable of preventing the gelatine film from being too brittle is poured upon the surface of a perfectly level finely ground glass plate, and carefully dried in the dark in such a manner as to preserve a very even surface. When dry the plate is ready to be exposed under a reversed negative in the usual manner. After the surface has received sufficient exposure the plate is turned and its under surface is exposed to the full power of the light for a short time to render it thoroughly hard and insoluble and prevent it from swelling too much in the after washing. The plate is now

washed till all the bichromate is removed and is then rolled in with soft printing ink.

This is the simplest mode of printing but in the course of working out the Heliotype process Mr. Edwards found that it was very difficult to obtain perfect contact between the negative and the gelatine film and thus it was impossible to obtain the sharpest results, so he thought of preparing a tissue which might be printed upon just like a sheet of sensitive photographic paper or carbon tissue and afterwards transferred on to a zinc plate or any other suitable surface which would stand the wear and tear of printing. This was a great and valuable improvement, but in the course of my experiments I found some difficulty in transferring the tissue, and as I find that with proper precautions fairly sharp results may be obtained by printing on the original plate, I have abandoned the use of tissue till I have more fully worked out the process.

I will now briefly describe the mode of working which, after many trials and failures I have found most successful.

Having well cleaned some pieces of finely ground plate glass such as is ordinarily used for looking-glasses, and having carefully levelled them. I prepare a mixture composed of—

Gelatine,.....	1 ounce.
Honey Soap, ...	30 to 60 grains.
Tannin, ...	10 grains.
Distilled water, ...	8 ounces.

I have found 10 grains of tannin to 1 ounce of gelatine sufficient to render it quite insoluble, and I think even less would do; but if more is added, it has the effect of rendering the film insensitive to light. The object of adding the soap is to render the film tough and prevent it from becoming brittle and breaking up when dried, its use for this purpose was first suggested by Mr. Johnson, in working the autotype process. Some precautions are necessary in mixing the solution so that it will give an even transparent film when dry. I have tried many kinds of soap, but I have found that the honey soap exported by Coward of London, such as is commonly sold by the boxwallas, is the best. The soap and tannin must be

separately dissolved in about 1 ounce of hot water, then mixed and added very gradually, and with constant stirring to the gelatine dissolved in the remaining 6 ounces of hot water. The mixture is then filtered through coarse cloth and poured on the plates. Should any air bubbles be formed they may be removed with the point of a pen-knife. The gelatine soon sets and as soon as I find the film is firm, I turn the plates face downwards and place them out to dry in the open air on suitable supports. They dry in from 12 to 24 hours or longer according to the state of the atmosphere. I think the plan I have here adopted of preparing the gelatine film without the addition of the sensitive bichromate is advantageous in many ways. It enables the plates to be dried in the open air, quickly and evenly and I find that when turned face downwards very little dust settles on them; another advantage is that a stock of plates may be prepared and kept till required to be sensitised for use. After sensitising the plates dry very quickly and heat may be used without any fear of the film becoming dissolved and flowing off the plate. I tried Mr. Edwards' process of mixing together the gelatine, chrome alum and bichromate of potash according to his published formula, but I found that the plates so prepared took a very long time to dry and required to be kept carefully level in the drying box, besides this there were other disadvantages which led me to abandon the use of chrome alum and substitute tannin with which I had made some experiments so long ago as 1866.

When the plates are thoroughly dry I immerse them in a solution of bichromate of potash about 1 oz. of the salt to 20 ounces of water and then place them in a drying box. As the gelatine is quite insoluble there is no necessity for keeping the plates level in this second drying and if necessary heat may be used. The plates dry in 2 or 3 hours and are then ready for use. I expose under a *reversed* negative for about 10 minutes in the sun for a clear line subject and about half an hour for a subject in half tone according to the density of the negative. When sufficiently exposed I remove the negative and expose the *back* of the sensitive plate to light for a few minutes in order to thoroughly harden the under surface of the gelatine film and prevent swelling and it from puckering up during the printing. The plate is then thoroughly

washed in several changes of water till all the bichromate is removed and is ready for printing.

The printing is the most difficult part of the whole process and success appears to depend entirely upon the composition of the ink. In printing line subjects some inks are too tough and cannot well be cleaned off the plate, others are too soft and are liable to be rubbed off when the plate is cleaned with a cloth. Then again in printing subjects in half tone a stiff ink will only take on the shadows, while a soft thin ink will take all over the plate and by giving a slight tone to the high lights destroy all brilliancy of effect. In printing subjects in line I roll in with a tolerably stiff ink made of ordinary lithographic chalk ink thinned with olive oil instead of varnish and before printing, clean the surface of the plate with a damp cloth. For half tone subjects, the plate must first be rolled in with stiff ink in order to obtain depth in the shadows and the detail of the half tones afterwards brought out by the use of a softer and lighter ink which should just be of such a consistency and tint that the half tones may all be well developed, but the high lights left clear. The inking in may be done with lithographic rollers, but rollers of india-rubber have been found better. The printing is best performed by vertical pressure in an ordinary type printing press which should be furnished with an india-rubber bed to prevent the glass plates being broken, and the plate should be covered with a padding of felt, so that the paper may be well pressed into the hollows forming the deepest shadows. Enamelled paper is the best for printing on, especially for subjects in half tone. The proofs I have with me have all been pulled in an ordinary copying press which I find answers the purpose fairly, though it is inconvenient in many respects.

If it is required to print on a tissue, a plan which certainly possesses many great advantages, a perfectly polished glass plate is used instead of ground glass, and the surface is rubbed with a solution of wax in ether, so that when it is dry, the film may be stripped off with ease. The composition I have described above makes an excellent tissue.

Such are the details of my process as far as I have gone, it is very imperfect in many points, but I am still working

at it, and hope soon to perfect and bring it into practical use in the Surveyor General's office for the reproduction of fine delicate drawings in line or brush shading, which are not susceptible of being reproduced by photography, and also to replace the costly and tedious process of silver printing for ordinary photographs.

The experience I have already gained has shewn me that the process is perfectly practical, and also exceedingly economical both in time and in material. It is true the preparation of the plates takes a long time, but once the plate is prepared, copies may be pulled from it at the rate of from 100 to 200 copies a day, and as the plates may be kept ready prepared, the time taken in their preparation is really of little consequence. As regards the cost of materials, I find that the preparation of a square foot of surface costs about 4 annas and 6 pie. This is a mere trifle, when the great advantages of the process are considered: 1st, in being able to copy drawings or other subjects in line with a sharpness and delicacy equal to the finest lithography or copper plate engraving, and 2ndly, in being able to print copies of shaded drawings or ordinary photographs, which shall be permanent and perfectly reproduce all the gradations of the original, and I need not point out how immensely valuable it will be for the reproduction and cheap circulation of photographs illustrating various branches of science.

I would only further add that I do not put this forward as an original process of my own, as I must acknowledge my obligations to former workers in the same direction. I can only claim to be the first to have worked out a practical process suitable for use in this country, and hope that the subject may be taken up by some of our Indian photographers.

II.—*Note on three Arabic Inscriptions by early Muhammadan Kings of Bengal, received from* A. Broadley, Esq., C. S., Bihar.—*By* H. Blochmann Esq., M. A., *Calcutta Madrasah.*

The three Arabic inscriptions which I have the pleasure to lay before the meeting, were sent to me, among others, by Mr. A. Broadley, C. S., Bihár. Mr. Broadley has taken rubbings of a large number of inscriptions, which he found on ruined buildings and shrines in the town of Bihár, a town, which in the early

period of Bengal history held a much higher rank than it does now-a-days. From the rubbings which I have examined, it is certain that Mr. Broadley's inscriptions will considerably add to our knowledge of the beginning of the Muhammadan period of Bengal History, and I hope that he will find leisure to publish his large collection, and add archeological notes on the old buildings of Bihár, and also collect the numerous legends, still current in the district, regarding the early Muhammadan invaders of Bengal.

My object in laying a few of Mr. Broadley's inscriptions before the meeting, is to direct attention to Bihár inscriptions in general, and to appeal to officers stationed in that province to send rubbings to our Society for publication. Every inscription with the name of a king and a date on it, is of value. At a former meeting, I explained what progress had been made, up to the present time, in the elucidation of Bihár and Bengal history. I mentioned that we do not even possess a correct and complete list of the Muhammadan kings of Bengal and Bihár, and that no historian had yet attempted to fix the limits to which the kingdom of Bengal, at various times, extended. There exist no MS. histories of Bengal; the first attempt at a connected history known to us, is the short chapter by Nizámuddín in the *Ṭabaqát i Akbarí*, which was composed so late as A. H. 1001, or A. D. 1592. For the beginning of the Muhammadan period, we have only occasional notices in the MS. histories of the Dihlí empire, and coins and inscriptions. The information which coins yield, will be found in Mr. E. Thomas's excellent Essay on the '*Initial Coinage of Bengal*' (Journal, A. S. Bengal, for 1867). He compiled a valuable list of the early Muhammadan Governors, and assigned to several kings, whose names were not to be found in the existing histories of Bengal, their proper places. As an example, I may mention the king Shamsuddín Fírúz, of whom Mr. Thomas found coins struck between 1315 and 1322, A. D. The inscriptions at Tribení near Húglí, which I laid last year before the Society, mention the same king as having reigned in 1313, A. D. Two of Mr. Broadley's inscriptions—and this will shew the value of his discoveries, prove—

1. that Fírúz already reigned in 1309 over (Western) Bengal, or Lak'hnautí.

2. That South Bihár under him belonged to Bengal, whilst other inscriptions shew that Bihár in 1352 again belonged to Dihlí.

3. That Shamsuddín had a son of the name of Hálim Khán, who in 1309 and 1315, and hence most likely during the intervening years, was governor of Bihár.

From a letter, I lately had from Mr. Broadley, it would also appear that portions of Hálim Khán's palace still exist, and that his descendants are still inhabitants of the town of Bihár.

Of the three inscriptions before the meeting two belong to Hálim Khán and contain the dates 1309 and 1315; the former inscription seems to have belonged to a saraí, the latter to a mosque.

The third inscription is of a still earlier date, and mentions an edifice built in A. H. 640, or A. D. 1242, by 'Izzuddín Abulfath Tughril Khán, who styles himself *Sulṭán*, and assumes other regal epithets, as *Kháqán ul Mu'azzam, khallada-lláhu mulkahu, &c.*, though his contemporary, the author of the *Ṭabaqát i Náçirí* merely calls him *Hákim*, or Governor, of Lak'hnautí, which was then looked upon as belonging to the Dihlí empire.

The characters of all three inscriptions are *Ṭughrá*.

III.—*A History of the Village of Aṛuṛa, Tahçíl Jagráon, Zil'ah Lúdhiáná.*—*By* Attar Singh, Chief of Bhaddaur.

This paper is written in Hindí, and contains several interesting facts. The writer states that Aṛuṛa lies a little north of Bhaddaur, and eight *kos* south of Jagráon, and is inhabited by Muhammadans and Rájpúts. The decline of the place dates from the time of Ahmad Sháh Durrání.

In old times, Aṛuṛa was inhabited by Rájpúts of the Pramuṛa clan. Many of the inhabitants were killed when the Muhammadans invaded the district, and many emigrated. Among the fugitives were also several families of Bráhmans, and hence it is that certain clans, as, for example, the Kálígotra Bráhmans of the hills of Chintapúrí, look upon Aṛuṛa as their original domicile.

The writer then mentions several legends of Rái Fírúz, under whom Aṛuṛa flourished. His tomb still exists, and in one of its inscriptions the year 1532 Samvat is legible. The old tank called Ráníyáná near Aṛuṛa is frequented by numerous pilgrims.

People say that the ancient name of the place is Ahichatta, and that its ruler, Rájá Buddhamáti composed a work in Prakrit, entitled Dharma Kathá, which is still used by the Púja tribe in the district. In the 15th chapter of this book, it is mentioned that a former prince of the city of Ahichatta, named Kanaka Ketu, reigned at the time of Mahávíra Swámi, the twenty-fourth incarnation of Buddha. Under him the town was so large, that Bhaddaur and the adjoining villages were the suburbs of Aṛuṛa.

In conclusion, the writer mentions a few facts connected with Bhái Bahádur Singh of Bhaddaur, who died in A. D. 1866.

IV.—*Description of a New Species of Abrornis.—By* W. E. Brooks, Esq., C. E., Eta'wah.

Abrornis Jerdoni.—The dark slatey-headed *Abrornis*. Dimensions—length of skin 3½, but the bird in the flesh would probably measure 3¾; wing 1·82; tail 1·57; bill at front ·35; from gape about ·5; tarsus ·72.

Colors similar to those of *A. Xanthoschistos*, but the slate colour of the head and shoulders is very dark and without the greenish tinge observed in the other species. There is no apparent light-coloured coronal streak, but a greyish white supercilium. Lower back bright yellow green, as are also upper tail coverts. Upper part of wing vivid green, all the coverts primaries secondaries and tertial as well as tail feathers edged vivid yellow green. Two outer tail feathers white on their *inner* webs; the white of the outer one being spotless, while that of the penultimate one is clouded with pale brown spots; but that of the lower surface of body from chin to under tail coverts bright yellow; bill and feet coloured as in the other species.

Dr. Jerdon was acquainted with this bird, and he procured the specimens which Mr. Hume and I have. I therefore name it after him; but he confounded it with *Abrornis Xanthoschistos*, Hodgson. I have examined Mr. Hodgson's original drawing with dimensions of the latter; and find it represents undoubtedly the North-Western bird, which extends to Cashmere. This drawing is very accurate, and perfectly accords with Cashmere, Dhurmsala and Kumaon birds; also with others procured on the Nepal border by Mr. Yeatman, in the cold season. Mr. Hodgson's dimensions of *Xan-*

thoschistos are—length $4\frac{3}{8}$; bill from gape $\frac{1}{2}$; tail $1\frac{3}{4}$; wing $2\frac{1}{8}$ to $2\frac{3}{16}$; tarsus $\frac{3}{4}$.

Dr. Jerdon's dimensions of *Albo-superciliaris* are—length $4\frac{1}{2}$; wing $2\frac{1}{4}$; tail $1\frac{7}{8}$; tarsus $\frac{3}{4}$. Inasmuch as these are the dimensions of Hodgson's bird, and as his drawing exactly represents the North-West species, I have no hesitation in putting *Albo-superciliaris* as a synonym of *Xanthoschistos*. *Abrornis Jerdoni* is the eastern representative of *A. Xanthoschistos*.

Mr. Ball exhibited several birds captured by him in the Red and Arabian Seas, and said—"I wish to make a few remarks upon some birds which I recently captured in the Red and Arabian Seas, when on board the Mail Steamer 'Mongolia.' I am more particularly anxious to exhibit them as they have been cured by a process somewhat novel. Having neither the facilities nor inclination for skinning them, and being unable to procure any pure carbolic acid, I tried the effect of injecting them with common disinfecting fluid. The result has been that the birds have kept admirably and are only now gradually drying up into mummies. The specimens include—

1*st.*—A male and female of the common *Tinnunculus alaudarius*. Briss.

2*nd.*—A bird which I rather think may be a Hobby, *Hypotriorchis subbuteo*, L., but if so, it presents a very unusual phase of plumage. At some future time, I hope to describe it more fully.

3*rd.*—A species of Roller *(Coracias)* distinct from both the European and Indian birds. It comes nearest to the former, but differs from it in many details of plumage. Speaking generally, it has a more subdued coloration, and the violet blue of the lesser wing-coverts is not continued, as in *C. Garrula*, on to the shoulders. The head and neck too are a dirty green rather than a bluish green. I have not yet had time to ascertain whether it belongs to a known species.

4*th.*—A specimen of the somewhat rare Sanderling, *Calidris arenaria*, Tem. It came on board in the Arabian Sea in a very exhausted condition.

Besides the above, I observed many other land birds flying about or resting upon the ship. Notably a small party of six owls

which kept up with the ship for two days. I in vain tried to capture a specimen, they were observed one by one to drop exhausted into the sea. I am unable to say with any degree of certainty to what species they may have belonged, but think it just possible that they may have been *Otus brachyotus*, Gmel. Their markings and size resembled those of that bird, they had most decided ear-tufts.—

The meeting then broke up.

LIBRARY.

The following additions have been made to the library since the meeting held in October last.

Presentations.

*** Names of Donors in Capitals.

Journal Asiatique, No. 62.—SOCIE'TE' ASIATIQUE, PARIS.

The Quarterly Journal of the Geological Society, No. 107.—THE GEOLOGICAL SOCIETY OF LONDON.

Journal of the Chemical Society, May, June, and July, 1871.—THE CHEMICAL SOCIETY OF LONDON.

Monatsbericht der K. Pr. Akademie der Wissenschaften, July, 1871.—K. PR. AKADEMIE DER WISSENSCHAFTEN ZU BERLIN.

Memoires de la Société des Sciences Naturelles de Cherbourg, Tome xv.—SOCIE'TE' DES SCIENCES NATURELLES DE CHERBOURG.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, Band xxv, Heft. 1, 2.—THE EDITORS.

Indische Studien, von Dr. A. Weber, Band xii.—THE AUTHOR.

Wissenschaftlicher Jahresbericht über die Morgenländischen Studien, 1862 bis 1867, von Dr. R. Gösche.—THE AUTHOR.

Review of Christian Literature in India, during 1870, by J. Murdoch, LL.D.—THE AUTHOR.

Account of the Operations of the Great Trigon. Survey of India, vol. I., by Col. J. T. Walker, R. E.—THE SURV. GENERAL OF INDIA.

Selections from the Records of the Govern. of India, No. LXXXIII.—THE GOVERNMENT OF INDIA, HOME DEPARTMENT.

Purchase.

Numismatic Chronicle, Part II, 1871.—American Journal of Science, August, September, 1871.—Revue des Deux Mondes, Sept. 1871.—Comptes Rendus, 9, 10.—Journal des Savants, July August, 1871.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR DECEMBER, 1871.

A meeting of the Society was held on Wednesday, the 6th instant at 9 o'clock P. M.

T. Oldham, Esq., LL. D., Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

The following presentations were announced—

1. From the Government of India in the Home Department, a set of photographs of temples, &c., in Bihár.

The following correspondence accompanied the donation.

From ARTHUR HOWELL, ESQ., *Under-Secretary to the Government of India.*

I am directed to forward, for the use of the Asiatic Society, a set* of photographs of the Antiquities of Behar, together with copies of the papers noted on the margin,† containing a short account of each subject by the photographer.

* 148 pictures.

From Government of Bengal No. 272, of 30th January, 1871, and Enclosures.

† From Ditto No. 2194, of 26th July, 1871, and Enclosure.

From T. F. PEPPE', ESQ., *Sub-Deputy Opium Agent of Chota-Nagpore.*

I have the honor to forward herewith a concise notice of the photographs of the antiquities in the Behar division, of which I have negatives, as called for in your letter No. 66, dated 22nd July, and also one complete set of those

With photographs, one complete set, *viz.*, Nos. from 1 to 123, and one incomplete set, minus Nos. 3, 4, 6, 15, 16, 19, 22, 23, 26, 28, 38, 39, 42, 48, 49, 50, 53, 55, 56, 58, 67, 71, 72, 77, 79, 80, 81, 94, 98, 104, 106, 107, 108, 109, 111, 112, 114,

122, 123-39 which will be sent on their arrival from Calcutta.

Total sent—

Large	... ..	102
Small	.. ..	105
Total	...	207

mentioned and numbered according to the descriptions. The Shahabad photographs are not included in the above, as I have unfortunately no copies of them. As soon as they are received, the copies and descriptions will be forwarded.

2. I also forward some duplicate copies, which will be completed as soon as the remaining copies are received from Calcutta. This therefore makes three copies of the photographs more or less complete. I regret to state the sets could not be supplied complete at once; but as this could not be done, care will be taken that the missing ones are hereafter sent.

3. In the meantime, I would beg to state that I have been put to considerable expense in having them printed in Calcutta, and that as so many more are still required to complete the seven copies of each, I would beg that an advance of Rs. 600 be given to enable me to have them printed.

4. My transfer to Chota-Nagpore has prevented me from taking negatives of some of the antiquities still remaining to be photographed, and would beg to mention them for your guidance:

The tower at Girriak.

The fort at Behar.

The rock sculptures at Pabuttee, east of Girriak.

5. I have also included some copies of negatives of Chumparun, which are probably not required. In that case they can be returned, and so much of the description as applies to them may be curtailed.

GYA.—There are a great many interesting structures and remains of antiquity in and about Gya, as it has been a place of considerable importance for many centuries. Unfortunately, during this time, there have been at least two changes of religion, and very few of the older structures are now intact; for as the buildings of the deserted faith were at hand and readily available, they were used in the construction of buildings belonging to the prevalent religion. On rare occasions only was a new temple built of fresh materials. With the exception of the temple of Vishnu Pad, all

the other temples are either converted Buddhist, or built with the materials obtained from Buddhist, buildings.

Photographs Nos. 1 *and* 2.—The temple of Vishnu Pad, the largest and most important in Gya, although comparatively modern, is a most imposing structure, but its confined situation prevents a good photograph being obtained of it. It fronts the east, and the *façade* is very striking, although greatly disfigured by ragged purdahs, &c.

No. 3.—To the south of the temple, and almost touching it, there is a handsome pillared hall, where the bare rock shows itself; in fact, the pillars are let into the solid rock for a foundation.

No. 4.—Alongside, to the north, is the temple of Gadadhur or mace-bearer, which must have been a fine stone temple, but has been modified and renewed at a comparatively late date, and a number of Buddhist figures are collected in and around it.

No. 5.—In front of the Vishnu Pad and Gadadhur temples is the holy place where the pilgrims bathe in the Fulgo, which forms a principal part in the ceremony of *Pind*, for which so many pilgrims annually visit Gya from all parts of Hindustan and Nipal.

Nos. 6 and 7.—The old town of Gya is picturesquely situated on a rocky ridge running along the bank of the Fulgo. Photographs Nos. 6 and 7 conjointly show the whole river front of the old town of Gya, with its background of hills, and the nearly dry bed of the river in the foreground.

Nos. 8 and 9.—Are views of the old town from the Ram Gya hill on the opposite bank of the Fulgo, and the village of Selempur in the foreground.

Nos. 10 and 11.—The town extends from the banks of the Fulgo to the foot of the hills, occupying in fact the whole valley between; No. 10 is the view looking west from the high bank of the river, and No. 11 is the view looking north.

Nos. 12, 13, and 14.—The southern extremity of the town occupies a rocky eminence which commands the greater part of the town, and No. 12 is a view looking north from this point, and Nos. 13 and 14 are views looking south and west.

Nos. 15 and 16.—The peculiar priesthood of Gya, the Gyawáls, without whose assistance no ceremony is effective, have their houses

on the banks of the river, and in the most prominent sites within the city, but they, I believe, are restricted to certain portions of it. Photographs Nos. 15 and 16 are some of their houses along the banks of the Fulgo, many of them five and six stories high and very old.

Nos. 17 and 18.—To the south of the town the range of hills which surrounds the town ends in a conical hill called Brahmajoni, which is considered of great sanctity. There is a temple on the summit dedicated to the sakti or female energy of Brahma, hence the name. It is approached by a flight of stone steps leading up from below. The hill itself is 450 feet high, and is a prominent object in approaching Gya from every direction. It is one of the principal places which must be visited by the pilgrims who come to perform the ceremony of Pind.

Nos. 19 and 20.—Another of the principal places of pilgrimage is the Suruj Kund and temple. This is only a short distance from the Vishnu Pad. The temple is one of the oldest in Gya, and evidently belongs to Buddhist times. Inside there is a valuable inscription dated in the era of Buddha's death or Nirvan, which is of great value, as fixing the date of that event. The vestibule is formed of two double rows of pillars ten feet in height, and five pillars in each row. A great number of mutilated statues are let into the walls on either side.

No. 21.—Another place which must be visited by all pilgrims is the tank, or Kund Petta Mahaswar. The present buildings are quite modern, but a great number of Buddhist statues are collected in and around them.

Nos. 22 and 23.—The final ceremony of Pind is performed at the Achyber temple which is situated near the foot of the Brahmajoni hill and close to the Rukmini tank.

No. 24.—Gives the relative positions. The Achyber temple is very old, and must have been a monastery chapel, as the present buildings, although mostly rebuilt and altered, seem to have been originally a Buddhist monastery.

Nos. 25, 26, 27, and 28.—Higher up the same hill, which runs down to the Rukmini tank, there is an old temple much in the same style as the temple at Budh Gya called Mungla Deva, but of

later date, and on the same hill lower down, on the eastern side, is another of the same style facing the Sarasvatti tank.

Nos. 29 and 30.—The modern town of Gya, or more properly Sahibanj, contains few structures of any antiquity. The largest temple is a double-spired one, built by a wealthy Kaist, Fath Bahádur. Near this is a fine sculptured doorway.

No. 31.—Over one of the gateways of the town there is a fine arch. This was the limit of the city as originally enclosed. It has, however, extended very considerably to the north since then.

Buddh Gya.—This place, so celebrated in the annals of the Buddhist world, is situated six miles to the south of Gya.

No. 32.—The great temple faces the east, and is 50 feet square at the base, and is 160 feet high. Colonel Cunningham gives the date of its erection by Amara Deva about 500, A. D. It is remarkable as being the finest brick structure still standing in India.

No. 33.—To the west of the temple itself is the famous Bodhi Drum, or tree of knowledge, famous throughout the Buddhist world as the tree under which Sakya Singha sat for six years, and is still visited by pilgrims from Burmah, Ceylon, &c. It is said to have been rooted out by a Brahmanist king, Sasanka, and renewed by his contemporary the Buddhist Purna Varmma. Only one large branch is now alive and from all appearances it will not last much longer. Excavations made some years ago under the auspices of the Asiatic Society showed that the whole temple was surrounded by a Buddhist railing similar to the one at Sanchi. This shows conclusively that the present temple occupies the exact site of the original one, as these railings bear inscriptions in the ancient Pali of the time of Asoka.

No. 34.—The front of the temple which faces the east is in very bad repair, and large masses come down every rainy season. In a few years the aspect of this side will be entirely changed. The porch in front has now nearly disappeared; only portions of the arch of its roof adhere to the said walls. The peculiarity of this portion is the Lehra or horizontal arch to the third story, and the radiating arches on the second story.

No. 35.—In front of the building there is a small arched doorway leading into the courtyard, in which is the Buddha Pad, or impres-

sion of Buddha's feet, to which offerings are made by all classes of pilgrims, as also to the Buddha tree, but none of the orthodox enter the temple itself.

No. 36.—The south side of the temple is in the best preservation, and many of the niches still contain plaster figures of Buddha, but in many they are wanting.

No. 37.—On the same side a deep excavation made to follow the railings disclosed the original plinth of the temple in tolerable preservation. This has since been filled up. It showed that the general level of the courtyard, and the surrounding part was considerably above the plinth which must have been approached by steps, instead of descending to it, as at present, through the arched passage in front.

The arches in the front supporting the entrance and roof of the first and second story have attracted considerable attention, and it has been doubted whether they were true radiating arches, and whether they were part of the original building. Both these doubts have been cleared away, but it is still a problem how they came to be built, and it has cast great doubts on the assigned age of the building itself. Fergusson has decided, principally on the fact of these arches, that the building cannot be of the age assigned to it by Colonel Cunningham, as it is quite anomalous to find arches in a purely Hindu structure of such an early date. The fact, however, remains, and there seems no other solution to it than that the Hindus did understand the principle of the arch, but only resorted to it in structures of brick, very few of which are now left.

No. 38.—Inside the little cenotaph, to the left of the entrance, there are some Buddhist figures, representing Buddha himself seated under the Buddha tree.

No. 39.—To the east of the great temple there is a smaller one of something of the same style, but much later, dedicated to Tara Deva.

BURRABUR.—The group of hills in which the caves have been excavated is about sixteen miles to the north of Gya, and some two miles from the bank of the Fulgo.

No. 40.—The most westerly hill is an isolated peak called

'Kawwa Dol,' or the crow's swing. There are a number of large boulders at the foot, which seem to have fallen from the top. Many of these are sculptured with rude lingams, &c., and on one to the north-west angle of the hill there is a short inscription, which, however, is nearly illegible.

No. 41.—On the east side of the hill there must have been a large temple, some few pillars of which are still standing, and a gigantic figure of the ascetic Budh, measuring eight feet high, with a breadth across the shoulders of six feet, still in its original position, with part of the original brick wall behind it.

No. 42.—The temple itself must have been a large one, but there are only a few pillars now standing somewhat apart from the shrine where the gigantic Budh is. Whether more than one structure existed here it is difficult to say, but a great many mounds are existing in the neighbourhood, and a large village must also have existed to the north-east.

To the east of the Kawwa Dol there is a group of hills, the highest being Burabee, and the whole group is called Burrabur. Near the centre of the group, and to the south, five caves have been excavated in the solid granite rock, and the labour expended in cutting, and subsequently polishing the compact granite must have been enormous. There are three of these caves in one group.

No. 43.—The Sudama and Lomas Rishi are cut in the western face of the rock; the Sudama to the north, and the Lomas Rishi to the south. The Sudama cave, which has a plain doorway, has an inscription in the ancient character of Asoka's pillars, cut in the side of the doorway. It records the excavation of the cave, in the twelfth year of the reign of Rajah Pyadasi, that is, of Asoka himself; the cave therefore dates as far back as 252 B. C. It consists of two rooms, a circular one of 19 feet, 11 inches in diameter, and an outer one 32 feet, 9 inches in length, by 196 inches in breadth, the walls are 6 feet, 9 inches in height from the vaulted roof, which has a rise of 5 feet, 6 inches, making the total height of the chamber 12 feet, 3 inches.

No. 44.—The Lomas Rishi is similar to the Sudama cave both in size and arrangements, but the roof is unfinished; while the walls

and roof of the Sudama cave are highly polished. The doorways of both caves are of the Egyptian style, but the porch of the Lomas Rishi has been enlarged and ornamented, and represents the gable end of a thatched house with a frieze of elephants surrounding the doorway, executed in a most artistic manner. Indeed the drawing of the elephants contrasts favourably with the popular modern representations of this animal. Colonel Cunningham is of opinion that this porch was executed at a later period than the cave itself. There is an inscription in the porch over the doorway, of the third or fourth century of our era. It is curious to remark that in the representations found on the bosses of the Buddhist railing at Budh Gya, there is a similar representation of the gable end of a thatched house forming the doorway of a cave also.

No. 45.—On the northern side of the same granite rock as the two preceding, there is the third cave of the group called the Karna Chopar. It is 33 feet, 6½ inches long, by 14 feet wide. The sides of the cave are 6 feet, 1½ inches high, and the vaulted roof has a rise of 4 feet, 8 inches, making the total height 10 feet, 9 inches. On the outside of the doorway, there is an inscription in the ancient Pali recording the excavation of the cave in the nineteenth year of the reign of Rajah Pyadasi, that is, of Asoka himself. The cave, therefore, dates as far back as 245 B. C. To the east of the doorway the rock has been cut away, and several rude sculptures have been executed on the scarped face representing a linga and two rude Brahminical figures.

No. 46.—The group of hills nearer the Fulgo river, and about half a mile to the east of the Burrabur group, is called Nagarjuni. There are several caves in this group. The largest is cut in the southern face of a rocky ridge, and is approached from below by a flight of rude stone steps. The height of the cave doorway, above the level of the plains, is about 50 feet. The cave itself measures 46 feet, 5 inches long, by 19 feet, 2 inches broad, both ends being semi-circular, and, in the inscription on the doorway in the ancient character of Asoka's edicts, the cave is called the 'Gopi's' cave, and was executed by Dasaratha on his accession to the throne. "The Gopi's cave, an abode lasting as the sun and moon, was caused to be excavated by Dasaratha, beloved of the Devas, on his accession,

as a hermitage for the most devoted Bhadantas (Buddhist ascetics)." Dasaratha, according to the Vishnu Purana, was the grandson of Asoka, and as the son of Asoka, Sayasus, only reigned eight years, the accession of Dasaratha must have taken place in 214, B. C.

Nos. 47 and 48.—The other caves in the Nagurjuni group are situated in the northern side, and on the southern face of a rocky ridge, running parallel with the Nagarjuni hill, there are two caves, one to the west being nearly hidden in a recess, and has its entrance facing the east. The cave itself is 16 feet, 4 inches, by 4 feet, 3 inches, and there is a rude brick wall running across it, dividing it into two rooms, which has been done by some late occupant, said to have been a Musalman fakir. There is an inscription in ancient Pali, in which the cave is called Vadithi-ka-Kubha, the rest being letter for letter the same as the inscription in the Gopi cave; the date is therefore the same.

No. 49.—The eastern cave has a small porch 6 feet long by 5½ feet broad, and the doorway is Egyptian, like all the doors of these caves. The cave itself is 11 feet, 3 inches, by 16 feet, 9 inches long; the roof is vaulted, 10 feet, 6 inches in total height. There is an inscription on the porch in the ancient character of Asoka's edicts, in which the cave is called Vapiya-ka-Kubha, or the well cave. The inscription is word for word the same as that on the Gopi cave, so that the date is the same, 214 B. C. In front of the cave there is a large well 9 feet in diameter. From various inscriptions on these caves it would seem that they have been at various times occupied by Buddhists and Brahmanists, but were originally excavated for Buddhist ascetics by the kings Asoka and Dasaratha, in the third century B. C. About the third or fourth century of our era, the kings Sardula Varma and Anunta Varma placed Brahminical images in three of them, and subsequently Mussulman fakirs took possession of them. They are now, and have been for many years, uninhabited.

Nos. 50 and 51.—Alongside the Vapiya cave there is a curious boulder poised on two others, and the cavity thus formed had been built up into a grotto no doubt for Buddhist ascetics. The Nagurjuni hills are some little distance from the Burrabur group,

and No. 51 is a view of the Burrabur group from the plains in front of the Nagurjuni cave.

No. 52.—Is the view of the Burrabur group from the rocky ridge in which the two northern caves are cut, with the Burrabur peak and temple in the centre.

DHARAWUT. *Nos.* 53 and 54.—Dharawut lies immediately to the north of the Burrabur hills, about 1½ miles distant. There are large and extensive mounds in and around the present large village, and a large tank called Chandohur Tal, which is some 2,000 feet long by 800 feet in width, evidently as old as the Buddhist monasteries which existed here. On the banks of the tank there is a little temple, near which there is a fine standing figure of the famous Buddhisatva Avalokiteswara, the Pudma Pani of the Tibetans, and is always represented with a lotus in his hand.

Nos. 55 and 56.—From the little hill to the south of the tank, which is covered with brick and stone rubbish, some curious sculptures were obtained by the villagers searching for bricks, representing various objects of Buddhist worship.

NAIR. *No.* 57.—Nair is on the Patna and Gya road, west from Dharawut, and about twenty miles from Gya. There is a pillared temple close to the road very much in the same style as the temple at Poonawa. It consists of three rows of monolithic pillars, ten pillars in each row. Fronting the temple there is a further row of four pillars. The temple or shrine behind consists of brick and mud cement, but very little of it is now standing; the superstructure is entirely gone, and none of the temples of this form are sufficiently complete to allow of a conjecture as to their original form. The roof of the portico and the shrine is composed of large granite slabs, a linga now occupies the shrine, and there is a mutilated figure of Ganesh lying outside.

Judging by the size of the mound, and the part of the shrine remaining, the temple must have been a lofty one. The bricks are large and well made, although inferior in this respect to those used in the construction of the Buddha Gya temple. It is probable that the temple dates about 700 A. D.

No. 58.—Shows the temple from the east, with the remains of the shrine and mound of brick rubbish.

PALI. *No.* 59.—About seven miles nearer Gya, on the Patna road, there is a large mound with a small modern temple. Near this is a large slab with a representative of the same group of figures as at Koch Dapthoo, &c.

KISPA. *Nos.* 60 and 61.—This place is nearly west from Nair, about six miles. There are large mounds there, and a very fine standing statue of Sakya Singha as a teacher with the Buddhist creed in an inscription round the head. Near the above there is a large four-armed figure sitting on the shoulders of another squatting figure. This figure is quite unique; this being the only specimen of the kind to be found in the district, it is not known to what it refers.

No. 62.—There is also a curious sculptured block, which it is difficult to make out to what it belonged. It could not have been the base of a linga, as that is invariably inserted into the yoni, whereas in this case there is no place for insertion.

GENJAN. *No.* 63.—About a mile and a half from Kispa to the north-east, there is a village called Genjan on the top of a large mound. Here there is a very fine statue of Buddha the ascetic, with representations of the birth, teaching, and death or Nirvana of Sakya Singha in small figures surrounding it. This is one of the best-executed sculptures in the district, and although much mutilated and broken, it is of considerable interest.

RAJGEER. *No.* 64.—Rajagriha is one of the few places about which there can be no doubt of its identity, and was visited by the Chinese pilgrims, Fa-Hian in the fourth century, by Hwen Thsang in the sixth century. They both visited the 'Son Bundar' cave, famous in Buddhist annals as the spot where the first Buddhist synod was held in a temporary building in front of it, by Ajatasatru, Rajah of Magadha. There is an inscription cut on it not later then 200 A. D., but the cave itself is probably older. It measures 34 feet long by 17 feet wide, and is cut in the solid rock, but is neither smoothed nor polished.

No. 65.—The cite of the ancient city is now overgrown with brushwood, and is surrounded by hills in every direction. A small elevation in the centre marks the cite of a monastery chapel. View 65 is looking east from the door of the cave.

orthodox. Notwithstanding that there is a linga now occupying the shrine, the building itself is by popular tradition the work of Kol Rajahs (a generic name for the aboriginal races). This bad odour with the orthodox would seem to prove its Buddhist origin.

No. 80.—Four miles east of Konch, on the same road, there is a village called Pali, where there must have been some large temples, only a few pillars of which are now standing. It must have been of the same style as those at Nair and Poonawa.

No. 81.—The sculptured doorway, part of which is lying under a tree close by, closely resembles the fine one at Poonawa.

SEHAREE. *No.* 82.—About eight miles west of Konch, near the village of Seharee, there is a small stone temple on the roadside; it is constructed entirely of Chunar stone, and was completed at Chunar and sent down fit for erection. It is now the pride of the little hamlet where it stands.

OOMGA.—This place is situated within a mile of the dâk bungalow of Madunpore on the grand trunk road, and fourteen miles west of Shergháti.

No. 83.—The temple is built on a rocky spur of one of the highest hills overlooking the grand trunk road, and is built entirely of squared granite blocks without cement and is in excellent preservation. The height of the temple from the rock to the crest is about 60 feet, the extreme length from east to west is 68 feet, and the breadth 53 feet.

No. 84.—To the north and south there are balconies which give the temple a distinctive character, and marks a transition from the open pillared portico which had previously been the rule, as at Poonawa, Nair, and Pali.

No. 85.—The large porch in front was entirely enclosed, and was lighted by these side balconies, the interior has a very imposing appearance, and the monolithic pillars with bracket capital is a decided advance from plain column with cross brackets.

No. 86.—Inside there is a large slab of black chlorite with a long inscription recording the building of the temple by Bhairub Indra in Sambat 1496, *i. e.*, A. D. 1439, on Thursday, the light half of the moon Bysack, and was dedicated to Jagarnath, Balbhadru, and Subhadra. The shrine is, however, occupied by a linga.

No. 87.—To the south of the temple there is a fine large tank with a flight of stone steps on the east side nearest the fort, part of of which is still standing north and south of the tank. Several mounds indicate the position of the town.

No. 88.—Higher up the same hill on which the temple is built, and on the summit of a higher ridge, there is a curious little altar with a huge boulder alongside it. Under the boulder sacrifices of kids and other animals are still made. Every available ledge and spur on this hill seems to have been occupied by similar structures, and there are also a great number of figures and lingams both on this and the adjoining hills.

No. 89.—Still higher up, and also facing the east, are the ruins of another temple, nearly as large as the one lower down, and in the same style, but nearly the whole of the superstructure has fallen down. On the path between the two temples there are several inscriptions cut on the face of the rock, but from the texture of the granite they are nearly illegible.

On the hill opposite the dâk bungalow there is a small temple and tank which are of a much earlier date, and the bricks and style resemble those at Budh Gya. In this case also the chamber has an arched roof.

Deo. *No.* 90.—Deo is twelve miles to the west of Oomga, and there is a very fine temple here. It is in the same style as those at Oomga and like these built of squared blocks of stone. This temple, however, faces the west, and has been highly ornamented. There is no inscription on the temple, but it may be of a somewhat earlier date than those at Oomga.

No. 91.—This place is also the residence of the Maharajah Jai Pergash Singh, K. C. S. I. His palace, a large rambling building, is quite modern.

Bridge over the Poonpoon River. *No.* 92.—The bridge over the Poonpoon river, where it crosses the grand trunk road between Muddunpore and Baroon, is given simply to show the character of the scenery on this part of the country. The Poonpoon, which is here only a few miles from its source, is a mean little stream, but as it collects the whole of the rainfall between the Sone and Morhur rivers, it becomes towards Patna a large river, which lays the country under water for many miles to the south-east of Patna.

CHEON.—Is situated north-east of Oomga, about eight miles. A large number of isolated little hills are dotted over the country for some distance north of the grand trunk road. Many of these large masses of granite are not shown in the revenue maps. Nearly every one of these hills had little structures of some kind on their summits.

Nos. 93 and 94.—To the east of the village of Cheon there are the ruins of a temple of considerable size built of squared granite black without cement. It is now in ruins, only part of the shrine and doorway remaining.

The interior of the shrine is occupied by a linga, and there are no inscriptions; but from its general resemblance to the temples at Oomga it may be considered as of the same date.

Nos. 95, 96, and 97.—To the south of this temple, and to the east of a little hill there is a fine, life-sized four-armed statue with many fragments of others, also several mounds and masses of brick rubbish on every side. About 300 yards to the west, on another little hill called Puchar, there is a cave about half way up the hill. It is a natural hollow which has been built up enclosing a chamber some 10 feet by 12, with a doorway supported on bracket pillars. Inside there is a figure of Budh surrounded by a seven-headed snake called 'lungabeer.' There is also a figure of Mahamaya, the mother of Budh.

No. 98.—A little platform has been constructed in front of the cave, and a flight of rude steps led up from below. The cave faces the south.

No. 99.—About a mile to the south there is another cluster of little hills within the boundary of the village of Deokillee where there are many little caves similar to the one at Cheon. Most of them are filled up. One curious altar-like structure crowns the summit of a ridge between two hills immediately above a natural hollow in a rock which was used as a tank.

No. 100.—And on the north of the hill a bund has been thrown across a hollow, thus forming a large tank, thus showing that the whole locality had been one of some importance. All these hills must have literally swarmed with Buddhist ascetics. Judging by the great number of little caves and structures, the remains of

which now exist, it is to be regretted that no inscriptions have come to light.

Poonawa. *No.* 101.—This village is situated fourteen miles west of Gya, and the principal antiquity is a pillared temple of Triloknath, which has no superstructure left, but which, according to Major Kittoe, was not the case when he visited it in 1847, at which time a considerable portion of the superstructure was still perfect.

No. 102.—One of the doorways is beautifully carved in black chlorite, and is the finest piece of sculpture of the kind in this part of the country.

Seetamuree.—This place, which seems to have escaped the notice of all the antiquaries who have visited this district, although only fourteen miles from Poonawa, shows how difficult it is to obtain information of the whereabouts of antiquities, even to enquirers who devote themselves to such pursuits.

The village is situated about a mile south-east of a village called Nadgurha on the Nawadah and Gya road, and fourteen miles east from Poonawa.

No. 103.—The cave is excavated in a large block of granite on an open plain; the doorway is of the Egyptian form, being 1 foot, 10 inches at the top and 2 feet, 2 inches at the bottom. The passage leads into the cave at an oblique angle, and is 3 feet, 5 inches long. The chamber itself is 15 feet, 8 inches along the floor, and 15 feet along the roof, and 6 feet, 4½ high in the centre, and 11 feet, 1½ in width. The roof is vaulted, and springs at once from the floor. The whole of the inside is highly polished, and the rock is as compact as those in which the caves are executed at Burrabur. Curiously enough there is no trace of an inscription, inside or outside. Inside, from the high polish every where, no inscription could escape notice; outside, without a recess being cut for its reception, no inscription could be cut, and there is no sign of any such recess. Its construction at any time must have been an achievement of no ordinary kind, and it is remarkable that an inscription should have been omitted. Its date cannot be less than those at Burrabur, which it so closely resembles. The form of the doorway and the polished interior are conclusive, I think, on this point.

Kurkihar. *No.* 104.—Is situated about three miles north-east

of Poonawa. There are large and extensive ruins at this place, and a great number of statues scattered over a large area.

The principal one is a figure of Sakya Singha sitting under the tree at Budh Gya, with representations of events of his life on either side, and a small inscription on the pedestal.

BURRAGAON.—There is no place in this district where the ruins are so extensive, or on such a large scale. Unfortunately, the greater part are hidden under immense mounds of brick rubbish, and although the place has been used as a quarry for bricks for many years, the foundations are not yet reached. The place is the site of the ancient Nalanda, according to Colonel Cunningham, where the greatest monastery in all India existed.

No. 105.—There are a series of lofty mounds some 60 feet high, covering a space 1,600 feet long, by 400 feet in width. The principal ruin is that of the great temple of Baladitya, which is said to have resembled that at Budh Gya, and must have been built between 450 and 500 A. D.

Nos. 106 and 107.—The statue enshrined in this temple was most likely the gigantic one now called Bhairav. It is in a sitting position, and is now collected with a number of smaller figures in a small courtyard at the foot of the large mound.

No. 108.—To the north there is a large statue of the ascetic Budh, with several inscriptions on it giving the names of the attendants.

No. 109.—There is also a Jain temple in the same style as the Budh Gya one, and is therefore of much the same age.

No. 110.—At the adjoining village of Jagdespore there is a very fine large figure of the ascetic Budh surrounded by demons and alluring females.

CHILLOR.—Major Kittoe notices this place as the site of one of the eighteen viharas of Behar. The ruins are very extensive, consisting of large mounds, with many figures and sculptures.

No. 111.—The principal one is of a beautifully carved one, nearly life-size, said by Major Kittoe to be a representative of Siva, but this is doubtful, as there is a small figure of Buddha in the head-dress, the outline of an antelope forms the upper edge of the dress, which may determine what the figure really is. The expression

and attitude of this figure has more life in it than is general amongst ancient sculptures.

DAPTHU.—*Nos.* 112 and 113.—Is situated about a mile inland to the east of the Fulgo, and about fourteen miles from Gya to the north. This seems to have been the site of a large Buddhist community, and the remains are extensive. There are two temples partly standing. The northern one was dedicated to Surya, and a large figure of the same is still standing inside.

No. 114.—Both temples seemed to have had a pillared portico in front, but which has since been built up with brick. The door of the shrine in the southern temple is very fine, and has been figured in the first volume of Martin's India. Outside there is the same curious group of a prince on horseback with the same attendants, &c., as at Konch, &c., only differently arranged.

Nos. 115 and 116.—The south of the district of Gya is bounded by a range of hills which form the boundary between Gya and Palamau near Maharajganj. Some of these hills are composed of huge masses of granite of very suggestive outlines. The most conspicuous of these is the 'kotila' or granary, the curious dome-like peak of which is nearly inaccessible. Nevertheless on certain occasions a light is observed on its summit which would show that some one has a knowledge of the way of getting up to the summit, although I believe the revenue surveyors failed to do so.

No. 117.—The continuation of the same hills, and where the Koel river runs round their base, and at the point where the rock slopes down into the river, three large boulders block the path. These stones are said to have been collected by the popular hero 'Bhimsen' for his 'chula' or cooking-place, which the arrangement of the three boulders favours, as they closely resemble the three stones used by travellers to rest their pots on while cooking.

On the sloping rock which dips into the river there are some curious worn hollows, which I have no doubt were caused by the women of the aboriginal tribes in husking their rice, as is the universal custom amongst the Kol tribes of Chota Nagpore, as the wooden instruments for this purpose, so commonly in use elsewhere, are not used by them. I could never obtain any clue as to the meaning of these depressions until I had seen the practice

of the Kol women, and it is known that the aboriginal tribe of Mhars were in possession of the country until dispossessed by the ancestors of the present Rajput family of Sonpura.

TIRHUT. *No.* 118.—Bukra. This place, which is one of the banks of the Gandack or Naraini, must have been a place of great importance, and has been identified as the ancient Vaisala. The principal antiquity is one of Asoka's pillars surmounted by a lion. It is only 18 feet above the present level of the ground, and 27 feet, 11 inches above the level of the surrounding fields. Colonel Cunningham made an excavation down to the water level, or 14 feet below the present surface, but found no inscription, and had not then reached the square base, so that the whole length above the water level is 32 feet, and, including the statue and capital, 44 feet 2 inches.

No. 119.—Immediately to the north, and outside the courtyard in which the pillars stand, there is a ruined brick stupa with a fine old pipul tree growing on the top. This place is famous in Buddhist annals as the place where the second Buddhist synod was held.

LOURYA NEAR ARE-RAJ. *No.* 120.—Between Bukra and Betteah, and twenty miles north-west of Kesariya, at a village called Lourya, there is another of Asoka's pillars, and of the same polished compact sandstone. It is 36½ feet high and has no capital; it is 41·8 inches in diameter at the base, and 37½ inches at the top. It has several of Asoka's edicts neatly engraved on both sides, and the letters are still as fresh and sharp as if only done a year ago.

SIMROUN.—On the borders of Nepal, north-east of Motihari, is the fort of Simroun, the ancient capital of Mithila. The ruins cover an area of sixteen square miles, but are so overgrown with dense jungle that it is almost impossible to make out anything. A brick wall of four feet thick by a further thickness of 10 feet of mud, surrounds the whole. The bricks used are large, 10′ × 7′ × 2′, well burnt, and finely fitted together. Within the outer enclosure there is another, comprising about five acres; inside this was the palace and principal buildings. Between the two enclosures a great number of figures, carvings, statues, and large wells built with stone are scattered all over. The palace and many of the principal

buildings were built of squared blocks of sandstone 3 feet by 1½. Some part of the walls are still standing, but from the irregularity of the upper courses they must have been rebuilt, so that little remains to show what the structures original were.

Nos. 121 and 122.—Some large figures are collected near the little modern temple, which are beautifully carved, and seem representatives of Surya. Some slabs of sandstone are collected in the same place which no doubt formed part of a doorway, and executed in the very best manner. They consist of several figures enclosed in scrolls of lotus stem in a most beautiful and artistic manner.

No. 123.—An inscription let into the wall of the little temple is quite modern, but I am convinced this stone had an older inscription which must have been obliterated to receive the modern one.

No. 124.—This is a view of the rock in which the 'Karna Chowpar' cave, at Burrahur, has been excavated, and showing the general appearance from the east of the immense granite block in which the cave has been excavated, and also the scarped rock to the south.

No. 125.—Is a sculptured slab with a representation of the nine Avatars let into the wall of the porch of the temple at Konch.

No. 126.—Is a curious slab with some carved figures, and surmounted by some singular emblems with an inscription in Sanscrit underneath: unfortunately the inscription is too much worn to be decipherable. The figures represent a seated figure in the centre, something like a Budh, with male and female figures on either side. The emblems above are an open hand with a rosette in the palm; the emblems of the sun and moon on either side. There are three specimens of this emblematical stone in this district; the present one is from the banks of the large tank at Madinpore on the grand trunk road twenty-four miles west from Sherghátí, near the temple of Oonga; the other one is under a tree near that temple; and the third is on the temple of Gajadhur at Gya. All of these stones are nearly similar, and the stone is the same in each case, *viz.*, a soft soapstone, and in consequence the inscription is not readable in either of them. From the style of workmanship and the peculiar selection of this soft stone, it is probable that these stones are the work of a different race of people from the

carvers of the numerous statues and figures generally found in this district; the manner in which the hair is arranged in the figures differs also from the usual Buddhist and Hindi figures. It is believed that similar emblems are found on some Canarese inscriptions.

No. 127.—Is another view of the beautifully executed figure at Chillor, showing the standing figure of Budh, the teacher, alongside.

No. 128.—Is a view of the southern temple at Dapthoo; it is the larger of the two temples, and as it stands at present it consists of a pillared hall, which was originally open, but was subsequently enclosed. The shrine has now nearly fallen, and in the enclosed porch there are a great number of figures collected, most of them in very good preservation; but the want of light in the interior prevents their being photographed.

No. 129.—To the south of this temple there is a fine standing figure of Mahamaya, the mother of Budh, in good preservation and well executed; she is represented as four-armed, one hand holding a water vessel.

No. 130.—Is another view of the Vishnu Pud, at Gya, giving the whole of the upper portion of the temple, which, from its very confined situation, cannot be photographed as a whole.

No. 131.—Is a view of the old town of Gya looking west from the Vishnu Pud temple, with the Brahmajoni temple and hill in the distance.

No. 132.—Is another view of the fine old temple, at Deo, giving a better view of the south side of the temple, with part of the Maharajah's palace to the left.

SHAHABAD.

Sasseram, from having been selected by Sher Shah as his residence, was at one time a place of great importance, and there are very interesting buildings still in existence, although from inferior workmanship many of them are in a very dilapidated condition, and in a few more seasons some of them will have fallen.

Nos. 133 and 134.—The principal building is the tomb of the Emperor Sher Shah, which is situated to the west of the town in

the middle of a large tank. From the north side of the tank a bridge leads to the island, on which the tomb stands ; it has partially fallen down, and is replaced by a mud embankment. The island is raised by steps from the level of the water. Above this is a wall 30 feet high, surmounted by battlements six feet high. The terrace is placed obliquely on the island, for what reason it is difficult to say. The four corners of the battlements are formed into octagonal buildings, forming inside airy apartments. There are two balconies projecting on either side supported by stone brackets covered by cupolas supported by four stone pillars. The tomb itself consists of a great hall surrounded by an arcade forming a gallery. In the centre of the great hall is the grave of the king opposite the niche for prayer : the other graves are said to be those of favourite officers.

No. 135.—Sher Shah also erected a large monument to the memory of his father Husain Khán Súr, in the middle of the town ; it is enclosed in a large area by a high wall of cut stone ; the tomb is not so large as that of his son, but like it consists of a large hall surrounded by an arcade and covered with a handsome dome.

Rohtasgarh.—This fortress is situated on the banks of the river Sone, at a distance of some thirty miles south of the grand trunk road, and occupies the whole of the crest of a nearly isolated spur of the great table-land. Buchanan Hamilton, in Martin's *India*, states that this important fortress derives its name from the young prince Rohitasiva, the son Harishchandra, a king of the family of the sun, in the most remote period of Hindu legend. His image, he further says, was worshipped at this place, until the time of Aurungzeb. From the time of Harishchandra until the 12th century of the Christian era, it is not known in whose possession the fortress remained, but at this time it belonged to Pratapa Devala, father of the last Hindu emperor, and it continued for some time subject to his descendants. The tradition is, that it came under the Mussulman rule in the time of Sher Shah, A. D. 1539, and that on its capture he immediately set to work on strengthening its defences, but that the works projected were never completed owing to his having discovered a more favourable situation at

Shergarh near Sasseram, where he erected a fortress named after himself. When Man Singh was selected as viceroy of Behar, he selected Rohtas as a place of safety for his treasure and family, and almost the whole of the present buildings were erected by him, and this is confirmed by the inscriptions on the principal entrance to the palace, and also on the gateway of the fortress leading to the main table-land called the Ketantya gate. From these it would appear that the works were finished in the year 1654 Sambat, or A. D. 1597.

The fortress occupies the whole of the plateau, measuring about four miles from east to west, and five miles north to south; but from the deep windings of the precipitous crest, the whole circumference is said to be twenty-eight miles round.

No. 136.—The palace called the Mahal Sarai extends its greatest length north and south and the principal front faces the west, where it overlooks a large enclosure, probably intended as a parade ground, as the principal state rooms have balconies projecting from the walls overlooking this enclosure.

No. 137.—At the southern end of the principal front is a large arched gateway with two elephants cut in the stone on either side, and consequently called the Hathiya Pul. Within this gate there are several vaults and recesses for the accommodation of the guard and the officers on duty.

No. 138.—Passing through this gateway the passage leads into a sort of courtyard, and immediately opposite the entrance is one of the finest buildings in the whole place. It was the public reception room, and was called the Barahdoware or twelve gates, and it is divided into two principal halls, one behind the other, with lofty arched roofs, and are the only respectably sized rooms in the whole palace.

No, 139.—The eastern face of Barahdoware is ornamented with a double row of arched doors giving light to the spacious halls behind, and also giving a light, graceful appearance to this side, which is wanting in the principal front.

No. 140.—The northern part of the palace seems to have been the quarter set aside for the ladies' apartments, and the chief building was surrounded on three sides by a flower garden. It

was the residence of the chief's wife, and was called the Aínah Mahall. Photograph No. 140 is the view looking west with the open verandah of the Takht Pádisháhí to the left.

No. 141.—Is a view of the same building from the opposite side looking south-east. This building is not overlooked by any part of the palace, except from the roof of the Takht Pádisháhí or principal state room, and evidently intended as the chief's audience room.

No. 142.— Is a view of the Takht Pádisháhí with the cupolas on the summit, and part of the country beyond the walls, which is very pretty and park-like.

No. 143.—The inscription over the principal entrance on the inner side is a fine specimen of the florid style of Persian writing. The inscription is given both in Hindi and Persian on the same tablet.

No. 144.—To the north-west of the palace, where Sher Shah had contemplated the erection of a citadel, there are the remains of several very large buildings. The principal one is the tomb of the superintendent of the works, who is said to have been an Abyssinian slave (*Habshi*). It is in the same style as the tomb at Sasseram, and is now picturesquely overgrown with jungle.

No. 145.—Between the palace and the edge of the precipice, there is a small ravine by which the water from the tanks above finds its way to the edge of the precipice over which it throws itself in a tiny rill, which is lost in spray before reaching the bottom. From the opposite bank of this ravine, a good view of the palace is obtained.

No. 146.—At the south-east corner of the table-land there are some curious old buildings constructed evidently with the stones from some still earlier buildings. At the foot of a long flight of steps, leading up to the Hindu temple and the mosque, is a small, but handsome, temple ascribed to Man Singh.

No. 147.—The Lal-darwaza or Red Gate seems to have been the principal entrance from the places below, and although the cliffs are nearly inaccessible themselves, they have been strengthened with works on a large scale. The cliffs are very grand and impressive. Photograph No. 147 is the view looking south over the ridge of the cliff.

No. 148.—The precipice all round the plateau is quite perpendicular, dipping down for a distance of 500 feet in some places, and nearly double that distance in others.

The following gentlemen duly proposed and seconded at the last meeting were balloted for and elected Ordinary Members—

Capt. W. L. Samuells, Assistant Commissioner, Pachumba, Chord line,

S. E. Peal, Esq., Sibsagor, Asam.

The following gentleman is a candidate for ballot at the next meeting—

W. D. Butcher, Esq., M. R. C. S., proposed by Mr. G. Nevill, seconded by Mr. J. Wood-Mason.

The following gentlemen have intimated their desire to withdraw from the Society—

Dr. H. Warth; J. F. Cockburn, Esq.; Dr. J. M. Fleming.

The following letter from J. G. DELMERICK, ESQ., Ráwalpindí, was read—

'I beg to inform you of the discovery of a hoard of seventy-four Indo-Bactrian hemidrachms in this District.

'Of these no less than fifty-eight were of Menander, *viz.*:—20, with bare head; 15, with helmeted head; 22, with bare head, hurling a javelin. 1. Owl on the reverse. Six were of Antimachus Nikephoros, and ten of Apollodotus, square, and of the common elephant and bull type.

'These coins were recently found by Sharaf, son of Najú, caste Mochí, age 16, of the village of Shakarpaṛí, Tahçíl of Ráwalpindí. The site of their discovery is a ravine five miles due north of Ráwalpindí on the Saidpúr road. Sharaf was employed in digging out the root of a shrub when he accidentally came upon the coins in a hole. They might have been in a pot, which he thinks may have been broken by the spade with which he was digging, but he saw no pot. No buildings or ancient remains are anywhere near the spot, and Shakarpaṛí is an insignificant village with no pucca buildings or ruins. The finder was rewarded from our local funds, and the whole of the coins, which were in perfect

preservation and as fresh looking as if just issued from a mint, were forwarded for deposit in the Central Museum at Láhor.'

Bábú Rájendralála Mitra read the following report, for 1870-71, on the progress he had made in cataloguing Sanskrit MSS. that are found in private libraries in Bengal.

"I have the honor to submit the following report on the operations carried on during the last official year (1870-71) for collecting information regarding Sanskrit manuscripts in native Libraries.

2. The task of searching for MSS. during the past year was confided to the travelling Pandit solely, circumstances not having permitted me to proceed to the mofussil. The Pandit had, however, the aid of the Rev. J. Long for a time at Dacca, and subsequently consulted me regularly about his work, furnishing me every week nominal lists of whatever MSS. he met with, and noticing in detail those only which I thought to be new or rare.

3. Nearly four months were spent by the Pandit at Dacca, Vikrampur, and other old towns and villages in Eastern Bengal, and most of the leading pandits and zemindars of those places were consulted. No one evinced any disposition to withhold information or aid. The Kundu family of Bhágyakula took great interest in the operations of the Pandit. They convened a meeting of the influential people of their neighbourhood at their house, and urged them to assist us with the loan of MSS. They also testified their sense of the importance of the undertaking by subscribing Rs. 1000, towards its furtherance. The amount was sent to the Government of Bengal, and has since been received by the Society. Dacca, however, though celebrated as a seat of commerce for over two thousand years, and the metropolis of Bengal for a time during the supremacy of the Muhammadans, never acquired any reputation for learning, and does not contain any Sanskrit work of great value. All the MSS. that were examined turned out to be such as are common everywhere, or of little importance. Between forty and fifty little treatises were found, which were new to the Society, and detailed notices of these have been secured.

4. On the return of the Pandit from Dacca he was sent to Bánsberiyá in Zilla Hugli, which was at one time noted as a seat

of Sanskrit learning; but nothing of any interest was met with there.

5. The Pandit was therefore, after a fortnight's stay at that place, sent on to Burdwan where I had hoped to find large collections of MSS. in the Library of the Mahárájá and the pandits of the district. But I was equally disappointed there. The Mahárájá, at my request, very obligingly allowed the Pandit access to his Library, but there were not quite a hundred MSS. in Sanskrit, and they comprised the Mahábhárata and other well known works which have been already printed. The head pandit of the Mahárájá's palace, however, showed some works on the Vedánta new to the Society's Library, and notices of these have been duly secured. Burdwan, is a place of some antiquity, and was of considerable importance during the Muhammadan rule, but it seems, like Dacca, to be very poor in Sanskrit works, and there is not a single pandit of any note who has a decent collection of MSS.

6. The disappointment at Burdwan, however, was amply compensated at Mánkar, near the Boodbood station of the East Indian Railway. Bábu Hitalála Mis'ra, a zemindar and Honorary Magistrate of the sub-division, has an excellent library, in which the travelling Pandit found between five and six hundred works on the Vedánta. These I had hoped, would have occupied his time for at least four months, but before he had time to take notes of about forty or fifty works, the Dusserah vacation intervened, and the Bábu's pandit subsequently falling ill, there was nobody to keep the library open, and the travelling Pandit had to be removed to Halisahar, a small town situated opposite Hugli.

7. Halisahar had at one time a large number of *toles* or colleges of Sanskrit learning, and several are still extant. In the time of Rájá Kṛishṇachandra Ráya of Nadia, about one hundred and fifty years ago, the place was celebrated for its Nyáya school, and some of the best pandits of Calcutta came from that place. But the pandits who now own the toles, proved the most bigotted of their kind, and offered so many obstacles, and raised so many difficulties, that after two months' stay, my travelling Pandit had to return without getting a single work of any importance.

8. During the last two months of the year, the travelling Pan-

dit was employed in examining the library of the late Sir Rájá Rádhákánta Bahádur, K. C. S. I. where he will have ample work for at least four months.

9. My assistant was, for a time during the period under report, employed in examining the library of Rájá Yatíndramohana Thakura of Calcutta, who has very kindly placed his collection of MSS. at my disposal. It is perhaps the richest private collection in Calcutta, and contains a larger number of Tantras than what I have any where else met with, not excepting the collections of the Asiatic Society of Bengal, and of the Sanskrit colleges of Calcutta and Benares. Very few works of this class have yet been examined by European orientalists, and owing to the circumstance of some of them being of an offensive character, they are generally looked upon with disfavour. They are wanting too in the halo of antiquity. The oldest among them, as far as I can guess, does not date before the 3rd century of Christ, and the bulk of them were composed probably between the 5th and the 12th centuries. They exercise, however, the most sovereign influence on the religious life of the Hindus, and control all their actions. A few display a curious phase of thought, in which a hypertrophy of the sentiment of veneration for the creative energy has lead to the most mystic and obscene rites that mankind has ever indulged in. Some of the works of this class profess to be revelations by S'iva made at the request of his consort Párvatí, and a great many are acknowledged to be compilations, but they all have the same characteristics, the same style of composition, and very similar professions of faith. Their subjects are various. Ancient legends, topography, medicine, and grammar are frequently treated of, but those subjects are all intended to lead to the establishment of the preëminence of the female energy in the creation of the world, or the mysterious adoration of the phallic emblems as the means of salvation. Traces of this dogma may be noticed in the Egyptian, the Chaldee, the Hebrew, the Gnostic, the Greek and other ancient creeds, but nowhere has it been developed to so inordinate or revolting an extent, or carried to so extravagant a length as in the Tantras, and in that respect they are of interest to the antiquarian and the student of ancient religious history.

The mystic charms and mantras and gesticulations which the better class of these works inculcate have, further, almost entirely superseded the rituals of the Vedas, and in the present day scarcely a ceremonial is performed, or a prayer repeated by a Hindu, which does not borrow its primary elements from the Tantras. For a correct understanding of the modern Indian forms of religion it is necessary, therefore, that these works should be carefully examined, and their true character thoroughly brought to light. It may be added also that, however offensive some of these works may appear in the light of modern European civilization, they were held in peculiar esteem by the dreamy monastic followers of the Buddhist creed in the 7th, 8th and 9th centuries, who translated a great number of them, and compiled others, with a view to engraft their doctrines on Buddhism, and we find in Csoma de Korosi's essay on the Buddhist literature of Nipal and Tibet hundreds of Tantras noticed as forming parts of the sacred scriptures of those places. Mr. Hodgson describes them as containing the esoterics of the Buddhist religion of Nipal, and in connexion with the Buddhism of the north, these works, therefore, are also of importance.

10. According to the Nila Tantra, the original Tantric revelations of S'iva are reckoned at 64, but their number has of late multiplied manyfold, and in the collection of Rájá Yatíndramohana Thakura, there are upwards of three hundred different works. Most of them are, however, fragmentary, and others are avowed compilations. In the notices already published I have given brief accounts of upwards of a hundred of these works, and I hope ere long to add considerably to that number. In Europe there are not a score of these works to be met with in the India House, the Berlin, the Bodleian, and other collections.

11. Altogether notices of about six hundred manuscripts have been compiled, and are now ready for the press.

12. The publication of the notices has not been carried on so expeditiously as could be wished. The form originally suggested by me and approved by the Society, did not meet with the approbation of the Government of India, and the correspondence which thereupon ensued, prevented me from pushing on the work. I have, therefore, to report the publication of only two numbers of

about 250 pages, containing notices of 317 manuscripts. These, with the first number which has been reprinted (the first edition having been exhausted), constitute a volume of 360 pages, containing notices of 519 works, of which 40 are on rituals, phonetics and other Vedic subjects, 32 on the Nyáya, 17 on the Vedánta, 20 on astronomy and astrology, 14 grammars, 23 Kávyas, 14 Náṭakas and 38 Smṛiti treatises. The body of the Vedas are represented by only two works, the Rudrakáṇḍa of the Yajur Veda and the Chhándogya Bráhmaṇa of the Sáma Veda. This paucity is, however, not a subject of wonder, considering that the study of the Vedas had fallen into disuse in Bengal long before the reign of the Sena rájas, and the founder of their dynasty, nine hundred years ago had to obtain five Bráhmaṇs versed in Vedic rites from the King of Kanauj to officiate at a sacrifice. The descendants of those priests, who now constitute the bulk of the Bráhmans of this province, have nowhere kept up the learning of their ancestors, and not a single native of Bengal is to be now met with who has systematically studied the Vedas. The Vedic Sútras are also ill-represented, and the few that have been noticed were obtained from Benares. The philosophical and theological portions of the Vedas, the Upanishads, have, however, been represented by no less than 75 treatises, most of which will be new to European scholars. The Puránas are met with in considerable numbers in Bengal, but as most of them are contained in the Library of the Asiatic Society, I have not deemed it expedient to notice them at length. On the completion of the Society's catalogue, which is now in a forward state, full information regarding them will be rendered accessible to scholars.

13. Annexed is a list of the MSS. which have been purchased for Government. Most of them, it is believed, will be new to the India House Library, though some of them are of little interest. They had to be bought as they formed parts of a collection which could not be broken up. Owing to the owner not having called for their price, most of them have not yet been paid for. Three of the works in the list, *viz.* the 2nd part of the Sáṅkháyana Sútra, the Vivaraṇa Bháshya and the Chhándogaparis'ishṭa, were copied from codices in the possession of pandits at Benares.

Skanda Puráṇíya Kshetramáhátmya.
S'aktisaṅgama Tantra.
Kámarúpa-yátrá paddhati.
Nigama-tattva-sára.
Brahmajṇána-mahá-tantra-sára.
Kálí-sahasranáma stotra.
S'rígurusahasranáma stotra.
Brahmajnána Tantra.
Náḍijnána-dipiká.
Dolárohaṇa-paddhati.
Kálístavarája.
Syámá-stotra.
Yati-bhushaṇi.
Darsana-kaliká.
S'ríbhaktiratnávalí.
Harinámámṛita.
Ísána Saṅhitá.
Mátriká-kosha.
Madana-párijáta.
S'ánti-s'ataka.
Shaṭ-chakra Ṭippani.
Vagalámukhí-kavacha.
——— Stotra.
Vástuhoma.
Grantha-saṅgraha.
Chaurakávya saṭíka.
Gáyatrí-hṛidaya.
Gáyatri-kalpa.
Jṇána Tantra.
Gurugítá.
Piṭha-nírṇaya.
Sarasvatí Tantra.
Guhyátiguhya Tantra.
Mugdhabodha-ṭíká.
Svatantra Tantra.
Goraksha-s'ataka.
Purṇánanda-chakra.
Vas'ishṭha-yogakánḍa.
Ís'vara-gítá.
Gaṅgáshṭaka.
Annadákalpa.
Puras'charaṇa-rasollása.
Gaṇgáshṭaka.
Devíkavacha.
Dattátreya Saṅhitá.
Puras'charaṇa-viveka.
Gurú Tantra.
Durgádádináma stotra.
Takárádi-svarúpa.
Níla Tantra.
Vagalá Paṭala.
Adbhuta-sára saṅgraha.
Rájavallabha.
Rogavinischaya.
Sáṅkhya Kaumudi.
Muṇḍamálá Tantra.
Sandhyá paddhati.
Karpurastava Ṭíká.
S'iva-saṅhitá.
Gáyatrí-hṛidaya.
Gauríkanchuliká.
Sundari-s'aktidána.
Do. Tíká.
Sahasranáma-stuti.
Víjakosha.
Gaṅgástava.
Gáyatríbráhmaṇollása Tantra.
Tripurá-samuchchaya Ṭíká.
Aparokshánubhuti.
Svarodaya.
Pavanavijaya.

Mátrikájaganmaṇḍala-kavacha.
Grantha-saṅgraha.
Prasna-kaumudí.
Jyotihságara-sára.
Chandronmílana.
Padártha-saṅgraha.
Vyávasthárṇava.
Dvitiyádivyutpattiváda.
Anumiti Rahasya.
Vyápti-panchaka Rahasya.
Siṅha-vyághra Rahasya.
Shaṭchakravivriti Ṭíká.
Suddhi-dípiká.
Divya-chuḍámaṇi.
Annapurṇá Upanishad.
Nirvána Upanishad.
Ekákshara Upanishad.
Yajñyavalkya Upanishad.
Akshamálika Upanishad.
Vyádhikaraṇa-dharmávachchtina-bhávao
Sámányábháva Rahasya.
Vis'eshavyápti Rahasya.
Vyáptigrahopáya Rahasya.
Tarka Rahasya.
Vyáptyanugama Rahasya.
Sámányalakshaṇá Rahasya.
Pakshatá Rahasya.
Vrihannáradíya Puráṇa.
Tarka Ṭippaní.
Vyáptyanugama Ṭippaní.
Sámánya bháva Ṭippaní.
Siṅha-vyághara Ṭippaní.
Tárárahasya-vrittiká.
Kátantra-vrittiká.
Kátantra-vritti-durga-ṭiká.
Kátantra paris'ishṭa.
Durgávàkya-prabodha.
Siddhánta-dípa.
Sabda-chintámanyáloka.
Smriti-chandríya sráddhakalá.
Válakrishṇáshṭaka.
Áchárasára Tantra.
Sráddhavidhi.
Chhandoga Paris'ishṭa.
Vivaraṇa Bháshya.
Sáṅkháyana Sútra, part II.

The following paper was read—

The Rock-cut Excavations at Harchoka, discovered by Captain W. L. Samuells when employed as Boundary Commissioner on the Rewah and Chutiá Nágpúr Frontier, Season 1870-71.—*By* Capt. W. L. Samuells, *Assistant Commissioner, Pachumba, Chord line.*

The Secretary read the paper, which will be printed in No. III of Part I of the Journal. A tracing of the excavations and a plan of the temples by Capt. Samuells will accompany the paper.

Colonel Thuillier moved that the thanks of the members are due to Capt. Samuells for his valuable and interesting contributions and donations to the Society.

The Chairman put the motion to the vote. Carried unanimously. A conversation ensued in which several members joined.

The receipt of the following papers was announced—

1. *List of Shells collected on the Arakan Coast.—By* W. Theobald Esq., Burma.

2. *On a New Species of Flamingo.—By* W. E. Brooks, Esq., C. E., Etâwah.

The meeting then broke up.

Library.

The following additions have been made to the library since the meeting held in November last.

Presentations.

*** Names of Donors in Capitals.

Journal Asiatique, No. 63.—Socie'te' Asiatique, Paris.

Journal of the Linnean Society, Zoology, Vol. XI, Nos. 49 to 52. —The Linnean Society.

Ditto, Botany, Vol. XI, Nos. 54 to 56, Vol. XIII, No. 65.—The Linnean Society.

Journal of the Statistical Society of London, Vol. XXXIV, Pt. III.—The Statistical Society of London.

Proceedings of the Royal Geographical Society, Vol. XV, Nos. 3, and 4.—The Royal Geographical Society.

Journal of the Anthropological Institute of Great Britain and Ireland, Vol. I, No. 2.—The Anthropological Institute.

Annual Report of the Settlement of Port Blair for the year 1870-71.—The Government of India, Home Department.

Records of the Geological Survey of India, Vol. IV, Pt. IV.—The Geological Survey of India.

Catalogue of the Syriac MSS. in the British Museum, Pt. II.—The Trustees of the British Museum.

Memoirs of the Aksakof family, a sketch of Russian Rural Life seventy years ago.—Revd. J. Long.

Catalogue, Punjab and Sindh Plants.—J. E. T. AITCHISON, ESQ., M. D.

Seventh Annual Report of the Sanitary Commissioner to the Government of India.—J. M. CUNNINGHAM, ESQ., M. D.

The Calcutta Journal of Medicine, 1871, No. 9, Sept.—THE EDITOR.

The Christian Spectator, 1871, Nov. and Dec.—THE EDITOR.

Purchase.

Táríkh-i-Jahángír (Mírzá Jahángír), MS. :—Journal des Savants, September, 1871 :—Comptes Rendus, Nos. 11 to 14 :—Revue des Deux Mondes, 1st October, 1871 :—The Annals and Magazine of Natural History, 1871, September and October :—Westminster Review October, 1871 :—L. E. and D. Philosophical Magazine, 1871, September and October :—Hewitson Exotic Butterflies, Part 80 :—Reeve's Conchologia Iconica, Parts 288, 289 :—Kitab al Fihrist, I Band, Text :—Al Haríri's Durrat al Ghawwáç :—Ma'súdí, Les Prairies d'Or, texte et traduction, par C. Barbier de Meynard, Tom VI.

APPENDIX.

CORRESPONDENCE RELATIVE TO DEEP SEA DREDGING.

Calcutta, 14*th June*, 1871.

From F. STOLICZKA, PH. D., *Hony. Secretary, As. Soc. of Bengal,*

To E. C. BAYLEY, ESQ., C. S. I., *Secretary to the Government of India, Home Department.*

SIR,—I am instructed by the President and Council of the Asiatic Society of Bengal, to solicit the favorable consideration of His Excellency the Viceroy and Governor-General in Council to a subject which appears to the Council of the Society one of the very highest importance, namely, the desirability of undertaking deep sea dredgings in Indian waters.

The Council believe they can best bring the matter before His Excellency in Council by submitting a copy of a Memorandum, drawn up at the suggestion of the Natural History Committee and, after full discussion by the Committee, accepted by the Council of the Society.

It cannot, the Council believe, be questioned that results are to be expected from deep sea dredgings of the highest importance for the progress of both biological and physical science. It is a well known fact, that in former periods of our planet there prevailed a much more uniform distribution of temperature, and of animal and vegetable life. In the kainozoic epoch the climate in Europe was somewhat similar to that of our present Indian and Australian waters, and many of the then inhabitants of the seas shew great affinities to those now found living in Indian seas. In order to trace the connection of these faunas, dredging in Indian waters would undoubtedly supply most valuable materials.

Again, as yet there have been no systematic observations made regarding the laws regulating the temperature of water in Indian seas, the various currents, the physical character of sea bottom, &c. Valuable results may, therefore, be justly expected for the progress of hydrography, and collaterally for the benefit of navigation; and

equally important will be the examination of the sea bottom for the study of geology and physical geography.

An undertaking of this range is beyond the means of any private individual, but its importance is so great that the Council believe it to be well worth the consideration of His Excellency the Viceroy and Governor-General in Council, and the enlightened Government of a powerful State like the Indian empire.

The Council of the Society are, therefore, confident that His Excellency in Council will approve generally of the proposal, put forward in the accompanying Memorandum, and trust that he will give the undertaking the same generous support which has been afforded to similar expeditions in England and other countries.

They would hope that steps might at once be taken in communication with the Admiral commanding the Indian stations, and that this project may be brought under the consideration of the Lord Commissioners of her Majesty's Admiralty at home, so that certain special preparations which will be required may be made without delay. Owing to the peculiar nature of the climate in these latitudes such researches can be favourably carried on only during one-half of the year, and the importance of completing preliminary arrangements at an early period becomes, therefore, more obvious.

Memorandum on Deep Sea Dredging Operations proposed to be undertaken in Indian Waters.

The Sub-Committee appointed to consider the desirability of undertaking Deep Sea Dredging in Indian waters, beg to submit the following Memorandum on this subject :—

The vast importance of Deep Sea Dredging for the study of Zoology, Geology, Physics and Hydrography has been placed beyond all doubt by the results of the explorations which have been lately carried on, and are still being prosecuted, under the auspices of the Governments of England, Sweden and Norway, and in America. In England, the importance of such researches was recommended to the consideration of the Royal Society of London chiefly for the following reasons :—

1. To test a rather generally accepted opinion that no animal life existed below the depth of a few hundred fathoms :

2. To determine the influence of light and of pressure upon animal life at great depths :

3. To further the study of the geographical distribution of animal and vegetable life.

4. To determine the temperature, the strength and direction of the currents, the relative Chemical composition and the amount of dissolved gases in Sea Water at various depths, &c.

5. To determine the nature of the Deep Sea bottom, the mode of its deposition, and the sources whence the materials composing it were derived.

The interest attaching to the study of these questions, and their important bearing upon the progress of Biological and Physical Science, having been duly considered by the Royal Society, it was resolved that application should be made to Government for assistance. The Lords Commissioners of the Admiralty in the most liberal manner acceded to the recommendation of the Royal Society by placing a suitable vessel at the disposal of the Dredging Committee by whom the Scientific exploration of the Deep Sea has been, and is being, most successfully prosecuted. The results of their explorations have been given from time to time in the reports printed in the Proceedings of the Royal Society (Vol. XVII, No. 107, Vol. XVIII, No. 121, &c.), and they fully justify the high expectation of success from the expedition which had been formed. The Sub-Committee would only draw attention to one or two of the most important acquisitions to science.

Dredging operations conducted down to the enormous depth of upwards of two thousand fathoms have proved the existence of animal and vegetable life in abundance, even at that vast depth.

Most valuable observations have been made on the rate of diminution of temperature with increase of depth. The existence of two distinct submarine climates in close proximity and on the same level, called respectively the Warm and the Cold areas, has been most conclusively proved, and each area has been shewn to possess its own peculiar fauna and sea-bed; this in the warm area being almost entirely composed of *Globigerina*-mud and in the cold area

of fragments of rocks. It seems impossible to overrate the important bearing of these observations on the study of Geology. The Atlantic sea-bed was in places found to be covered with a jelly-like net work of protoplasm (*Bathybius* of Huxley), which offers a curious parallel to the Laurentian Eozoon, the oldest trace of animal life yet discovered.

Up to the present time naturalists in India never have had a possibility of carrying out such researches. There has been no vessel, fitted for such duties available, and no means of carrying them on. Since, however, it has been determined to form the Indian waters into a special naval station, and several steamers have been placed on the station, it is hoped that the possibilities of success have been entirely changed. The experienced officer who commands the station is fully alive to the great importance of enquiries such as we have alluded to, and has expressed his anxious willingness to aid them, in so far as his duty will permit. The readiness and friendly support which the Lords Commissioners of the British Admiralty have shewn in the promotion of any line of research calculated to advance knowledge, lead us also to hope that the same friendly aid will be extended to Indian naturalists, and we would, therefore, urge that an application be made to the Government of India for its support in these enquiries, with a request that it will also urge the question on the favourable consideration of the Lords Commissioners of Her Majesty's Admiralty, so that if consistent with naval duties, some one of the steamers, now in these waters, might for a time be placed at the service of the Committee.

It is beyond doubt that results of equal value and importance to those obtained by the Dredging Expeditions at home can, and will, be obtained by explorations of a similar kind undertaken in Indian waters, and, no regular dredging operations having ever been conducted in the seas of a tropical country, the Sub-Committee venture to think that the more favourable climate and the far richer fauna and flora of tropical and subtropical regions justify the expectation of even more numerous and more varied results, than those which have been obtained in colder regions. The variety and abundance of animal life must be enormous, because we have

to deal in the Indian seas with such vast differences of depth and, by a consequence, of temperature. It is known that these seas are the home of several species of Mollusca and other invertebrate animals only known to occur besides in the Middle and Upper Tertiaries of Europe. Of others occurring in the same, and even in more ancient, deposits, we know that the nearest living representatives are only to be found in Australian waters, and it would be a most valuable acquisition both for Geological and Zoological science, if we could in any way establish a connexion between these widely separated faunas.

Again, it is an acknowledged fact that complete and rapid destruction of organic life hardly ever extends over very large areas. We know the enormous richness of the Cephalopodous fauna that existed during the latter part of the Cretaceous Epoch in some districts of Southern India, and it seems to us almost incredible that such a vast variety of forms of animal life should have in one moment, so to speak, been entirely extinguished. Moreover, the fact that species of *Nautilus*, very similar to those found fossil in the deposits just mentioned, continue to live in the waters of the Bay of Bengal, almost justifies the expectation that some recent descendants of the *Ammonitidæ*, believed to be entirely extinct, also may have survived.

The Sub-Committee are confident that explorations of the deep sea in Indian waters will not only furnish data which will illustrate the modification of certain supposed laws regulating animal and vegetable life in countries Geographically and Climatologically different, but that they will undoubtedly supply much and most important material for the study and explanation of many yet obscure facts in Zoology, Geology, Physics, and the collateral branches of science.

The Sub-Committee, therefore, earnestly hope that Government may be led to regard the undertaking of Deep Sea Dredging in Indian waters as the most important source whence great progress to Natural History and Physical Science will result.

In the first instance your Committee would suggest the examination of the Bay of Bengal by a line of Dredging right across from new Juggurnath Black Temple to Cape Nigrais, to be fol-

lowed by another traverse from near Madras to the Andamans or the Nicobars, and again by a line from Ceylon to the coast of Sumatra. It would be necessary that, say three persons acquainted with the mode of enquiry should accompany each expedition, and it is hoped that sufficient accommodation could readily be found for them on board.

It is unnecessary to point out, that very vast acquisitions to our knowledge of the depths, currents, character of bottom, &c., of that part of the Indian Ocean and of the Bay of Bengal would result from these traverses, quite independently of the additions to our knowledge of the life, inhabiting these as yet entirely unsearched seas.

Your Sub-Committee, however, do not wish to insist on the adoption of this ground in the first instance. No course can be taken which will not yield a rich harvest of novelties and additions, and they would suggest that the convenience of the vessels on the station, should be one of the first considerations, as well as the climatal periods of Monsoon, &c., &c.

With regard to the appliances necessary for Deep Sea Dredging, the Sub-Committee beg to enumerate the following—

1. Three dredges of various sizes and an adequate supply of strong Manilla rope, which will probably be best obtained through the Admiralty. For heaving up the dredge, the vessel charged with the conduct of the expedition, should be provided with a donkey-engine, and might be otherwise so fitted as to render it adapted for the duty: the latest experiences in Deep Sea Dredging at home, have shewn that a double-cylinder donkey-engine proved to be the most efficient contrivance for hauling-in.

2. Sounding leads.

3. At least a dozen of Siemann's differential thermometers; or Prof. Miller's new Thermometer for Deep Sea Dredgings; these may be obtained from the Meteorological Department at home.

4. Water bottles.

5. In order to determine the nature and proportion of the dissolved gases, contained in sea water from various depths, an operation which must be performed at once on ship-board—3 glass hydrometers and 2 of Prof. Miller's apparatus for the Analysis of gases will be necessary.

6. The Sub-Committee believe that an annual grant of Rs. 2000, placed at the disposal of the Dredging Committee for the purchase of glass bottles, spirits of wine, scientific apparatus, &c., &c., necessary for the preservation and examination of the material obtained, would be sufficient.

7. They recommend that a Dredging Committee be appointed by the Government, including—

The President of the Asiatic Society of Bengal, for the time being.
Do., Natural History Committee, ditto.
Do., Physical Science, ditto ditto.
Thos. Oldham, Esq., LL. D., F. R. S., F. G. S.
Col. J. F. Tennant, R. E., F. R. S.
F. Stoliczka, Ph. D., F. G. S.
W. T. Blanford, Esq., F. G. S., C. M. Z. S.,
H. F. Blanford, Esq., F. G. S.
J. Anderson, Esq., M. D., F. L. S., F. Z. S.
J. Wood-Mason, Esq., F. G. S.

8. That this Committee be entrusted with the management of the explorations and with making suggestions as to the manner in which these can be best carried out.

9. That all specimens collected be in the hands of the Committee until they shall have been worked out; that the choicest specimens be eventually transferred to the Trustees of the Indian Museum where they should be preserved; and that the Committee have direction of the distribution of the duplicates to the Museums and men of science in Europe and America, who are engaged in similar researches.

10. That the report on each Dredging expedition be submitted to Government through the Committee by the officers who shall have had charge of the expedition.

THOMAS OLDHAM,
FERD. STOLICZKA,
JAMES WOOD-MASON.

From J. GEOGHEGAN, ESQ., *Under-Secretary to the Government of India, Department of Agriculture, Revenue and Commerce,*

To the Hony. Secretary to the Asiatic Society of Bengal.

Simla, the 28th August, 1871.

SIR,—I am directed to acknowledge the receipt of your letter No. 280, dated 14th June last, forwarding a Memo. on a proposed series of deep sea dredging operations in Indian waters, and requesting the Government of India to extend its support to the undertaking and to place a steamer at the disposal of the Committee appointed for the purpose.

In reply I am directed to state that the Governor-General in Council cordially approves of the proposal of the Society, and would be glad to make a steamer available for the undertaking. At present, however, no vessel can be spared either from the Royal Navy or the Indian Marine.

A Nautical Survey of the Indian seas is, however, contemplated, and when the result of inquiries that have been instituted in connection with that subject is arrived at, it will be considered whether a vessel can be made available for the joint purpose of carrying out the deep sea dredgings as well as the Marine Survey.

H. M. S. Forte, Seyshelles, August 26th.

From His Excellency the Commander-in-Chief Her Majesty's Naval Forces, East Indies.

To FERD. STOLICZKA, *Hony. Secretary, Asiatic Society, Bengal.*

SIR,—I have the pleasure to acknowledge the receipt of your letter, 23rd June, enclosing papers from the Asiatic Society regarding "Deep Sea Dredging."

I beg to assure your Society that I will assist in every way in my power so desirable an object. I would take the liberty to suggest to you to obtain as soon as possible all the apparatus necessary,—ready to embark in any vessel which may be made available.

I will represent to His Excellency the Viceroy that one of the two vessels of war stationed in the sea of Bengal might with ad-

vantage be employed on this service during N. E. Monsoon (supposing her services not otherwise urgently required) a temporary cabin being erected for the accommodation of the gentlemen who would conduct the scientific operations.

The small (or donkey) engine on board could be made to serve the purposes desired in the circular you have sent to me.

Asiatic Society's Rooms. Calcutta, 9th October, 1871.

From F. STOLICZKA, ESQ., PH. D., *Hony. Secret. As. Soc. Bengal.*

To J. GEOGHEGAN, ESQ., *Under-Secretary to the Government of India, Department of Agriculture, Revenue and Commerce.*

SIR,—I have the honor to acknowledge your letter No. 181, dated Simla, 28th August, 1871 and to express the thanks of the Council of the Asiatic Society of Bengal for the great interest with which His Excellency the Governor-General in Council is prepared to meet the recommendation of the Society conveyed in my letter No. 280, dated 14th June, 1871.

The Council has been informed by His Excellency the Admiral of the India Naval station that there is a likelihood of a Steamer being available for the proposed Deep Sea Dredgings during the approaching North East Monsoons provided that "her services are not otherwise urgently required," and His Excellency suggests, that the necessary apparatus should be obtained as early as practicable.

The Society has also received most encouraging letters from the Secretary of the Royal Society of London, and other leading men of science at home.

Considering the great importance of the subject I have the honor, by direction of the Council of the Asiatic Society, to suggest that His Excellency the Viceroy and Governor-General of India may be pleased to appoint a Committee for Deep Sea Dredgings, and also to apply through the Right Hon'ble the Secretary of State to the Lords Commissioners of the Admiralty for the early supply of the necessary apparatus which I had the honor to specify in my letter, No. 280, dated 14th June, and enclosure.

The Council is confident that the Royal Society would be glad to afford their aid in selecting the necessary instruments, and also in testing their value. The application for those instruments just at this time would probably be opportune, as several expeditions for Deep Sea Dredging are being organized in England, in Norway, by the German Empire and by the United States.

From J. GEOGHEGAN, ESQ., *Under Secretary to the Government of India, Department of Agriculture Revenue and Commerce.*

To the Honarary Secretary to the Asiatic Society of Bengal.

Simla, the 6th November, 1871.

SIR,—In reply to your letter, No. 500, dated 9th Ultimo, on the subject of a proposed series of Deep Sea Dredging operations in Indian waters, and the allotment of the Steamer for the purpose, I am directed to inform you that His Excellency the Governor-General in Council much regrets that it is not, at present, possible to promise the services of a vessel. The request will, however, he borne in mind and due intimation given of any arrangements which may hereafter become feasible. Copies of the Office Memorandum and enclosures accompany.

To His Excellency the Commander-in-Chief, Her Majesty's Naval Forces, East Indies.

SIR,—I am directed to acquaint you that a telegram to the following effect has this day been despatched to you :—

"PRECEDENCE."

Your letter of 9th October, and telegram of 23rd, Your Excellency's proposals regarding "Dryad" approved.—She should go to Bombay for repair and fittings and be back at Sandheads by last week of December to take the King of Siam up to Calcutta.

Enclosure of letter No. 18 of 18th October will have informed Your Excellency that a man-of-war is now required at Sandheads only to meet the King of Siam.

I have &c.,

(Sd.) H. K. BURNE, *Colonel, Secy. to the Govt. of India.*

Simla, the 27th October, 1871.

Government of India, Marine Department, Simla, 1st November, 1871.

OFFICE MEMORANDUM.

No. 423, dated 28th October, 1871.

With reference to the communication from the Department of Agriculture, Revenue and Commerce, noted in the margin, the undersigned has the honor to transmit copy of a letter from His Excellency the Commander-in-Chief of Her Majesty's Naval Forces, dated 9th October, and of the reply, No. 36, dated 27th October, regarding Her Majesty's Ship "Dryad."

2. The "Dryad" will proceed to Bombay for repairs and return to the Sandheads the last week in December, to meet and convey the King of Siam to Calcutta. She may perhaps afterwards be required to proceed to Burmah, so that it is much regretted that it is not at present possible to promise that her services shall be available for other duty, but the request will be borne in mind.

(Sd.) H. K. BURNE,
Secretary to the Government of India.

To the Department of Agriculture, Revenue and Commerce.

From His Excellency the Commander-in-Chief of Her Majesty's Naval Forces, East Indies.

To Major General H. W. NORMAN, C. B. *Secretary to the Government of India, Marine Department.*

H. M. S. "GLASGOW." *Trincomallie, 9th October,* 1871.

SIR,—I have the honor to acknowledge the receipt of your letter of the 21st ultimo.—(Marine Department No. 34) conveying the request of His Excellency the Viceroy for H. M. S. "Wolverene" to be sent to the Isthmus of Kra in January next to embark the King of Siam who is about to visit British India.

I have to inform you that the "Wolverene" has sailed for the East Coast of Africa, my Flag-ship (the "Glasgow") taking her place here.

Some time since I received a letter from Mr. Stoliczka, the Secretary to the Asiatic Society of Bengal, requesting my co-operation

in a scientific exploration of the sea of Bengal. I answered that I would take an early opportunity to consult with the Viceroy and to suggest that "the Second Vessel of War" stationed in this sea be so employed.

I wish now to propose that the "Dryad" (the Second Vessel of War) a ship of 1000 tons, be substituted for the "Wolverene;" and that on her arrival at Bombay next month, (for repairs) sufficient accommodation be temporarily added for the use of the scientific gentlemen, who would embark for the Marine explorations; this additional accommodation would render her a very suitable vessel to embark His Majesty of Siam.

I do not think the expense of this extra cabin-room would cost above £100.

I shall be glad to know His Excellency the Viceroy's opinion upon this proposition.

I have, &c.,

(Sd.) J. B. COCKBURN.

APPENDICES.

APPENDIX A.

List of papers submitted to the Society during the year* 1871, *with dates when they were received, and how they were disposed of.*

[* Short communications and abstracts, chiefly printed in full in the Proceedings are not included in this list, but referred to in the General Index.

Authors.	Titles of Papers.	When received.	How disposed of.
Anderson, John, M. D.....	A list of the Reptilian Accession to the Indian Museum, Calcutta, from 1865 to 1870, with a description of some new species,.....	28th Oct. 1870.	Printed in Journal, Pt. II, for 1871, p. 12.
Ayrton, W. E.	On a quantitative method of Testing a "Telegraph Earth,"	6th April 1871.	Printed in Journal, Pt. II, for 1871, p. 177.
Ball, V., B. A.	Names of Birds, &c., in four of the aboriginal languages of Western Bengal,	.....	Printed in Journal, Pt. I, for 1871, p. 103.
Bayley, E. C., C. S., C. S. I.	Note on a gold coin bearing the name of Prince Fírúz Sháh Zafar son of Fírúz Sháh of Delhi,.....	.....	Printed in Journal, Pt. I, for 1871, p. 160.
Bayley, E. C., C. S., C. S. I.	Translations from the Táríkh i Fírúz-sháhí, ...	.....	Will be printed in Journal, Pt. I, for 1872.

Blanford, H. F.	On some undescribed species of Camptoceras and other land shells, ...	2nd Dec. 1870.	Printed in Journal, Pt. II, for 1871, p. 39.
Blanford, H. F.	Note on the correction of the Calcutta Standard Barometer to the Kew and Greenwich Standards, ...	4th Sep. 1871.	Printed in Journal, Pt. II, for 1871, p. 446.
Blanford, W. T.	Note on Col. McMaster's list of Birds from Nagpur, &c., ...	.....	Printed in Journal, Pt. II, for 1871, p. 216.
Blanford, W. T.	List of Birds collected or observed in the Wardha Valley and its vicinity near Chanda, ...	14th April 1871.	Printed in Journal, Pt. II, for 1871, p. 268.
Blanford, W. T.	Account of a visit to the Eastern and Northern Frontiers of Independent Sikkim, with notes on the Zoology of the Alpine and Sub-alpine regions, Pt. I, ..	28th July 1871.	Printed in Journal, Pt. II, for 1871, p. 367.
Blochmann, H., M. A.	Notes from Muhammadan Historians on Chutiá Nágpúr, Pacheṭ and Palámau, ..	.....	Printed in Journal, Pt. I, for 1871, p. 111.
Chandrasekhara Banarji, ..	An account of the Antiquities of Jajpur in Orisa, ...	.....	Printed in Journal, Pt. I, for 1871, p. 151.
Colvin, A., C. S.	Translations from the Táríkh i Fírúzsháhí,	.....	Printed in Journal Pt., for 1871, p. 217.

Authors.	Titles of Papers.	When received.	How disposed of.
Day, F.	Monograph of Indian Cyprinidæ, (Pt. I,)	4th Jan. 1871.	Printed in Journal, Pt. II, for 1871, p. 95.
Day, F.	Monograph of Indian Cyprinidæ, (Pt. II,)	.....	Printed in Journal, Pt. II, for 1871, p. 277.
Day, F.	Monograph of Indian Cyprinidæ, (Pt. III,)	.....	Printed in Journal, Pt. II, for 1871, p. 337.
Delmerick, J. G.	A History of the Gakk'hars, ...	.....	Printed in Journal, Pt. I, for 1871, p. 67.
Dobson, G. E., M. B.	On a New species of Vespertilio, ...	1st March 1871.	Printed in Journal for 1871, Pt. II, p. 186.
Dobson, G. E., M. B.	Description of four new species of Malayan Bats from the collection of Dr. Stoliczka,	3rd May 1871.	Printed in Journal, Pt. II, for 1871, p. 260.
Dobson, G. E., M. B. ...	On a new genus and species of Rhinolophidæ, with description of a new species of Vesperus, and Notes on some other species of insectivorous bats from Persia,	7th June 1871.	Printed in Journal, Pt. II, for 1871, p. 455.
Forbes, L. R.	Letter regarding the Mughul Invasions of Palámau, ...	1st June 1871.	Printed in Journal, Pt. I, for 1871, p. 129.
Godwin-Austen, H. H.	Descriptions of the species of Alycaeinæ known to inhabit the Khasi Hill Ranges,	2nd Dec. 1871.	Printed in Journal, Pt. II, for 178 ,p.1 87.

Growse, F. S., M. A., C. S.	The Country of Braj, ...	.....	Printed in Journal, Pt. I, for 1871, p. 34.
Kurz, S.	On some new or imperfectly known Indian Plants, (continuation from Journal, Vol. XXXIX, Pt. II, pp. 61-91, ...	2nd Dec. 1870.	Printed in Journal, Pt. II, for 1871, p. 45.
Kurz, S.	List of Algæ collected by Mr. S. Kurz, in Burmah and adjacent Islands, by Dr. G. v. Martens, in Stuttgardt. Communicated by Mr. S. Kurz, ...	15th July 1871.	Printed in Journal, Pt. II, for 1871, p. 461.
McMaster, A. C.	Notes on Birds observed in the neighbourhood of Nagpore and Kamptee (Central Provinces) Chikalda and Akola in Berar,	24th Feb. 1871.	Printed in Journal, Pt. II, for 1871, p. 207.
Nevill, G. & H.	Description of new Mollusca from the Eastern Regions, ...	7th Sept. 1870.	Printed in Journal, Pt. II, for 1871, p. 1.
Pratápach Ghosha, ...	Note on two Copperplate Inscriptions from Bámanghátí, ...	.....	Printed in Journal, Pt. I, for 1871, p. 161.
Ráj endralála Mitra, ...	The Alla Upanishad, a spurious chapter of the Atharva Veda, ...	5th July 1871.	Printed in Journal, Pt. I, for 1871, p. 170.
Rakhal Dass Haldar, ...	An Introduction to the Mundari Language,	.....	Printed in Journal, Pt. I, for 1871, p. 46.
Rakhal Dass Haldar, ...	Notes on three inscriptions on stone found in Chutiá Nágpúr, ...	1st June 1871.	Printed in Journal, Pt. I, for 1871, p. 108.

Authors.	Titles of Papers.	When received.	How disposed of.
Rashbihari Bose, ...	Extracts from my Diary regarding a visit to K'harakpúr, in the district of Munger (Monghyr) and several places in the Banka Sub-Division, (Bhagulpore), ..	.....	Printed in Journal, Pt. I, for 1871, p. 22.
Rashbihari Bose, ...	Legends and Ballads connected with persons deified or held in great veneration in Bhágalpúr and the neighbouring districts (being extracts from Diaries),	.....	Printed in Journal, Pt. I, for 1871, p. 138.
Rodgers, C. J.	Note on the Death of Humayun, ...	.....	Printed in Journal, Pt. I, for 1871, p. 133.
Samuells, W. L.	The Rock-cut Excavations at Harchoka, discovered by Capt. W. L. Samuells, when employed as Boundary Commissioner on the Rewah and Chutia, ...	18th Nov. 1871.	Printed in Journal, Pt. I, for 1871, p. 177.
Schwendler, L.	Arrangement for the discharge of Long Overland Telegraph lines, ...	27th Jan. 1871.	Printed in Journal, Pt. II, for 1871, p. 78.
Stoliczka, F.	Notes on Terrestrial Mollusca from the neighbourhood of Moulmein (Tenasserim Province) with descriptions of new species, ...	5th Jan. 1871.	Printed in Journal, Pt. II, for 1871, pp. 143, 217.

Stoliczka, F.	Notes on some Indian and Burmese Ophidians, ...	22nd Aug. 1871.	Printed in Journal, Pt. II, for 1871, p. 421.
Tolbort, T. W. H., C. S. ...	Notes on the district of Dera Ismail Khan, Trans-Indus, ...	.....	Printed in Journal, Pt. I, for 1871, p. 1.
Whalley, P., C. S.	The reign of Mu'izzuddín, translated from the Táríkh i Fírúzsháhí	.....	Printed in Journal, Pt. I, for 1871, p. 185.
Wood-Mason, J.	Contributions to Indian Carcinology. On Indian and Malayan Telphusidæ, Pt. I,	25th April 1871.	Printed in Journal for 1871, Pt. II, p. 189.
Wood-Mason, J.	On Indian and Malayan Telphusidæ, Pt. I,	25th April 1817.	Printed in Journal, Pt. II, for 1871, p. 201.
Wood-Mason, J.	On Indian and Malayan Telphusidæ, Pt. I,	25th April 1871.	Printed in Journal, Pt. II, for 1871, p. 449.

APPENDIX B.

List of Donations (not including Books, or other publications and MSS., these being acknowledged in the monthly library lists).

[Objects marked with an asterisk have been transferred to the Trustees of the Indian Museum].

Donors.	Donations.
Dall, The Rev. C. H.....	* Three Nepal coins.
Falle, Capt. J. V.	*A skin of the great Albatross, Diomedea exulans, shot off the Cape.
Ferrar, M. L., Esq , C. S.....	Two silver and six copper coins dug up at Qanauj.
Foster, J. M., Esq., M. R. C. P.	Three Assam small silver coins.
Graham, Major, J. M.	*A group of rudely moulded brass figures, representing "Lushais" and their social habits.
Hamilton, Col. T. C.	*A large round gold coins very thin, somewhat more than an inch in diameter.
Miller, Lieut. W., M. N. I.	*An egg of Megapodius Nicobariensis from Kamorta island and the carapace of a remarkably shaped Pagurid crab from one of the small Nicobar islands.
Newman, Dr.	Five silver coins.
Prankissen Chatterji, Babu,....	A stone seal, found west of Bardwán.
Rájendralála Mitra, Bábu, ...	*A dried specimen of a new species of Scincus.
Samuells, Capt. W. L.	*Two copper axes.

INDEX.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

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	29.907	29.998	29.843	0.155	71.5	81.6	63.5	18.1
2	.934	30.009	.883	.126	72.9	81.2	66.4	14.8
3	.986	.072	.928	.144	67.1	73.7	60.5	13.2
4	30.009	.107	.941	.166	62.3	70.0	56.0	14.0
5	29.969	.031	.897	.134	61.7	70.8	54.0	16.8
6	.954	.024	.889	.135	63.9	73.5	56.5	17.0
7	.985	.059	.931	.128	65.7	75 2	58.0	17.2
8	.981	.055	.930	.125	67.0	76.7	59.5	17.2
9	.985	.073	.936	.137	65.7	76.2	57.0	19.2
10	.970	.047	.912	.135	65.5	75.5	56.7	18.8
11	.948	.015	.910	.105	66.8	78.0	57.5	20.5
12	.962	.042	.924	.118	66.8	74.5	60.5	14.0
13	.977	.058	.923	.135	65.7	76.5	57.2	19.3
14	.996	.072	.943	.129	65.7	77.5	56.2	21.3
15	.986	.067	.931	.136	66.8	78.4	57.3	21.1
16	.971	.041	.901	.140	68.9	79.5	60.0	19.5
17	.945	.004	.900	.104	70.0	79.2	61.2	18.0
18	.982	.062	.930	.132	72.7	79.4	67.8	11.6
19	30.005	.106	.943	.163	72.3	79.8	65.4	14.4
20	29.976	.076	.897	.179	68.8	75.7	62.6	13.1
21	.943	.022	.881	.141	66.1	75.0	58.3	16.7
22	.959	.022	.913	.109	66.9	76.6	60.0	16.6
23	.989	.065	.932	.133	68.7	78.8	60.5	18.3
24	.984	.053	.947	.106	70.0	80.3	62.4	17.9
25	.977	.062	.923	.139	71.3	81.5	63.5	18.0
26	30.037	.119	.960	.159	69.3	76.9	62.2	14.7
27	.057	.148	.996	.152	65.6	75.0	57.5	17.5
28	.032	.115	.966	.149	64.5	74.7	55.5	19.2
29	.011	.099	.944	.155	66 8	77.3	58.4	18.9
30	.013	.099	.962	.137	69.4	79.5	61.0	18.5
31	.029	.104	.988	.116	70.9	81.0	61.6	19.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from [illegible] observations, made at the *several hours* during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

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	65.0	6.5	59.8	11.7	0.520	5.69	2.69	0.68
2	66.3	6.6	61.0	11.9	.541	.93	.80	.68
3	59.0	8.1	52.5	14.6	.407	4.50	.82	.62
4	55.9	6.4	50.1	12.2	.375	.19	.12	.66
5	56.0	5.7	50.9	10.8	.385	.31	1.88	.70
6	58.6	5.3	53.8	10.1	.425	.73	.90	.71
7	60.7	5.0	56.7	9.0	.469	5.19	.83	.74
8	60.9	6.1	56.0	11.0	.458	.07	2.23	.70
9	59.4	6.3	54.4	11.3	.434	4.81	.21	.69
10	59.0	6.5	53.8	11.7	.425	.71	.27	.68
11	60.5	6.3	55.5	11.3	.450	.99	.27	.69
12	60.0	6.8	54.6	12.2	.437	.84	.42	.67
13	58.0	7.7	51.8	13.9	.397	.40	.62	.63
14	58.0	7.7	51.8	13.9	.397	.40	.62	.63
15	58.5	8.3	51.9	14.9	.398	.41	.85	.61
16	60.9	8.0	54.5	14.4	.435	.80	.94	.62
17	63.0	7.0	57.4	12.6	.480	5.27	.73	.66
18	66.1	6.6	60.8	11.9	.537	.88	.80	.68
19	65.2	7.1	59.5	12.8	.515	.63	.95	.66
20	61.9	6.9	56.4	12.4	.464	.11	.60	.66
21	59.7	6.4	54.6	11.5	.437	4.84	.26	.68
22	60.4	6.5	55.2	11.7	.445	.93	.35	.68
23	61.8	6.9	56.3	12.4	.462	5.10	.59	.66
24	63.6	6.4	58.5	11.5	.498	.47	.53	.68
25	65.8	5.5	61.4	9.9	.548	6.02	.31	.72
26	61.9	7.4	56.0	13.3	.458	5.05	.78	.65
27	56.5	9.1	49.2	16.4	.363	4.04	.96	.58
28	56.8	7.7	50.6	13.9	.381	.24	.52	.63
29	59.6	7.2	53.8	13.0	.425	.70	.56	.65
30	63.0	6.4	57.9	11.5	.488	5.36	.50	.68
I	64.9	6.0	60.1	10.8	.525	.76	.47	.70

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 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.981	30.064	29.896	0.168	63.9	71.5	58.3	13.2
1	.972	.049	.892	.157	63.2	70.0	57.2	12 8
2	.964	.038	.883	.155	62·5	69.4	56.0	13.4
3	.957	.031	.894	.137	61.9	68.5	55.7	12.8
4	.956	.026	.895	.131	61.3	68.0	55.5	12.5
5	.964	.051	.906	.145	60.8	67.8	55.0	12.8
6	.977	.072	.916	.156	60.4	68.0	54.2	13.8
7	30.001	.101	.941	.160	60.1	68.0	54.0	14.0
8	.031	.120	.970	.150	62.3	68.4	57.7	10.7
9	.057	.148	.991	.157	65.5	71.7	59.7	12.0
10	.061	.142	.998	.144	69.2	75.5	62.5	13.0
11	.043	.114	.976	.138	72.0	77.5	65.0	12.5
Noon.	.014	.082	.941	.141	74.0	79.0	67.0	12.0
1	29.979	.046	.899	.147	75.6	80.4	68.5	11.9
2	.954	.028	.873	.155	76.5	81.2	69.4	11.8
3	.939	.013	.851	.162	77.1	81.6	70.0	11.6
4	.931	.014	.843	.171	76.1	80.5	69.0	11.5
5	.934	.022	.846	.176	74.8	79.5	67·9	11.6
6	.943	.040	.855	.185	71.8	76.7	65.5	11.2
7	.959	.056	.870	.186	69.6	74.3	63.2	11.1
8	.978	.067	.880	.187	67.8	72.6	61.6	11.0
9	.992	.079	.893	.186	66.7	72.6	60.5	12.1
10	.998	.082	.899	.183	65.6	72.0	59.5	12.5
11	.993	.075	.894	.181	64.8	71.8	58.6	13.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Mid-night.	60.1	3.8	56.7	7.2	0.469	5.22	1.41	0.79
1	59.6	3.6	56.4	6.8	.464	.17	.32	.80
2	59.2	3.3	56.2	6.3	.461	.15	.20	.81
3	58.6	3.3	55.6	6.3	.452	.06	.17	.81
4	58.2	3.1	55.4	5.9	.449	.02	.10	.82
5	57.7	3.1	54.9	5.9	.441	4.94	.08	.82
6	57.4	3.0	54.7	5.7	.438	.91	.04	.83
7	57.1	3.0	54.4	5.7	.434	.86	.03	.83
8	58.1	4.2	54.3	8.0	.432	.83	.48	.77
9	59.8	5.7	55.2	10.3	.445	.95	2.03	.71
10	61.1	8.1	54.6	14.6	.437	.81	3.00	.62
11	62.0	10.0	54.0	18.0	.428	.69	.81	.55
Noon.	62.4	11.6	54.3	19.7	.432	.71	4.33	.52
1	63.0	12.6	54.2	21.4	.431	.68	.80	.49
2	63.0	13.5	53.5	23.0	.421	.57	5.18	.47
3	63.4	13.7	53.8	23.3	.425	.61	.31	.47
4	63.0	13.1	53.8	22.3	.425	.62	.01	.48
5	63.2	11.6	55.1	19.7	.444	.84	4.42	.52
6	63.9	7.9	57.6	14.2	.483	5.29	3.16	.63
7	63.4	6.2	58.4	11.2	.496	.46	2.44	.69
8	62.6	5.2	58.4	9.4	.496	.48	.00	.73
9	62.0	4.7	58.2	8.5	.493	.45	1.78	.75
10	61.4	4.2	58.0	7.6	.489	.42	.58	.77
11	60.7	4.1	57.4	7.4	.480	.33	.50	.78

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
1	135.2	...	W by N	....	100.6	B to 3 A.M., \i to 12 A.M., B afterwards. Slightly foggy at midnight, 1 A. M., & 8 P. M.
2	135.0	...	W S W & W NW	...	143.6	B. Slightly foggy from 7 to 10 P. M.
3	129.8	...	NW, N& NN W	...	185.0	B to 2 A. M., \i to 6 A. M., B afterwards. Foggy from 7 to 11 P. M.
4	129.5	...	N W & N N W. [W	0.3	136.0	B. Foggy at midnight & 1 A. M., & from 8 to 11 P M.
5	126.5	...	NW, NNW&WN	...	159.4	B. Foggy at midnight & 1 A. M., & from 8 to 11 P. M.
6	128.0	...	W N W & N	...	143.6	B to 6 A. M., \i afterwards. Slightly foggy at midnight.
7	128.8	...	N by E & N W	...	126.9	B to 10 A. M., \i to 7 P. M. \i afterwards. Foggy from 9 to 11 P. M.
8	131.2	...	NW & W N W.	...	104.4	\i to 7 A. M., \i & _i to 6 P. M., B afterwards. Foggy from 8 to 11 P. M.
9	130.0	...	W N W & NNW	...	105.7	B to 11 A. M., \i to 6 P. M., B afterwards. Slightly foggy from midnight to 8 A. M., & 8 to 11 P. M.
10	132.5	...	N NW& WNW	...	108.0	\i & _i to 6 P. M., B afterwards. Slightly foggy from 7 to 11 P. M.
11	131.0	...	W N W & Wby N	...	77.0	B. Slightly foggy from midnight to 6 A. M., & 8 to 11 P. M.
12	123.8	...	W N W.	...	107.4	B to 2 A. M., \i to 6 P. M., B afterwards.
13	130.0	...	W N W.	...	106.6	B. Slightly foggy from 9 to 11 P. M.
14	133.5	...	W by N & ENE.	...	73. 0	B. Slightly foggy from midnight to 6 A. M.
15	133.0	...	E N E & N.	...	126.0	B to 7 A. M., \i to 10 A. M., B to 2 P. M., \i to 6 P. M., B afterwards. Slightly foggy from 7 to 11 P. M.
16	137.6	...	N N E & N.	...	150.6	B to 6 A. M., \i to 4 P. M., B afterwards.
17	137.8	...	NNE,NE&NbyE	...	136.7	B to 5 A. M., \i afterwards.
				...		

\i Cirri, —i Strati, ⌒i Cumuli, _i Ciro-strati, ⌒i Cumulo-strati, \i Nimbi, \i *Cirro-cumuli*, *B* clear, S stratoni, O overcast, T thunder, L lightning *R rain. D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
18	124.3	...	NE, N by E & NNE	...	81.7	⌒i to 4 A. M., O to 9 A. M., S to 3 P. M., ⌒i to 7 P. M., S afterwards. Slightly foggy from 9 to 11 P. M., D at 5½ & 11 A. M.
19	134.5	...	N & N W	...	98.2	Chiefly B. Slightly foggy at midnight & 1 A. M.
20	135.0	...	N W & W	...	156.1	B. Slightly foggy at 10 & 11 P. M.
21	134.5	...	W & W by N	...	109.1	B. Slightly foggy at midnight.
22	134,0	...	W by N & WSW	...	105.6	B. Slightly foggy from 8 to 11 P. M.
23	134.5	...	W S W & W.	...	77.3	B.
24	138.0	...	W&WSW. [W	...	99.7	B.
25	136.2	...	W S W, SW & SS	...	129.3	B.
26	134.0	...	WNW & Variable,	...	146.0	O to 7 A. M., B afterwards. Foggy from 1 to 4 A. M.
27	133.5	...	W N W & W	0.8	126.2	B. Slightly foggy from 7 to 11 P. M.
28	133.0	...	W & W by S	...	96.5	B. Slightly foggy at midnight from 5 to 7 A. M. & 9 to 11 P. M.
29	131.5	...	W by S & W	...	109.0	B. to 1 P. M., ⌣i to 4 P.M., B. afterwards.
30	131.5	...	W by S & W	...	104.9	B. to 12 A. M., ⌣ i, to 3 P. M., B afterwards
31	136.5	...	W by S & W	...	78.1	B. Slightly foggy from 7 to 9 P. M.

i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, *i Cirro-cumuli,* B clear, S stratoni, O overcast, T thunder, L lightning, *rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.983
Max. height of the Barometer occurred at 9 A. M. on the 27th. ...	30.148
Min. height of the Barometer occurred at 4 P. M. on the 1st. ...	29.843
Extreme range of the Barometer during the month	0.305
Mean of the daily Max. Pressures	30.062
Ditto ditto Min. ditto	29.926
Mean daily range of the Barometer during the month	0.136

	°
Mean Dry Bulb Thermometer for the month	67.6
Max. Temperature occurred at 3 P. M. on the 1st.	81.6
Min. Temperature occurred at 7 A. M, on the 5th.	54.0
Extreme range of the Temperature during the month	27.6
Mean of the daily Max. Temperature	77.1
Ditto ditto Min. ditto, ...	59.8
Mean daily range of the Temperature during the month... ...	17.3

Mean Wet Bulb Thermometer for the month	60.9
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	6.7
Computed Mean Dew-point for the month	55.5
Mean Dry Bulb Thermometer above computed mean Dew-point ...	12.1

	Inches.
Mean Elastic force of Vapour for the month	0.450

	Troy grain.
Mean Weight of Vapour for the month	4.98
Additional Weight of Vapour required for complete saturation ...	2·46
Mean degree of humidity for the month, complete saturation being unity	0.67

	°
Mean Max. Solar radiation Thermometer for the month ...	132.4

	Inches.
Drizzled 1 day,—Max. fall of rain during 24 hours	Nil.
Total amount of rain during the month	Nil.
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	Nil.
Prevailing direction of the Wind... ...	W N W, & W.

* Height 70 feet 10 inches above ground.

he Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Jan. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night	1		2		1		1		1																		1						3		3		3		4		6		3		2			
1	1		2		1		1		1																		1						3		3		3		4		5		4		2			
2	1		2		1		1		1																		1						3		3		3		3		6		4		2			
3			3		1				1																		1						3		3		3		3		6		4		3			
4			1		3				1																						1		3		3		3		3		6		4		2		1	
5	1		1		3				1																						1		3		3		3		3		6		4		1		1	
6	2		1		3	1			1																						1		3		3		3		3		6		4		1			
7	2		1		3				1																						1		3		3		3		3		6		4		1			
8	3		1		4				1																						1		2		3		3		3		6		2		2			
9	2		3		1		2		1																						1		2		3		3		3		6		2		2			
10	1		3		1		3		1																						1		1		4		2		3		6		3		2			
11	1				2		3	1	1																								3		3		1		3		7		2		3		2	
Noon.	2		3				3																										3		1		3		4		6		3		2		1	
1	4		1				3																										3				4		5		6		3		1		1	
2	4				1		1				1																				1		1		2		3		4		7		4		2			
3	2		1		1		1		1																						1		2		2		4		4		7		3		2			
4	2		1		1		1		1																						1		1		2		6		2		8		5					
5	2		1		1		1		1																						1		2				7		3		7		3		2			
6	2		1		1		1		1																				1				2				7		3		7		3		2			
7	2		1		1		1		1																				1				2		1		6		3		7		3		2			
8	1		2		1		1		1																				1				2		2		5		2		7		3		2		1	
9	1		2		1		1		1																				1				3		2		5		2		7		3		2			
10	1		2		1		1		1																				1				3		3		4		2		7		3		2			
11																											1						3		3		4		2		7		3		2			

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February 1871.

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	30.028	30.116	29.958	0.158	71.4	81.8	64.9	16.9
2	29.952	.037	.887	.150	71.2	83.2	60.5	22.7
3	.906	29.970	.840	.130	73.9	83.5	68.8	14.7
4	.909	.994	.834	.160	71.3	80.5	63.0	17.5
5	.868	.937	.803	.134	70.6	80.5	62.3	18.2
6	.894	.981	.841	.140	71.8	82.5	62.0	20.5
7	.903	.976	.847	.129	72.5	81.4	64.5	16.9
8	.895	.959	.838	.121	73.6	84.0	65.5	18.5
9	.899	.978	.850	.128	74.1	83.5	65.4	18.1
10	.899	.967	.840	.127	74.6	85.0	66.5	18.5
11	.912	.995	.865	.130	75.6	86.0	68.0	18.0
12	.893	.952	.840	.112	75.4	86.0	68.2	17.8
13	.882	.964	.809	.155	76.4	88.6	68.5	20.1
14	.887	.953	.839	.114	77.1	89.5	69.0	20.5
15	.885	.956	.837	.119	78.8	90.5	70.6	19.9
16	.872	.959	.816	.143	76.9	86.8	68.9	17.9
17	.916	30.019	.877	.142	69.9	74.0	66.7	7.3
18	.901	29.986	.836	.150	72.0	80.9	65.5	15.4
19	.926	.995	.865	.130	73.6	82.0	66.5	15.5
20	.926	.995	.866	.129	72.2	80.4	66.0	14.4
21	.955	30.031	.905	.126	71.3	80.4	62.0	18.4
22	.936	.025	.877	.148	74.5	85.0	65.2	19.8
23	.873	29.944	.809	.135	77.4	87.5	68.8	18.7
24	.890	.962	.830	.132	80.0	89.6	73.7	15.9
25	.915	.995	.847	.148	78.3	86.8	72.5	14.3
26	.905	.990	.833	.157	75.4	82.5	69.8	12.7
27	.878	.962	.836	.126	74.6	83.0	68.3	14.7
28	.896	.981	.841	.140	74.9	85.5	65.0	20.5

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February 1871.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
1	64.8	6.6	59.5	11.9	0.515	5.64	2.71	0.68
2	63.5	7.7	57.3	13.9	.478	.24	3.06	.63
3	67.6	6.3	63.2	10.7	.582	6.35	2.66	.71
4	61.8	9.5	54.2	17.1	.431	4.72	3.61	.57
5	62.8	7.8	56.6	14.0	.467	5.13	.02	.63
6	64.1	7.7	57.9	13.9	.488	.34	.11	.63
7	65.9	6.6	60.6	11.9	.534	.84	2.79	.68
8	65.5	8.1	59.8	13.8	.520	.67	3.26	.64
9	66.4	7.7	61.0	13.1	.541	.90	.17	.65
10	68.6	6.0	64.4	10.2	.605	6.61	2.59	.72
11	68.9	6.7	64.2	11.4	.601	.54	.94	.69
12	69.5	5.9	65.4	10.0	.626	.81	.62	.72
13	69.4	7.0	64.5	11.9	.607	.60	3.12	.68
14	70.5	6.6	65.9	11.2	.636	.90	.02	.70
15	68.9	9.9	62.0	16.8	.559	.04	4.40	.58
16	69.2	7.7	63.8	13.1	.593	.44	3.42	.65
17	65.7	4.2	62.3	7.6	.565	.21	1.77	.78
18	66.9	5.1	62.8	9.2	.574	.29	2.21	.74
19	67.7	5.9	63.6	10.0	.590	.44	.49	.72
20	64.8	7.4	58.9	13.3	.504	5.52	3.03	.65
21	62.5	8.8	55.5	15.8	.450	4.94	.39	.59
22	67.8	6.7	63.1	11.4	.580	6.33	2.85	.69
23	72.3	5.1	68.7	8.7	.697	7.55	.46	.75
24	74.9	5.1	71.3	8.7	.758	8.18	.63	.76
25	71.8	6.5	67.2	11.1	.664	7.19	3.09	.70
26	66.1	9.3	59.6	15.8	.516	5.61	.82	.60
27	63.8	10.8	56.2	18.4	.461	.02	4.18	.55
28	66.9	8.0	61.3	13.6	.546	.95	3.33	.64

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 1871.

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.	°	°	°	°
Midnight.	29.914	30.042	29.872	0.170	70.3	76.0	65.5	10.5
1	.906	.035	.860	.175	69.7	75.5	64.5	11 0
2	.898	.032	.855	.177	69·1	75.3	63.7	11.6
3	.889	.024	.846	.178	68.5	75.0	63.0	12.0
4	.882	.027	.837	.190	68.0	74.7	62.0	12.7
5	.891	.041	.843	.198	67.6	74.5	61.5	13.0
6	.908	.057	.861	.196	67.1	74.5	61.0	13.5
7	.928	.066	.888	.178	67.0	73.7	60.5	13.2
8	.951	.090	.913	.177	69.2	76.5	63.8	12.7
9	.975	.113	.927	.186	72.1	78.7	66.5	12.2
10	.983	.116	.937	.179	75.2	81.5	70.0	11.5
11	.973	.102	.910	.192	78.2	84.5	72.0	12.5
Noon.	.946	.067	.890	.177	80.3	86.5	66.7	19.8
1	.910	.033	.841	.192	81.9	88.2	68.8	19.4
2	.879	.002	.819	.183	83.1	89.4	69.5	19.9
3	.861	29.979	.803	.176	83.7	90.5	70.0	20.5
4	.853	.963	.803	.160	83.4	90.3	69.5	20.8
5	.855	.958	.809	.149	82.2	88.4	68.0	20.4
6	.861	.964	.819	.145	79.2	84.5	68.4	16.1
7	.873	.978	.833	.145	76.3	81.5	68.0	13.5
8	.894	.992	.849	.143	74.4	79.0	67.8	11.2
9	.910	.999	.860	.139	72.7	77.0	67.7	9.3
10	.916	30.002	.874	.128	71.8	76.3	67.5	8.8
11	.916	29.991	.881	.110	71.2	76.3	66.5	9.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	66.5	3.8	63.5	6.8	0.588	6.16	1.62	0.80
1	66.2	3.5	63.4	6.3	.586	.45	.48	.81
2	65.9	3.2	63.3	5.8	.584	.43	.35	.83
3	65.7	2.8	63.5	5.0	.588	.48	.17	.85
4	65.1	2.6	63.3	4.7	.584	.44	.09	.86
5	65.1	2.5	63.1	4.5	.580	.41	.03	.86
6	64.8	2.3	63.0	4.1	.578	.40	0.92	.87
7	64.5	2.5	62.5	4.5	.568	.29	1.01	.86
8	65.7	3.5	62.9	6.3	.576	.35	.46	.81
9	66.9	5.2	62.7	9.4	.572	.27	2.26	.74
10	67.9	7.3	62.8	12.4	.574	.26	3.11	.67
11	68.4	9.8	61.5	16.7	.550	5.95	4.39	.58
Noon.	68.4	11.9	60.1	20.2	.525	.65	5.26	.52
1	68.6	13.3	59.3	22.6	.511	.48	.96	.48
2	68.6	14.5	58.4	24.7	.496	.31	6.55	.45
3	68.5	15.2	57.9	25.8	.488	.21	.86	.43
4	68.2	15.2	57.6	25.8	.483	.16	.89	.43
5	68.2	14.0	58.4	23.8	.496	.31	.23	.46
6	69.2	10.0	62.2	17.0	.563	6.08	4.48	.58
7	68.3	8.0	62.7	13.6	.572	.21	3.48	.64
8	67.4	6.6	63.2	11.2	.582	.35	2.80	.69
9	67.4	5.3	63.2	9.5	.582	.36	.32	.73
10	67.0	4.8	63.2	8.6	.582	.37	.08	.75
11	66.8	4.4	63.3	7.9	.584	.41	1.89	.77

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 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	138.0	...	W & W N W	...	78.7	B. Foggy from 3 to 8 A. M., & 8 to 10 P. M.
2	138.0	...	W, W S W & S W	...	89.3	B to 6 P. M., \i afterwards. Slightly foggy at 6 & 7 A. M.
3	138.0	...	S S W & W	...	112.3	S to 7 A. M., \i to 6 P. M., B, afterwards. Slightly foggy from 1 to 5 A. M., & 8 to 11 P. M.
4	137.2	...	W S W & W by S	...	119.0	B. Foggy at 8 & 9 P. M.
5	135.5	...	S by W & W by S	...	89.7	B to 10 A. M., \i to 4 P. M. B, afterwards.
6	137.8	...	S S E & S by E	...	81.0	B.
7	134.7	...	S, S S E & S by E	...	76.6	B. to 11 A. M., _i to 2 P. M., \i to 5 P. M., B afterwards. Foggy from 6 to 8 A. M.
8	135.0	...	S & S S E	...	80.8	B.
9	134.0	...	S S W & W S W	...	80.0	B. Slightly foggy at 8 P. M.
10	136.0	...	S W & S S W	...	92.2	B. Foggy from 5 to 7 A. M.
11	138.5	...	S S W & S W	...	102.1	B.
12	137.0	...	S S W	...	142.1	B. Foggy from 2 to 5 A. M.
13	139.5	...	SSW, SW & S by W	...	187.3	B. Slightly foggy at 4 & 5 A. M.
14	135.5	...	S by W & S S W	...	107.1	B. Foggy from 3 to 8 A. M.
15	140.0	...	S S W & S W	...	126.0	B.
16	141.3	...	S W & Variable,	...	165.5	B to 6 A. M., \i to 5 P. M., B afterwards. Smart Shocks of Earthquake felt at 5¼ A. M.
17	...	0.25	Variable	...	132.0	\i to 10 A. M., O afterwards. R at 11 & 12 A. M., & 4 & 6 P. M.
18	136.2	...	W	...	131.3	Clouds of different kinds to 4 P. M., B afterwards.
19	141.3	0.10	W by N & S W	9.0	96.1	_i to 5 A. M., \i to 11 A. M., ⌒i to 6 P. M., clouds of different kinds afterwards. L from 7 to 9 & at 11 P. M., T & R at 8 P. M.
20	135.5	...	S W & W by N	...	111.9	S to 4 A. M., _i to 10 A. M., B afterwards. Slightly foggy from 9 to 11 P. M.
21	140.0	...	W N W & W by S	...	100.0	B. Slightly foggy at midnight, & 1 A. M.
22	139.0	...	W S W & S W	...	109.9	B.
23	141.0	...	S by W, S & S S W	...	126.5	Chiefly B. Foggy at 6 A. M.
24	142.0	0.40	S by W & S S W	...	128.8	Clouds of various kinds. T at 6½ & 7 P. M., L from 6½ to 8 P. M., R at 6, 7 & 10½ P. M.

\i *Cirri*, —i *Strati*, ⌒i Cumuli, _i Ciro-strati, ⌒i Cumulo-strati, \⌒i Nimbi, \i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February 1871.

Solar Radiation. Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches.		lb	Miles	
25	139.0	...	S S W & W	...	195.6	B. Slightly foggy at 8 & 9 P M.
26	139.0	...	W by N & W by S	...	144.4	B.
27	140.0	...	W S W, W & W by S	...	101.1	B. Foggy from 4 to 7 A. M.
28	141.0	...	W S W, W by S, & S W.	...	101.2	B.

Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, *Cirro-cumuli, B* clear, S stratoni, O overcast, T thunder, L lightning, *Rain. D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.907
Max. height of the Barometer occurred at 10 A. M. on the 1st. ...	30.116
Min. height of the Barometer occurred at 3 & 4 P. M. on the 5th. ...	29.803
Extreme range of the Barometer during the month	0.313
Mean of the daily Max. Pressures	29.985
Ditto ditto Min. ditto	29.849
Mean daily range of the Barometer during the month	0.136

	°
Mean Dry Bulb Thermometer for the month	74.3
Max. Temperature occurred at 3 P. M. on the 15th.	90.5
Min. Temperature occurred at 7 A. M, on the 2nd.	60.5
Extreme range of the Temperature during the month	30.0
Mean of the daily Max. Temperature	84.0
Ditto ditto Min. ditto, ...	66.7
Mean daily range of the Temperature during the month... ...	17.3

Mean Wet Bulb Thermometer for the month	67.1
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	7.2
Computed Mean Dew-point for the month	62.1
Mean Dry Bulb Thermometer above computed mean Dew-point ...	12.2

	Inches.
Mean Elastic force of Vapour for the month	0.561

	Troy grain.
Mean Weight of Vapour for the month	6.12
Additional Weight of Vapour required for complete saturation ...	3·00
Mean degree of humidity for the month, complete saturation being unity	0.67

	°
Mean Max. Solar radiation Thermometer for the month ...	138.1

	Inches.
Rained 3 days,—Max. fall of rain during 24 hours	0.40
Total amount of rain during the month	0.75
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	0.83
Prevailing direction of the Wind... ...	SSW, & SW.

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Feb. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.																	1				1				2		4		8		2		4				3		1		2							
1																	1				1				1		4		8		2		4				3		2				1					
2																	1				1				1		4		8		2		4				3		1		1						1	
3																					2				1		4		7		3		4				2		2		1						1	
4																					1		1		1		4		7		3		4				2		2		1						1	
5																					1		1		2		3		7		3		4				2		2		1						1	
6																					1		1		1		4		6		4		4				2		2		1				1			
7																					1		1		1		3		6		5		3		1		2		2		1		1					
8																					1				2		4		4		4		4		2		2		2		1		1					
9							1														1				2		4		4		2		3		2		2		1		4		1					
10		1					1														1		1				2		7		3		2		2		3						2		2			
11						1	1														1		1				1		6		5		1		2		5	1					1		2			
Noon.		1																			1		1		1				3		6		4		3	1	3				3		1				1	
1						1	1														1		1						4		6		5		2		3		2		1		1					
2																	1		2										4		4		7				5		2		2		1					
3																			1		2								4		5		5		3		4		2		1		1					
4																					1		1		1				4		5		5		4		4		1	1	1		1					
5																					1		1		1		1		4		4		4		5		5				1		1					
6																					1		2	1	2		1		3		6		3		5		3		1		1							
7																					2		1		2	1	1		5		5		2		5		3		1		1							
8																			1	1	2				2		1		5		5		1		5		3		1		2							
9																					2				3		1		6		5				5		3		1		2							
10							1														1				3		3		8		3		2		3		2		1		1							
11																					2				3	1	2		9		2		4		1		2		1		2							

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

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	29.882	29.950	29.809	0.141	76.2	84.3	70.0	14.3
2	.923	30.012	.845	.167	69.2	70.5	67.0	3.5
3	.845	29.928	.789	.139	68.0	70.5	65.0	5.5
4	.847	.916	.788	.128	69.8	77.1	64.0	13.1
5	.953	30.034	.902	.132	71.8	79.5	66.0	13.5
6	.969	.050	.917	.133	73.2	82.0	65.4	16.6
7	.913	29.981	.846	.135	75.4	83.8	69.0	14.8
8	.944	30.028	.883	.145	74.0	82.5	67.0	15.5
9	.937	.009	.870	.139	76.2	86.7	67.5	19.2
10	.885	29.957	.812	.145	78.0	88.2	70.5	17.7
11	.880	.940	.816	.124	79.2	89.0	72.2	16.8
12	.891	.962	.831	.131	80.9	91.0	73.5	17.5
13	.859	.944	.782	.162	81.1	91.0	74.0	17.0
14	.784	.860	.711	.149	82.4	92.3	74.0	18.3
15	.698	.758	.638	.120	83.1	93.5	74.5	19.0
16	.762	.851	.669	.182	82.6	91.5	74.5	17.0
17	.849	.942	.793	.149	78.2	87.0	70.3	16.7
18	.836	.918	.788	.130	77.7	87.0	68.4	18.6
19	.837	.908	.783	.125	78.9	89.8	71.5	18.3
20	.884	.966	.834	.132	80.8	91.0	74.5	16.5
21	.868	.940	.793	.147	81.7	93.0	72.0	21.0
22	.837	.906	.778	.128	83.4	94.0	74.5	19.5
23	.854	.934	.791	.143	83.5	95.0	75.5	19.5
24	.818	.900	.746	.154	83.8	96.0	73.8	22.2
25	.776	.844	.717	.127	84.1	95.0	77.0	18.0
26	.797	.858	.730	.128	84.9	97.7	76.5	21.2
27	.849	.929	.779	.150	83.4	92.4	76.5	15.9
28	.832	.912	.768	.144	85.2	94.0	79.3	14.7
29	.818	.896	.754	.142	83.5	92.2	76.0	16.2
30	.761	.854	.642	.212	84.9	97.2	76.5	20.7
31	.750	.825	.666	.159	85.1	95.5	77.7	17.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

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	72.8	3.4	70.4	5.8	0.736	8.00	1.66	0.83
2	68.0	1.2	67.0	2.2	.659	7.27	0.54	.93
3	66.8	1.2	65.8	2.2	.634	.01	.52	.93
4	66.1	3.7	63.1	6.7	.580	6.38	1.57	.80
5	65.9	5.9	61.2	10.6	.544	5.97	2.48	.71
6	67.2	6.0	62.4	10.8	.567	6.19	.63	.70
7	70.0	5.1	66.2	9.2	.642	.99	.44	.74
8	68.3	5.7	64.3	9.7	.603	.59	.45	.73
9	69.0	7.2	64.0	12.2	.597	.19	3.17	.67
10	73.1	4.9	69.7	8.3	.720	7.80	2.39	.77
11	73.7	5.5	69.8	9.4	.722	.81	.75	.74
12	73.6	7.3	68.5	12.4	.692	.47	3.63	.67
13	74.5	6.6	69.9	11.2	.725	.80	.37	.70
14	72.7	9.7	65.9	16.5	.636	6.82	4.79	.59
15	74.5	8.6	68.5	14.6	.692	7.42	.44	.63
16	72.3	10.3	65.1	17.5	.619	6.64	5.04	.57
17	64.1	13.8	54.7	23.5	.438	4.73	.52	.46
18	65.9	11.8	57.6	20.1	.483	5.22	4.88	.52
19	72.3	6.6	67.7	11.2	.674	7.30	3.17	.70
20	72.6	8.2	66.9	13.9	.657	.08	.99	.64
21	72.4	9.3	65.9	15.8	.636	6.83	4.54	.60
22	75.9	7.5	70.6	12.8	.741	7.94	.02	.66
23	73.1	10.4	65.8	17.7	.634	6.79	5.21	.57
24	74.2	9.6	67.5	16.3	.670	7.18	4.92	.59
25	77.7	6.4	73.2	10.9	.806	8.63	3.58	.71
26	74.6	10.3	67.4	17.5	.668	7.12	5.37	.57
27	77.5	5.9	73.4	10.0	.811	8.69	3.27	.73
28	77.8	7.4	72.6	12.6	.799	.43	4.18	.67
29	75.1	8.4	69.2	14.3	.708	7.59	.41	.63
30	77.8	7.1	72.8	12.1	.795	8.50	3.99	.68
31	79.3	5.8	75.2	9.9	.860	9.18	.39	.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 March 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.857	29.964	29.703	0.261	75.3	80.8	65.2	15.6
1	.844	.958	.690	.268	74.7	80.5	65.0	15.5
2	.830	.953	.673	.280	74.2	80.0	65.7	14.3
3	.821	.943	.669	.274	73.8	80.0	66.0	14.0
4	.818	.939	.668	.271	73.2	79.8	65.0	14.8
5	.829	.949	.674	.275	72.8	79.6	64.5	15.1
6	.848	.964	.688	.276	72.3	79.5	64.0	15.5
7	.871	.987	.710	.277	72.5	79.3	64.0	15.3
8	.899	30.014	.737	.277	74.8	81.5	65.0	16.5
9	.918	.046	.743	.303	77.4	84.0	66.5	17.5
10	.922	.050	.758	.292	80.2	87.0	68.0	19.0
11	.914	.040	.750	.290	83.1	90.2	68.7	21.5
Noon.	.892	.016	.732	.284	85.2	92.5	69.8	22.7
1	.864	29.992	.718	.274	86.7	94.3	69.5	24.8
2	.834	.958	.686	.272	87.8	96.0	69.7	26.3
3	.808	.933	.668	.265	88.5	97.2	69.5	27.7
4	.797	.920	.650	.270	88.4	97.7	70.4	27.3
5	.792	.924	.638	.286	87.3	96.0	70.0	26.0
6	.798	.927	.650	.277	84.4	92.0	69.3	22.7
7	.815	.935	.672	.263	81.3	87.6	69.2	18.4
8	.836	.957	.684	.273	79.3	85.0	69.0	16.0
9	.854	.968	.699	.269	78.0	83.8	68.0	15.8
10	.864	.971	.708	.263	76.9	81.8	67.0	14.8
11	.862	.971	.703	.268	76.2	81.2	67.0	14.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Midnight.	72.5	2.8	70.5	4.8	0.739	8.05	1.35	0.86
1	72.1	2.6	70.3	4.4	.734	.02	.21	.87
2	71.8	2.4	70.1	4.1	.729	7.97	.12	.88
3	71.4	2.4	69.7	4.1	.720	.87	.11	.88
4	71.1	2.1	69.4	3.8	.713	.80	.02	.88
5	70.8	2.0	69.2	3.6	.708	.75	0.96	.89
6	70.4	1.9	68.9	3.4	.701	.69	.89	.90
7	70.6	1.9	69.1	3.4	.706	.73	.90	.90
8	71.7	3.1	69.5	5.3	.715	.80	1.46	.84
9	72.3	5.1	68.7	8.7	.697	.55	2.46	.75
10	72.8	7.4	67.6	12.6	.672	.25	3.63	.67
11	73.0	10.1	65.9	17.2	.636	6.82	5.04	.58
Noon.	73.0	12.2	64.5	20.7	.607	.48	6.13	.51
1	72.3	14.4	63.7	23.0	.591	.29	.89	.48
2	72.1	15.7	62.7	25.1	.572	.08	7.52	.45
3	72.1	16.1	62.7	25.8	.572	.06	.82	.44
4	72.6	15.8	63.1	25.3	.580	.15	.69	.44
5	73.1	14.2	64.6	22.7	.609	.47	6.94	.48
6	73.9	10.5	66.5	17.9	.648	.93	5.38	.56
7	73.3	8.0	67.7	13.6	.674	7.25	3.99	.65
8	72.7	6.6	68.1	11.2	.684	.38	.21	.70
9	72.5	5.5	68.6	9.4	.695	.53	2.66	.74
10	72.1	4.5	69.2	7.7	.708	.69	.17	.78
11	72.7	3.5	70.2	6.0	.732	.95	1.71	.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 March 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 1½ ft. above Ground.	Wind. Prevailing direction.	Max. Pressure	Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	136.5	0,65	S S W & S by W.	...	114.4	B to 3 A. M., S to 9 A. M., ⌒i to 4 P. M., O afterwards. T & L from 3¾ to 9 P. M. R at 1, 4 & from 6¾ to 11 P. M.
2	...	3.83	SSE & Variable.	...	178.1	O. T at 2½ A. M., 8 & 10 P. M. L at 2½ A. M. & 8 P. M. R nearly the whole day.
3	...	0.79	SE	...	224.2	Chiefly O. R from 1 to 4 & at 12 A. M., & from 2 to 5½ P. M.
4	132.0	0.14	W N W & N W	0.9	187.4	Chiefly B. Slightly foggy from 8 to 10 P. M. R at 3 A. M.
5	135.0	...	W & W S W	...	95.2	\i to 5 A. M. B, to 10 A. M., ⌒i to 4 P. M. B, afterwards. Foggy from 7 to 11 A. M.
6	139.0	...	WSW,S by W& S	...	93.2	B to 11 A. M., ⌒i to 5 P. M., B afterwards.
7	137.0	...	S by W & S W	...	213.0	B to 9 A. M., \–i to 2 P. M., B to 8 P. M., \i afterwards.
8	138.2	...	S S W & W by S	...	208.0	Chiefly B. Foggy from 4 to 10 A. M.
9	140.0	...	WSW.SSW&SW	...	113.4	B.
10	141.0	...	S & S S W	...	177.0	B.
11	142.5	...	S & S S W	...	59.1	B.
12	144.5	...	S by W &SW	...	101.0	B. Slightly foggy at 9 P. M.
13	141.5	...	S by W	...	163.8	B. Foggy from 4 to 9 A. M.
14	145.0	...	S by W & S W	...	91.5	Chiefly B. Slightly foggy at 6 A. M.
15	144.5	...	S S W & S W	...	127.4	B.
16	142.8	...	S & W	...	108.0	B. Slightly foggy from 5 to 7 A. M.
17	144.0	...	W N W & W	...	99.5	B.
18	140.0	...	W S W	...	99.3	B.
19	141.3	...	SSW&SW. [W.	...	138.3	B.
20	145.0	...	SbyW,SSW&WS	...	136.1	Chiefly B. Slightly foggy at 6 & 7 A. M.
21	146.5	...	WSW.SW&SSW	...	109.6	B.
22	143.8	...	S by W&WSW	...	117.8	S to 2 A. M., B afterwards. Slightly foggy at 4 & 5 A. M.
23	148.8	...	S S W & W by S	...	120.6	B. Foggy from 4 to 8 A. M.
24	148.0	...	S W & S by W	...	169.7	B. to 5 A. M., \i to 3 P. M., B afterwards.
25	143.0	...	SSW,S&SSE	...	230.5	B to 2 P. M., \i to 8 P. M., B afterwards.
26	145.0	...	S by E,SW&W	...	180.4	B to 9 A. M., \i to 1 P. M. B afterwards.

\i Cirri,—i Strati, ⌒i Cumuli, ⌒i Ciro–strati, ⌒i Cumulo-strati, ⌒i Nimbi, \i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
27	141.0	...	SSW, SSE & S	...	111.4	B to 3 A. M. S to 8 A. M. B to 2 P. M., ⌣i to 7 P. M. S afterwards. Foggy at 6 A. M., L & D at 10½ P. M.
28	143.0	...	S by W	...	111.4	S. to 6 A. M., B afterwards.
29	140.0	...	S & S by W	...	105.4	⌣i to 8 A. M., B afterwards.
30	148.0	...	S by W & S	...	165.1	B to 5 P. M., ⌣i afterwards.
31	146.8	...	S S E & S	...	229.0	B. to 2 P. M., ⌣i to 8 P. M., B afterwards.

Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, *Cirro*-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, rain, D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

MONTHLY RESULTS.

	Inches.
Mean height of the Barometer for the month...	29.850
Max. height of the Barometer occurred at 10 A. M. on the 6th. ...	30.050
Min. height of the Barometer occurred at 5 P. M. on the 15th. ...	29.638
Extreme range of the Barometer during the month	0.412
Mean of the daily Max. Pressures	29.926
Ditto ditto Min. ditto	29.783
Mean daily range of the Barometer during the month	0.143

	°
Mean Dry Bulb Thermometer for the month	79.4
Max. Temperature occurred at 4 P. M. on the 26th.	97.7
Min. Temperature occurred at 6 & 7 A. M, on the 4th.	64.0
Extreme range of the Temperature during the month	33.7
Mean of the daily Max. Temperature	88.7
Ditto ditto Min. ditto, ...	72.1
Mean daily range of the Temperature during the month... ...	16.6

Mean Wet Bulb Thermometer for the month	72.2
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	7.2
Computed Mean Dew-point for the month	67.2
Mean Dry Bulb Thermometer above computed mean Dew-point ...	12.2
	Inches.
Mean Elastic force of Vapour for the month	0.664

	Troy grain.
Mean Weight of Vapour for the month	7.17
Additional Weight of Vapour required for complete saturation ...	3.45
Mean degree of humidity for the month, complete saturation being unity	0.68
	°
Mean Max. Solar radiation Thermometer for the month ...	142.2

	Inches.
Rained 5 days.—Max. fall of rain during 24 hours	3.83
Total amount of rain during the month	5.41
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	5.16
Prevailing direction of the Wind... ...	S by W, & S S W.

*Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																											
Mid night.																			1		1		3	1			4		7		8				4				1				2					
1																					2	1	2			1	5		9		6		1		3								2					
2																			1	1	1		3	1			5		9		6		1		4								1					
3																					1	1	2	1	1		4		10		6		1		4								1		1	1		
4							1														1	1	2		1	2	3		8		7		1		5								1					
5							1														1		2		1	2	3		8		7		1		5								1					
6							1								1	1					2					2	2		9		7		1		4		1						1					
7							1		1				1	1							1		1			2	1		8		8				4		1				1		1					
8											1	1	1						1		1		2				1		8		8				4				1		1		1			1		
9											1	1	1						1				3				1		6		8		2		4				1				1			1		1
10				1											1				2				2			1	1		2		7		11		1						1				1			
11							1												1		1		2				3		2		4		13		1						2				1			
Noon.							1												1		1	1	1				3		2		5		13		1				1		1					1		
1																					1						1		5	1	5		10		2		1		2		1		1		2			
2																					1	1	1				3		3		3		8		3		2		4		1		1		1			
3																							2	1	1				4		5		8		2		2		5		1		1					
4																					1	1	1				4	1	5		4		6	1	3		2		3		1		1					
5																							3	1			4		5		5		4		3		2		4				1					
6																					1	1	1				5		7		4		3		3		3		3				1					
7							1	1													1		1	1	2		3		7		4		3		2		3		3				1					
8									1	1									1	1	1		2		1		4		5		5		2		2		3		3				1					
9																			1	1	1		3	1			7		6		4		1		3		2		2				1					
10															1	1					1		3	1			8		5		4		2		3		2		1				1					
11															1	1							1	1			7		6		6				3		2		1				1					

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

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° Faht.	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	29.770	29.852	29.715	0.137	84.6	94.4	78.0	16.4
2	.823	.894	.771	.123	83.6	90.0	78.8	11.2
3	.816	.872	.727	.145	82.1	89.5	73.6	15.9
4	.762	.836	.672	.164	80.2	88.0	72.3	15.7
5	.769	.847	.703	.144	82.8	91.3	76.5	14.8
6	.803	.876	.754	.122	82.7	89.2	79.0	10.2
7	.743	.813	.660	.153	83.8	91.0	78.5	12.5
8	.729	.795	.676	.119	84.3	93.0	78.6	14.4
9	.769	.826	.725	.101	83.7	88.2	80.5	7.7
10	.839	.909	.768	.141	85.5	93.3	80.8	12.5
11	.881	.948	.802	.146	84.9	92.7	78.7	14.0
12	.841	.915	.759	.156	85.3	94.5	79.5	15.0
13	.757	.826	.674	.152	85.4	94.2	80.5	13.7
14	.716	.766	.631	.135	85.0	93.6	79.4	14.2
15	.746	.854	.677	.177	81.0	93.0	72.3	20.7
16	.837	.895	.778	.117	75.8	83.0	72.0	11.0
17	.829	.911	.741	.170	79.3	88.6	71.0	17.6
18	.798	.866	.730	.136	81.6	90.0	74.0	16.0
19	.784	.860	.701	.159	83.7	92.5	77.5	15.0
20	.769	.826	.685	.141	81.9	93.0	74.3	18.7
21	.757	.820	.681	.139	80.2	90.2	73.5	16.7
22	.728	.831	.651	.180	76.2	80.8	72.2	8.6
23	.704	.775	.633	.142	79.7	87.6	72.4	15.2
24	.727	.800	.681	.119	81.2	86.3	75.2	11.1
25	.759	.816	.696	.120	81.9	89.0	77.7	11.3
26	.744	.818	.689	.129	81.9	89.2	74.5	14.7
27	.722	.788	.656	.132	85.0	92.6	79.5	13.1
28	.765	.855	.703	.152	85.5	93.0	80.0	13.0
29	.752	.830	.679	.151	86.0	93.8	81.0	12.8
30	.709	.784	.651	.133	86.1	94.5	80.0	14.5

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

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	79.4	5.2	75.8	8.8	0.876	9.37	3.02	0.76
2	79.0	4.6	75.8	7.8	.876	.39	2.64	.78
3	76.9	5.2	73.3	8.8	.809	8.98	.83	.75
4	75.2	5.0	71.7	8.5	.768	.28	.60	.76
5	77.3	5.5	73.4	9.4	.811	.71	3.04	.74
6	79.3	3.1	76.9	5.8	.908	9.74	1.98	.83
7	79.8	4.0	77.0	6.8	.910	.75	2.35	.81
8	80.3	4.0	77.5	6.8	.925	.90	.38	.81
9	80.0	3.7	77.4	6.3	.922	.80	.18	.82
10	80.6	4.9	77.2	8.3	.916	.79	.93	.77
11	80.6	4.3	77.6	7.3	.928	.93	.56	.80
12	80.8	4.5	77.6	7.7	.928	.91	.73	.78
13	80.5	4.9	77.1	8.3	.913	.76	.92	.77
14	80.4	4.6	77.2	7.8	.916	.79	.74	.78
15	75.1	5.9	71.0	10.0	.751	8.09	3.05	.73
16	71.6	4.2	68.7	7.1	.697	7.58	1.96	.80
17	73.1	6.2	68.8	10.5	.699	.54	3.05	.71
18	75.3	6.3	70.9	10.7	.748	8.05	.29	.71
19	77.4	6.3	73.0	10.7	.801	.57	.50	.71
20	76.9	5.0	73.4	8.5	.811	.71	2.73	.76
21	74.4	5.8	70.3	9.9	.734	7.92	.96	.73
22	71.7	4.5	68.5	7.7	.692	.53	.13	.78
23	75.3	4.4	72.2	7.5	.781	8.41	.31	.79
24	76.5	4.7	73.2	8.0	.806	.68	.53	.77
25	78.0	3.9	75.3	6.6	.862	9.27	.17	.81
26	77.1	4.8	73.7	8.2	.819	8.82	.62	.77
27	81.0	4.0	78.2	6.8	.946	10.11	.42	.81
28	80.6	4.9	77.2	8.3	.916	9.79	.93	.77
29	81.7	4.3	78.7	7.3	.961	10.26	.65	.80
30	81.9	4.2	79.0	7.1	.970	.35	.60	.80

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.770	29.909	29.667	0.242	79.0	82.5	72.0	10.5
1	.761	.898	.663	.235	78.8	82.2	71.5	10.7
2	.751	.883	.658	.225	78·6	82.0	71.0	11.0
3	.742	.866	.651	.215	78.4	81.8	71.5	10.3
4	.745	.871	.674	.197	78.2	81.5	72.0	9.5
5	.762	.888	.692	.196	77.8	81.0	72.0	9.0
6	.778	.897	.709	.188	77.5	81.0	71.5	9.5
7	.797	.907	.735	.172	78.2	81.5	71.9	9.6
8	.817	.928	.755	.173	80.5	83.7	75.0	8.7
9	.832	.948	.763	.185	83.1	86.8	78.7	8.1
10	.840	.943	.765	.178	85.2	89.0	80.5	8.5
11	.829	.933	.760	.173	87.0	91.2	79.5	11.7
Noon.	.814	.915	.745	.170	88.2	92.5	73.5	19.0
1	.787	.895	.723	.172	89.3	93.5	72.2	21.3
2	.760	.861	.695	.166	89.6	94.5	73.2	21.3
3	.731	.837	.663	.174	89.7	94.5	74.2	20.3
4	.715	.817	.639	.178	89.0	94.0	76.5	17.5
5	.711	.809	.633	.176	87.7	92.5	78.0	14.5
6	.725	.819	.641	.178	85.5	90.0	75.7	14.3
7	.744	.854	.631	.223	82.7	86.6	72.3	14.3
8	.761	.853	.687	.166	81.1	85.5	72.3	13.2
9	.774	.883	.708	.175	80.5	83.6	73.0	10.6
10	.787	.891	.710	.181	79.9	83.2	72.5	10.7
11	.783	.898	.703	.195	79.4	82.6	72.5	10.1

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	76.1	2.9	74.1	4.9	0.830	8.98	1.52	0.86
1	76.0	2.8	74.0	4.8	.827	.95	.49	.86
2	75.9	2.7	74.0	4.6	.827	.95	.43	.86
3	75.9	2.5	74.1	4.3	.830	9.00	.31	.87
4	75.9	2.3	74.3	3.9	.835	.05	.20	.88
5	75.8	2.0	74.4	3.4	.838	.10	.03	.90
6	75.8	1.7	74.6	2.9	.843	.14	0.90	.91
7	76.3	1.9	75.0	3.2	.854	.25	1.00	.90
8	77.6	2.9	75.6	4.9	.871	.39	.59	.86
9	78.8	4.3	75.8	7.3	.876	.41	2.45	.79
10	79.7	5.5	75.8	9.4	.876	.37	3.24	.74
11	80.1	6.9	76.0	11.0	.882	.39	.90	.71
Noon.	80.4	7.8	75.7	12.5	.873	.26	4.50	.67
1	80.7	8.6	75.5	13.8	.868	.20	5.01	.65
2	80.4	9.2	74.9	14.7	.851	.00	.33	.63
3	80.5	9.2	75.0	14.7	.854	.03	.34	.63
4	80.4	8.6	75.2	13.8	.860	.11	4.97	.65
5	79.9	7.8	75.2	12.5	.860	.13	.43	.67
6	78.9	6.6	74.3	11.2	.835	8.92	3.80	.70
7	77.6	5.1	74.0	8.7	.827	.88	2.84	.76
8	76.9	4.2	74.0	7.1	.827	.91	.26	.80
9	76.8	3.7	74.2	6.3	.832	.98	.00	.82
10	76.9	3.0	74.8	5.1	.849	9.17	1.61	.85
11	76.6	2.8	74.6	4.8	.843	.11	.51	.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 April 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
1	146.5	...	S.	...	234.8	B. to 5 A. M., ⌒i to 2 P. M., ⌒i to 5 P. M., B to 8 P. M., ⌒i afterwards. L on N at 9 P. M., D at 9½ A. M.
2	141.8	...	S.	...	211.3	Clouds of different kinds to 9 A. M., ⌒i afterwards.
3	129.0	1.84	S & S S E	30.0	260.7	S to 5 P. M., O afterwards. Storm from 6¾ to 7 P. M. T & L from 6 to 11 P. M. R from 6¾ to 8 & at 11 P. M.
4	139.0	0.71	S S W & S	9.6	336.9	⌒i to 8 A. M., ⌒i to 4 P. M., O afterwards. High wind from 6 to 6¼ P. M. T L & R at midnight, & from 5 to 7 P. M.
5	142.0	...	S S W & S W	...	279.6	Chiefly ⌒i L on S W at 7 P. M.
6	138.0	0.04	S S W & S	...	180.6	Clouds of various kinds. T at 4 6½ & 9 P. M. L. on N. at 6½ & 9 P. M. Light R at 5, 7 & 8¾ P. M.
7	143.7	...	S S W & S	...	224.2	Scuds to 10 A. M. B to 8 P. M. Scuds afterwards.
8	147.0	...	S by E & S	...	194.1	Scuds to 8 A. M. ⌒i & ⌒i to 7 P. M. Scuds afterwards.
9	136.0	...	S by W & S	...	198.3	Chiefly S.
10	149.0	...	SbyW,SSW&Sb.E	...	216.0	Scuds to 9 A. M. ⌒i to 5 P. M. B afterwards.
11	140.8	...	S & S by W	...	211.0	Chiefly B.
12	145.0	...	S & S S W	...	215.7	B to 2 A. M. ⌒i to 8 A. M. B to 2 P. M. ⌒i afterwards.
13	144.8	...	S by W & S	...	217.5	S to 8 A. M. B to 11 A. M., ⌒i to 7 P. M., B afterwards.
14	145.0	...	S S W & S	...	269.4	Chiefly ⌒i L from 9 to 11 P. M.
15	140.0	0,07	Variable	0.9	244.4	S to 9 A. M., clouds of different kinds to 4 P. M. O to 9 P. M. B afterwards. L at midnight & 1 A. M. & from 6 to 8 P. M. T from 4½ to 8 P. M, Light R. at 9½ & 10¼ A. M., & from 4½ to 7 P. M.
16	128.3	...	E & Variable	2.0	212.7	S to 7 P. M., B afterwards. T from Noon to 2 P. M. D at 7 A. M. & 2 P. M.
17	145.5	...	E by N & Variable	...	108.2	Clouds of different kinds to 9 A. M., ⌒i to 7 P. M. B afterwards L from 7¼ to 9 P. M.

⌒i Cirri,—i Strati, ⌒i Cumuli, ⌒i Ciro-strati, ⌒i Cumulo-strati, ⌒i Nimbi, ⌒i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
18	148.0	...	S E & S	...	92.4	B to A. M., ⌒i to 9 A. M., ⌒i to 4 P. M., ⌒i to 7 P. M., B afterwards.
19	147.3	...	S by W & S S W	1.8	91.2	B to 6 A. M., ⌒i afterwards T & D at 3¾ P. M.
20	145.0	0.47	S by W & S S W	4.0	164.7	B to 7 A. M. ⌒i to 5 P. M. O afterwards. Brisk wind from 4½ to 5½ P. M. T from 5 to 8 P. M. L from 6 to 10 P. M. R. from 4¾ to 10 P. M.
21	142.0	0.12	EN E,S & S by W	4.4	195.3	S to 4 A. M. ⌒i to 1 P. M., S to 4 P. M., O afterwards. Brisk wind from 10to 12 A. M. T & L from 5¾ to 8 P. M. Light R at 6, 8 & 11 P. M.
22	137.6	0.61	Variable	4.2	261.0	O to 6 A. M. ⌒i to 10 A. M., O to 2 P. M., ⌒i to 7 P. M., O afterwards. Briskwind at 11 A. M., 8¾ & 10¼ P. M., T after intervals L at 3 A. M. & from 7 to 9 P. M., R from 9¾ A. M., to 2 & 8½ to 10 P. M.
23	142.0	...	S S W & S	...	200.9	S to 5 A. M., ⌒i to 10 A. M., ⌒i afterwards. L on S W at 9¾ & 11 P. M.
24	142.5	...	S W & S by W	...	65.0	S to 10 A. M., ⌒i & ⌒i afterwards. D at midnight.
25	145.0	1.46	S & S S E	...	218.9	⌒i to 3 A. M., ⌒i to 8 P. M., O afterwards. L from 9 to 11 P. M., T & R from 10 to 11 P. M.
26	140.8	0.40	S S W, S W & S	...	165.3	O to 8 A. M., clouds of different kinds afterwards. T at midnight L at midnight & 8 P. M. R from midnight to 3 A. M.
27	147.0	...	S S W	...	184.1	B to 7 A. M., ⌒i to 8 P. M., ⌒i afterwards. L on E at 7 P. M.
28	150.2	...	S by W. S S W & S	...	131.1	⌒i to 11 A. M., ⌒i to 6 P. M., B afterwards
29	145.5	...	S S W & S	...	162.6	B to 3 A. M., ⌒i to 3 P. M., B afterwards.
30	144.8	...	S & S by W	...	267.8	B to 2 P. M., ⌒i to 8 P. M., B afterwards.

⌒i Cirri,—i Strati, ⌒i Cumuli, ⌒i Cirro-strati, ⌒i Cumulo-strati, ⌒i Nimbi, ⌒i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.772
Max. height of the Barometer occurred at 9 A. M. on the 11th. ...	29.948
Min. height of the Barometer occurred at 7 P. M. on the 14th. ...	29.631
Extreme range of the Barometer during the month	0.317
Mean of the daily Max. Pressures	29.843
Ditto ditto Min. ditto	29.702
Mean daily range of the Barometer during the month	0.141

	°
Mean Dry Bulb Thermometer for the month	82.7
Max. Temperature occurred at 2 & 3 P. M. on the 12th & 30th ...	94.5
Min. Temperature occurred at 2 A. M, on the 17th.	71.0
Extreme range of the Temperature during the month	23.5
Mean of the daily Max. Temperature	90.7
Ditto ditto Min. ditto, ...	76.7
Mean daily range of the Temperature during the month... ...	14.0

Mean Wet Bulb Thermometer for the month	77.9
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	4.8
Computed Mean Dew-point for the month	74.5
Mean Dry Bulb Thermometer above computed mean Dew-point ...	8.2
	Inches.
Mean Elastic force of Vapour for the month	0.840

	Troy grain.
Mean Weight of Vapour for the month	9.03
Additional Weight of Vapour required for complete saturation ...	2.69
Mean degree of humidity for the month, complete saturation being unity	0.77
	°
Mean Max. Solar radiation Thermometer for the month ...	143.0

	Inches.
Rained 14 days,—Max. fall of rain during 24 hours	1.84
Total amount of rain during the month	5.72
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	4.64
Prevailing direction of the Wind... ...	S, S by W, & S S W.

*Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.											1		1				1		3				1		10	1	7		4	1	1	1							1	1							
1															1		2		1		3		2		6		7		6		1						1	1									
2																			2		5		4		2		7		6		2						2	1									
3											1								2		2		2		5		9		6		2				1	1											
4											2	1							2		2		2		5		8		8		1																
5					1				1		1								2		1		3		5		5		9		1										1							
6			1						1		1								1		1		3		6		6		8		1														1			
7									3	1					1		1		1				3		5		10		5		1																	
8									2		1				1				1		1				8		6		8		2																	
9									2		1				1				1		1				3		6	1	11		4																	
10							1	1	1		2						1				2	1			1		8		10	1	4																	
11											1		1		1						1		1		4		1		12		7												1	1				
Noon.									1	1			1						1				3		7		8		5		3		1															
1									1		1	1							1				1		7		8		7		2		1								1							
2					1														2	1	1		1		13		5	1	3		3										1							
3																	1		1		1		4		14		6		1		1								1									
4																			2	1	3		2		8		12		1		1								1									
5							2	2	1	1			1								4		1		16	1	3		1										1									
6							1	1			1										3		5		11	1	3		3										2	1					1	1		
7									1	1			1								2		1		16	2	2		4						1	1					1				1	1		
8													4	1					1		2		3		13		1		5	1					1	1												
9									1				1				1		1		2	1	2		15	1	4		1		1	1	1															
10									2				1				1		1	1			2		14	1	6		2	1	1																	
11							1						3	1			1						1		13		6	1	4		1	1																

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

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° Faht.	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	29.757	29.842	29.694	0.148	84.8	89.0	79.0	10.0
2	.787	.869	.721	.148	83.3	92.0	76.8	15.2
3	.766	.843	.709	.134	84.9	92.2	78.0	14.2
4	.750	.824	.639	.185	84.0	93.0	74.4	18.6
5	.729	.775	.656	.119	78.8	90.0	74.0	16.0
6	.705	.766	.599	.167	81.0	91.4	74.8	16.6
7	.683	.743	.589	.154	83.8	94.3	76.8	17.5
8	.697	.735	.627	.108	80.6	88.9	75.0	13.9
9	.704	.753	.649	.104	79.9	86.9	74.5	12.4
10	.714	.772	.644	.128	81.8	91.8	76.5	15.3
11	.723	.775	.637	.138	80.8	91.2	75.2	16.0
12	.718	.776	.640	.136	82.2	89.2	75.5	13.7
13	.713	.766	.616	.150	82.5	91.0	75.6	15.4
14	.687	.751	.604	.147	82.1	89.0	75.5	13.5
15	.661	.712	.587	.125	83.8	90.2	78.0	12.2
16	.651	.697	.574	.123	86.9	94.0	80.6	13.4
17	.662	.719	.595	.124	88.0	95.0	82.5	12.5
18	.641	.702	.555	.147	86.4	94.7	82.7	12.0
19	.590	.636	.523	.113	86.7	93.5	80.6	12.9
20	.577	.629	.506	.123	80.8	85.3	77.0	8.3
21	.551	.614	.459	.155	83.7	92.8	78.0	14.8
22	.538	.595	.475	.120	82.4	89.8	79.1	10.7
23	.537	.601	.428	.173	84.6	93.2	78.5	14.7
24	.571	.647	.533	.114	82.3	89.4	76.5	12.9
25	.645	.779	.586	.193	84.0	91.0	75.3	15.7
26	.695	.754	.653	.101	82.0	90.7	76.0	14.7
27	.747	.812	.687	.125	84.0	91.6	77.0	14.6
28	.735	.814	.641	.173	82.8	91.5	76.0	15.5
29	.730	.788	.659	.129	83.0	90.5	76.5	14.0
30	.690	.762	.612	.150	84.6	92.3	77.7	14.6
31	.669	.730	.604	.126	86.2	93.0	80.5	12.5

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	80.5	4.3	77.5	7.3	0.925	9.90	2.56	0.80
2	75.9	7.4	70.7	12.6	.744	7.97	3.96	.67
3	78.1	6.8	73.3	11.6	.809	8.63	.86	.69
4	77.9	6.1	73.6	10.4	.817	.75	.42	.72
5	74.7	4.1	71.8	7.0	.771	.33	2.11	.80
6	75.9	5.1	72.3	8.7	.783	.43	.71	.76
7	78.0	5.8	73.9	9.9	.824	.83	3.27	.73
8	76.3	4.3	73.3	7.3	.809	.72	2.29	.79
9	76.1	3.8	73.4	6.5	.811	.75	.03	.81
10	77.8	4.0	75.0	6.8	.854	9.18	.22	.81
11	76.9	3.9	74.2	6.6	.832	8.96	.11	.81
12	78.0	4.2	75.1	7.1	.857	9.21	.33	.80
13	77.5	5.0	74.0	8.5	.827	8.88	.76	.76
14	78.2	3.9	75.5	6.6	.868	9.33	.18	.81
15	79.2	4.6	76.0	7.8	.882	.45	.65	.78
16	80.5	6.4	76.7	10.2	.902	.60	3.65	.73
17	81.2	6.8	77.1	10.9	.913	.70	.98	.71
18	81.5	4.9	78.1	8.3	.943	10.06	.00	.77
19	81.4	5.3	78.2	8.5	.946	.07	.11	.76
20	77.6	3.2	75.4	5.4	.865	9.34	1.73	.84
21	79.5	4.2	76.6	7.1	.899	.63	2.44	.80
22	79.5	2.9	77.5	4.9	.925	.94	1.67	.86
23	79.9	4.7	76.6	8.0	.899	.61	2.78	.78
24	79.7	2.6	77.9	4.4	.937	10.08	1.50	.87
25	80.5	3.5	78.0	6.0	.940	.07	2.10	.83
26	78.6	3.4	76.2	5.8	.887	9.54	1.93	.83
27	80.3	3.7	77.7	6.3	.931	.98	2.19	.82
28	78.5	4.3	75.5	7.3	.868	.33	.42	.79
29	78.7	4.3	75.7	7.3	.873	.38	.44	.79
30	78.7	5.9	74.6	10.0	.843	.02	3.37	.73
31	81.2	5.0	77.7	8.5	.931	.92	.07	.76

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.693	29.815	29.543	0.272	79.5	84.2	74.0	10.2
1	.683	.805	.526	.279	79.2	84.0	74.2	9 8
2	.672	.786	.513	.273	78·9	83.8	74.0	9.8
3	.665	.768	.500	.268	78.6	83.5	74.0	9.5
4	.665	.776	.504	.272	78.4	83.0	74.0	9.0
5	.675	.782	.522	.260	78.2	82.7	74.0	8.7
6	.691	.809	.540	.269	78.4	83.0	74.4	8.6
7	.710	.850	.572	.278	79.6	84.0	75.0	9.0
8	.724	.866	.583	.283	82.1	87.0	77.0	10.0
9	.732	.869	.591	.278	84.5	88.3	77.0	11.3
10	.730	.867	.582	.285	86.4	90.0	77.0	13.0
11	.717	.849	.571	.278	87.9	92.4	79.3	13.1
Noon.	.702	.829	.556	.273	88.4	93.5	76.5	17.0
1	.680	.798	.533	.265	89.3	94.7	77.5	17.2
2	.653	.768	.499	.269	89.5	95.0	79.3	15.7
3	.628	.735	.473	.262	89.6	95.0	79.2	15.8
4	.615	.721	.459	.262	89.8	95.0	80.6	14.4
5	.612	.735	.428	.307	88.0	94.8	76.0	18.8
6	.624	.727	.453	.274	86.2	94.0	76.4	17.6
7	.648	.736	.491	.245	83.5	90.0	76.0	14.0
8	.669	.763	.523	.240	81.9	87.5	75.0	12.5
9	.686	.810	.532	.278	81.3	86.7	75.0	11.7
10	.699	.832	.541	.291	80.6	85.4	75.0	10.4
11	.699	.842	.544	.298	80.0	84.6	74.4	10.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	76.7	2.8	74.7	4.8	0.846	9.14	1.52	0.86
1	76.6	2.6	74.8	4.4	.849	.19	.37	.87
2	76.6	2.3	75.0	3.9	.854	.24	.23	.88
3	76.4	2.2	74.9	3.7	.851	.21	.17	.89
4	76.4	2.0	75.0	3.4	.854	.25	.06	.90
5	76.4	1.8	75.1	3.1	.857	.28	0.97	.91
6	76.8	1.6	75.7	2.7	.873	.45	.86	.92
7	77.5	2.1	76.0	3.6	.882	.52	1.17	.89
8	78.8	3.3	76.5	5.6	.896	.63	.88	.84
9	79.8	4.7	76.5	8.0	.896	.59	2.76	.78
10	80.7	5.7	76.7	9.7	.902	.60	3.46	.74
11	81.2	6.7	77.2	10.7	.916	.73	.91	.71
Noon.	81.1	7.3	76.7	11.7	.902	.56	4.28	.69
1	81.4	7.9	76.7	12.6	.902	.55	.66	.67
2	81.2	8.3	76.2	13.3	.887	.41	.88	.66
3	80.9	8.7	75.7	13.9	.873	.24	5.09	.65
4	81.2	8.6	76.0	13.8	.882	.33	.09	.65
5	79.9	8.1	75.0	13.0	.854	.07	4.61	.66
6	79.5	6.7	74.8	11.4	.849	.06	3.93	.70
7	78.7	4.8	75.3	8.2	.862	.25	2.75	.77
8	77.8	4.1	74.9	7.0	.851	.15	.29	.80
9	77.8	3.5	75.3	6.0	.862	.29	1.95	.83
10	77.4	3.2	75.2	5.4	.860	.28	.73	.84
11	76.8	3.2	74.6	5.4	.843	.11	.70	.84

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 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
1	142.0	...	S & S by W	...	224.4	Chiefly ⌒i.
2	142.5	...	W & variable.	...	166.5	Chiefly ⌒i.
3	147.0	...	W & W by S	...	84.6	⌒i to 12 A. M., ⌒i to 6 P. M., B afterwards.
4	147.7	...	S S W & S by W	3.2	115.7	Chiefly ⌒i. Brisk wind from 7¼ to 7½ P. M., T at 8 P. M. L on W at 7 & 8 P. M.
5	131.8	0.25	E S E & Variable	3.6	239.0	⌒i to 3 A. M., B to 9 A. M., clouds of different kinds afterwards. Brisk wind from 11½ to 11¾ A. M. T at 11¼ & 12 A. M., & from 6 to 8 P. M., L from 6 to 8 P. M. R. at 11½ & 12 A. M., and from 6½ to 8 P. M.
6	148.5	...	WNW & variable.	...	202.7	Chiefly ⌒i, D at 6½ P. M.
7	150.0	0.48	S E & S S W	19.5	83.3	Chiefly ⌒i., strong wind at 6½ P. M. Hailstone at 6¼ P.M., T & L from 6 to 9 P. M. R from 6½ to 7½ P. M.
8	135.2	0.13	S E & Variable.	2.8	99.5	⌒i, to 3 A. M., O to 6 A. M., clouds of different kinds to 6 P. M. O afterwards. Brisk wind at 1¼ P. M. T at 1 P. M. L on S at 9 P. M., Slight R at 1¼, 7 & 8 P. M.
9	145.0	...	S S E & S W	...	147.3	Chiefly ⌒i.
10	144.0	0,24	S S W & S	1.7	98.0	Chiefly ⌒i. Brisk wind between 4½ & 5 P. M. T at 4 & 5 P. M. R at 5 & 6 P. M.
11	147.4	0.27	S E & S by W	2.2	140.6	B to 10 A. M., ⌒i, to 5 P. M. O afterwards. Brisk wind between 5 & 5½ P. M., T at 5½ & 7 P. M., L at 9 & 11 P. M., R from 5½ to 7 P. M.
12	146.5	0.16	SSW, SE&SSE	...	136.9	Clouds of different kinds to 7 A. M., ⌒i to 7 P. M., O afterwards. T at 8½ P. M. L on S W at 8 P. M., R from 8¼ to 10 P. M.
13	150.0	1.40	S by E & S S W	7.8	114.0	⌒i to 8 A.M., ⌒i to 6 P. M., O afterwards. High wind at 7 P. M. T at 7 & 8 P. M. L from 7 to 9 P. M. R at 7 & 8 P. M.
14	145.0	...	S S E & E N E	...	113.3	O to 4 A. M., B to 9 A. M., ⌒i to 6 P. M., S afterwards.

⌒i Cirri, —i Strati, ⌒i Cumuli, ⌒i Cirro-strati, ⌒i Cumulo-strati, ⌒i Nimbi, ⌒i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
15	150.2	0.89	S S W & Variable	1.7	108.8	B to 8 A. M., ⌒i to 4 P. M. B afterwards. R between 1 & 2 P. M.
16	149.8	...	[S W SSW, S by W & W	...	46.3	B to 3 A. M., \i to 8 A. M., ⌒i to 7 P. M. B afterwards. L at 9 & 10 P. M.
17	149.7	...	S S W & S by E	0.8	68.3	B to 9 A. M., ⌒i to 5 P. M. B afterwards.
18	152.0	0.22	S by E & S W	1.8	72.7	B to 6 A. M., ⌒i to 7 P. M. B afterwards. T at 2½ & 4½ P. M. R at 2, 3 & 5 P. M.
19	148.0	...	S S W	...	113.6	B to 4 A. M., \i to 4 P. M., S afterwards. L at midnight & from 7¼ to 9 P. M.
20	120.0	0.27	S by W & Variable	0.8	177.1	Chiefly O. L from 2 to 5 A. M., & at 10 P. M. T at 5 & from 8¼ to 10¼ A. M., R from 5½ to 10 A. M., & at 8 P. M.
21	149.0	0.19	S W & E S E	2.6	108.3	S to 10 A. M., ⌒i to 7 P. M. O afterwards. Brisk wind between 5 & 5½ P. M. L on S at 8 P. M. R at 3½ & 5½ P. M.
22	145.8	0.21	E S E & W S W	2.4	85.4	Clouds of different kinds to 8 A.M., ⌒i to 2 P.M. O to 6 P.M., \i to 9 P. M., B afterwards. Brisk wind, T & R at 2½ P.M.
23	144.3	...	W S W & S S E	1.9	46.8	B to 4 A. M., \i to 10 A.M., ⌒i to 4 P. M., S afterwards. T at 4¼ & 5 P. M.
24	135.5	1.40	S S E & S by W	6.5	96.1	S to 6 A. M., \i to 10 A. M. O to 3 P. M., S afterwards. High wind at 11 A.M. T from 12 A. M., to 1 P. M., L at 11 & 12 A. M., & from 8 to 11 P. M., R at 11 & 12 A. M.
25	140.7	2.58	S S W	22.0	164.4	S to 10 A.M., ⌒i to 7 P. M. O afterwards. Storm at 9¼ P. M., T & L at midnight & 1 A. M., & from 7 to 11 P. M., R from 7¾ to 10 P. M.
26	141.2	0.82	S W & S by E	11.4	239.8	O to 6 A. M., S to 3 P. M., O afterwards. High wind between 4¼ & 4½ P. M., T at 5 P. M., L at midnight & 1 A. M., & from 7 to 9 P. M., R from 4½ to 6 P. M.

\i *Cirri*,—i *Strati*, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, \⌣i Nimbi, \i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, R rain, H hail.

Abstract of the Result of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Solar Radiation, Weather, &c.,

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles.	
27	145.8	...	S S W	...	147.8	O to 7 A. M., ⌒i to 5 P. M., B afterwards. L on N W at 8 P. M.
28	145.0	1.57	SSW & Variable	3.8	126.9	S to 8 A. M., ⌒i to 5 P. M., O afterwards. Brisk wind between 7½ & 8¾ p. M. T & L from 7 to 11 p. M. R from 6 to 8 p. M. & at 11 p. M.
29	145.8	...	SW & E S E	...	155.2	S to 7 A. M., ⌒i to 7 p. M., S afterwards. L on S at 8 p. M.
30	143.0	...	W	...	90.8	\i & _i to 7 A. M., B to 2 p. M. ⌒i & \i afterwards.
31	148.9	...	S W & S	...	99.7	Chiefly ⌒i. L on N at 8 & 9 p. M.

\i Cirri —i Strati, ⌒i Cumuli, _i Cirro-strati, ⌒i Cumulo-strati, ⌒i Nimbi, \i Cirro-Cumuli; B clear, S stratoni, O overcast, T thunder, L lightning, R rain, D drizzle

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

Monthly Results.

	Inc hes
Mean height of the Barometer for the month...	29.678
Max. height of the Barometer occurred at 9 A. M. on the 2nd. ...	29.869
Min. height of the Barometer occurred at 5 P. M. on the 23rd. ...	29.428
Extreme range of the Barometer during the month	0.441
Mean of the daily Max. Pressures	29.741
Ditto ditto Min. ditto	29.603
Mean daily range of the Barometer during the month	0.138

	°
Mean Dry Bulb Thermometer for the month	83.3
Max. Temperature occurred at 4P. M. on the 17th.	95.0
Min. Temperature occurred at 5 A. M, on the 5th.	74.0
Extreme range of the Temperature during the month	21.0
Mean of the daily Max. Temperature	91.2
Ditto ditto Min. ditto, ...	77.2
Mean daily range of tLe Temperature during the month... ...	14.0

Mean Wet Bulb Thermometer for the month	78.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	4.6
Computed Mean Dew-point for the month	75.5
Mean Dry Bulb Thermometer above computed mean Dew-point ...	7.8
	Inches.
Mean Elastic force of Vapour for the month	0.868

	Troy grain.
Mean Weight of Vapour for the month	9.31
Additional Weight of Vapour required for complete saturation ...	2.62
Mean degree of humidity for the month, complete saturation being unity	0.78
	°
Mean Max. Solar radiation Thermometer for the month ...	144.4

	Inches.
Rained 17 days,—Max. fall of rain during 24 hours	2.58
Total amount of rain during the month	11.08
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	9.33
Prevailing direction of the Wind... ...	S S W.

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.					1								1				2		3		4		2		1		3		9				2				2				1							
1							1										2		3		5		2		3		2		8				2				2				1							
2							1										2		3		5		2		1		2		9		1		2				2				1							
3																	2		3		5		3	1	1		1		10		2		1				2				1							
4																	2		4		4		3		1				10		2		1		1		2				1							
5																	2		4		3		4		1				9		4		1				2				1							
6																	2		3		4		1		1				7		2		5	1			2				1							
7									1		2		2				1		2		4		1		4		1		4		2		3	1	1		2		1									
8									2		2		2						2		3				3		3		6		3	1	2				2		1									
9					1				2		2		1										1		6		4		5		3	1	2				3		1									
10					1		1		1				2				1		1						3		3		7	1	5		1				4				1							
11					1		1						1		1		2		2						4		1		6		3		3		1		3				1				1	1		
Noon.									1						2		1		2				1		1		5	1	8		3				3		2				1	1					1	
1							1		1				1		1		1		1		1		1		2		4		8		3				3		2						1					
2									4	1					1		1				3	2			1		6		7		2		1		2		2						1					
3							1		1		1						1						1		4		4		9		2	1	2		2		2	1									1	
4											1				1		1				1		2		3		2		10		3		3		2		1	1							1			
5							1				1		2								1		1		1		2		9		1		5	1	1		1	1			1		1	1				
6	1				1	1					1		2	1			1		1		2	1			1		4		7	1	2		4	1	2	1	1				1	1						
7	2	2	1						1	1	1		1	1			1		2	1	1	1	1		2		2		5		5		2		1		2				1							
8							2	1					2	1			3	1	2				1		3	1	2		6	1	4		1		2	1	2	1			1							
9							1		1								3		3		2		2		2				8	1	2		3				3	1			1							
10							1		1								2		4		2		1		3				9	1	1		1				3				2	1			1			
11			1								1						3		3		3		2		3		1		8		1		2	1	1		2											

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

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	29.655	29.714	29.590	0.124	86.3	93.8	82.7	11.1
2	.625	.675	.550	.125	80.7	88.0	77.0	11.0
3	.579	.647	.497	.150	81.2	87.0	77.0	10.0
4	.526	.570	.471	.099	81.8	87.0	79.5	7.5
5	.551	.590	.508	.082	82.1	87.5	80.0	7.5
6	.549	.605	.488	.117	82.0	86.0	80.5	5.5
7	.520	.594	.454	.140	82.8	88.4	80.0	8.4
8	.508	.555	.454	.101	83.3	87.5	80.5	7.0
9	.520	.572	.459	.113	81.5	85.9	77.8	8.1
10	.565	.612	.512	.100	83.7	90.0	80.5	9.5
11	.578	.623	.537	.086	81.4	83.0	80.2	2.8
12	.541	.595	.469	.126	82.8	88.0	79.8	8.2
13	.515	.562	.455	.107	81.7	84.6	80.0	4.6
14	.488	.539	.407	.132	83.6	87.0	81.0	6.0
15	.472	.549	.405	.144	83.5	87.0	81.3	5.7
16	.437	.486	.374	.112	84.1	87.3	81.0	6.3
17	.460	.535	.403	.132	83.6	87.4	80.8	6.6
18	.528	.587	.482	.105	84.4	89.6	80.5	9.1
19	.543	.593	.484	.109	85.5	90.5	81.8	8.7
20	.465	.543	.370	.173	85.1	89.5	83.0	6.5
21	.428	.479	.371	.108	83.7	89.7	80.6	9.1
22	.405	.454	.342	.112	82.1	85.4	80.5	4.9
23	.425	.499	.370	.129	82.2	86.4	80.0	6.4
24	.490	.552	.441	.111	81.0	84.3	80.0	4.3
25	.531	.573	.466	.107	81.4	86.7	78.5	8.2
26	.536	.576	.474	.102	81.2	83.5	79.5	4.0
27	.501	.539	.444	.095	81.2	84.5	78.5	6.0
28	.519	.588	.463	.125	82.0	86.0	78.7	7.3
29	.598	.672	.531	.141	81.6	86.5	76.5	10.0
30	.635	.690	.580	.110	82.8	89.4	76.4	13.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

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	82.1	4.2	79.2	7.1	0.976	10.41	2.61	0.80
2	78.7	2.0	77.3	3.4	.919	9.92	1.12	.90
3	78.9	2.3	77.3	3.9	.919	.90	.31	.88
4	79.7	2.1	78.2	3.6	.946	10.17	.23	.89
5	80.3	1.8	79.0	3.1	.970	.44	.07	.91
6	80.3	1.7	79.1	2.9	.973	.47	.00	.91
7	80.3	2.5	78.5	4.3	.955	.27	.48	.87
8	80.6	2.7	78.7	4.6	.961	.31	.62	.86
9	80.1	1.4	79.1	2.4	.973	.49	0.82	.93
10	80.4	3.3	78.1	5.6	.943	.10	1.97	.84
11	80.3	1.1	79.5	1.9	.986	.62	0.65	.94
12	81.0	1.8	79.7	3.1	.992	.66	1.09	.91
13	80.5	1.2	79.7	2.0	.992	.68	0.69	.94
14	81.5	2.1	80.0	3.6	1.001	.72	1.31	.89
15	81.3	2.2	79.8	3.7	0.995	.66	.34	.89
16	81.2	2.9	79.2	4.9	.976	.45	.76	.86
17	80.6	3.0	78.5	5.1	.955	.25	.78	.85
18	80.3	4.1	77.4	7.0	.922	9.87	2.44	.80
19	81.6	3.9	78.9	6.6	.967	10.32	.40	.81
20	82.6	2.5	80.8	4.3	1.027	.98	1.59	.87
21	80.9	2.8	78.9	4.8	0.967	.37	.70	.86
22	80.2	1.9	78.9	3.2	.967	.41	.10	.90
23	80.3	1.9	79.0	3.2	.970	.44	.10	.91
24	80.2	0.8	79.6	1.4	.989	.68	0.46	.96
25	79.9	1.5	78.8	2.6	.964	.38	.89	.92
26	79.3	1.9	78.0	3.2	.940	.13	1.08	.90
27	79.2	2.0	77.8	3.4	.934	.07	.14	.90
28	79.8	2.2	78.3	3.7	.949	.20	.27	.89
29	79.6	2.0	78.2	3.4	.946	.19	.15	.90
30	80.3	2.5	78.5	4.3	.955	.27	.48	.87

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.545	29.683	29.424	0.259	81.5	84.5	77.0	7.5
1	.533	.672	.412	.260	81.2	84.3	76.4	7.9
2	.521	.665	.407	.258	80.9	84.1	76.4	7.7
3	.507	.647	.399	.248	80.6	84.0	76.6	7.4
4	.502	.648	.398	.250	80.5	84.0	76.9	7.1
5	.511	.653	.403	.250	80.4	83.6	77.0	6.6
6	.525	.684	.414	.270	80.5	83.7	77.4	6.3
7	.539	.697	.426	.271	81.0	84.5	78.0	6.5
8	.556	.711	.438	.273	82.1	86.5	78.5	8.0
9	.563	.714	.442	.272	83.3	87.0	78.2	8.8
10	.563	.706	.454	.252	84.3	88.5	79.0	9.5
11	.557	.703	.440	.263	84.3	90.5	79.8	10.7
Noon.	.541	.679	.417	.262	85.0	91.7	81.0	10.7
1	.522	.642	.392	.250	85.1	93.0	77.5	15.5
2	.503	.627	.370	.257	85.3	93.8	77.0	16.8
3	.485	.604	.354	.250	85.0	91.0	78.2	12.8
4	.469	.590	.349	.241	84.8	90.0	78.4	11.6
5	.470	.600	.342	.258	84.2	88.9	79.0	9.9
6	.482	.602	.365	.237	83.6	87.6	79.0	8.6
7	.499	.621	.381	.240	82.9	86.0	79.5	6.5
8	.520	.635	.388	.247	82.3	85.3	77.9	7.4
9	.536	.661	.413	.248	82.1	85.0	78.0	7.0
10	.553	.670	.437	.233	81.8	85.0	76.5	8.5
11	.553	.672	.430	.242	81.6	84.0	76.8	7.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	80.1	1.4	79.1	2.4	0.973	10.49	0.82	0.93
1	79.8	1.4	78.8	2.4	.964	.40	.81	.93
2	79.6	1.3	78.7	2.2	.961	.37	.73	.93
3	79.5	1.1	78.7	1.9	.961	.37	.64	.94
4	79.3	1.2	78.5	2.0	.955	.31	.67	.94
5	79.3	1.1	78.5	1.9	.955	.31	.63	.94
6	79.4	1.1	78.6	1.9	.958	.34	.64	.94
7	79.7	1.3	78.8	2.2	.964	.40	.74	.93
8	80.3	1.8	79.0	3.1	.970	.44	1.07	.91
9	80.8	2.5	79.0	4.3	.970	.42	.51	.87
10	81.1	3.2	78.9	5.4	.967	.37	.91	.84
11	81.0	3.3	78.7	5.6	.961	.29	.99	.84
Noon.	81.5	3.5	79.0	6.0	.970	.37	2.16	.83
1	81.4	3.7	78.8	6.3	.964	.31	.26	.82
2	81.4	3.9	78.7	6.6	.961	.26	.38	.81
3	81.3	3.7	78.7	6.3	.961	.29	.24	.82
4	81.2	3.6	78.7	6.1	.961	.29	.17	.83
5	80.8	3.4	78.4	5.8	.952	.19	.05	.83
6	80.6	3.0	78.5	5.1	.955	.25	1.78	.85
7	80.6	2.3	79.0	3.9	.970	.42	.37	.88
8	80.3	2.0	78.9	3.4	.967	.41	.17	.90
9	80.2	1.9	78.9	3.2	.967	.41	.10	.90
10	80.2	1.6	79.1	2.7	.973	.47	0.93	.92
11	80.0	1.6	78.9	2.7	.967	.41	.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 June 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	151.0	0.51	S & Variable.	1.7	133.5	Chiefly ⌒i. T at 5 P. M. R at 9¼ P. M.
2	113.0	3.87	S S W & S W	1.3	152.4	S to 8 A.M. O afterwards. T from 10 A. M., to 6 P. M. L at 3 A. M., & from 12 A. M., to 2 P. M. R from 8¾ A.M., to 2 P.M.
3	139.4	0.68	S S E & S	2.0	101.4	O to 7 A. M., S to 1 P. M., ⌒i afterwards. T from 1 to 3, 7 to 9 A. M., & at 11 P. M. L from 1 to 3 A. M., at 7 & from 9 to 11 P.M. R from 1 to 3 A. M.
4	...	2.57	S & S by E	...	88.9	S to 6 A. M., ⌣i to 9 M. A., ⌒i & ⌣i to 2 P. M. O to 6 P. M. S afterwards. T at 6 & 7 A.M. & from 1 to 4 P. M. L at midnight. R at 2, 6, 10½ & 12 A. M. & from 1 to 3 P. M.
5	145.0	0.84	S by E, S & S S E	...	60.6	⌒i to 12 A. M. O to 4 P. M. S afterwards. T at 1 P. M. R at 1 A. M., & 1 & 2 P. M.
6	140.0	0.11	S S E & E S E	...	59.9	\i to 3 A. M. S to 7 A. M., ⌒i to 12 A. M. O to 6 P.M., \i afterwards. T at 1 & 2 P. M. Slight R from 11½ A. M., to 3 P. M.
7	138.3	0.35	E S E & N N E	...	61.8	\i to 3 A. M. S to 6 P. M. O afterwards. T at 10 A. M., and from 8 to 10 P. M. L from 8 to 10 P. M. Slight R at 11 A. M. & from 7 to 11½ P. M.
8	132.0	0.12	WSW, NNW & N [E.	...	120.3	O to 4 P. M., \i & ⌣i afterwards. T at 2 A. M., & 11½ P. M. L at 2 A. M., & 11 P. M. R at 3 A. M.
9	127.6	4,04	W by S & S S W	2.0	101.9	O to 3 P. M. S afterwards. Brisk wind at 3¾ A.M. T from midnight to 7 A.M. & at 7 P.M. L from midnight to 6 A. M. & 7 to 11 P. M. R from midnight to 12½ A. M.
10	141.8	0.74	S W & S S W	0.8	152.2	S to 11 A. M., \i & ⌒i to 4 P. M. O afterwards. T, L & R at 5 & 6 P. M.
11	...	0.34	S S E & S by E	...	102.7	Chiefly O. T from 1 to 4 & at 8 A. M. L from 1 to 4 A. M. Slight R from 2 to 6 & 10 to 12 A. M., & at 2 P. M.

\i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒⌣i Cumulo-strati, ⌣⌣i Nimbi, \i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, R rain, D d[illegible]

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
12	145.3	2.18	S E & S S E	...	199.3	S to 7 A. M., ⌒i to 3 P. M. O to 7 P. M. B afterwards. L at 4 A. M., & 11 P. M. R from 12 A. M., to 3 P. M.
13	...	1.38	S by W & S	...	107.4	O to 7 P. M., ⌣i afterwards. R at 1 & from 5 to 7 & 10½ A. M., to 1 P. M., & at 3 P. M.
14	152.3	0.06	S & S S W	...	77.4	S to 4 A. M. O to 9 A. M., ⌒i to 2 P. M. O to 9 P. M. B afterwards. Slight R at 8 A. M., 1, 4, 6 & 9 P. M.
15	137.5	0.13	WSW, S &S by E	...	75.9	Clouds of different kinds. Slight R at 2 A. M., & from 12 A. M. to 3 P. M.
16	...	0.25	S by E, S & S by W	...	171.5	⌣i to 4 A. M. O to 7 A. M., ⌒i & ⌒i to 7 P. M. S afterwards. L on S at 11½ P. M. R at 7, 12 A. M., & 1 P. M.
17	149.2	0.01	S	...	206.5	S to 5 A. M., \i to 9 A. M., ⌒i to 1 P. M. O afterwards. D at 6 A. M., 2½, 4 & 5 P. M.
18	146.5	...	S by W & S S W	...	165.8	O to 4 A. M. S to 8 A. M., \i to 11 A. M., ⌒i to 6 P. M., ⌣i afterwards.
19	148.5	...	S S W & S	...	114.8	\i to 5 A. M., ⌒i to 7 P. M. B afterwards.
20	127.0	...	S & E S E	...	115.8	O to 9 A. M., clouds of different kinds afterwards. L at 4 & 5 A. M., & 11 P. M. T at 8 A. M. D at 8 & 12 A. M., & 1 & 2½ P. M.
21	143.0	0.27	S E &E by S	...	153.2	⌣i to 5 A. M. S to 10 A. M., ⌒i to 8 P. M. O afterwards. R at 12 A. M., 4, 5 & 11 P. M.
22	...	0.84	S E & E S E	1.0	216.7	O to 3 A. M. S to 6 A. M., \i & ⌒i to 9 A. M. O to 1 P. M., clouds of different kinds afterwards. R. at midnight, 10, 11 A. M., 1½, 2½, 4, 5 & 7 P. M.
23	138.8	0.45	E S E & S E	0.8	273.8	S to 6 A. M., ⌒i to 1 P. M., O afterwards. T at 10½ P. M. Slight R at 1, 3, 11 A. M., 2, 6, 7 & from 9 to 11 P. M.
24	...	1.53	E S E & S	...	254.6	O. T at 2¼ & 6½ P. M. L at 2¼ P. M. R after intervals.

\i *Cirri*,—i *Strati*, ⌒i *Cumuli*, ⌣i *Cirro-strati*, ⌒i *Cumulo-strati*, ⌣i *Nimbi*, ⌣i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, R rain, D drizzle

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

Solar Radiation, Weather, &c..

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles.	
25	120.0	0.44	S W & S S E	...	85.0	Chiefly O. R at 1½ & 3 A.M., & 4 P. M.
26	128.5	0.02	S S W	...	168.2	S to 6 A. M. O to 11 A. M. S afterwards. Light R from 7 to 11 A. M.
27	137.0	1.12	S S W & S W	0.8	179.1	Chiefly O. R from 1½ to 9 at 11 & 12 A. M., & 6 P. M,
28	114.0	0.21	S S W & S W	0.8	139.3	Chiefly O. Slight R at midnight from 6 to 10 A.M., & between 7 & 8 P. M.
29	110.5	1.82	S S W & W S W [W	2.0	79.9	Chiefly O. R from 3 to 11 P. M.
30	134.0	0.47	W N W, S W & S S	...	98.9	O to 9 A. M, S afterwards. T at 1 A.M. L at 1 A.M., & from 8 to 10 P. M. R from midnight to 4 A. M., at 1, 2½ & 11 P. M.

i Cirri —*i Strati*, i Cumuli, i Cirro-strati, i Cumulo-strati i Nimbi
i Cirro-Cumuli, B clear, S stratoni, O overcast, T thunder, L lightnin
R rain, D drizzle

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.523
Max. height of the Barometer occurred at 9 A. M. on the 1st. ...	29.714
Min. height of the Barometer occurred at 5 P. M. on the 22nd. ...	29.342
Extreme range of the Barometer during the month	0.372
Mean of the daily Max. Pressures	29.579
Ditto ditto Min. ditto	29.462
Mean daily range of the Barometer during the month	0.117

	°
Mean Dry Bulb Thermometer for the month	82.7
Max. Temperature occurred at 2 P. M. on the 1st.	93.8
Min. Temperature occurred at 1 & 2 A. M, on the 30th.	76.4
Extreme range of the Temperature during the month	17.4
Mean of the daily Max. Temperature	87.2
Ditto ditto Min. ditto, ...	79.8
Mean daily range of the Temperature during the month... ...	7.4

Mean Wet Bulb Thermometer for the month	80.4
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	2.3
Computed Mean Dew-point for the month	78.8
Mean Dry Bulb Thermometer above computed mean Dew-point ...	3.9
	Inches.
Mean Elastic force of Vapour for the month	0.964

	Troy grain.
Mean Weight of Vapour for the month	10.36
Additional Weight of Vapour required for complete saturation ...	1.36
Mean degree of humidity for the month, complete saturation being unity	0.88
	°
Mean Max. Solar radiation Thermometer for the month ...	135.8

	Inches.
Rained 28 days.—Max. fall of rain during 24 hours	4.04
Total amount of rain during the month	25.35
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	23.56
Prevailing direction of the Wind... ...	S & S S W.

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																													
Mid night.														1	1			2	1	3	1	3		7		4				3	1	2		3		1				1	1						
1																		4	2	2		1		5	1	7	1	1	1	3		2		3	1	1		1	1							
2																1		3		2		3	2	4	1	4		2		5	2	1		3	1							2	2			
3														1				3	1	2		3	1	2		4		3		4	1	2	1	2				1	1	1	1	2	2			
4														1		1		3	1	1		3		2		4		3		3		5	2	2								1	1	1	1	
5														1		1		3	1	1		2		3		4		3	1	4	1	4	1	2								1		1	1	
6																2		3		2		2				7	3	1		4	1	4	2	1		1	1	1				2				
7														1				4	1	3	1	2				6		2	1	4	2	5	1			1		1				1				
8											2							3		4	1			1		4	1	3		6	2	3	1			1	1	2	1							1
9	1								1		1					1		1		4		1		1		4		3		4	2	5	2	1		1	1	1								
10							1				1					1		1		2		1	1	1		5	2	4		5	1	4	2	1		1	1					1				1
11					2	1					1			1	1					3	1	3	2	1		4	2	1		6		4	2	1	1	1						1				1
Noon.					1						1		1	1	1	1		2	1	2	2	1	1	2	2	5	3	3		5		3	1			1						1	1			1
1					1											1		3		2	2	3	1	2		2		5	1	6	2	3	2			1								1		
2					1									2		1	1	1	1	2	2	3	1	2	2	4	1	3		7	2	1		2										1		
3					1									3	1	1	1	1	1	2	1			1	1	8	2	2		7	2	1		1				1	1					1		
4					1									1		2		1				5	2	2		5	2	5	1	3		2		2	1									1		
5					1				1					1		1		2		2	2	2		1		7	1	3		4	1	2		2	1								1			
6					1											1		3	1	2		3		1		8	1	3		3	1	3	2										2			
7					1	1	1									1		2			2	3		4		6	1	1		5	1	2						1		1						
8							1							1				2		2		5		2		7		1		4	1	2		1		1	1	1								
9							1							1				1		1		6	1	2		7		1		3	1	3	1	1	1	1		1								
10							1							1		1		3		2	1	4		5		4	1			3		3		3	3	1						1				
11																																														

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

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	29.608	29.666	29.528	0.138	80.3	87.5	76.4	11.1
2	.555	.594	.500	.094	78.1	80.5	75.5	5.0
3	.561	.633	.522	.111	82.4	88.0	79.0	9.0
4	.637	.683	.596	.087	82.9	87.4	79.4	8.0
5	.602	.666	.537	.129	83.7	88.5	80.2	8.3
6	.576	.616	.511	.105	84.4	89.8	80.5	9.3
7	.543	.594	.470	.124	85.1	90.0	81.5	8.5
8	.519	.563	.462	.101	83.8	90.2	81.2	9.0
9	.528	.588	.480	.108	83.1	85.7	81.0	4.7
10	.539	.581	.488	.093	83.2	86.7	80.7	6.0
11	.522	.579	.465	.114	83.3	89.0	79.4	9.6
12	.592	.660	.552	.108	81.9	86.5	78.0	8.5
13	.674	.724	.624	.100	80.0	81.8	77.6	4.2
14	.657	.721	.563	.158	83.5	88.4	80.5	7.9
15	.575	.644	.495	.149	84.4	87.5	81.4	6.1
16	.542	.596	.485	.111	83.3	86.0	81.0	5.0
17	.513	.555	.450	.105	82.6	86.4	78.5	7.9
18	.495	.537	.435	.102	83.9	89.9	80.5	9.4
19	.482	.520	.423	.097	83.2	89.0	80.2	8.8
20	.512	.564	.463	.101	82.4	86.5	80.0	6.5
21	.550	.598	.506	.092	80.9	84.2	78.0	6.2
22	.600	.639	.561	.078	79.9	81.5	78.2	3.3
23	.600	.637	.553	.084	81.6	84.6	79.0	5.6
24	.541	.607	.464	.143	82.9	86.8	80.5	6.3
25	.494	.540	.421	.119	79.6	83.9	77.2	6.7
26	.510	.583	.462	.121	82.9	89.0	78.0	11.0
27	.576	.618	.537	.081	82.5	87.6	78.8	8.8
28	.568	.611	.500	.111	84.0	89.0	79.5	9.5
29	.482	.561	.390	.171	84.8	90.5	81.1	9.4
30	.416	.494	.359	.135	82.4	86.0	80.0	6.0
31	.525	.613	.457	.156	80.9	82.8	79.4	3.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

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	77.7	2.6	75.9	4.4	0.879	9.49	1.42	0.87
2	77.1	1.0	76.4	1.7	.893	.68	0.54	.95
3	79.7	2.7	77.8	4.6	.934	10.03	1.58	.86
4	79.5	3.4	77.1	5.8	.913	9.80	.99	.83
5	80.7	3.0	78.6	5.1	.958	10.28	.79	.85
6	81.2	3.2	79.0	5.4	.970	.40	.91	.85
7	81.7	3.4	79.3	5.8	.979	.46	2.11	.83
8	81.3	2.5	79.5	4.3	.986	.57	1.53	.87
9	81.1	2.0	79.7	3.4	.992	.66	.20	.90
10	81.4	1.8	80.1	3.1	1.005	.77	.12	.91
11	80.7	2.6	78.9	4.4	0.967	.39	.54	.87
12	79.4	2.5	77.6	4.3	.928	9.99	.45	.87
13	78.8	1.2	78.0	2.0	.940	10.15	0.66	.94
14	80.9	2.6	79.1	4.4	.973	.45	1.55	.87
15	81.6	2.8	79.6	4.8	.989	.58	.73	.86
16	81.0	2.3	79.4	3.9	.983	.54	.39	.88
17	80.1	2.5	78.3	4.3	.949	.20	.48	.87
18	80.8	3.1	78.6	5.3	.958	.28	.85	.85
19	80.4	2.8	78.4	4.8	.952	.21	.68	.86
20	80.2	2.2	78.7	3.7	.961	.33	.28	.89
21	78.9	2.0	77.5	3.4	.925	9.98	.12	.90
22	78.5	1.4	77.5	2.4	.925	10.00	0.78	.93
23	79.5	2.1	78.0	3.6	.940	.11	1.23	.89
24	79.8	3.1	77.6	5.3	.928	9.97	.82	.85
25	78.0	1.6	76.9	2.7	.908	.80	0.89	.92
26	79.4	3.5	76.9	6.0	.908	.74	2.05	.83
27	79.7	2.8	77.7	4.8	.931	10.00	1.64	.86
28	80.6	3.4	78.2	5.8	.946	.13	2.04	.83
29	81.2	3.6	78.7	6.1	.961	.29	.17	.83
30	80.1	2.3	78.5	3.9	.955	.27	1.34	.89
31	79.2	1.7	78.0	2.9	.940	.13	0.97	.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 July 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.574	29.710	29.457	0.253	81.1	83.0	77.0	6.0
1	.564	.701	.447	.254	80.7	82.6	76.3	6 3
2	.554	.693	.420	.273	80·4	82.2	76.0	6.2
3	.542	.682	.404	.278	80.1	82.3	75.7	6.6
4	.536	.662	.391	.271	79.8	82.3	75.6	6.7
5	.543	.671	.399	.272	79.7	82.5	75.6	6.9
6	.554	.674	.399	.275	79.7	82.5	75.5	7.0
7	.568	.691	.408	.283	80.5	83.0	77.0	6.0
8	.578	.714	.429	.285	81.6	84.5	77.3	7.2
9	.585	.721	.438	.283	82.9	85.8	78.0	7.8
10	.587	.715	.430	.285	83.8	87.5	78.2	9.3
11	.580	.724	.419	.305	84.7	88.5	79.0	9.5
Noon.	.567	.709	.401	.308	85.5	89.5	79.5	10.0
1	.550	.707	.391	.316	85.9	90.5	79.0	11.5
2	.531	.689	.384	.305	85.7	90.0	78.8	11.2
3	.513	.654	.366	.288	85.1	90.0	79.0	11.0
4	.500	.640	.359	.281	85.2	90.0	79.6	10.4
5	.495	.624	.371	.253	84.7	88.7	79.5	9.2
6	.508	.637	.384	.253	83.6	87.5	77.5	10.0
7	.528	.650	.411	.239	82.5	86.3	77.5	8.8
8	.548	.681	.431	.250	82.1	85.2	78.0	7.2
9	.567	.700	.458	.242	81.8	84.3	78.2	6.1
10	.581	.718	.472	.246	81.5	83.7	77.5	6.2
11	.582	.717	.464	.253	81.4	83.6	77.5	6.1

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	79.7	1.4	78.7	2.4	0.961	10.37	0.80	0.93
1	79.4	1.3	78.5	2.2	.955	.31	.73	.93
2	79.2	1.2	78.4	2.0	.952	.27	.67	.94
3	79.0	1.1	78.2	1.9	.946	.21	.63	.94
4	78.8	1.0	78.1	1.7	.943	.18	.57	.95
5	78.6	1.1	77.8	1.9	.934	.09	.63	.94
6	78.7	1.0	78.0	1.7	.940	.15	.57	.95
7	79.3	1.2	78.5	2.0	.955	.31	.67	.94
8	79.8	1.8	78.5	3.1	.955	.29	1.05	.91
9	80.1	2.8	78.1	4.8	.943	.12	.67	.86
10	80.5	3.3	78.2	5.6	.946	.13	.97	.84
11	80.9	3.8	78.2	6.5	.946	.11	2.31	.81
Noon.	81.2	4.3	78.2	7.3	.946	.11	.61	.80
1	81.3	4.6	78.1	7.8	.943	.06	.81	.78
2	81.1	4.6	77.9	7.8	.937	.00	.80	.78
3	81.2	3.9	78.5	6.6	.955	.21	.36	.81
4	81.1	4.1	78.2	7.0	.946	.11	.50	.80
5	80.8	3.9	78.1	6.6	.943	.08	.34	.81
6	80.5	3.1	78.3	5.3	.949	.18	1.85	.85
7	79.9	2.6	78.1	4.4	.943	.14	.50	.87
8	79.8	2.3	78.2	3.9	.946	.17	.34	.88
9	79.8	2.0	78.4	3.4	.952	.25	.15	.90
10	79.7	1.8	78.4	3.1	.952	.25	.06	.91
11	79.8	1.6	78.7	2.7	.961	.35	0.92	.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 July 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches	[by S	lb	Miles	
1	143.5	2.24	S W, S S W & W	1.4	142.2	O to 12 A. M., \i to 5 P. M. O afterwards. Rfrom midnight to 2 A. M., & 5½ to 11 P. M.
2	...	1.01	W S W & W by S.	...	159.9	O. R from midnight to 9 A. M., 1 to 2½ & at 6, 8 & 9 P. M.
3	150.0	0.02	W by S & S by W.	...	111.1	O to 6 A. M., ⌒i afterwards. Light R at 12 A. M., 1½ & 3½ P. M.
4	145.0	0.09	S by W, S S E & S by [E.	0.5	208.4	B to 5 A. M., ⌒i to 7 P. M. B afterwards. Slight R at 11 A. M., 1½ & 2½ P. M.
5	...	0.43	S S E & S by E.	...	219.9	S to 8 A. M., ⌒i afterwards. L from 8 to 10 P. M. R from 12½ A. M., to 2½ P. M.
6	148.0	0.27	S by E & S.	...	109.3	\i to 6 A. M, ⌒i to 7 P. M. B afterwards. R at 8 A. M. & 3 P. M.
7	145.0	...	S by E & S.	...	144.4	B to 4 A. M., ⌒i & \i afterwards. T at 4 P. M.
8	144.0	0.84	S S E.	...	165.3	S to 7 A. M., ⌒i to 1 P. M. O to 7 P. M. S afterwards. T at 1¼ & 5½ P. M. R at 4 A. M., 2, 3, 5 & 7 P. M.
9	120.0	0.49	S S E.	...	119.6	S to 3 A. M. O to 7 P. M. S afterwards. T at 9¾ A. M. 1, 2 & 3 P. M. L at 9 P. M. R at 9¼, 12 A. M., & 1 P. M.
10	126.0	0.36	S S E & S.	...	93.9	S to 8 A. M., ⌒i, to 12 A. M. O to 4 P. M. S afterwards. T at 1½ P. M. Slight R at 12½ A. M. & from 2¼ to 4 & at 6½ P. M.
11	153.0	0.30	S by E & S S E	...	81.2	S to 4 A. M., \i to 8 A. M., ⌒i to 2 P. M. O afterwards. R at 3 & between 7 & 8 P. M.
12	150.0	0.16	S by E & S W	...	112.5	O to 7 A. M., ⌒i to 1 P. M. S to 4 P. M. O afterwards. Slight R from 1½ to 6 & at 10 A. M.
13	...	1.41	S by E & S	...	127.7	O to 4 P. M., \i to 8 P. M. S afterwards. R from 1½ A. M., to 3 P. M.
14	146.0	0.43	S & S S W,	...	174.6	O to 9 A. M., \i to 5 P. M. O afterwards. R at 5½ A. M., & from 6½ to 9 P. M.
15	125.8	0.11	S S W.	...	266.5	S to 4 P. M. O afterwards. T from 9 to 11 P. M. L from 8 to 10 P. M. Slight R at 8¼ & 10 P. M.

\i Cirri,—i Strati, ⌒i Cumuli, _i Cirro-strati, ⌒_i Cumulo-strati, _i Nimbi, _i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, R rain, D drizzl.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
16	113.0	0.02	S & S W	...	151.5	O to 10 A. M. S to 5 P. M. O afterwards. L on E at 9 P.M. Light R at 3 A. M.
17	148.8	0.83	W & S	...	85.6	O to 5 A. M., \i & ⌣i to 10 A. M., ⌒i to 2 P. M., ⌒\i afterwards. R at 3 & 4 A. M.
18	136.0	...	S, S E & E S E	...	30.4	⌣i to 4 A. M., ⌒i & \i to 6 P. M. B afterwards. T at 8½ P. M. L on W at 11 P. M. D at 11 A. M., & 8½ P. M.
19	110.5	0.17	E S E & S E	...	266.2	Clouds of various kinds. T at 2 P. M. Slight R at 7 & 11½ A. M., 1½, 5½ & 7 P. M.
20	148.5	0.38	S E & S by E	0.8	257.4	O to 10 A. M. S afterwards. Slight R at 4, 10 & 12½ A. M., & 3, 6½ & 10 P. M.
21	129.4	1.12	S by E & S S W	...	120.6	O to 11 A. M. S afterwards. R at 2, 3½ & from 6 to 11 A. M.
22	...	0.42	S S W & S by W	...	133.9	Chiefly O Slight R from 4 to 6 & 10 A. M to 6 P. M.
23	120.0	0.05	S S W	...	120.1	O to 9 A. M. S to 7 P. M. O afterwards. Light R at 3½ A.M.
24	134.1	...	S S W & S W	...	121.9	O to 10 A. M., ⌒i & \i to 8 P. M. O afterwards. L at 10 & 11 P. M. D at 8 A.M.. & 10 P.M.
25	134.0	3.25	WSW, W&W [S by	...	101.7	Chiefly O. T & L at 1 & 2 A. M. R from 1 to 12 A. M., & 4 to 7 P. M.
26	145.0	0.11	W by S & S S E	...	87.7	S to 5 A. M., ⌒i afterwards. Slight R at 4, 5 A. M., & 2 P.M.
27	129.6	0.13	S E. & S	...	190.7	B to 4 A. M. S to 9 A. M., ⌒i to 4 P.M., \i afterwards. Slight R at 12 A. M., 2 & 4 P. M.
28	148.0	...	S & S by E	...	108.3	B to 2 A. M., \i to 8 P. M., ⌒i afterwards. D at 4 & 6½ P.M.
29	147.2	0.05	S SE, E & E by N	0.5	144.2	S to 4 A. M., ⌒i afterwards. Slight R from 7½ to 9 P. M.
30	128.0	0.51	E S E & S S E.	...	141.5	S to 6 A. M., ⌒i to 4 P. M. O afterwards. R after intervals.
31	...	0.73	S & S by E	...	145.3	O. R after intervals.

i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, \i Nimbi *Cirro-cumuli,* B clear, S stratoni, O overcast, T thunder, L lightning, *ain.* D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.551
Max. height of the Barometer occurred at 11 A. M. on the 13th. ...	29.724
Min. height of the Barometer occurred at 4 P. M. on the 30th. ...	29.359
Extreme range of the Barometer during the month	0.365
Mean of the daily Max. Pressures	29.606
Ditto ditto Min. ditto	29.492
Mean daily range of the Barometer during the month	0.114

	°
Mean Dry Bulb Thermometer for the month	82.5
Max. Temperature occurred at 1 P. M. on the 29th.	90.5
Min. Temperature occurred at 6 A. M, on the 2nd.	75.5
Extreme range of the Temperature during the month	15.0
Mean of the daily Max. Temperature	86.8
Ditto ditto Min. ditto, ...	79.4
Mean daily range of the Temperature during the month... ...	7.4

Mean Wet Bulb Thermometer for the month	80.0
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	2.5
Computed Mean Dew-point for the month	78.2
Mean Dry Bulb Thermometer above computed mean Dew-point ...	4.3
	Inches.
Mean Elastic force of Vapour for the month	0.946

	Troy grain.
Mean Weight of Vapour for the month	10.17
Additional Weight of Vapour required for complete saturation ...	1.47
Mean degree of humidity for the month, complete saturation being unity	0.87
	°
Mean Max. Solar radiation Thermometer for the month ...	137.2

	Inches.
Rained 30 days,—Max. fall of rain during 24 hours	3.25
Total amount of rain during the month	15.93
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	1.477
Prevailing direction of the Wind... ...	S by E, S & S S W.

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.																	2		2		3		5		4		4		3		2	1			2		1	1										
1																	2		2		3		4		5		1		5		2	1	2	2	2													
2																	2		2		3		5	2	4	1	1		5		2	2	2	2	2													
3																	2		2		3		5	1	2		1		5	1	3	2	2	2	2		1	1										
4															1		1	1	2	1	3		3	1	5	1	1		4	2	3	1	2	2	2	1	1	1										
5															1		2	1	2		3		3		4	1	1		5	3	3		2	2	2		1											
6															2		1		2		3		5	1	4	1	1	1	5	2	3		3	2			1											
7													2	1			1		3		5		4	1	3		2		4	1	3		2	2			1											
8													1				3	1	3		4	1	4		3	1	1		6	1	2	1	1	1	1	1	1											
9											1				2	1	1		1		7	1	5	1	1	1	1		7		1		1	1			2	1										
10													1		2		1		2		4		4		6	3	1	1	6	1	1		1				2	1										
11											1						1		3	1	6		4		6	2	2	1	3		2	1					3	1										
Noon.													1				1	1	5		7	2	2	2	5	1			4		3	1			2		1	1										
1													1		2		1		2		4	2	6	3	6	1			3		2	1	1		1		2	1										
2													2	1			2	1	3	2	6	2	3	1	5	1	1		5	1			1		1		2	1										
3									1						1		1	1	3	1	2		5	2	7	3	1		6	2	1				3	1												
4											1	1					1		5	2	3		5		5	2	4		4	1	1				2	1												
5											1								1		6	2	7	1	5		4		5	1			1	1	1													
6															1		1		1	1	2		6	1	7		6	1	3		1				2	1					1	1						
7											1								1		3	2	5		7	3	2		6	2	1	1			2	1					1	1						
8																	1	1	2		1		8	1	5		2		6	1					3	2												
9											1	1							2	1	2		8		6	2	2		2		2	1			3	2												
10											1						1		1		2		8	1	5		3	1	3	1	1	1	1	1	2													
11																	2		1		4		6		5		3	1	3		2	1			2													

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August 1871.

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	29.624	29.672	29.584	0.088	78.9	79.8	77.5	2.3
2	.642	.692	.590	.102	80.9	84.3	78.8	5.5
3	.614	.667	.549	.118	82.9	88.9	79.3	9.6
4	.564	.603	.484	.119	84.4	88.5	80.5	8.0
5	.535	.580	.480	.100	84.9	88.2	82.7	5.5
6	.524	.564	.457	.107	84.7	89.2	82.0	7.2
7	.452	.528	.370	.158	83.8	88.7	80.6	8.1
8	.407	.456	.359	.097	82.1	86.0	80.5	5.5
9	.444	.500	.396	.104	82.6	88.0	80.5	7.5
10	.465	.508	.401	.107	83.8	89.6	80.5	9.1
11	.482	.524	.436	.088	83.4	91.3	80.5	10.8
12	.464	.508	.392	.116	83.2	87.0	81.0	6.0
13	.493	.586	.413	.173	82.8	86.2	80.7	5.5
14	.560	.604	.506	.098	83.8	88.2	81.0	7.2
15	.566	.601	.518	.083	82.4	86.5	79.8	6.7
16	.558	.624	.514	.110	80.0	81.3	78.7	2.6
17	.617	.690	.570	.120	82.1	86.9	78.2	8.7
18	.663	.721	.601	.120	84.1	88.2	79.9	8.3
19	.647	.689	.593	.096	83.6	86.0	81.0	5.0
20	.652	.692	.613	.079	83.5	86.5	81.5	5.0
21	.654	.697	.586	.111	81.6	87.0	78.0	9.0
22	.641	.703	.580	.123	81.4	86.0	78.7	7.3
23	.637	.688	.592	.096	81.8	86.8	78.5	8.3
24	.672	.716	.620	.096	83.4	87.4	80.0	7.4
25	.709	.760	.653	.107	84.0	88.6	79.5	9.1
26	.721	.774	.661	.113	83.9	88.0	81.2	6.8
27	.700	.747	.630	.117	82.9	87.0	79.5	7.5
28	.693	.734	.638	.096	82.5	87.2	79.8	7.4
29	.717	.763	.661	.102	83.6	88.5	79.6	8.9
30	.767	.831	.706	.125	84.9	91.0	80.0	11.0
31	.800	.859	.743	.116	83.6	89.0	80.8	8.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August 1871.

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	78.1	0.8	77.5	1.4	0.925	10.03	0.44	0.96
2	79.5	1.4	78.5	2.4	.955	.31	.79	.93
3	80.3	2.6	78.5	4.4	.955	.27	1.52	.87
4	81.2	3.2	79.0	5.4	.970	.40	.91	.85
5	82.1	2.8	80.1	4.8	1.005	.73	.76	.86
6	82.1	2.6	80.3	4.4	.011	.82	.60	.87
7	81.3	2.5	79.5	4.3	0.986	.57	.53	.87
8	80.7	1.4	79.7	2.4	.992	.68	0.83	.93
9	81.1	1.5	80.0	2.6	1.001	.75	.93	.92
10	81.1	2.7	79.2	4.6	0.976	.45	1.65	.86
11	81.1	2.3	79.5	3.9	.986	.57	.39	.88
12	81.2	2.0	79.8	3.4	.995	.69	.20	.90
13	80.6	2.2	79.1	3.7	.973	.45	.30	.89
14	81.5	2.3	79.9	3.9	.998	.69	.41	.88
15	80.8	1.6	79.7	2.7	.992	.66	0.95	.92
16	79.0	1.0	78.3	1.7	.949	.24	.57	.95
17	79.7	2.4	78.0	4.1	.940	.11	1.40	.88
18	80.3	3.8	77.6	6.5	.928	9.93	2.28	.81
19	81.4	2.2	79.9	3.7	.998	10.69	1.34	.89
20	80.4	3.1	78.2	5.3	.946	.15	.85	.85
21	79.6	2.0	78.2	3.4	.946	.19	.15	.90
22	79.0	2.4	77.3	4.1	.919	9.90	.37	.88
23	79.0	2.8	77.0	4.8	.910	.79	.61	.86
24	80.0	3.4	77.6	5.8	.928	.95	2.01	.83
25	80.3	3.7	77.7	6.3	.931	.98	.19	.82
26	81.3	2.6	79.5	4.4	.986	10.57	1.56	.87
27	80.4	2.5	78.6	4.3	.958	.30	.49	.87
28	80.2	2.3	78.6	3.9	.958	.30	.34	.89
29	80.3	3.3	78.0	5.6	.940	.07	.96	.84
30	81.0	3.9	78.3	6.6	.949	.14	2.35	.81
31	80.4	3.2	78.2	5.4	.946	.15	1.88	.84

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observatio taken at the Surveyor General's Office, Calcutta, in the month of August 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elem 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 Tem ture for each ho during the mon		
		Max.	Min.	Diff.		Max.	Min.	I
	Inches.	Inches.	Inches.	Inches.	°	°	°	
Mid-night.	29.620	29.820	29.423	0.397	81.4	84.0	78.5	
1	.610	.813	.411	.402	81.2	83.8	78.6	
2	.600	.806	.399	.407	81·0	83.4	78.8	
3	.589	.794	.388	.406	80.8	83.2	78.5	
4	.580	.781	.366	.415	80.6	83.0	78.5	
5	.588	.787	.371	.416	80.5	82.9	77.5	
6	.601	.794	.399	.395	80.5	82.7	77.5	
7	.615	.800	.409	.391	81.0	83.8	78.0	
8	.630	.820	.421	.399	82.0	85.0	78.3	
9	.641	.838	.429	.409	83.2	86.8	78.8	
10	.645	.859	.423	.436	84.2	87.8	79.1	
11	.637	.841	.422	.419	85.4	89.0	79.0	
Noon.	.622	.825	.410	.415	85.9	89.2	78.9	
1	.602	.791	.401	.390	85.9	91.0	78.7	
2	.581	.770	.387	.383	86.4	91.3	78.8	
3	.565	.753	.382	.371	85.8	90.5	79.5	
4	.500	.743	.359	.384	85.6	91.0	79.5	
5	.500	.746	.369	.377	85.1	88.4	78.5	
6	.561	.767	.385	.382	83.7	87.6	78.0	
7	.579	.773	.394	.379	82.7	86.6	78.8	
8	.600	.797	.403	.394	82.5	86.0	79.0	
9	.622	.815	.422	.393	82.1	84.5	79.0	
10	.637	.827	.427	.400	81.7	84.3	78.2	
11	.637	.837	.439	.398	81.5	84.0	78.7	

The Mean Height of the Barometer, as likewise the Dry and Wet Thermometer Means are derived from the observations made at the se 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 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	80.1	1.3	79.2	2.2	0.976	10.52	0.75	0.93
1	80.0	1.2	79.2	2.0	.976	.52	.69	.94
2	79.9	1.1	79.1	1.9	.973	.49	.65	.94
3	79.8	1.0	79.1	1.7	.973	.49	.58	.95
4	79.6	1.0	78.9	1.7	.967	.43	.58	.95
5	79.6	0.9	79.0	1.5	.970	.46	.52	.95
6	79.5	1.0	78.8	1.7	.964	.40	.58	.95
7	79.9	1.1	79.1	1.9	.973	.49	.65	.94
8	80.2	1.8	78.9	3.1	.967	.41	1.06	.91
9	80.6	2.6	78.8	4.4	.964	.36	.53	.87
10	80.8	3.4	78.4	5.8	.952	.19	2.05	.83
11	81.3	4.1	78.4	7.0	.952	.17	.51	.80
Noon.	81.5	4.4	78.4	7.5	.952	.15	.72	.79
1	81.5	4.4	78.4	7.5	.952	.15	.72	.79
2	81.7	4.7	78.4	8.0	.952	.15	.91	.78
3	81.3	4.5	78.1	7.7	.943	.06	.77	.78
4	81.6	4.0	78.8	6.8	.964	.29	.47	.81
5	81.2	3.9	78.5	6.6	.955	.21	.36	.81
6	80.7	3.0	78.6	5.1	.958	.28	1.79	.85
7	80.3	2.4	78.6	4.1	.958	.30	.42	.88
8	80.4	2.1	78.9	3.6	.967	.39	.25	.89
9	80.3	1.8	79.0	3.1	.970	.44	.07	.91
10	80.1	1.6	79.0	2.7	.970	.44	0.93	.92
11	80.0	1.5	78.9	2.6	.967	.41	.90	.92

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 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	...	2.23	S & S by E	...	126.4	O to 6 P. M., ⌒i afterwards. R from 1½ A. M., to 6 P. M.
2	136.0	0.04	S by E & S by W.	...	83.6	S to 1 P. M., clouds of different kinds afterwards. Light R from 6 to 9 A. M.,
3	146.0	...	S by W, E & SW.	...	39.2	\i to 7 A. M., ⌒i afterwards. T at 6½ & 8 P. M. L on N W at 8 P. M. D at 5½ P. M.
4	147.5	...	S W, W & WSW.	...	94.2	\i to 3 A. M., \i to 7 A. M., ⌒i afterwards. L on N at 11 P. M.
5	...	...	WS W, W by N & [N.	...	111.3	\i to 8 A. M., clouds of different kinds afterwards. L at 8 & 10 P. M. D at 6½ P. M.
6	147.3	1.12	N & E N E.	...	97.6	\i & ⌒i to 5 P. M. O afterwards. T at 10½ A. M. L at 9 P. M. R at 10½ A. M. 1, 8 & 9 P. M.
7	128.0	0.04	N E & E N E	1.4	245.7	Clouds of various kinds. L at midnight. Light R a midnight 7½ A. M., 1½, 6½ & 9 P. M.
8	...	0.30	E & S E	1.6	272.3	O L on N. W. at 8 P. M. Slight R afterintervals.
9	133.0	0.56	S E & S S E	...	240.3	O to 9 A. M., ⌒i to 8 P. M. S afterwards. T at 12½ A. M. & 3 P. M. L at 8 & 9 P. M. R at midnight, 1, 3, 8 A. M., 1 & 3 P. M.
10	149.2	0.03	S E & E S E.	...	181.1	O to 8 A. M., ⌒i to 7 P. M. S afterwards. T at 12½ A. M. L at 7, 9 & 11 P. M. Slight R at 2 A. M., & 3 P. M.
11	144.6	0.53	S S E, E & S	...	181.4	S to 8 A. M., ⌒i to 5 P. M. S afterwards. T at 4 & 5 P. M. L at midnight, 4 A. M., 8 & 9 P. M. R at 7, 8 A. M., & 2 P. M.
12	129.7	0.60	E by S, E N E & E [by N	...	145.3	Chiefly ⌒i L at midnight, 1 A. M., 7 & 8 P. M. R at 6½, 9½, 11, 12½ A. M., 1½ & 5 P. M.
13	138.2	0.25	S by E, S S E & S	...	202.7	O to 11 A. M., clouds of different kinds afterwards. Slight R at 4, 5½, 10, 11 A. M., 1, 4 & 5 P. M.
14	152.0	...	S by E & S	...	235.2	S to 10 A. M., ⌒i afterwards. L on W at 5 A. M. D at 8 P. M.
15	145.2	0.56	S by W, S & SSW	...	102.9	\i to 6 A. M. O to 10 A. M., ⌒i to 3 P. M. O afterwards. T at 5½ P. M., Slight R from 8 to 12 A. M. & 3½ to 8 P. M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌒i Cirro-strati. ⌒i Cumulo-strati, \i Nimbi, \i Cirro-cumuli, B clear, S stratoni, O (⌒under, L lightning R rain, D drizzle

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
16	...	1.01	S S W	1.0	133.0	O to 6 P. M. S afterwards. Slight R from 3½ A. M., to 5 P. M.
17	141.5	0.92	S S W & S by W	...	178.0	O to 10 A. M., ⌒i to 7 P. M. O afterwards. T & L between 7 & 8 P. M. R at 1, 3 A. M., & from 5½ to 11 P. M.
18	146.0	...	S, S W & S by W	...	157.9	\i & ⌣i to 9 A. M., ⌒i to 4 P. M. S to 7 P. M. B afterwards. L at 11½ P. M
19	115.0	0.02	S S W & S by W	...	73.8	S. Light R at 6 A. M.
20	128.0	...	S by W & S W	...	87.8	S. L on N between midnight & 1 A. M.
21	141.3	2.69	S S W & S by W	1.5	96.5	Chiefly O. R from 1½ to 12 A. M., & 5 to 11 P. M.
22	126.5	0.16	W S W&S S W	...	194.7	O to 12 A. M., ⌒i to 9 P. M. O afterwards. L on W at 8 & 9 P.M. Slight R at 2, 3, 6½, 9½ 12½ A. M., & 11 P. M.
23	150.5	0.02	W & S W	...	98.5	O to 8 A. M., ⌒i & \i to 3 P. M. S afterwards. Light R at midnight 1 & 7 A. M.
24	150.0	...	S W, W by S & W	...	84.4	O to 3 A. M. S to 8 A. M., ⌣i & \i to 7 P. M. S afterwards. D at 5 & 8½ A. M.
25	149.6	...	S W & S S W	...	73.4	Chiefly S. L at 11¾ P. M. D at 6 & 8 A. M.
26	135.0	...	S W	...	53.9	Clouds of different kinds. L at midnight. D at 10 A. M.
27	144.0	0.19	S W, S & S S W	...	73.6	S to 9 A. M., \i to 5 P. M. S afterwards. Slight R from 5½ to 7 P. M.
28	137.8	0.30	S S W & S by E	...	102.5	Clouds of different kinds to 3 P. M. S to 8 P. M., \i afterwards. T at 3 P. M. Slight R at 4½, 12 A. M., 2 & 3 P. M.
29	144.5	0.25	S by E, S SE & S	...	85.0	B to 5 A. M., ⌒i to 7 P. M. B afterwards. R at 11½ A. M., 1 & 4½ P. M.
30	153.2	0.07	S & S S E	...	50.9	\i to 8 A.M., ⌒i afterwards. T from 9 to 11 P. M. L from 6½ to 10 P.M. Slight R at 8¾ P M.
31	137.0	0.22	S by E, S S E & S by W	0.4	80.6	\i to 7 A. M., ⌒i afterwards. T at 1 & 3 P. M. Slight R at 12½ A. M., 1½, 3, 6 & 7 P. M.

rri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, rro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, n. D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August 1871.

MONTHLY RESULTS.

	Inches.
Mean height of the Barometer for the month...	29.603
Max. height of the Barometer occurred at 10 A. M. on the 31st. ...	29.859
Min. height of the Barometer occurred at 4 P. M. on the 8th. ...	29.359
Extreme range of the Barometer during the month	0.500
Mean of the daily Max. Pressures	29.654
Ditto ditto Min. ditto	29.515
Mean daily range of the Barometer during the month	0.109

	°
Mean Dry Bulb Thermometer for the month	82.9
Max. Temperature occurred at 2 P. M. on the 11th.	91.3
Min. Temperature occurred at 5 & 6 A. M, on the 1st.	77.5
Extreme range of the Temperature during the month	13.8
Mean of the daily Max. Temperature	87.3
Ditto ditto Min. ditto, ...	80.0
Mean daily range of the Temperature during the month... ...	7.3

Mean Wet Bulb Thermometer for the month	80.5
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	2.4
Computed Mean Dew-point for the month	78.8
Mean Dry Bulb Thermometer above computed mean Dew-point ...	4.1

	Inches.
Mean Elastic force of Vapour for the month	0.964

	Troy grain.
Mean Weight of Vapour for the month	10.36
Additional Weight of Vapour required for complete saturation ...	1.43
Mean degree of humidity for the month, complete saturation being unity	0.88

	°
Mean Max. Solar radiation Thermometer for the month ...	140.6

	Inches.
Rained 28 days,—Max. fall of rain during 24 hours	2.69
Total amount of rain during the month	12.11
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	10.68
Prevailing direction of the Wind... ...	S S W. & S. W.

* Height 70 feet 10 inches above ground.

of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Aug. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.	1						1		2	1					1				2	1	1		5		3		3		3		6		1		1		1	1										
1	1								1	1	1		1		1				1		2	1	5		3		3		4	1	5		2				1	1										
2	1								2	1					2				1	1	1		5		3	1	3		5	1	5		2	1			1											
3	1								2						1				2		1		5	1	3	1	3		5	2	5		2	1			1											
4	1						1				1	1			1				1		3	1	4		3	1	3		5	2	5		2				1											
5	1						1		1				1		1		1		1		1		5		3	1	4	1	4	2	4	1	2				1											
6	1						1		1				1		2		1						6	3	3		4	1	4	2	3		2		1		1											
7							2		2	2			1				2				1		4	1	4	1	4	1	4	1	3		2	1	1		1	1										
8							1	1	2		1	1			1		2	1			2		4	2	3	1	5	1	4	2	2		1		1		1		1									
9							1		2				2	1			2				4	1	4	2	3		1	1	7	1			1		2	1	1		1									
10									2		2	2	1				1		3	1	5	1	1		2		2	1	6	2	1		1	1	1		2		1									
11									4	2			1		1	1			1		6	2	2	1	2				7	2	2		1		1		2						1					
Noon.							1				1		2				1		3		4	1	4	3	1				4	2	5				1		2		1		1							
1							1				1		1		1		2	1	3	1	3	2	2	1	2	1			5	1	4		1	1			3				2	1						
2							1	1					3	2	1		1	1	2		2		2	2	5		1		4	1	3		1		1		2				1		1					
3	1						1				1		1		1				4	2	2		2	1	2		2		6	3	3		1		1		2		1									
4			1				1				1				1				4	1	2		3	1	2		4	1	3	1	4				3		1		1									
5			1				1				1								2		4	1	3	2	5		3		2	1	3	1	1	1	3		1		1									
6	1								1				1	1							4		3	2	7	2	2		5	2	3	1	1		1		1		1									
7	1		1	1					2	1											2		4	1	5	1	4		4	2	6	1	1		1													
8	2	1							1								1		1		1		3		5	1	5		4	1	5		2	1	1													
9	1						2	2									1		1	1	1		5	1	3		5	1	4		6		1		1	1												
10	1						1		1		1								2	1	1		3		4		4		4	1	6		2		1	1												
11	1						1		1				1						3		1		3		3		4		4	1	6		1		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 September 1871.

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	29.755	29.837	29.668	0.169	83.3	86.5	80.8	5.7
2	.707	.765	.627	.138	83.6	88.5	80.6	7.9
3	.684	.732	.649	.083	83.9	87.2	81.5	5.7
4	.709	.755	.627	.128	83.3	91.0	79.0	12.0
5	.727	.778	.670	.108	81.2	87.7	78.0	9.7
6	.714	.765	.641	.124	81.7	86.5	79.0	7.5
7	.673	.736	.574	.162	82.0	87.4	78.5	8.9
8	.612	.678	.513	.165	84.3	90.8	78.8	12.0
9	.558	.611	.480	.131	83.6	88.5	81.4	7.1
10	.563	.616	.496	.120	82.4	87.1	79.0	8.1
11	.546	.609	.475	.134	82.4	88.4	80.0	8.4
12	.528	.583	.470	.113	79.8	81.5	78.6	2.9
13	.541	.606	.494	.112	79.9	84.0	77.8	6.2
14	.605	.673	.557	.116	80.8	83.7	78.5	5.2
15	.660	.709	.616	.093	82.2	86.2	78.2	8.0
16	.641	.695	.574	.121	83.1	87.6	79.5	8.1
17	.614	.656	.569	.087	82.1	85.0	79.5	5.5
18	.622	.662	.569	.093	81.5	88.4	79.3	9.1
19	.640	.699	.564	.135	82.6	88.7	78.6	10.1
20	.693	.746	.626	.120	83.7	88.8	80.2	8.6
21	.681	.747	.604	.143	84.3	89.9	80.8	9.1
22	.655	.698	.591	.107	82.1	88.0	79.5	8.5
23	.649	.699	.601	.098	80.5	82.6	79.5	3.1
24	.726	.833	.643	.190	80.4	83.3	79.1	4.2
25	.806	.873	.720	.153	82.8	87.9	78.5	9.4
26	.790	.836	.745	.091	82.5	87.8	78.5	9.3
27	.809	.857	.764	.093	83.4	88.7	78.7	10.0
28	.812	.884	.739	.145	84.2	89.5	79.5	10.0
29	.805	.870	.743	.127	83.3	87.4	79.6	7.8
30	.762	.819	.700	.119	84.3	89.8	80.0	9.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September 1871.

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	80.5	2.8	78.5	4.8	0.955	10.25	1.68	0.86
2	80.5	3.1	78.3	5.3	.949	.18	.85	.85
3	80.8	3.1	78.6	5.3	.958	.28	.85	.85
4	80.5	2.8	78.5	4.8	.955	.25	.68	.86
5	79.0	2.2	77.5	3.7	.925	9.96	.25	.89
6	79.3	2.4	77.6	4.1	.928	.99	.38	.88
7	79.5	2.5	77.7	4.3	.931	10.02	.45	.87
8	80.6	3.7	78.0	6.3	.940	.07	2.21	.82
9	80.6	3.0	78.5	5.1	.955	.25	1.78	.85
10	79.8	2.6	78.0	4.4	.940	.11	.50	.87
11	79.9	2.5	78.1	4.3	.943	.14	.47	.87
12	79.0	0.8	78.4	1.4	.952	.30	0.45	.96
13	79.0	0.9	78.4	1.5	.952	.27	.51	.95
14	79.7	1.1	78.9	1.9	.967	.43	.64	.94
15	80.0	2.2	78.5	3.7	.955	.27	1.27	.89
16	80.6	2.5	78.8	4.3	.964	.36	.50	.87
17	80.7	1.4	79.7	2.4	.992	.68	0.83	.93
18	80.0	1.5	78.9	2.6	.967	.41	.90	.92
19	80.2	2.4	78.5	4.1	.955	.27	1.41	.88
20	80.7	3.0	78.6	5.1	.958	.28	.79	.85
21	80.8	3.5	78.3	6.0	.949	.16	2.12	.83
22	80.0	2.1	78.5	3.6	.955	.27	1.24	.89
23	79.1	1.4	78.1	2.4	.943	.18	0.80	.93
24	79.2	1.2	78.4	2.0	.952	.27	.67	.94
25	79.9	2.9	77.9	4.9	.937	.06	1.69	.86
26	79.7	2.8	77.7	4.8	.931	.00	.64	.86
27	79.6	3.8	76.9	6.5	.908	9.72	2.24	.81
28	80.1	4.1	77.2	7.0	.916	.81	.43	.80
29	80.2	3.1	78.0	5.3	.940	10.09	1.84	.85
30	80.2	4.1	77.3	7.0	.919	9.84	2.44	.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 September 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.694	29.837	29.542	0.295	80.9	83.6	79.2	4.4
1	.681	.826	.534	.292	80.6	83.2	79.0	4.2
2	.671	.811	.520	.291	80.4	83.0	78.8	4.2
3	.661	.807	.509	.298	80.2	82.5	78.5	4.0
4	.657	.805	.494	.311	79.9	82.0	78.5	3.5
5	.666	.819	.500	.319	79.7	81.5	78.2	3.3
6	.678	.842	.512	.330	79.7	81.5	78.5	3.0
7	.695	.845	.524	.321	80.3	82.4	78.0	4.4
8	.714	.866	.556	.310	81.8	84.2	78.0	6.2
9	.725	.883	.571	.312	83.4	86.2	77.8	8.4
10	.725	.884	.575	.309	84.2	87.4	78.1	9.3
11	.716	.867	.572	.295	85.3	88.0	80.0	8.0
Noon.	.697	.848	.563	.285	86.2	89.9	79.5	10.4
1	.669	.821	.514	.307	86.2	90.5	80.8	9.7
2	.643	.795	.497	.298	86.1	91.0	79.6	11.4
3	.624	.776	.470	.306	85.9	90.8	79.6	11.2
4	.620	.764	.480	.284	84.6	89.4	78.0	11.4
5	.621	.773	.472	.301	84.0	88.5	78.6	9.9
6	.632	.775	.482	.293	83.0	87.2	79.0	8.2
7	.654	.805	.490	.315	82.1	86.2	79.0	7.2
8	.679	.822	.515	.307	81.8	85.5	79.2	6.3
9	.698	.844	.524	.320	81.6	85.0	79.4	5.6
10	.705	.855	.534	.321	81.3	84.3	79.4	4.9
11	.702	.839	.551	.288	81.1	84.0	79.3	4.7

* The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Mid-night.	79.6	1.3	78.7	2.2	0.961	10.37	0.73	0.93
1	79.4	1.2	78.6	2.0	.958	.34	.67	.94
2	79.2	1.2	78.4	2.0	.952	.27	.67	.94
3	79.1	1.1	78.3	1.9	.949	.24	.64	.94
4	78.9	1.0	78.2	1.7	.946	.21	.57	.95
5	78.8	0.9	78.2	1.5	.946	.21	.51	.95
6	78.8	0.9	78.2	1.5	.946	.21	.51	.95
7	79.3	1.0	78.6	1.7	.958	.34	.57	.95
8	80.0	1.8	78.7	3.1	.961	.35	1.05	.91
9	80.4	3.0	78.3	5.1	.949	.18	.78	.85
10	80.4	3.8	77.7	6.5	.931	9.96	2.28	.81
11	81.0	4.3	78.0	7.3	.940	10.05	.59	.80
Noon.	81.2	5.0	77.7	8.5	.931	9.92	3.07	.76
1	81.1	5.1	77.5	8.7	.925	.86	.13	.76
2	81.2	4.9	77.8	8.3	.934	.97	2.98	.77
3	81.2	4.7	77.9	8.0	.937	10.00	.87	.78
4	80.6	4.0	77.8	6.8	.934	9.99	.40	.81
5	80.5	3.5	78.0	6.0	.940	10.07	.10	.83
6	80.2	2.8	78.2	4.8	.946	.15	1.67	.86
7	79.9	2.2	78.4	3.7	.952	.23	.28	.89
8	79.7	2.1	78.2	3.6	.946	.17	.23	.89
9	79.8	1.8	78.5	3.1	.955	.29	.05	.91
10	79.7	1.6	78.6	2.7	.958	.32	0.92	.92
11	79.7	1.4	78.7	2.4	.961	.37	.80	.93

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 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	147.2	...	S by W & S SW.	...	22.8	S to 2 A. M., \i to 8 A. M., ⌒i to 4 P. M., \i afterwards. D at 1 P. M.
2	140.5	...	S by W & S S W	1.0	65.7	\i to 2 A. M. S to 4 P. M., \i & ⌣i afterwards. D at 8 A.M.
3	137.6	...	S by W & S S W	...	101.1	\i to 2 A. M. S afterwards. L on S W at 7 & 8 P. M.
4	151.0	3.25	S by W & S W	2.4	146.0	S to 7 A. M., ⌒i to 3 P. M. O afterwards. Brisk wind at 3¾ P. M. T at 4 & from 12½ A. M., to 6 P.M. L at 4 A. M., & from 4 to 8 P. M. Heavy R from 3¾ to 4½ P. M., & slight R from 4½ to 11 P. M.
5	147.0	1.28	S W & S by W	1.9	75.9	\i to 5 A. M., \⌣i to 10 A. M. ⌒i to 3 P. M. O afterwards. Brisk wind at 3½ P. M. T at 3½ & 5 P. M. L at 5 P. M. R from 1½ to 9 P. M.
6	150.6	0.35	S by W & S	...	41.0	O to 6 A. M., \⌣i to 10 A. M., ⌒i to 6 P. M. S afterwards. Slight R from 3 to 5 & at 9½ A.M.
7	144.5	0.20	S & S by E	0.6	125.1	S to 2 A.M., \i to 6 A.M., ⌒i to 6 P. M. B afterwards. R at 4 P.M.
8	148.8	...	S & S by E	...	44.9	B to 5 A. M., \i to 8 A. M., ⌒i afterwards L from 7 to 11 P. M. D at 4½ P. M.
9	148.7	0.25	S by W, & E by S	...	30.2	O to 9 A. M., ⌒i to 5 P. M. O to 8 P. M. S afterwards. L at midnight & 7 P. M. Slight R at 6, 7, 8 A. M. 3½ & 7 P.M.
10	141.0	0.09	E, S E & S E	0.2	70.0	O to 7 A. M., \i to 10 A. M., ⌒i to 3 P. M. O to 7 P. M. B afterwards. Light R at 1½, 10½, 12¾ A. M., 2¾, 4, 5 & 6 P.M.
11	141.5	0.02	E. S. E. & E.	0.5	152.1	Clouds of different kinds. L at 7 & 10 P. M. Light R at 1¼, 2, 4 & 6 P. M.
12	...	1.26	E S E & S S. E.	...	142.7	O. L at midnight. Slight R at 3 & 4, from 6 A. M., to 1 P. M., & 3 to 6 P. M.
13	129.8	0.48	S S E & S by E	...	99.6	O to 10 A. M. S to 3 P. M. O afterwards. Slight R nearly the whole day.
14	114.8	0.68	S by E.	...	131.4	O to 7 A.M. S to 4 P.M. O to 7 P. M. B afterwards. Slight R from midnight to 7 A.M., & at 5 P.M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒⌣i Cumulo-strati, \⌣i Nimbi, \⌣i *Cirro-cumuli, B* clear, S stratoni, O overcast, T thunder, L lightning, *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
15	120.0	0.07	S by E & S	...	147.0	O to 5 A. M. S to 7 P. M., _i afterwards. Slight R at 1, 2, 3, 4 A. M., 5¼ & 10½ P. M.
16	134.0	0.15	S & S by E	...	216.4	B to 2 A. M. S to 6 A. M., \i to 9 A. M., ⌒i to 7 P. M. B afterwards. Slight R at 4, 10 A. M. 1 & 3 P. M.
17	...	0.27	S & S S E	...	164.3	Clouds of different kinds to 10 A.M. O to 2 P.M. S afterwards. L on E from 8 to 10 P.M. Slight R at 2, 10, 12 A. M., & 1½ P.M.
18	147.8	0.18	S S E & S by E	1.4	93.2	B to 4 A. M. S to 8 A. M., ⌒i to 12 A. M. O to 7 P. M. B afterwards. T at 1 P. M. Slight R at 10 A. M., 1, 2 & 3 P. M.
19	151.2	0.36	S by E, SE & SSE	...	101.5	B to 6 A. M., ⌒i to 4 P. M. S to 8 P. M. B afterwards. T at 4 & 7 P. M. L from 7 to 11 P. M. R from 6½ to 7¾ P. M.
20	153.0	...	S S E & S E	...	103.9	B to 4 A. M., \i to 8 A. M., ⌒i to 6 P. M. B afterwards. L at midnight & 7 P. M.
21	144.0	...	S S E & S E	...	78.8	B to 5 A. M., \i to 9 A. M., ⌒i to 5 P. M. S afterwards.
22	144.0	0.25	S E	...	104.9	\i to 9 A. M., ⌒i to 1 P. M. O to 7 P. M. S afterwards. T at 1¼, 2½ & 3 P. M. Slight R at 10 A. M., & from 1½ to 7 P.M.
23	114.0	0.20	E S E, S E & S S E	...	125.7	S to 7 A. M. O afterwards. L on N at midnight & 1 A. M. Slight R after intervals.
24	...	0.36	S S E & S E	...	223.8	Chiefly O Slight R from 1 to 3, at 8½, 9, 10½, A. M. & 1 P.M.
25	149.2	0.07	S S E & S	...	167.4	B to 5 A. M., \i to 9 A. M., ⌒i to 4 P. M., \i afterwards. Slight R at 12¾ A. M
26	147.0	0.16	S & S by W.	...	133.6	\i to 2 A. M. B to 6 A. M., \i & ⌒i afterwards. R at 12½ A.M.
27	148.8	...	S by W & S S W	...	97.4	\i to 8 A. M., ⌒i to 4 P. M., \i afterwards.
28	147.0	...	S S W, S by W & S	...	99.6	\i to 7 A. M., ⌒i to 5 P. M. \i afterwards.
29	140.2	...	S & S by W	...	106.1	\i to 6 P. M. B afterwards.
30	147.0	...	S by W & S S W	...	134.3	\i & ⌣i to 7 A. M., \i afterwards. L from 6½ to 8 P.M.

i Cirri,—i Strati, ⌒i Cumuli, _i Cirro-strati, ⌒i Cumulo-strati, _i Nimbi, i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, rain, D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month... ...	29.676
Max. height of the Barometer occurred at 10 A. M. on the 28th.	29.884
Min. height of the Barometer occurred at 3 P. M. on the 12th.	29.470
Extreme range of the Barometer during the month ...	0.414
Mean of the daily Max. Pressures	29.734
Ditto ditto Min. ditto	29.610
Mean daily range of the Barometer during the month ...	0.124

	°
Mean Dry Bulb Thermometer for the month	82.5
Max. Temperature occurred at 2 P. M. on the 4th.	91.0
Min. Temperature occurred at 9 A. M, on the 13th.	77.8
Extreme range of the Temperature during the month	13.2
Mean of the daily Max. Temperature	87.3
Ditto ditto Min. ditto, ...	79.4
Mean daily range of the Temperature during the month... ...	7.9

Mean Wet Bulb Thermometer for the month	80.0
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	2.5
Computed Mean Dew-point for the month	78.2
Mean Dry Bulb Thermometer above computed mean Dew-point ...	4.3
	Inches.
Mean Elastic force of Vapour for the month	0.946

	Troy grain.
Mean Weight of Vapour for the month	10.17
Additional Weight of Vapour required for complete saturation ...	1.47
Mean degree of humidity for the month, complete saturation being unity	0.87
	°
Mean Max. Solar radiation Thermometer for the month ...	141.9

	Inches.
Rained 23 days,—Max. fall of rain during 24 hours	3.25
Total amount of rain during the month	9.93
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	9.25
Prevailing direction of the Wind	S by W. S. S. E. & S.

* Height 70 feet 10 inches a[illegible] [illegible]nd.

the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Sept. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.																	3		2		7		4	1	5		7		1		1																	
1																	3		2	1	7		3	2	6		7		1		1																	
2																	3	1	2	1	7		4	2	5	1	7		1		1																	
3															1		3	1	1		6	1	4	2	5		8	1	1		1																	
4															1		3	1	2		5		2	1	6	1	9	2	1		1																	
5													1				3		2		5	1	2		6	1	9	2	1		1																	
6													1				3	1	2		5		3		5		9	2	1		1																	
7													1				3	1	1		5		3		5		8	2	3	1	1																	
8													1				1	1	4		6	1	4		5	1	4	1	4	1	1																	
9											1		1						7	1	4		4	1	4		4		4	1	1																	
10											1		1						6	4	5	1	1		5		4	1	6	2	1																	
11											1		1						7	2	2	2	3		6	1	3		5	1	2																	
Noon.											1				1		2		4	1	2	1	3	1	6		5	1	2		4																	
1													4				1	1	4	2	3	3	5	1	6	2	1		3	1	3																	
2											1		4	1			2	1	3	2	2		5		5	1	3		3		2	1																
3											1		4				1	1	3	3	2	1	6	1	5	1	3		3		1		1	1														
4											1						3	1	4	2	5	3	5	1	3		3		4	1	1								1	1								
5																	4	1	3	2	5	2	6	2	6		3		2										1	1								
6																	2	1	3	1	7	2	6	3	6		3		2				1	1														
7															1	1	2		4	1	6	2	5	1	4		5	1	2				1	1														
8															1		2		3	1	6	1	4	1	5		6	1	2				1	1														
9															1		2		3		6		5	1	4		7	1	1		1	1																
10															1		2		1		8		5	1	4		7		1		1	1																
11																	3		1		8	1	5	2	4		7		1		1	1																

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

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° Faht.	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	29.756	29.804	29.704	0.100	84.8	90.4	81.5	8.9
2	.742	.794	.677	.117	85.4	90.8	81.0	9.8
3	.748	.798	.705	.093	86.2	91.7	82.0	9.7
4	.773	.827	.727	.100	86.0	92.0	81.5	10.5
5	.746	.803	.679	.124	86.2	91.0	81.0	10.0
6	.714	.768	.652	.116	86.2	91.8	82.0	9.8
7	.675	.724	.629	.095	85.1	90.0	80.5	10.1
8	.702	.760	.653	.107	84.9	90.7	79.5	11.2
9	.727	.796	.667	.129	85.1	91.5	79.0	12.5
10	.738	.798	.684	.114	86.0	91.7	81.3	10.4
11	.738	.814	.683	.131	82.8	85.3	79.5	5.8
12	.718	.800	.666	.134	79.5	82.0	77.5	4.5
13	.765	.834	.668	.166	80.5	81.0	78.0	3.0
14	.853	.903	.795	.108	80.8	84.3	78.5	5.8
15	.892	.947	.841	.106	81.9	88.0	77.5	10.5
16	.911	.977	.857	.120	83.6	89.8	79.4	10.4
17	.896	.968	.831	.137	82.9	89.0	79.0	10.0
18	.888	.951	.832	.119	81.8	88.0	77.0	11.0
19	.905	.967	.855	.112	81.2	88.5	75.8	12.7
20	.918	.976	.874	.102	79.9	87.4	73.5	13.9
21	.899	.962	.842	.120	80.7	87.4	74.3	13.1
22	.891	.957	.832	.125	81.7	88.3	76.4	11.9
23	.867	.934	.796	.138	81.2	87.5	77.5	10.0
24	.827	.888	.779	.109	74.6	78.0	72.7	5.3
25	.691	.771	.627	.144	72.7	74.5	71.5	3.0
26	.673	.759	.624	.135	74.1	78.0	71.0	7.0
27	.788	.856	.739	.117	77.3	85.2	71.0	14.2
28	.821	.882	.764	.118	78.9	86.0	73.0	13.0
29	.879	.939	.836	.103	79.1	86.0	73.7	12.3
30	.887	.955	.826	.129	78.7	85.0	73.5	11.5
31	.896	.960	.844	.116	78.3	85.8	71.8	14.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

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	81.0	3.8	78.3	6.5	0.949	10.14	2.32	0.81
2	81.0	4.4	77·9	7.5	.937	.00	.68	.79
3	80.0	6.2	75.7	10.5	.873	9.30	3.69	.72
4	80.2	5.8	76.1	9.9	.885	.44	.47	.73
5	80.0	6.2	75.7	10.5	.873	.30	.69	.72
6	79.1	7.1	74.1	12.1	.830	8.85	4.14	.68
7	78.2	6.9	73.4	11.7	.811	.66	3.91	.69
8	78.3	6.6	73.7	11.2	.819	.76	.73	.70
9	78.9	6.2	74.6	10.5	.843	9.00	.57	.72
10	80.2	5.8	76.1	9.9	.885	.44	.47	.73
11	80.5	2.3	78.9	3.9	.967	10.39	1.36	.88
12	78.2	1.3	77.3	2.2	.919	9.94	0.72	.93
13	78.5	2.0	77.1	3.4	.913	.86	1.12	.90
14	78.6	2.2	77.1	3.7	.913	.84	.23	.89
15	78.6	3.3	76.3	5.6	.890	.57	.87	.84
16	78.3	5.3	74.6	9.0	.843	.03	3.00	.75
17	76.6	6.3	72.2	10.7	.781	8.36	.43	.71
18	75.4	6.4	70.9	10.9	.748	.05	.35	.71
19	73.6	7.6	68.3	12.9	.688	7.40	.81	.66
20	72.7	7.2	67.7	12.2	.674	.28	.50	.68
21	74.4	6.3	70.0	10.7	.727	.82	.22	.71
22	75.5	6.2	71.2	10.5	.756	8.12	.25	.71
23	76.4	4.8	73.0	8.2	.801	.62	2.59	.77
24	73.5	1.1	72.7	1.9	.792	.65	0.55	.94
25	71·8	0.9	71.1	1.6	.753	.25	.43	.95
26	71.7	2.4	70.0	4.1	.727	7.94	1.13	.88
27	73.0	4.3	70.0	7.3	.727	.89	2.09	.79
28	74.8	4.1	71·9	7.0	.773	8.36	.11	.80
29	74.7	4.4	71.6	7.5	.766	.27	.26	.79
30	73.3	5.4	69.5	9.2	.715	7.74	.67	.74
31	72.1	6.2	67.8	10.5	.677	.32	.96	.71

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 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.807	29.918	29.672	0.246	79.0	84.2	71.7	12.5
1	.798	.911	.654	.257	78.6	84.0	71.5	12.5
2	.789	.908	.649	.259	78.3	83.8	71.5	12.3
3	.781	.902	.647	.255	78.0	83.6	71.5	12.1
4	.780	.901	.627	.274	77.8	83.5	71.5	12.0
5	.793	.915	.625	.290	77.6	83.4	71.0	12.4
6	.810	.943	.643	.300	77.5	83.2	71.0	12.2
7	.827	.945	.673	.272	78.3	83.7	71.7	12.0
8	.847	.965	.676	.289	80.6	85.5	72.0	13.5
9	.860	.977	.705	.272	82.2	87.5	72.5	15.0
10	.861	.974	.707	.267	83.9	89.5	73.0	16.5
11	.845	.960	.685	.275	84.8	90.5	73.0	17.5
Noon.	.824	.944	.668	.276	85.4	90.7	73.6	17.1
1	.798	.920	.646	.274	86.2	91.5	74.0	17.5
2	.774	.894	.632	.262	86.5	91.5	73.0	18.5
3	.759	.885	.624	.261	86.6	92.0	73.7	18.3
4	.755	.889	.631	.258	86.0	91.7	73.5	18.2
5	.760	.879	.634	.245	85.1	91.0	73.0	18.0
6	.769	.880	.642	.238	83.1	89.0	72.3	16.7
7	.787	.903	.656	.247	81.8	87.5	72.1	15.4
8	.808	.924	.672	.252	81.0	86.5	72.4	14.1
9	.819	.932	.671	.261	80.3	86.0	72.4	13.6
10	.824	.939	.689	.250	79.6	85.5	72.5	13.0
11	.821	.931	.682	.249	79.2	84.6	72.7	11.9

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	76.7	2.3	75.1	3.9	0.857	9.27	1.23	0.88
1	76.5	2.1	75.0	3.6	.854	.24	.14	.89
2	76.4	1.9	75.1	3.2	.857	.28	.00	.90
3	76.2	1.8	74.9	3.1	.851	.22	0.97	.91
4	76.2	1.6	75.1	2.7	.857	.28	.85	.92
5	76.0	1.6	74.9	2.7	.851	.22	.85	.92
6	75.9	1.6	74.8	2.7	.849	.20	.84	.92
7	76.5	1.8	75.2	3.1	.860	.31	.97	.91
8	77.2	3.4	74.8	5.8	.849	.15	1.86	.83
9	77.3	4.9	73.9	8.3	.824	8.87	2.67	.77
10	77.3	6.6	72.7	11.2	.792	.49	3.64	.70
11	77.0	7.8	71.5	13.3	.763	.16	4.30	.66
Noon.	77.1	8.3	71.3	14.1	.758	.10	.58	.64
1	77.0	9.2	70.6	15.6	.741	7.89	5.10	.61
2	76.8	9.7	71.0	15.5	.751	.99	.11	.61
3	76.5	10.1	70.4	16.2	.736	.84	.30	.60
4	76.4	9.6	69.7	16.3	.729	.68	.23	.60
5	76.9	8.2	71.2	13.9	.756	8.07	4.50	.64
6	77.1	6.0	72.9	10.2	.797	.56	3.30	.72
7	77.2	4.6	74.0	7.8	.827	.90	2.50	.78
8	77.1	3.9	74.4	6.6	.838	9.02	.12	.81
9	76.9	3.4	74.5	5.8	.840	.07	1.84	.83
10	76.8	2.8	74.8	4.8	.849	.17	.52	.86
11	76.7	2.5	74.9	4.3	.851	.21	.35	.87

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	153.2	...	S by W	...	129.0	\i to 7 A. M., ⌒i to 7. P. M. B afterwards. T at 12¾ A. M., 2½, 4 & 5 P. M. D at 5½ P. M.
2	152.0	...	S & S by W	...	108.6	B to 7 A. M., ⌒i to 4 P. M. B afterwards.
3	146.3	...	S by W&W by N [& N W	...	83.1	B to 12 A. M., ⌣i to 5 P. M. B afterwards.
4	148.6	...	W by N, W N W	...	67.3	B to 8 A. M., ⌒i to 6 P. M. B afterwards.
5	149.7	...	N W & W N W	...	69.8	B to 8 A. M., ⌒i to 6 P. M. B afterwards.
6	152.0	...	W N W & W SW	...	73.2	B to 10 A. M., ⌒i to 3 P. M. B afterwards.
7	153.3	...	W S W &W by S	...	79.3	B to 4 A. M., \i to 10 A. M. ⌒i to 2 P. M., ⌣i afterwards.
8	150.0	...	W by S & N W	0.5	76.5	B to 10 A. M., ⌒i to 5 P. M. B afterwards.
9	149.0	...	N W & W N W	...	66.2	B to 10 A. M., ⌒i to 3 P. M., \i to 6 P. M. B afterwards.
10	147.5	...	W N W	...	71.5	B to 5 A. M., \i to 10 A. M., ⌒i to 6 P. M. B afterwards.
11	...	0.89	W N W & S E	...	80.1	S to 12 A. M. O to 7 P. M., \i afterwards. T at 9¼ A. M., 1 & 2½ P. M., R at 8, 11½ A.M., 1, 2½, 4½ & 6 P. M.
12	...	0.60	S. E, E S E & E.	...	122.5	Chiefly O. R at 4, 10, 11 A. M., & from 2 to 6 P. M.
13	127.0	...	S by W.	...	108.5	O to 10 A. M. S afterwards.
14	135.5	0.47	S by W & S S E	...	59.8	Clouds of different kinds to 6 P. M. B afterwards. L on N W at 6 P. M. R at 11 & 12 A. M.
15	153.0	...	S S E & S	...	75.7	B to 6 A. M., ⌒i to 5 P. M. B afterwards. D at 12½ A. M.
16	145.7	...	S, S by W & N by E	...	94.0	B to 9 A M ⌣i to 4 P. M. B afterwards.
17	147.2	...	N by E & W	...	85.6	B to 9 A. M., ⌒i to 4 P. M. B afterwards.
18	146.2	...	W & W S W	...	96.3	B.
19	147.0	...	W S W & W	...	81.0	B.
20	145.5	...	W & E N E	...	90.7	B to 10 A. M., \i to 5 P. M. B afterwards.
21	146.8	...	E N E & N by E [E N E.	0.8	106.8	B to 10 A. M., ⌒i to 6 P. M. B afterwards.
22	144.5	...	N by E, N N E &	...	155.6	B to 9 A. M., \i to 5 P. M. B afterwards.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒iCumulo-strati, \⌒iNimbi, ⌣i *Cirro*-cumuli, B clear, S stratoni, O over cast, L lightning *R rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
23	145.0	0.03	ENE,NE&E by S	...	115.5	Clouds of different kinds to 6 A. M. B to 9 A. M., ⌒i to 3 P. M., ⌣i afterwards. Light R at 4½ P. M.
24	...	2.58	E by S & E S E	...	173.2	O. R from 4 A. M., to 11 P.M.
25	...	2.46	E, E by N & E N E	...	238.8	O. R from midnight to 2 P. M., & at 5 & 11 P. M.
26	130.0	...	N E & N W	...	378.4	O to 5 P. M. B afterwards. D at midnight.
27	144.7	...	N W & W N W	...	140.5	B to 12 A. M., ⌒i to 4 P. M., \i afterwards.
28	143.0	...	W N W & S W	...	90.4	B.
29	144.0	...	S W	...	71.6	B to 1 P. M., \i to 6 P. M. B afterwards. Foggy from 3 to 8 A. M. & 8 to 11 P. M.
30	143.0	...	S W & W by S	...	42.5	B Slightly foggy from midnight to 2 & 5 to 7 A. M.
31	142.7	...	W by S & S S E	...	47.3	B.Slightly foggy at 10 P.M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, ⌣i Nimbi, \i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning, *rain, D drizzle.*

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	29.804
Max. height of the Barometer occurred at 9 A. M. on the 16th. ...	29.977
Min. height of the Barometer occurred at 3 P. M. on the 26th. ...	29.624
Extreme range of the Barometer during the month	0.353
Mean of the daily Max. Pressures	29.867
Ditto ditto Min. ditto	29.748
Mean daily range of the Barometer during the month	0.119

	°
Mean Dry Bulb Thermometer for the month	81.6
Max. Temperature occurred at 3 P. M. on the 4th.	92.0
Min. Temperature occurred at 5 & 6 A. M, on the 26 th& 27th ...	71.0
Extreme range of the Temperature during the month	21.0
Mean of the daily Max. Temperature	87.1
Ditto ditto Min. ditto, ...	77.1
Mean daily range of the Temperature during the month... ...	10.0

Mean Wet Bulb Thermometer for the month	76.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	4.9
Computed Mean Dew-point for the month	73.3
Mean Dry Bulb Thermometer above computed mean Dew-point ...	8.3

	Inches.
Mean Elastic force of Vapour for the month	0.809

	Troy grain.
Mean Weight of Vapour for the month	8.70
Additional Weight of Vapour required for complete saturation ...	2.64
Mean degree of humidity for the month, complete saturation being unity	0.77

	°
Mean Max. Solar radiation Thermometer for the month ...	145.6

	Inches.
Rained 9 days.—Max. fall of rain during 24 hours	2.58
Total amount of rain during the month	7.03
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	6.20
Prevailing direction of the Wind ... ... W. N. W, N. W. & S. by W.	

* Height 70 feet 10 inches above ground.

...of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Oct. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.			2				1	1	2						1		1	1	1		1		1		2		3				2		2		2		2		1		4		3				
1			2				1		2		1	1			1				1		1				2		4				2		2		2		2		1		4		3				
2			2				1		2				1	1	1				1		1				2		4				2		2		2		2		1		4		3				
3			2				1		2				2	1			1				1				2		4				2		2		2		2		1		4		3				
4			2				2		1				2	2			1	1			1				2		3				3		2		2		2		1		4		3				
5			2				2		1				1	1			2	1			1				2		3				3		2		2		2		1		4		3				
6			2				2		1				1	1			2	1			1				1		4				3		2		2		2		2		3		3				
7			2		1		1		1				1	1	1		1	1			1				1		4				2		3		2		2		2		3		3				
8	1		1		1		1		1				1	1	2	1					1				1		4				2		3		2		3		1		3	1	3				
9			1		2		3						1	1	2	1									2		3		1		2		4		2		2		1		2		3				
10	1		1				1		2		2	1					2	2							1		4		2		1		4		2		2		1		2		3				
11	1				2				1		2	1					1	1	1	1	1				1				2		3	1	4		3				1		3		4				1
Noon.	1		1				1				4	2					1	1									3		1		2		5		1		1		1		3		5	1			1
1	1		1	1	1		1		1		2	1	1	1							1						1		1		3		5	1			2				5		3		1		1
2			1		2		2				3	2					1	1	1								1		1		3		3		2		2				6		1		2		
3			1		2		1		1		1		2	1	1	1	1		1	1					1		1		1		2		2		4		1		1		5				2		
4	1				1				3				1		1		2	1	2	1							2		1		2		2		3		2		1		5		2				
5	2		1						3	1			1	1	1		2	1	2	2							2				2		2		2		3		1		5		2				
6	1	1	2						2		1		1	1	2	1			2	1	1				1		2				2		2		2		2		1		4		3				
7			2						3				1		1		1	1	2		2				1		2				2		2		2		2		1		4		3				
8			2						3				1		2	1			1		2		1		1		2				2		2		2		2		1		4		3				
9			2						3				2	1	1				1		2		1		1		2				2		2		2		2		1		4		3				
10			2						3				1		2	1			1		2				2		2				2		2		2		2		1		4		3				
11			2						3	1			1		2	1			1		2				2		2				2		2		2		2		1		4		3				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November 1871.

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° Faht.	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	29.932	30.006	29.873	0.133	78.2	85.4	72.0	13.4
2	.934	.000	.878	.122	79.1	86.9	72.5	14.4
3	.947	.012	.900	.112	79.0	86.5	73.3	13.2
4	.950	.014	.894	.120	77.7	85.0	71.5	13.5
5	.970	.047	.919	.128	76.9	85.0	70.3	14.7
6	.986	.061	.927	.134	77.0	84.8	70.0	14.8
7	.957	.016	.905	.111	76.9	83.1	71.6	11.5
8	.942	.029	.873	.156	77.5	84.5	73.3	11.2
9	.936	.006	.874	.132	77.5	84.5	71.0	13.5
10	.930	.006	.869	.137	77.0	83.8	71.0	12.8
11	.916	29.993	.847	.146	76.4	83.6	72.0	11.6
12	.875	.939	.808	.131	75.9	83.6	69.5	14.1
13	.878	.926	.828	.098	76.9	84.0	71.2	12.8
14	.960	30.028	.891	.137	78.2	85.7	72.0	13.7
15	.942	.025	.869	.156	78.5	85.5	73.5	12.0
16	.931	.000	.888	.112	78.6	85.7	73.5	12.2
17	.984	.055	.932	.123	77.1	84.4	71.5	12.9
18	.993	.063	.925	.138	76.2	83.2	70.5	12.7
19	.968	.020	.922	.098	75.2	82.5	69.0	13.5
20	.993	.072	.929	.143	75.5	82.6	69.5	13.1
21	.992	.060	.932	.128	75.2	82.0	69.5	12.5
22	.988	.066	.941	.125	74.4	81.0	69.0	12.0
23	.970	.025	.908	.117	74.2	82.5	67.0	15.5
24	.998	.063	.952	.111	74.9	83.5	68.0	15.5
25	.992	.059	.939	.120	73.5	82.0	67.5	14.5
26	.962	.038	.897	.141	71.9	81.4	64.6	16.8
27	.929	29.989	.865	.124	70.7	79.7	63.2	16.5
28	.962	30.035	.914	.121	70.0	78.8	62.0	16.8
29	.947	.031	.878	.153	71.0	80.4	63.5	16.9
30	.908	29.969	.854	.115	73.0	82.4	65.0	17.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November 1871.

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	72.7	5.5	68.8	9.4	0.699	7.57	2.68	0.74
2	74.3	4.8	70·9	8.2	.748	8.10	.43	.77
3	73.5	5.5	69.6	9.4	.717	7.76	.74	.74
4	71.3	6.4	66.8	10.9	.655	.10	3.00	.70
5	70.1	6.8	65.3	11.6	.623	6.76	.10	.69
6	70.8	6.2	66.5	10.5	.648	7.03	2.86	.71
7	72.1	4.8	68.7	8.2	.697	.57	.29	.77
8	72.8	4.7	69.5	8.0	.715	.75	.29	.77
9	72.0	5.5	68.1	9.4	.684	.41	.63	.74
10	71.4	5.6	67.5	9.5	.670	.27	.62	.74
11	70.4	6.0	66.2	10.2	.642	6.98	.74	.72
12	70.3	5.6	66.4	9.5	.646	7.03	.54	.74
13	71.2	5.7	67.2	9.7	.664	.20	.66	.73
14	73.5	4.7	70.2	8.0	.732	.92	.33	.77
15	73.2	5.3	69.5	9.0	.715	.74	.61	.75
16	72.4	6.2	68.1	10.5	.684	.38	3.00	.71
17	70.8	6.3	66.4	10.7	.646	.01	2.91	.71
18	70.8	5.4	67.0	9.2	.659	.17	.49	.74
19	68.2	7.0	63.3	11.9	.584	6.35	3.02	.68
20	69.7	5.8	65.6	9.9	.630	.86	2.60	.73
21	69.9	5.3	66.2	9.0	.642	.99	.38	.75
22	68.4	6.0	64.2	10.2	.601	.56	.59	.72
23	67.1	7.1	62.1	12.1	.561	.12	.97	.67
24	67.7	7.2	62.7	12.2	.572	.24	3.04	.67
25	64·8	8.7	58.7	14.8	.501	5.47	.43	.62
26	64.0	7.9	57.7	14.2	.485	.31	.17	.63
27	62.6	8.1	56.1	14.6	.459	.04	.14	.62
28	63.7	6.3	58·7	11.3	.501	.52	2.48	.69
29	65.0	6.0	60.2	10.8	.527	.78	.47	.70
30	65.9	7.1	60.2	12.8	.527	.76	3.00	.66

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 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.955	30.010	29.869	0.141	72.5	76.9	65.3	11.6
1	.947	.008	.863	.145	72.0	76.3	64.1	12 2
2	.940	.002	.851	.151	71.5	75.8	63.6	12.2
3	.933	29.996	.844	.152	70.9	75.0	63.0	12.0
4	.934	.993	.842	.151	70.4	74.7	62.5	12.2
5	.948	30.012	.859	.153	69.9	74.0	62.3	11.7
6	.965	.020	.877	.143	69.7	73.5	62.0	11.5
7	.983	.043	.906	.137	70.0	74.5	62.2	12.3
8	30.004	.057	.920	.137	73.2	77.5	66.8	10.7
9	.021	.072	.925	.147	76.0	80.5	70.2	10.3
10	.019	.066	.926	.140	78.4	82.0	73.0	9.0
11	29.998	.051	.907	.144	80.2	83.5	75.0	8.5
Noon.	.970	.052	.883	.142	81.6	85.2	77.0	8.2
1	.936	29.984	.853	.131	82.6	85.6	78.0	7.6
2	.914	.965	.835	.130	83.2	86.9	78.5	8.4
3	.901	.952	.814	.138	83.3	86.6	78.8	7.8
4	.896	.953	.808	.145	82.1	85.5	77.5	8.0
5	.904	.959	.814	.145	80.8	84.7	76.0	8.7
6	.914	.971	.829	.142	78.2	82.2	72.5	9.7
7	.932	.989	.848	.141	76.5	80.3	71.0	9.3
8	.951	30.003	.870	.133	75.3	79.2	69.5	9.7
9	.963	.018	.887	.131	74.3	77.8	68.5	9.3
10	.967	.023	.876	.147	73.6	77.0	67.0	10.0
11	.963	.016	.876	.140	73.0	77.0	66.5	10.5

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
Mid-night.	69.5	3.0	67.1	5.4	0.661	7.25	1.38	0.84
1	69.2	2.8	67.0	5.0	.659	.23	.27	.85
2	68.8	2.7	66.6	4.9	.651	.14	.24	.85
3	68.4	2.5	66.4	4.5	.646	.10	.13	.86
4	68.0	2.4	66.1	4.3	.640	.04	.06	.87
5	67.8	2.1	66.1	3.8	.640	.04	0.94	.88
6	67.5	2.2	65.9	3.8	.636	.00	.93	.88
7	67.7	2.3	65.9	4.1	.636	.00	1.00	.88
8	69.2	4.0	66.0	7.2	.638	6.98	.84	.79
9	69.9	6.1	65.6	10.4	.630	.86	2.74	.72
10	70.3	8.1	64.6	13.8	.609	.59	3.72	.64
11	70.2	10.0	63.2	17.0	.582	.27	4.61	.58
Noon.	70.1	11.5	62.0	19.6	.559	.00	5.34	.53
1	70.1	12.5	61.3	21.3	.546	5.86	.82	.50
2	70.2	13.0	61.1	22.1	.543	.81	6.08	.49
3	70.0	13.3	60.7	22.6	.536	.72	.21	.48
4	69.8	12.3	61.2	20.9	.544	.84	5.67	.51
5	71.0	9.8	64.1	16.7	.599	6.44	.43	.58
6	71.7	6.5	67.1	11.1	.661	7.16	3.09	.70
7	71.5	5.0	68.0	8.5	.681	.39	2.36	.76
8	71.1	4.2	68.2	7.1	.686	.47	1.93	.80
9	70.7	3.6	68.2	6.1	.686	.49	.63	.82
10	70.2	3.4	67.8	5.8	.677	.39	.54	.83
11	69.8	3.2	67.2	5.8	.664	.26	.50	.83

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 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	144.2	...	S S E & S	...	68.7	Chiefly B.
2	145.5	...	S & S W	...	95.0	B.
3	141.0	...	S S W & W	...	77.2	B. Slightly foggy at 9 & 10 P. M.
4	141.7	...	W, W S W & W by S	...	35.2	B.
5	141.0	...	W by S	...	54.7	B to 6 A. M., \i to 5 P. M. B afterwards.
6	141.8	...	W by S & N N E	...	79.2	B to 5 A. M., \i to 6 P. M. B afterwards. Slightly foggy from 9 to 11 P. M.
7	137.0	...	N N E & N W	...	47.5	B to 5 A. M., \i to 6 P. M. B afterwards. Slightly foggy at 1 A. M., & 10 P. M.
8	146.0	...	N W & N by W	...	35.3	B to 5 A. M., \i to 6 P. M. B afterwards.
9	143.2	...	N by W & N	...	30.3	B to 10 A. M., ⌣i to 3 P. M. B afterwards. Slightly foggy from 4 to 6 A. M., & 9 to 11 P. M.
10	143.5	...	N & N by W	...	53.2	B to 10 A. M., ⌒i to 4 P. M. B afterwards. Slightly foggy from midnight to 6 A. M.
11	142.5	...	N by W & N N W	...	73.2	B to 10 A. M., ⌒i to 3 P. M. B afterwards. Slightly foggy from 9 to 11 P. M.
12	141.5	...	N N W & N E	...	66.4	B to 10 A. M., ⌒i to 7 P. M. B afterwards.
13	139.0	...	E N E & S by W	...	56.4	B to 1 P. M., ⌒i to 3 P. M. B afterwards.
14	140.0	...	S by W & S S W	...	59.0	B to 11 A. M., ⌣i to 4 P. M. B afterwards.
15	140.0	...	S S W & W by S	...	67.8	Chiefly B.
16	139.0	...	W by S & W by N	...	90.7	Chiefly B.
17	148.0	...	W by N & W	...	57.7	B to 11 A. M., ⌒i to 1 P. M. B afterwards. Slightly foggy at 11 P. M.
18	139.8	...	W & W by S	...	72.2	B to 11 A. M., ⌣i to 2 P. M. B afterwards. Slightly foggy from 7 to 9 P. M.
19	137.8	...	W by S	...	52.4	B.
20	138.8	...	W by S & S S W	...	73.2	B. to 10 A. M., ⌒i to 4 P. M. B afterwards. Foggy from 7 to 10 P. M.
21	137.5	...	S S W & S W	...	43.4	B to 11 A. M., ⌒i to 3 P. M. B afterwards. Slightly foggy at 8 & 9 P. M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ∿i Cumulo-strati, ⌒i Nimbi, \⌒i Cirro-cumuli, B clear, S stratoni O overcast, T thunder, L lightning, R rain, D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
22	137.0	...	S W	...	80.3	Chiefly B Slightly foggy at 9 P. M.
23	141.0	...	S W & W S W	...	108.0	B to 10 A. M., \i to 4 P. M. \i afterwards. Slightly foggy from 7 to 10 P. M.
24	140.0	...	W S W & W	...	76.1	\i to 2 A. M. B to 3 P. M., ⌣i to 8 P. M. B afterwards. Slightly foggy at 7 P. M.
25	137.0	...	W & N N W	...	129.9	Chiefly B. Slightly foggy from 7 to 11 P. M.
26	137.0	...	N N W & WbyN [& N W	...	124.8	Chiefly B. Slightly foggy at midnight & from 8 to 11 P. M.
27	137.0	...	W by N, W N W	...	118.8	B. Slightly foggy at midnight & 1 A. M., & from 7 to 11 P. M.
28	136.4	...	N W & N N W	...	100.9	B. Slightly foggy from midnight to 2 A. M., & 7 to 11 P.M.
29	136.8	...	N N W & N W	...	83.1	B to 2 P. M., \i to 7 P. M. B afterwards. Slightly foggy from midnight to 7 A. M., & at 9 P. M.
30	142.0	...	N W & W by N	...	76.3	B to 10 A. M., \i to 6 P. M. B afterwards.

ri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒i Cumulo-strati, \⌒i Nimbi, *ro-cumuli,* B clear, S stratoni, O overcast, T thunder, L lightning, *D drizzle.*

Abstract of the Results of the Daily Meteorological Observations, as taken at the Surveyor General's Office, Madras, in the month of November 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month	[illegible]
Max. height of the Barometer [illegible]	[illegible]
Min. height of the Barometer [illegible]	[illegible]
Extreme range **of the Barometer** during the month	[illegible]
Mean of the daily Max. Pressures	[illegible]
Ditto ditto Min. [illegible]	[illegible]
Mean daily range **of the Barometer** during the month	[illegible]

	°
Mean Dry Bulb Thermometer for the month	75.8
Max. Temperature [illegible]	[illegible]
Min. Temperature [illegible]	62.9
Extreme range **of the Temperature** during the month	24.9
Mean of the daily Max. Temperature	83.5
Ditto ditto Min. [illegible]	69.6
Mean daily range **of the Temperature** during the month	13.9

Mean Wet Bulb Thermometer for the month	69.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	6.1
Computed Mean Dew-point for the month	65.4
Mean Dry Bulb Thermometer above computed mean Dew-point	10.4

	Inches.
Mean Elastic force of Vapour for the month	0.626

	Troy grain.
Mean Weight of Vapour for the month	6.81
Additional Weight of Vapour required for complete saturation	2.73
Mean degree of humidity for the month, complete saturation being unity	0.71

	°
Mean Max. Solar radiation Thermometer for the month	110.4

	Inches.
Rained no days.—Max. fall of rain during 24 hours	Nil
Total amount of rain during the month	Nil
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	Nil
Prevailing direction **of the Wind**	W. by S, N. W. & W

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Nov. 1871.

MONTHLY RESULTS

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
1	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
2	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
3	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
4	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
5	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
6	1				1				1												1				1		1		3		2		1		5		3		2				3		3		2
7	1				1				1												1				1		1		3		2		2		5		2		1		1		3		3		2
8	1				1				1												1				1		1		3		2		2		5		2		1		1		3		3		2
9	1				1				1														1				1		3		2		3		4		2		2		2		2		3		2
10	1				1				1																1				3		3		2		5		1		2		4		1		2		3
11	2				1				1																1				2		4		2		4		1		3		3		3		2		1
Noon.	2				1				1																1				2		4		2		3		4		1		1		6		1		1
1	1				1																1				1				2		3		2		3		4		2		1		4		2		3
2			1				1																		2				2		2		2		4		3		3		3		1		4		2
3	2						1																		2				2		3		2		3		3		4				2		2		4
4	1		1				1																		1		1		2		3		2		3		4		3				3		3		2
5	1		1				1																		1		1		2		3		1		5		3		3				3		3		2
6	1				1		1																		1		1		2		3		1		5		3		3				3		3		2
7	1				1		1																		1		1		2		3		1		5		3		3				3		3		2
8	1				1				1																1		1		2		3		1		6		3		2				3		3		2
9	1				1				1																1		1		2		3		2		5		3		2				3		3		2
10	1				1				1																1		1		2		3		2		5		3		2				3		3		2
11	1				1				1																1		1		3		2		2		5		3		2				3		3		2

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December 1871.

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° Faht.	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	29.932	30.006	29.880	0.126	74.5	82.5	67.5	15.0
2	.991	.071	.929	.142	74.1	82.3	67.0	15.3
3	30.021	.102	.973	.129	70.7	79.2	64.0	15.2
4	.035	.116	.980	.136	67.9	76.4	60.5	15.9
5	.050	.138	30.004	.134	67.7	77.3	59.9	17.4
6	.023	.094	29.960	.134	69.6	79.2	61.1	18.1
7	.028	.115	.968	.147	70.8	79.7	63.5	16.2
8	.025	.104	.972	.132	69.4	78.0	62.7	15.3
9	.013	.088	.948	.140	69.2	78.5	61.9	16.6
10	29.984	.057	.923	.134	69.2	79.5	60.4	19.1
11	30.003	.076	.950	.126	70.5	80.5	63.2	17.3
12	.048	.123	.995	.128	69.8	79.5	62.2	17.3
13	.104	.174	30.054	.120	69.3	79.0	61.0	18.0
14	.128	.197	.062	.135	66.8	75.4	58.6	16.8
15	.114	.188	.065	.123	66.8	75.5	59.5	16.0
16	.080	.157	.011	.146	68.1	78.0	60.5	17.5
17	.102	.180	.048	.132	68.3	76.5	61.2	15.3
18	.114	.179	.051	.128	68.4	77.2	61.4	15.8
19	.114	.193	.058	.135	68.7	76.7	61.0	15.7
20	.059	.128	.006	.122	70.3	78.0	65.0	13.0
21	.019	.093	29.968	.125	69.5	77.7	63.0	14.7
22	29.998	.071	.949	.122	69.9	77.5	63.2	14.3
23	.984	.045	.926	.119	69.8	78.2	62.0	16.2
24	30.003	.077	.960	.117	70.3	77.7	63.0	14.7
25	.009	.068	.949	.119	70.9	77.2	66.0	11.2
26	.037	.118	.975	.143	68.5	75.6	63.0	12.6
27	.036	.110	.987	.123	67.4	75.0	60.0	15.0
28	.084	.171	30.017	.154	64.9	74.0	58.8	15.2
29	.100	.168	.042	.126	64.2	72.7	57.0	15.7
30	.056	.129	29.994	.135	65.7	75.4	57.8	17.6
31	.036	.114	.969	.145	68.6	78.5	60.2	18.3

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly observations, made at the several hours during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December 1871.

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	69.1	5.4	65.3	9.2	0.623	6.81	2.37	0.74
2	67.2	6.9	62·4	11.7	.567	.18	.89	.68
3	63.2	7.5	57.2	13.5	.476	5.22	.96	.64
4	60.7	7.2	54.9	13.0	.441	4.87	.64	.65
5	61.8	5.9	57.1	10.6	.475	5.24	.22	.70
6	63.6	6.0	58.8	10.8	.503	.53	.37	.70
7	65.3	5.5	60.9	9.9	.539	.92	.28	.72
8	63.4	6.0	58.6	10.8	.499	.50	.36	.70
9	62.8	6.4	57.7	11.5	.485	.33	.48	.68
10	62.6	6.6	57.3	11.9	.478	.26	.55	.67
11	63.7	6.8	58.3	12.2	.494	.43	.70	.67
12	63.6	6.2	58.6	11.2	.499	.50	.45	.69
13	62.1	7.2	56.3	13.0	.462	.09	.74	.65
14	59.9	6.9	54.4	12.4	.434	4.80	.46	.66
15	61.2	5.6	56.7	10.1	.469	5.18	.08	.71
16	63.0	5.1	58.9	9.2	.504	.57	1.98	.74
17	62.0	6.3	57.0	11.3	.473	.22	2.38	.69
18	62.3	6.1	57.4	11.0	.480	.29	.33	.69
19	63.2	5.5	58.8	9.9	.503	.54	.15	.72
20	65.1	5.2	60.9	9.4	.539	.93	.15	.73
21	64.5	5.0	60.5	9.0	.532	.86	.02	.74
22	64.5	5.4	60.2	9.7	.527	.79	.19	.73
23	64.4	5.4	60.1	9.7	.525	.77	.18	.73
24	65.5	4.8	61.7	8.6	.554	6.08	.00	.75
25	66·9	4.0	63.7	7.2	.591	.50	1.73	.79
26	63.1	5.4	58.8	9.7	.503	5.54	2.11	.72
27	61.8	5.6	57.3	10.1	.478	.28	.11	.71
28	59.5	5.4	55·2	9.7	.445	4.95	1.90	.72
29	58.6	5.6	53.6	10.6	.422	.69	2.00	.70
30	60.1	5.6	55.6	10.1	.452	5.02	.00	.72
31	62.8	5.8	58.2	10.4	.493	.44	.23	.71

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 1871.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	30.045	30.150	29.914	0.236	65.4	71.0	61.0	10.0
1	.035	.141	.905	.236	64.7	70.5	60.5	10 0
2	.026	.125	.898	.227	64.1	70.0	59.3	10.7
3	.017	.118	.894	.224	63.6	69.4	59.1	10.3
4	.017	.129	.899	.230	63.1	69.0	58.8	10.2
5	.029	.137	.910	.227	62.6	68.0	58.0	10.0
6	.043	.145	.920	.225	62.1	67.5	57.5	10.0
7	.064	.165	.940	.225	61.9	67.5	57.0	10.5
8	.091	.178	.979	.199	64.8	71.4	59.7	11.7
9	.114	.196	30.006	.190	68.7	74.7	62.0	12.7
10	.117	.197	.003	.194	71.6	78.1	64.7	13.4
11	.099	.175	29.978	.197	73.9	81.0	66.8	14.2
Noon.	.068	.141	.945	.196	75.6	82.0	68.9	13.1
1	.032	.104	.911	.193	76.5	82.2	70.6	11.6
2	.008	.077	.898	.179	77.5	82.5	72.4	10.1
3	29.993	.071	.888	.183	77.5	82.2	72.7	9.5
4	.989	.065	.880	.185	76.3	81.2	71.8	9.4
5	.997	.072	.899	.173	74.9	79.6	71.0	8.6
6	30.007	.082	.912	.170	72.1	77.0	68.0	9.0
7	.023	.096	.930	.166	70.4	75.6	66.2	9.4
8	.041	.126	.949	.177	68.9	74.8	64.5	10.3
9	.055	.146	.959	.187	67.7	73.4	62.5	10.9
10	.061	.149	.971	.178	66.8	72.5	61.6	10.9
11	.057	.155	.970	.185	65.9	71.8	61.0	10.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	°	Inches		lb	Miles	
1	136.0	...	W S W	...	93.4	\i to 6 P. M. B afterwards. Slightly foggy at 8 P. M.
2	137.0	...	W N W &N N E	...	91.1	B to 2 A. M., \i to 7 A. M. B afterwards.
3	135.4	...	E N E &N N E	...	110.2	B Slightly foggy at 8 & 9 P. M.
4	135.5	...	N N E & N W	...	77.2	B. Slightly foggy from 7 to 11 P. M.
5	132.5	...	N W	...	66.5	Chiefly B.
6	135.0	...	N W & W S W	...	54.8	B. Slightly foggy from 5 to 7 A. M.
7	133.0	...	WS W & W by N	...	60.9	Chiefly B.
8	132.0	...	W & N	...	134.8	B. Slightly foggy from 9 to 11 P. M.
9	135.0	...	N & W N W,	...	124.8	B. Slightly foggy at midnight & 1 A. M., & from 9 to 11 P. M.
10	134.0	...	W N W & W	...	57.0	B. Slightly foggy at 5 & 6 A. M.
11	136.0	...	W & W N W	...	89.3	B.
12	132.8	...	W by N & W	...	76.6	B. Slightly foggy from 8 to 10 P. M.
13	135.5	...	W & W N W	...	90.7	B.
14	132.8	...	W N W	...	84.7	Chiefly B.Slightly foggy at 9 & 10 P. M.
15	130.8	...	W N W	...	75.6	B to 1 P. M., \i to 5 P. M. B afterwards. Slightly foggy at midnight
16	127.5	...	W N W	...	71.2	B to 6 A. M., \i to 6 P. M. B afterwards. Slightly foggy from 6 to 8 A.M., & 7 to 9 P. M.
17	130.0	...	W N W & N N E	...	81.8	Chiefly B. Slightly foggy at 8 & 9 P. M.
18	135.2	...	N N E & S S W	...	109.9	B. to 5 A. M., \i to 5 P. M. B afterwards. Slightly foggy at 8 & 9 P. M.
19	132.0	...	S S W & S W	...	63.1	B to 9 A. M., \i afterwards. Slightly foggy from 8 to 10 P. M.,
20	132.5	...	S W	...	46.6	S to 2 A. M., \i to 4 A. M. S to 7 A. M., \ i to 3 P. M. B afterwards. Slightly foggy from 7 to 10 P. M.
21	131.0	...	E by S & S E	...	63.4	B to 11 A. M., ⌒i to 3 P. M. B afterwards. Slightly foggy at 5 & 6 A. M., & from 7 to 10 P. M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒⌣i Cumulo-strati, ⌣⌣i Nimbi, \⌣i Cirro-cumuli, B clear, S stratoni, O overcast, T thunder, L lightning R rain, D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December 1871.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 1½ ft. above Ground.	Wind. Prevailing direction.	Wind. Max. Pressure	Wind. Daily Velocity.	General aspect of the Sky.
	o	Inches		lb	Miles	
22	134.0	...	S E & E S E	...	57.4	B to 11 A. M., ⌒i to 4 P. M. B afterwards. Slightly foggy at 6 & 7 A. M., & from 7 to 10 P. M.
23	138.5	...	E S E & S S E	...	61.2	B to 11 A. M., ⌒i to 4 P. M., \⌣i afterwards.
24	135.0	...	S S E & S W	...	37.0	B to 10 A. M., \⌣i afterwards. Slightly foggy at 9 & 10 P. M.
25	138.4	...	S W & W N W	...	90.4	⌒i to 3 A. M. B to 11 A. M., ⌒i to 6 P. M. B afterwards.
26	133.0	...	W N W & NW	...	132.1	B to 11 A. M., ⌣i to 3 P. M. B afterwards.
27	131.0	...	N W	...	95.2	B.
28	131.0	...	N N E & N N W	...	180.2	B. Slightly foggy at 7 & 8 P. M.
29	131.5	...	N by W & N W	...	101.0	B. Foggy from 9 to 11 P. M.
30	132.0	...	N W	...	72.7	B. Foggy at midnight & 1 A. M., & 10 & 11 P. M.
31	135.4	...	N W & W N W	...	68.3	B. Slightly foggy at midnight & from 8 to 11 P. M.

\i Cirri,—i Strati, ⌒i Cumuli, ⌣i Cirro-strati, ⌒⌣i Cumulo-strati, \⌣i Nimbi, \⌣i *Cirro-cumuli*, B clear, S stratoni, O overcast, T thunder, L lightning, R rain, D drizzle.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December 1871.

Monthly Results.

	Inches.
Mean height of the Barometer for the month...	30.043
Max. height of the Barometer occurred at 10 A. M. on the 14th. ...	30.197
Min. height of the Barometer occurred at 4 P. M. on the 1st. ...	29.880
Extreme range of the Barometer during the month	0.317
Mean of the daily Max. Pressures	30.118
Ditto ditto Min. ditto	29.986
Mean daily range of the Barometer during the month	0.132

	°
Mean Dry Bulb Thermometer for the month	69.0
Max. Temperature occurred at 2 P. M. on the 1st.	82.5
Min. Temperature occurred at 7 A. M, on the 29th. ...	57.0
Extreme range of the Temperature during the month	25.5
Mean of the daily Max. Temperature	77.7
Ditto ditto Min. ditto, ...	61.8
Mean daily range of the Temperature during the month... ...	15.9

Mean Wet Bulb Thermometer for the month	63.1
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer	5.9
Computed Mean Dew-point for the month	58.4
Mean Dry Bulb Thermometer above computed mean Dew-point ...	10.6
	Inches.
Mean Elastic force of Vapour for the month	0.496

	Troy grain.
Mean Weight of Vapour for the month	5.46
Additional Weight of Vapour required for complete saturation ...	2.30
Mean degree of humidity for the month, complete saturation being unity	0.70
	°
Mean Max. Solar radiation Thermometer for the month ...	133.6

	Inches.
Rained no days,—Max. fall of rain during 24 hours	Nil
Total amount of rain during the month	Nil
Total amount of rain indicated by the Gauge* attached to the anemometer during the month	Nil
Prevailing direction of the Wind	W. N. W. & N W.

* Height 70 feet 10 inches above ground.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Dec. 1871.

MONTHLY RESULTS.

Tables shewing 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. by E.	Rain on.	N. N. E.	Rain on.	N. E.	Rain on.	E. N. E.	Rain on.	E. by N.	Rain on.	E.	Rain on.	E. by S.	Rain on.	E. S. E.	Rain on.	S. E.	Rain on.	S. S. E.	Rain on.	S. by E.	Rain on.	S.	Rain on.	S. by W.	Rain on.	S. S. W.	Rain on.	S. W.	Rain on.	W. S. W.	Rain on.	W. by S.	Rain on.	W.	Rain on.	W. by N.	Rain on.	W. N. W.	Rain on.	N. W.	Rain on.	N. N. W.	Rain on.	N. by W.	Rain on.
	No. of days																																															
Mid night.	1				2				1						1		1		1		1								1		2		3				3		1		6		6				1	
1	1				2				1						1		1		1		1								1		2		3				3		1		6		6				1	
2	1				2				1						1		1		1		1								1		2		3				3		1		6		6				1	
3	1				3				1						1		1		1		1								1		2		2				3		1		7		5				1	
4	1				3				1						1		1		1		1								1		2		2				3		1		7		5				1	
5	1				3				1						1		1		1		1								1		2		2				3		1		8		4				1	
6	1				3				1						1		1		1		1								1		2		2				3		1		8		4				1	
7	1				3				1						1		1		1		1						1		1		1		2				3		1		8		4				1	
8	1				3				1						1		1		1		1								1		1		2				1		3		8		5				1	
9	1				3				1						1		1		1		1								1		1		2				1		3		7		6				1	
10	1				3				2						1		1		1		1										2		2				1		2		7		6				1	
11	1				2		2		1								1		2						1						2		2		1		1		1		7		6		1			
Noon.			2				1		1								1		2		1								1		2		2		1		1		2		5		8		1			
1					1		1		1								1		2		1								1		2		2				2		3		4		7		2		1	
2	1				1		2														4										3		3				1		1		7		5		3			
3	1				1		2														3						1				3		2				2		1		8		6		1			
4	1				1		2												1		2								1		3		2				1		2		8		6				1	
5	1				3												1		1		1								1		3		2				1		2		8		6		1			
6	1				3												1		1		1								1		3		2				2		1		8		6		1			
7	1				3												1		1		1								1		3		2				2		1		8		6		1			
8	1				3												1		1		1								1		3		2				2		1		8		6		1			
9	1				3												1		1		1								1		3		2				2		1		8		6		1			
10	1				3												1		1		1								1		3		2				2		1		8		6		1			
11	1				3										1		1		1		1								1		2		2				2		1		8		6		1			

APPENDIX.

LIST OF MEMBERS

OF THE

ASIATIC SOCIETY OF BENGAL,

ON THE 31ST DECEMBER, 1870.

LIST OF ORDINARY MEMBERS.

The * distinguishes Non-Subscribing, and the † Non-Resident Members.

N. B.—Gentlemen who may have changed their residence, since this list was drawn up, are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alterations may be made in the subsequent edition.

Gentlemen who are proceeding to Europe, with the intention of not returning to India, are particularly requested to notify to the *Secretaries*, whether it be their desire to continue as members of the Society.

Date of Election.		
1847 June 2.	*Abbot, Major-Gen. J., R. Artillery.	Europe
1860 Dec. 5.	Abdullatíf Khán Bahádur, Maulavi.	Calcutta
1868 Sept. 2.	†Adam, R. M., Esq.	Sambhar Lake viâ Jeypúr
1869 Jan. 20.	Adley, C. C. Esq., C. E., Nerbudda Coal & Iron Co.,	Gunwarra Central India
1860 July 4.	†Ahmad Khan, Saied, Bahádur.	Allighur
1860 April 4.	†Aitchison, J. E. T., Esq. M. D.	Rawul Pindee
1859 Feb. 2.	*Alabaster, C., Esq.	China
1866 Jan. 17.	Allan, Lieut.-Col. A. S.	Calcutta
1869 Oct. 6.	*Allardyce, A., Esq.	Europe
1852 July 7.	*Allan, C. Esq. B. C. S.	Europe
1867 Aug. 7.	†Amery, C. F., Esq.	Amritsar, Panjab.
1860 Oct. 3.	Amir Ali Khán, Bahádur, Múnshi,	Calcutta
1870 June 1.	†Ameer Hussun Khán, Bahádur, Rája.	Mahmudabad, Oudh
1865 Jan. 11.	*Anderson, Dr. J., F. L. S.	Europe
1843 Sept. 4.	*Anderson, Lieut.-Col. W., Bengal Artillery.	Europe
1864 Dec. 7.	*Anderson, W., Esq.	Europe
1861 Sept. 4.	*Asghur Ali Khán, Bahádur, Nawáb.	Europe
1869 Feb. 3.	*Ashton, The Rev. J. P.,	Europe
1861 July 3.	*Asphar, J. J. T. H., Esq.	Europe
1855 July 4.	Atkinson, W. S., Esq., M.A., F. L. S.	Calcutta
1869 Feb. 3.	†Attara Singh, Bahádur, Sirdár,	Loodianah

Date of Election.		
1835 Oct. 7.	*Baker, Col. W. E., Bengal Engineers.	Europe
1859 Aug. 3.	Baláichánda Sinha, Bábu,	Calcutta
1865 Nov. 1.	†Ball, V., Esq., Geol. Survey.	Geol. S. Office
1860 Nov. 7.	Banerjea, The Rev. K. M.,	Calcutta
1869 Dec. 1.	Barker, R. A., Esq., M. D.,	Serampore
1864 May 4.	*Barry, Dr. J. B.,	Europe
1862 Aug. 6.	†Basevi, Capt. J. P., Royal Engineers,	Mussurie
1860 July 4.	†Batten, G. H. M., Esq., B. C. S.	Agra
1838 Jan. 3.	*Batten, J. H. Esq., B. C. S.	Europe
1859 May 4.	*Bayley, E. C., Esq., B. C. S., C. S. I.	Europe
1861 Feb. 6.	†Bayley, S. C., Esq., B. C. S.	Patna
1868 May 6.	*Baynes, J., Esq.	Europe
1869 Feb. 3	†Baxter, J. B., Esq., M. R. C. S.	Port Canning
1849 June 6.	*Beadon, The Hon'ble Sir Cecil, B. C. S.	Europe
1864 Sept. 7.	†Beames, J., Esq., B. C. S.	Balasore
1841 April 7.	Beaufort, F. L., Esq., B. C. S.	Calcutta
1847 Aug. 4.	*Beckwith, J., Esq.	Europe
1867 July 3.	†Belletty, N. A., Esq., Civil Assistant Surgeon.	Mymensing
1869 Jan. 20.	†Bellew, Dr. P. F.,	Madras
1830 Sept. 1.	*Benson, Lieut.-Col. R.,	Europe
1862 Oct. 8.	†Bernard, C. E., Esq., B. C. S.	Nágpúr, Central Provinces.
1862 June, 4.	†Bhau Daji, Dr.	Bombay
1864 Nov. 2.	Bhudeva Mukerjea, Bábu,	Chinsurah
1840 July 15.	*Birch, Major-General Sir R. J. H., K. C. B.	Europe
1846 Mar. 4.	*Blagrave, Major T. C., 26th Regt., B. N. I.	Europe
1859 Sept. 7.	*Blane, Col. Sir S. J.,	Europe
1857 Mar. 4	Blanford, H. F., Esq., A. R. S. M. F. G. S.	Calcutta
1859 Aug. 3.	†Blanford, W. T. Esq., A. R. S. M., F. G. S., Geol. Survey.	Geol. S. Office
1864 April 6.	Blochmann, H., Esq., M. A.	Calcutta
1857 Aug. 2.	*Bogle, Lieut.-Col. Sir A., Kt.	Europe
1869 June 2.	Bonnerjee, W. C., Esq.	Calcutta
1859 Oct. 12.	†Bowring, L. B., Esq., C. S. I., B C. S.	Mysore
1868 Jan. 15.	*Boxwell, J., Esq., C. S.	Europe
1854 Nov. 1.	*Boycott, Dr. T., B. M. S.	Europe
1860 Mar. 2.	†Brandis, Dr. D.,	India
1860 Oct. 3.	*Brandreth, The Hon'ble J. E. L.,	Europe
1870 Aug. 3.	Broadley, A. M., Esq., C. S.	Patna
1866 April 4.	*Broderick, H. C., Esq., M. D.	Europe

Date of Election.		
1847 June, 2.	*Brodie, Capt. T., 5th Regt., B. N. I.	Europe
1866 Jan. 17.	†Brown, Col. D.,	Rangoon
1866 Nov. 7.	†Browne, Lieut.-Col. Horace A.,	Thayetmo, British Burma
1866 June, 6.	†Brownfield, C., Esq.	Kámrúp
1868 June, 3.	†Buck, E. C., Esq., C. S.	Furruckabad
1866 June, 6.	†Buckle, Dr. H. B., C. B.	Dacca
1856 Sept. 3.	Bashiruddin, Sultán Mohammad,	Chinsurah
1869 Jan. 20.	†Cadell, A., Esq., B. A., C. S.	Mozaffernagar
1859 Sept. 7.	*Campbell, Dr. A.,	Europe
1863 June, 3.	*Campbell, The Hon'ble G.,	Europe
1860 Jan. 3.	†Carnac, J. H. Rivett, Esq., B. C. S.	Nágpur
1867 Dec. 4.	†Chambers, F. J., Esq.	Lucknow
1868 Aug. 5.	†Chandramohana Gosvámi, Pundita	Gowhátí
1863 Aug. 5.	†Chandranátha Ráya, Rájá,	Nátor
1868 Feb. 5.	†Clark, Major E. G., Bengal Staff Corps.	Baraitch, Oudh
1863 April, 1.	*Cleghorn, Dr. H.,	Europe
1861 Sept. 4.	†Cockburn, J. F., Esq., C. E.	Karharbári Colliery
1868 Nov. 4.	†Cole, Lieut. H. H., Royal Engr.	Siálkot
1862 April, 2.	*Colles, J. A. P., Esq., M. D.	Europe
1851 Mar. 5.	*Colvin, J. H. B., Esq., B. C. S.	Europe
1868 Dec. 2.	†Cooke, J. E., Esq.	Haidarábád
1860 Dec. 5.	*Cooper, F. H., Esq., B. C. S.	Europe
1870 June, 1.	*Couch, The Hon'ble Sir R., Kt.	Europe
1857 Mar. 4.	*Cowell, E. B., Esq., M. A.	Europe
1866 May, 2.	*Cox, W. H., Esq.	Europe
1861 July, 3.	*Crockett, Oliver R., Esq.	China
1868 Sept. 2.	Cutsem, E. Ch. Van, Esq.	Calcutta
1862 April, 2.	*Dalrymple, F. A. E., Esq., C. S.	Europe
1847 June, 2.	†Dalton, Col. E. T., C. S. I., Staff Corps.	Chhotá Nágpur
1870 May, 4.	†Damant, G. H., Esq., C. S.	Dinagepore
1861 Mar. 6.	*Davey, N. T., Esq., Revenue Surv.,	Europe
1861 Nov. 6.	†Davies, R. H., Esq., C. S. I., B. C. S.	Panjab
1869 April 7.	†Day, Dr. F., F. L. S., F. Z. S.	India
1870 Feb. 2.	†DeFabeck, F. W. A., Esq., Bengal Medical Service,	Jeypore
1869 Oct. 6.	†Delmerick, J. G., Esq.	Ráwal Pindi
1864 July, 6.	Devendra Mallika, Bábu,	Calcutta
1856 June, 4.	†DeBourbel, Major R., Bengal Engrs.	Oudh
1861 June, 5.	*Denison, His Excellency Sir W., K. C. B.	Europe
1861 Mar. 6.	*Devereux, The Hon'ble H. B., B. C. S	Europe

Date of Election.		
1862 May, 7.	†Dhanapati Singha Dughar, Ráya Bahádur.	Azimganj
1853 Sept. 7.	*Dickens, Lient.-Col. C. H.,	Europe
1870 April, 6.	Dickens, Col. A. D.	Calcutta
1870 May, 4.	Dobson, G. E., Esq., M. B.,	Calcutta
1859 Sept. 7.	†Douglas, Col. C.,	Mirut
1869 Feb. 3.	†Drew, F., Esq.	Kashmir
1864 Dec. 7.	*Dunlop, H. G., Esq.	Europe
1867 June, 5.	Duthoit, W., Esq., C. S.	Mirzapúr
1870 Mar, 8.	*Duke of Edinburgh, The, His Royal Highness,	Australia
1861 May, 1.	*Earle, Capt. E. L., Bengal Artillery,	Europe
1857 May, 6.	*Eatwell, Dr. W. C. B.,	Europe
1868 Oct. 7.	†Eddowes, W. Esq., M. D.	Erinpúr
1840 Oct. 7.	*Edgeworth, M. P., Esq., B. C. S.	Europe
1863 May 6.	†Edgar, J. W., Esq., B. C. S.	Cachar
1865 Feb. 1.	*Egerton, Ph., Esq., B. C. S.	Europe
1846 Jan. 7.	*Elliot, Sir Walter, late M. C. S.	Europe
1859 Nov. 2.	†Elliot, C. A., Esq., B. C. S.	Allahabad
1856 Mar. 5.	*Ellis, Lieut.-Col. R. R. W., 23rd Regt., B. N. I.	Europe
1854 Nov. 1.	*Elphinstone, Capt. M. W., 3th Regt., B. N. I.	Europe
1861 Jan. 9.	*Erskine, The Hon'ble C. J., Bombay C. S.	Europe
1856 Aug. 6.	*Erskine, Major W. C. B.,	Europe
1863 Oct. 7.	Ewart, Dr. J.,	Calcutta
1862 Aug. 6.	*Eyre, Col. Vincent, C. B.	Europe
1851 May, 7.	Fayrer, Dr. J., C. S. I.	Calcutta
1863 Jan. 15.	†Fedden, Francis, Esq., Geol. Survey.	Hinganhát
1869 April, 7.	†Ferrar, M. L., Esq., B. A., C. S.	Sitapúr
1868 May, 6.	†Field, C. D., Esq., M. A., C. S.	Chittagong
1869 Sept. 1.	†Fisher, J. H., Esq., C. S.	Allahabad
1860 Mar. 7.	*Fitzwilliam, The Hon'ble W. S.,	Europe
1865 April, 5.	Fleming, Dr. J. M.	Nimár
1867 April, 3.	†Ford, Lieut.-Col. B.,	Khundwá.
1859 Oct. 12.	†Forlong, Lieut.-Col. J. G. R., Madras Staff Corps.	A'bú, Rájputána
1861 Feb. 6.	†Forest, R., Esq., Civil Engineer.	Dehra
1863 June, 3.	†Forsyth, T. D., Esq., C. B.	Jullundar
1868 April, 1.	*Frederic of Schleswig Holstein, H. R. H. Prince,	Europe
1860 Mar. 7.	*Frere, His Excellency Sir H. Bartle, K. C. B., B. C. S.	Europe

Date of Election.			
1866 Nov. 1.	Harendra Krishna Bahadur, Kumar,		Calcutta
1862 Oct. 8.	*Harington, The Hon'ble H. R.,		Europe
1861 Feb. 6.	†Harrison, A. S., Esq., R. A.		Bareilly
1859 Oct. 12.	*Haughton, Lieut.-Col. J. C., C. S. I.		Orch Behar
1862 Aug. 6.	†Heeley, W. L., Esq., R. A., C. S.		Rajshahi
1866 April, 4.	*Henry, N. A., Esq.		Europe
1853 July, 6.	*Herschel, W. J., Esq., R. C. S.		Krishnaggur
1854 Mar. 1.	Hichens, Lieut. W., Bengal Engrs.		Europe
1868 Aug. 5.	†Hobart, R. T., Esq., C. S.		Kish
1863 July, 1.	*Horne, C., Esq., C. S.		Europe
1870 Jan. 5.	Hume, Allan, O., Esq., C. B., C. S.		Calcutta
1870 June, 1.	Hunter, W. W., Esq., LL. D., C. S.		Calcutta
1863 Jan. 15.	†Howell, M. S., Esq., C. S.		Dehra Dhoon
1867 Aug. 17.	†Hughes, T. H., Esq., A. R. S. M., F. G. S., Geol. Survey.		Geol. S. Office
1867 Aug. 7.	†Hughes, Captain W. G.,		Akyab, B. Burma
1868 Nov. 4.	†Holroyd, Capt. W. R. M.		Lahor
1866 Feb. 7.	Hoyle, G. W., Esq.		Calcutta
1867 May, 1.	*Hyatt, Dr. B. N., Civil Surgeon.		Europe
1868 April, 1.	Hyde, Lieut.-Col. H., R. E.		Calcutta
1869 Sept. 1.	Hyde, E., Esq.		Calcutta
1866 Mar. 7.	†Irvine, W., Esq., C. S.		Gorukpur
1860 Jan. 4.	Innes, Lieut.-Col. J. J. McLeod, R. E.		Calcutta
1870 April, 6.	Innes, F. W. Esq., M. D., C. B.		Calcutta
1862 Oct. 8.	*Irwin, Valentine, Esq., C. S.		Europe
1853 Dec. 7.	†Isvariprasáda Singha Bahadur, Rája		Benares
1864 Sept. 7.	Jackson, The Hon'ble E.,		Calcutta
1841 Mar. 5.	*Jackson, W. B., Esq., B. C. S.		Europe
1861 Dec. 4	*James, Major H. R., C. B.		Europe
1845 Dec. 3.	*Jerdon, Dr. T. C.		Europe
1870 Sept. 7.	John, R. T. St., Esq.		Akyab
1866 Feb. 7.	*Johnson, W. H., Esq.		Sialkote
1847 June, 2.	*Johnstone, J., Esq.		Europe
1862 Mar. 5.	†Johnstone, Capt. J. W. H., Assistant Commissioner,		Jhelum
1867 Dec. 4.	†Johnstone, Capt. J.		Keonjar viâ Bhadrack
1859 Sept. 7.	*Jones, R., Esq.		Europe
1865 June, 7.	†Jayakissen, Dása Bahádur, Rája, C. S. I.		Allighur
1869 April, 7.	Kabiruddin Ahmad, Moulavi,		Calcutta
1863 July, 1.	*Kane, H. S., Esq., M. D.		Europe
1850 April, 3.	*Kay, The Rev. W., D. D.		Europe
1861 Dec. 15.	†Kempson, M., Esq., M. A.		Berolli

Date of Election.		
1867 Dec. 4.	†King, G., Esq., M. B.	Dehra Dhoon
1867 Mar. 6.	†King, Capt. H. W.	P. & O. Co.'s Office
1862 Jan. 15.	†King, W., Jr., Esq., Geol. Survey.	Madras
1867 Mar. 6.	†Knox, G. E., Esq., C. S.	Balandshahur
1869 May, 5.	Kurz, S., Esq.	Calcutta, Botanic Garden
1839 Mar. 6.	*Laidlay, J. W., Esq.	Europe
1861 Mar. 6.	*Laing, The Hon'ble S.,	Europe
1869 Sept 1.	Latham, G., Esq., C. E.	Calcutta
1869 May, 5.	†Leeds, R. J., Esq., C. S.	Mirzapúr
1852 April, 7.	*Lees, Lieut.-Col. W. N., LL. D.	Europe
1868 Feb 5.	†Lees, L. H., Esq., M. D.	Umbala
1868 July, 1.	†Leitner, D. G. W.,	Láhor
1859 Dec. 7.	*Leonard, H., Esq., C. E.	Europe
1870 July, 6.	*Lethbridge, E., Esq., M. A.	Hugli College, Chinsurah
1869 June, 2.	†Leupolt, J. C., Esq., C. S.	Azimgarh
1865 June, 7.	*Lewin, Capt. T. H.,	Europe
1856 Feb. 6.	*Liebig, Dr. G. von	Europe
1860 Jan. 4.	Lindsay, E. J., Esq.	Calcutta
1862 Dec. 3.	*Lobb, S., Esq., M. A.	Krishnaggur
1864 Nov. 2.	Locke, H. H., Esq.	Calcutta
1869 April, 7.	*Lockwood, E. D., Esq., C. S.	Europe
1866 May, 2.	*Lovett, Lieutenant B.	Ispahán
1866 Jan. 17.	†Low, James, Esq., G.T. S.	Almora
1854 Nov. 1.	*Lushington, F. A., Esq., B. C. S.	Europe
1869 July, 7.	†Lyall, C. J., Esq., B. A., C. S.	Allahabad
1870 April, 6.	†Lyman, B. Smith, Esq.	Calcutta
1868 Dec. 2.	†Macauliffe, M., Esq., B. A., C. S.	Mozufferghur
1866 June, 6.	Macdonald, Major J., Staff Corps.	Calcutta
1848 April, 5.	†Maclagan, Col, R., F.R.S.E.	Láhor
1866 Jan. 17.	†Macgregor, Lieut.-Col. C. M., Staff Corps.	Simla
1853 April, 6.	*Macrae, Dr. A. C.,	Europe
1867 July, 3.	Mackenzie, S. C., Esq., M. D.	Calcutta
1867 July, 3.	Macnamara, Dr. C.	Calcutta
1870 May, 4.	Macnaghten, C., Esq.	Darbhanga
1863 Jan. 15.	*Maine, The Hon'ble H. S.,	Europe
1867 April, 3.	†Mainwaring, Lieut.-Col. G. B.,	Darjeeling
1860 Jan. 4.	*Mair, D. K., Esq., M. A.	Europe
1862 Sept. 3.	†Mallet, F. R., Esq., Geol. Survey.	Geol. S. Office
1852 Nov. 3.	Manickjee Rustomjee, Esq.	Calcutta
1867 Mar. 6.	*Markby, The Hon'ble W.,	Europe
1869 July, 7.	†Markham, A. M., Esq., C. S.	Nynee Tal
1850 Jan. 2.	*Marshman, J. C., Esq.	Europe

Date of Election.		
1863 Nov. 4.	*McClelland, Dr. J.,	Europe
1837 Oct. 4.	*McLeod, The Hon'ble Sir D. F., C.B. K. C. S. I., B. C. S.	Europe
1860 Mar. 7.	†Medlicott, H. B., Esq., F. G. S., Geol. Survey.	Geol. S. office
1861 Feb. 6.	*Melville, Capt. A. B., Staff Corps.	Europe
1855 Nov. 7.	*Middleton, J., Esq.	Europe
1870 July 6.	Miller, A. B., Esq.	Calcutta
1867 June 5.	Milman, D. D., The Right Rev. Lord Bishop of Calcutta, R.,	Calcutta
1850 April 3.	*Mills, A. J. M., Esq., B. C. S.	Europe
1867 April 3.	Mahendralála Saracára, Dr.,	Calcutta
1847 April 7.	*Money, D. J., Esq., B. C. S.	Europe
1856 Feb. 6.	†Money, W. J., Esq., C. S. I., B.C.S.	Mymensing
1867 Mar. 6.	†Montgomerie, Major T. G., R. E.	Dera
1854 Dec. 6.	*Morris, G. G., Esq., B. C. S.	Europe
1837 July 5.	*Muir, J , Esq.	Europe
1854 Oct. 11.	†Muir, The Hon'ble Sir W., K. C. S. I., B. C. S.	Alláhábád
1862 July 2.	†Napier of Magdala, Lord R., General, G. C. S. I., G. C. B.	India
1869 May 5.	Nevill, G., Esq., C. M. Z. S.	Calcutta
1869 May 5.	†Newall, Lieut.-Col. D. J. F., R. A.	Gwalior
1870 Feb. 5.	†Newman, J. H., Esq., M. D.	Jondpur Rajpútana
1865 Feb. 1.	†Newul Kishwar, Múnshi,	Lucknow
1852 Sept. 1.	*Nicholls Capt. W. T., 24th Regiment, M. N. I.	Europe
1863 Jan. 15.	Norman, The Hon'ble Mr. Justice P.,	Calcutta
1869 July 7.	†Nursing Rao, A. V., Esq.	Vizagapatam
1851 June 4.	Oldham, T., Esq., LL. D., F. R. S., Superintendent Geol. Survey.	Calcutta
1869 April 5	†Oldham, W., Esq., LL. D., C. S.	Ghazipur
1867 Aug. 7.	†Oldham, R. A., Esq., C. E.	Dehree,on Sone
1870 April 6.	Osborn, Capt. R. D.,	Calcutta
1837 June 7.	*O'Shaughnessy, Sir W. B.,	Europe
1847 Feb. 10.	*Ousely, Major W. R.,	Europe
1864 Mar. 2.	*Palmer, Dr. W. J.,	Europe
1868 Nov. 4.	†Pearson, C., Esq.	Rawul Pindi
1862 May 7.	Partridge, S. B., Esq., M. D.	Calcutta
1869 July 7.	Pell, S., Esq.	Calcutta
1867 Feb. 6.	*Paul, J. Esq.	Europe

Date of Election.		
1860 Feb. 1.	†Pearse, Major G. G.,	Cannanore
1867 Mar. 6.	Pearimohana Mukarji, M. A., Bábu,	Uttarpárah
1864 Mar. 2.	Pellew, F. H., Esq., C. S.	Hooghly.
1865 Sept. 6.	†Peppe, J. H., Esq.	Gayá
1868 May 6.	†Peterson, F. W., Esq.	Bombay
1867 Nov. 6.	*Petit, Mons. Eugene,	Europe
1835 July 1.	*Phayre, Col., Sir A. P., K.C.S.I., C.B	Europe
1864 Nov. 2.	Phear, The Hon'ble Mr. Justice, J. B.	Calcutta
1869 Feb. 3.	†Pickford, J., Esq.	Madras
1867 Sept. 4.	*Place, Mons. V., Consul-Gen., France	Europe
1870 Feb. 2	†Powell Baden, H., Esq., C. S.	Lahore
1862 Oct. 8.	†Pulinavehári Sen, Bábu,	Berhampur
1868 April 1.	†Pramathanátha Ráya, Kumár,	Digápáti
1869 Feb. 3.	Pratápachandra Ghosha, B. A.	Calcutta
1839 Mar. 6.	†Pratt, The Ven'ble Archdeacon J.H., M. A.	Calcutta
1825 Mar. 9.	*Prinsep, C. R., Esq.	Europe
1856 Mar. 5.	Rájendralála Mitra, Bábu,	Calcutta
1868 Jan. 15.	†Rakhaldass Haldára, Babu,	Chota Nágpúr
1837 Feb. 1.	Ramánátha Thákura, Bábu,	Calcutta
1866 Jan. 17.	†Rattray, A., Esq., Asst. Commr., Hill Tracts.	Chittagong
1860 Mar. 7.	†Reid, H. S., Esq., C. S.	Alláhábád
1857 June 7.	*Riddell, The Hon'ble H. B., B. C. S.	Europe
1868 April 1.	Robb, G., Esq.	Calcutta
1868 July 1.	†Roberts, The Rev. J.,	Panjáb
1863 April 1.	*Robertson, C., Esq., C. S.	Europe
1865 Feb. 1.	*Robinson, S. H., Esq.	Europe
1847 Dec. 1.	*Rogers, Capt. T. E.,	Europe
1870 Dec. 7.	Rogers, A., Esq.	Calcutta
1869 July 7.	*Ross, Lieut. J. C., R. E.	Europe
1870 Jan. 5.	†Ross, Alexander G., Capt., Staff Corps.	Simla
1870 May 4.	Satyánand Ghoshála, Rája.	Calcutta
1861 Dec. 4.	†Saunders, C. B., Esq., C. B., B. C. S.	Haidarábàd
1864 June 1.	Saunders, J. O'B., Esq.	Calcutta
1854 Dec. 6.	†Saxton, Col. G. H., F. G. S., Madras Staff Corps.	Ootacamund
1854 May 2.	*Schiller, F., Esq.	Europe
1870 May 4	†Schlich, Dr. W.,	Kurachee
1869 Feb. 3.	Schwendler, L., Esq.	Calcutta
1860 Feb. 1.	*Scott, Col. E. W. S.,	Europe
1869 Aug. 4.	*Selbach, W., Esq.	Europe
1860 July 4	†Shelverton, G., Esq.	Waltair, near Vizagapatam

Date of Election.		
1867 April 3.	†Sheriful Omrah, Nawab Sir, Bahádur, K. C. S. I.	Madras
1845 Jan. 14.	*Sherwill, Lieut.-Col. W. S., 66th Regiment, B. N. I., F. G. S., F. R. G. S.	Europe
1868 Oct. 7.	Shircore, Dr. S. M.,	Calcutta
1863 April 1.	†Showers, Lieut.-Col C. L.,	Peshawur
1869 June 2.	Schroeder, J., Esq.	Calcutta
1866 June 6.	†Sime, J., Esq., B. A.	Agra
1864 Sept. 7.	*Sladen, Major E. B.	Europe
1866 June 6.	†Smart, R. B., Esq., Rev. Survey.	Rajpúr, Central Province
1865 July 5	†Smith, D. Boyes, Esq., M. D.	
1868 April 1.	†Smith, McLaren W., Esq.	Berhampúr
1856 Feb. 6.	*Smith, Col. J. F.,	Europe
1854 Sept. 6.	*Spankie, The Hon'ble R., B. C. S.	N. W. P. Allahabad
1864 Mar. 2.	†Spearman, Capt. H. R.,	Shivegyen
1867 May 1.	†Steel, Lieut. E. H., R. A.	Debrughar
1843 Sept. 4.	†Stevens, W. H., Esq., C. E.	Darbhánga
1867 Dec. 4.	*Stephen, Major J. G., 8th N. I.	Europe
1863 Sept. 2.	†Stewart, R. D., Esq.	Serajgunge
1864 April 6	*Stewart, J. L., Esq., M. D.	Europe
1870 April 6.	Stewart, R. Esq.	Calcutta
1861 Sept. 4.	Stokes, Whitley, Esq.	Calcutta
1863 Nov. 4.	Stoliczka, F., Esq., Ph. D., F. G. S., Geol. Survey.	Calcutta
1843 May 3.	Strachey, Col., The Hon'ble R., F. R. S., F. L. S., F. G. S., C. S. I., C. B.	Calcutta
1869 Feb. 3	Strachey, The Hon'ble J.,	Calcutta
1859 Mar. 2.	†Stubbs, Major F. W., Ben. Artillery.	Attock
1858 July 7.	†Sutherland, H. C., Esq., B. C. S.	Sylhet
1864 Aug. 11.	Swinhoe, W., Esq.	Calcutta
1863 Sept. 3.	Syámácharana Saracára, Bábu,	Calcutta
1865 Sept. 6.	Tawney, C. H., Esq., M. A.	Calcutta
1865 April 5.	Taylor, R., Esq.,	Lahore
1860 May 2.	Temple, The Hon'ble Sir R., K. C. S. I., B. C. S.	Calcutta
1859 Mar. 2.	†Theobald, W., Jr., Esq., Geological Survey.	B. Burma
1869 Feb. 3.	†Thomas, T., Esq.	Lucknow
1869 Oct. 6.	†Thomson, A., Esq.	Faizábád
1860 June 6.	*Thompson, J. G., Esq.	Europe
1863 Mar. 4.	*Thompson, Major G. H., Bengal Staff Corps.	Europe

Date of Election.		
1863 June 4.	†Thornton, T. H., Esq., D. C. L., C. S.	Láhore
1847 June 2.	Thuillier Col. H. L., Royal Artillery, F. R. S., C. S. I.	Calcutta
1862 July 2.	*Thurlow, The Hon'ble T. J. H.,	Europe
1865 July 5.	†Tolbort, T. W. H., Esq., C. S.	Dera Ismail Khan
1865 July 5.	Tonnerre, Dr. C. F.,	Calcutta
1862 Feb. 5	*Torrens, Col. H. D.,	Europe
1861 June 5	*Tremlett, J. D., Esq., M. A., C. S.	Europe
1863 Mar. 4.	*Trevelyan, The Right Hon'ble Sir C., K. C. B.	Europe
1841 Feb. 3.	*Trevor, The Hon'ble C. B., B. C. S.	Europe
1861 Sept. 4.	Tween, A., Esq., Geological Survey.	Calcutta
1863 May 6.	†Tyler, Dr. J.,	Mynpuri
1869 June 2.	†Udayachánda Dutta, Bábu,	Nowacali
1860 May 2.	†Vanrenen, Col. A. D., Ben. Staff Corps.	Landou
1864 Feb. 3.	Verchere, A. M., Esq., M. D.	Barackpore
1864 April 6.	†Vijayaráma Gajapati Ráj Munniá Sultán Bahádur, Máharájah Mirza,	Vizianagaram
1870 June 1.	†Vrindávanachandra Mandala, Búbu,	Balasore
1869 Augt. 4.	Wáhid Ali, Prince Jahán Qadr Muhammad, Bahádur.	Garden Reach
1865 Nov. 1.	Waldie, D., Esq., F. C. S.	Calcutta
1861 May 1.	†Walker, Col., J. T., Royal Engrs. Bombay.	Dera
1863 Dec. 2.	†Walker, A. G., Esq., C. S.	Onao, Oudh
1863 May 6.	*Wall, P. W., Esq., C. S.	Europe
1869 Dec. 1.	Wallace, Lieut. W. E. A., R. E.	Calcutta
1863 Oct. 7.	Waller, W. K., Esq., M. B.	Calcutta
1862 Jan. 15.	†Ward, G. E., Esq., B. C. S.	Mirat
1852 July 7.	*Ward, J. J., Esq., B. C. S.	Europe
1859 July 6.	*Warrand, R. H. M., Esq., B. C. S.	Europe
1870 May 4.	†Warth, Dr. H.,	Kheurah, near Pind Dadun Khan, Panjáb
1865 May 3.	Waterhouse, Capt. J., Royal Artillery.	Calcutta
1854 July 5.	*Watson, J., Esq., B. C. S.	Europe
1847 Nov. 3.	*Waugh, Major-General Sir A. S., C. B., F. R. S., F. R. G. S.	Europe
1869 Sept. 1.	Westland, J., Esq., C. S.	Calcutta
1867 Feb. 6.	†Westmacott, E. V., Esq., B. A., C. S.	Dinajpur
1862 Oct. 8.	†Wheeler, J. T., Esq.	British Burma
1867 Aug. 7.	†Wilcox, F., Esq., Bengal Police.	Purulia, Manbhúm

Date of Election.		
1864 Mar. 2.	Wilkinson, C. J., Esq.	Calcutta
1861 Sept. 4.	†Williams, Dr. C., H. M.'s 68th Regt.	Rangún
1867 Jan. 16.	*Williamson, Lieut. W. J.,	Europe
1867 Mar. 6.	Willson, W. G., Esq., B. A.	Krishnagur
1870 Aug. 3.	Wilson, R. H., Esq., C. S.	Calcutta
1859 Aug. 3.	*Wilmot, C. W., Esq.	Europe
1866 Mar. 7.	*Wise, Dr. J. F. N.,	Europe
1867 July 3	†Wood, Dr. J. J.,	Ranchi
1851 May 7.	Woodrow, H., Esq., M. A.	Calcutta
1859 Mar. 2.	*Wortley, Major A. H. P.,	Europe
1862 Aug. 6.	*Wylie, J. W., Esq., Bombay C. S.	Europe
1869 Sept. 1.	Yadulála Malika, Bábu,	Calcutta
1868 June 3.	Yatindramohana Thákura, Bábu,	Calcutta
1867 Mar. 6.	Yogendranátha Malika, Bábu,	Andul
1858 April 4.	*Young, Lieut.-Col. C. B.,	Europe
1856 July 2.	*Yule, Col. H., R. E.	Europe

LIST OF HONORARY MEMBERS.

Date of Election.		
1825 Mar. 9.	M. Garcin de Tassy, Membre de l'Inst.	Paris
1826 „ 1.	Sir John Phillippart.	London
1829 July 1.	Count De Noe.	Paris
1831 „ 7.	Prof. C. Lassen.	Bonn
1834 Nov. 5.	Sir J. F. W. Herschel, F. R. S.	London
1834 „ 5.	Col. W. H. Sykes, F. R. S.	London
1835 May 6.	Prof. Lea.	Philadelphia
1842 Feb. 4.	Dr. Ewald.	Göttingen
1842 „ 4.	Right Hon'ble Sir Edward Ryan, Kt.	London
1843 Mar. 30.	Prof. Jules Mohl, Memb. de l' Instit.	Paris
1847 May 5.	His Highness Hekekyan Bey.	Egypt
1847 Sept. 1.	Col. W. Munro.	London
1847 Nov. 3.	His Highness the Nawab Nazim of Bengal.	Murshidábéd
1848 Feb. 2.	Dr. J. D. Hooker, R. N., F. R. S.	Kew
1848 Mar. 8.	Prof. Henry.	Prinecton, United
1853 April 6.	Major-Gen. Sir H. C. Rawlinson, K. C. B., F. R. S., D. C. L.	London
1854 Aug. 2.	Col. Sir Proby T. Cautley, K. C. B., F. R. S.	London
1858 July 6.	B. H. Hodgson, Esq.	Europe
1859 Mar. 2.	The Hon'ble Sir J. W. Colvile, Kt.	Europe

ELECTION IN 1870.

Ordinary Members.

Allan O'Hume, Esq., C. B., C. S.	
J. Wood-Mason, Esq., F. G. S., Queen's College, Oxford.	Calcutta
Capt. Alexander G. Ross.	Simla
Fred. Wm. Alexander de Fabeck, Esq.	Jeypore
J. H. Newman, Esq., M. D., Mount Aboo.	Rajpootana
Baden H. Powell, Esq., C. S.	Lahore
His Royal Highness the Duke of Edinburgh.	Europe
Col. A. D. Dickens.	Calcutta
F. W. Innes, Esq., M. D., C. B.	Calcutta
B. Smith Lyman, Esq.	Philadelphia
Capt. R. D. Osborn.	Calcutta
R. Stewart, Esq.	Calcutta
G. H. Damant, Esq., C. S.	Dinagepore
G. E. Dobson, Esq , M. B.	Chinsurah
C. Macnaughten, Esq.	Darbhanga
Raja Satyanand Ghoshala.	Calcutta
Dr. W. Schlich.	Sind
Dr. H. Warth.	Panjab
Raja Ameer Hussun Khan Bahadur, Talukdar.	Mahmudabad
W. W. Hunter, Esq., B. A., LL. D.	Calcutta
The Hon'ble Sir R. Couch, Kt.	Calcutta
Babu Vrindávanachandra Mandala	Balasore
E. Lethbridge, Esq., M. A.	Hugli
A. B. Miller, Esq.	Calcutta
A. M. Broadley, Esq., C. S.	Patna
R. H. Wilson, Esq., C. S.	Calcutta
R. F. A. S. John, Esq.	Akyab
A. Rogers, Esq.	Calcutta

LOSS OF MEMBERS DURING 1870.

By Retirement.

W. M. Bourke, Esq.	Calcutta
T. E. Coxhead, Esq., C. S.	Sarun
Baron O. Ernsthusen.	Calcutta
J. A. Crawford, Esq., C. S.	Calcutta
E. G. Man, Esq.	Rangoon
W. L. Granville, Esq.	Calcutta
Col. G. B. Malleson.	Mysore

By death.

J. Kavanagh, Esq.	Oudh
R. Jardine, Esq.	Agra
Lieut. R. C. Beavan.	Calcutta
Bábu Rádhánátha Sikdára	Calcutta
M. H. Ormsby, Esq., LL. D.	Calcutta
Bábu Káliprasanna Sinha.	Calcutta
J. Avdall, Esq.	Calcutta
Major J. J. Hovenden.	Europe
The Hon'ble Sir Raja Deonarain Singh, Bahadur, K. C. S. I.	Benares
Dr. T. Anderson, F. L. S.	Europe

[APPENDIX.]

ABSTRACT STATEMENT

OF

RECEIPTS AND DISBURSEMENTS

OF THE

ASIATIC SOCIETY OF BENGAL

FOR

THE YEAR 1870

STATEMENT,

Abstract of the Cash Account

RECEIPTS.

				1870.			1869.		
Admission Fees.									
Received from Members, ...			Rs.	864	0	0	1,632	0	0
Subscriptions.									
Received from Members, ...			...	8,812	10	0	9,180	12	0
Publications.									
Sale proceeds of Journal and Proceedings of the Asiatic Society, ...	423	14	0						
Subscription to ditto, ...	1,370	11	0						
Refund of Postage Stamps, ...	73	4	3						
Ditto of Freight, ...	9	4	0						
Ditto of lithographing charges, ...	26	0	0						
				1,903	1	3	1,636	9	6
Library.									
Sale proceeds of Books, ...	652	0	0						
Refund of Freight, ...	97	10	0						
Ditto of Postage Stamps, ...	3	4	0						
				752	14	0	752	6	0
Secretary's Office.									
Refund of the amount from the Trustees Indian Museum, the expenditure incurred in transferring the Society's Publication to Kyd Street,	265	10	3						
Ditto of Freight paid for sending Pali Type to Messrs. Trübner and Co.,...	14	0	0						
Ditto of packing charges, ...	5	3	6						
Ditto of Postage Stamps, ...	2	4	0						
Sundries, ...	0	4	3						
				287	6	0	8	13	6
Conservation of Sanscrit MSS.									
Received amount of donation made by the Coondoo family of Dacca to Government for the conservation of Sanscrit MSS., ...	1,000	0	0						
Ditto from the Accountant General of Bengal on account of the annual sum Rs. 3,100 sanctioned towards the conservation of Sanscrit MSS. for the first half 1870-71, ...	1,550	0	0						
Ditto from the Government of Bengal, as per bill, dated 27th June, 1870, by a Cheque on the Bank of Bengal,	1,079	2	9						
Refund of advance paid to the travelling Pandita, ...	30	0	0						
Ditto of ditto ditto to Poreshnath Chatterjee, ...	40	0	0						
Sale proceeds of 4 copies of Notices of Sanscrit MSS., ...	4	0	0						
				3,703	2	9			
Carried over, Rs.				16,323	2	0			

No. 1.

of the Asiatic Society for 1870.

DISBURSEMENTS.

				1870.			1869.		
Publications.									
Paid freight for sending Journal and Proceedings to Messrs. Williams and Norgate, ...	44	15	6						
Ditto Lithographing and Engraving charges, ...	839	3	0						
Ditto, Printing charges, ...	3,972	3	3						
Ditto, Purchase of Postage Stamps, ...	229	10	8						
Ditto, Commission on sale of Books,...	61	9	9						
Ditto, Binding charges, ...	8	15	0						
Ditto, Paper for Plates, &c., ...	61	5	0						
Ditto, Purchase of Journal, ...	16	0	0						
Ditto, Petty charges, ...	5	15	3						
				5,239	13	5	6,870		
Library.									
Paid Messrs. Williams and Norgate for purchase of Library Books as per their order, dated 16th July, 1870, £80 at 1-10¼ per Rupee, ...	862	14	8						
Ditto, Salary of the Librarian, ...	840	0	0						
Ditto, Establishment, ...	120	0	0						
Ditto, Commission on sale of Books,...	73	14	6						
Ditto, Purchase of Books, ...	416	4	8						
Ditto, Landing charges, ...	21	5	9						
Ditto, Book-binding, ...	79	0	0						
Ditto, Subscription to the Calcutta Review, ...	16	0	0						
Ditto, Freight, ...	2	13	0						
Ditto, Bearing Postage, ...	3	4	8						
Ditto, Postage Stamps, ...	3	1	0						
Ditto, New Mat for the Librarian's Room, ...	20	0	0						
Ditto, Petty charges, ...	13	9	0						
				2,472	3	3	2,328	12	6
Secretary's Office.									
Paid, General Establishment, ..	294	0	0						
Ditto, Secretary's Office Establishment,	1,524	9	0						
Ditto, Purchase of Postage Stamps,...	116	4	0						
Ditto, ditto of Stationery, ...	26	4	0						
Ditto, Insufficient Postage, ...	2	0	8						
Ditto, Bearing Postage, ...	1	6	4						
Ditto, Printing charges, ...	43	0	0						
Ditto, Salary of a Punkha man, ...	35	0	0						
Ditto, Book-binding charges, ...	24	0	0						
Ditto, Purchase of Army List, ...	34	0	0						
Ditto, Fee for Stamping 25 Cheques, .	1	9	0						
				2,702	1	0			
Carried over, Rs.				7,712	0	8			

DISBURSEMENTS.				1870.			1869.		
Brought over, Rs.	2,102	1	0	7,712	0	8			
Paid, Fee for Auditing the Annual Account for 1869, ...	75	0	0						
Ditto Sheet Almanac for the year 1871,	1	0	0						
Ditto Petty charges, ...	9	12	0						
				2,187	13	0	2,463	13	8
MISCELLANEOUS.									
Paid Salary of a Malee, ...	57	0	0						
Ditto, Meeting charges, ...	191	10	6						
Ditto, Advertising charges, ...	49	8	0						
Ditto, Fee for Stamping Cheques, ...	1	9	0						
Ditto, Freight on a box copper implement, ...	12	5	6						
Ditto, Bullock Train hire on 2 Boxes of Stone Idols, ...	30	7	0						
Ditto, Printing charges, ...	16	0	0						
Ditto, Petty charges, ...	38	13	3						
	397	5	3						
Sundris, ...	1,633	12	2	2,031	1	5	416	5	3
BUILDING.									
Paid House rate, ...	444	0	0						
Ditto Water rate, ...	238	12	9						
Ditto Police and Lighting rate, ...	216	0	0						
Ditto Repairing Society's Premises, ...	11	13	6						
				910	10	3	697	12	0
COIN FUND.									
Paid Bearing Postage on a parcel of Coin, ...	0	8	0						
Ditto Purchase of Coins,... ...	12	14	4						
				13	6	4			
LT.-COL. E. T. DALTON, ETHNOLOGY OF BENGAL.									
Paid to Dr. T. Oldham, ...				5,000	0	0			
CONSERVATION OF SANSCRIT MS.									
Salary of the Travelling Pandita, ...	347	0	0						
Copying MS., ...	132	9	3						
Repairing Catalogue, ...	380	0	0						
Travelling allowance, ...	230	0	0						
Printing 150 Copies of Notices of Sanscrit MS., ...	215	12	0						
Purchase of Postage Stamps, ...	9	13	6						
Freight, ...	19	9	0						
Purchase of Sanscrit MSS, ...	89	0	0						
Ditto, of Stationery, ...	72	12	0						
Fee for getting Money Order, ...	1	8	0						
Advertising charges, ...	8	8	6						
Carriage hire, ...	12	0	0						
Petty charges, ...	8	14	3						
				1,527	6	6	458	10	6
Carried over, Rs.				19,382	6	2			

DISBURSEMENTS.	1870.	1869.
Brought over, Rs.	19,382 6 2	

BALANCE.

In the Bank of Bengal, viz., account-current Dr. J. Muir, ...	898	10	0			
Ditto Conservation of Sanscrit MS.,...	1,717	1	9			
Ditto Asiatic Society, ...	2,661	6	0			
				5,277	1	9
Cash in hand, ...			...	125	15	3
			Rs.	24,785	7	2

H. HYDE, Lieut.-Col. R. E.
Financial Secy. and Treasurer.

Examined and found correct,
L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

STATEMENT,

Abstract of the Cash Account,

RECEIPTS.

				1870.			1869.		
Oriental Publication.									
Received by Sale of Bibliotheca Indica, ... Rs.	1,804	0	6						
Ditto by Subscription to ditto, ...	30	10	0						
Ditto Refund of Postage and Packing charge, ...	76	11	0	1,911	5	6	3,076	14	6
Government Allowance.									
Received from the General Treasury at 500 Rs. per month, ...	6,000	0	0						
Ditto ditto additional Grant for the Publication of Sanscrit Works at 250 Rs. per month, ...	3,000	0	0	9,000	0	0	8,000	0	0
Vested Fund.									
Received Interest on the Government Security by the Bank of Bengal, ...	175	0	0	175	0	0	1,865	0	0
Library.									
Refund of the amount from Bábu Rájendralála Mitra, paid for Purchase of Sanscrit MSS. on the 22nd July, 1869,...	400	0	0	400	0	0			
Asiatic Society of Bengal, ...	621	15	6						
Bábu Mothooranath Mookerjea, ...	9	2	0						
Ram Krishnajee Bhauduker, ...	2	7	0						
Pundit Rumgoo, ...	0	5	0						
Damudara Jitta, Esq., ...	170	4	0						
Messrs. Gunnesh Persad & Co., ...	8	12	0						
Mr. Vamon Narain Othe, ...	9	10	6						
K. Roghu Nath Row, ...	25	0	0						
R. Govindo Row, ...	8	9	0						
F. Kittel, Esq., ...	0	9	0						
Gopal Row Hurry Dishmookh, ...	3	8	0						
Bálaji Prabhaker Modok,... ...	25	0	0						
Bábu Okil Chunder Banerjea, ...	6	6	0						
Babu Krishna Chandra, ...	1	2	0						
Atmaram Patell, Esq., ...	0	2	0						
G. Jyamiah, Esq., ...	15	0	0						
Damura Ballabh, Esq., ...	1	13	0						
T. Nagaiya, Esq., ...	7	3	0						
Major M. W. Carr, ...	0	10	0						
M. Gunnesh Sing, ...	0	4	0						
P. Swaminatheir, Esq., ...	14	0	0						
	931	10	0						
Carried over, Rs.				11,486	5	6			

No. 2.

Oriental Publication Fund, for 1870.

DISBURSEMENTS.

					1870.			1869.		
Oriental Publication.										
Commission on Sale of Books, ...	Rs.	220	2	0						
Packing charges, ...		63	12	0						
Postage Stamps, ...		151	14	0						
Advertising charges, ...		400	0	0						
Freight, ...		517	6	0						
Petty charges, ...		11	6	0						
					1,364	8	0	1,136	4	6
Vested Fund.										
Paid Commission to the Bank of Bengal for Drawing Interest on the Government Securities, ...		0	7	0						
					0	7	0	8	8	7
Library.										
Purchase of Books, ...		520	6	0						
					520	6	0	563	8	3
Custody of Oriental Works.										
Paid Salary of the Librarian, ...		369	0	0						
Establishment, ...		588	0	0						
Stationery, ...		43	11	0						
Printing charges, ...		59	12	0						
Repairing Case of the Bibliotheca Indica, ...		17	3	6						
Fee to the Bank of Bengal for Stamping charges, ...		2	13	0						
Ditto for auditing the Annual Account for 1869, ...		75	0	0						
Subscription to the Hindu Commerator for 1870 and 1871, ...		30	0	0						
Petty charges, ...		48	9	6						
					1,225	1	0	1,514	10	3
Catalogue of Sanscrit MS.										
Paid Salary for Cataloguing Sanscrit MSS., ...		278	0	0						
					278	0	0			
Copying MSS.										
Paid for copying charges,... ...		71	3	6						
					71	3	6	77	0	0
Tandya Moha Brahmana.										
Paid Editing and Printing charges, ...		3,593	12	0						
					3,593	12	0	328	3	0
Ain i Akbari.										
Paid Salary to Munshi, ...		330	0	0						
Ditto 2 copies of Ain i Akbari, ...		65	1	0						
Ditto Printing charges, ...		1,222	12	0						
					1,617	13	0	2,957	6	3
	Carried over,				Rs. 8,671	2	6			

RECEIPTS.				1870.			1869.
Brought over, Rs.	931	10	0	11,486	5	6	
V. B. Soobiah, Esq., ...	15	0	0				
Bajaba Balaji Nene, ...	40	12	0				
Kanu Duftery, ...	4	0	0				
Dowhitram Doolie Chand, ...	0	4	0				
Bábu Ram Chunder Bose, ...	1	6	0				
J. Bisch, Esq., ...	0	15	0				
				993	15		
Carried over, Rs.				12,480	4	6	

DISBURSEMENTS.		1870.	1869.
Brought forward, Rs.		8,671 2 6	
Tarikhi Badaoni.			
Paid for purchase of 2 copies of ditto,	5 0 0	5 0 0	791 0 0
Mimansa Darsana.			
Paid Editing and Printing charges,...	427 2 0	427 2 0	331 2 0
Sama Veda.			
Purchase of Sama Veda MSS. ...	108 8 6	108 8 6	
Gopatha Brahman Atherbur Veda.			
Paid Editing charges, ...	96 0 0	96 0 0	
Khafi Khan.			
Paid Editing and Printing charges, ...	1,836 0 0	1,836 0 0	2,588 10 0
Farhangi Rashidi.			
Paid for copying charges, ...	56 12 0		
Ditto a Copy of ditto, ...	48 0 0		
Ditto Editing and Printing charges, ..	364 0 0	468 12 0	
Poems of Chand.			
Paid Postage and Banghy Expense for sending MSS.	7 9 0	7 9 0	6 2 3
Lattyayana Srauta Sutra.			
Paid Editing and Printing charges, ...	2,393 5 0	2,393 5 0	
Agni Purana.			
Paid Editing and Printing charges, ...	941 0 0		
Ditto a Copy of ditto, ...	20 0 0	961 0 0	
Ma'a Sir i Alamgiri.			
Paid Editing and Printing charges, ...	614 0 0	614 0 0	
Gopala Tapini.			
Paid Editing and Printing charges, ...	283 0 0	283 0 0	
Taittiriya Brahmana.			
Paid Editing and Printing charges, ...	348 0 0	348 0 0	144 0 0
Taittiriya Aranyaka Upanishad.			
Paid Editing and Printing charges, ...	380 12 0	380 12 0	767 0 0
Maitri Upanishad.			
Paid Stitching charges, ...	18 2 3	18 2 3	
Carried over, Rs.		16,618 5 3	

RECEIPTS.				1870.			1869.
	Brought over, Rs.			12,480	4	6	
BALANCE OF 1869.							
In the Bank of Bengal, ..	...	5,559	8	1			
Cash in hand, ...	...	73	13	3			
				5,633	5	4	
	Rs.			18,113	9	10	

H. HYDE, Lieut.-Col. R. E.
Financial Secy. and Treasurer.

Examined and found correct,
L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

DISBURSEMENTS.				1870.			1869.		
Brought over, Rs.				16,618	5	3			
TAITTIRIYA SANHITA.									
Paid Editing charges, ...	96	0	0	96	0	0	280	12	0
SIKANDARNAMAH BAHARI.									
Paid Printing charges, ...	226	8	0	226	8	0	75	0	0
GOBIL SUTRA.									
Paid Postage for sending proof to Pandita Chandra Kant Turkalanker,	0	1	0	0	1	0			
Mothoora Nath Mookerjea, ...	1	9	0						
Maharaja Pertap Sing, ...	55	0	0						
Pundit Rumgoo, ...	6	13	0						
Messrs. Gunnespersad and Co., ...	2	6	6						
Damudara Jitta, Esq., ...	156	15	0						
Mr. Vamon Narain Othe, ...	9	10	6						
R. Govinda Roe, Esq., ...	8	9	0						
Gopal Roe Hurry Desk Mookha, ..	3	8	0						
Bajaba Balaji Nene, ...	40	0	0						
Balaji Prabhaker Modak, ...	25	0	0						
Bábu Okil Chunder Bannerjea, ...	6	6	0						
Kanu Duftery, ...	4	0	0						
Nobin Chunder Roy, ...	1	0	0						
Ram Chunder Bose, ...	1	6	0						
Krishna Chander Babu, ...	1	2	0						
Damaroo Ballabh, Esq., ...	12	14	0						
T. Nagaiya, Esq., ...	0	4	0	336	7	0			
BALANCE,									
In the Bank of Bengal, ...				836	4	7			
			Rs.	18,113	9	10			

H. HYDE, Lieut.-Col. R. E.
Financial Secy. and Treasurer.

Examined and found correct,
L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

STATEMENT, No. 3.

Showing the Assets and Liabilities of the Asiatic Society of Bengal on the 1st January, 1871.

CASH ASSETS.	1870.		1869.
In the Bank of Bengal, Rs.	5,277 1 9	...	2,309 14 7
Cash in hand, ..	125 15 3	...	128 1 9
Government Securities,...	2,000 0 0	...	2,000 0 0
		7,403 1 0	4,438 0 4
OUTSTANDING.			
Admission Fees, ...	96 0 0	...	256 0 0
Subscription, ...	4,132 6 8	...	6,266 5 8
Sale of Journal, ...	275 6 11	...	481 8 9
Subscription of ditto, ...	744 1 0	...	980 12 0
Sale of Library Books, ...	382 6 0	.	426 8 0
Due from O. P. Fund, ...	517 14 11		...
		6,148 6 6	8,411 2 5
	Rs.	13,851 7 6	12,849 2 9

H. Hyde, Lt.-Col. R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. Schwendler, J. Wood-Mason, } *Auditors.*

LIABILITIES.		1870.	1869.
Salary and Establishment for December, 1870, ... Rs.		241 14 8	234 14 8
Printing charges Baptist Mission Press, for Proceedings and Journal, ..	1,204 3 0		
Ditto for Part I. No. IV.,...	200 12 0		
		1,494 15 0	1,000 0 0
Plates for Journal and Proceedings, 1870,		275 12 0	367 10 6
Messrs. Williams and Norgate, ...		600 0 0	600 0 0
Building rates,...		156 0 0	
Conservation of Sanscrit MSS., ...		1,717 1 9	
Dr. J. Muir, account-current, ...		898 10 0	898 10 0
House rate, 4th Dec., 1870,	108 0 0		
Lighting and Police rate,	48 0 0		
	156 0 0		
Rs.		5,384 5 5	3,101 3 2

H. Hyde, Lt.-Col. R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. Schwendler, J. Wood-Mason, } *Auditors.*

STATEMENT, No. 4.

Shewing the Assets and Liabilities of Oriental Publication Fund, 1st January, 1871.

ASSETS.		1870.			1869.		
In the Bank of Bengal, ...	Rs.	836	4	7	5,559	8	1
Cash in hand, ...	...	0	0	0	73	13	3
Government Securities, ...	...	3,500	0	0	3,500	0	0
Government allowance for December, 1870, ...	...	750	0	0	750	0	0
Bibliotheca Sale and Subscription, ...		973	2	0	792	7	3
	Rs.	6,059	6	7	10,675	12	7

H. HYDE, Lt.-Col., R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. SCHWENDLER, J. WOOD-MASON, } *Auditors.*

LIABILITIES.				1870.			1869.		
Salary and Establishment for December, 1870, ...	Rs.			77	13	4	77	13	4
Price of 4 Historical MSS. for the Ed. Pers., ...				149	0	0			
Editing Charges.									
Biographical Dictionary, ...	99	4	0						
Tandya Brahmana, Fas. XVII.,	96	0	0						
Sama Veda, Fas. I., ...	96	0	0						
Nrisinha Tapine, Fas. I., ...	96	0	0						
Mimansa Darsana, Fas. II., ...	192	0	0						
Tandya Brahmana, Fas. ...	96	0	0						
				675	4	0			
Printing and Advertising, ...			...	2,554	2	0			
Asiatic Society of Bengal, ...			...	517	14	11			
			Rs.	3,974	2	3			

H. HYDE, Lt.-Col., R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. SCHWENDLER, J. WOOD-MASON, } *Auditors.*

STATEMENT, No. 3.

Shewing the Assets and Liabilities of the Asiatic Society of Bengal on the 1st January, 1871.

CASH ASSETS.	1870.		1869.
In the Bank of Bengal, Rs.	5,277 1 9	...	2,309 14 7
Cash in hand, ...	125 15 3	...	128 1 9
Government Securities,...	2,000 0 0	...	2,000 0 0
		7,403 1 0	4,438 0 4
OUTSTANDING.			
Admission Fees, ...	96 0 0	...	256 0 0
Subscription, ...	4,432 6 8	...	6,266 5 8
Sale of Journal ...	275 6 11	...	481 8 9
Subscription of ditto, ...	744 4 0	...	980 12 0
Sale of Library Books, ...	382 6 0	...	426 8 0
Due from O. P. Fund, ...	517 14 11		
		6,448 6 6	8,411 2 5
		Rs. 13,851 7 6	12,849 2 9

H. HYDE, Lt.-Col. R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

LIABILITIES.		1870.	1869.
Salary and Establishment for December, 1870, ... Rs.		241 14 8	234 14 8
Printing charges Baptist Mission Press, for Proceedings and Journal,...	1,294 3 0		
Ditto for Part I. No. IV.,...	200 12 0		
		1,494 15 0	1,000 0 0
Plates for Journal and Proceedings, 1870,		275 12 0	367 10 6
Messrs. Williams and Norgate, ...		600 0 0	600 0 0
Building rates, ...		156 0 0	
Conservation of Sanscrit MSS., ...		1,717 1 9	
Dr. J. Muir, account-current, ...		898 10 0	898 10 0
House rate, 4th Dec., 1870,	108 0 0		
Lighting and Police rate,	48 0 0		
	156 0 0		
Rs.		5,384 5 5	3,101 3 2

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STATEMENT, No. 4.

Shewing the Assets and Liabilities of Oriental Publication Fund, 1st January, 1871.

ASSETS.		1870.			1869.		
In the Bank of Bengal, ...	Rs.	836	4	7	5,559	8	1
Cash in hand, ...	...	0	0	0	73	13	3
Government Securities, ...	...	3,500	0	0	3,500	0	0
Government allowance for December, 1870, ...	...	750	0	0	750	0	0
Bibliotheca Sale and Subscription, ...		973	2	0	792	7	3
	Rs.	6,059	6	7	10,675	12	7

H. HYDE, Lt.-Col., R. E.
Fin. Secy. & Treas.

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L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

LIABILITIES.				1870.			1869.		
Salary and Establishment for December, 1870, ...	Rs.			77	13	4	77	13	4
Price of 4 Historical MSS. for the Ed. Pers., ...	...			149	0	0			
Editing Charges.									
Biographical Dictionary, ...		99	4	0					
Tandya Brahmana, Fas. XVII.,		96	0	0					
Sama Veda, Fas. I., ...		96	0	0					
Nrisinha Tapine, Fas. I., ...		96	0	0					
Mimansa Darsana, Fas. II., ...		192	0	0					
Tandya Brahmana, Fas. ...		96	0	0					
					675	4	0		
Printing and Advertising, ...				...	2,554	2	0		
Asiatic Society of Bengal, ...				...	517	14	11		
	Rs.				3,974	2	3		

H. HYDE, Lt.-Col., R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. SCHWENDLER, } *Auditors.*
J. WOOD-MASON, }

Cr. *Conservation of Sanscrit MSS. in Account-Current with Asiatic Society of Bengal.* Dr.

Amount received from Coondoo Family, through Government of Bengal, ...	Rs.	1,000	0	0	Balance due to the Society as per Account furnished, 31st Dec., 1869, ..	Rs.	458	10	6
Amount received from Government, ...		1,079	2	9	Amount spent in 1870, ...		1,527	6	6
Amount received from Government as an advance,...		1,550	0	0					
Refund of the amount from Travelling Pandita paid as advance on the 11th September, 1869, and 3rd February, 1870, ...		30	0	0					
Ditto ditto from Poresh Natha Chatterjea, paid as advance on the 7th October and 14th December, 1869,...		40	0	0					
Sale Proceeds of 4 Copies Notices of Sanscrit MSS.,		4	0	0					
	Rs.	3,703	2	9					

H. Hyde, Lt.-Col., R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. Schwendler, J. Wood-Mason, } *Auditors.*

Balance, ...	1,986	1	0					
	1,717	1	9					
Rs.	3,703	2	9					

H. Hyde, Lt.-Col., R. E.
Fin. Secy. & Treas.

Examined and found correct,
L. Schwendler, J. Wood-Mason, } *Auditors.*

STATEMENT, No. 5.

Cr. *Conservation of Sanscrit MSS. in Account-Current with Asiatic Society of Bengal.* Dr.

Amount received from Coondoo Family, through Government of Bengal, ...	Rs.	1,000	0	0
Amount received from Government, ...		1,079	2	9
Amount received from Government as an advance,...		1,550	0	0
Refund of the amount from Travelling Pandita paid as advance on the 11th September, 1869, and 3rd February, 1870, ...		30	0	0
Ditto ditto from Poresh Natha Chatterjea, paid as advance on the 7th October and 14th December, 1869,...		40	0	0
Sale Proceeds of 4 Copies Notices of Sanscrit MSS.,		4	0	0
	Rs.	3,703	2	9

H. Hyde, Lt.-Col., R. E.
Fin. Secy. & Treas.
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Balance due to the Society as per Account furnished, 31st Dec., 1869,...Rs.	458	10	6					
Amount spent in 1870, ...	1,527	6	6					
				1,986	1	0		
Balance, ...				1,717	1	9		
				Rs. 3,703	2	9		

H. Hyde, Lt.-Col., R. E.
Fin. Secy. & Treas.
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L. Schwendler, J. Wood-Mason, } *Auditors.*

Binding, Preservation 1988