

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL.

EDITED BY



THE HONORARY SECRETARIES,



JANUARY TO DECEMBER,
1888.



CALCUTTA:
PRINTED BY G. H. ROUSE, BAPTIST MISSION PRESS,
AND PUBLISHED BY THE
ASIATIC SOCIETY, 57 PARK STREET.
1889.

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PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JANUARY, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday the 4th January 1888, at 9 P. M.

E. T. ATKINSON, Esq., C. S., PRESIDENT, in the Chair.

The following Members were present :

H. Beveridge, Esq., Babu Nobin Chánd Burál, E. C. Cotes, Esq., W. R. Criper, Esq., Maulavi Abdul Hai, Dr. Hoernle, R. D. Mehta, Esq., Babu Asutosh Mukhopádhyaý, T. R. Munro, Esq., L. de Nicéville, Esq., Moug Hla Oung, Esq., H. M. Percival, Esq., T. A. Pope, Esq., Hon. Dr. Mahendralál Sarkár, Maulavi Golám Sarwar, Pandit Haraprasád Sástri, D. Waldie, Esq., Lieut.-Col. J. Waterhouse, J. Wood-Mason, Esq.

The Minutes of the last meeting were read and confirmed.

Forty-four presentations were announced, as detailed in the appended Library List.

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

Dr. A. Alcock, I. M. S., 4th Panjab Infantry, Dera Ghazi Khan, proposed by Col. W. B. Thomson, seconded by R. A. Sterndale, Esq.

W. L. Sclater, Esq., B. A., Oxon., Deputy Superintendent Indian Museum, proposed by J. Wood-Mason, Esq., seconded by Lieut.-Col. J. Waterhouse.

H. H. Anderson, Esq., Rector, St. James' High School, proposed by J. Wood-Mason, Esq., seconded by Dr. Hoernle.

Major C. H. E. Anderson, Deputy Commissioner, Bhamo, Burmah, proposed by E. T. Atkinson, Esq., seconded by L. de Nicéville, Esq.

2 Lt.-Col. J. Waterhouse—*Exhibits specimens of Heliogravure.* [JAN.

W. H. Lee, Esq., B. C. S., proposed by J. Wood-Mason, Esq., seconded by E. T. Atkinson, Esq.

The Hon. Ajodhyánáth Pandit, Allahabad, proposed by Nawab Abdul Latif, Bahadur, seconded by E. T. Atkinson, Esq.

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

F. W. Peterson, Esq.

W. Trego Webb, Esq.

F. J. E. Spring, Esq.

The SECRETARY reported the death of the following Member :

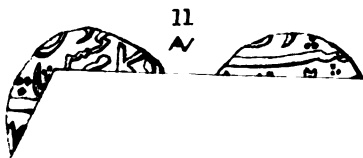
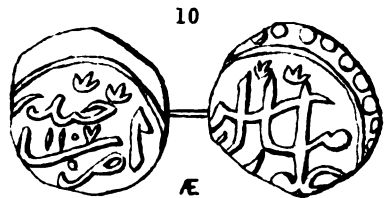
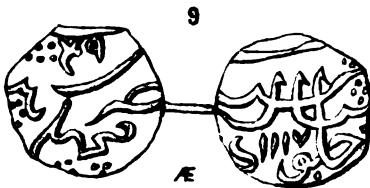
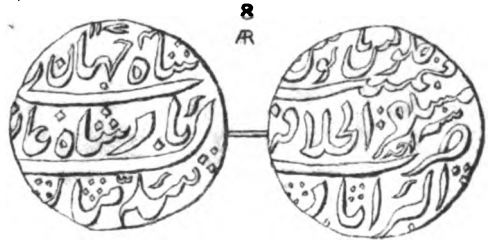
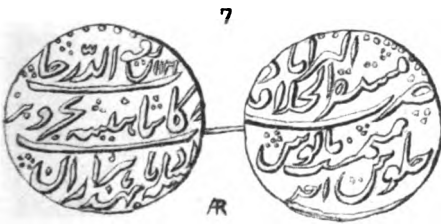
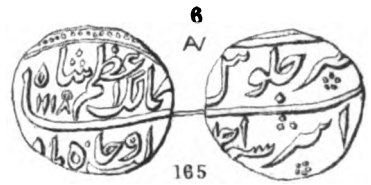
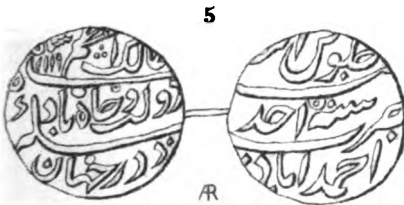
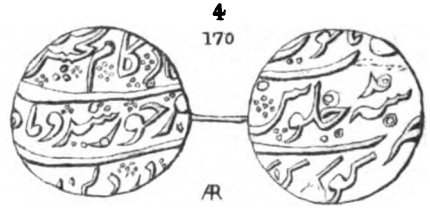
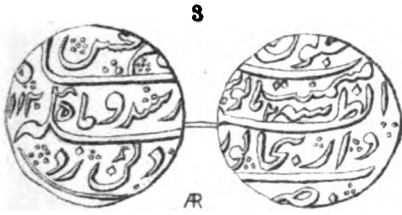
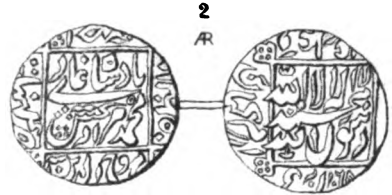
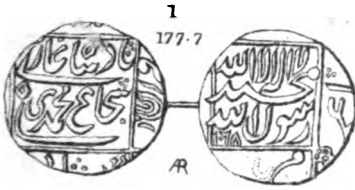
F. Fedden, Esq.

The PRESIDENT reported that Sirdar Gurdial Sing and Rev. A. E. Medlicott were largely in arrears of subscription, and though registered letters had been sent to them in accordance with Rule 37 no notice had been taken of them. Their names would therefore be suspended for a month as defaulters in the Society's meeting-room, and unless the sums due were paid in the meantime they will be declared removed from the Society at its next meeting. In accordance with Rule 38 this fact will be notified in the Proceedings.

COL. WATERHOUSE exhibited some views of Jaunpur and other specimens of heliogravure by the photo-etching process and said :—

“At the meeting of the Society in March 1887, I exhibited some specimens of heliogravure, chiefly by the photo-electrotype method. These I have now the pleasure of showing you are by the photo-etching process, and are reproductions from the original negatives of some views of Jaunpur intended for the illustration of Dr. Burgess' Archæological Survey Report. My assistant, Mr. Turner, has carried out a good many improvements in the process lately, and it is now being worked with considerable success. We find that many of these reproductions are really much better than ordinary silver prints from the same negatives, and this was particularly the case with some reductions we lately made from Dr. Giles' negatives taken in Gilgit. The etching process is exceedingly rapid, the plates require very little touching up, and the prints being pulled in the copper-plate press are as permanent as ordinary engravings.

I gave a description of the *process* on the occasion referred to and need not repeat it, but I may remark that we have now adopted the plan of etching with baths of perchloride of iron of different strengths, usually 45° 40° 36° and 27° B. commencing with the strongest.”



The following papers were read—

1. *Notes on Indian Rhynchota.* Heteroptera, No. 4.—By E. T. ATKINSON, Esq., C. S., PRESIDENT.

2. *Reliquæ Indicæ: being contributions to the Prehistoric Archæology of India and adjoining Provinces, founded chiefly on objects in the collection of the Indian Museum, Calcutta.* No. 1, on some objects from a Neolithic settlement recently discovered by Mr. W. H. P. Driver at Ranchi in the Chotâ-Nâgpur district.—By J. WOOD-MASON, Esq., Superintendent Indian Museum and Professor of Comparative Anatomy and Zoology in the Medical College of Calcutta.

These papers will be published in full in the Journal, Pt. II.

3. *On Miscellaneous Coins.*—By C. J. RODGERS, Esq., Archæological Department. (With a plate.)

In years gone by whenever I came across a rare coin, obtained for my own cabinet or for the cabinets of my friends, I made a point of drawing it. After several years I find myself in possession of a small collection of drawings. As most of these coins thus drawn are of the greatest rarity, I have put the drawings of them on the accompanying plate (Plate 1). I will give a short description of each with a transcription of the legends as far as they are legible.

No. 1. Rupee of Sháh Shujá', son of Sháh Jahán.

Obverse:— In square: شاه شجاع محمدی
بادشاه غازی

Margins illegible:

Reverse:— Kalimah and date ۱۰۶۸ in square.

Margins, names of the four companions of Muhammad.

This rupee I obtained some years ago in Dehli. It is now in the cabinet of Sir A. Cunningham.

No. 2. Rupee of Murád Bakhsh, son of Sháh Jahán.

Obverse:— in square: محمد مراد بخش
بادشاه غازی

Margins:— ضرب كهنابیت || سنه احد || ابوالمظفر || مروج الدین

Reverse:— Kalimah in square.

Margins:— Names and titles of the four companions and date ۱۰۶۸

This rupee was obtained by me for Government this year. It gives the *kuniyat* of Murád Bakhsh, *Murawaju-d-Dín*, not *Táju-d-Dín* as given by Mr. Delmerick in this Journal for 1875, p. 127. This reading of mine is supported by the Súrat rupee given in Marsden, Pl. XLII, No. DCCCLXXXII. These rupees are very rare indeed now.

No. 3.—A rupee of Kám Bakhsh, son of Aurangzib.

Obverse:— سکه در دکن زد بر خورشید و ماه
بادشاه کام بخش دین پناه ۱۱۲۰

Reverse:— ضرب دارالظفر ایچا پور
سنه ۲ جلوس میمنت مانوس

The couplet on the obverse I have made up by comparing this coin with Nos. 4 and 11. The mint is Bijápúr, Dáru-l-Zafar (the gate of Victory), a title occurring on the rupees of Aurangzib, struck in this mint.

No. 4.—A second rupee of Kám Bakhsh.

Obverse:— Same as on No. 3, but without date.

Reverse:— Mint not legible. Year احد

No. 5.—A rupee of A'zam Sháh, son of Aurangzib.

Obverse:— زد در جهان سکه دولت و جاه
پادشاه مملک اعظم شاه ۱۱۱۹

Reverse:— ضرب احمدآباد سنه احد
جلوس میمنت مانوس

No. 6.—A mohur of A'zam Sháh, struck at Asír (Garh).

Obverse:— Same as No. 5, but date ۷۱۱۱

Reverse:— ضرب اسپر سنه احد

These two coins of A'zám Sháh are in the cabinet of General Sir A. Cunningham. I found the rupee in Amritsar, years ago.

No. 7.—A rupee of Rafí'u-d-Darjât, struck at Akbarábád (Agra).

Obverse:— سکه رد با هزاران برکات
شاهنشہ بحر و بر رفیع الدرجات ۱۱۳۱

Reverse:— ضرب مستقر الخلافت اکبر آباد
سنه احد جلوس میمنت مانوس

No. 8.—A rupee of Sháh Jahán III., also struck at Akbarábád.

Obverse:— سکه مبارکی شاه جهان بادشاه غازی ۱۱۷۴

Reverse:— Same as on No. 7.

No. 9.—A copper pice of Aurangzib, struck at Machohlípatan (Masulipatam).

Obverse:— سنه جلوس مبارک ۱۱۱۷

Reverse:— ضرب مچھلی پتن ۱۴۹

No. 10.—A second pice of Aurangzib, struck at Haidarábád.

Obverse:— سنه جلوس مبارکی

Reverse:— ضرب حیدرآباد ۱۱۰۷

No. 11.—A mohur of *Kám Bakhsh*, struck at *Haidarábád*, here called *Dáru-l-Jihád*, 'the gate of war for religion.'

Obverse :— Same as on No. 3.

Reverse :— دارالجهاد حیدرآباد ۲

&c. &c.

This mohur was in the cabinet of the late Hon. J. Gibbs, C. S. I., C. I. E., who gave me an electrotype copy of it before he went home.

No. 12.—A small, but fine mohur of *Aurangzib*, struck at *Malikanagar*, a place I know nothing about. The inscription on the obverse differs from that usually on the mohurs of this *Sultán*.

Obverse :— محي الدين محمد اونگزيب بهاد بادشاه غازي

Reverse :— ماكه نگر ۹۰ (۱۰) جلوس ۴۲

The inscription on the obverse is found on rupees of the 1st year of *Aurangzib*. It is not often that the year of accession (*jalús*) and of the *Hijrah* come on the same face of the coin. This mohur is in my cabinet.

In reading these coins one must begin, as a rule, at the last line, and read upwards. This is nearly always the case where coin couplets are concerned. There are no less than three coin couplets on the coins here described. It will be seen from the rupees of *Kám Bakhsh*, how difficult it is to read the whole couplet from a single coin.

The subject of conversation was *Xavier's Historia Christi Persica* by H. Beveridge, Esq.

LIBRARY.

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

TRANSACTIONS, PROCEEDINGS, AND JOURNALS

presented by the respective Societies and Editors.

Amsterdam. *Revue Coloniale Internationale*,—Tome V, No. 5, Novembre, 1887.

Berlin. *Der Königlichen Akademie der Wissenschaften zu Berlin*, —*Sitzungsberichte*, 19—39, 1887.

Buenos Aires. *La Academia Nacional de Ciencias en Cordoba*,—*Actas*, Tome V, Entregá, 3.

- Calcutta. The Indian Engineer,—Vol. IV, Nos. 6 and 7.
 ———. Indian Engineering,—Vol. II, Nos. 24—27.
- Edinburgh. The Scottish Geographical Society,—Magazine, Vol. III, No. 11, November, 1887.
- Frankfurt, a. O. Des Naturwissenschaftlichen Vereins des Reg.-Bez. Frankfurt,—Monatliche Mittheilungen aus dem Gesamtgebiete der Naturwissenschaften, 4 Jahrgang, Nr. 7 und 8.
- Havre. Société de Géographie Commerciale du Havre,—Bulletin, Septembre et Octobre, 1887.
- Leipzig. Der Deutschen Morgenländischen Gesellschaft,—Zeitschrift, Band XLI, Heft 3.
- London. The Academy,—Nos. 811—814.
 ———. Anthropological Institute of Great Britain and Ireland,—Vol. XVII, No. 2.
 ———. The Athenæum,—Nos. 3134—3137.
 ———. Nature,—Vol. XXXVII, Nos. 940—945 and Index to Vol. XXXVI.
 ———. Pali Text Society,—Journal, 1886.
 ———. Royal Asiatic Society of Great Britain and Ireland,—Journal new series, Vol. XIX, Part 4, October, 1887.
 ———. Royal Astronomical Society,—Monthly Notices, Vol. XLIII, No. 9, supplementary number.
 ———. Royal Geographical Society,—Proceedings, Vol. IX, Nos. 10—12, October—December, 1887.
 ———. Royal Society,—Proceedings, Vol. XLII, Nos. 257—258.
 ———. Royal Statistical Society,—Journal, Vol. L, Part 3, September, 1887.
 ———. Zoological Society of London,—Proceedings, Part 3, 1887.
- Mexico. La Sociedad Científica “Antonio Alzate,” Memorias, Tomo I, No. 4.
- Munich. Akademie der Wissenschaften,—Abhandlungen, Historische Classe, Vol. XVII, No. 3.
 ———. Mathematisch-Physikalische Classe, Vol. XV, Nos. 2-3; Vol. XVI, No. 1.
 ———. Philo.-Philologischen Classe, Vol. XVII, Nos. 2-3.
 ———. Sitzungsberichte, Mathematisch-Physikalische Classe, Heft 2—4, 1885; Heft 1—3, 1886; Inhaltsverzeichnis Jahrgang 1871—1885.
 ———. Philo.-Philol. und Historische Classe, Heft 2—4, 1885; 1—4, 1886; 1—2, 1887; Inhaltsverzeichnis Jahrgang 1871—1885.

- Naples. Società Africana D'Italia,—*Bollettino*, Anno VI. Fasc. 9—10 Settembre et Ottobre 1887.
- Paris. *Journal Asiatique*,—Tome X, No. 1—Juillet-Août, 1887.
- . La Société de Géographie,—*Compte Rendu des Séances*, No. 13, 1887.
- . La Société d'Ethnographie,—*Bulletin*, 2^e Série, Nos. 6—7, Juin—Juillet, 1887.
- Roorkee. *The Indian Forester*,—Vol. XIII, No. 11, November, 1887.
- Schaffhausen. La Société Entomologique Suisse,—*Bulletin*, Tome VII, Heft Nr. 8. Juni, 1887.
- Simla. United Service Institution of India,—*Journal* Nos. 1—34, and Vol. XV, No. 69, 1887.
- St. Petersburg. La Société Impériale Russe de Géographie,—*Journal*, Tome XXIII, No. 4.
- Sydney. Linnean Society of New South Wales,—*Proceedings*, Vol. II, Part 2, 1887.
- . Royal Society of New South Wales,—*Journal and Proceedings*, Vol. XX, 1886.
- Tókió. Der Kaiserlich-Japanischen Universität,—*Mittheilungen aus der Medicinischen Facultät*, Band I, No. 1, 1887.
- Toronto. The Canadian Institute,—*Proceedings*, Vol. V, (3rd series) No. 1, October, 1887.
- Vienna. Der K. K. Naturhistorischen Hofmuseums,—*Annalen*, Band II, Nr. 3.
- Yokohama. Der Deutschen Gesellschaft für Natur-und Völkerkunde Ostasiens in Tokio,—*Mittheilungen*, Heft 37. October 1887.

BOOKS AND PAMPHLETS

presented by the Authors, Translators, &c.

- MURDOCH, J. *Religious Reform, Part I (Popular Hinduism.)* 8vo. Madras, 1887.
- ROY, PROTÁP CHANDRA. *The Mahabhárata of Krishna-Dwaipayana Vyása*, translated into English Prose, Part XXXVI. 8vo. Calcutta, 1887.
- THURSTON, E. *Preliminary Report on the Marine Fauna of Rameswaram and the neighbouring Islands.* 8vo. Madras, 1887.

MISCELLANEOUS PRESENTATIONS

- Gedächtnissrede auf Carl Theodor v. Siebold, von Richard Hertwig. 4to. München, 1886.
- . ———. Leopold von Ranke, von Wilhelm v. Giesebrecht. 4to. München, 1887.

Gedächtnissrede auf Joseph von Fraunhofer, von Carl Max v. Bauernfeind. 4to. München, 1887.

Joh. Andr. Schmeller. Eine Denkrede, von Konrad Hofmann. 4to. München, 1885.

Zum Begriff und Wesen der römischen Provinz, von Alois von Brinz. 4to. München, 1885.

AKADEMIE DER WISSENSCHAFTEN. MÜNCHEN.

Annual Report of the Department of Mines, New South Wales, for the year 1886. Fcp. Sydney, 1887.

Geology of the Vegetable Creek Tin-Mining Field, New England district, New South Wales, with maps and sections. 4to. Sydney, 1887.

DEPARTMENT OF MINES, NEW SOUTH WALES, SYDNEY.

Adhua Mazda und die Asuras, ein Beitrag zur Kenntniss Altindogermanischer Religionsgeschichte. Habilitationsschrift der Philosophischen Facultät der Ludewigs-Universität zu Giessen zur Erlangung der *venia legendi*, vorgelegt von Dr. P. von Bradke. 8vo. Giessen, 1884.

GIESSEN UNIVERSITY.

Report on the Administration of the Customs Department in the Bengal Presidency for the official year 1886-87. Fcp. Calcutta, 1887.

Report on the Calcutta Medical Institutions for the year 1886. Fcp. Calcutta, 1887.

Report on the Charitable Dispensaries under the Government of Bengal for the year 1886. Fcp. Calcutta, 1887.

Selections from the Records of the Government of India, Home Department, No. CCXIII. Reports on publications issued and registered in the several provinces of British India during the year 1884. Fcp. Calcutta, 1886.

GOVERNMENT OF BENGAL.

The Avifauna of British India and its dependencies, by James A. Murray. Vol. I, Part 3. 8vo. Bombay, 1887.

GOVERNMENT OF INDIA, HOME DEPARTMENT.

Memoir on the winds and monsoons of the Arabian Sea and North Indian Ocean, by W. L. Dallas. 4to. Calcutta, 1887.

Monthly Weather Review August, 1887. 4to. Washington, 1887.

METEOROLOGICAL REPORTER, GOVERNMENT OF INDIA.

Archæological Survey of Southern India, Vol. I, the Buddhist-Stupas of Amaravati and Jaggayyapeta, by Dr. J. Burgess. Fcp. 1887.

GOVERNMENT OF INDIA, REV. & AGRI. DEPT.

Annual Administration Reports of the Forest Department (Southern and Northern circles,) Madras Presidency for the official year 1885-86. Fcp. Madras, 1887.

GOVERNMENT OF MADRAS.

Summary of the Administration of the North-Western Provinces and Oudh—April, 1882—November, 1887. Rl. 8vo. Allahabad, 1887.

GOVERNMENT OF N.-W. P. & OUDH.

Johns Hopkins University. Studies in Historical and Political Science, Fifth Series, X. The study of History in England and Scotland, by Paul Frederico. 8vo. Baltimore, 1887.

JOHNS HOPKINS UNIVERSITY, BALTIMORE.

Anuario del Observatorio Astronómico Nacional de Tacubaya, para el Año de 1888. Año VIII. 8vo. Mexico, 1887.

SECRETARÍA DE FOMENTO, MEXICO.

The Sumaṅgala-Vilásiní, Buddhaghosa's Commentary on the Dígħa Nikáya. Edited by T. W. Rhys-Davids and J. Estlin Carpenter, Part I. 8vo. London, 1886.

The Vemána-Vatthu of the Khuddhaka Nikáya Sutta Pitaka. Edited by Edmund Rowland Gooneratne. 8vo. London.

PALI TEXT SOCIETY, LONDON.

Prodromus of the Zoology of Victoria, or Figures and Descriptions of the living species of all classes of the Victorian Indigenous Animals, by Frederick McCoy, F. R. S. Decade 1—14. 8vo. Melbourne, 1880.

PUBLIC LIBRARY, MUSEUMS AND NATIONAL GALLERY OF VICTORIA,
MELBOURNE.

Annual Report of the Director of the Royal Alfred Observatory, Mauritius, for the year 1886. Fcp. Mauritius, 1887.

Mauritius Meteorological Results for 1886. Fcp. Mauritius, 1888.

C. MELDRUM, Esq.

Results of the Magnetical and Meteorological Observations made at the Royal Observatory, Greenwich in the year 1885. 4to. London, 1887.

ROYAL OBSERVATORY, GREENWICH.

Proceedings and Transactions of the Royal Society of Canada for the years 1885 and 1886, Vols. III and IV. 4to. Montreal, 1886 and 1887.

ROYAL SOCIETY, CANADA.

PERIODICALS PURCHASED.

Berlin. Deutsche Litteraturzeitung,—VIII Jahrgang, Nrn. 40—44.

— —. Zeitschrift für Ethnologie.—XIX Jahrgang, Heft 4.

Calcutta. Indian Medical Gazette, Vol. XXII, No. 11, November, 1887.

Cassel. Botanisches Centralblatt,—Band XXXI, Heft 2 und 13; Band XXXII, Heft 1—4.

Geneva. Archives des sciences Physiques et Naturelles,—Tome XVIII, No. 11, Novembre 1887.

Giessen. Jahresbericht über die Fortschritte der Chemie und verwandter Theile anderer Wissenschaften,—Heft 4, 1885.

- Göttingen. Der Königl. Gesellschaft der Wissenschaften,—Gelehrte Anzeigen, Nrn 18—20, 1887.
- . Nachrichten, Nrn 13 und 14, 1887.
- Leeds. The Journal of Conchology,—Vol. V, No. 8, October, 1887.
- Leipzig. Annalen der Physik und Chemie,—Band XXXII, Heft 4.
- . Literatur-Blatt für Orientalische Philologie,—Band III, Heft 4.
- . Literarisches Centralblatt,—Nrn 39—44, 1887.
- London. The Annals and Magazine of Natural History,—Vol. XX (5th series), No. 119, November, 1887.
- . The Chemical News,—Vol. LVI, Nos. 1460—1463.
- . The Entomologist,—Vol. XX, No. 294, November, 1887.
- . The Entomologist's Monthly Magazine,—Vol. XXIV, No. 282, November, 1887.
- . Ibis,—Vol. V (5th series), No. 20, October, 1887.
- . The Journal of Botany,—Vol. XXV, Nos. 298 and 299, October and November, 1887.
- . The London, Edinburgh, and Dublin Philosophical Magazine, Vol. XXIV (5th series), No. 150, November, 1887.
- . The Messenger of Mathematics, Vol. XVII, No. 7, November, 1887.
- . Nineteenth Century,—Vol. XXII, No. 130, December, 1887.
- . Society of Arts,—Journal, Vol. XXXVI, Nos. 1826—1829.
- New Haven, Conn. The American Journal of Science,—Vol. XXXIV, (3rd series), No. 202, October, 1887.
- Paris. L' Académie des Sciences,—Comptes Rendus des Séances, Tome CV, Nos. 13—17.
- . Annals de Chimie et de Physique,—Tome XII (6^{me} Série), Octobre, 1887.
- . Journal des Savants,—Septembre, 1887.
- . Revue Critique,—Tome XXIV, Nos. 39—43.
- . Revue Scientifique,—Tome XL, Nos. 13—18.
- . Revue de Linguistique et de Philologie Comparée,—Tome XX Fascicule 4.
- Philadelphia. Manual of Conchology,—Vol. IX, Part 35; Vol. III (2nd Series), Part 11.

BOOKS PURCHASED.

- ABERCROMBIE, HON. R. Weather, A popular exposition of the nature of weather changes from day to day. (The International Scientific Series, Vol. XIX.) 8vo. London, 1887.

BÖHTLINGK, OTTO. Sanskrit Wörterbuch in Kurzerer Fassung, Theil VII, Lieferung 1. 4to. St. Petersburg, 1887.

GODWIN-AUSTEN, LT.-COL. H. H., F. B. S. Land and Fresh Water Mollusca of India, Part VI, September, 1887. 4to. London, 1887.

Report on the Scientific Results of the Exploring voyage of H. M. S. "Challenger"—1873-1876—Zoology, Vol. XXII. 4to. London, 1887.



PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR FEBRUARY, 1888.

The Annual Meeting of the Asiatic Society of Bengal was held on Wednesday the 1st February 1888, at 9 P. M.

E. T. ATKINSON, Esq., C. S., President, in the chair.

The following members were present :

H. Beveridge, Esq., Babu Nobin Chánd Burál, E. C. Cotes, Esq., Babu Saratchandra Dás, Kumár Vinayakrishna Deva, Báhádur, S. R. Elson, Esq., E. Gay, Esq., Dr. G. M. Giles, Dr. Hoernle, A. Hogg, Esq., Dr. George King, Dr. William King, Rev. Fr. E. Lafont, Dr. K. MacLeod, R. D. Mehta, Esq., Babu Asutosh Mukhopádhyaý, T. R. Munro, Esq., L. de Nicéville, Esq., Moug Hla Oung, Esq., H. M. Percival, Esq., Dr. Prasanna Kumár Ráy, Hon. Dr. Mahendralál Sarkár, Pandit Haraprasád Shástri, Dr. W. J. Simpson, D. Waldie, Esq., Lieut.-Col. J. Waterhouse, J. Wood-Mason, Esq.

Visitors:—W. L. Selater, Esq., Babu Pratápchandra Roy, Babu Siddheswar Mitra, Pandit Harimohan Vidyábhushan, Lama Ugyen Gyatsho, Lama Namgyal, (Lama of Tsun-thang dgon-pa,) Lama Ralang.

According to the Bye-Laws of the Society the President ordered the voting papers to be distributed for the election of officers and members of Council for 1888, and appointed Messrs. Beveridge and Gay, Scrutineers.

The PRESIDENT then called upon the Secretary to read the Annual Report.

ANNUAL REPORT FOR 1887.

The Council of the Asiatic Society of Bengal have the honor to submit the following Report on the state and progress of the Society's affairs during the past year.

Member List.

During the year under review, 19 gentlemen were elected Ordinary Members of the Society, 17 members withdrew, and 8 members died. Of the 19 elections one was a re-election. The total number of members, therefore, at the close of 1887 was 313, against 319 at the end of the preceding year. Of these 98 were Resident, 137 Non-Resident, 15 Foreign, 17 Life, 44 Absent from India, and 2 Special Non-Subscribing members, as will be seen from the following table, which also shows the fluctuations in the number of Ordinary Members for the past 6 years.

Year.	Paying.				Non-paying.				Grand Total.
	Resident.	Non-Resident.	Foreign.	Total.	Life.	Absent.	Special Non-Subscribing.	Total.	
1882 ..	101	155	18	274	15	47	1	63	337
1883 ...	100	142	18	260	15	47	1	63	323
1884 ...	102	157	12	271	15	39	1	55	326
1885 ...	105	161	13	279	16	34	1	51	330
1886 ...	93	142	18	253	16	48	2	66	319
1887 ...	98	137	15	250	17	44	2	63	313

The 8 Ordinary Members, who died during the year, were Colonel G. C. De Prée, Mr. J. C. Douglas, Mr. T. G. H. Moncrieffe, the Hon'ble Sir Ashley Eden, Dr. Rám Dás Sen, Lieut.-Colonel T. C. Plowden, Babu Girijá Bhusan Mukherji, and Babu Rákháldás Háldár.

Among the Corresponding Members intimation of the deaths of the following gentlemen was received:—Mr. J. Nietner and Mr. R. H. Barnes, both of Ceylon, Dr. E. Smith of Beyrout, Mr. J. Taylor of Bussorah, and Dr. H. Frederick of Batavia. Their number now stands at 8.

The lists of Honorary and Associate Members continue unaltered from last year, their numbers standing at 27 and 8 respectively.

Mr. C. R. Lanman compounded for his subscription as Foreign Member.

Indian Museum.

The list of Trustees appointed by the Asiatic Society to the Museum under Act XXII of 1876, remained unaffected by the new Indian Museum Act, No. IV, of 1887.

Mr. A. Pedler was appointed a Trustee *vice* Mr. H. F. Blanford in April.

A collection of 20 old copper coins, presented to the Society by Babu Jogesh Chunder Dutt, was transferred to the Museum, the Society's Cabinet being amply provided with coins of the several descriptions contained in the collection.

Finance.

The accounts of the Asiatic Society are shown in the Appendix under the usual heads.

Statement No. 8 contains the Balance Sheet of the Asiatic Society and of the different Funds administered through it.

The Budget of the year 1887 was estimated at the following figures: Receipts, Rs. 14,200 and Expenditure, Rs. 13,816.

Taking into account only the ordinary items of receipt and expenditure for the year 1887, the actual results have been:—Receipts, Rs. 14,082-10-1, and Expenditure, Rs. 13,267-13-5 leaving a balance in favour of the Society on its ordinary working of Rs. 814-12-8.

In the present year's accounts there are, however, shown in the first place a large item under extraordinary receipts due to the sale of a narrow strip of the Society's land to Government for the purpose of widening the footpath in Park Street amounting to Rs. 2,116, and on the other hand the total expenditure is swelled by the fact that some heavy repairs to the Society's premises have had to be undertaken, during which many beams &c. have had to be changed, and the cost of them has amounted to no less than Rs. 2,489-10-0.

The total receipts for the year 1887 have therefore been Rs. 16,198-10-1, and the total expenditure Rs. 15,757-7-5, which still shows a balance in favour of the Society of Rs. 441-2-8 on the gross transactions. This, however, is only a nominal balance, for it has been decided to apply the amount received from the sale of the land towards the erection of a substantial iron railing in the place of the present boundary wall which has to be pulled down. The cost of such heavy repairs as have been carried out during the year 1887, cannot, however be fairly charged wholly to this one year, but should be spread over at least four or five, and the credit balance of the Society on the ordinary working shown to be Rs. 814-12-8 is a substantial set off against this item of expenditure which must be classed as extraordinary.

The ordinary receipts for the year have been Rs. 14,082-10-1, against the estimated amount of Rs. 14,200. The slight falling off in the receipts is mainly due to the very small amount of the sales of the Society's publications made by Messrs. Trübner and Co. during 1886; and which sales are credited in this year's accounts. On the other hand one or two items of receipts show a decided advance; and thus the subscriptions

have exceeded the budget estimate by more than five hundred rupees, part of which is accounted for by the receipt of a compounding fee from a foreign member. The ordinary expenditure was estimated in the last annual report to be Rs. 13,816, but the actual expenditure has been Rs. 13,267-13-5. Leaving out of consideration the extraordinary expenditure in building above referred to, the purchase of books has shown an excess on the budget expenditure of Rs. 340-15-5; the expenditure on the Journal has been smaller than that budgetted for by between seven and eight hundred rupees, and the Proceedings show a diminished cost of about a hundred rupees. There has thus been a total diminished expenditure below the budget allotment. The expenditure on Part II of the Journal in 1887 has been very heavy, and thus out of a total expenditure of Rs. 3,421-2-6 on the Journal Rs. 3,000-10-3 have been debited to Part II.

The budget estimate for ordinary expenditure and receipts for 1888 does not show much change from that of 1887. The probable receipts are put down as Rs. 14,000, and the ordinary expenditure at Rs. 13,824. On the receipts side, the estimate under the heading "Subscriptions" is based upon the average of the actual amounts received in the past 3 years. The amount estimated to be received from the sale of periodicals has been placed at Rs. 400; this estimate is Rs. 600 less than that of the previous year, but it is rather larger than the actual receipts of the past year. On the expenditure side the changes in the estimated amounts are merely nominal; and thus while in 1887, the estimated ordinary expenditure stood at Rs. 13,816, for 1888 it stands at Rs. 13,824.

There will, however, be two extraordinary items of expenditure to be dealt with during the year 1888. The first item will be the erection of an iron railing in the place of the wall which has to be pulled down to widen the footpath in Park Street, and the erection of a new Durwan's lodge. The cost of these is estimated to be about four thousand rupees, but against this more than two thousand rupees have been received by the sale of the strip of land. The second large item will be the continuation of the repairs to the Society's house, godowns &c. for which a further estimate of more than two thousand rupees has been sent in. If this work is carried out it will make a total expenditure of about Rs. 5,000 on repairs in the two years, and this excess expenditure will probably have to be temporarily met by the sale of perhaps four or five thousand rupees of the Government Securities belonging to the Society. As before stated, such expenditure as this is not strictly chargeable to any one year, but should be equitably spread over a period of years.

The Budget Estimate for 1888 is as follows:—

RECEIPTS.			
Subscription	...	...	Rs. 7,300 0 0
Sale of Periodicals	...	...	400 0 0
Interest on Investment	...	...	6,200 0 0
Miscellaneous	...	...	100 0 0
			<hr/>
			14,000 0 0
			<hr/>

EXPENDITURE.			
Salaries	...	...	Rs. 4,000 0 0
Commission	...	...	330 0 0
Stationery	...	...	150 0 0
Lighting	...	...	80 0 0
Building (ordinary)	...	...	100 0 0
Taxes	...	...	714 0 0
Postage	...	...	600 0 0
Freight	...	...	20 0 0
Meeting	...	...	100 0 0
Contingencies	...	...	150 0 0
Books	...	...	1,500 0 0
Local Periodicals	...	...	30 0 0
Binding	...	...	500 0 0
Journals	...	...	4,200 0 0
Proceedings	...	...	1,200 0 0
Printing Circulars &c.	...	...	100 0 0
			<hr/>
			13,824 0 0
			<hr/>

Probable extraordinary expenditure during 1888.

For repairs to House	...	...	Rs. 2,500 0 0
Iron Railing and new Durwan's Lodge	...	...	4,000 0 0
			<hr/>

London Agency.

The statement submitted by Messrs. Trübner & Co. of their account with the Society for 1886, showed a debit balance for £183-7-9. This is an unusually large and unfavourable balance against the Society. In last year's accounts the balance for 1885 was only £107-8-8½. The cause of this exceptionally large balance is apparently due to two facts.

First, the sales made by Messrs. Trübner and Co. in 1886, are only about one-fifth of the usual amount, the total sum credited being only £21-1-10, instead of annual average sale proceeds of about a hundred pounds, but no explanation of this fact has been received. The expenditure side has also been largely swelled by the cost of plates for Part II. of the Journal, which has amounted to £88-9-0.

The sales of the Society's Publications effected by Messrs. Trübner and Co. in 1886 amounted to only £14-19-4½, against the sum of £49-5-9 in 1885, while the sales of the Bibliotheca Indica only reached £6-3-6 in 1886, against the sum of £59-9-3 in 1885.

The numbers of copies of parts of the Journal, of the Proceedings and of the Bibliotheca Indica sent to Messrs. Trübner and Co. during 1887 for sale were 180, 240, and 483 respectively.

Thirteen invoices of books purchased and of Publications of various Societies sent in exchange were received in 1887. The value of the books purchased in 1887, was £116-5-1.

The amount of £129-8-9, the balance in the hands of the late Mr. Grote on account of the publications of Atkinson's Lepidoptera, Part III, was made over to Messrs. Trübner and Co. in March 1887.

Library.

The total number of printed volumes or parts of volumes added to the Library during the year was 2,171, of which 797 were purchased, and 1374 presented.

Of the Catalogues of Manuscripts reported last year as in progress, the Burmese Catalogue has been completed, and is in the press.

A Manuscript of the *Riyáz-ush-Shu'arâ*, a history of Persian poetry, was purchased at a cost of Rs. 40.

Publications.

There were published for the year ten numbers of the Proceedings containing 275 pages of letter-press, and 4 plates; three numbers of the Journal, Part I, containing 173 pages of letter-press and 10 plates; and four numbers of the Journal, Part II, containing 376 pages of letter-press and 15 plates. There was also published a fifth part of the Journal Part II for 1886, after the report for that year had been issued. There were also published during the year the Indexes to the Journal Part II for the years 1884, 1885 and 1886.

Building.

The expenditure on the building during the year was Rs. 2,428, of which Rs. 1,214 was for renewing decayed beams and burgahs in the roof, and Rs. 1,214 for half-terracing the roof.

Coin Cabinet.

During the year 63 coins were added to the Cabinet, of which 2 were of gold, 57 of silver and 4 of copper. One of the two gold coins, a Kufi coin found in Seistán, was acquired by purchase; the four copper coins were presented to the Society by Kaviráj Shyamal Dás of Udaipúr, in connection with his paper on the ancient remains at Nagari in Meywár, published in the Journal Part I.; all the rest were acquired under the Treasure Trove Act, and were from the Bengal Presidency. Detailed descriptions of the coins are given in the Society's Proceedings for January and November, with the exception of the four copper coins, which were so defaced as to be past identification.

Office of the Secretaries.

Mr. J. Wood-Mason, and Mr. H. M. Percival, continued as Natural History Secretary, and General Secretary during the year. During the temporary absence of the General Secretary in May and October his duties were taken up by the Treasurer.

Dr. Hoernle took over charge of the duties of Philological Secretary from Mr. H. Beveridge in January.

Mr. J. Eliot held the Treasurership from January to the beginning of May, when, on his departure for Simla, Mr. A. Pedler succeeded him as Treasurer.

Mr. H. Ronaldson continued as Assistant Secretary during the year.

Mr. J. H. Elliott continued as Assistant Librarian till December, when, on his being granted leave without pay for one year, his duties were distributed between the Cashier and the Copyist, and sanction given for the appointment of a new Copyist.

Babu Nriya Gopal Bose has continued as Cashier, Babu Hari Mohan Mukherji as Pandit, and Babu Jogesh Chandra Chatterji as Copyist, during the year.

Bibliotheca Indica.

Fifty-two fasciculi were published during the year, of which seventeen were in the Arabic-Persian, and thirty-five in the Sanscrit Series. They belong to twenty-two different works, of which four are in the Arabic-Persian, and eighteen in the Sanskrit Series. There was one new publication,—the *Maásir-ul-Umará*,—in the former Series, whilst in the latter there were five new publications, *viz.*, *Ashta Sáhasriká Prajñá Páramitá*, *Madana Párijáta*, *Nyáya Vártikam*, *Varáha Purána*, and *Institutes of Parásara* (English translation): the last being complete in one fasciculus.

In the annual report of the preceding year it had been estimated that 45 fasciculi would be published in the course of the ensuing year, at a probable cost of Rs. 18,045. The actual out-turn has been, as stated, 52 fasciculi. The expenditure out of the Oriental Publication Fund during the year amounted to Rs. 16,987-3-4, which sum includes Printing charges for 37 fasciculi, and Editing charges for 45 fasciculi, and gives an average cost of Rs. 376 per fasciculus. For the year 1888 the out-turn may be reckoned at 50 fasciculi. These, at the above average rate, will cost Rs. 18,800. The average annual income calculated on the receipts of the last five years is Rs. 13,081, which gives an excess of estimated expenditure over average income amounting to Rs. 5,719. Towards meeting this excess there is a Balance of Rs. 12,368. This balance will have to meet a further charge of Rs. 1,500, if a proposal that has been made to purchase a set of the Tibetan Tangyur in block-print, is carried out.

Of the following works of which fasciculi have appeared in previous years no fasciculi were published during the year under review :—

1. TABAQÁT-I-NÁSIRÍ (Index of persons and places).
2. PRÁKRITA LAKSHANA (English translation and notes).
3. KÁTANTRA (introduction).
4. SUŚRUTA SAMHITÁ (English translation).
5. MUNTAKHAB-UL-TAWÁRIKH (English translation).
6. ĀPASTAMBA ŚRAUTA SÚTRA (Text).
7. PARÁSARA SMṚITI (Text).
8. MANU TÍKÁ SAMGRAHA (Text).
9. PRITHIRÁJA RÁSAU (Text).
10. LALITA-VISTARA (English translation).

Of the following works sanctioned in previous years no fasciculi have as yet appeared :—

1. BRIHADDEVATÁ (Text).
2. PRÁKRITÁDHYÁYA (Text and translation).
3. CHABAKA (English translation with notes).
4. NAQÁID-UL FARAZDAQ-JERIR (Text with English translations in prose and verse.)
5. KÁLA VIVEKA (Text).
6. VEDÁNTA SÚTRA Commentaries on, (Text).
7. YOGINÍ TANTRA (Text).
8. KARANA GRANTHA (Text).
9. MUNTAKHAB-UL-TAWÁRIKH Vol. I. (English translation).
10. TÁJ-UL MAÁSIR (Text).
11. TÁRIKH-I-WASSAF (Text).
12. TÁRIKH-I-YÁMINÍ. (English translation with notes).
13. JŃÁTÁ DHARMAKATHÁ and VIPÁKA SÚTRA (Text).
14. SADDHARMA PUᅇᅇARIKA (Text).
15. SAT-SAI (Text).
16. GADYA KUSUMÁNJALI (Text).
17. AL TABRIZI'S Commentary (Text).
18. MÁRKANDEYA PURÁNA (English translation).
19. SVAYAMBHU PURÁNA (Text).
20. BAUDHÁYANÍYA ŚRAUTA SÚTRA and HIRANYAKESI ŚRAUTA SÚTRA (Text).
21. ANIRUDDHA'S Commentary (Text).
22. TUZAK-I-JEHÁN-GIRI (Text).
23. TÁRIKH-I-FÍROZ SHÁHÍ (Text).

The following new works have been sanctioned during the year for publication :—

A. Arabic-Persian Series.

1. MAĀSIR-UL-UMARĀ : Text, to be edited by Maulavi 'Abdur Rahím.
2. AÍN-I-AKBARÍ : English Translation (to be a continuation of that begun by Mr. Blochmann) by Lieut.-Col. Jarrett.
3. RIYÁZ-US-SALĀTÍN : Text and English Translation, by Maulavi 'Abdul Haq 'Abid and Dr. Hoernle.

B. Sanskrit Series.

1. COMMENTARY on the NYĀYAVINDU by DHARMOTTARĀCHĀRYA, to be edited by Professor P. Peterson.

The Tibetan Text of this work is to be published *pari passu* with the Sanskrit.

2. BRIHADHARMA PURĀNA : Text, to be edited by Pandit Hara-prasád Shástri.

3. BODHISATVĀVADĀNA KALPALATĀ by Kshemendra : to be edited by Babu Sarat Chandra Dás. This work will be published with the Sanskrit and Tibetan Texts in juxtaposition.

The following is a detailed list of the publications issued during 1887.

A. Arabic-Persian Series.

1. ISĀBĀH, edited by Maulavi Abdul Hai of the Calcutta Madrasa. Nos. 257, 258, 259, 260, 261, 263, (Old Series) Fasc. XXXIV, XXXVI, XXXIX. Vol. II. Nos. 10, 11, 12, and Fasc. XXXIII, XXXV, XXXVII. Vol. III. Nos. 12, 13, 14. Total *six* fasciculi.

2. AKBARNĀMAH OF ABUL FAZL. The publication of this great work has now been completed under the editorship of Maulavi Abdur Rahim of the Calcutta Madrasah. He took up the work on the death of Maulavi Aga Ahmed Ali, under whose superintendence the first twenty-four fasciculi were published. It is needless to expatiate on the merits of the Akbarnámah, or on the great importance of having a correct edition of it. The publication of the Lucknow edition is due to the munificence of the Rájá of Pattiálá, but unfortunately, says Professor Dowson, its literary value is by no means commensurate with the money expended upon it. The present edition has been prepared from ten MSS. of which the editor gives an account in his preface. He also pays there a well-merited tribute to the memory of Professor Blochmann, through whose influence and exertions the work was under-

taken. In a preface to the 3rd volume the editor states that the Akbar-námah up to the 47th year of Akbar's reign is the work of Abul Fazl, and that the continuation to the end of the reign is by Mahábat-'Alí Khán. This writer is not mentioned by Sir Henry Elliot in his account of the Akbar-námah in Vol. VI. The supplement to the Akbar-námah which he quotes is the Takmila-i-Akbar-námah by Mazat-Ulla. Index to Vol. III. Total *one* fasciculus.

3. MAÁSIR-UL-UMARÁ, or Memoirs of Nobles, by Nawáb Samsám-ud-Dowlá Sháh Nawáz Khán, edited by Maulavi Abdur Rahím of the Calcutta Madrasah. Professor Dowson says of this work that it may be called "The Peerage of the Mughal Empire." It is a biographical dictionary of the "pillars of the empire" from Akbar's time down to the latter part of the 18th century. It is a modern work, for the author lived till 1757, when he was killed at Aurangábád in the Deccan by the soldiers of Bussy. But the author was a man of much research and consulted many authorities. His book has been much used by Professor Blochmann in drawing up his accounts of Akbar's gardens (*vide* his translation of the Ain-i-Akbari, p. 308 note), and Professor Dowson remarks that the *Maásir* must always hold its place as one of the most valuable books of reference for the student of Indian History. The real name of the author is Abdu-r-Razzák, Samsám-ud-Dowlá &c. being his titles. The work was completed and brought down to 1780 by his son Abdul Hai. Both father and son held high office in Hyderábád. An interesting account of the work and of its authors will be found in Dr. Rieu's Catalogue of the Persian MSS. in the British Museum Vol. I, 339. See also Elliot's History of India, Vol. VIII, 187. Nos. 623, 628, 634, 637. Fasc. I. II. III. IV. Total *four* fasciculi.

4. ZAFARNÁMAH by Mauláná Sharfuddín 'Alí of Yazd, edited by Maulavi Muhammed Iláhdád. The Zafarnámah, or Book of Victory, is the history of the exploits of Timur. It was used by Gibbon, (in the French translation of Petis de La-Croix), who says of Sharfuddin that his Geography and Chronology are wonderfully accurate, and that he may be trusted for public facts, though he servilely praises the virtue and fortune of his hero. An account of the Zafarnámah and numerous extracts from it will be found in Elliot, VIII, 478—522. See also Catalogue of Persian MSS. in the B. M. I, 173. Nos. 604, 610, 616, Vol. I. Fasc. VII, VIII, IX. Nos. 624, 633, 636, Vol. II. Fasc. I, II, III. Total *six* fasciculi.

B. Sanskrit Series.

5. ASHTASÁHASRIKÁ PRAJÑÁ PÁRAMITÁ, or, the Transcendental Knowledge of the Buddhists in 8,000 slokas, edited by Dr. Rájendralála

Mitra, contains the substance of the metaphysical speculations of the Maháyána school of the Buddhists. It is one of the nine canonical works of the Banddhas of Nepal. A translation of this work forms the 20th volume of the Sher-chin section of the Kah-Gyur collection of the Thibetan Buddhist works. The work gives much interesting information as to the difference between the Maháyána and the Hínáyána schools of the Buddhists of the Middle Ages. Nos. 603, 620, 629—Fasc. I, II, III. Total *three* fasciculi.

6. KÁLA MÁDHAVA, edited by Pandit Chandra Kánta Tarkálankár, is an astrological treatise by Mádhavácháryya, the great commentator of the Vedas, for the determination of the proper time for various rituals of the Hindus. No. 622. Fasc. III. Total *one* fasciculus.

7. KATHÁ SARIT SÁGARA, translated by Mr. Tawney. This work is said to be a metrical abridgment of a much larger prose work entitled Brihat Kathá by Kshemendra, now lost. The Kathá Sarit Ságara was compiled by Somdeva of Kashmir. This fasciculus brings Mr. Tawney's labours to a close. It contains an alphabetical index of proper names and subjects in the work. No. 615, Fasc. XV. Total *one* fasciculus.

8. MADANA PÁRIJÁTA, edited by Pandit Madhusúdan Smritiratna, is a well known digest of Hindu law compiled during the reign of Madana Pál of Delhi, said in the work to belong to the Káshthya dynasty. No. 641. Fasc. I. Total *one* fasciculus.

9. NYÁYA VÁRTIKA, edited by Pandit Vindhyeswari Prasád Dube, is a commentary on the Vátsyáyana bháshya on the aphorisms of the Nyáya school of Philosophy. It was something like a missing link in the long chain of commentaries on the Nyáya Sútras, and the publication of this rare work will supply a long-felt desideratum. No. 625, Fasc. I. Total *one* fasciculus.

10. MIMA'NSA' DARŚANA, edited by Mahámahopádhya Maheshachandra Nyáyaratna, C. I. E., with the bháshya commentary by Śabara Svámi, has been finished in the last fasciculus issued. It now only remains to add a preface from the pen of the learned editor to complete the edition. No. 605, Fasc. XIX. Total *one* fasciculus.

11. TAITTIRIYA SAMHITA', or the Samhitá of the Black Yayur Veda, edited by the same learned editor, with the commentary of Mádhavácháryya. This fasciculus brings the work down to the end of the 19th Anuváka of the 5th Prapáthaka of the 5th Kánda. No. 617, Fasc. XXXIV. Total *one* fasciculus.

12. INSTITUTES OF PARA'SARA, translated by Pandit Krishna Kamal Bhattácháryya, treats of the *Áchára* and *Práyascitta* of the Hindus. The work is complete in one fasciculus. No. 611, Fasc. I. Total *one* fasciculus.

13. VARA'HA PURA'NA, edited by Pandit Hrishikesh Shástri, is one of the eighteen *Mahápuránas*. It contains an account of the world as given by the *Mahá Varáha* or the Great Boar Incarnation to the goddess Earth, while raising her from the bottom of the sea by means of his immense tusks. Nos. 601, 631, 635, 640, Fasc. I, II, III, IV. Total *four* fasciculi.

14. The AŚVA-VAIDYAKA, a treatise on the diseases of the Horse. Compiled by Jayadatta Śūri, edited by Kaviráj Umesachandra Gupta Kaviratna. Nos. 597, 598, Fasc. IV, V. Total *two* fasciculi.

15. CHATURVARGA CHINTA'MANI, by Hemádri, edited by Pandits Yogesavara Smritiratna and Kámákhyánátha Tarkaratna, Nos. 607, 621, Fasc. XVI, XVII. Total *two* fasciculi.

16. KÚRMA PURÁNA, edited by Pandit Nilmani Mukhopádháya, Professor, Presidency College, Nos. 602, 618, 642, Fasc. III, IV, V. Total *three* fasciculi.

17. NIRUKTA, with commentaries, edited by Pandit Satyavrata Sámaśramí. Nos. 613, 626, Vol. IV, Fasc. III, IV. Total *two* fasciculi.

18. SÁ'NKHÁ'YANA ŚRAUTA SŪTRA, edited by Dr. Alfred Hillebrandt, Professor of Sanskrit and Comparative Philology in the University of Breslau, Nos. 606, 638, Vol. I. Fasc. IV, V. Total *two* fasciculi.

19. TATTVA CHINTÁMANI, edited by Pandit Kámákhyánátha Tarkaratna, Nos. 612, 627, 639, Fasc. VI, VII, VIII. Total *three* fasciculi.

20. UVA'SAGADASA'O, the seventh Anga of the Jains, on the rules of conduct of Jain laymen; edited by Dr. A. F. Rudolf Hoernle. Nos. 614, 644, Fasc. III, IV. Total *two* fasciculi.

21. VIVA'DARATNA'KARA, a digest of laws relating to jurisprudence; edited by Pandit Dinanátha Vidyálankára, Nos. 599, 619, 630, Fasc. V, VI, VII. Total *three* fasciculi.

22. VRIHANNA'EADI'YA PUR'ANA, edited by Pandit Hrishikeśa Śástri, Professor, Sanskrit College, Calcutta, Nos. 600, 632, Total *two* fasciculi.

List of all Societies, Institutions, &c., to which the Publications of the Asiatic Society have been sent during the year, or from which Publications have been received.

* Societies, &c., which have received the Asiatic Society's publications, and have sent their publications in return.

† Societies, &c., which have received the Asiatic Society's publications, but have sent none in return.

§ Societies, &c., whose publications have been received, but to which nothing has been sent in return.

• Allahabad :—Editor, Pioneer.

§ American Philological Association.

- * Amsterdam :—Royal Zoological Society.
- * Angers :—Société d' Etudes Scientifiques d' Angers.
- * Baltimore :—Johns Hopkins University.
- * Batavia :—Society of Arts and Sciences.
- § ——— :—Magnetic and Meteorological Observatory.
- * ——— :—Kon. Natuurkundige Vereeniging in Nederlandsch-Indië.
- * Berlin :—Royal Academy of Sciences.
- § ——— :—Entomologischer Verein.
- † Berne :—Société Suisse d' Entomologie.
- § Birmingham :—Birmingham Philosophical Society.
- * Bombay :—Anthropological Society.
- * ——— :—Bombay Branch, Royal Asiatic Society.
- * ——— :—Editor, Indian Antiquary.
- * ——— :—Editor, Times of India.
- * ——— :—Natural History Society.
- * Boston :—Natural History Society.
- * Bordeaux :—L' Académie Nationale des Sciences, Belles-Lettres et Arts.
- § ——— :—Société de Géographie Commerciale.
- * ——— :—Société Linnéenne.
- * Brisbane :—Royal Society of Queensland.
- * Brookville :—Society of Natural History.
- * Brunswick :—Verein für Naturwissenschaft.
- * Brussels :—L' Académie Royale des Sciences.
- * ——— :—Musée Royal d' Histoire Naturelle de Belgique.
- * ——— :—Société Entomologique de Belgique.
- * ——— :—Société Royale Malacologique de Belgique.
- * Buda Pest :—Royal Hungarian Academy of Sciences.
- * Buenos Ayres :—Museo Nacional.
- * ——— :—Academia Nacional de Ciencias de la Republica Argentina.
- * Calcutta :—Agri-Horticultural Society of India.
- * ——— :—Geological Survey of India.
- * ——— :—Editor, Englishman.
- * ——— :—Editor, Hindu Patriot.
- * ——— :—Editor, Indian Daily News.
- * ——— :—Indian Mirror.
- * ——— :—Indian Museum.
- † ——— :—Mahommedan Literary Society.
- * ——— :—Public Library.
- * ——— :—Survey of India.
- * ——— :—Tuttobodhini Shova.
- † ——— :—University Library.

- * Cambridge:—University Library.
- * Cassel:—Der Verein für Naturkunde.
- * Cherbourg:—Société Nationale des Sciences Naturelles.
- * Christiana:—University Library.
- * Clinton:—Editor, American Antiquarian and Oriental Journal.
- * Colombo:—Ceylon Branch, Royal Asiatic Society.
- * Copenhagen:—La Société Royale des Antiquaires du Nord.
- † Cuttack:—Cuttack Library.
- * Danzig:—Naturforschenden Gesellschaft.
- * Dehra Dun:—Great Trigonometrical Survey.
- * Dublin:—Royal Dublin Society.
- * ———:—Royal Irish Society.
- § ———:—Geological Society of Dublin.
- * Edinburgh:—Royal Society.
- * ———:—Scottish Geographical Society.
- § ———:—Botanical Society.
- * Florence:—Società Italiana di Anthropologia e di Etnologia.
- * ———:—Società Africana d' Italia.
- * Frankfurt:—Senckenbergische Naturforschende Gesellschaft.
- * ———:—Naturwissenschaftlichen Verein.
- * Geneva:—Société de Physique et d' Histoire Naturelle.
- * Genoa:—Museo Civico di Storia Naturale.
- * Giessen:—Oberhessische Gesellschaft für Natur und Heilkunde.
- * Graz:—Naturwissenschaftlicher Verein für Styria.
- § Hague:—Koninklijk Instituut voor de Taal-Land-en Volkenkunde van Nederlansch-Indië.
- * Hamburg:—Naturhistorisches Museum zu Hamburg.
- * ———:—Naturwissenschaftlichen Verein.
- * Halle:—Deutsche Morgenländische Gesellschaft.
- † ———:—Die Kais. Leopoldinisch-Carolinische Akademie.
- * Hamilton:—Hamilton Association (Canada).
- * Harrisburgh:—Second Geological Survey of Pennsylvania.
- * Havre:—Société de Géographie Commerciale du Havre.
- * Helsingfors:—Societas pro Flora et Fauna Fennica.
- * ———:—Société des Sciences de Finlande.
- § Ithaca (U. S. A.):—Cornell University.
- * Königsberg:—Die Physikalisch-Oekonomische Gesellschaft.
- * Lahore:—Editor, Civil and Military Gazette.
- § ———:—Anjuman-i-Panjab.
- § ———:—Agricultural Society.
- * Leyden:—Royal Herbarium.
- * Liège:—La Société Géologique de Belgique.

- * Liège :—La Société des Sciences.
- § Lille :—Société de Géographie.
- * Liverpool :—Literary and Philosophical Society.
- * London :—Anthropological Institute.
- * ——— :—Editor, Academy.
- * ——— :—Editor, Athenæum.
- * ——— :—British Museum.
- * ——— :—Geological Society.
- * ——— :—Institution of Civil Engineers.
- * ——— :—Institution of Mechanical Engineers.
- * ——— :—Editor, Nature.
- * ——— :—Linnean Society.
- * ——— :—Royal Asiatic Society of Great Britain and Ireland.
- * ——— :—Royal Astronomical Society.
- * ——— :—Royal Geographical Society.
- * ——— :—Royal Institution.
- * ——— :—Royal Microscopical Society.
- * ——— :—Royal Society.
- * ——— :—Society of Telegraph Engineers.
- * ——— :—Statistical Society.
- * ——— :—Zoological Society.
- * Lyons :—La Société d' Agriculture, d' Histoire Naturelle et des Arts Utiles.
- * ——— :—Muséum d' Histoire Naturelle.
- * ——— :—Musée Guimet.
- * ——— :—La Société d' Anthropologie.
- § ——— :—La Société de Géographie.
- † Madras :—Literary Society.
- * ——— :—Government Central Museum.
- * Manchester :—Literary and Philosophical Society.
- § Melbourne :—Royal Society of Victoria.
- * Mexico :—Sociedad Científica " Antonio Alzate."
- * Moscow :—Société Impériale des Naturalistes.
- * ——— :—Imperial Society of Amateurs of Natural Sciences, Anthropology and Ethnology.
- * Munich :—K. Bayerische Akademie der Wissenschaften.
- * ——— :—Editor, Repertorium der Physik.
- * Naples :—Società Africana d' Italia.
- * Netherlands : Royal Society.
- * New Haven :—Connecticut Academy of Arts and Sciences.
- § ——— :—American Oriental Society.
- * Newport (B. I.) :—Natural History Society.

- * Ottawa :—Geological and Natural History Survey of the Dominion of Canada.
- * Oxford :—Bodleian Library.
- * ——— :—Indian Institute.
- * Paris :—La Société de Géographie.
- * ——— :—Société d' Anthropologie.
- * ——— :—Société Asiatique.
- * ——— :—National Library.
- * ——— :—Société Zoologique.
- * ——— :—Société Académique Indo-Chinoise.
- § ——— :—Institution Ethnographique.
- * Philadelphia :—Academy of Natural Sciences.
- § ——— :—American Philosophical Society.
- * Pisa :—Società Toscana di Scienze Naturali.
- § Prague :—K. K. Sternwarte.
- § Rio de Janeiro :—Museo Nacional.
- * Rome :—Società degli Spettroscopisti Italiani.
- § ——— :—R. Accademia dei Lincei.
- * Santiago :—Sociedad Científica Alemana.
- * St. Petersburg :—Comité Géologique.
- * ——— :—Imperial Library.
- * ——— :—Société Impériale Russe de Géographie.
- * ——— :—Académie Impériale des Sciences.
- * ——— :—Hortus Petropolitanus.
- * San Francisco :—Californian Academy of Arts and Sciences.
- * Schaffhausen :—Schweizerischen Entomologischen Gesellschaft.
- * Shanghai :—North China Branch, Royal Asiatic Society.
- * Simla :—United Service Institution of India.
- * Stettin :—Entomologischen Verein.
- * Stockholm :—Kongl : Svenska Vetenskaps Akademien.
- * Sydney :—Royal Society of New South Wales.
- * ——— :—Linnean Society of New South Wales.
- * Tokyo :—Imperial University of Japan.
- * Toronto :—Canadian Institute.
- * Trieste :—Società Adriatica di Scienze Naturali.
- * Turin :—Reale Accademia delle Scienze.
- † Ulwar :—Ulwar Library.
- * Vienna :—Anthropologische Gesellschaft.
- * ——— :—K. K. Akademie der Wissenschaften.
- * ——— :—K. K. Central-anstalt für Meteorologie und Erdmagnetismus.
- * ——— :—K. K. Geologische Reichsanstalt.
- * ——— :—K. K. Zoologisch-Botanische Gesellschaft.

- * Vienna :—K. K. Naturhistorischen Hofmuseum.
- * ——— :—Ornithologische Verein.
- * Washington :—Commissioners of the Department of Agriculture.
- * ——— :—Smithsonian Institution.
- § ——— :—U. S. Army Signal Service.
- * ——— :—United States Geological Survey.
- § ——— :—U. S. Coast and Geodetic Survey.
- * Wellington :—New Zealand Institute.
- * Württemberg :—Natural History Society.
- * Yokohama :—Asiatic Society of Japan.
- * ——— :—Deutschen Gesellschaft für Natur-und Völkerkunde Ostasiens.
- * Zagreb :—Arkeologickoga Druzstva.

ABSTRACT OF PROCEEDINGS OF COUNCIL DURING 1887.

January 27th, Ordinary Meeting.

The names of the five Trustees appointed by the Society under the new Indian Museum Act, No. IV of 1887, were furnished to the authorities of the Indian Museum with the information that the present list remained unaffected by the new Act.

On a report from Colonel Waterhouse on the probable cost of printing the Photographs, Maps and Plans connected with Mr. Hoey's report on the excavations and exhumations at Sahet Mahet, the estimate of Rs. 1,050 for executing the work by Collotype, was accepted.

On the recommendation of the President the *Zeitschrift für Ethnologie* was subscribed for.

A letter from Syud Mahomed Karrar Husain enquiring whether the Society would purchase any of the MSS. in his Library, a list of which he forwarded, was referred to Dr. Hoernle and Maulavi Kabiruddin.

The work of supervising the publication of Atkinson's *Lepidoptera*, undertaken by the late Mr. A. Grote, was entrusted to Mr. W. T. Blanford, while the remittance made by the Society for the purpose was made over in deposit to Messrs. Trübner and Co.

Dr. Hoernle submitted a report of his attendance at the International Congress of Orientalists at Vienna on behalf of the Society.

On a proposal by the Secretary that the Society asks for a Charter enabling it to confer the title of *Fellow of the Asiatic Society, Bengal*, upon its distinguished members, it was ordered that the old papers on the question, when it was raised before, be brought out.

On the motion of the President, a resolution was passed "that the Society in its corporate capacity present an address to Her Majesty on

the occasion of the Jubilee, with a suitably bound copy of the *Centenary Review*," and a Sub-Committee, consisting of the President, Mr. Blanford, Mr. Medlicott and the General Secretary, was appointed to carry out the resolution.

An application from Maulavi Abdur Rahim to be allowed to edit the *Ālam-ará-i-Abbási* was referred to the Philological Committee.

On a letter from Mr. E. Gay stating that Mr. R. Taylor was willing to present the Society with a set of the Oriental Series of Facsimiles of MSS. published by the Palæographical Society, Mr. Gay was desired to convey the thanks of the Council to Mr. Taylor for his offer, and to inform him that the Society already possessed a set.

The Assistant Secretary was authorized to spend a moderate sum in illuminating the Society's building during the Jubilee celebration.

February 24th, Ordinary Meeting.

On a letter from Dr. H. Haupt the Government of India was asked to place the University of Giessen on the list of institutions to which the Catalogue of Sanskrit MSS. is to be sent.

A copy of the *Vienna Oriental Journal*, a new quarterly publication, edited by the Directors of the Oriental Institute of the University of Vienna, was subscribed for.

The several Committees for the current year were appointed.

Mr. A. Simson and Nawab Abdul Latif Bahadur were appointed to be Members of the Council.

Dr. Hoernle reported that he had resumed charge of the Philological Secretaryship from Mr. Beveridge.

An offer from Maulavi Khudá Baksh, Khán Bahádur, to place Rs. 500 at the Society's disposal towards the publication of a Persian work by himself entitled *Kanzúl Lúbáb fi Márifatil Kútúb i wal Kúttáb*, was declined.

Messrs. Meugens and King were re-appointed Auditors for the year.

March 31st, Ordinary Meeting.

An enquiry from the Honorary Secretary, Executive Committee, Jubilee of the Queen-Empress, whether the Society would wish their address to be forwarded in the casket in which the addresses from public bodies and associations were to be forwarded to Her Majesty, and if so, whether the Society would contribute Rs. 100 towards the cost, was answered in the negative.

At the suggestion of the Natural History Secretary, it was resolved to make a representation to the Government of India pointing out that

little had been done towards a systematic investigation of the Zoology of the Indian Seas in connexion with the survey of the coasts.

A substantial reduction was effected through the Natural History Secretary in the rates charged by the Baptist Mission Press for printing the Proceedings and Journals.

A copy of a reprint, with considerable additions, of the *Sabda Kalpa Druma* was subscribed for.

A new edition of the Library Rules was ordered to be printed.

April 28th, Ordinary Meeting.

On Mr. H. B. Medlicott resigning his seat on the Council on leaving India, Dr. W. King was appointed to succeed him.

An offer from the *Société des Naturalistes de la Nouvelle Russie*, Odessa, for an exchange of publications was declined.

An exchange of publications (Proceedings and Journal, Pt. II,) with the College of Science, Imperial University of Japan, was sanctioned.

An exchange of publications (Journal, Part II,) with the *Naturwissenschaftlichen Verein*, Hamburg, was sanctioned.

An exchange of publications (Journal, Part I,) with the Literature College, Imperial University of Japan, was sanctioned.

An offer from Pandit Haraprasád Shástri to edit the *Svyambhu Purána* was referred to the Philological Committee, and it was resolved that Professor Cowell be asked to procure for the Society a loan of two MSS., of the work from the Cambridge University Library.

In accordance with the minutes of the Philological Committee, in circulation, Maulavi Abd-ur-Rahim was allowed to withdraw his application to edit the *Alam-Ará-i-Abbási*, and was appointed to edit the *Mádsir-ul-Umará* instead.

A grant of Rs. 2,428 was sanctioned for renewing all the decayed beams and burgahs in the roof of the Society's building, and for half-terracing the roof.

Read a letter from Messrs. Trübner and Co. acknowledging the receipt from Mrs. Sterling, executrix to the estate of the late Mr. A. Grote, of the sum of £129-8-9, and forwarding receipts for a further sum of £32-7-9 paid in 1882, together making up the sum of £161-16-6, that had been remitted to Mr. Grote in September last on account of the publication of Atkinson's *Lepidoptera*.

Mr. A. Pedler was appointed Treasurer *vice* Mr. Eliot proceeding to Simla; Mr. Pedler was also appointed a Trustee of the Indian Museum *vice* Mr. H. F. Blanford, proceeding to England.

May 26th, Ordinary Meeting.

An exchange of publications (Proceedings and Journals) including the back numbers from 1866 to 1886, as far as available, with the Zoological and Anthropological-Ethnographical Museum of Dresden, was sanctioned.

An application from the *Verein für Erdkunde zu Leipzig* for an exchange of publications was declined.

On Mr. L. De Nicéville resigning his seat on the Council and on the Natural History Committee, Mr. J. Beames was asked to accept a seat on the Council.

A request from Sirdár Lál Triloki Náth Singh that the Council would be good enough to forward his work on Magic Squares, entitled *Bhuvaneśa-aṅka-prakāśa*, to Her Majesty the Queen, to whom he had dedicated the work, was declined.

A suggestion by General Maclagan whether it would not be an advantage to revert to the former mode of issuing the Journal on a fixed date, containing such papers as were ready, with the Proceedings, instead of dividing the Journal into Parts I. and II., was declined.

A proposal by Bábu Ásutosh Mukhopádháya to adopt a new rule in connection with the rule 24a then under consideration, to the effect that Foreign members who had compounded, on becoming Resident members should, after payment of the usual annual contribution for 5 years, be exempted from any further payment, was declined.

An application from Professor W. H. Lowe, Cambridge, to undertake a translation of the Persian work *Khafi Khán* on a remuneration at the rate of 2 shillings to the rupee was declined; and it was resolved that any proposal to pay for editing and other work done for the Society for the Bibliotheca Indica Series in England, at the exchange of 2 shillings per rupee, could not be entertained.

On the General Secretary reporting the receipt from the Collector under the Land Acquisition Act, of a notice regarding a strip of the Society's land about to be taken up under Act X. of 1870 for widening the foot-path in Park Street, it was resolved that the Secretary appear before the Collector to defend the Society's position in the matter, and to ask for an adequate remuneration to meet the expenses of putting up a handsome iron railing.

June 30th, Ordinary Meeting.

Read a letter from Mr. J. Beames declining the offer of a seat on the Council.

Read a letter from the Secretary to the Government of Bengal acknowledging receipt of the statements showing the receipts and dis-

bursments of the Oriental Publication Fund and the Conservation of Sanskrit MSS., Fund, for 1886, and stating that the Lieutenant-Governor approved of the manner in which the Government grants in aid of the Funds had been applied.

Read a letter from the Collector under Act X. of 1870 (in reply to the General Secretary's letter under Council orders forwarding a claim amounting to Rs. 2,460 on behalf of the Society as compensation for the strip of land required for widening the foot-path in Park Street), stating that the land, &c., had been valued at Rs. 1,641-0-9, and asking whether the Council was willing to accept the valuation: Resolved that the Collector be informed that the Council cannot accept the valuation.

A copy of the *Játaka-málá* or *Bodhisattvavadána-málá*, to be edited by Professor Kern was subscribed for.

An enquiry from Professor Garbe whether he could be paid his honorarium for editing in the Bibliotheca Indica without deducting exchange, was answered in the negative.

July 28th, Ordinary Meeting.

Read a letter from the Surveyor and Assessor to the Calcutta Municipal Corporation (in reply to the General Secretary's letter asking for a reduction on the assessment of the Society's premises) stating that the present assessment could not be disturbed except by the Appeal Bench at the ensuing revision of the assessment of the ward.

An exchange of publications with the *Sociedad Científica Alemana*, Santiago de Chilé, was sanctioned.

Read a letter from the Collector under Act X. of 1870 (in reply to the General Secretary's letter, under Council orders, regarding the amount of compensation for the land required for widening the foot-path in Park Street) stating that he was prepared to pay the Society Rs. 1,819-4-9, and that if this valuation was not accepted, he would refer the case to Court, and take possession of the land in the first week of August: Resolved that the Collector be informed that the Council cannot accept this valuation.

An application from Professor P. Peterson, with the minutes of the Council in circulation thereon, for editing the *Commentary on the Nyáyavindu* by Dharmottaráchárya was referred to the Philological Committee.

On the recommendation of the Philological Secretary an increase of pay to the Pandit, from forty to fifty rupees, as conditionally promised on his appointment, was sanctioned with effect from 1st August.

An estimate from the contractor repairing the building, amounting to Rs. 432-6-8 for replacing another beam subsequently found defective,

for sundry petty repairs, and for hire of tarpaulins was referred to the General Secretary.

On the recommendation of the Finance Committee, Rs. 49-12-0 standing against the name of the late Mr. J. C. Douglas, ordinary member, and Rs. 28 against the name of Col. Godwin-Austen, ordinary member, elected non-subscribing member, were written off.

August 25th, Ordinary Meeting.

An exchange of publications with the *Societa Africana d' Italia*, Naples, was sanctioned.

One copy of *Sāstraprakāsa* to be published in monthly parts was subscribed for.

On a representation by the Superintendent, Baptist Mission Press, as to the difficulty of procuring a fresh supply of the colored paper used for the cover of the Proceedings, it was left to the General Secretary to arrange for the present.

Read a letter from the Collector under Act X. of 1870 (in reply to the General Secretary's letter under Council orders) stating that as the total length of wall to be dismantled did not exceed 120 feet instead of being 180 feet as at first stated by him, he was now prepared, after discussing the matter with Dr. Mahendralál Sarkár, to pay the Society Rs. 2,116 in satisfaction of all claims: Resolved that the Collector's offer be accepted.

On an application from the Provincial Museum Committee, Lucknow, for copies of certain publications of the Society, and requesting that the Secretary of the Provincial Committee be reckoned as a member of the Society, it was ordered that the publications of the Society, as far as available for presentation, be given, and that the Secretary be informed that the rules of the Society did not admit of his request as regards membership being granted.

Professor P. Peterson was appointed to edit the *Commentary on the Nyáyavindu* by Dharmottarácharya.

A letter from Dr. Hoernle enquiring whether advertisements, other than those of the Society's own publications, can be inserted in the Society's publications, was referred to the General Secretary for enquiry as to rates.

October 6th, Ordinary Meeting.

On an application from Professor Aufrecht for the loan for three months of the Sanskrit MS. *Kshératarangini* in the Government Collection, which he wished to examine to try to elucidate some obscure points in the *Dhátupátha*, it was ordered that the cost of making a copy of the MS. be ascertained.

Read the minutes of the members of the Council, in circulation, relating to the erection of an iron railing to replace that portion of the wall of the Society's premises to be dismantled by the Municipality. The General Secretary also submitted four tenders with designs received in answer to an advertisement for putting up 160 feet of iron railing and a pair of iron gates. Resolved that it would be desirable to extend the railing along the entire frontage, and that a Sub-Committee consisting of Colonel Waterhouse, Mr. Pedler and the General Secretary, be appointed to make the best possible arrangements to secure this.

Read the minutes of the Philological Committee, in circulation, on a memorandum by Mr. Beveridge on the following points: (a) that an Index should be prepared to Major Raverty's translation of the *Tabaqât-i-Nâsiri* (b) that the preface to the text of Khafi Khân had never been written and (c) that there are errors in Professor Lowe's translation of the *Muntakhab-ul-Tawârikh*.

Read the minutes of the Philological Committee in circulation regarding the purchase of a complete set of Block-prints of the Tibetan *Tanpyur* in 225 volumes at a cost of Rs. 3,000, including cost of carriage from Tibet. Resolved that the Government of Bengal be applied to for half the purchase money, and for permission to meet the second half out of the Oriental Publication Fund.

On the minutes of the Philological Committee, in circulation, Colonel Jarrett was asked to undertake a translation of the *Ain-i-Akbari* at the rate of Rs. 3 a page.

The Treasurer reported the receipt of a cheque for Rs. 2,116 from the Collector under Act X of 1870 for the strip of the Society's land taken up at the cost of the Municipality for widening the foot-path in Park Street, being the amount of compensation accepted by the Council.

On the motion of Nawab Abdul Latif, a Sub-Committee was appointed to examine and report on the damage said to have been caused to some of the MSS. by damp during the repairs.

October 27th, Ordinary Meeting.

An exchange of publications (Proceedings) with the *Sociedad Científica "Antonio Alzate,"* Mexico, was sanctioned.

Read the minutes of the Philological Committee, in circulation, on a memorandum by Mr. Beveridge pointing out defects in the arrangements for publishing text editions of Persian works in the *Bibliotheca Indica*.

Read the minutes of the Philological Committee on the question of the publication of the text of the *Riyâz-ush-Sulâtin* by Ghulâm Husain.

On the report of the Philological Secretary as to the cost of making a copy of the *Kāhīrataranginī* it was ordered that a copy be made and carefully examined.

Read the report of the Sub-Committee appointed to arrange for the erection of an iron railing along the frontage of the premises: also a letter from Messrs. Mackintosh, Burn and Co. offering to erect an iron railing with two pairs of iron gates, a new Durwan's lodge and the necessary carriage road-way, in exchange for a piece of land facing Chowringhee Road, containing about six and a half cottahs: Resolved that Messrs. Mackintosh, Burn and Co.'s offer cannot be entertained; and that complete estimates for the railing with one and with two pairs of gates respectively, together with a memorandum showing the funds available, be drawn up.

Read the report of the Sub-Committee appointed to enquire into the damages to the MSS. through damp, to the effect that the damages were slight.

On an application from Babu Sarat Chandra Dās that the Lama Sherab Gyatso, who was coming to Calcutta to aid him in the compilation of a philosophical and technical dictionary of Tibetan, may be permitted to reside in the Society's premises for three months, permission was given, if a suitable place was available.

November 24th, Ordinary Meeting.

A set of Photographs from the Paintings at Ajunta, executed between March 1882 and February 1884 was received from the Government of India.

Colonel Jarrett expressed his willingness to undertake the translation of the *Ain-i-Akbari* in continuation of that by the late Mr. Blochmann.

A copy of a French-Arabic Dictionary by E. Gasselin, Consul General for France, was subscribed for.

A copy of the *International Archives für Ethnographie* to be published under the auspices of the Musée Nationale d' Ethnographie de Leide, was subscribed for.

A copy of the *Prithirāja Rāsau*, edited by Pandit M. L. Pandia, was subscribed for.

Read a letter from the Surveyor and Assessor to the Municipal Corporation (in reply to the General Secretary's letter asking for a reduction) stating that the assessment of the Society's building had been reduced from Rs. 400 to Rs. 350 per mensem, with effect from the current quarter.

Read the minutes of the Council in circulation on the question of

the erection of an iron railing : also, the General Secretary submitted an estimate by a Contractor for Rs. 4,348 for putting up an iron railing, two pairs of gates, a Durwan's lodge, and making a new carriage roadway : Resolved that the Treasurer and the General Secretary be empowered to contract at a rate not exceeding the above sum for the whole work, as detailed.

Maulavi Abd-ul-Haq Abid was appointed to edit the text of the *Riyáz-ush-Salátin*, by Ghulam Husain.

Professor Cowell's proposal to prepare a translation of *Khaft-Khan* was sanctioned.

Pandit Haraprasád Shástri was appointed to edit the *Brihaddharma Purána*.

Babu Sarat Chandra Das was appointed to edit the *Bodhisattvá-vadána Kalpalatá* in Sanskrit and Tibetan.

A MS. of the *Riyáz-ush-sh'uará*—a history of Persian Poetry (incomplete) was purchased.

An examination of the beams and burgahs on the ground floor was ordered.

December 29th, Ordinary Meeting.

An exchange of publications with the Linnean Society of New South Wales was sanctioned.

A copy of a forthcoming work by Dr. E. Bonavia on the cultivated Oranges and Lemons of India and Ceylon was subscribed for.

An offer from the *Club de Engenharia* of Rio de Janeiro for an exchange of publications was declined.

A copy of a forthcoming work entitled *Récherches Anthropologiques dans le Caucase*, was subscribed for.

On a letter from Mr. F. E. Pargiter offering to resign the work of translating the Márkandeya Purána, on the ground that he would be unable to furnish annotations as pointed out by the Philological Secretary, it was resolved that Mr. Pargiter be asked to publish a translation without notes.

The University of Breslau was placed on the list of institutions entitled to receive the Bibliotheca Indica publications.

The General Secretary reported the result of his enquiries as to the rates charged for advertisements by other publishers.

The Contractor's Bill for Rs. 2,428 as sanctioned in April last, was passed.

The following amounts were ordered to be written off :—Rs. 9, standing against the name of the late Babu Girijábhushan Mukherji, ordinary member : Rs. 90 and Rs. 77 standing against the names of

Sirdar Gurdyál Singh and Mr. A. E. Medlycott, respectively, ordinary members, defaulters under rule 38.

A letter of condolence on the illness of Dr. Rájendralál Mitra was sent to his son.

The Report having been read the President invited the Meeting to put any questions or offer any remarks which any member might think necessary in connection therewith.

No remarks having been offered the President moved the adoption of the Report. The motion was unanimously carried.

The PRESIDENT then addressed the Meeting as follows :

Address.

The Society.—In the explanation of the affairs of the Society, read by our General Secretary, you will find a full account of the manner in which the trust committed to us by you has been managed during the past year. We have again to state that our income just about balances our expenditure, and this is a matter for congratulation, since the quantity of our publications has been more than the average, and, I am glad to say, has also kept up to the high standard attained by the Society's Journal. Before reviewing the work accomplished during the year, it affords me great pleasure to again bring to your notice the valuable services rendered by the officers of the Society. Mr. H. M. Percival, the General Secretary, Mr. J. Wood-Mason, the Natural History Secretary, Dr. Hoernle, the Philological Secretary, Mr. J. Eliot and Mr. A. Pedler as Treasurers, have all devoted themselves to the work entrusted to them with the result that you may rest assured that your affairs are well administered. I would ask you therefore for a vote of thanks to the office-bearers mentioned for their voluntary services during the year 1887. (*Carried unanimously.*)

Obituary.—Year by year we have to announce the loss of members who have been active contributors to the Society's Journal or who have aided its objects in other ways. The obituary for 1887 records the deaths of the Honourable Sir Ashley Eden, Colonel G. C. De Prée, Mr. J. C. Douglas, Mr. T. G. H. Moncrieffe, Lieut.-Col. T. C. Plowden, and Bábú Girijábhúsan Mukharji. I need not recall to your minds the services of Sir Ashley Eden, for there is hardly any important institution or public movement in Bengal during the last thirty years with which he had not been more or less connected. Mr. J. C. Douglas is known to you for his paper on Indian bees; and his efforts in attempting the acclimatisation of Italian bees in India. I have also to record the

death of Bábú Rámdás Sen of Murshidabad, known for his work on Indian antiquities entitled *Aitihásik Rahasya*, and his fine collection of manuscripts. Also of Bábú Rákhál Dás Háldár, whose edition of the *Nága Vansávalí* of Benirám, a poet of Chutiyá Nágpur, and papers on the ethnology and antiquities of that District, form valuable contributions to our knowledge of a little known tract.

Publications :—*Journal*.—For the first part of our Journal which is, as you know, devoted to philology and literature, we have had, during the year 1887, a number of papers which have either already been published or will appear during the current year. Amongst them is one on the 'Šafwí dynasty of Persia' by Mr. E. E. Oliver; Kashmirí riddles by the Rev. J. H. Knowles; the 'era of Lachhman Sen', and 'the Mother of Jahángír' by Mr. H. Beveridge; 'Materials for a literary history of India' by Mr. G. A. Grierson; 'On the couplets or 'baits' on the coins of Sháh Núru-d-dín Jahángír' by Mr. C. J. Rodgers, and, by the same author, some critical remarks on the notes on the coins mentioned by Major Raverty in his translation of the *Ṭabaqát-i-Náşirí*. Bábú Sarat Chandra Dás gives an interesting digest of the Tibetan work on geography called the *Dsam Ling Gyeshá*, and another on 'the sacred and ornamental characters of Tibet.' Dr. Führer publishes three grants of Govindachandra Deva of Kanauj, dating from the twelfth century, and also the Kudarkhoṭ inscription of Takshadatta, and Dr. Rájendralála Mitra, a donative inscription of Vidyádhara Bhanja, an Orissa Raja. We have papers on the ruins at Nagari in Mewar by Kaviráj Syámal Dás, describing a tower mentioned by Tod as 'Akbar's lamp': on Buddha's Shadow-cave near Prabhása by Mr. Cockburn: on the excavated temple at Núrpur in Kángará by Mr. C. J. Rodgers: on the city of Hirát, by Captain Yate, and on ancient mounds in the Quetta district by Major J. F. Garwood, R. E. Mr. W. H. P. Driver, also, has given us ethnological notes on the Asuras, Bíríjiyás, Bír'hors and Khariyás, aboriginal tribes of the Chutiyá Nágpur division.

In Part II of the Journal, we have a paper on the mammals and birds collected by Capt. Yate during his service with the Afghán Boundary Commission, prepared by Dr. Scully, and also one on the Chiroptera of Nepál by the same writer. Mr. J. Baly describes a new phytophagous coleopteron found feeding on rice in the Chittagong district, and Mr. E. T. Atkinson continues his notes on Indian Rhynchota, the third part of the catalogue of species falling under the sub-order Heteroptera having been read. M. E. Simon gives us two valuable papers on the *Arachnida* of the Indian Museum collected in Tavoy and the Andamans. Dr. G. Giles has two others on *Amphipoda* from the Bay of Bengal; Mr. Wood-Mason, one on a new crustacean belonging to the

Brachyurous family *Bauanidae*; and Mr. E. J. Jones one 'on nodular stones dredged from 675 fathoms of water off Colombo.' All these last are chiefly based upon materials furnished by the Marine Survey party under Commander A. Carpenter, R. N., who himself gives a paper 'on the mean temperature of deep sea waters in Bengal.' Mr. Elson, of the Pilot service, has a paper 'on observed changes in the density of sea-water coincident with and due to aerial disturbances, and consequent alterations of baric pressure over adjacent sea areas.' Mr. H. F. Blanford gives an interesting and suggestive paper 'on the Influence of Indian forests on rain-fall,' and Dr. Prain brings to notice the hot-springs of the Namba forest. Dr. G. King, F. R. S., has three papers on new species of *Ficus* from New Guinea and Sumatra, and the species of *Loranthus* indigenous to Perak, and Dr. Barclay one on the commoner uredines of the neighbourhood of Simla. Bábu Ásútosih Mukhopádhya contributes four valuable mathematical papers, on the differential equation of a trajectory, Mongé's differential equation to all conics, and on plane analytical geometry, nor must I omit to mention Dr. Scully's paper on the effects of bismuth on the ductility of silver, which has been reprinted at home in the '*Chemical News*,' and that on neolithic and palæolithic finds in Southern India, by Mr. R. B. Foote.

In the *Proceedings*, the discussion on the term '*Ekotibháva*' opens with a letter from Professor Max Müller, in which he practically concurs in the view held by Dr. Rájendralála Mitra as to its meaning. Contributions to the subject were subsequently made by Bábu Sarat Chandra Dás, from Tibetan sources, as to the derivation, and also by Mr. F. S. Growse, and Dr. Hoernle. Pandit Mahésachandra Nyáyaratna has some notes on the authorship of the Sanskrit drama *Mrichchhakatiká*, popularly ascribed to Rája Súdhraka, but by Professor Pischel to Daṇḍin, a poet who lived in the seventh or eighth century of our era. Dr. Mitra also gives a notice of Mandlik's edition of Manu with the seven commentaries, and Dr. Hoernle, an account of the seventh Oriental Congress held at Vienna in 1886. Amongst the other minor papers of importance, mention may be made of Mr. H. F. Blanford's note on the rain-fall in the Carnatic, Mr. E. T. Atkinson's note on an insect destructive to rice in the Tinnevely district, and descriptions of four insects belonging to the genus *Chrysocoris*, Hahn, which are new to science; and Mr. de Nicéville's description of a new satyrid. In addition, we have the usual reports on the coins added to the Society's cabinet, which, however, do not contain much of novelty, and notes on some inscriptions which are of little more than local interest, as well as remarks by the Rev. T. Tracy on Pandyan coins, and a communication from Col. Biddulph on rock-cut caves in Chitrál. Altogether the work of the year as shown in our Journal and Proceedings is a fair result for voluntary effort in India.

Bibliotheca Indica.—Fifty-two numbers of the *Bibliotheca Indica* series were issued during the year, of which 35 belong to the Sanskrit division and 17 to the Arabic-Persian division. The former represent eighteen separate works, and the latter four, including an index to the third volume of the *Akbarnámah*. We have sanctioned, during the year, the publication in the Sanskrit series of the text of the Sanskrit Buddhist work Dharmottaráchárya's commentary on the *Nyáyabindu*, to be edited by Professor Peterson, and the *Bṛihad Dharma Purána* to be edited by Pandit Hara Prasáda Sásṭrī, also the *Bodhisattvavadána Kalpalatá* with a Tibetan version, of which I shall have more to say hereafter. In the Persian series, we have arranged for a translation of the remainder of the *Aín-i-Akbarí* by Colonel Jarrett, so well begun by the late Professor Blochmann, and of the *Muntakhabu-l-Lubúb*, better known as the *Tarikh-i-Kháfí Khán*, by Professor Cowell; the text and a translation of the *Riázu-s-salátín* by Maulaví Abdul Hak Abid jointly with Dr. Hoernle; and the text of the *Ma'ásiru-l-Umará* edited by Maulaví Abdur Rahím, of which four fasciculi have already appeared. There are, however, still some twenty works for which sanction has been given, but which have not yet been taken up, and ten of which no part has issued during the past year.

Tibetan literature.—Last year, I stated that steps had been taken to furnish aids to those who might be disposed to undertake the study of Tibetan, and I now have the very great pleasure of placing on the table the first fasciculus of the first Tibetan manuscript printed in India, due to the energy and industry of our member, Bábú Pratápa Chandra Ghosha. I trust that it may be the pioneer of a long series of Tibetan issues from our *Bibliotheca*, opening up a new field of great philological and literary interest which has too long been left neglected. The fasciculus before you contains the commencement of the '*Shes-rab-kyi—pha-ro-lu-phyin-pá*' (by contraction '*Sher-phyin*' and pronounced '*Sher-chin*'), which is itself a translation made in the ninth century, into Tibetan, from the Sanskrit of the Buddhistic work entitled *Prajñá-páramitá* forming, according to Csoma de Kőrös, the second division of the *Ká-gyar*, or Tibetan *Tripiṭaka*, a collection of the sacred books of Tibet, translated from the Sanskrit, and comprising one hundred volumes. There are, however, twenty-one volumes in this division, of which twelve comprise the *Sher-chin* of 100,000 *ślokas*. Of the remainder, eight volumes form abridgements of more or less authority of the *Sher-chin* itself, the first being the 20,000 *ślokas* abridgement, containing however the equivalent of 25,000 *ślokas*, the next that of 18,000 *ślokas*, the third that of 10,000, and the last that of 8,000, the Sanskrit text of which, under the name *Ashṭasáhasriká Prajñá-páramitá*, is now being brought out for us in the

Bibliotheca by Dr. Rájendralála Mitra. This last is taken from Nepálese manuscripts, and three fasciculi have appeared in 1887. It is also the first work of its character printed in India, nor has any edition or translation of it ever been made or attempted, to the best of my knowledge, in any European country. The last volume of the series is entitled the *S'na-ts-hogs*, or 'the miscellany,' and comprises treatises of the *Sútra* class explanatory of the preceding volumes. The Society has undertaken the publication of the 100,000 *ślokas* Tibetan text, and, as already stated, since there is only the one impression available, the efforts of the editor will be devoted to faithfully reproducing the text as it stands, leaving it to others hereafter with better materials to make such corrections as will doubtless be found necessary, for there are evident traces of mistakes made by the engraver. It may be possible also to omit many of the tedious repetitions with which the work abounds.

The entire work is in prose, and forms twelve volumes, comprising 303 divisions (*bam-po*), each containing 300 *ślokas*, or rather their equivalent in prose, and occupying each about twenty-one leaves of the block print. In preparing the work for the press, Bábú P. C. Ghosha has separated the several words by spacing them out, and has also arranged the sentences in paragraphs for more easy reference, and, only so far, has not followed the original, which gives neither divisions nor paragraphs. The numbering of the pages in the original is also reproduced in the body of the text now printed. The *Sher-chin* is devoted to Buddhistic philosophy, theoretical and practical, and, as stated by Csoma de Kőrös, contains the psychological, logical, and metaphysical terminology of the Buddhist faith without entering into or reconciling conflicting views on any particular subject. There are 108 subjects or *dharmas*, regarding which, if any predicate be added to them, affirmative or negative judgments may be formed. All these contain the substance of the teachings of the great teacher himself delivered on the Gṛidhrakúṭa hill at Rájagṛiha in Magadha. To the student of the earlier systems of philosophy and religion in India, the *Sher-chin* should be of much interest, for a Buddhistic philosophical work is very uncommon in India, and most of the information that we possess on the subject is at second-hand and comes through those who hated the very name of Buddhist.

In continuation of the same project, our Associate Member, Bábú Sarat Chandra Dás, is bringing out for the Society a hitherto unpublished work by the poet Kshemendra, entitled *Avadána Kalpalatá*, of which we have the complete Sanskrit with an interlinear Tibetan version in a manuscript recently acquired from Tibet. It is intended to publish the Sanskrit and Tibetan texts in parallel columns, the

first fasciculus is in the press, and I place on the table the proofs of the first few pages. The manuscript is in verse, and was translated into Tibetan by Lochava Shoñton Dorje and the Indian pandit Laksh-míkara at the *vihára* of Gedun Shidé in Mañyul under the orders of Ponchhen Shakya Ssañpo, ruler of Tibet in 1279 A. D. The blocks from which the print used was taken were engraved by the direction of the Dalai Lama Nágwañ Lossañ in 1645 A. D. The work consists of 108 *pallavas*, of which 107 were written by Kshemendra and one by his son Somendra. The copies hitherto procured and now deposited in our library and that of the Cambridge University are imperfect, containing only the second part of the work, and a fragment of the first, so that the publication of this Sanskrit and Tibetan version of the entire poem will restore to India a portion of a valuable Buddhistic work that has been lost to it for over five hundred years. Kshemendra is said to have been the court poet of Ananta, Rájá of Kashmir, and undertook the work at the instance of his Buddhist friend Nakka. It is a veritable store-house of the legends as to Buddha's life and acts according to the Maháyána school of Northern Buddhism, and is written in a simple, elegant style, quite free from the turgid verbosity and tedious repetition usually characteristic of Buddhist Sanskrit works. The arrangement of the original and Tibetan version in juxtaposition should give an impetus to the study of classical Tibetan and afford an accurate basis for further research.

In my address last year, it was brought to your notice that Bábú Sarat Chandra Dás was also engaged upon a vocabulary of Tibetan Buddhistic terms. Since then he has procured several manuscript dictionaries in Sanskrit-Tibetan and Tibetan-Sanskrit, and it is now proposed, if it can be arranged, to compile a comprehensive Tibetan-Sanskrit-English dictionary, with an appendix containing the Sanskrit-English portion with a reference to the Tibetan equivalent. This work when completed should serve as a key to the great collections of manuscripts in St. Petersburg, Paris, and London which written, as they are, in classical Tibetan require more aid to understand them than is afforded by the dictionaries of Csoma de Körös and Jäschke. It is not unreasonable to expect from the works, now in progress under your auspices, a flood of light on the history of northern Buddhism, regarding which our knowledge at present is so mixed with conjecture. Learned Indian Buddhist pandits travelled to Tibet and communicated to the Lochavas there the received interpretation of the phrases and terms used which were subsequently embodied in the dictionaries prepared in Tibet, and found in the *Bstan-hgyur* (*Mdo* class, *Go* volume), so that we, perhaps, could not reasonably expect a more authoritative interpretation than

that afforded by these manuscripts.* It should be a subject of congratulation to this Society that as it was the first in the field in bringing to the notice of European scholars the Sanskrit literature of India, it is again the first to open up this new source of knowledge, clearing away yet another cloud from the mists overhanging the history of the dark middle ages of India. I would also notice that the catalogues of the Burmese and Tibetan manuscripts belonging to the Society have been completed, the first has been prepared by Moung Hla Oung, and the second by Bábú Pratápa Chandra Ghosha.

Notices of Sanskrit MSS.—The 'Catalogue of Sanskrit manuscripts,' edited by Dr. Rájendralála Mitra, has reached its twenty-second number during 1887. This contains 160 pages with notices of 183 manuscripts, making the total of notices in this series amount to 3072. As already observed, this great mass of material requires collation and consolidation with the similar work undertaken in the other Provinces of India.

Work outside the Society.—Following the practice adopted last year, I purpose very briefly to review the work done outside the Society, and to bring to your notice matters that may interest you as bearing on the objects which the Society itself has in view. My time during the year has been so fully occupied by my official duties that I have not been able to keep myself so well acquainted as I should wish with the progress of research, but, thanks to the kindly aid of my colleagues,† I shall endeavour to tell you something of what has been done to advance our knowledge during the year 1887.

Survey of India.—Most of the operations of the Survey of India during the past year have been devoted to remunerative work as distinguished from purely scientific investigation. Parties have been engaged on the Revenue Survey of Akyáb and Bassein in Burma; parts of Orissa and Dinájpur in Bengal; Gorakhpur and Bastí in the N. W. Provinces; Jabalpur, Biláspur, Ráipur, Sambhalpur, Ságara, Narsinghpur, Damoh, Seóni, and Chhindwára in the Central Provinces; Muzaffarpúr, Gurdáspur, Amritsar, and Sháhpur in the Panjáb, and Darrang in Assam, besides Topographical and Forest surveys in Madras and Bombay, and a 50-foot to an inch survey of Calcutta. In many districts, the survey is cadastral with a record of rights. The Baluchistán parties have done a considerable amount of large-scale work around Quetta and towards the Khwája Amran range, and are now engaged on the half-

* See As. Res. XX, p. 398, 1836: Journ. I, p. 375, 1852.

† I beg to particularly record my obligations to Dr. G. King, Dr. W. King, Dr. Burgess, Dr. Barclay, Mr. Eliot, Mr. H. Bisley, and Colonel Thuillier; also to the Secretaries for aid in passing these pages through the press.

inch survey of that province. The Himálayan party has been working under Colonel Tanner towards Kulu, and the Andaman party has completed the survey of the coasts of the Nicobars.

In Burma, Captain Hobday, R. E., has been able to get through a large amount of work around Mandalay and towards Thebaw in the Shán States, whilst Colonel Woodthorpe, R. E., has connected his triangulation, carried down the Kyindwin from Manipur, with that of Captain Hobday around Mandalay. The latter officer and Mr. Kennedy have also surveyed portions of the Ruby Mines district. Colonel Woodthorpe, in the early part of 1887, explored the Kubo valley and the basin of the Yeu river, visiting Paungbyin on the Kyindwin and Thaungdut. A special officer has been employed in taking astronomical observations for latitudes from Jabalpur southwards towards Madras, and a party has extended a series of secondary triangles northwards from Madras, over a distance of 170 miles, to fix beacons and the position of prominent land-marks, for the Marine survey. Tidal observations have been taken at seventeen posts by self-registering gauges, and lines of spirit levels are being carried from these posts connecting them with the nearest triangulation stations. During the year, Tuticorin was thus connected with Erode, Negapatam with Trichinopali and Cochin, and Marmagoa with Shoránur and Kárwár. The reports and maps of the explorations of the surveyor M—H to the North of Nepal have appeared, but those of R—N in eastern Bhután, are not ready, and have not yet been issued in India.

Royal Geographical Society.—The *Proceedings of the Royal Geographical Society* contain as usual a number of papers that deserve our attention, and amongst them a prominent place must be given to those relating to Tibet and Central Asia. We have here notes of the progress made from time to time by the French travellers M.M. Bonvalot and Camus, who, after suffering much hardship in their adventurous journey across the western highlands from Samarkand, arrived safely in Simla in September last, by way of Chitrál and Gilgit. In Major-General Sir H. C. Rawlinson's article on 'the Dragon lake of Pámír', we find that he has discovered, from Mr. Ney Elias' account of his remarkable journey from the neighbourhood of Yengi-Hissar to Shighnán, that the route taken by that traveller is none other than the famous trade-route used by the caravans of Rome passing from Baktria along the 'Vallis Comedarum' to the Stone-tower on the border of Chinese territory; and, also, there is reason to believe that it is the same as that used by the great Chinese traveller Hiuen Tsiang in the seventh century. It would appear that there has been some confusion in the Buddhist ideas of geography, in making the Rang-kul, a lake on this route, one with the

Mánasarovara to the north of Kumaon, and attributing to it the name usually given to the Rákhas Tál, to the west of and close to the Mána lake. We have also an account of the journeys made by Captains Maitland and Talbot in Afghánistán, during which the Hirát triangulation has been carried to Bámián, and connected with points in the immediate neighbourhood of those fixed by the Kábul triangulation, a total area of about 9000 square miles having been surveyed and reconnoitred on the one-eighth inch scale. Nor should I omit to mention the survey work done by Colonel Woodthorpe, R. E., with the Gilgit Mission, covering some 10,000 square miles of the important and little-known districts of Yasin, Chitrál, Hunza-Nagar, and Wákhán and to complete which with General Lockhart he has been deputed to England.

Major C. R. Macgregor describes a journey made by himself and Colonel R. G. Woodthorpe from Sadiyá, on the upper waters of the Brahmaputra, to the Kampti Shán region, on the western branch of the Iráwadi. The expedition passed through a country inhabited by Kamptis or Sháns, Singphos or Kákhyens, Mishmis, Nágas and Kunnungs, and visited several of their villages including Lungnu and Padao. Another paper on the same region is that by General J. T. Walker, R. E., on the question whether the Lu river of Tibet is the source of the Iráwadi or of the Salwín. It gives a summary of our existing knowledge on the subject and an interesting discussion, the general result leaning towards the belief that the Lu-chu of Tibet forms the principal source of the Iráwadi. This is in its present stage a matter of purely speculative geography which will doubtless soon find a solution when affairs in Burma become a little more settled. We have also a brief notice of M. Potanin's lecture on his travels through North-Western China and Eastern Tibet, and a paper by Mr. H. E. M. James, giving a detailed account of his travels in Manchuria. Mr. E. D. Morgan's *resumé* of Russian geographical work in 1886 tells us of much that has been accomplished by the St. Petersburg Geographical Society, and in military topographical work by officers of the staff-corps and corps of military topographers in Asiatic Russia and Bokhára.

Mr. A. D. Carey's very modest account of his journey with Mr. Dalgleish round Chinese Turkistán, and along the northern frontier of Tibet, tells of an achievement second to none accomplished of late. Traveling from India by Leh, he crossed into Tibet by way of Polu and Kiria to Khoten, thence keeping the line of the Yurangkash river to Sháhyár, he struck the Tárím and followed it up to Lob Nor. Proceeding thence in a south-easterly direction, he skirted the great mountain ranges forming the northern boundary of the Tibetan highland, known as the Altun and

Kuen-lun, to Naichi. Here he was obliged to commence his homeward journey, which he effected by Sachu, Ghainshé, Hami, Turfán, Kuchár, and Yárkand to Leh, thus completing the circuit of Chinese Turkistán. Much of this route lay over country never visited hitherto by a European and not likely to prove attractive in the future. As Mr. Carey writes: 'the chief characteristic of the country is its extreme poverty: it may be described as a huge desert fringed by a few small patches of cultivation.' The paper is accompanied by a map prepared by Colonel Haig, R. E., from Mr. Dalgleish's notes. We have also an account of Prejevalsky's recent journeys and discoveries in Central Asia by Mr. E. D. Morgan, and we may shortly expect the first instalment of the traveller's own work on his last and perhaps most important expedition.

The Paris Geographical Society's Proceedings have a number of papers on the French possessions in Tongking, amongst which mention may be made of those on the Mekong river and the tribes inhabiting its banks, by M.M. Gouin and L. de Mazenad. In the '*Missions Catholiques*' there is a useful map of the lower Mekong, compiled by the missionaries, and in '*Excursions et Reconnaissances*,' a paper by M. Aymonier on Aunam, the country and people. We should also obtain some valuable information from M. Dutreuil de Rhin's forthcoming work on Tibet. The Berlin Geographical Society has the substance of a lecture delivered by Dr. F. Sarasin of Basle on the lengthened visit paid by him and his brother to Ceylon, during which they appear to have thoroughly investigated the physical and ethnological phenomena of the island. '*Globus*' has a series of articles on Merv and Prejevalsky's travels, and '*Das Ausland*,' a short notice of a pilgrimage to Jagannáth. The Parliamentary blue-book containing the 'Correspondence respecting the affairs of Central Asia' is furnished with maps which add much to its value, as it is presumed that they contain the latest information available from the records of the Survey, and, for those who are curious in this matter, the Russian official account entitled '*Délimitation Afghane. Négociations entre la Russie et la Grande Bretagne, 1872-85*,' lately published by the Russian Foreign office, gives the other side of the question. I must also mention Keane's '*Geography of the Malay peninsula, Indo-China and the Eastern Archipelago, Philippines and New Guinea*,' and Dr. Bastian's '*Indonesien oder die Inseln des Malayischen Archipels*.'

Indian Antiquary.—The *Indian Antiquary* upholds the high place that it has deservedly taken, and I have again to record the continuation of Mr. Fleet's '*Sanskrit and old Kánarese inscriptions*' (Nos. 168-171), and, by the same writer, papers on the date of the poet Rájásekhhara, and on the Gupta era. Professor Kielhorn continues his notes

on the *Mahābhāshya*, and gives an inscription of Yakshapāla from the Sati Ghāt in Gayā, and fresh readings of three Chandela copper-plate grants which have already appeared in our Journal, two edited by Mr. V. A. Smith,* and one by Dr. Rājendralāla Mitra.† They are dated in the end of the tenth and the beginning of the eleventh century, and were inscribed by order of Dhangadeva, Devavarmadeva, and Madanavarmadeva, Rājās of Kalanjara. Mr. Howorth continues his valuable series of papers on Chingiz Khān and his ancestors, and the Rev. S. Beal has a paper on Nāgārjuna Bodhisattwa and the King Shatopahanna. Pandit Bhagwān Lāl Indrajī gives an account of the Sirpur (Khandesh) grant of Mahārājā Rudradāsa, and Mr. Logan contributes to the discussion of the vexed question of Śankarāchārya's date which, from all that has been written, may be placed at the end of the seventh and beginning of the eighth century of our era. A feature of the year's issue is the collection of folk-lore from Southern India by Pandit S. M. Natesa Śāstrī, from Western India by Putlibai D. H. Wadia, Salsette by G. F. D'Penha, and Kashmīr by the Rev. J. H. Knowles.

Indian Notes and Queries.—With the *Indian Antiquary* may be mentioned '*Indian Notes and Queries*,' edited by Captain Temple and a competent staff. It admits short notices and articles, questions and answers to those questions, on all points connected with the physical and ancient geography, antiquities, history, fauna and flora, or products of India; or with its people, their history, distribution, languages, castes, customs, trade, and occupations. In fact, everything connected with India is admitted, except politics and religious topics of a controversial character. This periodical fulfils a distinct purpose, somewhat similar to that of its English namesake, and should be acceptable to the members of this Society as a useful adjunct to its own publications. Another interesting serial, also edited by Captain Temple, is the '*Legends of the Panjāb*,' which is intended to give the exact words used by the narrators themselves with a running translation and notes in explanation where necessary. Of this work two volumes have been published, and the third is under issue.

Other Journals.—The last number of the Journal of the *Bombay Branch of the Royal Asiatic Society* is taken up with Professor Peterson's third report on the Sanskrit manuscripts collected by him for Government, or catalogued as occurring in the Western Presidency, of which, also, a notice by Professor Bühler appears in the *Vienna Oriental Journal*. Attention may be drawn to the account of the Buddhist Sanskrit manuscript by Dharmottarāchārya, which is to be published for this

* xlvi, (1), p. 81, 84.

† *Ibid*, p. 73.

Society. The '*Madras Journal of Literature and Science*' contains papers by the editor, Captain R. H. C. Tufnell, on 'Hints to coin-collectors in Southern India,' by the Rev. M. Phillips, 'on the cosmogony of the Vedas,' and the text and a translation of a Pallava inscription from Amarávatí, by Dr. Hultzsch. We have not received anything from the *Ceylon Branch* of the Asiatic Society during the year, but in the *Journal of the Straits Branch of the Royal Asiatic Society*, there are some papers of interest to us in India. One is an English-Sulu-Malay vocabulary, another is 'on roots in the Malay language,' by Dr. Pijnappel, and a third is Mr. E. M. Satow's paper on the bibliography of Siam. I would also notice the second series of 'Miscellaneous papers relating to Indo-China' edited by Dr. R. Rost, which have been reprinted for the Straits Society from the Malayan 'Miscellanies,' the *Transactions and Journals* of the Batavian Society, and the *Journals* of the Royal Geographical and Royal Asiatic Societies, and our own *Journal*. The *Journal of the China Branch of the Royal Asiatic Society* contains a further instalment of Mr. G. Phillip's paper on the seaports of India and Ceylon from Chinese sources. In the *Journal of the Royal Asiatic Society* of London, I would draw attention to the papers by Mr. Senáthi Rája on 'the pre-Sanskrit element in ancient Tamil'; Major General Haig, 'on Ibn Baṭūṭa in Sindh'; and Mr. G. A. Grierson 'on some useful Hindí books'. Mr. F. Pincott continues his studies on the metrical arrangement of the hymns of the Ṛig-Veda, and gives his views on the peculiar system adopted in the first *Maṇḍala*, and Mr. H. G. Keene has an article 'on the revenues of the Moghul Empire.' Dr. T. Duka furnishes an essay on the Bráhúi grammar of the late Dr. Trumpp, in which he makes some valuable additions to our knowledge of this little-known language. The note by the Rev. S. Beal on Fah-Hien, the Chinese traveller, may be mentioned with his new translation of the life of Hieun Tsiang.

Foreign Societies.—In America, under the auspices of the American Oriental Society, a goodly number of papers have been published of interest to us in India. Professor Bloomfield gives us an article on 'two hymns from the Atharva Veda,' and Professor E. W. Hopkins contributes papers on 'the condition of Hindu women in the Mahábhárata,' 'the *Vyúha* or order of battle in the Mahábhárata,' 'Fire-arms unknown in ancient India,' and a short critique on Professor Bühler's edition of Manu. Dr. A. V. W. Jackson pursues his Zend studies, and has two papers on 'Avestan similes,' and a translation with notes of the *Afrigán-Rapithwina* of the Avestá, whilst the Rev. J. S. Chandler gives an article 'on the transliteration of Sanskrit proper names in Tamil,' and Professor Avery has an essay 'on the relationship of the Kachári and Gáro lan-

guages of Assam.' The Journal of the Asiatic Society of France (*Journal Asiatique*) contains the conclusion of M. Senart's papers on the language of the Aśoka edicts, which is also published separately, and also the conclusion of M. Sauvaine's 'materials for the history of Musalmán Numismatics and Metrology.' Attention may also be called to M. Abel Bergaigne's notes on the primitive *samhitá* of the Rig-Veda; M. L. Feer's translation of and notes on the *Upálisuttam*, and Mr. J. Darmesteter's paper on 'the *Mahábhárata* and *Sháhnámah*.' The Journal of the German Oriental Society (*Zeitschrift der Deutschen Morgenländischen Gesellschaft*) contains as usual much of interest on Indian subjects; Professor O. Böhtlingk giving a supplement to *Vasishṭha* which is criticised by Professor Bühler, and also a paper on *Apastamba*. Professor Bühler contributes a paper on the Aśoka edicts, and P. von Bradke continues his contributions to our knowledge of Indian religion and antiquities. To A. Hillebrandt we are indebted for an article on Vaidik ritual, and to A. Ludwig, for one on the meanings of words occurring in the Vedas, while Dr. Spiegel continues his *Avestá* studies. I am glad to hear that the Kashmír manuscripts described in last year's issue of the same Journal as having been collected by Dr. Hultzsch, have since been acquired by the Bodleian library at Oxford. In the *Vienna Oriental Journal*, we have a paper by Professor Bühler on the meaning of the particles 'iti' and 'cha,' with which may be compared Professor Böhtlingk's paper criticising the same in the Leipsic Journal. Dr. W. Cartellieri advances further evidence for the views of Professor Hall that Subandhu, author of the *Vásavadattá*, preceded Bána, and therefore that the books and stories quoted by him are older than the beginning of the seventh century. V. G. Ojha edits a new Valabhí grant, and Professor Jolly has a paper on Manu and Bṛihaspati. Professor Bühler further gives us gleanings from the *Kosha* entitled *Vaijayanti* by Yádavaprakáśa, an essay 'on the authenticity of the Jaina tradition,' and a review of S. P. Paṇḍit's *Gauḍaváha*, whilst Dr. Hultzsch commences a series of notes on new Indian inscriptions, giving an account of the Pallava inscription from Amarávatí of which the text appears in the *Madras Journal*. We have also to welcome the appearance of the first numbers of the publications of the new Italian Asiatic Society (*La Società Asiatica Italiana*) of Florence, which are apparently due to the recent visit of Count Angelo di Gubernatis to this country, and should do much to popularise Oriental research in Italy. I should also mention '*The Asiatic Quarterly Review*,' in which almost every article that has appeared is more or less concerned with Indian subjects, and which forms a valuable addition to an Indian library.

Other works. Semitic.—Besides the rather numerous editions of

the works of Arabic grammarians, especially in the Panjáb, we have to record the publication of the great grammar of Sibwayh or Sibawaihi, entitled '*Al Kitáb*' or 'the Book' by Maulavi Kabiruddin Ahmad at the '*Urdu Guide*' press in Calcutta. I note that an edition of this work is also appearing in Paris, edited by Professor H. Derenbourg. We may also record the near completion of a new edition of Lane's great lexicon, and the completion of the first volume of the *Dictionnaire Français-Arabe* by M. E. Gasselin, French Consul-General at Calcutta, containing all the words of the French language, including technical terms, with their Arabic equivalents, which are further grammatically and etymologically explained and illustrated by examples from classical writers. Dr. Lansing publishes a practical Arabic grammar at Chicago, and we have French translations of Ibn Baṭūṭā and Mas'ūdī's 'Meadows of gold.' But perhaps the most important Arabic work of the year is Professor Sachau's edition of the text and translation of the great work of Al Berúni, published under the auspices of the Secretary of State for India. Written in the eleventh century of our era, it contains the most accurate and philosophical account of the Hindu inhabitants of India of the time that is to be found in the whole range of Musalmán literature. Dr. O. S. Jayakar, Civil-Surgeon of Maskat, also gives us a brief account of the dialect spoken in the Oman district of Arabia.

Iranian-Aryan.—Portions of the Zend scriptures and writings have been reprinted in Gujrat and Bombay. We have the text with translation, commentary, and lexicon of the *Gajastak Abalish* prepared by A. Barthelemy, and reviewed by Kirste in the Vienna Journal, and also by the Rev. L. H. Mills, the third part of the English translation of the *Avestá*. M. C. Salaman's '*Mittelpersische Studien*,' in the *Bulletin* of the St. Petersburg Academy, criticises Peshutan Dastúr Behramjí Sayana's edition of portions of the Pahlavi writings transliterated in Zend characters, and translated into Gujrati and English with a commentary and glossary.

Sanskrit.—Your attention may be drawn to two serial publications in Bombay which serve the same purposes as our *Bibliotheca Indica*, for the minor Sanskrit works. One is the '*Kávyamála*,' carefully edited by Pandit Durgá Prasáda and Káshináth P. Paraba, and containing reprints of short poems and verses, and the other is the '*Kávyetihása saṅgraha*,' giving editions of dramas, chronicles, philosophical and theological works. We have also from Bombay, Dr. Taylor's translation of the *Prabodha chandrodaya*. Amongst new editions, a high place is taken by Professor Peterson's *Hitopadeśa*; Professor Jolly's *Mánava Dharma Śástra*, of which several notices appear; the *Maitráyani saṃhitá* by Schröder, and *Kátyáyana's Sarvanukramaṇi* to the Rig-Veda by Mr.

A. A. Macdonell, brought out through the authorities of the Cambridge University. Professor Pischel's editions of Rudrāṭa's erotic poem *Sṛīngāratilaka* and Ruyyaka's *Sahṛidayatīlā* win a commendatory notice from M. S. Levi. We have also the *Kaushitaki Brāhmaṇa* by Dr. B. Lindner, Hemachandra's *Lingānuśūyina* with a commentary by Dr. R. v. Franke, and Dr. Solf's 'die Kaśmīr recension der *Panṇasikā*.' Amongst grammars and dictionaries are Böhlingk's edition of Pāṇini, and a new edition of Max Müller's grammar by Mr. A. A. Macdonell, who is also engaged on a Practical Sanskrit dictionary. Parts of Prof. C. Capeller's '*Sanskrit-Wörterbuch*,' based on the great St. Petersburg dictionary, have appeared, and Dr. Speijer's valuable Syntax of classical Sanskrit, of which we hope soon to see a translation into English. I may mention here that the Paris Academy has chosen as one of the subjects for prizes in 1889, 'the Hindu drama.'

Indian Aryan.—The versions of the Scriptures in Marāṭhi, Dakhanī, Hindī, Santālī, Uriyā, and Urdu are now under-going revision at the hands of competent scholars, and should, from a merely philological point of view, furnish valuable results. Tulsidās's *Rāmāyana* has been republished in Bombay, and selections from it in the N. W. Provinces. It is to be regretted that it was not possible to issue any part of the Bihāri dictionary of Dr. Hoernle and Mr. G. A. Grierson during the year. Generally speaking, the school series of books in the various dialects spoken in India form a valuable contribution to the aids for their acquisition, by this I mean not only those published by the State Educational Department, but also those prepared by private Native compilers. In Urdu, special attention may be drawn to the new Hindustānī dictionary in preparation by the Rev. J. D. Bate of Allahabad which, it is promised, will contain many thousands of words that have never yet appeared in any dictionary hitherto published. Sindhi in Arabic characters makes a little progress: we have the '*Kisso sasi panhujā*,' a love story, and, in Hindi characters, a translation of the Bhāgavat.

Tibeto-Burman.—The Rev. S. Endle has published a grammar of the Kachāri-Bara, as spoken in the Darrang district in Assam; and Mr. Needham, already known for his labours in this field, has given us one of the Shaiyang-miri, spoken by the Miris near Sadiya, with texts and a vocabulary.

Indo-Chinese.—M. Azémar has published in Saigon a vocabulary of the Stieng language spoken in the valley of the Mekong, and M. Guion has, in the pages of the *Journal* of the Paris Geographical Society, several contributions on the Muongs, a tribe occupying portions of the upper banks of the same river. In the *Mélanges Orientaux*

we have a '*Texte Malais*' by the Abbé Faire, and Professor Abel des Michels' edition of some Annamite tales.

Dravidian.—Tirandumagni's commentary on the classical Tamil work *Tolkáppiyám* has been published in Madras, and it is hoped that we may soon have a translation, as this should throw considerable light on the ethnological condition of the people of Southern India. The *Nannúl* of Pávanandi, the standard grammar of Tamil, has gone through two editions, and Professor Vinson gives a 'Specimen of Tamil palæography' in the *Mélanges Orientaux*. Mr. L. Garthwaite has brought out a work on the essentials of Malayálim grammar, and the *Panchatantram* in the same language. In Telugu, we have several reprints of grammars and selections for educational purposes. The Rev. E. Droese continues his labours in the Maler language of the Bhágalpur district, and has produced a translation of a Gospel, and prepared some small works for educational purposes. The Gospels in the Badaga language are also under preparation by the Rev. W. Lutz; and revisions of the Telugu, Tolu and Konkani existing versions by other competent scholars.

Vernacular literature.—*Bengal.*—Your attention was called last year to the record of the current literature of India to be found in the 'Catalogue of books printed in British India' published quarterly in each Province. It is intended only very briefly to refer to it here, as the subject is too large to be usefully considered in an address of this nature, but it is desirable to keep it prominently before the members of this Society, and I would commend a review of the vernacular literature of the last decade as not unworthy of their attention. In Bengal there were 2,475 entries in the catalogue, from the middle of 1886 to the middle of 1887, for which alone the lists are available, and of these 838 works are described as written for educational purposes, and 1,657 as non-educational. The Bengal school of novelists is well represented by the '*Sítáram*' of Bábú Bankim Chandra Chattarji, which is intended to illustrate a more perfect stage of *nishkáma dharma* than has hitherto been attempted. The '*Saktik áman*' of Bábú Srish Chandra Majumdár, also, is notable, as giving a correct realistic view of the state of Hindu society in Bengal during the early part of the last century, when the rivalry of the Vaishnavas and Sáktas caused dissensions throughout the Province. The '*Harishe Bishád,*' of Bábú Táraka Chandra Gangúli, satirises the pretentious style adopted by some of the younger educated native officers of Government. In the domain of poetry, '*Apúrba máyá milan*' by a young author, and the '*Raivataka*' of Bábú Nabin Chandra Sen, are both worthy of notice. The latter attempts to give a rational explanation of the events recorded in the Mahábhárata. The year is remarkable for the publication of what may be considered

the oldest work in existence in the literary language of Bengal, the *Sri sri Krishna bijayá* of Gunaráj Khán, who flourished some 450 years ago. The labours of Pandit Rámanáráyaṇa Vidyáratna in reprinting a large and interesting series of Vaishnava works, and of Bábú Maheśa Chandra Pál in publishing works on philosophy deserve honourable mention. The latter has recently completed the commentary on the Vedánta by Mádhváchárya with the gloss of Jayatírtha. I have also to notice an important *bhášhya*, or commentary in Sanskrit, on the *Vaiśeshika-darśana*, by Mahámahopádhyáya Chandrakánta Tarkálankára. Already well known by his commentary on the *Gobhíltiya-gríhya sūtra* and the exposition of the tenets of the philosophical schools in his *Tattwabali*, the learned pandit now comes forward with a system of his own and shows himself a worthy successor of the Bháshyakáras of old. Another of our recently created Mahámahopádhyayas, Pandit Rákhál Dás Nyáyaratna of Bhátpará, justifies his selection for that honour by publishing a treatise on the Nyáya, in which he contests the views ordinarily held by the Naiyáyiks of Bengal. Mr. R. C. Datta has completed his edition of the Ṛig-veda, with a Bengali translation based on Sáyana's commentary, and notes derived both from indigenous sources and the results of the labours of European scholars. For using the latter he has received severe censure at the hands of some of his orthodox fellow-countrymen, but we may trust that more liberal views will soon prevail, and that the work done by Europeans who have rescued from oblivion so much that is valuable in Sanskrit literature will be fittingly recognized and valued even by the followers of the old orthodox school. Bábú Pratápa Chandra Ráya's valuable edition of the Mahábhárata, translated with the aid of competent European and Native scholars, has now reached the thirty-seventh part, which falls within the *Bhíshmaparvan*. Whether due or not to the prominence into which Buddhistic ideas have risen owing to the progress made by the Theosophical Society, it cannot but be regarded as a sign of the times that a commencement has been made in making the tenets of Buddhism more widely known by a translation from the Páli into Bengáli of the *Sutta Nípate* of the *Suttapítaka*, a portion of the sacred *Tripítaka*.

Madras.—The Madras issues comprise works in English, Tamil, Telugu, Malayálim, Kánarese, Urdu, Sanskrit, and polyglots. In Tamil, there are several works on grammar with commentaries, numerous religious works advocating the *advaita* system, or in praise of particular forms of the deity, such as the Kanjíviram Siva and Vishnu, the Tanjor Ganapati and Subramaniya. In Telugu, we have to note reprints of the works of the great southern teacher Rámanúja Achárya, besides the usual series of translations from the Sanskrit. The Malayálim issues

comprise both Hindu devotional works and numerous religious didactic treatises in the Arabic character and Mopla dialect, for the use of the Musalmán Moplas of the western districts of Madras. Several editions of well-known Sanskrit works have been brought out, amongst which mention may be made of the Black Yajur-Veda, the recognized ritual of the Smárta Brahmans.

Bombay.—The Bombay register contains books printed in English, Maráthí, Gujrátí, Sanskrit, Zend, Arabic in Hebrew and Arabic characters, Sindí in Persian and Hindí characters, Persian, Urdu, Marwárá, and Kánarese. Amongst those published in English, mention may be made of Mr. V. Shivrám Apte's 'Life and writings of the poet and dramatist Rájasekhara,' who is placed not earlier than the seventh century. In Maráthí, the life of the sage and poet Duyáneśwar, whose shrine exists in the Poona district, gives an interesting account of one who is famous in the popular songs of Maháráshtra. An edition, also, has been published, of his *Paribhāsháyukta* on the *Bhagavad-gíta*, which is probably one of the oldest specimens of literary Maráthí. Some curious legends, too, will be found in the account of the temple of the popular deities Vithoba and Rukmini in Pundharpur. There are many dramas founded on episodes in the Mahábháráta and Rámáyana, besides several of which the plot is original, such as that of the '*Gunotkarsha-nátik*' of V. Váman Sástrí Khare, laid in the time of Sivaji—and those with a didactic purpose, showing the evil effects of infant-marriage, drunkenness, and debauchery. Nor is the practical side of modern life neglected, for we have an encyclopædia of arts and manufactures based on Spon's standard work, and a Journal ('*Shetkari*') devoted to the improvement of agricultural processes. In *Gujrátí*, also, there is an agricultural journal, and a practical treatise on the working of cotton-mills, whilst light literature is represented by translations of 'Valentine Vox,' 'Munclausen's travels,' and others, besides some original stories and plays. There are several collections also of popular ballads and of the songs sung by women on festive occasions. A member of the Beni-Israel community gives an account of a journey to Jerusalem, and a devout Hindu one of a pilgrimage to Rámeśwar. These all indicate progress of the right kind, and a large increase in literary activity, which should lead to important results.

Panjáb.—The Panjáb register contains works in English, Arabic, Persian, Urdu, Sindí, Sanskrit, Hindí, Panjábí, and Marwárá. The Arabic-Persian series chiefly consists of reprints of grammars, commentaries on and parts of the Koran and Musalmán law-books, and poetry, and indeed the great mass of the issues in other languages comprises reprints of books of poetry and fiction, or of those designed

for educational or religious purposes. There were very few original works of any importance, and those that have appeared are mainly devoted to religious controversy, Sikh, Hindu, Musalmán, or Christian.

North-Western Provinces and Oudh.—The opening, during the year, of the new University at Allahabad supplies a long-felt want in the N. W. Provinces and Oudh. Hitherto the local institutions were affiliated to the Calcutta University, where there could be little sympathy or encouragement for the study of the local vernaculars, which, it is hoped, will now receive the attention that they so much deserve and need. The issues during the year, excluding periodicals, amounted to 800, of which 25 were in English, 361 Urdu, 261 Hindi, 31 Sanskrit, 19 Arabic, 69 Persian, and 30 polyglot. There were, as in the Panjáb, very few original works of value, though mention may be made of some treatises on medicine and on mathematics intended for educational purposes. Parts of Tulsidás's *Rámáyana* have gone through several editions, and in the '*Vijaya-dohavalí*' an attempt is made to explain the obscure *dohás*, *chaurpáís*, and *sorathás* occurring in that work.

Other Provinces.—Burma, Assam, and the Central Provinces, as might be expected, present but a meagre record. In Burma, there are numerous manuscripts both in Burmese and Páli, but the aid of the printing-press has been little resorted to, and there is here a tolerably wide field open to students. In Assam, Bengális are the principal writers, and their works, for the most part, are mere translations or simply reprints of Bengáli works, usually of a religious character.

Archæological Survey.—The survey of the Archæological remains in each Province continues to be prosecuted as vigorously as the organisation at the disposal of the Department admits. In the *Panjáb*, Mr. Rodgers has given the fruits of some of his labours in articles which will appear in our *Journal*, especially that relating to the old temple of Núrpur in Kángrá, besides collecting a large number of inscriptions. In *Bengal*, Mr. Beglar and his assistants have been employed on the ruins at Gaur in the Málda district and in Tírhút, but no detailed report is as yet available.

N. W. Provinces.—Dr. Führer, with Mr. E. W. Smith in charge of the survey in the N. W. Provinces and Central Provinces, in the beginning of the year, made a tour through Banda and parts of Allahabad and Bundelkhand, visiting Pratishtánapur, Bithábhayapatána, Bhattagráma or Garhwa, Kausambi, Prabhásá, Kalanjar, Mahobá, Ráhilyá and other important sites, and collecting numerous inscriptions, long and short, of which Dr. Führer has translated 10 Arabic, 24 Persian, and over 250 Sanskrit inscriptions in his report. Amongst these are 24 Gupta ones, and over 35 belonging to the sixth and seventh centuries; all of which

are new and of considerable importance. Gopála's cave at Prabhása, on which Mr. Cockburn has given us a paper already published in our *Journal*, was entered and surveyed, and all the inscriptions both inside and outside copied by means of ink impressions. These include three of the Indo-Skythian period, the oldest of which is dated Vikrama samvat 10, which may be 47 B. C., or only a regnal date, and five belong to the Gupta period. We may congratulate Dr. Führer on the success of his year's exploration. The draftsmen of the staff also made careful drawings of the architectural and other objects of interest at all the places visited during the tour. The report on the previous season's work at Jaunpur and in the eastern districts of the N. W. Provinces, with some important additions from the present season's work, is nearly ready for publication and will be richly illustrated. During the present season, the architectural assistant and draftsmen have been hitherto at Jaunpur, completing, in full detail, the survey of the Sharqi remains there, before they are further injured by unskilful 'restoration.' Dr. Führer has meantime been engaged upon a survey of the districts to the east of the Ganges and will, at a later date, be joined by the architectural staff in Rohilkhand. He has also compiled a very valuable descriptive list of the antiquarian and architectural remains in the N. W. Provinces and Oudh, which will be published by the Local Government at an early date. It is drawn up on the plan of the Bombay lists; but is fuller in details, and will afford an admirable guide to the archæology of the area with which it deals.

Dr. Burgess himself visited Kálsi in Dehra Dún, in the end of October, and took a complete impression in duplicate of the Ásoka inscription there, which it is expected from its clearness will leave little to be desired by scholars. He also obtained from the Lakkhá Maṇḍal temple, much further up the Jumna, two early inscriptions, one being a record of a temple built by Ísvará, a princess of the royal family of Singhapura who had married a Chandragupta prince of Jálandhara. It is not dated, but probably belonged to about 600 A. D., and gives a *vamsávalí* of eleven generations of the Singhapura family. From Sháhbázgarhi, he has also obtained, through the Assistant Commissioner, a new inscription in Baktrian-Páli, that may turn out to be the twelfth of the Ásoka edicts which was wanting in the great epigraph close by. It has been sent to Professor Bühler to be edited. From the Lalitpur district comes a long inscription, bearing the date 869 in some era, and from near Mathura, one of Kanishka of which the date may be 85 A. D. In last February, Dr. Burgess took impressions of all the inscriptions in the Nágpur Museum which are being now edited by Dr. Kielhorn

who has, also, recently ascertained the initial date of the Chedi era to be 248 A. D.

Bombay.—The Bombay Survey party made a tour last season in northern Gujarát and the west of Káthiáwád, visiting Kápadwanj, Vaḍnagar, Tarangi, Siddhapur, Anhilvádápaṭṭan, Mudhera, &c. in Gujarát, and the Jaina *tírtthá* of Satruñjaya at Pálitáná; the results, with a large number of photographs, drawings and inscriptions, as regards the Baroda territories, will, it is hoped, be brought out at His Highness the Gaekwár's expense, for whom a volume on other places in his State is now under preparation by the Director. It is understood that Col. S. Jacob of Jaipur is also making steady progress with his work on architectural ornament and detail from the buildings in the dominions of His Highness the Mahárájá, and which will be issued at His Highness's expense.

It is a most promising symptom of progress that these native Princes are taking so practical an interest in the work of the Archæological Surveys, and helping them. The Bombay party is devoting the present season chiefly to as thorough a survey, as its strength will permit, of the architecture of Bijapur, the capital of the Adil Sháhi dynasty (1489-1686 A. D.). The volume published by the late Mr. Fergusson and Meadows Taylor has given the student some general idea of the character of the Bijapur buildings, but a much more detailed survey is absolutely necessary to illustrate the wealth and beauty of the ornament and details, and the variety of structures represented. This it is hoped to accomplish by the present survey.

Madras.—The Madras Survey under Mr. A. Rea is understood to have done excellent work last season at Vellore, in the North Arcot district and elsewhere, having made a complete survey of the beautiful temple at Vellore, and of many others in the course of the season's tour. Mr. Rea has also been specially requested by Government, and very wisely we think, to visit and examine several prehistoric burial-grounds, and his explorations have been attended by success, far beyond those of any of his predecessors, in saving almost every object they contained intact. From Pallavaram, which had previously been visited by Dr. Bidie and Mr. Thorowgood, even in the rains, Mr. Rea excavated and carried entire to Madras an early earthen-ware coffin 6 feet long, of the most brittle material, with all its contents, and deposited it uninjured in the Madras Museum. His progress reports and accounts of these excavations are printed *in extenso* from time to time in the Madras Government orders, and would be well worth reproduction in a more permanent and accessible form. The present season is being devoted to the Krishná and Godávarí districts; and near Bejwádá, Mr. Rea has ex-

cavated the foundations of a genuine structural Buddhist vihāra, very similar to the only other hitherto noticed, that at Sanchi. The circuit of the walls is complete, except a part of the side wall, which some one has injured not knowing its importance : It is hoped, however, that the orders recently issued will be sufficient for its protection in future. Mr. Rea has also made important investigations at other places which will doubtless be duly reported in the Madras Government orders.

Dr. E. Hultzsch has completed the manuscript of what will form a considerable volume of inscriptions, chiefly in the Tamil character, and we may hope the Madras Government will not be slow to publish it. He is at present on tour through Salem, Trichinopali, Tanjor, &c. collecting impressions and copies of fresh inscriptions to be edited in the coming hot season and rains. I may also mention an interesting account of the ruins at Vijayanagar that has appeared in *The Madras Christian College Magazine*. Dr. Burgess' report on the Amarāvati and Jaggayapeta stūpas, completed so far as the author was concerned in 1886, has recently reached this country. Besides an account of these stūpas and the principal new sculptures and inscriptions, it contains, in the last chapter, a carefully written monograph on the Aśoka inscriptions from Dhanli and Jaugaḍa by Professor Bühler, based on impressions taken personally by Dr. Burgess. This chapter marks the last decided advance in the criticism of these important documents, and is accompanied by lithographic reproductions, on a small scale, of the impressions. Amongst the illustrations, Dr. Burgess has included the remainder of Colonel Colin Mackenzie's drawings made from slabs in 1816 and 1817, and not included in Mr. Fergusson's 'Tree and Serpent worship.' All the slabs so drawn, it is much to be regretted, have disappeared since 1817. This work reflects the highest credit on Dr. Burgess and his assistants, both for its method and execution and the excellence of the plates, woodcuts and plans. With it and Fergusson's work before us we have some of the best and most accurate materials in existence for a knowledge of Indian life in the earlier centuries of the Christian era. The Archæological Department may be justly proud of this, its latest contribution to the history of India, and I have no doubt that the same energy and rare discretion will be shewn in publishing the lapidary records of Eastern India, which have never yet been adequately represented.

The volume too is handsomely got up, but sells at the almost prohibitive price of three guineas, and we understand that Dr. Burgess rightly considers that the Reports of the surveys under his charge could be published in a form quite worthy of their importance at half the cost, by subscription, if no publisher's large profits had to be insured

Let us hope that both the Secretary of State and the Government of India will listen attentively to his proposals before they adopt other counsels. It would be a boon to all interested in Indian Art and Archæology if they could obtain by subscription the volumes of the Survey, containing 60 beautiful plates with the letter press, for Rs. 20, instead of at double or treble that cost through a publisher, and it is computed that a moderate subscription list would render this easily practicable.

The inscriptions it is expected will be issued in quarterly parts, either with or without other miscellaneous papers on archæological matters.

Anthropology.—The ethnographic enquiry which has been going on in Bengal for the last three years is now approaching completion, and a first instalment of the results is likely to be published in the form of a volume on 'The Tribes and Castes of Bengal' before the end of the current year. The scheme of this volume, of which the greater part is now in type, is purely ethnographic in the strict sense of the word, and it attempts to do little more than describe the internal structure, customs, and marriage system of all the castes and tribes found within the Province of Bengal. As the work is intended to serve administrative as well as scientific purposes, it is cast in the form of a glossary showing castes, tribes and their subdivisions in alphabetical order. Tables grouping these under their main heads are given in an Appendix, so as to illustrate the almost incredible extent to which the original social groups have broken up and multiplied. The large question of physical characteristics will be treated in a second volume, containing the measurements of most of the chief tribes in Bengal, the N. W. Provinces, Central Provinces, and the Panjáb. In this volume, I understand, an attempt will be made to distinguish the main types now discernible in the people of Northern India, and to ascertain how far these types correspond with the divisions based upon languages. For this latter we have a useful review of our present knowledge in Professor Fried. Müller's recent work on the language of all peoples and tribes of which grammars and dictionaries exist, and for another phase of the subject *L'histoire des religions* by M. M. Vernes. The '*Journal of the Anthropological Society*' of Bombay contains a number of interesting articles, amongst which I would notice one 'on demonolatry in South India' by Bishop Caldwell; 'on explorations in the Vedirata of Ceylon,' by Mr. C. W. Stevens, and 'on the formation and uses of an Anthropological Museum' by Captain R. C. Temple.

Biology.—The series of papers entitled '*Scientific Memoirs by Medical Officers of the Army in India*,' to which your attention was drawn last year, has, as was expected, rescued from oblivion many

discoveries in Natural Science which might have remained unrecorded for some time, if not for ever. In Part II, published early in 1887, there are six papers, whilst in Part III there are eleven memoirs; these, however, will be more properly considered amongst the results of 1888, as this part has not yet left the printer's hands. Of the papers in Part II, those by Dr. Cunningham are (1) 'On the effects sometimes following the injection of the choleraic comma-bacillus into the subcutaneous tissues in guinea-pigs,' and (2) 'On the phenomenon of gaseous evolution from the flowers of *Ottelia alismoides*.' In the former paper, it is shown that his inoculations were, in some instances, followed by an excessive multiplication of the bacilli within the bodies of the animals operated upon, and death with certain symptoms resembling those which characterise cholera in the human subject supervened, but the author does not think that the phenomena induced warrant the conclusion that they were of a truly choleraic nature. The two papers by Dr. Barclay are on the life-histories of two species of *Uredineæ*, one parasitic on *Strobilanthes dalhousianus*, which he has named *Æcidium strobilanthis*, and the other on *Urtica parviflora*, which he considers to be a variety of *Æcidium urticae*, a parasite well-known in Europe. Both parasites are heteroecious, or requiring two distinct hosts on which to complete their development. In the case of the former, the second host is *Pollinia nuda*, and in that of the latter, it is *Carex setigera*. These are the first species of *Æcidia* whose life-histories have been worked out in India.

Dr. King, F. R. S., discusses, in his paper 'On the fertilisation of *Ficus hispida*,' a problem of great interest in vegetable physiology which still remains unsolved. Lastly, Dr. Bomford notes the discovery of some eggs of *Distoma (Bilharzia) hæmatobium* in the intestines of two transport cattle which died in Calcutta. The discovery is of some importance, since hitherto the existence of this parasite has only been known in Africa, the Mauritius, and Arabia.

Indian Museum.—The Indian Museum continues to hold a high place in popular estimation, the number of visitors during the year of report being 460,992, giving an average of 1,928 for each day during which it was open to the public. Amongst the principal acquisitions of the year are the zoological collection from the Indian shores and deep seas contributed by the Marine Survey, and a collection of snakes from Singapore, mammals and birds from Afghanistan collected by Captain Yate, European Diptera from Dr. E. Becher, British Hymenoptera from Mr. E. T. Atkinson, invertebrates of the Arctic seas from the Stockholm Museum, and the Mergui collections that have been named through Dr. Anderson. The Trustees have long recognised their position as guardians of Imperial scientific research in India, but it has

not been found possible to do much hitherto in communicating the results of the collections that have been from time to time made. I am glad to be able to state that the cataloguing of our Indian fauna has at length been systematically commenced. Mr. W. Sclater has taken up the continuation of the 'Catalogue of the Mammalia,' so well begun by Dr. Anderson: Colonel C. Swinhoe and Mr. E. Cotes have published the second part of their 'Catalogue of Indian Moths' for the Trustees, and Mr. Wood-Mason has in hand a 'Catalogue of the *Mantoidea*' of which we have an excellent collection. The first plate of Mr. W. L. Distant's 'Monograph of the Oriental *Cicadidae*' is ready, so that we may expect an instalment of the work during the current year. Last year I announced the commencement of the publication by the Linnæan Society of the results of the examination of the collections made for the Indian Museum in the Mergui archipelago named through or by Dr. J. Anderson. A special volume has been devoted to these memoirs, and the following have appeared during the year:—Marine Sponges, by Mr. H. S. Carter: *Ophiurida* and on some parts of *Ophiothrix variabilis*, Dunc., and *Ophiocampsis pellicula*, Dunc., by Professor P. Martin Duncan: *Polyzoa* and *Hydroida* by the Rev. T. Hincks: a new species of *Brachyonychus* by Mr. H. W. Bates: the Birds, by Dr. J. Anderson: on *Dichelopsia pellucida*, Darwin, from the scales of an Hydrophid obtained at Mergui, by Dr. P. P. C. Hoek, and the Podophthalmous Crustacea by Dr. J. G. deMan. Most of these collections have already been returned, and all will eventually find a place in the Museum.

Nor has the practical side of zoology been forgotten. Collections of the silk-producing moths have been made for distribution to the several Provinces, and aid has been given to the inquiries now being made into the diseases affecting silk-worms. The laboratory has been completed, and stocked with appliances for the prosecution of these studies. To Mr. E. Cotes has been assigned the task of surveying the insect-pests of India, regarding which we are practically in utter ignorance, but this work can only be successfully accomplished by the co-operation of intelligent observers throughout the country, and I need only mention the subject to ensure your sympathy and support. An effort is also being made to re-arrange in a practical way the great mass of 'Economic Products' that has come into the possession of the Museum from the late Economic Museum and the Calcutta Exhibition. The object is to arrange the specimens so as to make them a practical commentary on Dr. Watt's 'Dictionary of Economic Products', now being prepared by him for the Government of India. This will contain the history, so far as known, of each specimen exhibited, and hereafter it is intended to add to this by a purely commercial survey of these products, showing the place where

each is procurable, the season, price, and probable quantity, and whether the supply is permanent or only casual. At first only those products that are of value and occur in marketable quantities will be examined, and in this way much useful work can be accomplished. Collections have already been made for and despatched to Russia, Italy, Belgium, France, and the Australian colonies. In connection with the Museum, I may be allowed to express the hope that steps may be taken to centralise within its walls the direction of the scientific research now fitfully undertaken in India. It has even now within its enclosure the Geological Department and Museum, and the nucleus of an Imperial archaeological collection, and within reasonable distance the magnificent herbarium of the Royal Botanical Gardens, but, if the Directors of these great branches of scientific inquiry became associated with the Board of Trustees and undertook the supervision of similar efforts in other Provinces, the work could be better apportioned and more efficiently and economically carried out, and neither friction nor interference with local wants or prejudices need necessarily follow.

Vertebrata.—We have in the ‘*Proceedings of the Zoological Society*’ a paper on the gnu-goat (*Budorcas taxicolor*, Hodgs.), by Mr. A. O. Hume and papers on the birds of Perak and on some birds in the Hume collection by Mr. Sharpe. In the ‘*Annals and Magazine of Natural History*,’ there are papers by Mr. O. Thomas on two new squirrels and a new rat from N. Borneo, as well as a reprint from our Journal of the article on Mammals from Northern Afghanistan which I have previously mentioned. Amongst those bearing on Asiatic ornithology in the ‘*Ibis*,’ mention may be made of one, by Dr. M. Menzbier, on some new birds from the palæarctic region, and of three, by Mr. Seebohm, on the birds of the Loo-choo islands, on the bull-finches of Siberia and Japan, and on *Phasianus colchicus* and its allies. Mr. Gurney contributes a paper on *Falco babylonicus* and *Falco barbarus* and Mr. Styan describes a new *Trochalopteron* from Yunnan, and gives an account of the birds of Foochow. Mr. Hargett describes a new woodpecker, *Gecinus gorii* from Southern Afghanistan. Another paper enumerates the birds collected by Prejevalski in his last expedition in Central Asia; and Mr. R. Bowdler Sharpe contributes papers on the birds of Fao, Bushire, and N. Borneo. Little has been done for our Indian species beyond the continuation of Mr. Murray’s ‘*Avi-fauna of British India*,’ of which the third part has appeared. This work, as previously stated, is intended to correct and bring up to the present level of our knowledge Jerdon’s well-known ‘*Birds of India*.’ It will serve as a very useful guide to bridge over the period between its issue and the publication of the results of the examination of Mr. A. O. Hume’s unequalled collection of Indian birds, now

the property of the British Museum. In the *Zeitschrift f. d. ges. Ornithologie*, we have an interesting paper by Dr. Blasius on the birds of Celebes, and in the *Bulletin* of the St. Petersburg Academy, one by Prof. V. Bianchi, on the birds of E. Bokhara. In the *Annals*, Mr. J. A. Murray describes a new *Zygæna* from Karáchi; Dr. Günther gives notes on batrachians from Perak, and Mr. G. A. Boulenger describes new batrachians from Corea and Malacca, and reptiles from Maskat, Afghánistán, Sumatra, and Borneo.

Invertebrata.—The Zoological Society's proceedings contain a paper on earth-worms from the Nilgiris and Shevaroyes by Mr. A. G. Bourne, and on a collection of Echinodermata from the Andamans by Professor F. J. Bell, whilst the conchologist has before him the continuations of Godwin-Austen's 'Land and Freshwater Mollusca of India,' of Sowerby's 'Thesaurus conchyliorum,' of Martini and Chemnitz's '*Systematisches Conchylien Cabinet*,' and of the great Philadelphia catalogue. In the '*Madras Journal of Literature and Science*,' Mr. J. R. Henderson has 'Notes on the Madras species of *Matuta*,' and Mr. H. S. Thomas a paper on the pearl oyster of Mannár. Amongst minor papers, mention may be made of those, by P. V. Gredler, on the shells of China, and by S. Clessin on the shells of India, Borneo, and Sumatra in *Malakozoologische Blätter*; by M. L. Morlet on the shells of Tongking in the '*Journal de Conchylogie*:' by Dr. O. F. von Möllendorff on the shells of the Philippines and by Dr. H. Pöhlig on the landshells of N. Persia, in the *Jahrbücher* of the German Conchological Society, and by Dr. O. Böttger on the *Melanidæ* and *Neritina* of China and Japan in the same publication. In the *Annals*, Mr. E. A. Smith describes some new shells from Sumatra, Java, and Borneo, and Mr. A. Dendy has a paper 'on the sponge-fauna' of Madras. In the same *Journal*, Mr. F. W. Pascoe describes some Asiatic *Ourculionidæ* and Mr. C. O. Waterhouse some *Erotylidæ* from Batchian and New Guinea and *Lucanidæ*, *Eutelidæ*, and *Lamiidæ* from Perak. In the '*Annales*' of the Entomological Society of Paris, M. Fairmaire describes some coleoptera from the interior of China including Yunnan and Kiang-si, of some interest as containing European forms side by side with special, local and Asiatic forms; and M. Flentiaux brings forward others from Annam. In the *Journal of the Linnean Society*, we have a paper on the *Colydiidæ* of Ceylon by Mr. G. Lewis, and one by Mr. J. S. Baly on new species of *Galerucineæ*. In the '*Revue d'Entomologie*,' Dr. O. M. Reuter continues his studies on Asiatic *Rhynchota*, and Mr. W. L. Distant in the '*Annals*,' describes *Cicadidæ* from S. India, China, and the Andamans, besides giving a paper on *Pentatomidæ* in the '*Transactions of the Entomological Society*' containing a number of new species collected by Mr. E. T. Atkinson in Sikkim.

In the Zoological Society's Proceedings, Colonel Swinhoe has a paper on the Lepidoptera of Mhow, and Mr. H. J. Elwes and Mr. L. de Nicéville describe new Indian species. Mr. de Nicéville is also engaged on the *Lycœnidæ* which will form the third part of his work on the butterflies of India, Burma and Ceylon. In the 'Annals,' Mr. H. Grose Smith records new species of butterflies from N. Borneo, Celebes, Philippines, Timor, Burma, and S. Afghánistán; Mr. W. L. Distant furnishes notes on the *Sphingidæ* from the Malay Peninsula, and describes a new species of *Ambulyæ* from North Borneo, and, with Mr. Pryer, some Rhopalocera from the same tract. I would notice in the 'Journal of the Bombay Natural History Society,' the interesting chatty notes entitled the 'Waters of Western India', and Captain Maoperson's life-history of *Hestia malabarica*. Mr. E. D. Morgan tells us that the Russian naturalist, M. Grumm-Grshimailo examined carefully the lepidopterous fauna of the Pámírs in 1884-85, and considers it to be distinct from that of the Thian-Shan, so far as known, but it has many affinities with that of the Hindu Kúsh, at least so far as types common to both would appear to indicate. 'The inference drawn from this fact is that at the period when the lepidoptera (and therefore other orders as well) of the Pámír were established, this region was in closer connection with the countries to the south of it than with those to the north; in other words, the Pámírs were then detached from the Thian-Shan. This may be explained in two ways; (1) a non-synchronous upheaval of the two mountain masses, or (2), if their upheaval took place at the same time, there was a certain interval of time during which they were parted from one another by a wide aqueous expanse, that is to say, at that period the ranges which now unite the Pámír with the Thian-Shan were non-existing, and Ferghána and Kashgár formed the bed of one sea—the Tárim-Ferghána.' I quote this suggestion at some length to show to what ingenious purposes the geographical distribution of our insect fauna may be applied. The '*Mémoires sur les Lépidoptères*,' edited by N. M. Romanoff, and published in St. Petersburg, contains many illustrated papers on the butterflies of Asiatic Russia and the neighbouring countries.

Botany.—Since I last addressed you, Government has made an arrangement by which the energies of Mr. J. F. Duthie, of the Saháranpur Botanic Garden, shall be almost exclusively devoted to the botanical exploration of the northern part of the Empire. The Flora of the whole of the North West frontier and of the Himálaya as far east as Nepál, together with the plains provinces of Sindh, the Panjáb, Rájputána, the North West Provinces and Oudh, can now thus be explored on a definite and well-organised plan. The

hope which I expressed in my last annual address that we should soon learn something of the botanical riches of the new province of Upper Burma is being realised more speedily than I had ventured to expect. For General Collett, an excellent and most enthusiastic botanist, has already sent to the Herbarium of our Botanic Garden several most interesting collections from the Shán hills. These collections contain several species which appear to be new to science, and many which have not been collected since Wallich's visit to Burma sixty years ago: and I learn from Dr. King that he has arranged for botanical collections being made at Bhámo. Thanks to the energy of Mr. G. Mann, Conservator of Forests, the botany of the Assam hill ranges is being gradually worked up, and the region between Assam and Burma will soon (there is some reason to believe) cease to be botanically a *terra incognita*. Mr. Mann appears at present to be the only Forest officer in Northern India who in any way forwards Botanical science, a state of matters little creditable to the Forest Department which of all others has the best and rarest materials at its disposal.

The chief work of public interest done in the Herbarium of the Botanical Garden at Síbpur has been the preparation, by Dr. King, of a monograph of the 'Oaks and Chestnuts of South-Eastern Asia,' similar to the same author's recently completed work on the 'Figs' of the Indo-Chinese countries. Dr. Prain, the recently appointed Curator of the Herbarium, has, I am informed, occupied part of his time in preparing a monograph of the difficult herbaceous genus *Pedicularis*. This monograph will probably see the light during the current year.

In the department of physiological Botany, our member Dr. D. D. Cunningham, has been hard at work, and has completed a remarkable memoir on the phenomena of movement in the leaves of the well-known 'Sensitive plant.' The cause of the movement has long been discussed by biologists. For many years it was considered to be explained by a mechanical theory, but Gardener and some recent writers have endeavoured to explain it by a theory of nervous or vital energy. This theory has for its basis the new anatomical doctrine that the protoplasmic contents of neighbouring cells in this plant are connected by thin threads, and that thus a kind of moniliform protoplasmic tissue is formed. These writers seek to explain the phenomena of movement by the transmission along this continuous protoplasm of a low kind of nervous force. The results of five hundred experiments and observations made by Dr. Cunningham on living sensitive plants go to prove that, even were the protoplasmic continuity an indubitable fact, the movements cannot be explained by any nervous force proceeding from the axis of the plant to the extremities of its leaves. Although not on a

botanical subject, another of Dr. Cunningham's researches merits notice here, as it is one in which every inhabitant of the Gangetic delta is practically interested. Dr. Cunningham, in his memoir on the nature of the sub-soil of the neighbourhood of Calcutta, shows that this soil is singularly porous in texture; and that, in a cubic foot of it, there is an air space equal to from one-fourth to one-third of its entire bulk. When the air in this space is replaced by water, the mass assumes a superficial resemblance to clay, although in fact it is a mixture of sand and water in the proportions just stated.

I may also mention here that the '*Journal of the Bombay Natural History Society*' contains interesting papers, by Mr. Birdwood, on the flora of Mahableswar and Matheran with a vernacular index, and by Dr. Dymock on the Maráthí names of plants. In the '*Annals*,' also, we have a useful paper by Mr. G. Murray on the 'Ceylon Algæ in the Herbarium of the British Museum.'

Geological Survey. Economic.—The most important economic work of the Geological Survey during the year has been the examination of the auriferous tracts of Mysore by Mr. Foote, who reports on all its known gold localities and their capabilities. The more interesting geological feature of his work lies in the fact that he has recognized a transition series to which in Mysore, and in the country on towards Dhárwár, the gold bearing reefs are confined. This Dhárwár series may eventually turn out to include some, if not all, the many transition groups of the northern portion of the peninsular area of India; and it is to be noted at the same time that the more decidedly metalliferous deposits are confined to such transition rocks rather than to the great crystalline or gneissic series. The next most interesting ore tract is that of the manganese and iron near Jabalpur, which is again under examination by Mr. Bose. Several new features have been noted which may lead to a larger estimate of the distribution and, perhaps, extent of the manganese ores than that put forth by Messrs. Medicott and Mallet in their original reports.

The estimate of the capabilities of the Chhatísgarh coal-field remains unchanged, though a seam of workable coal has been discovered and proved in one place near Korba. The example of the Mohpáni colliery, however, shows how necessary it is to carefully examine a seam before expensive works are undertaken; and, here also, it would be very hazardous to commence operations until further borings are made. With regard to the other great coal areas in Chhatísgarh, which have as yet given most indifferent and, in some cases, unreliable boring assays, a few trial pits to test the coal in bulk are about to be carried out. Mr. Oldham's further explorations in Rájputána have not yielded any

more promising evidence as to the coal possibilities in that region. Nor does his report on the long-known bitumenous occurrence at Tijára in Ulwar do more than confirm the conclusion formerly arrived at that the substance is merely a superficial deposit of sandy clay, containing vegetable organic matter, formed on the site of a deserted village. The substance burns, but, owing to the small amount, is of no use except locally for fuel. Mr. La Touche while employed by the Kashmír Darbár in examining the sapphire deposits in the Zanskár district, the survey of which has not yet been completed, has also explored the coal outcrops at Jammu, originally brought to notice by Mr. Medicott. He is inclined to look hopefully on the occurrence, provided some method can be devised for compressing the very crushed and powdery fuel procurable into bricks. The one coal-field (Singareni) in the Madras Presidency is at last being worked under the direction of Mr. Hughes, and we may now hope for extended and definite information regarding its capabilities; and, by comparison, the possibilities of the other areas of coal-measures known to occur further to the west in the Godávarí Valley. The Singareni field has always laboured under the disadvantage of being known only to the Geological Survey by its one outcrop and its area. The borings made, though on the sites marked out by Dr. King, were not put down under the direction of the Survey and consequently nothing is known by it of the character or quality of the samples of coal, or of carbonaceous shale (as it is feared some of them were) brought up from the borings. Though Upper Burmah has not yet come under the systematic work of the Survey, Mr. E. J. Jones has been able to send in some useful reports on the principal coal fields, and on the metalliferous mines in the Shán Hills.

Scientific.—Much and interesting information has been obtained on matters bearing strictly on scientific geology. The discussion on the geology of the Salt Range, arising out of Dr. Warth's find of concretions, and pebbly concretions containing *Conularia*, in the boulder bed at the base of the "speckled sandstones" and the "olive shales," and its bearing on the original observations of Wynne and Waagen, and the later ones of Oldham, has ceased for the present; and the old term 'olive shales' (presumed cretaceous) will now be discarded as a formational group, it being really identical with the "speckled sandstones" of the western portion of the range, of which the palæozoic (or 'upper carboniferous,' according to Dr. Waagen's latest conclusions) age was already inferred or known. So much being settled, the term 'speckled sandstone' will stand in the Salt Range nomenclature and classification.

Mr. Oldham has also visited Ladák and Kashmír with a view to determining how far the discrepancies between the sequence of beds

in Kashmír as described by Mr. Lydekker, and that of the Simla region were real. His report brings out points in what we may term the new view of the origin of the crystalline rocks, in the working out of which Col. C. A. Macmahon has done such excellent service, and to the microscopic study of which Mr. C. S. Middlemiss is now applying himself. The difficulty of distinguishing between gneissose granite and granitoid gneiss, still exists and gives rise to much diversity of opinion; and, perhaps too, the origin and recognition of the gneisses themselves are as controversial subjects among geologists as any. It is, therefore, interesting to notice that Mr. Oldham is at times, (particularly regarding the 'central gneiss' of the Wangar Valley) as decided in his recognition of their sedimentary origin from well defined and parallel beds differing in lithological and mineralogical structure, as some of his predecessors of so far back as 1857. While crossing the Bábeh Pass, Mr. Oldham noted that one of the most striking features is the marked absence of distinct traces of glaciers south of the pass and their presence north of it; on the latter side glacier evidences extend to a distance of 3000 feet below and 17 miles from the crest, while on the south no certain traces can be found below 1000 feet, or about half a mile from the summit. Mr. Oldham remarks that this difference is paralleled by the present distribution of ice, and that the contrast is doubtless due to the fact that the waste is much less on the north than on the south side, not only from the intensity of the sunshine being less, but to a much larger extent owing to the comparative absence of rain, little of which falls north of the pass, while there is probably a much less proportional difference in the snow-fall.

Regarding the very interesting question of the origin of the Rupshu lakes, Mr. Oldham does not think that the simple view of their arising out of the damming up of river valleys by the fans of their tributaries is completely satisfactory. In some cases, it may be that these fans form the entire barriers: but it would seem that local elevation of the river valley at a more rapid rate than that of the erosion of the river must be brought in as an ultimate cause. Mr. Oldham also suggests that the gradual and progressive drying up of Ladák appears to have been a direct result of the gradual elevation of the Himálaya, which in course of time cut off a larger and larger proportion of the moisture coming from the south. The lake basin and karewahs of Kashmír, which have hitherto been accounted for, either by a glacier descending into the Jhelam Valley, or by the formation of a talus fan similar to the supposed barriers of the Rupshu lakes, rather than by the more obvious hypothesis of a rock barrier since cut through, have also received notice from the same writer. He again falls back on the

supposition that, during the elevation of the Himálaya, there have been times when the rocky bed of a river has been elevated more rapidly than it could erode its channel, a deposit being formed above the barrier; and that this is the case in Kashmír, the greater extent of the valley being partly due to its drainage escaping across the junction of the Pír Panjál and Hazára systems of disturbance, a region which may well have been exposed to more repeated or extensive upheavals than other parts of the Himálaya.

Mr. R. Lydekker has added to the utility and completeness of the 'Records of the Survey,' by his excellent resumé of the 'Fossil Vertebrata of India;' and his description of the 'Eocene Chelonia of the Salt Range,' forms the new fasciculus of the 'Palæontologia Indica.' The issue of the concluding part of Dr. Waagen's great work on the 'Productus Limestone Fossils' of the Salt Range has only been temporarily delayed. Professor Martin Duncan's "notes on the *Echinoidea* of the cretaceous series in the Lower Narbada Valley," published by the Survey, and arising out of the views put forward by Mr. P. N. Bose in his memoir on the geology of the Lower Narbada Valley, is, as might be expected, a scholarly and courteous consideration of these views; and following this, it is eminently satisfactory to learn from Dr. Nöetling, the Palæontologist of the Survey, that his examination of the *Ammonitidæ* collected by Mr. Bose, entirely confirms Dr. Duncan's original conclusions regarding the exclusively Cenomanian age of these Bág fossils.

Meteorology.—There is not much to record in the science of meteorology in India during the past year, though steady progress is undoubtedly being made both in Europe and India. The recent visit of a distinguished English meteorologist has, judging from his subsequent writings, been the means of calling attention to what has been pointed out by Indian workers for years, the marked differences between the meteorology of Temperate (European) and Tropical (Indian) regions. Rain, for example, occurs in India in many cases under conditions different from those obtaining in Europe. Several of the more important features of cyclones are far more prominent in the Bay of Bengal than in the Atlantic, whilst others again are much less strongly marked. Ascensional movement of the air occurs on a larger, grander scale, and far more regularly than in Europe, exercising a powerful influence on the character of the weather. In India, weather forecasting must, therefore, probably take a different course from that which it has done in Europe and America, and indeed the forecasts of storms in the Bay of Bengal are more satisfactory and more to be relied upon than of those which visit the British shores from the Atlantic.

The forecast of weather in India for 24 hours in advance is, for the greater part of the year, a very easy matter, though, owing to the great distances, it is not easy to disseminate the information in time to be of practical value to those immediately interested. Seasonal forecasts have now been attempted with fair success for some years; and it is this branch of the science which seems likely to develop into a very useful aid to the administration. The recent disastrous shipwrecks drew attention to the storm-signal service for the protection of the Húghli and its approaches, and to the necessity for connecting Port Blair with the Meteorological office in Calcutta, and the Eastern Channel Light-ship by a cable with the mainland, in order to watch the progress of the larger cyclones. I regret that neither of these measures has, as yet, been carried into execution. Arrangements have, however, been made for warning all the more important ports in the Bay of Bengal from Maulmain to Negapatam of the existence and approach of dangerous storms, and arrangements are in progress for warning the ports at present unprotected on the Bombay side, which, when completed, will place the whole coast of India in communication with the telegraphic signal service.

The daily report, issued by the Simla office and based on observations at about 100 stations, has been considerably improved during the past year. It is now issued with a chart shewing the distribution of pressure, rainfall, wind direction and force throughout India for the day reported on. The charts of the Arabian Sea shewing the mean distribution of pressure, wind and currents, month by month, have been published on the same plan as those of the Bay of Bengal, noticed by me last year. Charts of the Bay of Bengal, shewing the specific gravity, distribution of the temperature of the air and of the surface water, have also been issued, and similar charts for the Arabian Sea are in preparation, thus completing the work commenced some years ago on marine meteorology, and based on the observations accumulated by the Board of Trade, during the years 1855—1878.

The PRESIDENT announced that the Scrutineers reported the result of the election of Office-Bearers and Members of Council to be as follows :—

President.

Lieut.-Col. J. Waterhouse, B. S. C.

Vice-Presidents.

E. T. Atkinson, Esq., B. A., C. S.

Rájá Rájendralála Mitra, C. I. E., D. L.

J. Wood-Mason, Esq.

Secretaries and Treasurer.

J. Wood-Mason, Esq.
 Dr. A. F. R. Hoernle.
 H. M. Percival, Esq., M. A.
 A. Pedler, Esq., F. C. S.

Other Members of Council.

D. Waldie, Esq., F. C. S.
 C. H. Tawney, Esq., M. A.
 Babu Pratápa Chandra Ghosha, B. A.
 Hon. Dr. Mahendralál Sarkár, C. I. E.
 E. Gay, Esq., M. A.
 Pandit Mahámahopádhyaýa Maheschandra Nyáyaratna, C. I. E.
 H. Beveridge, Esq., C. S.
 W. King, Esq., B. A., D. Sc.
 Nawab Abdul Latif Bahádur, C. I. E.
 A. Simson, Esq.
 Dr. J. Scully.
 Pandit Haraprasád Sástri, M. A.

The meeting was then resolved into the Ordinary Monthly General meeting.

LT.-COL. WATERHOUSE on taking the chair said :—

GENTLEMEN,—I have to tender you my warm acknowledgments for the great and unexpected honour you have done me in electing me to the honourable and responsible position of President of this Society. I must own my first impulse was to decline the honour in favour of some one possessing better scientific or literary qualifications, and with more time at his disposal to devote to the service of the Society. Friends, however, dissuaded me from taking a step which might have appeared ungracious, or due to a desire to evade duties which my long connection with the Council of the Society seemed to render incumbent upon me. I therefore resolved to accept the post if it were the pleasure of the Society that I should do so, and endeavour to fulfil its responsibilities to the best of my power. I need not say that personally it is very gratifying to me to be in a position to advance the interests of the Society. I can only regret that the rules of the Society prevented the longer continuance in office of our late esteemed President, who has done so much to aid the work of the Society both in the Philological and Natural History Departments, and I would propose that a vote of thanks be passed to him for his great services to the Society during his term of office. (*The vote of thanks was carried unanimously.*)

After the very able and interesting exposition of the work of the Society Mr. Atkinson has just given us I need not enter into that subject, and can only hope that notwithstanding my want of qualification for the post of President, the Society may at any rate not go back in its career of usefulness.

The minutes of the last meeting were read and confirmed.

Thirty-three presentations were announced, details of which are given in the Library List appended.

The following gentlemen, duly proposed and seconded at the last meeting of the Society, were balloted for and elected Ordinary Members.

Dr. A. Alcock.

W. L. Sclater, Esq.

H. H. Anderson, Esq.

Major C. H. E. Adamson.

W. H. Lee, Esq.

Hon. Ajodhyánáth Pandit.

The following gentleman has intimated his wish to withdraw from the Society.

E. F. Mondy, Esq.

The PRESIDENT announced that, in accordance with Rules 37 and 38 of the Society's Bye Laws, the names of the following gentlemen had been posted up as defaulting members since the last monthly General Meeting; and would now be removed from the list of Members, and the fact published in the Proceedings.

Sirdar Gurdyal Sing.

Rev. A. E. Medlycott.

The PRESIDENT announced that Babu Gaurdás Baisák had compounded for his subscription for life as a Non-Resident member by the payment in a single sum of Rs. 100.

Babu SARATCHANDRA DÁS exhibited the charmed horn called *Thumra*, used by the Tantriks of Tibet.

The NATURAL HISTORY SECRETARY read the following letter from Lieut.-Col. Allan Cunningham, R. E. remarking upon a statement contained in Babu Asutosh Mukhopádhyáy's paper on "Monge's Differential Equation to all Conics," published in the Journal, Part II, No. 2 for 1887:—

Brompton Barracks, Chatham, England, 29th December, 1887.

"At page 134 of Part II, No. 2, of the Journal of the Asiatic Society

of Bengal for 1887 there is a Paper on "Monge's Differential Equation to all Conics" wherein the author quotes the late Dr. Boole's remark that our powers of geometrical interpretation fail for this equation, (and presumably for nearly all except those of straight line and circle).

I would refer your readers to Vol. XIV of the Quarterly Journal of Pure and Applied Mathematics for 1877, page 226, wherein I gave three general geometric interpretations of differential equations in general.

These were as follows :—

1. The curve whose differential equation is of the m^{th} order can be drawn so as to satisfy m independent consistent conditions.

2. If the m^{th} order differential equation of a curve F be satisfied at any point of another curve f , then these curves have contact at that point of the m^{th} order (one degree higher than ordinary).

3. All fundamental geometric quantities (*e. g.* lengths, areas, eccentricities &c) connected with a variable curve F possessing m degrees of freedom and osculating in the highest or $(m-1)$ degree another fixed curve of *same species, similarly conditioned*, are constant right round the latter.

This last condition is the generalized form of those given by Boole for the straight line and circle: the interpretation of the Mongian thus becomes:—"The eccentricity of the osculating conic of a given conic is constant all round the latter." For proofs, see the paper referred to."

BABU ASUTOSH MUKHOPÁDHYÁY made the following remarks in reply :
MR. PRESIDENT AND GENTLEMEN,

When my paper on Monge's equation was read before the Society, I was not aware of Lt.-Col. Cunningham's paper, and, in fact, I had not the opportunity of examining it till I had learnt the contents of the letter which has just been read to you. With reference to the letter, and the paper to which we are referred therein, I will remark in the first place that they do not touch upon any of the vital points discussed in my paper. You may remember that my paper on Monge's equation was devoted principally to a consideration of four things, *viz.*, the easiest way of forming the Mongian differential equation from the integral equation of the conic, the integration of the Mongian by ordinary methods,* the permanency of form of the equation, and lastly, a cri-

* I find that in the *Messenger of Mathematics*, (Vol. XVII, pp. 118—145, December 1887 to February 1888), there is a paper by Col. Cunningham on the Depression of Differential Equations, the chief object of which seems to be the solution of the Mongian equation in different ways; I find that my transformation (*Journal*, A. S. B. Vol. LVI, Part II, p. 138) is reproduced on pp. 141—142, of course, without the slightest acknowledgement that it had been given before by me; that the Colonel was acquainted with my paper at the date of the publication of his article, is now sufficiently obvious, and his reasons for not acknowledging that the transformation in question had been given six months before by me, are best known to him.

ticism of Professor Sylvester's geometrical interpretation of the equation. Under this last head, which I consider to be the most important part of my paper, I pointed out that Professor Sylvester's interpretation was not anything like the one which had been sought for by mathematicians, and I took care to explain as fully and as clearly as I could, my reasons for differing from that eminent authority. To none of these points do the Colonel's remarks refer.* On the other hand, he takes objection to the statement which I incidentally made that as Professor Sylvester's interpretation cannot be accepted, the true interpretation has yet to be found; and the Colonel claims to have given the true interpretation in a paper published by him eleven years ago in the *Quarterly Journal of Mathematics* (Vol. XIV, 226—229). Before enquiring into the correctness or otherwise of the interpretation given in that paper, I may point out that Professor Sylvester's interpretation, which in my former paper was proved to be untenable, was given in 1886, and, while giving his own interpretation, the Professor not only made no mention of the Colonel's paper, but in fact seemed to hold, at least implicitly,† that he was himself the first person to give the true interpretation. Now, this could arise only in one of two ways, *viz.*, either Professor Sylvester had some doubts as to the soundness of the interpretation given by Col. Cunningham, or he was not at all aware of the Colonel's interpretation; as to the improbability of the latter assumption, I will simply say that Professor Sylvester's name appears as that of one of the editors on the title-page of that very volume of the *Quarterly Journal* which contains the Colonel's paper.

I shall now proceed to consider the Colonel's interpretation, and, I may tell you at once that after a very careful consideration of the subject, I have come to the conclusion that it is not at all the true interpretation of the Mongian equation. As there seems to be a total misconception about the true nature of the process of geometrical interpretation of differential equations, I shall first point out as clearly as I can, what I consider to be the only logical and correct view of the subject. In the first place, then, the integral equation of every curve contains a certain number of available arbitrary constants, by assigning particular values to which we may obtain all the curves of the family; the differential equation, on the other hand, being free from constants, denotes all the curves of the system. Now, it is well-known that the differential equation always comes out in the form

$$F = 0,$$

* I may mention here that Professor Cayley in a letter to me from Cambridge (14th September, 1887) remarks about my criticism of Professor Sylvester, that "it is, of course, all perfectly right."

† See *American Journal of Mathematics*, Vol. IX, pp. 18—19.

where F is a certain function of the variables and the differential coefficients; and, the process of geometrical interpretation of the differential equation is simply the process of discovering the geometrical meaning of the quantity which we have denoted by F ; in other words, we are required to find out a geometrical quantity, represented by F , which vanishes at every point of every curve of the system whose differential equation is

$$F = 0.$$

It is clear, therefore, that there are two tests which may be applied if we wish to examine whether a proposed interpretation of a given differential equation is relevant or not, *viz.*,

1. The interpretation must give a property of the curve whose differential equation we are interpreting; in fact, it must give a geometrical quantity which vanishes at every point of every curve of the system.

2. The geometrical quantity must be adequately represented by the differential equation to be interpreted.

To illustrate these propositions, let us first take the simple case of a straight line; the integral equation being

$$y = mx + b,$$

the differential equation is

$$\frac{d^2y}{dx^2} = 0,$$

and the interpretation clearly is that the curvature vanishes at every point of every straight line.

Again, in the case of the circle, the integral equation being

$$x^2 + y^2 + 2gx + 2fy + c = 0,$$

the differential equation is

$$\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\} \frac{d^3y}{dx^3} - 3 \frac{dy}{dx} \left(\frac{d^2y}{dx^2} \right)^2 = 0,$$

and the only true geometrical interpretation of this equation is that the angle of aberrancy vanishes at every point of every circle.

Let us now take Col. Cunningham's interpretation, *viz.*, the eccentricity of the osculating conic of a given conic is constant all round the latter. From what I have already explained to you, it is clear that this cannot be the geometric interpretation of the Mongian equation; it fails to furnish a geometrical quantity which, while adequately represented by the differential equation, vanishes at every point of every conic; in fact, it satisfies neither of the fundamental tests I have laid down. I may also point out that the general theorem which Col. Cunningham lays down, *viz.*, the constancy of all fundamental properties of the osculating curve, is, for similar reasons, not at all the geometric

meaning of the differential equation of any curve. The other interpretations given in the Colonel's paper are similarly wholly extraneous. To my mind, the matter appears to be simply this, *viz.*, the differential equation of any curve is nothing but the analytical representation of the vanishing of a certain geometrical quantity in connection with that curve, and the geometrical interpretation is exactly the process of discovering what this quantity is; Professor Sylvester's interpretation is irrelevant as not satisfying the first test laid down above, and Col. Cunningham's interpretation, as satisfying neither of the tests, has surely no better claims to our attention.

But, gentlemen, it is possible to prove not only that the Colonel's interpretation has entirely missed the mark, but also that it is the interpretation of a differential equation very different from the Mongian equation; and, guided by the wholly erroneous interpretations which Col. Cunningham has given in the case of the straight line and circle, I have been able to discover the differential equation to which in reality belongs the geometrical interpretation given by the Colonel. In fact, as we have already *a priori* shewn that the Colonel's interpretation is irrelevant, we may further strengthen our position by shewing that the interpretation belongs to a differential equation, which, though wholly distinct from the Mongian equation, stands in a very important relation to it.

Let us first take the case of the straight line, whose differential equation is interpreted by the Colonel to mean that the direction of a straight line is the same at all parts; this, as have already remarked, is totally erroneous. But, at the same time, the geometrical property is obviously the interpretation of the equation.

$$\frac{dy}{dx} = m,$$

which we at once recognize to be the first integral of

$$\frac{d^2y}{dx^2} = 0$$

which is the differential equation of all straight lines.

Similarly, in the case of the circle, the interpretation given by the Colonel, *viz.*, the curvature of a circle is constant, really belongs to the equation

$$\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\}^{\frac{3}{2}} \frac{d^2y}{dx^2} = r,$$

which, again, we recognize to be a first integral of

$$\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\} \frac{d^2y}{dx^2} - 3 \frac{dy}{dx} \left(\frac{d^2y}{dx^2} \right)^2 = 0$$

which is the differential equation of all circles. Guided by these two analogous cases, we guess that the Colonel's interpretation in the case of the conic may belong to a first integral of the Mongian equation, and, this point we now proceed to examine; the process will consist of two parts, *viz.*, we shall first form the differential equation whose interpretation is that the eccentricity of the osculating conic of any conic is constant, and, secondly, we shall examine whether this differential equation is a first integral of the Mongian equation.

The Mongian equation being one of the fifth order, it is clear that it has five independent first integrals, and, curiously enough, gentlemen, Col. Cunningham's interpretation does not belong to any of those first integrals which may easily be derived from the equation. Consider, now, the osculating conic of any conic; the equations of the two conics are identical, *viz.*, either being

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0,$$

we have

$$y = Px + Q \pm \sqrt{Ax^2 + 2Hx + B},$$

where

$$P = -\frac{h}{b}, \quad Q = -\frac{f}{b},$$

$$A = \frac{h^2 - ab}{b^2}, \quad H = \frac{hf - bg}{b^2}, \quad B = \frac{f^2 - bc}{b^2}.$$

Hence, as usual,

$$\frac{dy}{dx} = P \pm \frac{Ax + H}{(Ax^2 + 2Hx + B)^{\frac{1}{2}}}$$

$$z = \frac{d^2y}{dx^2} = \pm \frac{AB - H^2}{(Ax^2 + 2Hx + B)^{\frac{3}{2}}}$$

$$\frac{dz}{dx} = \frac{d^3y}{dx^3} = \mp \frac{3(AB - H^2)(Ax + H)}{(Ax^2 + 2Hx + B)^{\frac{5}{2}}}$$

$$\frac{d^2z}{dx^2} = \frac{d^4y}{dx^4} = \pm \frac{3(AB - H^2) \{ 4(Ax + H)^2 - (AB - H^2) \}}{(Ax^2 + 2Hx + B)^{\frac{7}{2}}}.$$

Now, as shewn in my previous paper (*Journal A. S. B.* Vol. LVI, Part II, 140), if we employ $z^{-\frac{1}{2}}$ as an integrating factor, a first integral is obtained from

$$z^{-\frac{1}{2}} \frac{d^2z}{dx^2} - 5z^{-\frac{3}{2}} \frac{dz}{dx} \frac{d^2z}{dx^2} + \frac{40}{9} z^{-\frac{5}{2}} \left(\frac{dz}{dx} \right)^2 = 0$$

to be

$$z^{-\frac{2}{3}} \frac{d^2z}{dx^2} - \frac{5}{3} z^{-\frac{5}{3}} \left(\frac{dz}{dx}\right)^2 = -3c_1.$$

The value of the left hand side is found on calculation to be

$$-3\Delta (AB - H^2)^{-\frac{1}{2}}.$$

Hence,

$$c_1 = \Delta (AB - H^2)^{-\frac{1}{2}} = \frac{h^2 - ab}{\Delta^{\frac{3}{2}}}$$

where Δ is the discriminant of the conic. But, as the area of the conic is

$$\frac{\pi\Delta}{(ab - h^2)^{\frac{3}{2}}},$$

we have

$$(\text{Area})^{\frac{2}{3}} = -\frac{\pi^{\frac{2}{3}}}{c_1}.$$

It follows, therefore, that the geometric meaning of the above first integral of the Mongian equation is the constancy of the area of the osculating conic.

Another first integral may be obtained as follows, *viz.*, employing $z^{-\frac{1}{3}}$ as an integrating factor, we have from

$$z^{-\frac{1}{3}} \frac{d^2z}{dx^2} - \left(\frac{7}{3} + \frac{8}{3}\right) z^{-\frac{4}{3}} \frac{dz}{dx} \frac{d^2z}{dx^2} + \frac{40}{9} z^{-\frac{1}{3}} \left(\frac{dz}{dx}\right)^2 = 0$$

the first integral

$$z^{-\frac{1}{3}} \frac{d^2z}{dx^2} - \frac{4}{3} z^{-\frac{4}{3}} \left(\frac{dz}{dx}\right)^2 = 3c_2.$$

The value of the left hand side is found on calculation to be (always taking the upper sign)

$$-3(AB - H^2)^{-\frac{1}{2}}.$$

Hence,

$$c_2 = -(AB - H^2)^{-\frac{1}{2}}.$$

But, as

$$AB - H^2 = \frac{\Delta}{b^2},$$

we have

$$c_2 = -b\Delta^{-\frac{1}{2}},$$

so that this first integral shews the constancy of

$$\frac{\Delta}{b^2}.$$

It may be noted that both the above first integrals may be obtained

from Roberts' Theorem that

$$cz^{\frac{2}{3}} + c'z^{\frac{1}{3}} = \left(\frac{dz}{dx}\right)^2$$

is a second integral of the Mongian equation, viz., differentiate this equation, then, eliminating c , we have one first integral, and, eliminating c' , we have the other.

The constancy of the quantities shewn above may also be shewn in another way, viz., as Dr. Wolstenholme has shewn by actual calculation, (Educational Times Reprint, t. XXIV, 105) the equation of the conic leads to

$$\left(\frac{d^2y}{dx^2}\right)^2 = \frac{9b}{\Delta^{\frac{1}{3}}}\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}} + \frac{9(h^2 - ab)}{\Delta^{\frac{2}{3}}}\left(\frac{d^2y}{dx^2}\right)^{\frac{2}{3}}.$$

But, if we have

$$\left(\frac{d^2y}{dx^2}\right)^2 = c'\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}} + c\left(\frac{d^2y}{dx^2}\right)^{\frac{2}{3}},$$

where c , c' are any two constants, we see that by differentiating twice and eliminating c , c' , the Mongian equation is obtained; hence, the quantities

$$\frac{b}{\Delta^{\frac{1}{3}}}, \frac{h^2 - ab}{\Delta^{\frac{2}{3}}}$$

are constants. From these we have

$$c^{\frac{2}{3}} = b^2\Delta^{-\frac{2}{3}}$$

$$c_1 = (h^2 - ab)\Delta^{-\frac{2}{3}},$$

so that

$$\frac{c_1}{c^{\frac{2}{3}}} = \frac{h^2 - ab}{b^2}.$$

These relations, however, do not shew the constancy of the eccentricity; but, as the Mongian being an equation of the fifth order has five independent first integrals, the fact of the eccentricity of the osculating conic being constant is probably the geometrical interpretation of one of the other three first integrals; before, however, actually proceeding to form that equation, we shall show how the constancy of the eccentricity may be otherwise established. Thus, we have

$$s = \pm \frac{(AB - H^2)^{\frac{1}{2}}}{(Ax^2 + 2Hx + B)^{\frac{3}{2}}}$$

or,

$$Ax^2 + 2Hx + B = \frac{(AB - H^2)^{\frac{2}{3}}}{s^{\frac{2}{3}}},$$

and, from

$$\begin{aligned}\frac{dz}{dx} &= \mp 3 (AB - H^2) (Ax + H) (Ax^2 + 2Hx + B)^{-\frac{5}{3}} \\ &= \mp 3 (Ax + H) z^{\frac{5}{3}} (AB - H^2)^{-\frac{2}{3}},\end{aligned}$$

we have

$$Ax + H = \mp \frac{1}{3} \frac{z^{-\frac{5}{3}}}{(AB - H^2)^{-\frac{1}{3}}} \frac{dz}{dx}.$$

Substituting in

$$\frac{dy}{dx} = P \pm \frac{Ax + H}{(Ax^2 + 2Hx + B)^{\frac{1}{3}}},$$

we get, after reduction

$$\frac{dy}{dx} - P = -\frac{1}{3} \frac{(AB - H^2)^{\frac{1}{3}}}{z^{\frac{4}{3}}} \frac{d^2y}{dx^2}.$$

Now, it is clear from the mode of genesis of this equation, that if we differentiate it twice and eliminate

$$P, (AB - H^2)^{\frac{1}{3}},$$

we should obtain Monge's equation; but, that would also be the case, if

$$P, (AB - H^2)^{\frac{1}{3}}$$

are replaced by any two constants; hence, it follows that P and $(AB - H^2)$ are constants. Now, as we have already shewn that

$$\frac{h^2 - ab}{b^2} = \frac{h^2}{b^2} - \frac{a}{b}$$

is a constant, we see, by remembering that

$$P = -\frac{h}{b},$$

that $\frac{a}{b}$ is also a constant. But, the equation of the eccentricity is

$$\frac{(2 - e^2)^2}{1 - e^2} = \frac{(a + b)^2}{ab - h^2} = \frac{\left(\frac{a}{b} + 1\right)^2}{\frac{a}{b} - \frac{h^2}{b^2}};$$

so that it follows at once that the constancy of the eccentricity is the geometrical interpretation of a first integral of the Mongian equation.

We now proceed to form the actual differential equation whose geometrical meaning is the constancy of the eccentricity. The above investigation shews that

$$K_1 \left(\frac{d^2y}{dx^2}\right)^{\frac{4}{3}} + K_2 \frac{d^3y}{dx^3} = \frac{dy}{dx} \left(\frac{d^2y}{dx^2}\right)^{\frac{4}{3}}$$

where K_1, K_2 are any two constants is a second integral of the Mongian equation. From this we have

$$\frac{d}{dx} \left[\frac{\left(\frac{dy}{dx} - P \right) \left(\frac{d^3y}{dx^3} \right)^{\frac{2}{3}}}{\frac{d^2y}{dx^2}} \right] = 0.$$

Taking the logarithmic differential, we get

$$\frac{\frac{d^2y}{dx^2}}{\frac{dy}{dx} - P} + \frac{4}{3} \frac{\frac{d^3y}{dx^3}}{\frac{d^2y}{dx^2}} - \frac{\frac{d^4y}{dx^4}}{\frac{d^3y}{dx^3}} = 0$$

which gives

$$P = \frac{3 \frac{dy}{dx} \frac{d^2y}{dx^2} \frac{d^4y}{dx^4} - 4 \frac{dy}{dx} \left(\frac{d^3y}{dx^3} \right)^2 - 3 \left(\frac{d^2y}{dx^2} \right)^2 \frac{d^3y}{dx^3}}{3 \frac{d^2y}{dx^2} \frac{d^4y}{dx^4} - 4 \left(\frac{d^3y}{dx^3} \right)^2}$$

Let,

$$U = 3 \frac{d^2y}{dx^2} \frac{d^4y}{dx^4} - 5 \left(\frac{d^3y}{dx^3} \right)^2$$

$$V = 3 \frac{d^2y}{dx^2} \frac{d^4y}{dx^4} - 4 \left(\frac{d^3y}{dx^3} \right)^2$$

$$W = 4 \frac{dy}{dx} \left(\frac{d^3y}{dx^3} \right)^2 + 3 \left(\frac{d^2y}{dx^2} \right)^2 \frac{d^3y}{dx^3} - 3 \frac{dy}{dx} \frac{d^2y}{dx^2} \frac{d^4y}{dx^4} \\ = 3 \left(\frac{d^2y}{dx^2} \right)^2 \frac{d^3y}{dx^3} - V \frac{dy}{dx}.$$

Now as

$$P = -\frac{h}{b},$$

we have

$$\frac{h}{b} = \frac{W}{V} = c_3, \text{ say.}$$

But, we have shewn that

$$\frac{c_1}{c_3^2} = \frac{h^2}{b^2} - \frac{a}{b},$$

whence,

$$\frac{a}{b} = c_3^2 - \frac{c_1}{c_3^2},$$

$$\frac{h}{b} = c_3.$$

Therefore, the equation for the eccentricity becomes

$$\frac{(2 - e^2)^2}{1 - e^2} = \frac{\left(\frac{a}{b} + 1 \right)^2}{\frac{a}{b} - \frac{h^2}{b^2}} = \frac{\left\{ c_3^2 (1 + c_3^2) - c_1 \right\}^2}{-c_1 c_3^2}.$$

To get the actual equation for the eccentricity, we have now simply to substitute for c_1, c_2, c_3 the differential expressions to which they are equivalent. For this purpose, we recall that the two first integrals

$$z - \frac{1}{3} \frac{d^3 z}{dx^3} - \frac{1}{3} z - \frac{1}{3} \left(\frac{dz}{dx} \right)^2 = -3c_1$$

$$z - \frac{1}{3} \frac{d^3 z}{dx^3} - \frac{1}{3} z - \frac{1}{3} \left(\frac{dz}{dx} \right)^2 = 3c_2$$

lead to the relations

$$3 \frac{d^2 y}{dx^2} \frac{d^4 y}{dx^4} - 5 \left(\frac{d^3 y}{dx^3} \right)^2 = -9c_1 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}},$$

$$3 \frac{d^2 y}{dx^2} \frac{d^4 y}{dx^4} - 4 \left(\frac{d^3 y}{dx^3} \right)^2 = 9c_2 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}},$$

which give

$$9c_2 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}} = V$$

$$9c_1 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}} = -U.$$

Hence, we have

$$1 + c_2^2 = 1 + \frac{W^2}{V^2} = \frac{W^2 + V^2}{V^2}$$

and

$$c_2^2 (1 + c_2^2) = \frac{W^2 + V^2}{81 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}}}.$$

Therefore,

$$\begin{aligned} c_2^2 (1 + c_2^2) - c_1 &= \frac{W^2 + V^2}{81 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}}} + \frac{U}{9 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}}} \\ &= \frac{T V}{81 \left(\frac{d^2 y}{dx^2} \right)^{\frac{2}{3}}}, \end{aligned}$$

where

$$\begin{aligned} T &= 3 \frac{d^2 y}{dx^2} \frac{d^4 y}{dx^4} - 4 \left(\frac{d^3 y}{dx^3} \right)^2 + 3 \left(\frac{dy}{dx} \right)^2 \frac{d^2 y}{dx^2} \frac{d^4 y}{dx^4} \\ &\quad - 4 \left(\frac{dy}{dx} \right)^2 \left(\frac{d^3 y}{dx^3} \right)^2 + 9 \left(\frac{d^3 y}{dx^3} \right)^4 - 6 \frac{dy}{dx} \left(\frac{d^2 y}{dx^2} \right)^2 \frac{d^3 y}{dx^3}. \end{aligned}$$

Also,

$$c_1 c_3^2 = -\frac{U V^2}{729 \left(\frac{d^2y}{dx^2}\right)^{\frac{2}{3}}}.$$

Hence, finally, we have

$$\begin{aligned} \frac{(2-e^2)^2}{1-e^2} &= \frac{\{c_2^2(1+c_3^2)-c_1\}^2}{-c_1 c_3^2} \\ &= \frac{1}{9 \left(\frac{d^2y}{dx^2}\right)^4} \cdot \frac{T^2}{U}. \end{aligned}$$

This, therefore, is the differential equation to which in reality belongs Col. Cunningham's interpretation. I may mention in passing that when $e^2=2$, we have $T=0$, and, when $e^2=1$, we have $U=0$; so that, $T=0$ is the differential equation of all equilateral hyperbolas, $U=0$ of all parabolas, $V=0$ of all pairs of right lines, and, $W=0$ of all central conics. I may also remark that I have never seen the eccentricity thus expressed in terms of the differential coefficients. Also, since

$$(\text{Area})^{\frac{2}{3}} = -\frac{\pi^{\frac{2}{3}}}{c_1}$$

and,

$$c_1 = -\frac{U}{9 \left(\frac{d^2y}{dx^2}\right)^{\frac{2}{3}}}$$

we have,

$$\text{Area} = \frac{27 \pi \left(\frac{d^2y}{dx^2}\right)^4}{U^{\frac{3}{2}}},$$

and, I have never seen the area expressed in this form.*

* Of course, the two absolute invariants, *vis.*, the area and the eccentricity, may be expressed in terms of the radius of curvature ρ , and arc, s ; thus, we have

$$\begin{aligned} \text{Area} &= \frac{27 \pi \rho^2}{\left\{9 + \left(\frac{d\rho}{ds}\right)^2 - 3\rho \frac{d^2\rho}{ds^2}\right\}^{\frac{3}{2}}} \\ \frac{(2-e^2)^2}{1-e^2} &= \frac{4}{9} \left\{9 + \left(\frac{d\rho}{ds}\right)^2\right\} + \frac{\rho^2 \left(\frac{d^2\rho}{ds^2}\right)^2}{9 + \left(\frac{d\rho}{ds}\right)^2 - 3\rho \frac{d^2\rho}{ds^2}}. \end{aligned}$$

We now proceed to verify that the differential equation

$$\frac{(2 - e^s)^2}{1 - e^s} = \frac{1}{9 \left(\frac{d^2y}{dx^2}\right)^4} \cdot \frac{T^2}{U}$$

whose geometrical meaning is Col. Cunningham's theorem about the constancy of the eccentricity, is a first integral of the Mongian equation. Thus, putting

$$p = \frac{dy}{dx}, \quad q = \frac{d^2y}{dx^2}, \quad r = \frac{d^3y}{dx^3}, \quad s = \frac{d^4y}{dx^4}, \quad t = \frac{d^5y}{dx^5},$$

we have,

$$\frac{(e^s - 2)^2}{1 - e^s} = \frac{T^2}{9 q^4 U},$$

so that taking the logarithmic differential and remembering that

$$\frac{dT}{dx} = (1 + p^2)(3qt - 5rs) + 10qr(3q^2 - 2pr)$$

$$\frac{dU}{dx} = 3qt - 7rs,$$

we get

$$\begin{aligned} & q^2(3q^2 - 2pr)(45qrs - 9q^2t - 40r^3) \\ &= (1 + p^2)(qs - 2r^2)(45qrs - 9q^2t - 40r^3), \end{aligned}$$

which proves that the equation of the eccentricity leads on differentiation to the equation

$$9q^2t - 45qrs + 40r^3 = 0$$

and is, therefore, a first integral of the Mongian equation.

Gentlemen, I have now examined the subject as completely as was necessary to shew the erroneous nature of Col. Cunningham's interpretation. I have explained to you, as lucidly as I could, the true meaning of geometrically interpreting a differential equation, and I have shown you that the Colonel's interpretation signally fails to satisfy the fundamental tests which every geometrical interpretation ought to satisfy; I have, further, pointed out to you that the Colonel's interpretation really belongs to a differential equation which is quite distinct from the Mongian equation, and, by actually forming that equation (as I have never seen done before), I have proved it to be a first integral of the Mongian equation. But, gentlemen, as this first primitive contains an arbitrary constant, it denotes any member of the given family of curves, while the differential equation itself indiscriminately denotes all the members of the family. Col. Cunningham's interpretation, therefore, involves a quantity, which remains constant as we pass from point to point on the same curve, but varies as we pass from one curve of the system to another. In reality, therefore, he failed to perceive the fundamental difference between a differential equation and its first primitive; he did not notice that while

the differential equation holds for every point of every curve of the system, the first primitive holds only for every point of the same curve, the different curves of the family being obtained by the variation of the constant which occurs in the first primitive. There can be no doubt that, failing to notice this distinction, Col. Cunningham has given an interpretation which belongs not to the Mongian equation but to one of its first primitives. Indeed, gentlemen, the error into which he has fallen reminds me of an old story with which you are familiar in eastern lore ; you have often been told how an oriental king, desirous of testing the powers of an astrologer placed a finger-ring set with precious stones in a casket, and having closed it asked the astrologer to divine its contents ; the astrologer moved the admiration of the prince when after long calculation, he pronounced the contents to be a hard stone, circular in form, with a hole in the centre and an object of every-day use ; but, imagine the disappointment of the king when on pressing the astrologer, he was told that the hidden object was a grinding stone such as you find in every Hindu household. Such is the facility of error where we have to fix upon a particular object from a not very definite description of it, and, Col. Cunningham's paper shews that such an error is possible even in an exact science like mathematics. To sum up: the Colonel's remarks do not refer to any of the vital points of my paper, and, as to his geometrical interpretation of the Mongian equation, it is wholly irrelevant. I, therefore, stick to my statement that the true interpretation of the Mongian equation has yet to be found.*

The following paper was read—

On Poisson's Integral.—By BABU ASUTOSH MUKHOPÁDHYÁY, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The object of the author in the present paper has been mainly to discuss a remarkable definite integral, which was first considered by Poisson in his memoir on definite integrals, inserted in the tenth volume (seventeenth cahier) of the *Journal de l'école Polytechnique*. The paper is divided into four sections, of which the first is introductory. The second section is devoted to a consideration of the transformation of the integral ; the method of reduction is first applied to a generalized indefinite form of Poisson's integral, from which Poisson's result is deduced with ease ; and the process at once leads to four remarkable definite integrals which are believed to be new. The third section gives

* Since these remarks were made, I have succeeded in discovering the geometrical meaning of the differential equation of all parabolas, which I hope to communicate to the Society at an early date.

a symbolic value for π , which is deduced as an immediate consequence, as well of Poisson's integral, as of an analogous definite integral also considered by that eminent mathematician. The fourth section contains an interesting geometrical interpretation of the analytical transformation in Poisson's remarkable result; the geometrical property used is the well-known relation between the true and eccentric anomalies, with which we are familiar in the planetary theory; in conclusion, the geometrical interpretation leads to a definite integral which is evaluated.

The paper will be published in the Journal, Part II for 1888.

LIBRARY.

The following additions have been made to the Library since the Meeting held in January 1888.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,

presented by the respective Societies and Editors.

- Baltimore. American Chemical Journal,—Vol. IX, No. 6, November, 1887.
- . American Journal of Philology,—Vol. VIII, No. 3. October, 1887.
- . Johns Hopkins University,—Circulars, Vol. VII, Nos. 60—61, November, December, 1887.
- Birmingham. Birmingham Philosophical Society,—Proceedings, Vol. V, Part II, Session 1886-87.
- Budapest. Magyar Tudományos Akadémia,—E'rtkezések, Kötet XIII Szám 3, 4, 6—12.
- . —————. Nyelvtudományi Közlemények, Kötet XX, Füzet 1—2.
- . —————. Régi Magyar Költök Tára, Kötet V.
- . —————. Mathematische und Naturwissenschaftliche Berichte aus Ungarn. Band IV.
- . —————. Ungarische Revue, Heft 1—7, 1887.
- . —————. Ethnologische Mitteilungen aus Ungarn, Jahrgang I, Heft. I.
- Bombay. Anthropological Society, Journal, Vol. I, No. 3, 1887.
- . Indian Antiquary, Vol. XVII, Part CCIV, January 1888.
- . Royal Asiatic Society, Bombay Branch,—Journal, Vol. XVII, No. XLVI, 1887.

- Calcutta. Geological Survey of India, Records, Vol. XX, Part 4.
 ———. Indian Engineering, Vol. III, Nos. 1—4.
 ———. The Indian Engineer,—Vol. IV, Nos. 8—9.
 ———. Meteorological Observations recorded at seven stations in India, corrected and reduced, August and September, 1887.
 ———. Stray Feathers, Vol. X, No. 6, 1887.
- Dublin. Royal Geological Society of Ireland,—Journal, Vol. VIII, (new series), Part II.
- Hamburg. Naturhistorisches Museum zu Hamburg,—Bericht, 1886.
- London. The Academy,—Nos. 815—818.
 ———. The Athenæum,—Nos. 3138—3142.
 ———. Nature,—Vol. XXXVII, Nos. 946—950.
- Mexico. La Sociedad Científica "Antonio Alzate",—Memorias, Tome I, No. 5.
- Mendon, Ill. The American Antiquarian and Oriental Journal, Vol IX, No. 6, Nov., 1887.
- Paris. La Société de Géographie,—Compte Rendu des Seances, Nos. 14—16, 1887.
- Philadelphia. Academy of Natural Sciences of Philadelphia,—Proceedings, Part III, October—December 1886, Part I, January—April 1887.
 ———. American Philosophical Society,—Proceedings, Vol. XXIV, No. 125, January to June, 1887.
- Rome. La Società degli Spettroscopisti Italiani,—Memorie, Vol. XVI, Dispensa 9^a, Settembre, 1887.
- San Francisco. California Academy of Sciences,—Bulletin, Vol. II, No. 6, January 1887.
- St. Petersburg. Comité Géologique,—Bulletins, Tome VI, Nos. 8—10 and supplement to Tome VI.
 ———. ———. Memoires, Vol. II, Nos. 4, 5, Vol. III, No. 3, 1887.
 ———. ———. La Société Impériale Russe de Géographie,—Journal, Tome XXIII, No. 5.
- Trenton, N. J. Trenton Natural History Society,—Journal, Vol. I, No. 2, January, 1887.
- Turin. La R. Accademia della Scienze di Torino,—Atti, Vol. XXIII, Disp. I^a, 1887-88.
- Vienna. Des K. K. Naturhistorischen Hofmuseums.—Annalen, Band, II, Nr. 4.
 ———. Der K. K. Zoologisch-Botanischen Gesellschaft in Wien,—Verhandlungen, Band XXXVII, Quartal, 4.
- Washington. United States Geological Survey,—Bulletins, Nos. 34-39, Index to Vol. IV, 1886.

- Washington. Smithsonian Institution,—Annual Report, Part I, 1885.
 ————. ————. Miscellaneous Collections,—Vols. XXVIII
 —XXX.
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BOOKS AND PAMPHLETS,

presented by the Authors, Translators, &c.

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 No. 1, 1887. The College of William and Mary. No. 2, 1887. The
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 Washington, 1887.
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 in the northern anthracite coal field, Luzerne County, on 18th
 December 1885. 8vo. 1887.
 ————. The Geologic distribution of natural gas in the United
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 GARDNER, Prof. P. New Greek coins of Bactria and India. 8vo. London,
 1887.
 JOLLY, Prof. J. Mánava Dharma Sástra, the Code of Manu. Original
 Sanskrit Text. 8vo. London, 1887.
 KOHLER, Prof. Dr. J. Die Gewohnheitsrechte des Pendschabs. Sepa-
 ratatdruck aus Zeitschrift für vergleichende Rechtswissenschaft. 8vo.

MISCELLANEOUS PRESENTATIONS.

- Fourth Annual Report of the Bureau of Ethnology 1882-83. 4to. Wash-
 ington, 1886.

BUREAU OF ETHNOLOGY, WASHINGTON.

- Mineral Resources of the United States, 1885. Division of Mining
 statistics and Technology. 8vo. Washington, 1886.
 Monographs of the United States Geological Survey. Vol. X, Dinocerata,
 an extinct order of gigantic Mammals. 4to. Washington, 1886.

GEOLOGICAL SURVEY UNITED STATES, WASHINGTON.

- Report on the River-Borne Traffic of the Lower Provinces of Bengal,
 and on the Inland Trade of Calcutta, and on the Trade of Chittagong
 and the Orissa Ports, with notes on Road Traffic, for 1886-1887. Fcp.
 Calcutta, 1887.
 Returns of the Rail-Borne Trade of Bengal, during the quarter ending the
 30th September 1887. Fcp. Calcutta, 1888.
 Report on the Rail-Borne Traffic of Bengal, during the year 1886-1887.
 Fcp. Calcutta, 1887.

Indian Forester,—Vol. XIII, No. 12, 1887, Vol. XIV, No. 1, 1888.

GOVERNMENT OF BENGAL.

Report on the search for Sanskrit Manuscripts in the Bombay Presidency during the year 1883-84. By Rámkrishna Gopál Bhándárkár, M. A., Ph. D. 8vo. Bombay, 1887.

GOVERNMENT OF BOMBAY.

Statement exhibiting the moral and material progress and condition of India during the year 1885-86. Fcp. London, 1887.

Review of Forest Administration in British India for the year 1885-86. Fcp. Simla, 1887.

Statistical Abstract relating to British India from 1876-77 to 1885-86. 8vo. London, 1887.

GOVERNMENT OF INDIA, HOME DEPARTMENT.

Annual Report on the Lunatic Asylums in the Madras Presidency for the year ending December 1886. Fcp. Madras, 1887.

Report on the Administration of the Madras Presidency during the year 1886-87. Fcp. Madras, 1887.

GOVERNMENT OF MADRAS.

Maps to accompany the Land Revenue Settlement Report of the Jhelum district, 1874-80.

GOVERNMENT OF PUNJAB.

Johns Hopkins University. Studies in Historical and Political Science, Fifth Series, XI. Seminary Libraries and University extension. By H. B. Adams. 8vo, Baltimore, 1887.

JOHNS HOPKINS UNIVERSITY, BALTIMORE.

Votják Népköltészetű Hagyományok. Gyűjtöttee és Fordította Dr. Munkácsi Bernát. 8vo. Budapest, 1887.

A Phonetika Elemei, Különös Tekintettel a Magyar Nyelvre. Irta Dr. Balassa József. 8vo. Budapest, 1886.

MAGYAR TUDOMÁNYOS AKADEMÉ'NIA, BUDAPEST.

Brief sketch of the Meteorology of the Bombay Presidency in 1886-87. By F. Chambers. Fcp. Bombay, 1887.

METEOROLOGICAL OFFICE, BOMBAY.

International Meteorological Observations, August, 1886. 4to. Washington, 1887.

Report on the Meteorology of India in 1886. By John Eliot, M. A. 4to. Calcutta, 1887.

METEOROLOGICAL REPORTER, GOVERNMENT OF INDIA.

Annual Report of the Director of the Royal Alfred Observatory, Mauritius, for the year 1886. Fcp. Mauritius 1887.

C. MELDRUM, ESQ.

Abhandlungen aus dem Gebiete der Naturwissenschaften. Band X.

Zeitschrift zur Feier des fünfzigjährigen Bestehens des Naturwissenschaftlichen Vereins in Hamburg. 18th November 1887.

NATURWISSENSCHAFTLICHEN VEREINS, HAMBURG.

Prodromus of the Zoology of Victoria, or figures and descriptions of the living species of all classes of the Victorian indigenous animals. Decade XV. 8vo. Melbourne, 1887.

PUBLIC LIBRARY, VICTORIA.

Tide Tables for the Indian ports for the year 1888 (also January 1889).

By Major J. Hill, R. E., in charge Tidal and Levelling operations, Survey of India, and E. Roberts, F. R. A. S., F. S. S. Nautical Almanac Office, London. Demi 8vo. London.

Tide Tables for the Hooghly River 1887 and 1888. By Major J. Hill, R. E., in charge Tidal and Levelling operations, Survey of India, and E. Roberts, F. R. A. S., F. S. S. Nautical Almanac Office, London. Two Sheets. London.

SURVEY OF INDIA, TIDAL AND LEVELLING OPERATIONS.

PERIODICALS PURCHASED.

- Calcutta. Calcutta Review,—Vol. LXXXV, No. 171, January, 1888.
 ———. Indian Medical Gazette,—Vol. XXII, No. 12, December, 1887.
 Geneva. Archives des Sciences Physique et Naturelle,—Tome XVIII,
 No. 12.
 Leipzig. Annalen der Physik und Chemie,—Band XXXIII, Heft I.
 ———. ———. Beiblatter, Band XI, Stuck 11.
 London. The Chemical News,—Vol. LVI, Nos. 1464—1468.
 ———. Mind,—Vol. XIII, No. 49, January, 1888.
 ———. The Nineteenth Century,—Vol. XXIII, No. 131, January,
 1888.
 ———. Society of Arts,—Journal, Vol. XXXVI, Nos. 1830—1834.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR MARCH, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 7th March 1888, at 9 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the chair.

The following members were present :

Nawab Abdul Latif Bahádur, C. I. E., E. T. Atkinson, Esq., W. R. Criper, Esq., S. R. Elson, Esq., E. Gay, Esq., Dr. Hoernle, Prince Jahán Qadr Muhammad Wáhid Áli, Bahádur, E. J. Jones, Rev. Father E. Lafont, Babu Asutosh Mukhopádhya, T. R. Munro, Esq., L. de Nicéville, Esq., Mounq Hla Oung, Esq., H. M. Percival, Esq., Hon. Dr. Mahendralála Sarkár, C. I. E., C. H. Tawney, Esq., D. Waldie, Esq., J. Wood-Mason, Esq.

T. D. La Touche, Esq., visitor.

The minutes of the last meeting were read and confirmed.

Twenty-seven presentations were announced, as detailed in the appended Library List.

The following gentlemen are candidates for election at the next meeting :

Babu Haridása Shástri, Principal, Mahárájá's College, Jeypúr, proposed by Pandit Haraprasáda Shástri, seconded by H. M. Percival, Esq.

Maulvi Ahmad, Arabic Professor, Presidency College, proposed by Nawab Abdul Latif Bahádur, seconded by A. Pedler, Esq.

The following gentleman has intimated his wish to withdraw from the Society :

F. C. Barnes, Esq.

The SECRETARY reported the death of the following member :

S. S. Jones, Esq., C. S.

The SECRETARY read the names of the following gentlemen who had been appointed by the Council to serve on the several Committees during the year :

LIBRARY COMMITTEE.

Nawab Abdul Latif, Bahádur.	Rájá Rájendralála Mitra.
E. F. T. Atkinson, Esq.	Mahámahopádhyáya Pundit Mahésa- chandra Nyáyaratna.
E. Gay, Esq.	Hon. Dr. Mahendralála Sarkár.
Babu Pratápachandra Ghosha.	W. L. Sclater, Esq.
Prince Jahán Qadr Muhammad	Dr. J. Scully.
Wáhid Áli, Bahádur.	
Dr. W. King.	

FINANCE COMMITTEE.

E. F. T. Atkinson, Esq.	Babu Pratápachandra Ghosha.
E. Gay, Esq.	Rájá Rájendralála Mitra.

PHILOLOGICAL COMMITTEE.

Nawab Abdul Latif, Bahádur.	C. J. Lyall, Esq.
H. Beveridge, Esq.	Rájá Rájendralála Mitra.
J. Beames, Esq.	Babu Nilmani Mukerjee.
J. Boxwell, Esq.	Mahámahopádhyáya Pundit Mahésa- chandra Nyáyaratna.
Dr. A. Führer.	Hon. Ajodhyanátha Pandit.
G. A. Grierson, Esq.	Hon. Dr. Mahendralála Sarkár.
F. S. Growse, Esq.	Babu Harapasáda Shástri.
Babu Pratápachandra Ghosha.	Hon. Sir Sayyid Ahmad.
Prince Jahán Qadr Muhammad	C. H. Tawney, Esq.
Wáhid Áli, Bahádur.	Dr. G. Thibaut.
Col. H. S. Jarrett.	Col. A. C. Toker.
Maulaví Khudá Bakhsh Khán	
Bahádur.	

COINS COMMITTEE.

Dr. A. Führer.	J. H. Rivett-Carnac, Esq.
A. Hogg, Esq.	C. J. Rodgers, Esq.
Rájá Rájendralála Mitra.	V. A. Smith, Esq.
Lt.-Col. W. L. Prideaux.	

HISTORY AND ARCHÆOLOGICAL COMMITTEE.

Syud Amír Ali.	Babu Pratápachandra Ghosha.
J. Beames, Esq.	Mahámahopádhyáya Kaviráj Shya- maldás.
H. Beveridge, Esq.	Rájá Rájendralála Mitra.
Babu Gaurdás Bysack.	

W. H. P. Driver, Esq.
Dr. A. Führer.
F. S. Growse, Esq.

J. H. Rivett-Carnac, Esq.
Capt. R. C. Temple.

NATURAL HISTORY COMMITTEE.

H. H. Anderson, Esq.
Dr. A. Barclay.
E. C. Cotes, Esq.
Dr. D. D. Cunningham.
J. F. Duthie, Esq.
Dr. G. M. Giles.
E. J. Jones, Esq.
Dr. G. King.
Dr. W. King.

C. S. Middlemiss, Esq.
L. de Nicéville, Esq.
Dr. Fritz Noetling.
R. D. Oldham, Esq.
S. E. Peal, Esq.
Dr. J. Scully.
W. L. Sclater, Esq.
Col. C. Swinhoe.

PHYSICAL SCIENCE COMMITTEE.

P. N. Bose, Esq.
Dr. D. D. Cunningham.
J. Eliot, Esq.
S. R. Elson, Esq.
Dr. G. M. Giles.
S. A. Hill, Esq.
E. J. Jones, Esq.
Rev. Father Lafont.
Dr. W. King.

J. J. D. La Touche, Esq.
C. S. Middlemiss, Esq.
Babu Ásutosh Mukhopádhyaýa.
Dr. Fritz Noetling.
R. D. Oldham, Esq.
Hon. Dr. Mahendralála Sarkár.
Dr. W. J. Simpson.
D. Waldie, Esq.

The PRESIDENT announced that the Hon. Adjodhyanátha Pandit, of Allahabad, had compounded for his subscription as a non-Resident member by the payment in a single sum of Rs. 300.

The PRESIDENT announced that the Council had sanctioned the publication in the Bibliotheca Indica of Bhaṭṭotpála's commentary on Varáha Mihira's *Bṛihat Saṃhitá*, to be edited by Dr. G. Thibaut; also that they had appointed Messrs. Meugens and King to be Auditors of the Society's Accounts for 1888.

The PHILOLOGICAL SECRETARY read the following extract from a letter from Prof. E. Senart:—

“J'ai vu les deux rochers de Mauhrah et de Shahbaz Garhi. J'espère que ma visite ne sera pas tout-à-fait sans résultat pour l'établissement de ces textes. Malheureusement ils sont, pour une grande partie, en si fâcheuse condition, qu'il n'y a aucun espoir d'arriver jamais à une conclusion définitive. Je vous ai écrit, je pense, que le xii^e édit venait d'être retrouvé à Shahbaz Garhi par le capitaine Deane. A Mauhrah il ne

manque dans les xiv édits que les Nos. 13 et 14. Je ne doute pas qu'ils n'existent quelque part autour des pierres connues. Mais je n'ai pu ni les découvrir ni recueillir aucun renseignement. Il faudrait avoir plus de temps dans la place.

Tout ce pays-là est plein de promesses certaines pour qui saurait y chercher. J'espère bien des choses de l'intelligence de capitaine Deane. Il a trouvé récemment de curieuses sculptures en bois très-anciennes. Elles m'ont fait repenser à cette grande masse de forme conique sculptée de pierres que nous avons vue ensemble à l'Indian Museum. Je serais bien curieux d'en avoir de bonnes photographies. Si vous trouviez possible d'en obtenir je serais tout disposé à faire quelques frais dans ce but."

The PHILOLOGICAL SECRETARY exhibited two silver coins of the reign of Gangeya Deva, the Kálachuri rájá of Chedi, received from the Government, N.-W. P. and Oudh.

The PHILOLOGICAL SECRETARY read reports on two finds of Treasure Trove coins.

I. Report on 37 silver pieces, forwarded by the Deputy Commissioner of Jabalpur, with his No. 600, dated 13th February 1888.

1. The silver pieces are said to have been found in a place called Khitoba, in the Jabalpur district.

2. They make up 36 silver coins, two of the pieces being fragments of one coin. These coins belong to the well-known class of "old Hindú punch coins," bearing a variety of symbols punched on their surface, generally on one side only. There are, among these 36 coins, 30 of a more or less square or oblong, and 6 of a more or less circular shape. Some of these bear punches on both sides. Most of them are of more or less impure silver. They are worth from two to four annas each.

II. Report on eleven old rupees, forwarded by the Deputy Commissioner of Sháhpur, with his No. 1141, dated 15th December 1887.

1. The coins were found by a labourer while digging for a foundation near a Khangah named Azim Jatti at Badar, on the Chenab, in the Sháhpur District.

2. They are Rupees of the following Mogul emperors of Delhi :—

	No. of specimen.
I. <i>Aurangzib</i> , 1068—1118 A. H. = 1658—1707 A. D., dates 1111, 43—1105, Mints: Súrat, Akbar- nagar.....	3
II. <i>Muhammad Sháh</i> , 1131—1161 A. H. = 1719—1748. a, <i>Sáhib Qirán</i> type, dates 114*, 19—11**, 25— 11**, 5 1***, 8—Mint :—Sháhjehánábád...	5

b, <i>Bádsháh Ghází</i> type, dates : 1146, 16—113*,	3
5—do.—Mint : Akbarábád	3
Total ...	11

3. They are not in a state of good preservation, and belong to very common types. Their value is R. 1 each.

The PHILOLOGICAL SECRETARY read the following note from Mr. V. A. Smith regarding a paper on the Gupta coinages, on which he is engaged :

“ Mr. V. A. Smith is engaged in preparing a paper on the silver and copper Gupta coinages, with supplementary notes on the gold coinage, and will be much obliged for any information on the subject with which he may be favoured. Details of the weight and find-spots of coins will be especially welcome. Mr. Smith believes that the Gupta copper coins are not so rare as has been supposed, and that many of them probably exist in private collections. Until November 1888 Mr. V. A. Smith's address will be “ Care of Messrs. Wm. Watson & Co., 27 Leadenhall Street, London, E. C.” ”

The following papers were read—

1. *On the Barisál Guns.*—By BABU GAURDÁS BYSACK (postponed from last meeting.)

I need scarcely make an apology for reverting to the subject of the physical phenomenon known as the Barisál Guns, a subject too important and too interesting to be lost sight of, or buried in oblivion. My object in doing so, is to place on record certain facts that have come to my notice since the subject was, for the first time I believe, broached at your meeting in 1867, (*vide* my paper on the Antiquities of Bagirhát published in Part I of the Journal for 1867, Vol. XXXVI), and to ask you not only to invite the attention of all learned scientific gentlemen, but to organise a system of enquiry and observation with a view to arrive at a solution of the problem.

You are already aware that the sounds resemble the booming of distant cannonade, and that they are usually heard during the months from April to September in a lull after a squall, or after a shower of rain, or when the clouds begin to break up. Barisál Guns they are called because at Barisál the explosions happened to be first noticed, but the area is vast over which such noises are heard. They are heard as high up as at Fureedpur and all over the south of Backergunj and Jessore (now Khulna) specially in the neighbourhood of the Baleswar river.

Recent facts that have come to my knowledge shew that other places than those enumerated above are wont to enjoy the honor of these mysterious salutes.

Similar sounds are heard, I heard them distinctly, at Tumlook. While in temporary charge of the Sub-Division during April and May 1883, and staying in the Government Bungalow standing formerly some way off, but at the time of my residence only 25 feet from the edge of the high bank that was being cut away by the river Rupnarayan, it was on an afternoon between 1 and 2 o'clock that, after a shower of rain, the reports like those of a distant cannon struck my ears. The similarity of the sounds to what I knew as Barisal Guns at once attracted my notice and excited my curiosity. I made an enquiry of the oldest inhabitants, and they told me that they were accustomed to hear the sounds from their childhood, but they knew not how to account for them, at least no superstitious legend like the Khanja Ally salutes ascribed to the Barisal Guns was attached to them. I utilised the opportunity by sending out a dinghy to cruise up and down the river for several miles, in order to ascertain if the banks had any where fallen in heavy masses, but nothing of the kind was discovered to favour the theory of those who ascribe the noise to such a cause. When I mentioned the fact to Mr. Medicott he told me that he has heard from a friend that similar sounds are heard at Cherra Punji. Babu Karunadas Bose of the Subordinate Judicial Service, an inhabitant of Dacca, wrote to me to say that these strange reports are heard in Vikrampur, more frequently in the wet than in the dry weather, but never in Dacca. These places are far out of the reach of the sea-beach, a fact that directly discountenances the surf theory, *i. e.*, surf breaking on the sea-shore and causing the noise, which seems to have found favour with certain learned gentlemen, who confidently laid stress upon it when the subject came in for fresh discussion at your meeting in August 1870: the theory, however, still remains where it was in the dark region of conjecture.

In order to arrive at a correct solution of the problem one must enquire on the spot, and frame his inquiries according to such information as he can collect, and such suggestions as he may gather from his first impressions. Any one who hears the noise may trace out its cause and origin. Very little can be suggested by one who has not heard it, and who is many hundred miles away. Mr. Blanford told me that with that view a set of questions from the Society were prepared, printed and circulated, but that no information was received in reply to them. Diligent search was made for a copy of the questions but without success.

I would suggest that a fresh effort be made to collect information, or to direct inquiry from a scientific point of view, so that the origin or cause of the sounds may be ascertained with as much precision or

accuracy, as the resources of science may enable us to do. If necessary, Government might be requested to aid the endeavours of the Society by asking the local officers of the places in which the sound is audible to institute inquiries in reference to the points suggested in the paper of questions that may be sent out to them.

The theories that have been hazarded to account for the cause of the phenomenon are the following :

- 1st. Breaking up of surf.
- 2nd. Falling of heavy masses of earth in the river.
- 3rd. Electrical discharges under water, or explosive gases stirred up by some sort of volcanic action escaping through the waters.
- 4th. Some subterranean or volcanic agency.

Postscript.

Since the above was written copies of the former series of queries referred to by me have turned up. I wrote with a copy of them to my friend Mr. P. N. Mitra, Barrister-at-Law, who resided at Barisal for several years, and whose professional duties took him to all parts not only of Backerganj, but also the neighbouring districts, asking him to let me have his impressions of the phenomenon. The answers given by him are noted below :

1. "The sounds are like the reports of big guns going at a distance. They are always heard at regular intervals, sometimes following one another in quick succession like minute guns, sometimes at intervals of 10 or 15 minutes. So far as I have been able to observe, I have heard these guns going sometimes for 3 or 4 hours together.

2. These reports are generally heard in the mornings and evenings, and seldom or never in the middle of the day. They may be heard at all times of the night.

3. The rainy season is the time of the year when these reports are most frequently heard. They are generally heard *after* a heavy shower, and sometimes *before*, just when the clouds have formed in the sky.

4. The reports seem generally to come from the south and are always accompanied by a *south wind*. I observed these phenomena in the town of Barisal itself and also in the southern parts of the District of Backerganj.

5. I know from personal experience that they are heard most frequently during the rains. I have never heard them in the cold weather or at the beginning of the hot weather either, during my eight years' experience in the district of Backerganj.

6. I never heard these sounds at Rungpore, and I am not aware that they are heard there. I have heard that these sounds can be



heard at Rajpur near the Sonarpur Railway Station (E. B. S. Railway) a few miles south of Calcutta."

It is necessary, with a view to see that all the facts already ascertained are correctly placed in their true light, and beyond the possibility of a doubt or dispute, that I should refer to one or two points in Mr. Mittra's answers, and also in the lucid summary of our President.

Mr. Mittra observed that he never heard these sounds during the cold weather. This qualifies the remark I made in my first paper on the Antiquities of Bagerhat, that at that station the sounds are heard at all times of the year. I did not carefully specify the periods when these sounds are most frequent, but generally stated that they occur most distinctly during a lull after a storm, or after a heavy shower of rain. It was not noticed by me that they were heard before a shower. It is certain that they do not occur after every shower of rain. I know from personal experience that at Barisál these sounds are very common, as common as they are at Bagirhát, but the fact recorded by me that, though the sounds are heard at Bagirhát they are not heard at places near there, nor in other parts of the Sunderbunds equally distant from the shores of the Bay, and where the surf is violent, might, I suspect, be open to correction. It may be accounted for in this way, that during the cold weather, November to February, I used to be absent from the Station and moving about (on tour) in the interior of the Subdivision, and the reason why I did not hear the sounds at the places I encamped, is because they did not occur at all. Having been familiar with the noise during nine months of the year at Bagirhát, it was but natural that the impression left on my mind was that it is heard at all times of the year, but this, as well as the fact of its being altogether inaudible during the cold weather in all parts of the two districts in question, should be tested by due inquiry and accurate observation before they are accepted or rejected for the purpose of ascertaining the cause of the phenomenon.

I was hitherto under the impression that the sound is not audible at Khulna, as it was never noticed by me although my stay there extended over 9 months (May to December) in 1863, and 17 months in 1869-70: but I observe that it is and has been heard there. My friend Babu Bunkim Chunder Chatterjee, who was in charge of the Subdivision for several years, writes me to say,

"Rainey is right after all. I remember very well that I used to hear the Barisál guns while at Khulna. I also remember that they were audible at various places within the Subdivision further east. I distinctly remember that I heard them on one occasion while encamped at Tála on the *Kaputaka*. I have always thought the only possible way

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of accounting for these noises is to accept the current theory that they proceed from subterranean sources."

I mention this to shew that people are generally indifferent to external occurrences, however curious or extraordinary in their nature, until their attention is drawn by somebody.

The fact mentioned by Mr. Mittra that the sounds are not known at Rungpore should be noted, as it is very near the Teesta, a very big and boisterous river; Mr. Mittra resided there for a long time.

The character of the sounds bears a strong resemblance to the booming of distant cannonade: it is neither like the rattle of musketry nor like the rumbling sound that precedes an earthquake, nor the crashing noise caused by the falling in of large masses of earth. If Mr. Elson had once heard the real Barisál Guns he would have at once given up the idea that they were due to the falling in of the river banks on the bight either of the Hughly or the Baleswar.

I may mention here an incident to illustrate the sharpness—the intensity with which the reports sometimes break on our ears. It was at Bagirhát on a moonlight night at about 9 P. M. that a report like that of a gun struck my ears. My servants had my permission to use my gun to shoot the *pariah* dogs or jackals that infested the compound, I called out to them to inquire what the matter was; they said they did not use the gun, but that it was the Khanja Ali salute.

Referring to the surf theory, it is said "the transmission of sound waves is, however, dependent very much on the conditions under which it takes place, and when these are favourable they travel to enormous distances," but I cannot conceive that the conditions under which sound travels could be so materially different as to render the Barisál Guns distinctly audible at Tumlook, and thoroughly inaudible at Diamond Harbour, almost a seaboard town.

The PRESIDENT read the following letter from Mr. H. J. Rainey on the subject:

RAINEY VILLA,
Khulna, Feb. 23, 1888.

DEAR SIR,

I have heard that at the next meeting of the Society a paper will be read on the so-called "Barisál Guns": I have for many years taken a great interest in the subject, and as I do not think it is at all likely that a satisfactory solution of the physical phenomena can be arrived at without a series of independent observations from various places in the districts where the sounds are heard, I would suggest that printed forms stating the several points on which information is desirable, should

be circulated to the several meteorological stations where the "Barisál Guns" are likely to be heard, and to all residents in such localities who may be expected to assist in the investigation.

If you will refer to one of my articles on "Jessore" published in the *Calcutta Review*, Vol. LXIII, p. 7, you will find that Mr. H. F. Blanford of the Meteorological Department, the then Secretary of the Society, forwarded to me such forms for circulation, but though some of my friends were good enough to promise to assist in the enquiry by recording their observations, yet not a single return was sent to me. The Society, however, acting directly with public and private persons, if it resolves to do so, is likely to meet with success.

I may add that I shall be very glad to assist in any way in investigating the matter if my aid is at all necessary.

Yours faithfully,

H. J. RAINEY.

In continuation the PRESIDENT said that the Society were much indebted to Babu Gaurdás Bysack for having again brought this interesting subject before their notice, and the paper is particularly interesting because it gives additional names of places where these sounds have been heard. It was much to be regretted that former efforts of the Society to elucidate the origin of these curious sounds had been unsuccessful, and that during the 18 years that had elapsed since the subject was discussed at the Society's meetings no new facts had been brought forward regarding them. In the absence of more definite information than already existed, it was difficult to see in what direction further enquiries could usefully be prosecuted.

As it might be interesting to the meeting he had drawn up a short memorandum of the facts already recorded regarding these mysterious sounds.

First as to the sounds themselves:—Most observers agree that they resemble the reports of guns fired or explosions at a distance. Sometimes the sound is dull, at others loud enough to wake a person from sleep. They are heard sometimes singly, sometimes in rapid succession or at intervals, occasionally lasting for several hours.

In his paper on the "Antiquities of Bagirhát" (*Journ. As. Soc. Beng.* 1867), Babu Gaurdás Bysack describes it as a dull roaring sound, as of the booming of distant cannonade, which is said to be fired by aerial hands in honour of Khanja Ali, or Khán Jahán, who was tehsildar of Baghirhát some 400 years ago.

Mr. Pellew says the noise exactly resembles the sound of surf as heard by him at Púri, when, on account of the cessation of the S. W.



Monsoon, the swell rises to an unusual height before breaking and then breaks simultaneously for perhaps a length of 3 miles of coast, the succession of reports being caused by the breaking of successive waves along the beach.

Mr. Beveridge has referred very fully to this phenomenon in his "Account of the District of Bakarganj." He says the sounds are heard like the discharge of cannon in Bakarganj, and part of Dacca, Faridpur, and Jessore at the beginning of the rains, *i. e.*, in May and June. At Barisál the sound comes from the S. and S. W., and is generally heard in a south wind and before rain. It is sometimes heard only for a minute or two; sometimes it continues for one or two hours, at intervals of two or three minutes between each discharge. It seems to be heard usually in the evening or at night, but perhaps this is only because the attention is more drawn to it in the absence of other noises. It has been supposed by some that the sounds are merely those of guns fired at marriages; by others that they are caused by the falling in of the river banks. But they are heard away to the south, among the Sundarbans where there are no marriages, and where there are no high river banks to fall in. They are heard down at Kúkri Múkri, the most southerly island in the district, and the Maghs there say that they are distinct from the noise of breakers or of the tide coming in. The natives say it is the sound of the opening and shutting of Ravan's gates in the Island of Lanka (Ceylon), which fiction, as Mr. Beveridge remarks, is valuable because it shews that the sound comes from the south. And he concludes by saying that it is not altogether impossible that it originates in that curious submarine depression in front of Jessore and Bakarganj which is known by the name of the "Swash of no ground."

In another part of the same work Mr. Beveridge records that he was told by a native of Kúkri Múkri that the sounds were sometimes heard from the north,—south, and south-west. The statement as regards their coming from the north is important because they are nearly always reported as coming from the south.

Captain W. J. Stewart, of the Revenue Survey, describes the sound as similar to the noise caused by the explosion of torpedoes under water, but at a great distance.

Mr. H. J. Rainey says the sounds resemble the report of cannons or loud explosions heard at a distance. Occasionally the reports are heard 3 or 4 times in rapid succession, while at others a minute or two intervenes between them.

Mr. Westland heard them at Jessore during the night, exactly like the distant firing of cannon occurring in single detonations and at irregular intervals.

Other observers record them as occurring at intervals of a few seconds.

The sounds are heard not only at Barisál, where they are very distinct, but over the whole delta of the Ganges from the Húghlí to the Megna. They are recorded from Cherra Punji, but do not appear to be generally heard further north than Dacca and Faridpur, and are not heard at Balasor. Sir W. Herschel says he never heard them spoken of as occurring at Kushtia, Rajshahaye, Nadiya or Maldah.

It is curious to note that the sounds are somewhat capricious, being frequently heard at certain places, but not at others close by.

They appear to be almost invariably heard from a southerly direction. According to Mr. H. J. Rainey they are quite independent of the direction of the wind and come from the south and south east directions, after a heavy fall of rain, or cessation of a squall and while the tide is rising. Captain Stewart says they are always heard in Barisál from one direction, and there and at Kúkri Múkri, Chapli Chur, Tiger Point and other places in the Sundarbuns he noticed the sounds always from the direction of the depression known as the "Swash of no-Ground," and from the fact of the direction being always the same he argues against the sounds being caused by the falling in of river banks, falling of trees or firing of bombs.

Mr. Beveridge says that at Barisál the sounds come from the south and south-west, and are generally heard in a south wind and before rain. At the Island of Kúkri Múkri they are said to be heard from the north, south and south west, and to be quite unconnected with the bore, the tides, or the surf.

Mr. T. R. Sarr reports their occurrence at Luckipara Factory, district Jessore, on the 28th June 1871, between 5 and 6 p. m. from the N. W., the direction of the wind being S. W. Reports sudden and momentary like bombs.

The sounds are said to have been heard at all hours of the day or night, though more often in the stillness of evening or night. Mr. Sarr reports them as occurring principally through the day.

They appear to be usually observed during the hot weather and rainy months from March to September. Mr. Sarr heard them near Jessore in May and June only. In 1870 they were frequent; in 1871 few and far between.

Captain Stewart heard them in the Sundarbans in March 1862 and again at Chapli Chur, on the Sea-face, in March 1863, as well as in April and May at Barisál.

Mr. Rainey says they are only heard during the S. W. Monsoon and rainy season.

They appear to be heard more distinctly after rain or in the lull after a squall, but are also recorded as occurring before rain.

Several theories have been brought forward to account for these sounds, and among them the principal are :

(I.) The breaking of enormous surf rollers on the shores of the upper part of the Bay of Bengal ; the sound of this travelling inland along the surface of the rivers, and to long distances under the favourable atmospheric conditions of the S. W. Monsoon.

(II.) The breaking down of the banks of the rivers in the vicinity of places where they are heard.

(III.) The firing of bombs or guns on the occasion of marriages.

(IV.) Subterranean or sub-aqueous volcanic or seismic agencies.

(V.) Atmospheric electricity.

Also by the bursting of bamboos or the falling of trees in the jungles. The evidence hitherto recorded, however, in support of these possible causes is altogether insufficient to warrant our attributing the sounds to any one of them.

It is evident that the first theory is dependent upon the proximity of the places where the sounds are heard to the sea coast or to rivers along which the sound could be carried.

Now we find that they are heard in nearly all parts of the Gangetic delta, a tract of almost absolutely flat country bordering the extreme north-western corner of the Bay of Bengal, extending from the Húghlí to the Megna, and intersected by innumerable streams and water-courses. They appear to be most common along the course of the Megna, but have also frequently been heard along the course of the Haranghatta about the middle of the Delta.

Babu Gaurdás Bysack records that at Bagirhát, on a tributary of the Haranghatta at a distance of about 56 miles from the open sea, they are heard at all times of the year, particularly when the weather is calm and the sky clear. They are most distinct after a storm or heavy shower of rain.

At Barisál, on the Baleswar River, about 34 miles from the sea, they are equally prominent, and are heard all over south Jessore and Bakarganj, at least in the neighbourhood of the Baleswar River, and extending to the foot of the Chittagong Hills. Mr. Pellew, who has given a good deal of information about them, says he has not heard them himself west of Morellgunj on the Haranghatta, about 42 miles from the sea, though Mr. Rainey has recorded them at Khulna, which is situated at the confluence of the Bhairab and Rupsa rivers, about 60 miles from the sea.

Babu Gaurdás Bysack has, however, recorded the curious fact that

though the sounds are heard at Baghirhát they are not heard at places near there, nor in other parts of the Sundarbans equally distant from the shores of the Bay and where the surf is equally violent.

In the 'Proceedings' of the Society, for August 1870, Mr. Rainey records that these sounds are heard as far north as Farídpur on the Padda River, about 104 miles from the nearest point of the sea coast at the mouth of the Tetulia river.

Mr. Dall also heard of them occurring at Farídpur, like discharges of artillery 3 or 4 miles away and loud enough to wake a person from sleep.

Captain Stewart writes that his assistant, Mr. N. T. Davey, constantly heard them in District Húghlí, as well as at Farídpur.

Again, in the 'Proceedings' for November 1870, Mr. Pellew records their occurrence on the Saplenga river in the Sundarbans, about 30 miles from the coast. They were loud enough to wake him up and were heard on 4 or 5 different occasions the same night. The sound came from the south and could not have been marriage guns because the country to the south was all forest.

He also mentions that at Púrí, when the S. W. Monsoon has lulled, he has 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 him, 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. He contends also that to a person close by the sound of each wave would appear continuous; but to a person 40 or 50 miles away it would be a boom like that of a gun. He further remarks that the wind blows very obliquely at Púrí and would not take the sound so far inland as at Bakarganj.

In the same 'Proceedings' Mr. Rainey records that the direction of the sounds appears to travel invariably along the course of the streams that discharge themselves into the Bay, and that when he was living at Khulna, which is at the confluence of the rivers Rupsá and Bhoirab, he noticed that the sounds came from the S. E., while when he lived on the other side of the Rupsá, on the west side of it, the noises were heard from the S. W. Again he lived at a place called Nali—or Schillerganj, on the Baleswar river and to the east of it, when the detonations were

heard from the S. W. At Schillerganj, which is distant about a tide from the open sea, the sounds were heard much louder than they were at Khulna, while below that point, as far down the Haranghatta river as a boat could venture out in the S. W. Monsoon, he heard them with even still greater precision, but the reports were quite as distinct then from one another as they were elsewhere, and he considers this as not bearing out Mr. Pellew's surf theory.

In the paper we have just heard read Babu Gaurdás Bysack records that similar sounds are heard at Tamlúk on the Rupnarain river in the estuary of the Húghli, about 50 miles from the sea and only about 36 from Calcutta. Also that Mr. Medicott had told him of their being heard at Cherra Punji, which is about 200 miles from the coast at the head of the Bay, and that a friend of his had heard them in Bikrampur near Múnshiganj, about the confluence of the Megna and the Padda rivers, some 104 miles from the coast, but never in Dacca.

It will be noticed that many of these places where the sounds are undoubtedly heard are at a great distance from the sea-beach, and further than one would imagine that the sound of breaking surf could possibly be heard. The transmission of sound waves is however dependent very much on the conditions under which it takes place, and when these are acoustically favourable they travel to enormous distances. With the exception, perhaps, of Cherra Punji, none of the stations named are outside the distance at which the sound of guns could be heard, and it is probable that the simultaneous breaking of heavy surf rollers two or three miles in length, as mentioned by Mr. Pellew, would be at least as loud if not louder. Under certain atmospheric conditions the noise might be heard at places a great distance from the sea more distinctly than at nearer places.

It is said that the cannonade at Waterloo was heard at Dover, and other instances are on record of cannon fired during naval engagements in the Channel being heard in the centre of England. Col. Sconce tells me that he heard the cannonade during the siege of Delhi over 60 miles away, and I may mention that when on duty with my battery at Saugor in Central India, between 1860 and 1864, we heard one day the sound of a salute of guns fired at Jubbulpore, over 80 miles away with intervening hills. I do not recollect hearing it myself, but it was the talk of the mess, and, I believe, was verified by letter. The guns used must have been the ordinary old bronze nine-pounders, which would give a sharper report than larger iron guns.

As regards distance, therefore, it seems quite within possibility that the sounds heard at places so far inland could be caused by the enormous rollers of the S. W. Monsoon, especially as it appears from the

evidence recorded that the places at which the sounds are best heard are near the courses of streams running up from the sea and from the direction of the courses of the streams, and we know that water is an admirable conductor of sound. During the rains, too, when the sounds are generally heard, the whole country is like a wet sponge, and the air laden with vapour at a high temperature.

At the meeting in August 1870 Mr. Justice Phear, then President of the Society, stated that similar sounds were heard in Cornwall and Devonshire, undoubtedly caused by breaking surf.

It is to be regretted that we have not fuller details of the conditions under which these sounds were heard at Cherra Punji and their direction, but it may be remarked that the station lies exactly in the direction of the upper course of the Megna, and its position on the extreme edge of the hills may in some way be connected with the sounds being heard, if it were possible that the sound of distant surf could be carried to such a distance under favourable conditions.

It seems also possible that the peculiar configuration of the Gangetic Delta and its position at the head of a deep trumpet-shaped Bay, on one side a dead flat and the other lined with fairly high hills, may favour the transmission of the sound of breaking surf inland.

It has been objected by Dr. Mitra that the sounds are not heard in other deltas, such as the Irrawádi, the Mahanadi, the Mississippi, and the Amazon—but in these cases the geographical conditions are quite different. The Delta of the Irrawádi is open on the west. The Deltas of the Sittoung and Salwín reproduce more nearly the conditions, but on a much smaller scale. The Mahanadi debouches into a much wider and more open part of the Bay, the Mississippi into an almost landlocked gulf, and the Amazon into the open sea.

The second theory, that the sounds are caused by the falling in of river banks, does not appear so far to be supported by any direct evidence; the facts recorded by Mr. Beveridge even seem to negative it. It is quite possible, however, that the sounds heard by some observers may be attributed to this cause.

As regards the sounds being caused by the explosions of fireworks or bombs on the occasion of marriages, Mr. Pellew states that the Musalmans of Perojpur 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 sounds of these from the Barrisál guns. In another place, however, he says the sound is quite distinct. Sir W. Herschel heard sounds in Dacca which he easily recognised as bomb-firing or could be attributed to it, unless proof were forthcoming that no bombs had been fired within the possible distance. It is not improbable,

therefore, that in some cases the sounds may be caused in this way, though it is certain that they are not the sole cause, as shown by Capt. Stewart's and Mr. Beveridge's statements that the sounds are heard in places where no marriages ever take place and where there are no river banks to fall in, and though the latter further states that his informants at Kúkri Múkri told him that the sounds were quite unconnected with the surf, the bore, or the tide, still these sound-producing agencies existed on or near the spot and might have been instrumental in causing the sounds, though the islanders may not have recognized it.

As regards the fourth theory, that the sounds are due to subterranean or subaqueous volcanic or seismic agencies, there is again no direct evidence, but the current opinion that such is the case and the fact recorded by Capt. Stewart of the sounds being like the explosion of a distant torpedo, and always coming from the same direction of the 'Swash of no-Ground,' when he heard them at Barisál, Kúkri Múkri, and other places in the Sundarbans, seem to point to some submarine source. Mr. Beveridge also suggests their connection with the 'Swash of no-Ground' and the statements he received from natives regarding the sounds being heard at Kúkri Múkri from the south-west, or direction of Ceylon, agree with Capt. Stewart's observations.

Capt. Stewart had an idea that the 'Swash' was the crater of an extinct volcano or submarine volcano and that subterraneous explosions found vent and sound through it, which were heard inland during the south-west monsoon. In the description of the 'Swash' by Commander Carpenter, R. N., of the Marine Survey, (Journal, A. S. B., Part II, 1885), there is no allusion to any such volcanic character, but the formation of the depression is shown to be caused by the convergence towards this region of all the channels through the shoals formed off the mouths of all the rivers of the Delta. The result of this tendency of the ebbing water is a number of whirls and eddies in that locality, the position of the 'Swash' being central with regard to the Deltaic mouths. This constant agitation of the sea hereabouts prevents the mud settling here during the ebb-tides, as it does on the banks on either side, which have thus never been able to meet, and consequently the depth still remains considerable. It would be most important to have further observations as to the state of the sea during the monsoon over this depression, and whether the contending currents cause such disturbance as would produce explosive sounds loud enough to be heard miles inland.

Mr. Rainey has also suggested that the sounds may be of volcanic or subterraneous origin, perhaps the upheaval of land as small islands on the sea-face of the Delta or Sundarbans. He further notes that the sounds travel from the direction of the active volcanic train running

from Chittagong along the coast of Arracan and Akyab. The occurrence of similar sounds at Cherrapunji, as recorded by Mr. Medlicott, would appear more probably connected with volcanic or seismic agency than with any water-borne sounds.

That they are commonly produced by volcanic or seismic causes seems improbable, because these would be accompanied by movements of the earth, which could not escape observation, and none of the observers have noted anything of the kind.

It only remains to consider the possible connection of the sounds with atmospheric electricity and the thunder-storms especially prevalent in Eastern Bengal at the changes of the seasons and during the S. W. monsoon. Distant thunder frequently sounds exactly like the firing of heavy guns far away, and in the case of such sounds being heard shortly before or after a thunderstorm or when thunder clouds were in the neighbourhood, their connection with the thunder would seem obvious unless otherwise accounted for. Such sounds would excite no special attention and might be heard all over the world. It is important, therefore to note that none of the persons who have observed the phenomenon have attributed it directly to thunder, and very few have connected it in any way with electrical action. Nothing, moreover, is recorded indicating any special meteorological or physical conditions obtaining in the Delta which would cause distant thunder to be heard in any very peculiar and unusual manner.

Capt. Stewart mentions that his Assistant, Mr. N. T. Davey, who had taken a good deal of interest in the question, had heard them in district Hughli and also at Faridpur from the southward, generally when the atmosphere was overloaded with electricity preceding thunderstorms. Mr. Davey attributed the sounds to electrical action in an atmosphere surcharged with moisture, as would be the case along the coast. At Faridpur they are heard from over the enormous *bhils* in the neighbourhood, which may also explain their being heard at Barisál and other places.

Mr. Sarr and Mr. Rainey both report the occurrence of the sounds near Jessore in very close weather after heavy falls of rain or squalls, but say nothing about thunder.

I have been unable to find any reference to the theory that the sounds are caused by the bursting of bamboos in the jungles in any of the papers on the subject to which I have had time to refer. This cause would not, however, be peculiar to the Gangetic Delta, as the Barisál guns seem to be, and certainly cannot be the principal cause of the sounds. The same remark applies to the falling of trees.

In the present very imperfect state of our knowledge regarding this

mysterious phenomenon it is impossible to form any decided opinion as to its cause, though from the evidence it would appear that the balance of probability favours the connection of the sounds in some way with the sea; the sodden state of the soil, the vapour-laden state of the atmosphere and the direction of the wind being exceptionally favourable for the transmission of such sounds, which seem to be heard most frequently at times of the year when the sea is at its highest and the contending influences of the river floods against wind and tides strongest. At the same time, some of the evidence seems to decidedly negative this theory, and it is quite possible that more causes than one may be active in producing similar sounds. The more or less intimate connection of the sounds with the river system of the Delta also seems to be established, but whence the sounds proceed there is nothing to show.

As will be seen from the foregoing remarks, the question opens up a very wide and interesting field of enquiry, and it would be very desirable that, if possible, further evidence should be obtained on the subject and a system of observations started on both sides of the head of the Bay, from Balasore to Diamond Island, and at as many inland stations as possible in the districts where the sounds are heard. Copies of the former series of queries referred to by Babu Gaurdás Bysack and Mr. Rainey are in existence, and would form a model upon which a new series of enquiries might be drawn up. I would propose, therefore, that the Council should be asked to refer the question to the Physical Science Committee with a view to arrangements being made, in consultation with the officers of the Meteorological Department, for a series of observations being carried out during the coming monsoon. The numerous meteorological stations now existing in this part of the country would afford much greater facilities for such observations than was formerly the case.* The assistance of the Marine authorities should also be sought in making observations of the state of the sea on the sea-face of the Sundarbans and in the neighbourhood of the 'Swash of no-Ground.'

MR. T. D. LA TOUCHE made the following remarks :—

I have frequently heard the sounds known as the Barisál guns while camping in the south-western portion of the Garo Hills, in Assam. The

* Since the meeting some papers have been discovered containing the replies to the circular issued by the Physical Science Committee in 1871, from Sir W. Herschel, Mr. Westland, Capt. W. J. Stewart, Mr. Rainey and Mr. Sarr. These add considerably to our knowledge of the subject, especially Capt. Stewart's observations in the Sundarbans, and I have therefore thought it desirable to entirely revise this memorandum and complete it as a note of the facts hitherto recorded on the subject.—J. W.

sounds may be heard at any time during the day or night, and always appear to come from the direction of the Brahmaputra, which skirts the western end of the hills. They are heard at considerable distances from the river banks, at least 30 miles in a direct line, over hills and valleys covered with dense jungle; and I hardly think that the fall of a bank of even 30 ft. high could be heard at that distance. They seemed to be most distinct near the village of Mohendraganj at the S. W. corner of the hill area, close to an old bed of the river, but I did not see any banks fall in during the few days I was there. I have heard them only during the cold weather, but I believe they are heard at other times. They can hardly then be caused by heavy surf during the S. W. monsoon, unless different causes could give rise to the same phenomenon.

With regard to the bamboo theory, I have often seen and heard dry bamboo jungle on fire in March and April, when the Garos burn their *jhúms*, and though the bursting of the bamboos makes a great noise, it is more like the rattle of musketry than the firing of heavy guns and cannot be heard at any great distance, especially when hills intervene.

It has occurred to me that a possible cause of these sounds may be the daily increase and decrease in depth of the water in the rivers of the delta, caused by the tides. It may be that the rising of the waters places the superficial strata in a state of strain, which is relieved when the tide falls, and the consequent earth movements, though slight, *may* give rise to these sounds. This is, however, merely a conjecture, and I do not feel inclined to lay much stress upon it until the subject has been more thoroughly investigated.

MR. ELSON remarked, with reference to what had been read about the Barisál Guns having been heard at Tumlúk on the Rúpnaráin river, that it was just possible the explosive noises were due to the falling in of portions of the high right river bank in Hooghly Bight, a spot peculiarly fitted for the production of the phenomenon, situated immediately at the mouth of that river, at its junction with the Hooghly. The rolling action of the joined streams of the two rivers had so cut away and undermined the bank, that the original raised embankment had in some places succumbed, the bank itself being 'up and down' like a wall, with some ten or twelve fathoms alongside it at low water: and Mr. Elson had himself often witnessed the crashing sound of the falling in of large masses of earth when anchored near this spot; generally at about low water, when the falling tide left the bank without its supporting lateral pressure, the bank gave way and fell. And he believed the sound of these landslips might be conveyed for many miles along a dense water medium: and very possibly distance so altered sound waves through this medium that the noise would not be heard as a loud



Photo etching

Survey of India Offices, Calcutta, April 1888.

TERRACOTTA FIGURE FOUND AT 'TUMLOOK.

Scale about two thirds

splash as those near would hear it, but as a sudden short explosion, a sharp thud, such as he himself had on two occasions been in a position for proving, and resembling the sound of guns, the dull thud, thud, he had heard actually emanating from out the sea on a calm still day from right alongside the boat in which he was at the time, situated about fifty miles from the north African coast, when the French were fighting at Algiers in 1859; or the same peculiar sharp sound of the 9 o'clock gun of one of Her Majesty's frigates at Sangor Roads, heard by him some years ago for three successive evenings, at the Pilot station, some thirty-five miles off, and that against a southerly breeze.

So that, on the whole, the theory of the sounds in question being caused by the falling in of river banks, and of their being propagated even along crooked river bends, should not, Mr. Elson thought, be entirely ignored nor discarded.

2. *Note on some Buddhist copper coins, and a terra-cotta figure.*—
By GAURDÁS BYSACK (with a plate).

“In April and May 1883, during my stay at Tumlook, I noticed the River Rúpnarayan to cut into and wash away large portions of the bank below that town, leaving exposed specimens of old coins, fragments of pottery, and clay figures imbedded for ages. On the tide retiring, these relics happened to be picked up by the people, especially children. I stopped them from this proceeding on the shore in front of the Sub-divisional bungalow, where the findings were collected for me by my servants. The coins thus got I now send for presentation to the Society. In local opinion, they are said to have been in currency under the old Hindú Rájás, but who they were, and when they flourished, nobody knows. There were first the Buddhist kings, and afterwards the Gangá Vaná princes ruling from Tumlook and Midnapore to Orissa, in the 12th century. I am not aware whether the Society is in possession of any of their coins, in which case they may help to throw light on the determination of the specimens sent by me.

“As to the terra-cotta utensils and figures secured for me, they are all more or less in a mutilated condition, excepting one, which being in fair preservation, is herewith forwarded for exhibition to the meeting. I wish I had an opportunity to compare it with similar figures found elsewhere, in order to solve the mystery of its representative character. But I have hardly a doubt of its great antiquity and of its being a Buddhist image. As such, it leads me to refer to those times when Tumlook was a great Buddhist emporium on our Delta, known under the name of Tamaralipta, or sea-laved,—answering to Tambapanni (the Taprobane of the Greeks) the earliest Buddhist name for Ceylon. The

port flourished when prince Mahendra, the son of Aśoka, sailed by the place from Paṭaliputra, on his religious mission to that Island. From this port, Fa Hian, the Chinese pilgrim, took shipping to return to his country *viâ* Ceylon and the Archipelago, in the 5th century. His countryman Hwen Thang visited it in the 7th century. The ancient Buddhist town and harbour is now about forty miles from the sea, lying buried deep under the silt of the Delta. It would not be amiss for me, I think, to refer the clay figure under consideration to some time in the Buddhistic history of Tamlook. The image strongly resembles the females of Buddhist sculpture. The size makes it a doll, the ornamentation and attitude give it the air of a dancing-girl. But I believe it is neither of these characters. Most probably it was a household image; but I am not in a position to offer a pronounced opinion. I would suggest a comparison with the Bhuvaneśwara temple female figures, and the figures of other Buddhist places, and could form a definite conclusion only by the result of such a comparison."

The PHILOLOGICAL SECRETARY said that the coins sent by the Bábú were of a well-known kind of which a large number had been sent to the Society some years ago. There were, however, among those now sent by the Bábú, some which were in a particularly good state of preservation. They were round and square coins, bearing a variety of Buddhist emblems on both sides, such as the bodhi tree, elephant, chaitya, swastika, and others. They have been already described and figured by Prinsep in his *Indian Antiquities* (ed. Thomas), Vol. I, pp. 84, 86, plate IV, fig. 8, 22. The terracotta figure (see Plate III) was that of a female fully dressed and profusely bedecked with jewels. It was the finest specimen of this kind of terracotta work that he had ever seen; but he would not venture to say how old it might be, though, of course, it could not be modern.

3. *Note on some Ancient Nepalese Coins.*—By DR. HOERNLE.

Dr. Rudolf Hoernle read the following note on some ancient copper coins from Nepal:—

"At the May meeting of last year I exhibited some ancient copper coins from Nepál which had been forwarded by Mr. V. Smith (see Proceedings for May 1887, pp. 144-147). I was then under the impression that that was the first public notice of coins of that description. I have lately, however, come across an earlier notice, by Mr. Cecil Bendall, which I regret had quite escaped my memory. It is published in volume XXXVI of the *Journal of the German Oriental Society* of 1882, and is also referred to on page xxxix of the Introduction to Mr. Bendall's *Catalogue of Buddhist Sanskrit Manuscripts* in Cambridge

(1883). It does not appear, however, so far as I can make out, that coins of this description have ever before been figured, and the plate accompanying my notice of last year will therefore still be welcome to numismatists. Moreover, among the coins noticed by Mr. Bendall, there do not appear to have been any like Mr. Smith's No. I. On the other hand, in Mr. Smith's collection there was none like Mr. Bendall's No. I. Mr. Smith's Nos. II appear to be identical with Mr. Bendall's Nos. 6 and 10, his Nos. III with Mr. Bendall's Nos. 2, 3, 4, 5, and his Nos. IV with Mr. Bendall's Nos. 7, 8, 9, 10, 12.

“The reverse legend of Nos. II, Mr. Bendall reads as कान देहि *kāman dehi* (on his No. 1), but, as will be seen from the facsimiles, the correct reading is undoubtedly कानदेही *kāmadehī*. The animal on the obverse Mr. C. Bendall, I observe, also takes to be a winged lion. The legend on the obverse Mr. Bendall reads अंशुवर्मे *aṃśuvarma*. I read it श्रीसुधर्म *śrīsudharma* or श्रीसुवर्मे *śrīsuvarma*. I think Mr. Bendall's reading is substantially correct, only it should be श्यांसुवर्मे *śryaṃśuvarma*; the first ‘akshara’ is not अ a but श्य *śrya*, at least it is distinctly so on the coins figured in my plate. The presence of the ‘anusvāra’ is doubtful. The legend, in fact, is exactly the same as that occurring in some of king Aṃśuvarman's inscriptions, published by Pandit Bhagvānlāl Indrajī in the *Indian Antiquary*, Vol. IX, for 1880 (see, e. g., Inscription, No. 8, p. 171).

“The reverse legend of Nos. III Mr. Bendall reads श्रीभगिनी *śrī Bhagini*, and suggests that it refers to the sister of king Aṃśuvarman, who is recorded (in Inscription, No. 7, in *Ind. Ant.*, Vol. IX, p. 171) to have dedicated a ‘linga’ to a temple of Paśupati. The figure which accompanies the legend, he describes as a ‘squatting figure of Buddha.’ This is certainly incorrect; at least, on the specimens figured on my plate, the figure is clearly that of a female, squatting on a lotus, the petals and stalk of which are distinctly seen; and the legend is श्रीभोगिनी *śrī bhogini*, ‘the enjoyable one.’ There is a similar connection between the legend and the image, as that pointed out by Mr. Bendall in the case of the legend *kāmadehī* (on his No. 1).

“The legend on the obverse of Nos. III is read मानाङ्क *mānānka* by Mr. Bendall. I read the name doubtfully पानाङ्क *pānānka* or मानाङ्क *mānānka*. I now agree with Mr. Bendall that, for the reasons suggested by him, the name must be read *mānānka*. The legend, however, is not simply मानाङ्क *mānānka*, but (at least on the specimens I have seen) श्रीमानाङ्क *śrīmānānka*.

“From Mr. Bendall's remarks on these coins (his Nos. 1-12) it would seem that he ascribed them all to king Aṃśuvarman. The coins, Nos. II and IV, certainly belong to that king; for they bear his name. But I doubt the ascriptions of the *śrī-mānānka* coins to him. The

prefix *śrī*, I think, shows that the name *mánánka* must be that of a king; and the name *śrī-bhoginī* on the reverse might be taken to be an allusion to the king Aṃśuvarman's sister Bhogadevī. In that case the name *Mánánka* must be another name or a *biruda* of king Aṃśuvarman. Now in the time of the latter king there were two ruling families in Nepal (see Fleet, *Early Chronology of Nepal*, in the *Indian Antiquary*, Vol. XIV, p. 350), the Ṭhákuri family residing in the palace (*bhavana*) of Kailásakúṭa, and the Lichchhavī family residing in the palace (*griha*) of Mána. A member of the latter family might call himself by a name derived from their residence, *mánánka*, 'the mána-marked,' or 'he of Mána.' But Aṃśuvarman belonged to the Ṭhákuri family, and he could not well bear the *biruda* of *Mánánka*. But there is a king of the Lichchhavī family who does call himself, after his residence, *Mánadeva*, 'the Lord of Mána.' For him *Mánánka* would be a most appropriate *biruda*. I am disposed, therefore, to ascribe the *Srī-mánánka* coins (Nos. 3) to king Máuadeva.

"There remains the coin No. 1. The name of the king on the obverse is nearly illegible. The reverse shows distinctly the title of Mahárájádhirája. This title was borne only by two kings of Nepal of that period (6th and 7th centuries), viz., Aṃśuvarman and Śivadeva II, both of the Ṭhákuri family. Two aksharas only are visible on the obverse. The first resembles closely the first akshara on the obverse of the coins Nos. II, and looks like श्र *śryam*. This could only be read as the commencement of *śryamśuvarma*. The second letter I read as गो *go* or गे *ge*; it might, however, be म and in that case the name would be *śrīśivadeva*. Till other specimens are found, the question must be left undecided.

"Aṃśuvarman reigned from about 637 to 651 A. D., Mánadeva from about 705 to 732 A. D., and Śivadeva from about 725 to 749 A. D. The coins, therefore, belong to the 7th and 8th centuries A. D.

"I do not think the object which the lion is 'pawing' can be a vine-branch, as Mr. Bendall describes it. On the specimens I have seen, the object, when present, is clearly a flower, made up of six dots in a circle with one dot in the centre, and a stalk below it (see fig. III, a and III, c). Mr. Smith speaks of a "sort of standard in front of the lion," on one coin. This might be the "vine-branch"; but I have not been able to identify the coin referred to."

4. *Akbar and Father Jerome Xavier*.—By H. BEVERIDGE, ESQ., C. S.

This paper will be published in the Journal, Part I.

5. *On the nature of the Toxic principle of Aroideæ*.—By C. H. T. WARDEN, ESQ., F. C. S. and A. PEDLER, ESQ., F. C. S.

This paper will be published in the Journal, Part II.

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PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR APRIL, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday the 4th April 1888 at 9-15 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present:

H. Beveridge, Esq., Babu Gaurdás Bysack, Dr. Hoernle, A. Hogg, Esq., Babu Asutosh Mukhopádhyaý, T. Munro, Esq., L. de Nicéville, Esq., R. D. Oldham, Esq., H. M. Percival, Esq. The Hon. Dr. Mahendralál Sarkár, W. L. Sclater, Esq., Dr. Scully, Pandit Haraprasád Shástri, D. Waldie, Esq.

The Minutes of the last meeting were read and confirmed.

Fifteen presentations were announced, details of which are given in the Library List appended.

The following gentlemen proposed and seconded at the last meeting, were balloted for and elected Ordinary Members :

Babu Haridás Shástri.

Maulvi Ahmad.

The following gentleman is a candidate for election at the next meeting :

Nawab Mir Mahomed Ali, proposed by Babu Gaurdás Bysack, seconded by Lieut.-Col J. Waterhouse.

The following gentleman has intimated his wish to withdraw from the Society :

J. G. Delmerick, Esq.

The PRESIDENT announced that the Council had sanctioned: (1) as a special case, the exemption of Babu Gaurdás Bysack, who has compounded for his subscription as a non-Resident Member, from payment of further subscription as a Resident Member, in consideration of his having been an old officer of the Society and a member of very long standing: (2) the purchase of a collection of old coins for Rs. 250 offered by Mr. Delmerick, some of them being very rare.

The PRESIDENT also announced that the Council, on the application of the Finance Committee, had authorized the sale of Government Promissory Notes of the nominal value of Rs. 2,000.

The PRESIDENT said that Members of the Society would be glad to hear that on the invitation of Commander Carpenter, R. N., commanding the Indian Marine Survey vessel "Investigator," the Trustees of the Indian Museum had given leave to Mr. Wood-Mason, the Superintendent of the Museum, and Natural History Secretary of the Society, to go on a cruise as Naturalist to do some deep sea dredging in the Indian Ocean. It was an opportunity which had been looked forward to by Mr. Wood-Mason, and there was no doubt he would take the fullest advantage of it to the benefit of the Museum and of the Society.

The GENERAL SECRETARY exhibited an old portrait in oil colours found in the Public Library at Allahabad sent by the Hon. Mr. Quinton, for the purpose of identification, if possible, and stated that it appeared from inscriptions in English and Persian faintly traceable on the Canvas at the top that the portrait was intended for a Mr. G. T. Dankin or Donkin, but that nothing could be ascertained from old directories or lists of civilians about any gentleman of that name.

Mr. W. L. SCLATER exhibited some specimens of the Mammalia of the genus *Paradoxurus*, and made the following remarks thereon:

The first specimen I have to exhibit was recently presented to the Indian Museum by Mr. James Ross of Ootacamund and was shot near that place; at first it seemed to be nothing but the common Palm cat of India (*Paradoxurus hermaphroditus* or *musanga*) but on examining the skull it was at once manifest that it was a species recently described by Mr. Blanford (P. Z. S. 1885, p. 613) and named by him *Paradoxurus jerdoni*.

The skull of *Paradoxurus jerdoni* can be at once distinguished from that of all other species of *Paradoxurus* by the length of the anterior palatal foramina, which extend back to the level of a line drawn across the palate behind the anterior pair of premolars.

The fur of the specimen exhibited has the same grizzled appearance mentioned by Mr. Blanford in his description, due to a subterminal band of gray on each individual hair, but it wants the white tip to the tail which is such a conspicuous feature in the coloured plate of Mr. Blanford's memoir on *Paradoxurus* (P. Z. S. 1885, pl. XLIX).

Mr. Gray in the Proceedings of the Zoological Society for 1864 p. 538, described a new species of *Paradoxurus* from a single skull in the British Museum; this skull differed from all other *Paradoxurus* skulls in the very much larger size of the teeth, especially of the 3rd upper premolar, which is provided with a distinct cingulum and a rudimentary inner lobe, the skull had no skin attached to it, and the locality was unknown.

In examining the specimens of *Paradoxurus* in the collection of the Indian Museum, I found three skulls which were undoubtedly skulls of *Paradoxurus macrodus* of Gray; the skulls in question had been extracted from a series of three mounted specimens from Malacca presented to the Asiatic Society in 1843 by Messrs. Frith and Lindstedt.

I have carefully examined the stuffed specimens to which the above skulls belong, and can see absolutely no character by which they could be distinguished from the ordinary *Paradoxurus hermaphroditus* or *musanga* as it occurs near Calcutta. However the species can easily be distinguished from *P. musanga* by its skull, and will therefore stand, and the addition to our knowledge is the locality whence it comes, *i. e.*, Malacca.

The third point is the question of the specific identity of the Burmese and Indian forms of Palm cat. Blyth and Jerdon only allow one species, *i. e.*, *Paradoxurus musanga*, but Mr. Blanford in his paper quoted above, has separated *P. musanga* into two species (a) *P. hermaphroditus* from Burma, Siam, Malaya, Lower Bengal, Nepal and Sikkim distinguished by its striped back, grey frontal band, even fur and by certain tooth measurements. (b) *P. niger* from the peninsular of India and Ceylon, distinguished by its unstriped back, ragged fur, absence of frontal bend and by the tooth characters.

After examining the specimens in the Museum here I have come to the conclusion that it is quite impossible to separate the two forms; there are in the Museum specimens from Rangoon resembling *P. niger* in having an unstriped back; there are specimens having the teeth of *P. niger* combined with the striped back of *P. hermaphroditus*, in fact not one of the characters enumerated by Mr. Blanford are constant, as indeed he himself says, no one can have no choice but in following the footsteps of Blyth and Jerdon in regarding the two forms of Palm cat as merely varieties of one species *Paradoxurus hermaphroditus*, Pall. (= *P. musanga*, Raffles.)

The PHILOLOGICAL SECRETARY read a report on a find of 538 Treasure Trove coins supposed to be copper, forwarded by the Deputy Commissioner of Sháhpur, with his No. 1886, dated 16th October 1886.

1. I much regret the delay in submitting this report. The coins were originally received while I was on furlough in Europe. They were handed over to my locum-tenens, who, on account of pressure of official work, was unable to attend to them till some time after my return, when they were made over to me. It was only then that they could be examined for the first time, and identified and classified.

2. The original letter of the Deputy Commissioner, No. 1886, dated 16th October 1886, advised the despatch of 549 coins. My locum-tenens, on making the coins over to me, stated, however, that on counting them, he found there were 534 coins. On recounting them, when made over to me, I found there were 538 coins, as detailed below.

3. I am unable to specify the exact locality where the coins were found. The original letter of the Deputy Commissioner above referred to, which presumably contained information on the subject, appears to have been lost during my absence on furlough. A copy of it probably exists in the Deputy Commissioner's office, and may be referred to, if it be considered necessary.

4. The coins were supposed to be copper. On cleaning, however, selected specimens, I find that they are of more or less impure silver, *i. e.*, silver and copper mixed. Most of them are in a moderately good state of preservation.

No. of specimens.

5. They belong to the following rulers :

No. 1.	MU'IZZU-D-DÍN, MUHAMMAD BIN SÁM, the conqueror of India, A. D. 1193—1205, type : <i>Mahamad Sáme</i> , as in <i>Chronicles</i> , p. 15, No. 10 ; Bull and Horseman, with Nágari legends	371
No. 2.	DITTO ; type as in <i>Chronicles</i> , p. 15, No. 5 ; <i>Obverse</i> : horseman with Nágari legend ; <i>Reverse</i> : Arabic inscription	3
No. 3.	MAHMÚD BIN GHYÁS-U-D-DÍN, about A. D. 1200 ; type as in <i>Chronicles</i> , p. 32, No. 25	1
No. 4.	TÁJU-D-DÍN ILDUZ, about A. D. 1210 ; type as in <i>Chronicles</i> , p. 31, No. 24	2
No. 5.	S'RÍ CHÁHARA DEVA, Rájá of Ajmír, about A. D. 1215.	
	a. Type <i>Samasorala Deva</i> , as in <i>Chronicles</i> , p. 70, No. 40.....	45

		No. of specimens.
	b. Type <i>Sámanta Deva</i> , as in <i>Chronicles</i> , p. 70, No. 39.....	57
No. 6.	S'RÍ PRITHVÍ RÁJÁ DEVA, Rájá of Dehli, about 1190 A. D.	
	a. Type <i>Prithví Rájá</i> , as in <i>Chronicles</i> , p. 64, No. 38.....	19
	b. Type <i>Pithimba Deva</i> , as in <i>Chronicles</i> , p. 59, No. 2	1
	c. Type <i>Pipala Rájá Deva</i> , as in <i>Chronicles</i> , p. 59, No. 3	4
No. 7.	S'RÍ SOMEŚVARA DEVA, Rájá of Ajmír; about A. D. 1160; type as in <i>Chronicles</i> , p. 63, No. 37.....	6
No. 8.	S'RÍ MADANAPÁLA DEVA, Rájá of Mahoba, about A. D. 1150; type as in <i>Chronicles</i> , p. 62, No. 34.....	22
No. 9.	S'RÍ AṆAMGAPÁLA DEVA, Rájá of Dehli, about A. D. 1060; type as in <i>Chronicles</i> , p. 59, No. 32.....	2
No. 10.	S'RÍ SALLAKSHAṆAPÁLA DEVA, Rájá of Mahoba, about A. D. 1090; type as in <i>Chronicles</i> , p. 62, No. 33	3
No. 11.	NÁŚIRU-D-DÍN KUBÁCHAH, Sultán of Sind, about A. D. 1210; type <i>S'ri Kubáchá Suritán</i> , as in <i>Chronicles</i> , p. 100, No. 86	2
Total, ...		538

The following paper was read—

Notes on some new Bactrian and Gupta coins.—By Dr. A. F. RUDOLF HOERNLE. (With a plate.)

Among the Bactrian coins which the Society lately purchased from Mr. J. G. Delmerick there are two of considerable interest.

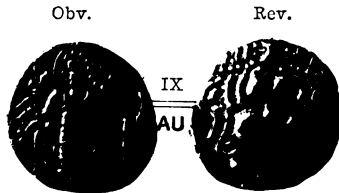
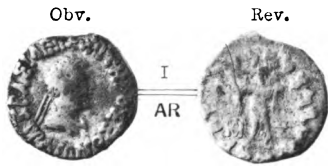
No. 1. One is a new variety of a silver hemidrachm of Strato I., (see Plate IV, fig. 1). It reads as follows:—

Obv. ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΣΤΡΑΤΩΝΟΣ, with king's head to right, with diadem.

Rev. (in Arian Páli characters) *Maharajasa tradatasa dhramikasa Thratasa*, with Pallas standing with thunderbolt and shield to left; on the left side the monogram, No. 22, on Pl. XI, c, in Princep's *Indian Antiquities* (ed. Thomas), Vol. II.

No hemidrachm of Strato I., exactly like this, has hitherto been known. There is, as I am informed by Mr. R. Stuart Poole, none like it in the British Museum. The usual reverse legend of the silver coins of Strato has *prachachhasa* (the Prákrit for *ἐπιφανούς*) in the place of *dhramikasa* (the Prákrit for *δικαίου*), thus: *Maharajasa prachachhasa tradatasa Thratasa*. The obverse legend usually reads *βασιλέως ἐπιφανούς σωτήρος Σπράτωνος*; but occasionally, as on the present coin, *ἐπιφανούς* is omitted. There are square copper coins of Strato I., which have the same legend with *dhramikasa*, as this new silver coin; but their obverse reads *βασιλέως σωτήρος δικαίου Σπράτωνος*, being an exact translation of the Páli. The legend with *dhramikasa* occurs also on the reverse of square copper coins of Strato and his wife Agathokleia, the obverse of which reads *βασιλίσσης θεοτρόπου Ἀγαθοκλείας*, (see Sallet's *Nachfolger Alexanders des Grossen*, pp. 127, 128; *Ind. Ant.*, vol. II, p. 196, and the *British Museum Catalogue*). Unfortunately, on the present coin, the word *dhramikasa* is not quite as distinct as one could wish; the two middle letters *mi* and *ka* are much worn; but the first letter *dhra* and the last letter *sa* are sufficiently clear to justify the identification of the word as *dhramikasa*. In any case it is impossible to read it a *prachachhasa*; for that word, when it occurs on Strato's coins, occupies a different position in the legend, before *tradatasa*, not after it.

The name of the king I read as *Thratasa*, not (as is usually done) *Stratasa*. The fact is that the value of the first letter has hitherto always been wrongly assumed to be *str*, for no other reason (as it would seem) than because the corresponding place in the Greek name is occupied by the letters *str*. But the compound *st* or *str* was always unpronounceable to the vernacular tongues of India; and it is, therefore, *a priori* unlikely that there would be a graphic symbol to indicate a combination of sounds which did not exist in the language. In the North-Western Prákrit (as in all Prákrits) the conjunct *st* was replaced by *th*, and the conjunct *str* by *thr*. Hence the Greek name *Strato* became *Thrata* (थ्रत) in the mouth of the natives of North-Western India. Similarly the Greek name *Hippostratos* became *Hippathrata* (थ्रपथ्रत), and is thus to be read, when it occurs on bilingual Bactrian coins. But the true value of the Arian Páli character 𑀓 is directly and clearly proved by its occurrence in genuine Prákrit words in which it indubitably represents the dental aspirate *th* (थ). Numerous instances occur in the Sháhbázgarhí inscription of Aśoka. Thus, in line 23, letters 17 and 18, we have *nathi* 'it is not' (Skr. *násti*); in line 24, letters 26 and 27, we have *tatha* 'there' (Skr. *tatra*). As the same words occur in the Khálsí inscription, where they are written in Indian Páli characters, there can be no doubt regarding the true value of the Arian Páli equivalents.



SOME NEW BACTRIAN AND GUPTA COINS

It may be useful to record here the normal form of the surd cerebrals and dentals, regarding which some uncertainty still seems to prevail. They are : + = ङ = ङ ; ञ = ञ = ञh ; ७ = ञ = t ; ७ = ञ = th. Occasionally variations of these normal forms occur, in which the cross line is not drawn straight or not continuous ; thus we may have ७ or ७ or ७ for + = ङ ङ ; or ७ for ञ ञh, or ७ or ७ or ७ for ७ ञ th. These are mere inaccuracies (sometimes owing to the nature of the surface on which the letters are incised), which cannot mislead when the normal form is known.

No. 2. The second Bactrian silver coin is a hemidrachm of Diomedes (see Plate IV, fig. 2). It is identical, or very nearly identical, with one in the British Museum collection, but, as will be seen by a reference to fig. 11, of Plate VIII, in Professor Gardner's catalogue (p. 31), the Prákrit inscription on the reverse is not nearly as complete as on the Society's newly acquired specimen. Sallet (*ib.*, p. 114) mentions another as an "unicum" in an "English private collection," which, however, is perhaps the identical one of the British Museum. The Society's specimen reads as follows :

Obv. BAΣIAEQΣ ΣΩTHPOΣ ΔIOMHΔOY, with king's head, helmeted, to right.

Rev. (in Arian Páli characters) Ma[harajasa] tradatasa Diyomidasa, with Dioscuri standing, lance in hand, to front ; on the left side the monogram, No. 20 a or b, on Pl. XI, c in *Ind. Ant.*, vol. II.

The name seems to read distinctly *Diyomidasa* or *Diyumidasa* ; the left leg of the letter *y* has a distinct curve attached to it, usually indicative of the vowel *u* or *o*.

No. 3. About two months ago I received from Mr. Henry S. Boys, B. C. S., in Lucknow, for decipherment, a gold Gupta coin, which he had obtained at Badaulí, about 25 miles from Ajudhyá. It is of a quite new type, and apparently unique. It is of somewhat coarse workmanship, though not more so than many other Gupta coins of well-known types, and is undoubtedly genuine, as it was bought of a common man at a little above its intrinsic value. Weight 112,5 grains. See Plate IV, fig. 3.

Obv. King standing in the same posture as on Samudra Gupta's coins of the "Javelin" type, (see Mr. Smith's Catalogue, J. A. S. B., vol. LIII, Part I, p. 172). King standing to left, dressed in be-jewelled close-fitting tail coat, trowsers, and tall pointed cap, left arm resting on javelin, right hand casting incense on a small altar in left field ; behind right arm the bird standard ; corona round the head. Under the king's left arm, within the field, चन्द्र *chandra* ; along the left hand

margin पर० न० म० *para. ma. bhaga*; along the right hand margin प्रविराट् गुप्त *praviraṭṭ Gupta*. The obverse is imperfectly struck; it looks as if the coin slipped on the die; most of the letters appear double, slightly overlapping each other; still they are all tolerably distinct, except गुप्त *gupta*, the प *p* of which is wanting. The marginal legend consists of abbreviated words, which I take to be in full *paramabhāgavata-praviraṭṭ Chandra Guptaḥ, i. e.*, "The most devoted worshipper of Vishṇu, the mighty Chandra Gupta." The circle is a well-known mark of abbreviation; its being used three times would seem to indicate three abbreviated words; but the first circle may be redundant; otherwise the phrase might be *parama-mahā-(or mahad-) bhāgavata*.

Rev. King and queen sitting on a couch, facing each other. The king sits on the right side, right leg drawn up on the couch, and his right hand holding up and apparently showing to the queen a cup, shaped somewhat like a modern shallow champagne glass. The queen sits on the left-side margin of the couch, with both legs down, supporting herself with the right arm on the corner of the couch, and her left arm a-kimbo. Both figures are dressed in lower garments (*dhoties*), the king in short ones reaching to above the knees, the queen in long ones coming down to below the knees. Both wear jewels in their hair and ears, also bracelets, the king also a necklace, and the queen anklets. There is a sort of corona round the king's head. The scene seems to represent a drinking bout, similar to what may be seen on old Buddhist sculptures. On the margin, behind the queen, श्री वि *śrī vi*, similarly behind the king, क्रमः *kramaḥ*; that is, श्री विक्रमः *Śrī Vikramaḥ*.

It is doubtful whether this coin should be attributed to Chandra Gupta I. or Chandra Gupta II. The only point, however, which really seems to favour the attribution to the latter king, is the reverse legend *Śrī Vikramaḥ*, which has hitherto been only found on coins of that king. The words *paramabhāgavata* (if correct) have also been met with on coins of the same king (see J. A. S. B., vol. LIII, pp. 180, 182). But another, and more striking peculiarity points rather to an older date for the coin, and to Chandra Gupta I. as its issuer. The king's figure on the obverse has a decidedly antique look. It closely resembles that on the early coins of the so-called Ghaṭotkacha, and of Chandra Gupta I. (*ibid.*, plate II, figs. 1—4). The reverse device of 'King and Queen', too, has hitherto been only observed on coins of Chandra Gupta I. and of Skanda Gupta (see *ibid.*, pp. 129, 171). If the coin should be attributed to Chandra Gupta II., we must assume that, on some of his coins, he reverted to the more antique obverse device of his early predecessors. On the other hand, as hitherto only one type of coin (King and Queen) of Chandra Gupta I. has been discovered, it is impossible

to assert, that he might not have used the legend *S'ri Vikramah* on other coins. On the whole the ascription to Chandra Gupta I. appears to me the more probable one.

No. 4. The next is a gold coin of Chandra Gupta I., forwarded to me by Mr. H. Rivett-Carnac. It belongs to Mr. Sykes, barrister-at-law at Lucknow, and was acquired by him either at Lucknow or Fyzabad. This is an undoubted coin of Chandra Gupta I., of the well-known type of "King and Queen" (*ibid.*, p. 171). It is only published here (see Plate IV, fig. 4), because, so far as I am aware, no specimen with the lion turned to the *left*, has been hitherto published. The usual reverse has the lion turned to the right (see *ibid.*, plate II, fig. 2). The legends on this coin, unfortunately, are very imperfect; but चन्द्रगुप्त *Chandra Gupta* on the obverse is clear. The action of the king appears to me that of offering the queen something to drink (or to eat); the idea of the device, therefore, being similar to that on the reverse of the preceding coin. Weight 112.5 grains.

No. 5. The next is a gold coin of Chandra Gupta II.; also forwarded by Mr. Rivett-Carnac, and belonging to Mr. Sykes, obtained at Lucknow or Fyzabad. See Plate IV, fig. 5. It is a new variety of the "Horseman to left" type, combining the mounted figure of the king of that type with the legend of the "Lancer" or "Horseman to right" type; (see *ibid.*, pp. 182, 183). The legend on the obverse is परमभागवत [श्री चन्द्रगुप्तः *parama-bhāgavata-[śrī-Chandragu]ptah*, *i. e.*, 'The most devoted worshipper of Vishnu Sri Chandragupta.' The reverse has the usual female figure, dressed in lower garments and seated on a *moghā* or Indian wickerstool, with fillet in right and lotus in left hand. Legend, with a straight line of dots underneath, अजितविज्जनः, *i. e.*, 'he of unvanquished might,' or 'the unconquered hero.' Weight 118.25 grains.

No. 6. This is a gold coin belonging to Mr. H. Rivett-Carnac. Its find-place is not specified further than "somewhere between Benares and Fyzabad." It is a coin of Kumāra Gupta, of the "Horseman to left" type, (see *ibid.*, p. 193). I publish it, because it has the obverse legend exceptionally well preserved, and may help to establish its correct reading. See Plate IV, fig. 5. It runs thus: + + महाराजपत behind the king's back, the vowel marks being clipped off; क्षि between the king's and the horse's head; निपति रथीपाद + + + in front and below the horse; there would be space for about six more letters behind the horse, joining the two preserved portions of the legend, though possibly the whole of the space was not occupied by letters. I would suggest to restore the legend thus: महाराजपति-क्षितिपति-रथीपाद [विजय-कुमारगुप्तः] *mahārājapati—kshītipati—rathīpāda—vijaya—Kumāra—Guptah*, *i. e.*, "the lord of Mahārājas, the lord of the earth, the famous chariot-man,

the victorious Kumára Gupta." The reading of the preserved portion of the legend, as above given, is practically certain, except the *akshara* 𑀘 *thi*, the consonant of which is too blurred to be recognizable, and the vowel might be a long *á*. The bracketed portion of the reading I have supplied from another specimen of the "Horseman to left" type in the Society's collection (see *Proceedings*, A. S. B., for 1882, pp. 111—114, also J. A. S. B., vol. LIII, p. 194). The reverse has, as usual, the legend 𑀅𑀲𑀢𑀺𑀓 *ajita-Mahendra*, i. e., "the unconquered Mahendra", and a female figure seated on a *morhá*, holding a fillet in her right, and a long-stalked lotus in her left hand. There is no monogram. The weight is 123.75 grains.

Nos. 7, 8, 9 are new specimens of later Indo-Scythic coins, or "link-coins" as Prinsep called them. They have been discussed by the late Mr. E. Thomas in a paper in the *Indian Antiquary*, Vol. XII, p. 6. No. 7 is evidently the oldest and purest. Along the obverse rim (to be read from outside the coin) there are mutilated traces of the well-known Indo-Scythic legend, in Greek characters, PAO (in front of the king's face). In the angle, formed by the king's left armpit, there appears to be the letter 𑀠 *ga* or 𑀡 *sa*; in the field outside the spear, there are two letters, apparently 𑀧 *gasha* or 𑀨 *tasha*; at the left-hand bottom, there seems to be 𑀶 *vi* or perhaps 𑀷 *kha*. The reverse also shows traces of the Greek letters *οκπο*(?) in a very debased form. Weight 121 grains.

No. 8 very closely resembles a specimen figured and described in Mr. Thomas' paper (*ibid.*, p. 9). The obverse has 𑀘 *kirda* under the king's left arm. Along the right-hand margin there is 𑀧 *gadaha*; and in the left bottom of the field, between the fire-altar (partially visible on the rim) and the king's legs, there are three very minute and not very distinct letters placed beside (not above) one another. The first appears to be a compound letter, though I cannot identify it with Mr. Thomas' reading (*kshana*); the other two look like 𑀧 *pura*. The reverse, with the usual figure of the enthroned goddess, shows two letters (above one another) on the right-hand margin, 𑀧 *yasha*. Weight 118, 25.

No. 9 is the crudest and latest specimen. The obverse apparently has 𑀘 *kkida* (or 𑀘 *kirda*) under the king's left arm; under his right arm there are two characters, which seem clearly to read 𑀧𑀢 *baśa*. The reverse, with a crude enthroned goddess, shows on the right-hand margin traces of 𑀧𑀢 *śr[ī] pri . va[ṛ]mma*. Weight 112.5 grains.

Besides the above-mentioned, I received from Mr. H. Rivett-Carnac other twelve gold and one silver coins. All these, however, belong to well-known types and varieties that have been already published. Among

them there are four gold Indo-Scythians; *viz.*, one Kadphises, with king's head to left (as in *Ariana Antiqua*, Plate X, figs. 8, 10, 11), weight 97·175 grains; one Kanerki with MAO reverse (as *ibid.*, Plate XII, fig. 1), weight 119·75 grains; and two Bazodeo, with OKPO reverse (OKPO to be read from the rim of the coin, (as *ibid.*, plate XIV, fig. 14), except that there is a nimbus round Siva's head, (as *ibid.*, figs. 12, 13); one of the two coins is slightly broader and thinner, but without any trace of that slight concavity generally shown by the thinner specimens of Bazodeo's coins; weight 112,5 grains; the other weighs 125·825 grains. The Kadphises and Kanerki coins, I may add, belong to Mr. Sykes.

The remainder are all Guptá coins; *viz.*, 1, one Ghaṭotkacha, with a very fine reverse (as in J. A. S. B., vol. LIII, pl. II, fig. 1), weight 125,825 grains.

2, four Chandra Gupta II., "Archer" type, with lotus seat reverse (as *ibid.*, pl. III, figs. 1, 2); one of the ordinary kind, weight 123,75 grains; one has the क *ka* doubled in the rev. legend, weight 125,825 grains; another shows a circle (or wheel) over the king's right shoulders (as in var. β, *ibid.*, p. 180), weight 125·75 grains; and one appears to be a cast forgery, weights 92,075 grains.

3, one Kumára Gupta, belonging to Mr. Sykes, of the "Combatant lion" type (as *ibid.*, p. 197, pl. IV, fig. 3), weight 119·75 grains; the obverse legend is very imperfect; on left margin there are traces of three letters, the last two of which look like क्क *krama* (perhaps विक्रम *vikrama*); on the right margin there are traces of seven letters, the first two looking like श्री *dya śrí*, and the last like कु *ku*; there must have been other letters below the king and behind the lion, joining the two preserved portions, and making up कुमारगुप्तस्य *Kumára Guptasya*, the initial कु *ku* of which is preserved. The reverse legend reads clearly कुमारगुप्तधिराज्ञो *Kumára Guptádhirájño* (not merely *Kumára Guptádhirája*).

4, one Skandagupta, "Archer" type (as *ibid.*, p. 19E), weight 142,175 grains.

5, apparently a crude imitation of Chandra Gupta's coins of the "Archer" type; the name under the king's right arm is a mere scroll; the reverse legend is fairly legible as श्री विक्रम *śrí-Vikrama*; weight 146·25 grains.

6, a silver Gupta coin of the "peacock" type, but with the legend quite illegible, weight 28,125 grains.

LIBRARY,

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

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- Bombay. The Indian Antiquary.—Vol. XVI, Parts 204—206, January—March, 1888.
- Budapest. La Société Hongroise de Géographie.—Bulletin, Tome XVI, Fascicule I—II.
- Brussels. La Société Royale des Sciences de Liège.—Mémoires, 2^{de} série, Tome XIV.
- Buenos Aires. La Academia Nacional de Ciencias en Cordoba.—Boletin, Tome X, Entregas. I.
- Copenhagen. La Société Royale des Antiquaires du Nord.—Mémoires 1887.
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- Leipzig. Der Deutschen Morgenländischen Gesellschaft,—Zeitschrift, Band XLI, Heft 4.
- London. Institution of Mechanical Engineers.—Proceedings, August—September, 1887.
- . Library Catalogue, June, 1887.
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- . ———. Compte Rendu des Séances, Nos. 3—5, 1888.
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- Sydney. Linnean Society of New South Wales,—Proceedings, Vol. II, Part I.
- Turin. La R. Accademia delle Scienze di Torino,—Atti, Vol. XXIII, Disp. 2^a et 5^a 1887—1888.

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- Resolution on the Revenue Administration of the Central Provinces for the year 1886-87. Fcp. Nagpur, 1888.

CHIEF COMMISSIONER, CENTRAL PROVINCES.

- Catalogue of Canadian Plants, Part III—Apetalæ. By John Macoun, M. A. 8vo. Montreal, 1886.

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- The Indian Forester, Vol. XIV. No. 2, February 1888. 8vo. Roorkee, 1888.

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- Correspondence between the Government of India and the Secretary of State relating to the concession of Mining Rights in the Deccan. Fcp. London, 1887.
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Bulletin of Miscellaneous information. 8vo. London, 1887.

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Twenty-third Annual Report of the Sanitary Commissioner with the Government of India, 1886. Fcp. Calcutta, 1887.

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Scientific memoirs by Medical officers of the army of India, edited by Sir Bengamin Simpson, Part III, 1887. 4to. Calcutta, 1888.

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 ———. *Literarisches Centralblatt*,—Nrn. 52, 1887, Index to 1887 und Nrn. 1—4, 1888.
- London. *The Annals and Magazine of Natural History*,—Vol. I (6th series) No. I, January 1888.
 ———. *The Chemical News*,—Vol. LVII, Nos. 1473—1477.
 ———. *The Entomologist*,—Vol. XXI, No. 296, January 1888.
 ———. *The Entomologist's Monthly Magazine*,—Vol. XXIV, No. 284, January 1888.
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 ———. *The Journal of Botany*,—Vol. XXVI, No. 301, January 1888.
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- LEVI, LEONE. *International Law, with materials for a code of international law* (*The International Scientific Series*, Vol. LXII). 12mo. London, 1887.
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PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR MAY, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 2nd May, 1888, at 9.15 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present :

E. T. Atkinson, Esq., P. N. Bose, Esq., Babu Gaurdás Bysack, E. C. Cotes, Esq., E. Gay, Esq., E. J. Jones, Esq., Babu Asutosh Mukhopádhyaý, L. de Nicéville, Esq., R. D. Oldham, Esq., A. Pedler, Esq., H. M. Percival, Esq., T. A. Pope, Esq., Abdur Rahman, Esq., Dr. P. K. Ray, H. M. Rustomjee, Esq., W. L. Sclater, Esq., D. Waldie, Esq.

The minutes of the last meeting were read and confirmed.

Thirty-one presentations were announced, as detailed in the appended Library List.

The following gentleman, duly proposed and seconded at the last meeting of the Society, was ballotted for and elected an Ordinary Member :

Nawab Mir Mahomed Ali.

The following gentlemen are candidates for election at the next meeting :

A. P. Pennell, Esq., C. S., proposed by J. Crawford, Esq., seconded by A. Pedler, Esq.

Kumar Devendra Narayan Roy, proposed by Babu Gaurdás Bysack, seconded by H. M. Percival, Esq.

Maulvi Kabiruddín Ahmad, Khan Bahadur, (for re-election), proposed by Babu Gaurdás Bysack, seconded by H. M. Percival, Esq.

Babu Peary Mohun Roy, proposed by Babu Gaurdás Bysack, seconded by Lt.-Col. Waterhouse.

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

W. D. Blyth, Esq., C. S.

B. L. Gupta, Esq., C. S.

The PRESIDENT announced that the Council had sanctioned expenditure up to Rs. 500 for the purpose of carrying out enquiries as to the cause of the explosive sounds known as “Barisal guns,” with reference to the paper on the subject read at the March meeting of the Society.

The PHILOLOGICAL SECRETARY read the following report on a find of Treasure Trove Coins in the Sialkot District :—

Report on 125 old coins forwarded by the Deputy Commissioner of Sialkot, with his No. 521, dated 23rd March, 1888.

1. The coins are stated to have been found as follows : 13 were dug from a mound of earth at Naugal Satkan, Tahsil Zafarwal ; 38 were found buried in a sugarcane-field in Chak Ram Dass, Tahsil Doska ; 74 were found in digging at the banks of a swamp in Mouzah Saddhar, Tahsil Pasrur. There is no means of identifying the coins belonging to these several finds.

2. All the coins, with the exception of one, are (silver) Rupees of the following Moghul Emperors of Delhi.

	No. of specimens.
I. SHÁH JAHÁN, 1037—1068 A. H. = 1627—1658 A. D.,	
<i>a</i> , Type I, two square areas, date 1050, 13—mint Súrat, others illegible ;	5
<i>b</i> , Type II, one round area ; mint, date illegible ;	1
<i>c</i> , Type III, lettered surfaces, 1041, 1044, Multán.	2
II. AURANGZÍB, 1068—1118 A. H. = 1658—1707 A. D.	
<i>a</i> , Type I, lettered surfaces, dates 1099 ⁴ —1102—1103—1108—1109—1110—1111 ² —1112—1113—1115—1116—1117—1118 ; Mints : Súrat, ⁴ Patnah, Dáru-z-Zafar (Akbarabad ?), Dáru-s-Saltanat Láhor ⁵ , Etáwá, Bareilí, Mus-taqiru-l-Khiláfat Akbarábád,	19
<i>b</i> , Type II, two square areas, 1096, Akbarábád...	1
III. BAHÁDUR SHÁH, 1119—1124 A. H. = 1707—1712 A. D.	
Two different types of lettered surfaces, dates 1121, mints : Dáru-s-Saltanat Láhor, Dáru-l-Khiláfat Sháhjahánábád, Dáru-s- ?)	4

		No. of specimens.
IV.	FAROKH Sifr, 1124—1131 A. H. = 1712—1719 A. D. Two different types of lettered surfaces; dates: 1127, 1128, 1130 ⁴ , mints: Dáru-s-Saltanat Lahor ⁴ , Dáru-l-khiláfat Sháhjahánabád ? ...	6
V.	RAFÍ'UD DARAJÁT, 1131 A. H. = 1719 A. D. Date 1131, mint: Dáru-l-khiláfat Sháh-jahánabád	1
VI.	MUHAMMAD SHÁH, 1131—1161 A. H. = 1719—1748 A. D. <i>a</i> , Type I, <i>Sháh Qirán</i> , two varieties, dates various; mint of all: Dáru-l-khiláfat Sháh-jahánabád	34
	<i>b</i> , Type II, <i>Bádsháh Gházi</i> dates 1142, 1145 and others, mints: Dáru-s-Saltanat Láhor ¹⁶ , Korá ⁴ , Dáru-l-khiláfat Akbarábád ² , Multán...	23
VII.	AHMED SHÁH 1161—1167 A. H. = 1748—1754 A. D. Two varieties of lettered surfaces; dates: 1161, 1162, 1163, 1165 and others, mints: Dáru-s-Saltanat Láhor ² , Ahmadábád, Bhirat.....	12
VIII.	ALAMGÍR ZÁNI', 1167—1175 A. H. = 1754—1761 A. D. <i>Type I</i> , <i>Alamgír</i> , dates 1172 ⁴ , mint: Dáru-s-Saltanat Láhor ⁶	6
	<i>Type II</i> , <i>Azízuddín</i> , dates 1173 ⁵ , mints: Dáru-s-Saltanat Láhor ⁷ , Aṭṭak	10
Total ...		124
3. IX.	One coin is a Rupee of <i>Nádír Sháh</i> , struck in Peshawer, in the year 1153 A. H. = 1740 A. D. during his expedition to India	1
Grand total...		125

Mr. R. D. OLDHAM exhibited some flexible sandstones and made a few remarks thereon.

Mr. W. L. SCLATER exhibited the head and antlers of a stag from Darjeeling.

The following paper was read—

An account of the Dacca Tornado of April 7th, 1888, by DR. A. CROMBIE, Civil Surgeon, Dacca, with a short description of the Meteorology of Bengal at that period.—By A. PEDLER, ESQ., F. C. S.

(Abstract.)

The opening part of the paper by Mr. Pedler consists first of a short explanation of the manner in which tornadoes differ in their phenomena from the ordinary storms such as cyclones &c. which visit Bengal. The second part gives a very short account of the few well-authenticated cases of tornadoes which have previously occurred in Bengal. The third section is devoted to a brief resumé of the state of our knowledge of tornadoes and their occurrence and of the conditions which are found to precede them as ascertained by the scientific work done in America by the Meteorological Department of the United States. This section also gives very briefly the theories which are held to account for the formation of the phenomena called nor'-westers and dust-storms, while the fourth or concluding part of the meteorological section of the paper gives a very brief outline of the meteorology of the period, April 6th to the 8th, and the conclusion is come to that the conditions which preceded the formation of the storm are similar to those which precede similar tornadoes in the United States.

Incidentally also a description is given of three other tornadoes which have recently occurred in Bengal, one in the Magura Sub-division of the Jessore District on the 27th March 1888, a second in the Pubna District on the same date, and the third of a tornado which occurred at Bhadreswur, close to Serampore, on the 27th of April 1888.

The second part of the paper is by Dr. Crombie who details the phenomena of the actual storm, giving also certain explanations of the path selected by the storm, and of the damage done. Dr. Crombie first discusses the action which a storm with winds gyrating in direction opposite to the hands of a watch would have on obstacles in its path and proves that the storm in question was a tornado with winds rotating from right to left, (*i. e.*, against the hands of a watch) by taking up its action in one part of its course on the Buckland Bund close to the Nawab's palace, and shews also how by the position of the objects thrown down, the precise track of the centre of the storm can be proved. It appears the tornado began its destructive course at the extreme west end of the municipal limits of Dacca. The first clear signs of the rotatory nature of the tempest occur in an orchard to the north-east of Fakirinka Masjid, where there is a clump of plantain trees thrown down, and twisted in all directions, and even in its first mani-

festations, it is clear that the storm was of great violence. The vortex commenced to travel in a south easterly-direction between the old river bed and the road running parallel to it, destroying every kutchah hut in this portion of Dacca. In its passage eastward it gradually edged more and more towards the old river bed, and when it was opposite the Elephant Ghat, the vortex was actually in the bed of the river, and it appeared as if the storm would have moved in the direction of least resistance, and have passed out into the open maidan lying to the south of Nawabgunge. Suddenly, however, the vortex moved to the north, and was met with winds of hurricane force apparently quite separate from the true tornado, blowing from the north, the track of which was not more than 60 paces across, and was very local. Having advanced a short distance in a N. E. direction it again turned towards the south-east. Up to this time the tornado does not seem to have had power to destroy pucca masonry buildings, though it had destroyed very numerous huts, trees, &c. It, however, here passed into the maidan to the south of Lalbagh, and on being freed from such obstacles as buildings &c., it seems rapidly to have accumulated additional force, and from this point it was able to destroy even the strongest houses. From Lalbagh the vortex passed into the river gradually crossing to the opposite bank, where it almost ground to powder a newly built masonry house. It was then approaching a village called Subudiya, and at this time the part of Dacca on the north bank of the Buriganga seemed safe and Subudiya doomed, but when crossing an open maidan it appears to have encountered a strong current of air blowing up from the south, when it abruptly altered its direction, wheeled nearly at a right angle to the north and travelled in a north-easterly direction back to Dacca, when the largest amount of damage was done, masonry houses being demolished and everything in the track being destroyed until the storm reached the Sankari Bazar, where it more or less suddenly rose from the ground and passed high into the air. In no part of its course did the breadth of the tornado exceed 200 paces and at the part where it did most damage it was only 180 paces wide. It travelled altogether over $3\frac{1}{2}$ miles and its rate of progress was according to different estimates from 20 to 12 miles an hour. The lateral force of the wind as above stated was enormous and the uprush must have been equally strong, as after the walls of houses had been blown out, large beams were kept from falling for distinct periods by this violent uprush. The shape of the tornado cloud appears to have been something like a top cut off a little above the sharp point, it was accompanied by a distant rumbling sound, considerable electrical disturbance seems to have accompanied it and the cloud appears to have been more or less illuminated.

The storm caused 118 deaths, while 1200 persons were somewhat severely wounded and nearly 7 lakhs worth of property was destroyed.

The paper will be published in full in Journal Part II for 1888.

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LIBRARY.

The following additions have been made to the Library since the meeting held in April, 1888.

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- . ——— List of Members, 31st August, 1887.
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- . ———. Meteorological Observations, January-December, 1887.

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- . Annals de Chemie et de Physique,—Tome XIII (6<sup>me</sup> serie) Février, 1888.
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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1888.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 6th June 1888, at 9.15 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present :

Nawab Abdul Latif Bahádur, C. I. E., Prince Jahán Qadr Muhammad Wáhid Alí, Bahádur, H. Beveridge, Esq., E. C. Cotes, Esq., E. Gay, Esq., E. J. Jones, Esq., Babu Asutosh Mukhopádhyaý, T. Munro, Esq., L. de Nicéville, Esq., R. D. Oldham, Esq., H. M. Percival, Esq., W. L. Sclater, Esq., D. Waldie, Esq., J. Wood-Mason, Esq.

The Minutes of the last meeting were read and confirmed.

Twenty-four presentations were announced, as detailed in the appended Library List.

The following gentlemen, duly proposed and seconded at the last meeting of the Society, were ballotted for and elected Ordinary Members :

A. P. Pennell, Esq., C. S.

Kumár Devendra Náráyan Roy.

Maulvi Kabir-ud-din Ahmad, Khán Bahádur (re-elected).

The following gentlemen are candidates for election at the next meeting :

Lieut. Eaton W. Petley, R. N., Offg. Port Officer, Calcutta, proposed by Lieut.-Col. J. Waterhouse, seconded by A. Pedler, Esq.

Babu Kiran Chandra Roy, Zemindar of Narail, Zillah Jessore, proposed by Nawab Abdul Latif Bahádur, seconded by Babu P. C. Ghosha.

The following gentleman has intimated his wish to withdraw from the Society :

C. A. Hackett, Esq.

The PRESIDENT announced that the Council had, on the application of the Finance Committee, sanctioned the sale of Government Promissory notes of the nominal value of Rs. 3,000 out of the Oriental Publication Fund, to meet excess expenditure for the present year : as also the re-grant of a sum of Rs. 1,000 for binding the principal periodicals, which had been sanctioned some time back, but had lapsed.

The PHILOLOGICAL SECRETARY read the following extract from a letter from Mr. C. J. Rodgers, of Amritsar, regarding coins collected by him for Government in his tour during the past winter ;—

“ Perhaps you may be interested to hear that I have, during my tour of the past winter, again made a collection of coins for Government. This collection includes a fine square mohur of Sháh Jahán’s and a new type in gold of Muḥammad Tughlaq. In Sonapat I came across the leavings of the great find of which General Cunningham bagged so many. (See his analysis of the find in Num. Chron., Vol. XII, N. S., p. 159). I obtained in Sonapat one hemidrachma of Agathokleia (her bust and name on obverse) with Straton’s name on reverse. One hemidrachma of Heliokles, helmeted head of king, to left, with spear behind shoulders ; two hemidrachma of ditto, bare head with fillet to right, 3 of Apollodotus square, 3 of Menander of different types ; one of Hermæus, helmeted king to right ; one of ditto and Kalliope : one of Antialkides. I saw a poor one of Antimachus and a good one of Philoxenes. People say they are constantly turning up in the rains in the ruins of Sonapat.

“ Besides these I obtained a new rupee of Muḥammad Tughlaq, and a new one of Ghiyáṣu-d-dín Tughlaq I. and Náṣiru-d-dín Bughra of Bengal.

“ In Dehli I obtained remarkably good specimens of rupees of the following Sultáns of Bengal, Jalálu-d-dín, Muḥammad Sháh, Dáúd, Bahádur Sháh, and a fine one of Mubárizu-d-dín Muḥammad Sháh Súri. I also obtained there some fine rupees of Jahángír and Akbar. There had been a find of the Bengálí rupees. I saw a bag full also of the rupees of the Paṭhán Sultáns ’Aláu-d-dín Masa’úd Sháh and Náṣiru-d-dín Maḥmúd Sháh. These, however, nearly all lacked dates.

“ In Panipat I came across an old Sanskrit coin with letters very old on it (रामद्वज), over an image, with tree to left and a flower-pot to right.

“ In Ludíánah I secured a hemidrachma of Zoilus. In Firozpur I obtained a copper coin of some Satrap, probably Rajnabala.

“ But everywhere, even in Dehli, what a falling off is there in the matter of old coins ? It is true there are such things in the bazaars, but nothing really fine is now obtainable ; everything has long since been nipped up. And now-a-days with the bazaars inundated with globe-trotters who buy anything and everything at fabulous prices, it is a wonder I obtained anything. I still think, however, that if a great effort were made, a really good collection of coins might even yet be made for the Imperial Museum in Calcutta. My success last year and this seems to show that in places *off the rail*, there are still coins obtainable.

“ In Amritsar and Lahore nothing seems to have turned up during the past year. I hope, however, to have more of a find of silver coins of Maḥmūd of Ghaznī, made at Pindī or its neighbourhood during the past year. The coins may have come from Kábul. I hear there are many new types.

“ Besides coins I obtained impressions of inscriptions of about twenty Sultáns of Dehli. Several are of Balban, one of 'Aláu-d-dín Masa'úd Sháh, many of Bábar and Humáyún and of the time of Sikandar and Ibrahím Lodí. I made also a collection of sculptures and of carved bricks for the Lahore Museum. I came across many Jain images of great beauty and execution and the ruins of many Jain or Hindú temples. My five draftsmen have made some beautiful drawings of images and pillars, &c.”

Mr. E. C. COTES exhibited specimens of the Wheat and Rice Weevils and made the following remarks upon them :—

I have brought some specimens of weevilled wheat and rice here to-night which I thought might be of interest to the Society.

According to Messrs. Ralli Brothers of Calcutta this weevil destroys an average of  $2\frac{1}{2}$  per cent. of Indian wheat, which represents an annual loss of £150,000 in exported wheat alone, and that this is not an excessive estimate is shown by the fact that the Delhi wheat merchants, from whom careful inquiries have been made, estimate the damage in some cases at as much as eight or ten seers per maund. And in two of the samples I have brought here to-night, which were taken at random from the wheat godowns in Calcutta last January, you will see the refraction due to weevil is estimated by the trade at 2 and 5 per cent. respectively.

I need hardly say that this is a very serious matter, especially now that India has entered into competition with America and Russia for supplying the world with wheat.

In America and Europe this weevil is known and is called the “ Rice weevil ” (to distinguish it from the allied European wheat weevil *Calandra granaria*) ; it is, however, very sensitive to cold, and consequently

in temperate climates is only able to develop under exceptional circumstances, and therefore it does relatively but little damage, while out here in India it is to be found in every grain-dealer's godown and wherever wheat or rice is exposed to the air, whether in sacks or bulk.

The life history of the weevil is briefly this. The female weevil bores a minute hole in the grain of wheat or rice, as it lies in the store and deposits a single egg in it, covering up the hole with saliva and dust, so as to make it almost invisible, thence it goes on to other grains and deposits a single egg in each, laying in all some 150 eggs. Out of each egg soon creeps a tiny white grub which bores its way into the grain, but does not damage the integument, so that the grain continues to look quite sound. When it is full fed the grub sheds its skin and becomes a pupa. The pupa lies dormant inside the grain until it is ready to transform into the perfect insect, when it wriggles out of its pupal skin and becomes a weevil. This weevil cuts its way out through the skin of the grain and is then ready to commence a new generation.

We thus see that from the time the egg is laid to the emergence of the perfect insect, the grain is apparently quite sound, and hence it is that the connection between the original weevils and the generation of their offspring which cut their way out of the grain, is usually quite lost sight of, the native dealer believing that the weevils appear from outside and eat up the wheat. And this period of incubation (as it were) accounts, I think, for the many stories one hears of weevils appearing in clean wheat stored in a clean godown, the explanation being that the wheat may have been already affected by eggs, larvæ or even pupæ of the beetle before it was put into the clean godown.

Most of the weevils cut their way out of the grain during the rains, and consequently it is then that the weevils are generally noticed for the first time, although the mischief had been going on for weeks or even months while the grub was eating and growing inside the grain, without, however, any sign of its presence being visible externally.

The cultivator succeeds in protecting his wheat by storing it in pits or mud erections, which he lines with broken straw and chaff from the threshing-floor, or even with sand, covering up the whole carefully with earth. Preserved in this way his grain lies unharmed by weevil in some cases for many years. It is, however, after it leaves his hands, when the wheat find its way into the dealers' godowns, that it is invariably attacked.

Much the same is the case with rice, which appears to be quite free from weevil as long as it remains in the village granaries where it is stored in the husk, but which becomes affected as soon as ever it is taken out of the husk and stored in the dealers' godowns.

No attempt seems to be at present made in any of the godowns that I have visited in Calcutta or up-country to clean out and disinfect them before introducing new wheat; the native grain-dealers indeed appearing to have no idea whatever of the natural history of the weevil, and refusing to believe that the weevils use the grains as a place for depositing their eggs, and insisting that weevils come from outside in the rains and eat up the wheat.

This being the case there seems to be every probability that by carefully disinfecting the granaries and removing all old weevily wheat before introducing clean wheat, it will be possible to a great extent to do away with the weevil and put a stop to its ravages.

There seems to be a somewhat widespread idea that although wheat is apparently free from weevil when it leaves the fields or the village granaries, yet that it will invariably develop weevil whenever it is stored so as to be exposed to the air, independently of any further contamination by weevils.

This idea is no doubt chiefly due, as has been pointed out, to the fact that after the eggs are laid a period of at least about six weeks elapses before anything is seen of the resulting weevils. And consequently that the grain may have lain in some infested place and thus got infected before ever it reached the clean godown.

But it is also possible that in some cases the eggs of the weevil may be laid in the grain when it stands in the ear, though everything I have learnt about it seems to point the other way. At the same time this prevailing idea militates against the adoption of the preventive measures which appear promising. It would seem very desirable therefore to have careful experiments made in order to settle the question beyond dispute. And I hope that this will be done; several maunds of clean wheat from different floors and stores in the N. W. P. and from the Punjab are being sent down to Calcutta, and these I am distributing to different places where there is no fear of contamination from old grain, with a view to ascertaining to what extent the storage under the conditions which would obtain in a properly kept godown will protect the wheat from attack.

On the whole it would seem that in reasonable precautions to prevent the spread of infection will be found a practicable means of dealing with a pest that at present is doing very considerable injury to the wheat and rice trades in India.

The GENERAL SECRETARY read the following Memorandum by Colonel A. Bloomfield, of Narsingpúr, on Copper Celts in the Bálághát district, C. P.

“Ever since the great discovery of Copper Celts in the Balaghat

district about 1870 I have taken great interest in such matters. But I never could find out that any natives knew anything about them or ever saw any of them. During this last touring season I have discovered that they are to some extent known. They are noted as being made of the very best copper obtainable.

“The people here call them Kurabhán (or it may be Kuruphán?) and they believe they fall from the sky during the thunderstorms. They are occasionally ploughed up and brought to the Sonars and brass workers, who purchase them at 12 annas to 1 rupee per ser, and melt them up. An old Kasera of Chiebli, before me to-day, told me he has seen 15 or 20 of them, but never knew they were of value.”

The following papers were read :—

1. *A list of the Ferns of Simla, in the N. W. Himalayas, between levels of 4,500 and 10,500 feet.*—By H. F. BLANFORD, ESQ., F. R. S.
2. *Notes on some Indian Chiroptera.*—By W. F. BLANFORD, ESQ., F. R. S.
3. *On new or little known butterflies from the Indian Region.*—By L. DE NIC'VILLE, ESQ., F. E. S.

These papers will be published in full in the Journal, Part II.

4. *On the Differential Equation of all Parabolas.*—By BABU ASUTOSH MUKHOPÁDHYÁY, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The object of the author in the present paper has mainly been the discussion of the differential equation of all parabolas, which, it is believed, is geometrically interpreted here for the first time. The paper is divided into four sections, of which the first is introductory, giving the easiest method of deriving the differential equation of all parabolas from the integral equation of the conic, and explaining the exact meaning of the process of geometrically interpreting differential equations. The second section is devoted to a full exposition of Transon's Theory of Aberrancy; in addition to the ordinary terms, angle of aberrancy, axis of aberrancy and centre of aberrancy, three new terms are introduced, namely, the *radius of aberrancy*, being the distance between the given point on the curve and the corresponding centre of aberrancy, the *index of aberrancy*, being the reciprocal of the radius of aberrancy, and the *aberrancy curve*, being the locus of the centre of aberrancy. A lemma is then proved, establishing a relation between the angle included by the normal and central radius vector at any point of a conic, the radius of curvature of the conic at that point, and the radius of curvature at the corresponding point of the evolute. The well-known value of the angle of aberrancy is then easily obtained, and expressions are also



derived for the radius of aberrancy and the index of aberrancy. In the next place, expressions for the co-ordinates of the centre of aberrancy, when the curve is referred to rectangular axes through any origin, are written down with ease, and, it is pointed out that several interesting results, including the equation of the axis of aberrancy, are immediate consequences of the formulæ obtained. The third section contains the geometric interpretation; from the formula for the index of aberrancy previously obtained, it is shewn that the true geometric interpretation of the differential equation of all parabolas, is that *the index of aberrancy vanishes at every point of every parabola.* The fourth and last section contains a discussion of some miscellaneous theorems; it is pointed out that the differential expression, the vanishing of which is found to be the differential equation of all parabolas, may appropriately be taken to distinguish the species of the conic of closest contact at any point of a given curve; lastly, the differential equation of all parabolas in terms of the radius of curvature and the angle which the normal makes with the principal axis, is obtained from a result incidentally given in the course of the foregoing discussion; and, by integrating this differential equation, the known form of the intrinsic equation of a parabola is verified.

The paper will be published in full in the Journal, Part II, for 1888.

5. *The Geometrical Interpretation of Monge's Differential Equation to all Conics.*—By BABU ASUTOSH MUKHOPÁDHYÁY, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The object of the author in the present paper has been to establish the true geometric interpretation of the Mongian equation, recently discovered by him. The paper is divided into two sections, of which the first contains an historical introduction, in which a rapid survey is taken of the past history and present condition of the problem; the review begins with an account of Monge's original paper; Boole's statement that in the case of the Mongian equation our powers of geometrical interpretation fail, is next noticed; and, lastly, the reasons for rejecting the interpretations of Cunningham and Sylvester, are summarised.

The second section gives the geometrical interpretation of the Mongian equation; the most general expression for the radius of curvature at any point of the aberrancy curve (which is the curve-locus of the centre of aberrancy) of any given curve, is first calculated by means of the formulæ given in the author's paper on the Differential Equation of all Parabolas, of which an abstract will be found above. As an immediate consequence of this formula, it is deduced that the true

geometric interpretation of Monge's differential equation to all conics is that *the radius of curvature of the aberrancy curve vanishes at every point of every conic*. This geometrical interpretation satisfies all the tests which every true geometrical interpretation ought to satisfy, and, it is believed, we have at length got here the true interpretation which has been sought for by mathematicians during the last thirty years, ever since Boole wrote his now famous lines.

The paper will be published in full in the Journal, Part II, for 1888.

6. *Notes on Indian Rhynchota, Heteroptera, No. 5.*—By E. F. T. ATKINSON, Esq., B. A.

7. *New Indian Rhynchota.*—By E. F. T. ATKINSON, Esq., B. A.

These papers will be published in full in the Journal, Part II.

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LIBRARY.

The following additions have been made to the Library since the meeting held in May 1888.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,

presented by the respective Societies and Editors.

Amsterdam. *Revue Coloniale Internationale*,—Tome I, Nos. 1—6, Juillet—Décembre, 1885. Tome II, No. 1, Janvier, 1886.

Baltimore. Johns Hopkins University,—Circulars, Vol. VII, No. 65, April, 1888.

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Brussels. Musée Royal D'Histoire Naturelle de Belgique,—Bulletin, Tome V, No. 1.

Calcutta. *Indian Engineering*,—Vol. III, Nos. 18—22.

———. *The Indian Engineer*,—Vol. V, Nos. 3—8, and Title-page and Index to Vol. IV.

Cherbourg. *La Société Nationale des Sciences Naturelles et Mathématiques*,—Memoires, Tome XXV. (3^e série—Tome V.)

Danzig. *Der Naturforschenden Gessellschaft in Danzig*,—Schriften, Neue Folge, Bande VII, Heft I.

Edinburgh. *The Scottish Geographical Society*,—Magazine, Vol. IV, No. 4, April, 1888.

- Frankfurt a'O. Des Naturwissenschaftlichen Vereins des Reg.-Bez. Frankfurt,—Monatliche Mittheilungen aus dem Gesamtgebiete der Naturwissenschaften, 5 Jahrgang, Nrn 9—10.
- . Societatum Litteraræ, No. 12, Title-page and Index, 1887 and Nos. 1—2, 1888.
- Halle. Der Kaiserlichen Leopoldino-Carolinischen Deutschen Akademie der Naturforscher,—Leopoldina, Jahrgang, 1886 et 1887.
- . ————. Nova Acta, Tomes XLIX—LI.
- . ————. Katalog der Bibliothek, Lief. I, 1887.
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- . Royal Geographical Society,—Proceedings, Vol. X, No. 4, April, 1888.
- . Royal Society,—Proceedings, Vol. XLIII, No. 263.
- . Society of Telegraph Engineers and Electricians,—Journal, Vol. XVII, Nos. 70 and 71, and Title-page and Index to Vol. XVI, 1887.
- . The Academy,—Nos. 833—836.
- . The Athenæum,—Nos. 3156—3159.
- Paris. Musée Guimet,—Revue de L'Histoire des Religions, Tome XVI, No. 3, Novembre-Décembre, 1887.
- . La Société D'Anthropologie de Paris,—Bulletins, Tome X, (III^e série), Fascicule 4. Octobre à Décembre, 1887.
- . ————. Memoirs, Tome III (2nd série) Fascicule III et IV.
- . La Société de Géographie,—Compte Rendu des Séances Nos. 7 et 8, 1888.
- . La Société Zoologique de France,—Bulletin, Tome XIII, No. 2.
- Pisa. La Società Toscana di Scienze Naturali,—Atti (Processi Verbali), Vol. 6, Gennaio, 1888.
- Rome. La Società Degli Spettroscopisti Italiani,—Memorie, Vol. XVII Dispensa 2^a, Febbraio, 1888.
- Schaffhausen. La Société Entomologique Suisse,—Bulletin, Tome VII, Heft Nr. 10.
- Shanghai. China Branch of the Royal Asiatic Society,—Journal, Vol. XXII (new series), Nos. 5 and 6.
- Simla. United Service Institution of India,—Journal, Vol. XVI, No. 70.
- St. Petersburg. L' Académie Impériale des Sciences de St. Petersburg, —Mémoires, Tome XXXV, (VII^e serie) No. 10.

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- MURDOCH, J. *Religious Reform, Part III (Vedic Hinduism)*. 8vo. Madras, 1888.
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- Catalogue of the Birds in the British Museum, Volume XII*. By R. Bowdler Sharpe. 8vo. London, 1888.
- Catalogue of Fossil Mammalia, in the British Museum, Part V*. By Richard Lydekker, B. A., D. G. S. 8vo. London, 1887.
- Guide to the Shell and Starfish galleries in the Department of Zoology of the British Museum (Natural History)*. 8vo. London, 1887.
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- The species of Ficus of the Indo-Malayan and Chinese Countries. Part I, Palæomorphe and Urostigma. Part II, Syncœcia, Sycidium, Covellia, Eusyce and Neomorphe*. By George King, M. B., LL. D., F. L. S.,

Superintendent of the Royal Botanic Garden, Calcutta. Fol. Calcutta, 1887 and 1888.

The Indian Forester. Vol. XIV, Nos. 4 and 5, April and May 1887. 8vo. Roorkee, 1888.

GOVERNMENT OF BENGAL.

Excursions et Reconnaissances. Vol. XIII, No. 30, Janvier-Fevrier, 1887. 8vo. Saigon, 1887.

GOVERNMENT OF FRENCH COCHIN CHINA.

Army Estimates of Effective and Non-Effective Services for 1888-89 (with index). Fcp. London, 1888.

Further Correspondence respecting the affairs of Central Asia. No. 2, (1887). Fcp. London, 1887.

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Weather Charts of the Arabian Sea and the adjacent portion of the North Indian Ocean, shewing the Mean Pressure, Winds and Currents in each month of the year. Folio size, Calcutta, 1888.

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- . ———. Nachrichten, Nrn. 2—3, 1888.
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- . ———. Beiblätter, Band XII, Stück 4.
- . Literarisches Centralblatt,—Nrn. 9—14, 1888.
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- . The Chemical News,—Vol. LVII, Nos. 1482—1485.
- . The Entomologist,—Vol. XXI, No. 299. April, 1888.
- . The Entomologist's Monthly Magazine,—Vol. XXIV, No. 287, April, 1888.
- . The Journal of Botany,—Vol. XXVI, No. 304, April, 1888.
- . The London, Edinburgh, and Dublin Philosophical Magazine,—Vol. XXV (5th series), No. 155, April, 1888.
- . The Messenger of Mathematics,—Vol. XVII, Nos. 11—12, March and April, 1888.
- . The Nineteenth Century,—Vol. XXIII, No. 135, May, 1888.
- New Haven, Conn. The American Journal of Science,—Vol. XXXV (third series), No. 207, March, 1888.
- Paris. Annals de Chimie et de Physique,—Tome XIII (6^{me} serie), Mars, 1888.
- . Journal des Savants,—Fevrier et Mars, 1888.
- . L'Académie des Sciences,—Comptes Rendus des Séances, Tome CVI, Nos. 8—13, et Tables, Tome CIV.
- . Revue Scientifique, Tome XLI, Nos. 16—19.
- Philadelphia. Manual of Conchology, Vol. IX, Parts 36a and 36b ; Vol. III, (2nd series), Part 12.

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- RYE, EDWARD CALDWELL, F. Z. S. The Zoological Record for 1873 Volume X. 8vo. London, 1875.
- The Encyclopædia Britannica, a Dictionary of Arts, Science, and General Literature. Ninth Edition.—Vol. XXIII. Royal 4to. Edinburgh, 1888.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JULY, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday the 4th July 1888, at 9-15 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present: Nawab Abdul Latif Bahádur, C. I. E., H. Beveridge, Esq., E. C. Cotes, Esq., E. Gay, Esq., Asutosh Gupta, Esq., A. Hogg, Esq., E. J. Jones, Esq., Dr. W. King, L. de Nicéville, Esq., R. D. Oldham, Esq., A. Pedler, Esq., H. M. Percival, Esq., T. A. Pope, Esq., D. Waldie, Esq.

The Minutes of the last meeting were read and confirmed.

Fifteen presentations were announced, details of which are given in the Library List appended.

The following gentleman, duly proposed and seconded at the meeting held in May, was balloted for and elected an Ordinary Member at the June meeting.

Babu Peary Mohun Roy.

The following gentlemen, duly proposed and seconded at the last meeting of the Society, were balloted for and elected Ordinary Members.

Lient. Eaton W. Petley, R. N., F. R. G. S.

Babu Kiranchandra Roy.

The following gentlemen are candidates for election at the next meeting :

Babu Rajanikánta Gupta, proposed by Pandit H. P. Shástri, seconded by H. M. Percival, Esq.

Nawab Syud Mahomed Zainool Abideen Khán Bahádur Feroze Jung, (Nizamut Family,) Moorshedabad, proposed by Nawab Abdul Latif Bahádur, C. I. E., seconded by H. Beveridge, Esq.

The SECRETARY reported the death of the following member :

J. Hart, Esq. .

The PRESIDENT said that Members of the Society would be greatly gratified to learn that the late President, Mr. E. T. Atkinson, had been unanimously elected an Honorary Member of the Royal Imperial Hungarian Academy, both as President of the Society and in recognition of his valuable literary and scientific labours connected with the Gazetteer of the N. W. Provinces and researches into Indian Entomology. The Hungarian Academy has been in correspondence with the Asiatic Society for many years, and the late Mr. Arthur Grote, who was one of our most devoted Presidents, was also an Honorary Member of the Academy.

The PRESIDENT further announced that intimation had been received from the Geographical Society of Paris of their intention to hold a Geographical Congress in the month of August during the Exhibition in that city next year.

Mr. DUBERN exhibited a new method of illuminating for the microscope (postponed from last meeting).

The GENERAL SECRETARY read the following description by Mr. W. H. P. Driver, of Ranchi, of a peculiar custom amongst the aboriginal tribes of those parts, called “*Era Sendra*,” or ‘*women's hunt*’ :—

“We have just witnessed a peculiar custom of the people of these parts. It is called the “*Era Sendra*” or ‘*women's hunt*,’ and on this occasion the expulsion of the cholera demon was its purpose.

“It is an ancient custom, amongst the aboriginal tribes, that when any great calamity, which they cannot cope with, overtakes the land, the women dress themselves up in men's clothes, arm themselves with weapons, and go out to hunt.

“They do not, however, take to the jungles in quest of game, but visit the nearest villages lying to the east of them, when they hunt the pigs and fowls, and everything they kill is their legitimate spoil. They also levy “blackmail” from the heads of the villages for the purchase of liquor. The owners of the pigs and fowls cannot prevent their killing and taking away their property, but the headmen generally compromise matters by giving the visitors a pig as well as some pice ‘*pour boire*.’

“Towards evening the Shikar party retire to some neighbouring stream, where they cook and eat the meat, and drink the liquor which, thanks to a benevolent Government, is always handy. They eat neither rice nor anything else at this meal. After supping they bathe in the stream and then return home.

“On such occasions no men are allowed to accompany the women, who, for the time being, conduct themselves in a very masterful and masculine fashion.

“They are decked out with pagris, coats and all the finery they can borrow from their husbands and sweethearts, and they flourish their spears, axes and sticks, beat their ‘nageras,’ (iron drums) shout, sing hunting songs, and dance the Sendra and Kharia just as the men do. The ceremony commences in the west and each village that has been visited goes out on a similar excursion to its neighbours, but always to the east. By this means it is supposed that the evil spirit is safely conducted out of the district, without offending its dignity.

“There is one village near Ranchi which is a notable exception. Its title is ‘Mahadaiva,’ *i. e.*, devoted to Mahadev, and there the amazonian huntresses are not allowed to enter, as it is supposed to be under the special protection of its patron saint. Were cholera to appear in the ‘Mahadaiva’ village, it would be because Mahadev had been offended, and he would have to be propitiated before it could disappear.”

BABU ASUTOSH MUKHOPÁDHYAY read the following extract from a letter on Monge's Differential Equation to all Conics, written (20th June 1888) to him by G. H. Stuart, Esq., M. A., Principal and Professor of Mathematics in the Madras Presidency College.

“I have some recollection of seeing a paper on the general differential equation to a conic in one of the mathematical journals, and I have postponed my reply until I could give you the reference, but I cannot find it. The substance of the paper was that for the general conic, if ρ be the radius of curvature, and ψ its inclination to a fixed line, the general differential equation can, by the relation

$$\rho = \frac{\left\{ 1 + \left(\frac{dy}{dx} \right)^2 \right\}^{\frac{3}{2}}}{d^2y/dx^2},$$

be transformed into

$$\rho^2 \frac{d^3\rho}{d\psi^3} - 5\rho \frac{d\rho}{d\psi} \frac{d^2\rho}{d\psi^2} + \frac{40}{9} \left(\frac{d\rho}{d\psi} \right)^3 + 4\rho^3 \frac{d\rho}{d\psi} = 0;$$

and if $\rho_1, \rho_2, \rho_3, \dots$ be the radii of curvature at the corresponding points of the 1st, 2nd, 3rd, \dots evolutes, so that

$$\rho_1 = \frac{d\rho}{d\psi}, \rho_2 = \frac{d\rho_1}{d\psi}, \rho_3 = \frac{d\rho_2}{d\psi}, \&c. \dots\dots\dots,$$

this equation becomes

$$\rho_1^3 - 5\rho_1\rho_2\rho_3 + \frac{40}{9}\rho_1^3 + 4\rho_1^2\rho_1 = 0,$$

which is a geometrical relation, being an equation between the volumes contained by certain lines belonging to the curve.

For the parabola, the equation becomes

$$3\rho \frac{d^2\rho}{d\psi^2} - 4 \left(\frac{d\rho}{d\psi} \right)^2 = 9\rho^2,$$

and this can be written

$$9\rho^2 + 4\rho_1^2 - 3\rho\rho_2 = 0$$

which is again a geometrical relation involving the rectangles contained by certain lines belonging to the figure.

These are probably the best geometrical interpretations that can be given.

The above equation to parabolas can be written

$$\frac{d^2\rho}{d\psi^2} \left(\rho^{-\frac{1}{2}} \right) + \rho^{-\frac{3}{2}} = 0$$

which leads at once to the ordinary formula

$$\rho = \frac{2a}{\sin^2\psi}.$$

Similarly the general equation to the conic can be written

$$\left(\frac{d^2\rho}{d\psi^2} + 4 \right) \frac{d\rho}{d\psi} \cdot \rho^{-\frac{1}{2}} = 0$$

which leads to the ordinary value for ρ , viz.,

$$\frac{1}{\rho^2} = \frac{(a^2 \cos^2\psi + b^2 \sin^2\psi)^3}{a^4 b^4},$$

or,

$$\rho = \frac{a^2 b^2}{p^3},$$

if the constants of integration be suitably determined."

Babu Asutosh Mukhopádhya then made the following remarks :

"I have thought it proper to lay before the Society Prof. Stuart's interesting remarks on the Mongian Equation, as I believe they are valuable and ought to be preserved : it is rather unfortunate that he cannot give the name of the author of the paper to which he refers, nor that of the Journal in which it appeared. The only paper on the subject which I can find has anything to do with Prof. Stuart's remarks is Transon's *Recherches sur la Courbure des Lignes et des Surfaces* (Liouville, *Journal de Mathematiques*, Ser. I, t. VI, 1841, pp. 191—208) ; the equation to all parabolas

$$9\rho^2 + 4\rho_1^2 - 3\rho\rho_2 = 0$$

which Prof. Stuart gives, is on page 197 ; but I am not quite sure that Transon's paper is the one to which Prof. Stuart refers ; his remarks refer to my first paper on the Mongian Equation (*Journal*, A. S. B. 1887, Vol. LVI, Part II, pp. 134—145), and, when he wrote his letter, he was,

of course, not aware of my second paper which was read at the last meeting of the Society; I need not, however, refer further to the results of Transon's paper, as by analysing and extending them, I have already given the geometric interpretation of the differential equations of all parabolas and conics. (See pp. 156—158 *ante*.)

“Since Prof. Stuart attempts to give a new geometrical interpretation of the Mongian Equation, he appears to accept implicitly my view that Prof. Sylvester's interpretation is out of mark as failing to give a property true of all conics. Prof. Stuart's interpretation certainly satisfies the tests which every true geometrical interpretation ought to satisfy, *viz.*, it gives a property which is adequately represented by the differential equation to be interpreted, and it leads to a geometrical quantity which vanishes at every point of every conic; and, the only objection which can possibly be taken to this interpretation is, that the quantity which is analytically represented by

$$\rho^2 \rho_3 - 5\rho_1 \rho_2 \rho_3 + \frac{40}{9} \rho_1^3 + 4\rho^2 \rho_1 = 0$$

and which involves the radius of curvature at any point of a conic and the radii of curvature at the corresponding points of its first, second and third evolutes, does not admit of being expressed in language; in fact, we do not know how to construct geometrically the solid, the vanishing of the volume of which is the geometrical meaning of the equation given above; the interpretation, in fact, is only semi-geometrical.”

The following paper was read :

Ruins and Antiquities of Rámpál.—By ASUTOSH GUPTA, Esq., C. S.
The paper will be published in the Journal, Part I.

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### LIBRARY.

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

### TRANSACTIONS, PROCEEDINGS AND JOURNALS, *presented by the respective Societies and Editors.*

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Berlin. Der Königlichen Akademie der Wissenschaften zu Berlin,—  
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Bombay. Bombay Natural History Society,—Journal, Vol. III, No. 2.

————. Indian Antiquary, Vol. XVII, Part 207, April, 1888.

- Bordeaux. La Société Linnéenne de Bordeaux.—Actes, Vols. X (4<sup>me</sup> série), XI, (5<sup>me</sup> série) 1886, 1887.
- Budapest. La Société Hongroise de Géographie,—Bulletin, Tome XVI, Fasciculi III—IV.
- Calcutta. Geological Survey of India,—Records, Vol. XXI, Part 2.  
 ———. Indian Engineering,—Vol. III, Nos. 23—26.  
 ———. The Indian Engineer, Vol. V, Nos. 9—11.
- Chicago. The American Antiquarian and Oriental Journal,—Vol. X, No. 3, May, 1888.
- Edinburgh. The Scottish Geographical Society,—Magazine, Vol. IV, No. 5, May, 1888.
- Florence. La Società Africana D'Italia, (Sezione Fiorentina)—Bullettino Vol. IV, Fascicoli 3<sup>o</sup> e 4<sup>o</sup>.
- Graz. Des Naturwissenschaftlichen Vereines für Steiermark,—Jahrgang, 1887.
- Havre. Société de Géographie Commerciale du Havre,—Bulletin, Mars-Avril, 1888.
- Leipzig. Der Deutschen Morgenländischen Gesellschaft,—Zeitschrift, Band XLII, Heft I.
- London. Institution of Mechanical Engineers,—Proceedings, No. 1, February, 1888.  
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 ———. Royal Asiatic Society of Great Britain and Ireland,—Journal, (New Series) Vol. XX, Part 2, April, 1888.  
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 ———. Royal Geographical Society,—Proceedings, Vol. X, No. 5, May, 1888.  
 ———. Royal Microscopical Society,—Journal, Part 2, April, 1888.  
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 ———. Society of Telegraph Engineers and Electricians,—Journal, Vol. XVII, Nos. 72—73.  
 ———. ———. Rules and regulations recommended for the preservation of fire-risks from Electric Lighting. April, 1888.  
 ———. The Academy,—Nos. 837—841.  
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 ———. Zoological Society of London,—Proceedings, Part 4, 1887.  
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- Madras. The Madras Journal of Literature and Science,—Session, 1887-88.

- Manchester. Manchester Literary and Philosophical Society,—Proceedings, Vols. XXV and XXVI, Sessions, 1885-86 and 1886-87.  
 ————. ————. Memoirs, Vol. X, 3rd series.
- Mexico. La Sociedad Científica "Antonio Alzate,"—Memoirs, Tome I, Nos. 9 et 10.
- Naples. Società Africana D'Italia,—Bollettino, Anno VII, Fasc. III e IV, Marzo—Aprile, 1888.
- Paris. La Société de Géographie,—Compte Rendu des Séances, Nos. 9—11, 1888.  
 ————. La Société Zoologique de France,—Bulletin, Vol. XIII, No. 3, Mars, 1888.
- Rome. La Società Degli Spettroscopisti Italiani,—Memorie, Vol. XVII, Dispensa 3ª, March, 1888.
- Stettin. Stettiner Entomologische Zeitung,—49 Jahrgang, No. 1—3, 1888.
- Sydney. Royal Society of New South Wales,—Journal and Proceedings, Vol. XXI, 1887.
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- Toronto. The Canadian Institute, Toronto,—Annual Report, Session, 1886-87.  
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 ————. ————. Elenco Degli Accademici Residenti, Nazionali non Residenti: Stranieri e Corrispondenti, al 1º Marzo, 1888.
- Valparaiso. Des Deutschen Wissenschaftlichen Vereins zu Santiago,—Verhandlungen, Heft 6, 1888.
- Vienna. Der K. K. Geologischen Reichsanstalt,—Verhandlungen, Nos. 6—7, 1888.
- Yokohama. Der Deutschen Gesellschaft für Natur und Völkerkunde Ostasiens in Tokio,—Mittheilungen, Band IV, Heft 39, April, 1888.

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- ELSON, S. R. Tornadoes and Water-Spouts. 12mo. Calcutta, 1888.
- MURDOCH, J. England's work in India. By Sir William Wilson Hunter, K. C. S. I., C. I. E., LL. D. Indian Edition, 12mo. Madras, 1888.
- TAYLOR, W. C. List of the Butterflies of Khorda in Orissa. Calcutta, 1888.

### MISCELLANEOUS PRESENTATIONS.

- Notes on the Annual Statements of the Government Charitable Dispensaries in the Central Provinces of the year 1887. Fcp. Nagpur, 1888.  
 Report on the Judicial Administration (Civil) of the Central Provinces for the year 1887. Fcp., Nagpur, 1888.  
 Report on the Lunatic Asylums in the Central Provinces for the year 1887. Fcp., Nagpur, 1888.

#### CHIEF COMMISSIONER, CENTRAL PROVINCES.

- Mineral products of New South Wales, by Harrie Wood : Notes on the Geology of New South Wales by C. S. Wilkinson, F. G. S. : and Description of the Seams of Coal worked in New South Wales, by John Mackenzie, F. G. S. 4to., Sydney, 1887.

#### DEPARTMENT OF MINES, SYDNEY.

- Reports of the Alipore and Hazaribagh Reformatory Schools for the year 1887. Fcp., Calcutta, 1888.

#### GOVERNMENT OF BENGAL.

- Magnetical and Meteorological Observations made at the Government Observatory, Bombay in 1886. 4to., Bombay, 1886.

#### GOVERNMENT OF BOMBAY.

- Agreements between the British and Persian Governments for prolonging until January 31, 1905, the Conventions between Her Majesty and the Shah of Persia of April 2, 1868, and December 2, 1872, relative to Telegraphic Communication between Europe and India-Persia. No. 1 (1888). Fcp., London, 1888.

#### GOVERNMENT OF INDIA, HOME DEPARTMENT.

- Illustrations of the Indigenous Fodder Grasses of the plains of North-Western India, Part II. 4to., Roorkee, 1887.  
 The Fodder Grasses of Northern India, by J. F. Duthie, B. A., F. L. S. 8vo., Roorkee, 1888.

#### GOVERNMENT OF N. W. P. AND OUDH.

- Administration Report of the Marine Survey of India for 1887-88. Fcp., Bombay, 1888.

#### MARINE SURVEY OF INDIA, POONA.

- A Catalogue of the Moths of India. Part II. Bombyces. Compiled by E. C. Cotes and Col. C. Swinhoe, F. L. S., F. Z. S., &c. 8vo., Calcutta, 1887.

#### INDIAN MUSEUM, CALCUTTA.

- Reis in oost-en Zuid-Borneo van Koetei naar Banjermassin, ondernomen op last der indische Regeering in 1879 en 1880. Door Carl Bock. 4to., The Hague, 1887.

#### KONINKLIJK INSTITUUT VOOR DE TAAL-, LAND-EN VOLKENKUNDE VAN NEDERLANDSCH-INDIE.

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- Berlin. Deutsche Litteraturzeitung,—IX Jahrgang, Nrn. 14—18.  
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 ———. The Ibis,—Vol. VI, (5th Series) No. 22, April, 1888.  
 ———. The Journal of Botany,—Vol. XXVI, No. 305, May, 1888.  
 ———. The London, Edinburgh and Dublin Philosophical Magazine,—Vol. XXV, (5th Series), No. 156, May, 1888.  
 ———. The Messenger of Mathematics,—Vol. XVIII, No. I, May, 1888.  
 ———. The Nineteenth Century,—Vol. XXIII, No. 136, June, 1888.  
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 ———. The Quarterly Journal of Microscopical Science,—Vol. XXVIII, No. 112, April, 1888.  
 ———. The Society of Arts,—Journal, Vol. XXXVI, Nos. 1852—1856.  
 New Haven, Conn. The American Journal of Science,—Vol. XXXV, No. 208, April, 1888.  
 Paris. L'Académie des Sciences,—Comptes Rendus des Séances. Tome CVI, Nos. 14—18, et Tables, Tome CV.  
 ———. Annales de Chimie et de Physique,—Tome XIII, (6<sup>me</sup> Series), Avril, 1888.  
 ———. Journal des Savants,—Avril, 1888.  
 ———. Revue Critique,—Tome XXV, Nos. 14—18.

Paris. *Revue de Linguistique et de Philologie Comparée*,—Tome XXI,  
Fasciculi 2.

——. *Revue Scientifique*,—Tome XLI, Nos. 20—23.

### BOOKS PURCHASED.

DAWSON, SIR J. WILLIAM, C. M. G., LL. D., F. R. S. *The Geological History of Plants. With illustrations. (The International Scientific Series, Vol. LXIII).* 12mo. London, 1888.

GODWIN-AUSTEN, LT.-COL. H. H. *Land and Freshwater Mollusca of India, Part VI, April, 1888.* 8vo. London, 1888.





PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1888.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday the 1st August, 1888, at 9-15 P. M.  
LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present :—

Nawab Abdul Latif Bahádur, C. I. E., E. F. T. Atkinson, Esq., H. Beveridge, Esq., E. C. Cotes, Esq., S. R. Elson, Esq., E. Gay, Esq., Dr. Hoernle, A. Hogg, Esq., Dr. W. King, Babu Asutosh Mukhopádhyáy, L. de Nicéville, Esq., H. M. Percival, Esq., W. L. Selater, Esq., J. Wood-Mason, Esq.

The minutes of the last meeting were read and confirmed.

Twenty-nine presentations were announced, details of which are given in the Library List appended.

The following gentlemen, duly proposed and seconded at the last meeting of the Society, were balloted for and elected Ordinary Members:

Nawáb Syud Mahomed Zainool Abideen Khán Bahádur Feroze Jung (Nizámüt Family), Murshedábád.

Bábu Rajanikánta Gupta.

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

Bábu Káli Prasanna Sen Gupta, proposed by Bábu Krishna Gopál Bhakta, seconded by Bábu Haricharan Basu.

Bábu Upendra Chandra Rái, Zamindar of Naráil, Zillah Jessore, proposed by Nawab Abdul Latif Bahádur, seconded by the Hon. Dr. Mahendralál Sarkár.

The PRESIDENT announced that intimation had been received from the Secretary of State that Her Most Gracious Majesty the Queen, Empress of India, had been pleased to accept the Address presented by the Asiatic Society of Bengal on the occasion of Her Majesty's Jubilee.

The SECRETARY read the following notice from the American Meteorological Journal Company dated June 1888, offering prizes for the best essays on Tornadoes.

#### PRIZE STUDIES OF TORNADOES.

The *American Meteorological Journal*, desiring to direct the attention of students to tornadoes, in hopes that valuable results may be obtained, offers the following prizes :

For the best original essay on tornadoes or description of a tornado, \$200 will be given.

For the second best, \$50.

And among those worthy of special mention \$50 will be divided.

The essays must be sent to either of the editors, Professor Harrington, Astronomical Observatory, Ann Arbor, Michigan, or A. Lawrence Rotch, Blue Hill, Meteorological Observatory, Readville, Mass., U. S. A., before the first day of July, 1889. They must be signed by a *nom de plume*, and be accompanied by a sealed envelope addressed with same *nom de plume* and enclosing the real name and address of the author. Three independent and capable judges will be selected to award the prizes; and the papers receiving them will be the property of the Journal offering the prizes. A circular giving fuller details can be obtained by application to Professor Harrington.

Mr. COTES exhibited a zoological collection illustrative of Indian Sericulture, and made the following remarks thereon :

Fourteen collections, illustrative of Indian silk producing Moths, have been prepared in the Indian Museum for distribution to various Museums and other institutions in Europe and India. The species illustrated are the ones which actually spin the various kinds of silk that are produced commercially in India, (that is to say, the different mulberry silk worms, the Tusser, the Eri, and the Muga,) and also several wild species, which are not used at present for commercial purposes but which, nevertheless, all spin silk, in some cases of excellent quality.

These collections do not by any means contain representatives of all the silk producing moths of India, but they contain all the more important species, and are as complete as the material available allowed.

In cases where it was possible to do so, specimens have been given

illustrative of all the different stages of the silk insects from the egg to the moths, also of their cocoons and raw silk.

The following are the species contained in the collections :

**BOMBYX MORI.**

*The "Annual" or "Cashmere" worm.*

The common mulberry feeding silk worm, reared in Japan, China, Bokara, Cashmere, Afghanistan, Persia, South Russia, Turkey, Egypt, Algeria, Italy, France, Spain, United States of America, and to a small extent in the Punjab, and North Western Provinces of India.

**BOMBYX FORTUNATUS.**

*"Desi" or "Chota Polo."*

A small mulberry feeding multivoltine silk worm, largely reared in Bengal, where it yields the principal cold weather crop of cocoons.

**BOMBYX CRESI.**

*"Nistry" or "Madrassee."*

A small multivoltine mulberry feeding silk worm, largely reared in Bengal, where it yields the principal hot season crop of cocoons.

**BOMBYX ARRACANENSIS.**

*"Nya Paw."*

A multivoltine mulberry feeding silk worm, largely reared in Arracan and Burma.

**BOMBYX TEXTOR.**

*"Boropolo" or "Pat Major."*

An annual mulberry feeding silk worm, recorded from Bengal and China; its cultivation seems to be dying out in India.

**BOMBYX SINENSIS.**

*"Sina" or "Chota Pat."*

A small multivoltine mulberry feeding silk worm, recorded from Bengal. Its silk is inferior to that of the "Desi" and "Madrassee," and its cultivation is said to be dying out.

**BOMBYX MERIDIONALIS.**

This is probably only a variety of the "Chota Pat;" it is reared in Mysore and the Madras presidency.

**THEOPHILA HUTTONI.**

A wild silk worm found feeding on indigenous mulberry trees in the North Western Himalayas. It has not been found possible to rear these

worms successfully in captivity and the silk is not made use of commercially at present. The worm is bivoltine in Mussooree.

ANTHERÆA MYLITTA.

The "Tusser" worm.

A semi-domesticated bivoltine silk worm, largely reared in many parts of India in the open air upon various trees, amongst which are: The Daiyeti (*Lagerstrœmia indica*); The Bher (*Zizyphus jujuba*); The Karinda (*Carissa carandus*); The Saj tree (*Terminalia tomentosa*). The cocoon can be reeled and yields a large amount of valuable silk which is remarkable for its strength and durability. The silk is largely exported in the form of locally woven cloth, reeled silk and waste, and forms a considerable item of trade.

ANTHERÆA ASSAMA.

"Mooga."

A semi-domesticated multivoltine silk worm, largely reared in Assam in the open air upon the Sum tree (*Machilus odoratissima*); The Suálu (*Tetranthera monopetala*), and other forest trees. The cocoon can be reeled and yields a valuable silk, in which there is a considerable trade.

ATTACUS RICINI.

"Eri" silk worm.

A multivoltine silk worm which is domesticated in Assam, Cachar, and Northern Bengal, it feeds upon the Castor oil plant and produces a valuable silk. The cocoon cannot be reeled, but the silk is carded, and there is a considerable trade in it in the forms of woven silk, "Waste" and Yarn.

ATTACUS ATLAS.

A wild silk worm, found in many parts of India, besides Burma, Ceylon, Java, China, and other parts of Southern Asia. It feeds upon a large number of different plants, but is not cultivated for its silk, which, however, is said to have a considerable market value when obtained in sufficient quantities.

CRIOULA TRIFENESTRATA.

The "Amluri" or Mango silk worm.

A wild silk worm, recorded from many parts of India, and Burma, and also from Java. The cocoons are found in masses upon mango, Sum, and other trees, they cannot be reeled and are of but little value.

RHODIA NEWERA.

A wild silk worm found in Sikkim and Nepal upon a species of weeping willow. This silk is not made use of in any way.

## ACTIAS SELENE.

A wild silk worm found in many parts of India, besides Ceylon and China. No use is made of its silk.

The PHILOLOGICAL SECRETARY read the following descriptive list, drawn up by the Pandit of the Society, of the translations of the Purānas, made under the supervision of the late Dr. H. H. Wilson, now in the Society's Library :—

*Mārkaṇḍeya Purāna.*

## Index and Translation.

Chapters 1 to 117, omitting chapters 3, 7—9, 13—15, 18—39, 42—51, 53, 56—86, 90—94.

This is a paraphrastic translation, except a few chapters extracts from which have been translated. No notes have been added to it. The contents of a few of the chapters of the translation do not agree with those of the text. The translation is neither complete nor perfect. The text of this Purāna edited by Rev. K. M. Banerjee ends at chapter 137. Rev. K. M. Banerjee also published this translation with improvements up to verse No. 21 of the 8th chapter, in the year 1851.

*Linga Purāna.*

## Index and Translation.

Pūrva Khaṇḍa, chapters ... 1—105.

Uttara Khaṇḍa ,, ... 5—17.

The translation is not a consecutive one.

*Kūrma Purāna.*

Preliminary Observations, Index and Translation. Pūrva Khaṇḍa, Chapters 1—53, omitting chapters 3—6, 10, 11, 13—18, 25—27, 38—40, 44, 50. Uttara Khaṇḍa, chapter first only.

The Uttara Khaṇḍa is incomplete, the text being complete in 46 chapters. The translation contains an appendix.

*Brahmāṇḍa Purāna.*

## Index and Translation.

Pūrva Khaṇḍa, chapters ... 1—100.

Uttara Khaṇḍa ,, ... 1—33.

Translation neither complete nor consecutive.

*Siva Purāna.*

## Index and Translation.

Pūrva Khaṇḍa, chapters ... 1—56.

Uttara Khaṇḍa ,, ... 1—36.

The translation is not a consecutive one.

*Brihannāradya Purāna.*

Preliminary observations, Index and Translation. Chapters 1—38, omitting chapters 2, 6, 7, 9, 10, 12—37.

*Ādi Purāna.*

Index, Introductory Observations and Translation. Chapters 1—25, omitting chapters 3—9, 11—22, 24. The MS. is slightly damaged by worms.

*Padma Purāna—Svarga Khaṇḍa.*

Index and Translation. Chapters 1—39, omitting chapters 8, 9, 16—22, 24, 27, 28, 30, 31, 33—36.

*Padma Purāna—Śrīṣṭi Khaṇḍa.*

Index and Translation.

Chapters 1—45, omitting chapters 4, 6, 8, 11, 18, 20, 21, 23—28, 31, 36, 38, 43, 44.

*Padma Purāna—Bhūmi Khaṇḍa.*

Index and Translation. Chapters 1—131.

The translation is not a consecutive one.

*Padma Purāna—Pātūla Khaṇḍa.*

Index and Translation.

Chapters 1—102, omitting chapters 5, 6, 8, 9, 11—33, 36—39, 42—64, 81—95.

*Vāyu Purāna.*

Introductory remarks, Index and Translation.

Chapters 1—54.

Translation neither consecutive nor complete. The text published by Dr. Mitra contains 61 Chapters in the Pūrva Khaṇḍa and 14 in the Uttara Khaṇḍa (incomplete).

*Vishṇu Purāna.*

Vols. I and II. We have also a duplicate copy of the first Vol. of this translation. It was published by Dr. Wilson in 1839.

*Nāradya Purāna.*

Index and Translation.

1st Part, chapters 1—18, omitting chapters 2, 4—12, 15—17. 2nd part, chapters 8—38.

*Kālikā Purāna.*

Index and Translation. Chapters 1—98, omitting chapters 7, 14, 15, 19, 21, 22, 25—27, 32—35, 42—51, 54—58, 65—71, 75—86, 92—96.

*Brahma Vaivarta Purāna—Brahma Khaṇḍa.*

Index, Introductory Observations and Translation.

Chapters 1—29. The translation is not a consecutive one.

*Brahma Vaivarta Purāna—Prakṛiti Khaṇḍa.*

Index and Translation.

Chapters 1—62, omitting chapters, 3—8, 10, 14—17, 19—31, 33, 34, 36—44, 47—53, 57—61.

*Brahma Vaivarta Purāna—Gaṇeśa Khaṇḍa.*

Index and Translation.

Chapters 1—46, omitting chapters 5, 6, 9, 10, 14—18, 20, 22—25, 33, 39—42.

*Brahma Vaivarta Purāna—Kṛishṇa-janmakathā. 2 Vols.*

Index and Translation.

Chapters 1—132. The translation is not a consecutive one.

All the MSS. in the list are paraphrastic translations. In a few places merely extracts from the texts have been translated. No notes have been added to these translations.

The PHILOLOGICAL SECRETARY read reports on the following finds of Treasure Trove Coins :

Report on 24 old silver treasure trove coins, forwarded by the Collector of Sarun, with his No. 328G, dated the  $\frac{1}{2}$ th May 1888.

1. The Collector's letter does not specify the locality where the coins were found.

2. They are Rupees of the following Emperors of Delhi :

|                                                                                                                                                                                                                                                                                                                                                         | No. of specimen |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| I. MUHAMMAD SHĀH, A. H. 1131—1161 = A. D. 1719—1748; type; <i>Bādshāh Ghāzi</i> ; Mint. 'Azimābād; dates: 1138, 7 and 1154, 23                                                                                                                                                                                                                          | 2               |
| II. 'ALAMGĪR ZĀNĪ, A. H. 1167—1173 = A. D. 1754—1759; type: <i>Bādshāh Ghāzi</i> ; Mint and date, illegible                                                                                                                                                                                                                                             | 1               |
| III. 'ALAM SHĀH, A. H. 1173—1221 = A. D. 1159—1806; symbol, on obverse: fish; Mint: Muḥamadābād: Benares; dates; 1196 <sup>3</sup> , 24—1203, 31—1205, 32—1206, 34—1207 <sup>3</sup> , 35—1208, 36—1209, 37—1210 <sup>3</sup> , 38—1212, 39—1214 <sup>2</sup> , 41 and 42—1216 <sup>2</sup> , 43 and 44—1217 <sup>3</sup> , 44 and 45—1219, 47—1220, 47 | 21              |
| Total...                                                                                                                                                                                                                                                                                                                                                | 24              |

Report on 72 coins forwarded by the Deputy Commissioner of Rohtak, with his No. 463, dated 23rd April 1888.

1. The coins are stated to have been found in a field of the village of Ghilour in the Goháná Tahsíl. They are 72 in number.

2. They all belong to the reign of the emperor Sháh 'Alam, who reigned from A. H. 1173—1221 = A. D. 1759—1806. They are all dated in the regnal year only, *viz.*, in the 40th year, which would be A. H. 1213 or A. D. 1798; and all were minted in Farrukhábád, apparently, to judge from the fashion of the coins, under English orders. They are of two kinds, 39 have a broad raised margin, with a smooth edge; and 43 have a hardly distinguishable margin, with a milled (or serrated) edge.

Report on 137 old coins, forwarded by the Deputy Commissioner of Sialkot, with his No. 1045, dated the 19th June, 1888.

1. These coins were found in two sets of 57 and 80 pieces respectively. The first set of 57 pieces is stated to have been found in the wall of a house in the Mauza Adowar of the Tahsíl Daska, and are described to be of an admixture of copper and silver. The second set of 80 coins is stated to have been found in a field, but the locality is not further specified, though perhaps the same Mauza and Tahsíl are intended. The two sets are stated to have been found as long ago as the 1st November, 1886 and 26th June, 1885 respectively.

2. The first set of coins belongs to a class of which numerous varieties have been found at various times. It is commonly known as 'Indo-Scythian,' and several varieties of it have been described, especially by the late Mr. E. Thomas, in the *Indian Antiquary*, Vol. XII, p. 6. Of the particular variety to which the coins under report belong the first specimen appears to have been found, along with a number of other coins of different classes, in the relic casket of the celebrated tope of Manikyála, when it was opened by General Ventura in 1830, (as described in the IIIrd volume of the *Journal of the Asiatic Society of Bengal*). James Prinsep, who examined the find at that time, failed to identify that specimen; but it was identified by General Sir A. Cunningham, in 1854, from two duplicates in his possession, as belonging to king Yaśovarman of Kanauj (see *Journal As. Soc. Beng.*, Vol. XXIII, p. 700), who must have reigned early in the 8th century A. D. This identification, so far as the name is concerned, is confirmed by the coins under report, among which there are two good specimens, giving every letter of the name in perfect condition. The age of these coins it was thought, could be determined from the fact, that among the coins found together with the Manikyála specimen, there was a so-called 'Sassanian coin,' one of 'Abdulláh bin Házim, Governor of



Khorásán, struck at Merw in A. H. 66, or A. D. 685-6, (see Prinsep's *Indian Antiquities*, ed. E. Thomas, Vol. I, p. 94). The only king, named Yaśovarman, who is known to have lived about this time, is he of Kanauj, the contemporary and rival of king Lalitáditya of Kashmír, who is calculated to have reigned from A. D. 719—756 (see *Göttingische Gelehrte Anzeigen*, 1888, p. 70). These two kings, according to the Kashmírian chronicle *Rájataranginí*, were at war with one another; and it was assumed that king Yaśovarman might have carried his arms victoriously so far west as the Panjáb and Kashmír. On that occasion, it was thought, the coins which bear Yaśovarman's name might have been struck. For they, and all coins of that class, belong to the extreme north-west of India. To my mind, there are some objections to this ascription of the Yaśovarman coins. In the first place, according to the *Rájataranginí*, which tells us of the war between the two kings (in the 4th Book), it was Lalitáditya of Kashmír who invaded the kingdom of Kanauj, and not Yaśovarman of Kanauj conquering Kashmír. This, therefore, affords no ground for assuming that Yaśovarman issued coins in the extreme north-west of India. It is true that the Prákrit poem called the *Gaúdaváho*, lately edited by Sh. P. Pañdit, also alludes to expeditions of king Yaśovarman of Kanauj into the North-west (to Thanesar in the Punjáb, and against the *Párasikas*). But vague statements in a poem which, in the form now preserved, makes no pretence to being a historical narration, cannot for a moment be pitted against the direct statements of a professedly historical work, possessing an admittedly general trustworthiness; (see the editor's Introduction, pp. XXVII, XXVIII, LXXII, LXXIII). In the second place, among the coins found with the Yaśovarman coin in the Manikyála tope, there was also a coin of Huvishka who reigned in the 2nd century A. D.; and there seems no cogent reason why the age of the Yaśovarman coin should be determined by its juxtaposition to the Sassanian coin rather than the Huvishka coin. In the third place, the general appearance of the Indo-Scythian coins of this class makes it probable that they are of a much older date, and are the last crude and deteriorated representatives of a type (the so-called "Ardokro" type), which commenced with the great Indo-Scythian kings Kanishka and Huvishka of the two first centuries A. D. In the fourth place, the form of the orthography and inflection of the name, which is that peculiar to the ancient North Western Prákrit, points to a very much earlier date. Under these circumstances I would suggest as a more probable view, that the Yaśovarman of the coin may be identical with a Yaśovarman (or Yaśodharman), who reigned early in the sixth century (about 532 A. D.), and who has recorded his exploits in three pillar-

inscriptions (see *Indian Antiquary*, Vol. XV, pp. 222, 253, 257). From these it is seen, that he was "a powerful king, whose dominions included the whole of the northern part of India, from the river Brahmaputra to the Western ocean, and from the Himálayas to the mountain Mahendra (in the South), who possessed countries which not even the Guptas and Hūnas could subdue; and to whom homage was done by even the famous king Mihirakula" of Kashmír (*ibid.*, p. 255). This would seem to imply that at one time Kashmír had been conquered by this Yaśovarman. In any case the statement affords some support for attributing to him the coins under review bearing his name. It may perhaps be worth noting, that there is nothing in the three inscriptions found in Málvá which absolutely proves that that country was the original dominion of Yaśovarman. The inscriptions show clearly, that he was a person of no known lineage, but originally an obscure 'tribal chieftain' (*jinendra* or *narádhīpati*), who succeeded in conquering the countries around him and thus founding an empire and a family,—possibly of no long duration. On doing so, he changed his name to Vishṇuvardhana, and assumed the imperial titles *rājádhirāja* and *paramēśvara*. He may have been one of the Indo-Scythian chieftains of the Panjáb, and by the pillars which bear his inscriptions he may have marked the southern extent of his victories, and the place where he transferred his capital. It is true in the inscriptions his name is spelled Yaśodharman; but the two letters *dh* and *v* are not unfrequently confounded, and there are other well-known examples of words which are found spelled both with *dh* and *v*.

The name of the king, as given on the reverse, is worth noting. It reads *Srī-Yaśovarman*. There is a distinct anusvāra(*ṃ*) over the final akshara *rma*. The orthography and inflection of the name distinctly belong to the language which may be defined as the literary form of the North-Western Prākṛit (the so-called Gáthá dialect), a partial sanskritisation of the vernacular Prākṛit. *Yaśovarman*, which in other respects agrees with Sanskrit usages, has the Prākṛit nominative singular masculine termination *aṃ*, instead of the regular Sanskrit termination *má*. The termination *aṃ* is here formed after the analogy of such words as *bhágavaṃ*, *arahaṃ*, etc. An exact parallel, made after the same analogy, is the nominative singular masculine form *sihiṃ* (for Sanskrit *śikhí*), quoted in E. Müller's *Beiträge zur Grammatik des Jaina Prākṛit*, p. 51. It is also worth noting, that in the old Sauraseni Prākṛit (according to Hemachandra, IV, 264) the vocative singular of words of this class may end in *aṃ*; e. g., *bho ráyaṃ* 'O king' (of *rájá*), *bho viyavammaṃ* 'O Vijaya-varma' (of *vijaya-varmá*); and the wording of Hemachandra's rule IV, 265 is sufficiently

vague to allow perhaps exceptional forms like nominative singular *vammam*. The selection of his examples shows that the facts to which he refers were not peculiar to the Saurasení, but rather to the old Prákrit of the Jains generally. The downward limit of the period during which that old Prákrit language was in use is not distinctly fixed. It was certainly current in the three or four first centuries of the Christian era, but was gradually being displaced by the Sanskrit. It may have lingered on later; but on the whole the evidence of the language and of the general appearance of these coins seem to me rather to favour the idea, that the Yaśovarman of these coins is none of the kings as yet known to us by that name, but that he is an otherwise unknown Scythian tribal chieftain, of a very early period of our era (say, of the 3rd or 4th century).

*Obverse*: Crude figure of king, standing to front, right arm (in wide sleeve) pointing downwards to fire-altar; left hand supporting spear or standard. The whole I take to be a very crude imitation of the obverse of good Indo-Scythian coins (e. g., of Kanishka). *Legend*: under left arm: किरि *kida*; outside spear क *ka*. The 'fire-altar' looks exceedingly like the akshara क *kaṃ*, and possibly that may be the intention, the akshara forming part of the legend; though, from the general circumstances of these and similar coins, it seems more probable that the resemblance is merely accidental, owing to the crudeness of the imitation of a misunderstood symbol.

*Reverse*: Crude female figure sitting on throne, holding cornucopie in left and scroll in right hand; the whole being an extremely crude imitation of the reverse of Vasudeva's *Ardokro* coins; the throne on which the female sits has almost entirely disappeared in the present coins, the only indication of it that is left is the horizontal line projecting on both sides of the waist. *Legend*: along the right hand margin श्री यशोव *śrī Yaśova*; on the left side in the lower field मं *rman*; the whole being श्री यशोवमं *śrī Yaśovarman*. The two portions of the legend do not run in the same direction.

Messrs. Hamilton & Co., Jewellers, of Calcutta, have kindly tested the coins at my request. They state that they are made of bronze, and weigh 115 grains each.

Obverses.

Reverses.



3. The second set of coins consists of 80 Rupees, 79 of which belong to the following emperors of Dehlí:—

|                                                                                                                                                                                    | No. of specimen. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| I. AURANGZÍB, A. H. 1068—1118 = A. D. 1658—1707; mint and date illegible; regnal year 15                                                                                           | 1                |
| II. BAHÁDUR SHÁH, A. H. 1118—1124 = A. D. 1707—1712; mint: Dáru-s-salṭanat Láhor; date: 1120, 2 .....                                                                              | 1                |
| III. FARUKHSIYA'R, A. H. 1124—1131 = A. D. 1712—1719; mints: Mustaqiru-l-khiláfat Akbarábád and Dáru-l-khiláfat Sháhjahánábád; dates: 1131, 7 and —, 5.....                        | 2                |
| IV. MUHAMMAD SHÁH, A. H. 1131—1161 = 1719—1748; <i>a</i> , type: <i>Sáhib Qirán</i> ; mint of all: Dáru-l-khiláfat Sháhjahánábád; legible dates 1133, 1136, 1146, 1149, 1153 ..... | 18               |
| <i>b</i> , type: <i>Báadsháh Gházi</i> ; mint of all, except one, Dár-s-salṭanat Láhor, of one, Multán; legible dates: 1134, 1144, 1148, 1152, 1157, 1158                          | 57               |

The remaining coin of the second set belongs to the Sikh Rájá RANJIT SINGH, dated Samvat 1885 (= 1828 A. D.) and struck at Amritsar. It is, however, a forgery, being copper silvered over.

The following papers were read:

1. *On the Mother of Jehángír.*—By MAHÁMAHOPÁDHYÁYÁ KAVIRÁJA SHYÁMAL DÁS, M. R. A. S., F. R. H. S.

2. *Note on the Arthúvá (Sanskrit) Inscription.*—By MAHÁMAHOPÁDHYÁYÁ KAVIRÁJA SHYÁMAL DÁS, M. R. A. S., F. R. H. S., (with an ink impression).

These papers will be published in full in the Journal, Part I.

3. *Some Applications of Elliptic Functions to Problems of Mean Values.*—By BABU ASUTOSH MUKHOPÁDHYÁY, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The present paper is occupied with the discussion of some problems of geometric mean values, which are chiefly interesting from the mode in which the applications of elliptic functions simplify the calculations. The paper is divided into six sections, of which the first gives an expression for the area common to an ellipse and a concentric circle intersecting it; the result is expressed as the sum of two inverse-sine-functions. The second section discusses the average value of the area common to an ellipse and a concentric circle of variable radius which

always intersects it; the result is expressed in terms of the perimeter of the ellipse, and, therefore, involves the complete elliptic integral of the second kind with the eccentricity for modulus. In the third section is obtained an expression for the angle of intersection of the circle and the ellipse. The fourth section furnishes the mean value of this angle of intersection; the result is found to depend on two complete elliptic integrals of the first and third kind, with the eccentricity for the modulus; the parameter is easily found to be the square of the tangent of the angle which the line joining a focus with an extremity of the minor axis, makes with that axis. The fifth section contains the calculation of the mean value of the acute angle included between the lines joining the opposite corners of the curvilinear quadrilateral formed by the intersection of the ellipse with the concentric circle of variable radius; the result involves the complete elliptic integral of the first kind with the eccentricity for modulus, and is also shown to be expressible in terms of the axes and the differential co-efficient of the perimeter with respect to the eccentricity. The sixth and last section gives the average length of the arc of the circle intercepted by the ellipse; the mean value is found to vary as the minor axis.

The paper will be published in full in the Journal, Part II for 1888.

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LIBRARY.

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

TRANSACTIONS, PROCEEDINGS AND JOURNALS,

presented by the respective Societies and Editors.

- Bombay. Bombay Anthropological Society,—Journal, Vol. I, No. 4, 1888.
- . The Indian Antiquary,—Vol. XVII, Part 208. May, 1888.
- Calcutta. Indian Engineering,—Vol. IV, Nos. 1—4.
- . Meteorological Observations recorded at seven stations in India, corrected and reduced. January to April, 1888.
- . The Indian Engineer,—Vol. V, Nos. 12—15.
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PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR NOVEMBER, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday, the 7th November, 1888, at 9 P. M.

E. F. T. ATKINSON, Esq., C. S., Vice-President, in the Chair.

The following Members were present :

Nawáb Abdul Latif Bahádur, C. I. E., H. Beveridge, Esq., Babu Gaurdás Bysáck, E. C. Cotes, Esq., W. L. Criper, Esq., E. Gay, Esq., Dr. Hoernle, A. Hogg, Esq., T. W. H. Hughes, Esq., E. J. Jones, Esq., Dr. W. King, F. R. Mallet, Esq., W. H. Miles, Esq., Babu Asutosh Mukhopádhyaý, T. R. Munro, Esq., L. de Nicéville, Esq., H. M. Percival, Esq., Dr. Prasanna Kumár Ráy, Babu Kiran Chandra Ráy, W. L. Sclater, Esq., D. Waldie, Esq.

The Minutes of the last meeting were read and confirmed.

One hundred and twenty-two presentations were announced, details of which are given in the Library List appended.

The SECRETARY reported that the following gentlemen had been elected ordinary members of the Society by the Council during the recess, in accordance with Rule 7.

Babu Káli Prasanna Sen Gupta.

Babu Upendra Chandra Ráy.

Brigadier-General Henry Collett, C. B., F. L. S.

The elections were confirmed by the meeting.

The following gentleman is a candidate for re-election at the next meeting :—

W. Croke, Esq., C. S., proposed by M. S. Howell, Esq., C. S., seconded by W. Grierson Jackson, Esq., C. S.

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

Major H. H. Cole, R. E.
R. C. Laughlin, Esq.
Capt. E. R. Shopland, I. M.
Capt. R. H. C. Tufnell, M. S. C.

The SECRETARY reported the death of the following members:

J. MacDonald, Esq., C. E.
Surgeon-Major J. J. Monteath.

The CHAIRMAN announced that A. P. Pennell, Esq., C. S., had compounded his subscription as a non-Resident member by the payment in a single sum of Rs. 300.

The CHAIRMAN announced that in consequence of the 4½ per cent. loan of 1870 having been paid off by the Government of India, the investment of Rs. 10,000, belonging to the Society in that loan had been transferred to the 4 per cent. loan of 1865.

Also, that on the recommendation of the Finance Committee the Council had sanctioned the sale of Government Securities in the 4 per cent. loan of the nominal value of Rs. 5,000 for payment of bills on account of the O. P. Fund.

DR. W. KING read the following letters:—

Ancient Stone Implements in India.—By V. BALL, M. A., F. R. S.
To the Secretary of the Asiatic Society of Bengal.

SIR,

Having recently read Mr. R. B. Foote's paper entitled "*Notes on some recent Neolithic and Palæolithic finds in South India,*" I believe it to be desirable in the interest of the history of the discovery of stone implements in India to invite the special attention of the Society to certain statements which it contains.

In section 4 of his paper Mr. Foote introduces me to his readers. I sincerely hope, as it is but a few years since I had the honour of occupying the posts of Treasurer and Natural History Secretary of the Society, that there was no real necessity for his doing so. He then proceeds to charge me with not having given him full credit in my paper* for his discoveries. That it was my desire to do so will, I think, be admitted by any one who takes the trouble to refer to the paper itself, wherein I specifically mention Mr. Foote's work at some length. My

* "*On the Forms and Geographical Distribution of Ancient Stone Implements in India.* Proc. Irish Acad., 1879."

whole object having been to give a comprehensive review of all that had been published on the subject, any omission of recorded finds was accidental. I was well acquainted with all Mr. Foote's principal papers, and if I was unaware of what he describes as his 'various references' to neolithic implements and his letter to the *Geological Magazine*, I can only regret that he omitted to state his facts, when he had the opportunity of doing so, in a more distinct, not to say accessible, form.

The charge against me of not having known of these 'various references' and letter come strangely from a gentleman who confesses (p. 263) that my paper was unknown to him* for more than six years after its publication, although, with the exception of an earlier edition of it published in the *Proceedings* in 1867, it is, I believe, the only paper which deals with the subject of the distribution of stone implements in India as a whole, and it has been referred to by various writers in Europe, India and America.

My attempt to group the facts and construct a map based upon all the information both published and unpublished, which was known to me at the time, had, I venture to think, certain strong arguments in its favour, although subsequent discoveries were sure to necessitate a modification of the boundaries as then indicated.

Such colonies of 'Neolithic' workers as those, of which the traces have been recently described by Mr. Foote, may very well have been offshoots from the many areas of distribution, and while by no means anxious to urge my theory in opposition to well authenticated facts, nor to press its survival if it should be proved that it ought to give place to another, still as regards India generally I fail to see that Mr. Foote offers anything in exchange for it. It is indeed, I think, to be regretted that his long devotion to the subject and the great opportunities he has enjoyed have not been more productive of conclusive generalisations as to the relations between the different classes of implements.

If Mr. Foote had been as well acquainted with the general literature of the subject as might reasonably be expected, he could hardly have claimed (p. 277) for the "discovery of the Palæolithic quartzite implements of Palavaran and the Attrampakkam nullah," that it "really started prehistoric research in this country."

It is surely both a narrow and a novel use of a term to limit '*prehistoric research*' to the discovery of stone implements and the inferences to be derived therefrom. I fancy there must have been Archæologists in India who before that period believed they were engaged in prehistoric research, though they may have known nothing what-

* A copy was sent to Mr. Foote but must have gone astray in the post.

ever about stone implements, so that Mr. Foote's assumption seems on this ground alone to be hardly justified. But as regards the question of priority, with reference to the observation and discovery of stone implements in India, it is one which it is perhaps impossible to decide. As early as the year 1845 Capt. Abbott* described certain agate splinters which were found on the banks of the river Narbada, under circumstances which we can now recognise as indicating a probably human origin for them. Again in 1847 flint flakes found in the Circar Warungul† attracted attention, but as I have no means of referring to this latter case, I cannot say whether a human origin was suggested for them.

In reference to 'Neolithic' (*i. e.*, polished) implements, the first recorded discoveries in India were by Mr. H. P. Le Mesurier in Bandelkhand in the year 1861, and by Mr. Theobald in 1862, and to them therefore due priority should undoubtedly be accorded.

As to the style of Mr. Foote's comments, it being so purely a matter of taste, I have nothing to say, being quite content to leave it to the judgment of readers of his paper. During the long period from 1867, when my paper first appeared, to 1887 when Mr. Foote's paper was published, there was more than time for correction of any omission which existed in the former. None had been made, however, in 1878, when I went to press with a second edition, and when the *Manual of the Geology of India* was printed, these discoveries of Mr. Foote's were unknown to others as well as to myself. I am therefore led to the conclusion that the chief offender in the matter was Mr. Foote himself, but at the same time I must add that had these particular finds been well-known and fully considered, they would not have very materially affected my conclusions as to the general features of the then ascertained geographical distribution of ancient stone implements in India.

DUBLIN,
24th July, 1888.

Yours, &c.
V. BALL.

*From R. BRUCE FOOTE, ESQ., in reply to the foregoing.
Remarks on MR. V. BALL'S note.*

Through the courtesy of the NATURAL HISTORY SECRETARY I am enabled to reply to a note by MR. VAL. BALL, F. R. S. on my "Notes on some Recent Neolithic and Palæolithic Finds in South India," read before the Society on the 3rd August, 1887. I am glad of this opportunity, as Mr. Ball accuses me of having charged him with unfairness in failing to give me full credit for my discoveries, in his paper "On

* J. A. S. B. XIV, p. 756.

† Madras Jour. of Lit. and Sc. Vol. XV, p. 223.

the Forms and Geographical Distribution of Ancient Stone Implements in India," (Proceedings, Roy. Irish Acad., 1879.)

It is quite true that I charged him with not giving me full credit for my discoveries, but I nowhere called in question his intention to do me full justice in the matter. I simply pointed out several omissions on his part to make himself acquainted with prehistoric facts relating to South India published by me at different times, and which omissions were, to say the least, unfortunate for a writer dealing in an *ex-cathedra* style with the whole literature on the subject.

In the tabular list of "Localities in India where stone implements have been discovered" given in his paper just quoted, he gives me credit for the discovery of a ring-stone, but omits to quote a celt which I mentioned in the same note to a paper I published in the *Journal of the Madras Literary Society* for 1866.* This celt I found in 1864 and made it known in 1865, when I had fifty copies of the paper in question struck off, nearly a year before the regular publication of the *Journal*, and distributed among the leading Geologists and Archæologists in England.

I do not refer to Mr. Ball's paper in the Proceedings of the B. A. S. for 1867, as I have been unable to get sight of it since reading his note which I am now replying to.

When an author who claims to be a great authority on any subject (as Mr. Ball distinctly does in the matter of Indian Prehistoric Stone Implements) brings out a second edition of a work, or part of a work, on such a subject the public has a very distinct right to expect such second edition should be fully up to date, and it was Mr. Ball's failure in this respect that obliged me to draw attention to his omissions. They were the following :

1. He repeated in the list to his paper read to the Royal Irish Academy the omission of any mention of the celt above referred to.
2. He failed to notice a paper I read to the International Prehistoric Congress at Norwich in 1868, and which was published in the Congress volume the next year. In this paper I referred† pointedly to my first celt and ring-stone when speaking of the relations between the Indian palæolithic and neolithic stone-workers, and also mentioned a second very perfect celt I had found near Nellore in 1866.
3. Mr. Ball also overlooked my letter to the *Geological Magazine* (in 1873) on the subject of the late Mr. W. Fraser's discoveries of neolithic centres at Bellary, and some similar finds of my own in that region.

* See second part of footnote (2), page 10.

† *Vide* Transactions of the International Congress of Prehistoric Archæology, Norwich, 1868. Longmans, London, 1869, p. 236.

Surely Mr. Ball cannot be in earnest when he writes of a paper published in the Annual Volume of a great Archæological Congress like that of Norwich, and of a letter in the pages of the Geological Magazine, as not being published in distinct and accessible forms. In what publications could they have appeared more fitting ?

4. *The last of my charges Mr. Ball has in his note passed by in silence!!!* I referred to the collection of palæolithic and neolithic implements I exhibited at the Vienna Exhibition in 1873. The collection contained about a dozen neolithic celts, besides corn-crushers, mealing-stones and pounders, all distinctly labelled and shown conspicuously in the Indian Gallery.

Believing Mr. Ball to be much interested in such antiquities, and being justly rather proud of my collection, I showed it him *myself* shortly after his arrival in Vienna. After my departure for India the collection remained till the close of the Exhibition in the charge of my friend Dr. Wm. King (the present Director of the Geological Survey of India), so that Mr. Ball had some four months' time in Vienna in which to examine the specimens more closely had it so pleased him. But not only this, the collection which I presented to the Geological Museum in Calcutta was on show there for many years after: here again, however, Mr. Ball ignored, or overlooked, the neolithic specimens, and worked out his startling theory based on the imaginary occurrence of only one celt found in Coorg.

That Mr. Ball's paper in the Proceedings of the Royal Irish Academy did not become known to me for six years after its publication I much regret, but it was nothing remarkable, as that gentleman must himself know after a lengthened residence in India. It is impossible for a private individual with limited means to take in every scientific serial going, however much he might wish so to do. The publication was one I never saw, and no one drew my attention to Mr. Ball's paper. I regret the fact most certainly, but cannot take any blame to myself about it. The copy of his paper he sent me I never received, and he never asked me, or wrote to me, for any information about South Indian prehistorics; had he done so, I could, even as early as 1878, have given him so many facts bearing on the distribution of neolithic implements, that he would probably have been saved committing himself to his ill-founded theory regarding the supposed low state of development of the Dravidian tribes in South India.

Mr. Ball is angry with me and holds that I am the chief offender in the whole matter, because I did not long since write and point out his omission to notice the priority of my first celt. I ought perhaps to have done so, and certainly should have, had it occurred to me that such a

grand ethnographic theory could have been based by any man on such purely negative evidence as his belief in the occurrence of only one specimen of a polished celt in the Peninsula. Why he should be angry at all I don't quite see, for he winds up his note in a most self-contented spirit by the remark: "At the same time I must add that had these particular finds (which he had overlooked or forgotten) been well known and fully considered, they would not have very materially affected my conclusions as to the general features of the then ascertained Geographical Distribution of ancient stone implements in India." I daresay not! for even now he is strongly inclined to back up his theory and to regard the neolithic settlements of the Peninsula as only "offshoots from the Main Areas of distribution." By the Main Areas of distribution he doubtless means the province which he has shown by a grey tint in the map illustrating his paper, and yet in his list of localities for neolithic finds, he does not quote a single instance of the connection of such finds with any locality known to have been inhabited by the people that made the polished implements, much less does he point out the connection of the implements with centres of their manufacture, or mention localities where other articles for domestic use, or for purposes of ornament, have also been found in intimate and unmistakable association with the celts. All the celts enumerated in his list (with one doubtful exception) were found either casually on the surface or else arranged in temples around Mahadevs (Lingams, Phalli), positions which throw not the faintest light on their origin or local derivation.

It would certainly appear to me that the region in which the localities inhabited by the celt-makers are distributed in considerable numbers, and traces of the manufacture of celts and the very various other implements used by the same people abound, should rather be regarded as the main area of distribution.

In my paper I enumerated over 40 localities inhabited by the celt-makers, and I can now add 16 more to my list; several of them of great importance, besides many fresh places in which casual finds have been made by myself or others. Within the last few months celts have been found in Malabar, on the West Coast (by Henry Gompertz, Esq., Deputy Superintendent, Madras Survey) and near Chingleput (by the Rev. A. Andrew.)

On the question of priority of neolithic finds, I have only claimed priority for my finds in South India. The agate flakes found by Captain Abbott in 1845, in the banks of the Nerbudda, were not regarded by him as of human origin, and the flint flakes found in the Circar Warangal in the Nizam's Dominions, in 1847, are so briefly al-

cluded to, that it is quite impossible to be certain as to their real nature so neither of these finds required any notice at my hands. Mr. Le Mesurier's and Mr. Theobald's discoveries of celts in Bandelkhand do not belong to South India, so I should never have dreamt of claiming priority over them, even had I not known that they were made prior to mine by four and three years respectively.

The expression used by me when I said that the discovery of palæolithic quartzite implements in the lateritic formations near Madras "really started prehistoric research in this country" was hardly too strong, for it attracted the attention of scores of observers where there had been none before, just as the recognition of Boucher de Perthes' merit in discovering the flint implements of the Somme valley was really the day-break in Europe of Prehistoric Archæology as now understood.

Mr. Ball thinks I have offered nothing in exchange for his theory! I think I have offered a number of important facts which abundantly show how utterly baseless and untenable it was. The great discoveries since made he loftily passes by with the remark that it is to be regretted that my long devotion to the subject, and the great opportunities I have enjoyed "have not been more productive of conclusive generalizations as to the relations between the different classes of implements"! Here I would only remark that the paper he criticises contains two very important generalizations: firstly, that the makers of the cores and flakes were a neolithic people, to wit the celt-workers themselves! Secondly, that the later *polished stone period* overlaps the beginning of the *iron period*; the early iron-workers being the lineal descendants of the celt-makers, and to some extent celt-makers themselves. To these I will add a third and fourth generalization, namely, that the early iron-workers were the stock from which sprang the Dravidian tribes at present inhabiting the Peninsula, and (fourthly) that no evidence has yet been obtained which can safely connect the chipped stone folk with the makers of polished celts. There is then no ground for assuming, as Mr. Ball did, "that the Dravidians who came from the North-West" may have been the people who manufactured the flakes and cores of North-Western and Central India "and who afterwards, when they had pushed off the Dekan basalt further south, took to making the chipped quartzite axes from a material which then became more accessible to them."* The fact is the early Dravidians appear first as a neolithic, not as a palæolithic people, and had by the beginning of the iron period attained to considerable proficiency in the manufacture of stone implements in great variety, of pottery of considerable elegance of shape and fineness of material, and lastly of articles of ornament such as necklaces

* *Loc. cit.*, p. 413.

of beads and bangles made of sections of chank shells (*Mazza rapa*). Their possession of lapis lazuli and chank shells alone proves that they must have had commercial relations with very distant peoples from the extreme North-West to the extreme South of India.

CAMP, ADONI,
26th November, 1888.

R. BRUCE FOOTE.

The NATURAL HISTORY SECRETARY read the following letter :
S. M. E. Chatham, England, 10th August, 1888.

SIR,

In a footnote on p. 74 of Proceedings Asiatic Society of Bengal for 1888, Babu Asutosh Mukhopádhyaý complains that a certain solution of Monge's differential equation of a conic, published by him in the Journal, Asiatic Society of Bengal, vol. LVI, p. 138 (issued in India in November 1887) has been *reproduced* by me in the "Messenger of Mathematics" for January 1888; and he complains that it is "reproduced of course without acknowledgment that it had been given before" (by him).

The facts are that my paper was in my Editor's hands either in 1886 or *early* in 1887, and was in type and out of my hands about December 1887, (although the latter part of it containing the solution in question appears in the Number for January 1888).

These facts can be verified by application to the Editor.

I deny therefore that any part of my Paper is in any sense a *reproduction*, and I submit that the imputation of *reproduction of course without acknowledgment* was unjustifiable.

I shall show in another place that the results which I published eleven years ago, which are held up in the Paper quoted at great length (10 pages) as *irrelevant, totally erroneous, &c.*, are not quite so absurd as therein depicted.

Yours faithfully,
ALLAN CUNNINGHAM, LT.-COL., R. E.

BABU ASUTOSH MUKHOPÁDHYÁÝ made the following remarks in reply thereto.

GENTLEMEN,

A question of priority is always so delicate a matter that I would willingly keep myself aloof from it, only if it were possible; but as Lt.-Col. Cunningham is evidently anxious to see the matter discussed, I cannot honestly keep back, specially as I feel that the remarks to which he takes objection, were not only perfectly justifiable at the time they were written, but remain so up to the present

moment. Let us see, then, what the plain facts of the case are. In the first place we find that the Mongian equation, though first given about eighty years ago, remained for a long series of years unsolved in any direct and elementary way. You will remember that in July 1887, I read a paper before our Society, in which I gave, I believe for the first time, among other things, a direct elementary solution of the Mongian equation; this paper, read in July, was published on the 2nd November 1887, though in the preceding August I had distributed to my friends both here and in England, the extra copies of the paper with which I had been furnished by the Society. Now, in April last I found that in the February Number of the *Messenger of Mathematics* (which had been published in Cambridge in March) there was a paper by Col. Cunningham giving exactly the same solution of the Mongian equation as had been given before by me, and the transformation not only appeared in the Colonel's paper, but it appeared without any acknowledgement that it had been given before; I, therefore, put a note in our February Proceedings (which were then passing through the press), calling attention to this point; in this note I stated that my transformation was reproduced in the *Messenger* without any acknowledgement, though Col. Cunningham was fully acquainted with my paper at the date of *publication* of his article. Of course, as I had expected, he takes objection to this remark, and tries to explain it away; but, gentlemen, I will presently show you that it is impossible to escape. We have, then, the two facts that my paper was published in Calcutta in November and his in Cambridge four months later. Of course, these two facts taken together prove nothing; for he being in England and not a member of our Society, it does not follow that he had an opportunity of seeing my paper before his article was published. You will, therefore, expect me to produce some direct evidence on the point, and under ordinary circumstances, it would be impossible for me to do so. But, gentlemen, in this case, the Colonel himself has been good enough to furnish us with a very satisfactory evidence. If you refer to the February Number of our Proceedings, you will find on page 73, a letter from Col. Cunningham, in which he criticizes that very paper of mine on the Mongian equation which contains the transformation in question; and you will see that his letter was written on the 29th December 1887; it follows, therefore, that in December 1887, that is to say, two clear months before the date of publication of his paper, he had studied my memoir. This, then, substantiates the statement I made; how is it, I ask, that knowing my solution in December, he published the same thing in February, without the slightest acknowledgement that it had been given before by me.

It does not at all improve matters by saying that his paper was written before he had seen my solution ; there may or may not be evidence of that ; and you will also notice that even if it be shown that his paper was written before he had seen mine, that would be no proof whatever that the particular portion which contains the solution in question, formed any part of the paper as originally written. At any rate, from what I have shown, there cannot be the slightest doubt that at least two months before his paper was *published*, the Colonel had seen mine, and yet allowed his paper to appear just as if he had never heard of my solution. I think, therefore, that the remarks I made are perfectly justifiable, and though they are probably severe, I see no reason to withdraw them.

The PHILOLOGICAL SECRETARY read the following reports on finds of old Treasure Trove Coins :

I. Report on five ancient copper coins, forwarded by the Deputy Commissioner of Rawal Pindi, with his No. 2063G, dated the 19th July, 1888.

These coins are stated to have been found in the Rawal Pindi District, without any further specification. Two of them are entirely illegible, every trace of figures or letters being obliterated. The three others are in indifferent condition, but sufficient traces of the impressions remain to identify them as Indo-Scythian ; *viz.*,

- 1, a large copper coin of Hoerki (Kenorano), as figured in *Ariana Antiqua*, Pl. XIII, fig. 10.
- 2, a small copper coin of Kanerki, as figured in *Ariana Antiqua*, Pl. XI, fig. 20.
- 3, a small copper coin ; uncertain ; on obverse, traces of a standing figure ; on reverse, traces of an enthroned figure. It may possibly be a Bactrian, with an enthroned Zeus on the reverse.

II. Report on 99 old silver treasure trove coins, forwarded by the Collector of Sarun with his No. 778G, dated 11th August, 1888.

These coins are stated to have been found in the village Usri, Police outpost Bathuniyá, Police station Sewan, Subdivision Sewan, on the 25th June 1885. Their value is estimated at Rs. 105-3.

They are rupees of the following Mughal Emperors :

	No. of specimens.
1, SHAH JAHAN, 1037-1068 A. H. = 1627-1658 A. D., of the two-square-areas type, dates and mints illegible 	2

	No. of specimens.
2, AURANGZĪ'B, 1068—1118 A. H. = 1658—1707 A. D., legible dates 1093, 1099, 1102, 1103, 1109, 1110, legible mints: Súrat, Multán, Bījápur; one has Dáru-l-Khair Ajmír, 1110	14
3, BAHÁDUR SHÁH, 1118—1124 A. H. = 1707—1712, A. D., legible dates 1123, 1124; legible mints: 'Azímábád, Lakhnaú	5
4, JAHÁNDÁR SHÁH, 1124 = 1712 A. D., indifferent specimen, date 1124, mint Lakhnaú	1
5, FARRUKH SIYAR, 1124—1131, A. H. = 1712—1719, A. D., legible dates 1125, 1126, 1129, 1130, legi- ble mints: Murshidábád, Etáwá, Láhor, Farrukh- ábád, Dáru-l-khiláfat Sháh Jahánábád, Kam- báyat, Súrat, 4 have Mustaqaru-l-mulk 'Azímá- bád	24
6, MUḤAMMAD SHÁH, 1131—1161 A. H. = 1719—1748, A. D. a, type <i>Sáhīb Qirán</i> , date illegible, mint Dáru-l- khiláfat Sháh Jahánábád	2
b, type <i>Bádasháh Gházi</i> , various dates, mint mostly 'Azímábád, Gwáliyar	42
7, SHÁH 'ALAM, 1175—1221 A. H. = 1759—1806 A. D., dates illegible, mint Lakhnaú	6
8, AKBAR II., 1221—1253 A. H. = 1806—1837 A. D., mint illegible, date (on one) 1253, regnal 34 (in- consistent), with the Bhartpur 'dagger'	4
Total	99

III. Report on 375 silver coins, forwarded by the Deputy Commissioner of Wardah with his No. 4759, dated 14th September, 1888.

Together with the coins were forwarded a so-called *Ta'wíz*, of silver, and a small gold plate with the figures of Jagannáth.

In a subsequent communication of the Deputy Commissioner, dated the 29th September, 1888, it was stated that the whole treasure had been found in Manza Anjhi, Tahsil Wardha, in digging an old wall standing on the site of a house which belonged to the finder. The latter asserted that it had been buried by his grandfather, and that his father had been aware of it, but did not know the particular spot where it had been hidden.

The coins were received divided into four separated portions ; viz., 1, Rs. 102, called "Nagpuri"; 2, Rs. 178 called "Modhoshai"; 3, Rs. 85 called "Chandapuri," and 4, Rs. 10 called "Sabji." With the last named portion were enclosed the silver *Ta'wiz* and the gold plate.

On examination the coins proved to be Rupees of the following Mughal Sultáns of Dehlí :—

	No. of specimens.
1, AURANGZÍB, 1068—1118 A. H. = 1658—1707 A. D., mints : Súrat, Akbarábád ; dates 1068, 1093, 1113	3
2, FARRUKH SIYAR, 1124—1131 A. H. = 1712—1719 A. D., mint and date illegible ; a bad specimen.	1
3, MUḤAMMAD SHÁH 1131 — 1161 A. H. = 1719 — 1748 A. D.,	
<i>a</i> , <i>Imperial Mintages</i> :—Muḥammadábád (Benares), Dáru-s-Salṭanat Sháhjahánábád, Arkát ; legible dates 1131, 1140, 1152,	7
<i>b</i> , <i>Provincial Mintages</i> :—Old Nágpúri Rupee, marked with the symbol \aleph (see Prinsep's Indian Antiquities, Useful Tables, pp. 66, 68, footnotes) ; said to be struck at the Chandra and Hingan Ghát mints ; but the mint named on the coins them- selves is Súrat, which is fully legible on about half a dozen specimens, though on most of the others no more than the final <i>t</i> is visible (see <i>ibid.</i> , p. 66, No. 10) ; no date visible on any. On the packets, in which they were received, 56 were marked as "Madhoshai," and 85 as "Chanda- puri"	139
4, AḤMAD SHÁH BAHÁDUR, 1161—1167 A. H. = 1748 —1754 A. D.,	
<i>a</i> , <i>Imperial Mintages</i> :—Katak ; no dates legible, except 116*, and 117* on reverse of two coins. On the packet in which they were received, they were marked as "Madhoshai and "Nagpuri" ...	121
<i>b</i> , <i>Provincial Mintages</i> :—New Nágpúri Rupee, marked by a flag, (see <i>ibid.</i> , p. 68)	16
do., marked by number 9 over flag.....	78
do., Jeswant Ráo's, marked by cross +.....	2
do., do., marked by the symbol V	3
On packet marked as "Nagpuri."	

	No. of specimens
5, 'ĀLAMGĪ'R ŠĀNĪ', 1167—1173 A. H. = 1754—1759 A. D., Madras Rupee, marked by ψ	1
6, SHĀH 'A'LAM, 1175—1221 A. H. = 1759—1806 A. D.,	
a, <i>Imperial Mintages</i> : mint illegible; legible date 1200	2
b, <i>Provincial Mintages</i> : New Nágpurí, marked by crescent ☽ (see <i>ibid.</i> , p. 68), dated 1190	1
do., Indor Rupee, marked by faced solar disk, date 1180, mint Mulhárnagar	1
Total...	375

The *Ta'wíz* (تعويذ) or 'amulet-holder' is a small box in the form of an octagonal cylinder with domed extremities, about $3\frac{1}{2}$ by $1\frac{1}{4}$ inches. It has two ornamental rings attached near to the two ends for the passage of a string by which it may be worn. On the side it is provided with a large square opening reaching over nearly three of its eight faces, and covered by a lid, moveable on a hinge and furnished with a thick knobby handle. The hinge, however, is broken. It is strongly made of silver, and weighs nine tolas.

The other object is a very thin gold plate, embossed with three very rudely made standing figures, apparently representing Jagannáth (Kṛishṇa), his brother Balarám and his sister Subhadrá. It is fixed to an equally thin silver plate with its ends turned over, so as to form a frame round the images. The whole measures $1\frac{1}{4}$ inch square, and weighs rather more than $\frac{1}{4}$ tola. It can easily be inserted in the amulet-holder, and may be the amulet belonging to it.

IV. Report on 498 old coins, forwarded by the Officiating Deputy Commissioner of Sháhpur, with his No. 836, dated 3rd October, 1888.

These coins are stated to have been found in ploughing a field near the village of Chitta in the salt range in the district of Sháhpur. They were enclosed in an earthen vessel, which came to pieces when taken out of the ground. The whole of the coins, with the exception of one, belong to SAIFU-D-DÍN ḤASAN QURLAGH, who was one of the leading generals of *Jalálu-d-dín Mankbarnín*, the last of the Khárizmian Kings, in the beginning of the 13th century A. D. See Thomas' *Chronicles of the Pathan Kings of Delhi*, pp. 85, 92, where, on p. 96, these coins are

described. They belong to the well-known type of 'Horseman and Bull' coins. On the obverse they show a horseman with the legend *Srī Hamīrah*, and, on the reverse, a recumbent humped bull, with the legend *Srī Hasana Kuralaka*, both legends in Nāgarī characters. Most specimens of these coins have the reverse legend only in the curtailed state of *Kurala*. In the present collection, however, there are several which distinctly exhibit the full reading *Kuralaka*.*

The one exception, above referred to, appears to be a coin of the Sultān SHAMSU-D-DĪN ILTIMISH, of the same 'horseman and bull' type. The name, however, on the reverse legend is too fragmentary to be confidently identified.

All these coins are common enough. They are made of a mixture of copper and silver, the former predominating.

V. Report on 62 ancient coins forwarded by the Collector of Bijnor, with his No. $\frac{1707}{\text{XII, 622}}$ dated 17th August, 1888, and his No. $\frac{1921}{\text{XII, 622}}$ dated 26th September, 1888.

The find-place of these coins is not specified, it being merely stated that the coins "were found buried in this district" (Bijnor). One of the coins was received in a broken state, it being stated, that the coin "was broken by the police to test the metal."

The coins belong to what is called "the Indo-Scythian class" of coins. They have been described by the late Mr. E. Thomas in the *Indian Antiquary*, volume XII, p. 6, and belong to the sub-class of what Mr. Thomas has called the "Kushan Branch" of the Indo-Scythian tribes. They are figured in the *Ariana Antiqua*, plate XVIII, figs. 27, 28. They show on the obverse, the figure of the king standing as usual, under his left arm *kida* or *kidu*, beyond the spear *kāsha* (with traces of a third letter *ṇa*), beside the small altar *kshapaṇ* (or *kshamṇa*; there is a distinct dot or anusvāra, generally below, but occasionally beside, the *ṇa*). On the reverse, they show a seated female figure, as usual. Over her head is a distinct crescent, either let into the dotted margin or immediately below it (as in Prinsep's *Indian Antiquities*, vol. I, pl. XXIII, fig. 13). The monogram (quite distinct on some examples) is generally 𑀘𑀓𑀭 , or occasionally 𑀘𑀓𑀭𑀮 , neither of which is given in Wilson's list in the *Ariana Antiqua*. On the right hand margin there are two (in some specimens apparently three) letters which in the most distinct cases seem to read *sala*.

* See Dr. Hoernle's paper on "Some new or rare Muhammadan and Hindī coins," and Plate IV, in the *Journal, As. Soc. Beng.*, vol. LVIII, Part I.

The following papers were read :

1. *On certain features in the Geological Structure of the Myelat District of the Southern Shan States in Upper Burma as affecting the drainage of the country.*—By BRIGADIER GENERAL COLLETT, C. B. Communicated by Dr. D. D. CUNNINGHAM.

2. *The Psychrometer and the condensing Hygrometer.*—By S. A. HILL, Esq., B. Sc., Meteorological Reporter to the Government of the N. W. Provinces and Oudh.

[Received October 12th.]

(Abstract.)

After a description of Regnault's condensing hygrometer and a justification of the assumption that the thermometer immersed in the ether has sensibly the same temperature as the surface on which the dew is deposited, the author goes on to discuss the results of an extensive series of comparative observations of the two instruments made by him this year, together with those of a shorter series made in 1881. Amongst the observations are some made under extreme conditions of heat and dryness, the dew point in one instance having been 74·5 degrees below the temperature of the air.

The conclusion arrived at is that it is unlikely that Regnault's modification of August's formula for reducing psychrometric observations will be improved upon; but that whilst the formula gives results which approximate very closely to the truth when the air round the thermometer is stirred by a moderate wind, the deduced humidity is considerably too high in a calm state of the atmosphere.

It is incidentally proved also that any method of reduction which assumes that the indications of the psychrometer are independent of barometric pressure, as do Glaisher's factors and a table recently constructed by Hazen, must give erroneous results except at places situated near sea-level.

3. *Anopolophrya æolosomotis, a new Ciliate Infusorian parasitic in the alimentary canal of Æolosome chlorostictum.*—By HENRY H. ANDERSON, Esq.

4. *Some new forms of Euplotes found in Calcutta Tanks.*—By HENRY H. ANDERSON, Esq. Communicated by the Microscopical Society.

5. *The Butterflies of the Nilgiri District, South India.*—By G. F. HAMPSON, Esq., B. A., Exeter Coll., Oxford. Communicated by THE SUPERINTENDENT OF THE INDIAN MUSEUM.

6. *Pseudopulvinaria Sikkimensis, a new genus and species of Coccidae from Sikkim.*—By E. T. ATKINSON, Esq., B. A.

7. *The Tornadoes and Hailstorms of last April and May in the Doab and Rohilkhand.*—By S. A. HILL, Esq., B. Sc., Meteorological Reporter to the Government of the N. W. Provinces and Oudh.

[Received October 6th.]

(Abstract.)

An account of the violent tornadoes and hailstorms which visited Moradabad and other places on the 30th April 1888, and of the storms at Delhi and *Tilhar* on the following day. The paper gives as complete an account of the times of occurrence and course of these storms as can be made out from the reports obtained from district officers and others, also of the destruction of life and property occasioned by the wind, and especially by the hail, which accompanied them. It then goes on to show that, whilst the conditions likely to generate such storms are not readily terminable from pressure and wind charts at or near sea-level, these conditions are probably explicable by the distribution of pressure at the cloud-level, and that, on the days when the storms occurred, the vertical distribution both of temperature and water vapour was very anomalous.

The paper contains appendices giving the local reports of the storms, with charts.

8. *Some applications of Elliptic Functions to problems of mean values* (second paper).—By BABU ASUTOSH ΜΥΚΗΟΡΑΔΗΥ, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The problem of determining the average area common to an ellipse and a concentric circle of variable radius always intersecting it, was, among other questions, discussed in the author's first paper on "Some Applications of Elliptic Functions to Problems of Mean Values," an abstract of which has been given before (p. 184 *ante*); the present paper is devoted to a discussion of the corresponding space analogue, *viz.*, to determine the average volume common to an ellipsoid and a concentric sphere of variable radius always intersecting it. The paper is divided into six sections, of which the first is introductory; it is pointed out that there are two distinct cases according as four, or only two, of the vertices of the ellipsoid are external to the sphere; these two cases correspond to the two cases of the radius of the sphere lying between the middle and the shortest axis, and between the middle and the longest axis of the ellipsoid. The next four sections contain a detailed examination of the first case; the second section gives an expression for the common volume and the third section calculates the mean value sought; the result is expressed in terms of Jacobi's func-

tions and an elliptic integral. In the fourth section, this integral is represented geometrically by the surface of the reciprocal ellipsoid. The fifth section shows how the expression for the common volume may be reduced to the canonical form of elliptic integrals, and it is then pointed out how this, coupled with the results obtained in the previous sections, gives a remarkable relation connecting four definite integrals. The sixth and last section contains a discussion of the case when only two of the vertices of the ellipsoid are exterior to the intersecting sphere; it is pointed out that it is not necessary to repeat the previous calculation for the present case, inasmuch as by an immediate application of Dr. Catalan's transformation, it may be made to depend on the preceding one.

These papers will be published in full in the Journal, Part II.

9. *Coins of the Muhammadan kings of Gujrat.* (With 3 plates).—By E. E. OLIVER, Esq.

10. *Report on Archæological excavations in Bijnour, N. W. Provinces.* (With exhibits).—By A. MACAULAY MARKHAM, Esq., C. S., F. R. G. S., F. Z. S.

11. *The Coins of the Chaghatai Mughals.* (With 4 plates).—By E. E. OLIVER, Esq.

12. *Notes on the Aboriginal tribes of the Paháriyá Kariyás, and the Koroás.*—By W. H. P. DRIVER, Esq.

13. *A Chhatisgarhí Grammar in Hindí* by MR. HÍ'RA LÁL KAVYOPÁDHYÁYA, Head Master of the A. V. School, Dhantari, Raipur, C. P. Translated into English by G. A. GRIERSON, Esq., C. S.

These papers will be published in full in the Journal, Part I.

LIBRARY,

The following additions have been made to the Library since the Meeting held in August last.

TRANSACTIONS, PROCEEDINGS AND JOURNALS,

presented by the respective Societies and Editors.

Batavia. Bataviaasch Genootschap van Kunsten en Wetenschappen,—Notulen, Deel XXVI, Aflevering 1 und 2.

—————. Tijdschrift voor Indische Taal,-Land-en Volkenkunde, Deel XXXII, Aflevering 4.

- Batavia. Bataviaasch Verhandelingen, Deel XLV, Afllevering 2.
- Berlin. Der Königlich Preussischen Akademie der Wissenschaften zu Berlin.—Sitzungsberichte, 1—20, 1888.
- Bombay. Bombay Natural History Society,—Journal, Vol. III, No. 3.
 ———. The Indian Antiquary,—Vol. XVI, Part 203, December 1887;
 Vol. XVII, Parts 209 and 210, June and July, 1888.
- Brisbane. Royal Society of Queensland,—Proceedings, Vol. V, Parts 1 and 2.
- Brussels. Musée Royal d'Histoire Naturelle de Belgique,—Annales, Tomes XIV et XV.
 ———. La Société Entomologique de Belgique,—Annales, Table Générale, I—XXX.
 ———. La Société Royal Malacologique de Belgique,—Procès-Verbal, 3 Juillet—3 Décembre, 1887.
- Budapest. La Société Hongroise de Géographie,—Bulletin, Tome XVI, Fasc 5 et 6.
- Buenos Aires. La Academia Nacional de Ciencias en Córdoba,—Boletín, Tomo X, Entrega 2.
- Calcutta. Geological Survey of India,—Records, Vol. XXI, Part 3.
 ———. Indian Engineer,—Vol. V, Nos. 16—24; and Vol. VI, Nos. 1—5.
 ———. Indian Engineering,—Vol. IV, Nos. 5—17, and Index to Vol. III.
 ———. Indian Meteorological Memoirs,—Vol. III, Parts 3 and 4.
 ———. Meteorological Observations recorded at seven stations in India, corrected and reduced, May and June, 1888.
- Chicago, Ill. The American Antiquarian and Oriental Journal, Vol. X, Nos. 4 and 5, July and September, 1888.
- Copenhagen. K. Nordiske Oldskrift-Selskab,—Aarboger, (II Række), 3 Bind, 3 Hefte.
- Dublin. Royal Dublin Society,—Scientific Proceedings, Vol. V, Parts 7 and 8; and Vol. VI, Parts 1 and 2.
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 ———. The Scottish Geographical Society.—Magazine, Vol. IV, Nos. 7—9, July—September, 1888.
- Florence. La Società Africana d'Italia,—Bullettino, Tome IV, Fasc. 5° et 6°.

- Frankfort. ^a/M. Der Senckenbergischen Naturforschenden Gesellschaft,—Abhandlungen, Band XV, Heft 2.
- Frankfort. ^a/O. Des Naturwissenschaftlichen Vereins des Reg.-Bez. Frankfurt,—Monatliche Mittheilungen aus dem Gesamtgebiete der Naturwissenschaften, 5 Jahrgang, Nrn 11 und 12.
- . Societatum Litterae,—2 Jahrg, Nos. 3 and 4.
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- Hamburg. Naturhistorisches Museum zu Hamburg,—Bericht, 1887.
- Havre. Société de Géographie Commerciale du Havre,—Bulletin, Mai—Juin, 1888.
- Ithaca. Cornell University,—Library Bulletin, Vol. II, No. 7.
- Königsberg. Der Physikalisch-Oekonomischen Gesellschaft zu Königsberg,—Schriften, Jahrgang XXVIII.
- Leipzig. Der Deutschen Morgenländischen Gesellschaft,—Zeitschrift, Band XLII, Heft 2.
- London. Anthropological Institute of Great Britain and Ireland,—Journal, Vol. XVIII, No. 1, August, 1888.
- . Geological Society,—Quarterly Journal, Vol. XLIV, Part 3, August, 1888.
- . Institution of Civil Engineers,—Minutes of Proceedings, Vol. XCIII.
- . Institution of Mechanical Engineers,—Proceedings, May, 1888.
- . Linnean Society of London,—Journal, Botany, Vol. XXIII; Nos. 152—155 and Vol. XXIV, Nos. 159—162.
- . —————. Zoology, Vol. XX, No. 118; Vol. XXI, Nos. 130 and 131; and Vol. XXII, Nos. 136—139.
- . —————. Transactions, Botany, Vol. II, Part 15; and Vol. III, Part 1.
- . —————. Zoology, Vol. III, Parts 5 and 6.
- . —————. List of Fellows, December 1887.
- . Nature,—Vol. XXXVIII, Nos. 977—989.
- . Royal Asiatic Society of Great Britain and Ireland,—Journal, Vol. XX, Part III, July 1888.
- . Royal Astronomical Society,—Monthly Notices, Vol. XLVIII, Nos. 7 and 8, May and June, 1888.
- . Royal Geographical Society,—Proceedings, Vol. X, Nos. 7—9, July—September, 1888.
- . Royal Microscopical Society,—Journal, Parts 3 and 4, June and August, 1888.
- . Royal Society,—Proceedings, Vol. XLIV, Nos. 267—270.

- London. Royal Statistical Society,—Journal, Vol. LI, Part 2, June, 1888.
- . Society of Telegraph Engineers and Electricians,—Journal, Vol. XVII, No. 74.
- . The Academy,—Nos. 846—858.
- . The Athenæum,—Nos. 3169—3181.
- . Zoological Society of London,—Proceedings, Parts 1 and 2, 1888.
- Mexico. La Sociedad Científica “Antonio Alzate,”—Memorias, Tome I, No. 12; and Tome II, No. 1.
- Montreal. Geological and Natural History Survey of Canada,—Annual Report, Vol. II.
- Moscow. La Société Impériale des Naturalistes de Moscou,—Bulletin, No. 2, 1888.
- Naples. La Società Africana d’Italia,—Bollettino, Anno VII. Fasc. 7 et 8, Luglio—Agosto 1888.
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- . Mémoires, Tome I, Nos. 1—3.
- Prague. Der K. K. Sternwarte zu Prag,—Magnetische und Meteorologische Beobachtungen, Jahre 1887.
- Rome. La Società Degli Spettroscopisti Italiani—Memoire, Tome XVII, Dispensa 4^a—8^a, Aprile—Agosto 1888.
- Shanghai. Royal Asiatic Society, China Branch—Journal, Vol. XXII, No. 5.
- Simla. United Service Institution of India,—Journal, Vol. XVI, No. 71; and Vol. XVII, No. 72.
- . Proceedings, 13th June 1888.
- . List of Life Members and Annual Subscribers, corrected up to 31st May, 1888.
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- . Bibliothèque Géologique de la Russie, 1887.
- . Mémoires, Tome V, Nos. 2—4; Tome VI, Nos. 1 et 2; et Tome VII, Nos. 1 et 2.

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- . Royal Society of New South Wales,—Journal and Proceedings, Vol. XXII, Part 1.
- Tokyo. Imperial University,—Journal of the College of Science, Vol. II, Parts 2 and 3.
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- . Der K. K. Geologischen Reichsanstalt,—Verhandlungen, Nos. 9—12, 1888.
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PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR DECEMBER, 1888.

The Monthly General Meeting of the Asiatic Society of Bengal was held on Wednesday the 5th of December 1888, at 9 P. M.

LIEUT.-COL. J. WATERHOUSE, President, in the Chair.

The following members were present :—

E. T. Atkinson, Esq., H. Beveridge, Esq., Bábú Gaurdás Bysack, Bábú Sarat Chandra Dás, E. Gay, Esq., Dr. Hoernle, Dr. W. King, T. R. Mallet, Esq., Bábú Asutosh Mukhopádhyáya, A. M. Nash, Esq., L. de Nicéville, Esq., Kumár Upendra Chandra Ráy, D. Waldie, Esq., J. Westland, Esq.

The minutes of the last meeting were read and confirmed.

Thirty-nine presentations were announced, details of which are given in the Library List appended.

The following gentleman, duly proposed and seconded at the last meeting of the Society, was balloted for and re-elected an Ordinary Member :

W. Crooke, Esq., C. S.

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

Bábú Jogendra Chandra Ghose, M. A., B. L., Vakil, High Court, proposed by H. Beveridge, Esq., seconded by Dr. P. K. Ráy.

G. C. Dudgeon, Esq., Mumfick Lebong Tea Company, Darjeeling, proposed by L. de Niceville, Esq., seconded by J. Wood-Mason, Esq.

Kumār Rameswar Maliáh, of Searsole, (for re-election) proposed by Bábú Gaurdás Bysáck, seconded by Lieut.-Col. J. Waterhouse.

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

Lieut.-Genl. G. G. Pearse, R. H. A., C. B.
W. Fiddian, Esq., C. S.

The PRESIDENT announced that Mr. Pedler had been obliged to resign the post of Treasurer on account of ill-health, and that the duties had been taken up by Dr. W. King;

also that the COUNCIL had with much pleasure accepted the invitation of the Microscopical Society that the President of the Asiatic Society should be an Honorary Member of their Society.

BÁBÚ SARAT CHANDRA DÁS exhibited some Tibetan MSS., one written in letters of gold, of the Bodhipathapradípa, by Dípámkara Sríjñána, the celebrated Buddhist Pandit of Bengal, who visited Tibet in 1038 A. D. (postponed from last meeting).

Mr. E. T. ATKINSON exhibited a Tibetan Map, painted on cloth, of Sikkim and adjacent parts of Tibet, including the Chumbí valley, and Phari, &c., obtained from the Tibetan camp.

The PHILOLOGICAL SECRETARY read a report on a find of 477 gold mohurs, forwarded by the Deputy Commissioner of Hoshangábád with his letters No. 2612, 2955, and 3588, dated respectively 7th July 1888, 28th July 1888 and 12th September 1888.

1. The coins are stated to have been found in a field, in the Sohágpur Tahsíl of the Hoshangábád district, by some ploughmen, while ploughing.

2. On examination 25 of the coins were found to be forgeries. Twenty one of these show on both faces a few illegible scrawls, some of which appear to be attempts at imitating Persian letters, while others seem to be a very crude imitation of the fish symbol on some of Sháh 'Alam's coinage; this is the only clue to their possible age. The other four are forgeries of Aurangzib's and Farrukh Siyar's mohurs. I have had them tested by Messrs. Cooke and Kelvey, Jewellers of Calcutta, who pronounce them to be silver gilt and worth about 8 annas each.

3. The other coins numbering 452 are genuine and belong to the following emperors of Dehli:

Serial Nos.	Names of Sultán.	No. of specimens.	Description of coin.	Frequency.
1	Ghiyásu-d-dín Balban 1265-87 A. D.	1	Chron. No. 111, p. 134; mint Dehli (?), date 667.	Rare.
2	Muizzu-d-dín Kai- qubád 1287-90 A. D.	1	Chron. No. 116, p. 141; mint Dehli; date 688.	Rare.
3	Jalálu-d-dín Fí- rúz 1290-1295 A. D.	1	Chron. No. 120, p. 144; mint Dehli; date 691.	Very rare (unique in Chron).
4-11	'Aláu-d-dín Mu- hammad 1295- 1315 A. D.	8	Chron. No. 134, p. 171; mint Deogír; date 712 ¹ , 714 ¹ , illegible 6.	Very rare (in gold).
12-44	do.	33	Chron. No. 133, p. 171; mint Dáru-l-Islám; dates 697 ¹ , 703 ² , 704 ² , 705 ¹ , 706 ¹ , 707 ² , 710 ¹ , 711 ² , 712 ⁴ , 713 ³ , 714 ² , illegible 11.	} Very rare (in gold).
45-394	do.	350	Chron. No. 130 (large, broad) and Chron. No. 131 (small, thick), 2 varieties. Mint De- hli; dates 696 ¹² , 697 ¹ , 698 ⁴ , 699 ⁴ , 700 ² , 701 ¹⁰ , 702 ⁹ , 703 ⁴ , 704 ²³ , 705 ¹⁰ , 706 ⁴ , 707 ² , 708 ⁸ , 709 ¹⁴ , 710 ¹¹ , 711 ¹³ , 712 ¹⁴ , 713 ¹⁶ , 714 ⁴ , 715 ⁴ , illegible 175.	
395-397	Ghiyásu-d-dín Tughlaq 1320- 1325 A. D.	3	Chron. No. 159, p. 190; mint Dehli; dates 724, 727, illegible 1.	Not common.

Serial No.	Names of Sultán.	No. of specimens.	Description of coin.	Frequency.
398-399	Muhammad bin Tughlaq 1325-1351 A. D.	2	Chron. No. 171, p. 207; mint Dehli; dates 726, 727.	Not common.
400-401	do.	2	Chron. No. 172, p. 208; mint Dehli; date 725.	Very rare (in gold, unique in Chron.)
402	Muhammad bin Tughlaq 1325-1351 A. D.	1	Chron. No. 174, p. 209, also J. A. S. B., LII, p. 62; mint Deogir, date 727.	Rare.
403	do.	1	Chron. No. 175, p. 210; mint Sultánpur; date 729.	Very rare.
404	do.	1	Chron. No. 176, p. 211; mint Dehli; date 736.	Not uncommon.
405-408	do	4	Chron. No. 179, p. 213; no mint; dates 733 ² , 734 ² .	Very rare (unique in Chron.)
409-412	do.	4	Chron. No. 212, p. 259; mint Dehli; dates 741 ¹ , 743 ² , 744 ¹ .	Rare.
413-420	do.	8	Chron. No. 213, p. 259; no mint or date.	Not common.
421	do.	1	Compare Chron. No. 218, p. 260 (copper only); no mint or date.	Unique (in gold).
422-424	Firúz Sháh 1351-1388 A. D.	3	Chron. No. 223, p. 274; no mint or date.	Very rare.

Serial No.	Names of Sultán.	No. of specimens.	Description of coin.	Frequency.
425-429	do.	5	Chron. No. 224, p. 274 ; mint Dehlí ; date 765, illegible 4.	Rare.
430-439	do.	10	Chron. No. 225, p. 275 ; no mint or date.	Very rare.
440	do.	1	Chron. No. 226, p. 275 ; mint Dehlí ; date 766.	Very rare (unique in Chron.)
441-442	Fírúz Sháh and Fath Khán 1358 -1374 A. D.	2	Chron. 240, p. 298 ; mint Sultánpur (?) ; date [76]1, illegible 2.	Very rare.
443-444	Fírúz Sháh and Zafar 1374.	2	Chron. No. 245, p. 300, also J. A. S. B. XL, p. 160 ; mint and date lost.	Very rare (unique in Chron.)
445-446	Ghiyásu-d-dín Tughlaq II 1388 A. D.	2	Not in Chron. ; Mint Dehlí, date 791 ; il- legible 1 ; (both new varieties).	Unique.
447	Abú Bakr bin Za- far 1388-89.	1	Not in Chron. ; mint and date lost.	Unique.
448	Muhammad bin Fírúz 1389-92 A. D.	1	Chron. No. 263, p. 308, also J. A. S. B. XLV, p. 291 ; no mint or date.	Very rare.
449-450	Mahmúd bin Mu- hammad bin Fí- rúz 1392-12 A. D.	2	J. A. S. B. XLIV, p. 127 and LII, p. 213 (with Muzaffar) ; no mint or date.	Very rare (only 3 others).

Serial No.	Names of Sulṭān.	No. of spec.	Description of coin.	Frequency.
451	Mahmūd bin Muhammad bin Tughlaq, 1351 A. D.	1	J. A. S. B. XLIII, p. 97, and XLIX, p. 211, No. 9; no mint or date.	Very rare (only 3 others.)
452	Sikandar Shāh bin Ilyās, of Bengal, 1351-1389 A. D.	1	Compare J. A. S. B. XXXII, p. 64, No. 2 (silver only).	Unique (in gold.)
<i>Forgeries.</i>				
453-454	Aurangzīb 1658-1707 A. D.	2	Similar to Marsden's DCCCLXXXIV; mint Sūrat; date lost.	
455-456	Farrukh Sīyar 1712-19 A. D.	2	Mint Etāwā (?); date [112]8, regn. 5.	
457-477	Perhaps Shāh 'Alam.	21	Unintelligible scrawls.	

The following papers were read.

1. *Note on a Bicircular Quartic.*—By BABU ASUTOSH MUKHOPĀDHYĀY, M. A., F. R. A. S., F. R. S. E.

(Abstract.)

The object of this note is to point out the relation between the different modes of generating a limaçon, viz., as the pedal of a circle, as the locus of a point such that its power with respect to a given circle is in a fixed ratio to its distance from the extremity of a fixed diameter, and as the envelope of a circle whose centre moves on a given circle and which passes through a given point. The inverse and spare analogue of the curve are also considered.

The paper will be published in full in the Journal, Part II.

2. *On some new or rare Muhammadan and Hindú coins.*—By DR. A. F. RUDOLF HOEHNLE.

The paper will be published in the Journal, Part I.

LIBRARY.

The following additions have been made to the Library since the Meeting held in November last.

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presented by the respective Societies and Editors.

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- . Indian Engineering,—Vol. IV, Nos. 19—22.
- . Meteorological Observations recorded at seven stations in India, corrected and reduced,—July, 1888.
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- . —————. II. Jadeit-und Nephrit-Objecte. A. Amerika und Europa.
- . —————. III. Jadeit-und Nephrit-Objecte. B. Asien, Oceanien und Afrika.
- . —————. IV. Alterthümer aus dem Ostindischen Archipel.
- . —————. V. Seltene Waffen aus Afrika, Asien und Amerika.
- . —————. VI. Holz-und Bambus-Geräthe aus Nord West Neu Guinea.
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LIST OF MEMBERS
OF THE
ASIATIC SOCIETY OF BENGAL.
ON THE 31ST DECEMBER 1887.

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LIST OF ORDINARY MEMBERS.

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L. M. = Life Member. F. M. = Foreign Member.

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N. B.—Members who have changed their residence since the list was drawn up are requested to give intimation of such a change to the *Secretaries*, in order that the necessary alteration may be made in the subsequent edition. Errors or omissions in the following list should also be communicated to the *Secretaries*.

Members who are about to leave India and do not intend to return are particularly requested to notify to the *Secretaries* whether it is their desire to continue members of the Society; otherwise, in accordance with Rule 40 of the Bye-Laws, their names will be removed from the list at the expiration of three years from the time of their leaving India.

Date of Election.		
1860 Dec. 5.	R.	Abdul-Latif, C. I. E., Nawab Bahádur. <i>Calcutta.</i>
1885 Mar. 4.	R.	Abdur Rahmán, A.F.M., Barrister-at-Law. <i>Calcutta.</i>
1860 July 4.	N.R.	Ahmad Khán, Bahádur, Hon. Sayyid, K. C. S. I. <i>Abigarh.</i>
1872 April 3.	N.R.	Ashán-ullah, Nawáb. <i>Dacca.</i>
1860 April 4.	A.	Aitchison, J. E. T., M. D., C. I. E., Secretary to the Surgeon-General, H. M.'s Forces, Bengal. <i>Europe.</i>
1884 Mar. 5.	L.M.	Ali, Sir Ali Kadar Syud Hassan, K. C. I. E., Bahádur. <i>Murshedabad.</i>
1874 June 3.	R.	Amír Alí, C. I. E., Syud, Barrister-at-Law. <i>Calcutta.</i>
1865 Jan. 11.	F.M.	Anderson, John, M. D., F. R. S., F. L. S., Superintendent, Indian Museum. <i>Europe.</i>
1884 Sept. 3.	R.	Anderson, J. A. <i>Calcutta.</i>
1887 June 1.	R.	Apjohn, J. H., M. I. C. E., P. W. Dept. <i>Calcutta.</i>
1887 May 4.	R.	Atkinson, Rev. Augustus W., M. A., Principal, La Martiniere. <i>Calcutta.</i>
1871 Sept. 6.	R.	Atkinson, Edwin Felix Thomas, B. A., C. S., Acct.-General, Bengal. <i>Calcutta.</i>
1869 Feb. 3.	N.R.	Attar Singh Bahádur, Sirdár, C. I. E., M. U. F., Chief of Bhadour. <i>Ludiana.</i>
1870 Feb. 2.	L.M.	Baden-Powell, Baden Henry, C. S., C. I. E., Offg. Judge, Chief Court of the Panjab. <i>Lahore.</i>
1862 Feb. 5.	R.	Baisák, Gaurdás. <i>Calcutta.</i>
1865 Nov. 7.	N.S.	Ball, Valentine, M. A., F. R. S., F. G. S. <i>Europe.</i>

Date of Election.		
1862 Aug. 1.	R.	Barclay, Arthur, M. B., Surgeon Major. Sec. to Surgeon General and Sanitary Commissioner with the Govt. of India. <i>Calcutta.</i>
1869 Dec. 1.	L.M.	Barker, R. A., M. D., Civil Surgeon. <i>Serampore.</i>
1877 Jan. 17.	N.R.	Barman, Kishor Kumár Rádhá Dev, Juvraj of Hill Tipperah. <i>Tipperah.</i>
1885 Nov. 4.	R.	Barman, Dámudar Dás. <i>Calcutta.</i>
1885 Aug. 5.	R.	Barnett, John, Bengal Pilot Service. <i>Calcutta.</i>
1881 Aug. 3.	N.R.	Barstow, Henry Clements, C. S., Magistrate and Collector. <i>Cawnpore.</i>
1886 Jan. 6.	R.	Barnes, Frederick Carnac. <i>Calcutta.</i>
1887 Aug. 3.	R.	Basu, Haricharan. <i>Calcutta.</i>
1886 June 2.	F.M.	Baumgarten, Casper Wilhelm. <i>Batavia.</i>
1873 Feb. 5.	A.	Bayne, R. R., M. E. I. B. A., Chief Engineer's Office, E. I. Railway. <i>Europe.</i>
1864 Sept. 7.	N.R.	Beames, John, B. C. S., Commissioner, Bhaugulpur Division. <i>Bhaugulpur.</i>
1878 Sept. 25.	N.R.	Beighton, T. D., C. S., Offg. Judge. <i>Dacca.</i>
1862 Oct. 8.	A.	Bernard, Sir Charles Edward, K. C. S. I., C. S., <i>Europe.</i>
1876 Nov. 15.	R.	Beveridge, Henry, C. S., District and Sessions Judge. <i>Alipur.</i>
1878 Oct. 4.	R.	Bhakta, Krishna Gopál. <i>Calcutta.</i>
1879 Mar. 5.	N.R.	Biddulph, Lt.-Col. J., B. S. C. <i>Deoli.</i>
1884 Jan. 2.	N.R.	Bidie, G., Brigade-Surgeon, M. B., F. L. S., C. I. E., Supdt., Govt. Central Museum. <i>Madras.</i>
1884 Feb. 6.	N.R.	Bigg-Wither, Major A. C., B. A., A. I. C. E. <i>Quetta.</i>
1885 Jan. 7.	N.R.	Bignold, T. F., C. S., Dist. and Sessions Judge. <i>Sooree.</i>
1885 Mar. 4.	N.R.	Bilgrámi, Syud Ali, B. A., A. R. S. M., F. G. S. <i>Hyderabad.</i>
1886 Aug. 4.	N.R.	Bingham, Capt. Charles Thomas, B. S. C., Deputy Conservator of Forests. <i>Burmah.</i>
1857 Mar. 4.	L.M.	Blanford, H. F., A. R. S. M., F. R. S., F. G. S. Meteorological Reporter, Govt. of India. <i>England.</i>
1859 Aug. 3.	L.M.	Blanford, W. T., A. R. S. M., F. R. S., F. G. S., F. E. G. S., F. Z. S. <i>London.</i>
1879 Aug. 28.	R.	Blyth, W. D., M. A., LL. D., C. S., Inspector General of Registration. <i>Calcutta.</i>
1885 Mar. 4.	N.R.	Bolton, C. W., C. S., Magte. and Collector. <i>Durbhanga.</i>
1880 Nov. 3.	N.R.	Bose, Pramatha Náth, B. Sc., F. G. S., Geological Survey of India. <i>Raipur, C. P.</i>
1876 Nov. 15.	A.	Bowie, Major M. M. <i>Europe.</i> [<i>Bankipur.</i>
1868 Jan. 15.	N.R.	Boxwell, John, C. S., Offg. Commr., Patna Divn.
1876 May 4.	N.R.	Bradshaw, Deputy Surgeon-General A. F., A. M. D. <i>Rawal Pindi.</i>
1860 Mar. 7.	L.M.	Brandis, Sir Dietrich, K. C. I. E., C. I. E., Ph. D., F. L. S., F. R. S. <i>Europe.</i>

Date of Election.		
1887 May 4.	R.	Burál, Nobinchánd, Solicitor. <i>Calcutta.</i>
1879 April 2.	R.	Calcutta, The Rt. Rev. the Lord Bishop of. <i>Calcutta.</i>
1880 Mar. 3.	N.R.	Carlleyle, A. C., Archæological Survey of India. <i>Allahabad.</i>
1881 Feb. 2.	N.R.	Carter, Philip John, Deputy Conservator of Forests. <i>Rangoon.</i>
1876 Nov.15.	A.	Cayley, Surgeon-Major H. <i>Europe.</i>
1885 April 1.	N.R.	Chambers, J. W. <i>Narainganj.</i>
1881 Mar. 2.	A.	Channing, Francis Chorley, B. C. S. <i>Europe.</i>
1880 May 5.	N.R.	Chatterji, Tárá Prasáda, Deputy Magte. <i>Maunbhum.</i>
1880 Jan. 7.	R.	Chaudhuri, Govinda Kumár. <i>Calcutta.</i>
1861 Mar. 1.	N.R.	Chaudhuri, Haranchandra, Zamindar. <i>Sherpur, Mymensingh.</i>
1880 Nov. 3.	N.R.	Chaudhuri, Khirod Chandra Rái. Deputy Inspector of Schools, Sonthal Pergunnahs. <i>Nya Dumka.</i>
1886 April 7.	N.R.	Chaudhuri, Rádháballabha. <i>Sherpur, Mymensingh.</i>
1885 Feb. 4.	N.R.	Chaudhuri, Rájá Suryakánta, Bahádur. <i>Mymensingh.</i>
1885 April 1.	N.R.	Clark, H. Martyn, M. B. <i>Amritsar.</i>
1877 Aug.30.	F.M.	Clarke, Major Henry Wilberforce, R. E. <i>Europe.</i>
1880 Aug.26.	F.M.	Clerk, Lieut.-Colonel Malcolm G. <i>Europe.</i>
1881 May 4.	N.R.	Cockburn, John, Asst. Sub-Depy. Opium Agent. <i>Karwi, Banda, N. W. P.</i>
1884 April 2.	N.R.	Cole, Major H. H., R. E. <i>Mhow.</i>
1886 Aug.26.	F.M.	Condenvove, Count H., Attaché Austro-Hungarian Legation. <i>Constantinople.</i>
1874 Nov. 4.	N.R.	Constable, Archibald, Resident Engineer and Personal Asst. to Chief Engineer, Oudh and Rohilkund Railway. <i>Lucknow.</i>
1884 Aug. 6.	R.	Cotes, E. C., Indian Museum. <i>Calcutta.</i>
1876 Mar. 1.	N.R.	Crawfurd, James, B. A. C. S., Barrister-at-Law, Offg. District and Sessions Judge. <i>Nuddea.</i>
1887 Aug.25.	R.	Criper, William Risdon, F. C. S., F. I. C., A. R. S. M. <i>Kasipur.</i>
1877 June 6.	R.	Croft, The Hon. Sir A. W., K. C. I. E., M. A., Director of Public Instruction, Bengal. <i>Calcutta.</i>
1874 Mar. 4.	N.R.	Crombie, Alexander, M. D., Civil Surgeon. <i>Dacca.</i>
1873 Aug. 6.	A.	Cunningham, David Douglas, Surgeon-Major. Honorary Surgeon to the Viceroy. <i>Europe.</i>
1873 Dec. 3.	N.R.	Dames, Mansel Longworth, C. S., Asst. Commissioner. <i>Dera Ismail Khan.</i>
1877 June 6.	N.R.	Darbhangá, Sir Luchmessur Sing, K. C. I. E., Bahádur, Mahárájá of. <i>Darbhangá.</i>
1865 June 7.	N.R.	Dás, Rájá Jaykrishna, Bahádur, C. S. I. <i>Bijnor.</i>
1879 April 7.	N.R.	Dás, Rám Saran, M. A., Secy., Oudh Commercial Bank, Limited. <i>Fyzabad, Oudh.</i>
1869 April 7.	F.M.	Day, Dr. Francis, F. L. S., F. Z. S. <i>Europe.</i>
1885 May 6.	N.R.	Dé, Kumár Baikuntánáth. <i>Balasore.</i>

Date of Election.		
1885 Mar. 4.	R.	Deb, Kumár Nilkrishna, Bahádur. <i>Calcutta.</i>
1859 Oct. 6.	N.R.	Delmerick, J. G., Extra Assistant Commissioner. <i>Mussoorie.</i>
1887 Oct. 6.	R.	Deva, Kumár Vinaya Khrishna, Bahádur. <i>Calcutta.</i>
1862 May 7.	N.R.	Dhanapati Singh Dnghar, Raí Bahádur. <i>Azimganj.</i>
1877 July 4.	R.	Diler Jang, Nawáb Syad Ashgar Alí, Khan Bahádur, c. s. i. <i>Calcutta.</i>
1886 June 2.	R.	Doyle, Patrick, C. E., F. G. S., M. B. A. S. <i>Calcutta.</i>
1887 Nov. 2.	N.R.	Driver, Walter Henry Parker. <i>Ranchi, Lohardugga.</i>
1879 Feb. 5.	N.R.	Duthie, J. F., Director, Government Botanical Survey, Northern India. <i>Saharanpur.</i>
1877 Aug.30.	R.	Dutt, Kedárnáth, Depy. Collector. <i>Calcutta.</i>
1870 Mar. 9.	L.M.	Edinburgh, H. R. H. The Duke of. <i>Europe.</i>
1863 May 6.	R.	Edgar, John Ware, c. s. i., c. s. Secretary, Government of Bengal. <i>Calcutta.</i>
1874 Dec. 2.	A.	Egerton, The Hon. Sir Robert Eyles, k. c. s. i., c. i. E., c. s. <i>Europe.</i>
1871 Dec. 2.	R.	Eliot, J., M. A., Meteorological Reporter to the Govt. of Bengal. <i>Calcutta.</i>
1886 Jan. 6.	R.	Elson, Samuel B. Bengal Pilot Service. <i>Calcutta.</i>
1863 Jan. 15.	N.R.	Fedden, Francis, Deputy Superintendent, Geological Survey of India. <i>Vizagapatam.</i>
1876 Jan. 5.	F.M.	Feistmantel, Ottokar, M. D. <i>Europe.</i>
1880 April 7.	A.	Fiddian, W., M. A., C. S., <i>Europe.</i>
1879 July 2.	R.	Finucane, M., c. s., Director of Agriculture, Bengal. <i>Calcutta.</i>
1869 Sept. 1.	A.	Fisher, John Hadden, c. s. <i>Europe.</i>
1886 April 7.	F.M.	Fleet, John Faithfull, C. I. E., C. S. <i>Europe.</i>
1876 July 5.	N. R.	Foulkes, The Rev. Thos. F. L. S., M. R. A. S., F. R. G. S., Chaplain. <i>Salem, Madras Presy.</i>
1869 Sept. 1.	A.	Fryer, Colonel G. E., M. S. C. <i>Europe.</i>
1880 April 7.	N.R.	Gajapati, Ananda Rám, k. c. i. E., Rájá of Vizianagram. <i>Vizianagram.</i>
1873 Dec. 3.	A.	Gamble, J. S., M. A., Conservator of Forests, Northern Circle, Madras. <i>Europe.</i>
1883 Aug. 1.	N.R.	Garga, Kumár Isvariprasád, Zemindar. <i>Maisádal.</i>
1859 Aug. 3.	L.M.	Gastrell, Major-General James Eardley. <i>Europe.</i>
1867 Dec. 4.	R.	Gay, E., M. A., F. R. A. S., Comptroller-General. <i>Calcutta.</i>
1883 Aug.30.	R.	Ghose, Manmohan. <i>Calcutta.</i>
1871 May 3.	R.	Ghoshá, Káliprasanna. <i>Calcutta.</i>
1869 Feb. 3.	R.	Ghoshá, Pratápchandra, B. A. <i>Calcutta.</i>
1884 Dec. 3.	N.R.	Giles, George M., M. B., F. R. C. S., Surgeon, Naturalist, S. S. "Investigator." <i>Sandoway.</i>
1886 Sept.30.	N.R.	Ginlette, George Hart Desmond, Surgeon, Bengal

Date of Election.		
		Medical Service, M. D., M. CH., M. B. C. S., L. S. A., Goona Political Agency. <i>Central India.</i>
1861 Feb. 5.	N.S.	Godwin-Austen, Lieut.-Colonel H. H., F. R. S., F. Z. S., F. R. G. S. <i>Europe.</i>
1882 May 3.	R.	Golám Sarwar, Maulavi. <i>Calcutta.</i>
1881 Mar. 2.	R.	Gosáin, Hem Chunder. <i>Calcutta.</i>
1863 Nov. 4.	F.M.	Gowan, Major-General J. Y. <i>Europe.</i>
1879 Jan. 8.	R.	Gowan, Major W. E. <i>Calcutta.</i>
1877 Nov. 7.	L.M.	Grant, Alexander, M. I. C. E. <i>Europe.</i>
1876 Nov. 15.	N.R.	Grierson, George Abraham, c. s. <i>Gya.</i>
1885 Dec. 2.	N.R.	Griesbach, C. L., c. I. E., F. G. S., Deputy Superin- tendent Geological Survey of India.
1861 Sept. 4.	N.R.	Griffin, Sir Lepel Henry, c. s., K. C. S. I., Agent Governor General, Central India. <i>Indore.</i>
1861 Feb. 6.	N.R.	Growse, Frederick Salmon, M. A., c. s., c. I. E., Mag- istrate and Collector. <i>Fatehgarh, N.-W. P.</i>
1886 Mar. 3.	N.R.	Gupta Ashootosh, c. s., Assistant Magistrate and Collector. <i>Munshigunge, Dacca.</i>
1880 Feb. 4.	N.R.	Gupta, Behárilál, c. s. <i>Furreedpore.</i>
1883 June 6.	N.R.	Gurdyál Singh, Sirdár, c. s., Asst. Commissioner, <i>Dera Ghazi Khan, Panjab.</i>
1867 July 3.	N.R.	Hacket, Charles Augustus, Deputy Superintendent Geol. Survey of India. <i>Camp Abu, Rajputana.</i>
1883 Jan. 3.	N.R.	Harding, Francis Henry, B. A., c. s. <i>Chittagong.</i>
1879 Mar. 5.	A.	Harraden, S. <i>Europe.</i>
1877 Sep. 27.	R.	Hart, J., Attorney-at-Law. <i>Calcutta.</i>
1875 Mar. 3.	N.R.	Hendley, Surgeon Major Thomas Holbein. <i>Jeypore.</i>
1883 May 2.	N.R.	Hill, Samuel, Alexander, B. SC., A. B. S. M., F. C. S., Prof. of Physical Science, Muir College and Meteor. Reporter to Govt., N.-W. P. and Oudh. <i>Allahabad.</i>
1872 Dec. 5.	R.	Hoernle, Rev. A. F. R., PH. D., Principal of the <i>Calcutta Madrasah. Calcutta.</i>
1878 Mar. 6.	N.R.	Hoey, W., c. s. <i>Etawah.</i>
1886 June 2.	R.	Hogg, Alexander. <i>Calcutta.</i>
1884 Mar. 5.	N.R.	Hooper, John, c. s., Settlement Officer. <i>Basti,</i> <i>N.-W. P.</i>
1873 Jan. 2.	L.M.	Houstoun, G. L., F. G. S. <i>Europe.</i>
1863 Jan. 15.	N.R.	Howell, Mortimer Sloper, c. s. <i>Moradabad,</i> <i>N.-W. P.</i>
1878 Sep. 25.	N.R.	Hughes, G., c. s., Deputy Commissioner. <i>Jhang.</i>
1867 Aug. 7.	N.R.	Hughes, T. W. H., A. B. S. M., F. G. S., Superinten- dent Geol. Survey of India. <i>Kutni, E. I. R.</i>
1866 Jan. 17.	A.	Hughes, Major W. G., M. S. C. <i>Europe.</i>
1870 Jan. 5.	N.R.	Hume, Allan Octavian, c. B., c. s. <i>Allahabad.</i>
1884 May 2.	N.R.	Hussein, Syud, B. A., Secy. to Nizam of Hydera- bad's Council.

Date of Election.		
1872 Dec. 4.	F.M.	Ibbetson, Denzil Charles Jelf, c. s., Deputy Commissioner. <i>Europe.</i>
1866 Mar. 7.	N.R.	Irvine, William, c. s., Magistrate and Collector. <i>Ghazipur.</i>
1884 May 2.	N.R.	Iskander Ali Mirza, Prince. <i>Murshedabad.</i>
1880 Dec. 1.	A.	Jackson, William Grierson, B. C. S. <i>Europe.</i>
1869 Aug. 4.	R.	Jahán Qadr Muhammad Wáhid Alí, Bahádur, Prince. <i>Garden Reach, Calcutta.</i>
1876 July. 5.	A.	Jarrad, Lieut. F. W., B. N., F. R. A. S., Marine Survey Dept. <i>Europe.</i>
1879 Mar. 5.	R.	Jarrett, Lt.-Col. H. S., B. S. C., Secy. to the Board of Examiners. <i>Calcutta.</i>
1881 Feb. 2.	A.	Jenkins, Major Thomas Morris, M. S. C., Deputy Commissioner. <i>Europe.</i>
1862 Mar. 5.	A.	Johnstone, Colonel James William Hope. <i>Europe.</i>
1867 Dec. 4.	A.	Johnstone, Col. Sir James, K. C. S. I., C. S. I. <i>Europe.</i>
1873 Dec. 3.	N.R.	Johore, H. H. the Mahárájá of, K. C. S. I. <i>New Johore, Singapore.</i>
1884 Aug. 6.	R.	Jones, E. J., Geol. Survey of India. <i>Calcutta.</i>
1875 Nov. 3.	N.R.	Jones, S. S., B. A., C. S. <i>Murshedabad.</i>
1882 Mar. 1.	N.R.	Kennedy, Pringle, M. A. <i>Mozufferpur.</i>
1874 Dec. 2.	N.R.	Khudá Baksh, Khán Bahádur, Maulaví. <i>Bankipur.</i>
1884 Nov. 5.	A.	Kitts, Eustace John, C. S. <i>Europe.</i>
1867 Dec. 4.	R.	King, G. M. B., F. L. S., Supdt., Royal Botanic Garden. <i>Sibpur.</i>
1881 Mar. 2.	N.R.	King, Lucas White, B. A., LL. B., C. S., Assistant Agent to the Governor General, Central India. <i>Indore.</i>
1862 Jan. 15.	R.	King, W., B. A., D. SC., Director, Geol. Survey of India. <i>Calcutta.</i>
1880 Dec. 1.	A.	Kirtan, Brigade Surgeon William Henry, F. L. S., Medical Store-Keeper. <i>Europe.</i>
1880 Jan. 7.	R.	Kisch, H. M., M. A., C. S. Post-Master General, Bengal. <i>Calcutta.</i>
1887 May 4.	L.M.	Lanman, Charles R. Corresponding Secretary of the American Oriental Society, Professor of Sanskrit in Harvard College. <i>Cambridge, Mass. U. S. America.</i>
1877 Sep. 27.	N.R.	La Touche, James John Digges, B. A., C. S., <i>Menbu, Upper Burma.</i>
1881 Feb. 2.	R.	Laughlin, Robert Campbell, Asst. Supdt., Govt. Telegraph Department. <i>Calcutta.</i>
1881 Mar. 2.	N.R.	Lee, J. Bridges, M. A., F. G. S., F. C. S., F. Z. S., Barrister-at-Law. <i>Lahore.</i>
1880 July 7.	A.	Lewis, Rev. Arthur, B. A., Vice-Principal, St. John's Divinity School. <i>Europe.</i>

Date of Election.		
1873 Feb. 5.	A.	Lewis, Timothy Richards, M. B., Special Asst. to the Sanitary Commissioner with the Government of India. <i>Europe.</i>
1886 Sep. 30.	N.R.	Luson, Hewling, C. S., Assistant Magistrate. <i>Shahabad.</i>
1869 July 7.	N.R.	Lyall, Charles James, B. A., C. S. <i>Skillong.</i>
1870 April 7.	L.M.	Lyman, B. Smith. <i>Philadelphia, Pa., U. S., America.</i>
1884 Dec. 3.	N.R.	McCabe, R. B., C. S., Deputy Commissioner, Naga Hills. <i>Assam.</i>
1868 Dec. 2.	N.R.	Macauliffe, Michael, B. A., C. S., Judicial Assistant Commissioner. <i>Sialkot.</i>
1886 June 2.	R.	Macdonald, A., Editor, "Englishman." <i>Calcutta.</i>
1880 June 2.	F.M.	MacDonald, James, C. E. <i>Scotland.</i>
1884 Mar. 5.	N.R.	Macdonnell, A. P., B. A., C. S., Secy., Govt. of India, Home Dept. <i>Calcutta.</i>
1879 Feb. 5.	A.	Macgregor, Major C. R., F. R. G. S., 44th N. I. <i>Europe.</i>
1848 April 5.	L.M.	Maclagan, General Robert, R. E., F. R. S. E., F. R. G. S. <i>Europe.</i>
1873 Dec. 3.	R.	MacLeod, Surgeon-Major Kenneth, M. D. <i>Calcutta.</i>
1880 May 5.	N.R.	MacLeod, Roderick Henry, B. C. S., Asst. Magte. <i>Kasia, Gorakpur, N.-W. P.</i>
1881 July 6.	R.	Mahomed Firukh Sháh, Prince. <i>Calcutta.</i>
1886 Jan. 6.	N.R.	Mahomed Latif Khán, Sayyid, Khán Bahádur. <i>Ferozpur, Panjab.</i>
1882 Aug. 2.	R.	Mahomed Yusoof, Hon. Maulavi. <i>Calcutta.</i>
1867 April 3.	R.	Mainwaring, Major-General George Byres, S. C. <i>Serampur.</i>
1878 April 3.	A.	Mallet, F. R., F. G. S., F. C. S., Superintendent, Geological Survey of India. <i>Europe.</i>
1869 Sept. 1.	R.	Mallik, Yadulál. <i>Calcutta.</i>
1880 May 5.	N.R.	Mandlik, The Hon. Ráo Sáhib Visvanáth Náráyana, C. S. I. <i>Bombay.</i>
1869 July 7.	N.R.	Markham, Alexander Macaulay, C. S., F. R. G. S., Collector. <i>Banda.</i>
1886 Aug. 26.	N.R.	Meade, Capt. Malcolm John, S. C., Assistant Agent, Governor-General. <i>Rajputana.</i>
1860 Mar. 7.	A.	Medlicott, H. B., M. A., F. R. S., F. G. S. <i>England.</i>
1877 Mar. 7.	N.R.	Medlycott, Rev. Adolphus Edwin, Ph. D., Military Chaplain. <i>Ferozepur, Panjab.</i>
1886 Mar. 3.	R.	Mehta, Roostumjee Dhunjeebhoj. <i>Calcutta.</i>
1884 Nov. 5.	N.R.	Middlemiss, C. S., A. B., Assistant Superintendent, Geological Survey of India. <i>Chakrata, N.-W. P.</i>
1871 Sept. 6.	N.R.	Miles, Lieut.-Colonel S. B., S. C., Political Agent. <i>Udaipur.</i>
1884 Sept. 3.	R.	Miles, William Harry. <i>Calcutta.</i>
1870 July 6.	R.	Miller, A. B., B. A., Barrister-at-Law, Official Assignee. <i>Calcutta.</i>

Date of Election.		
1874 May 6.	N.R.	Minchin, F. J. V. <i>Aska, Ganjam.</i>
1875 Aug. 4.	A.	Minchin, Colonel, C. C. <i>Europe.</i>
1856 Mar. 5.	R.	Mitra, Rájá Rájendralála, LL. D., C. I. E. <i>Calcutta.</i>
1876 Dec. 6.	F.M.	Mockler, Lt.-Col. E., British Consul. <i>Muscat, Persian Gulf.</i>
1886 May 5.	N.R.	Molesworth, Capt. E. H., Commandant, Police Levy, <i>Dibrugarh.</i>
1883 Dec. 12.	N.R.	Möller, Otto Chrestien. <i>Tukvar, Darjeeling.</i>
1881 May 4.	N.R.	Molloy, Major Edward, 5th Goorkhas. <i>Abbottabad, Hazara, Panjab.</i>
1884 April 2.	R.	Mondy, Edmund F., Civil Engineering Coll. <i>Sibpur.</i>
1881 Dec. 7.	N.R.	Monteath, J. J., M. D., Surgeon Major. <i>Kohima, Naga Hills.</i>
1864 Nov. 2.	N.R.	Muir, J. W., M. A., C. S. <i>Mirzapore.</i>
1879 May 7.	R.	Mukerjea, Bhadeva, C. I. E. <i>Calcutta.</i>
1867 Mar. 6.	R.	Mukerjea, Raja, The Hon. Pearimohan, C. S. I., M. A. <i>Uttarpara.</i>
1885 July 1.	R.	Mukerjea, Nilmani, Professor, Sanskrit College. <i>Calcutta.</i>
1886 May 5.	R.	Mukhopádhyaýa, Asutosh, M. A., F. R. A. S., F. E. S. E. <i>Bhowanipur, Calcutta.</i>
1887 May 4.	R.	Munro, Thomas R., Port Commissioner's Department. <i>Calcutta.</i>
1885 June 3.	N.R.	Naemwoollah, Maulavi, Depy. Magte. <i>Bulandshahr.</i>
1887 June 1.	N.R.	Narain, Ráo Govind Ráo. <i>Allahabad.</i>
1876 May 4.	R.	Nash, A. M., M. A., Inspector of European Schools, Bengal. <i>Calcutta.</i>
1881 Nov. 2.	R.	Nicéville, L. de., F. E. S. <i>Calcutta.</i>
1887 April 6.	R.	Noetling, Fritz. Ph. D. Palæontologist to the Geological Survey of India. <i>Calcutta.</i>
1869 July 7.	N.R.	Nursing Rao, A. V. <i>Vizagapatam.</i>
1885 Feb. 4.	R.	Nyáyaratna, Pandit Mahámahopádhyaýa Maheshchandra. <i>Calcutta.</i>
1879 Aug. 28.	N.R.	Oldham, Brigade-Surgeon C. F., F. R. G. S. <i>Dharamsalla.</i>
1883 Dec. 1.	N.R.	Oldham, R. D., A. E. S. M., F. G. S., Deputy Superintendent, Geol. Sur. of India. <i>Saharanpur.</i>
1883 Aug. 30.	N.R.	Oliver, Edw. Emmerson, M. I. C. E., Under-Secy. to Govt. Panjab, P. W. D. <i>Lahore.</i>
1885 Feb. 4.	N.R.	Oliver, James William, Forest Dept. <i>Tharrawaddy, Burmah.</i>
1887 July 6.	B.	Oung, Moung Hla, Financial Department, Government of India. <i>Calcutta.</i>
1880 Aug. 4.	L.M.	Pandia, Pandit Mohanlál Vishnulál, F. T. S., Member and Secy., Royal Council of Meywar. <i>Udaipur.</i>
1880 Jan. 7.	N.R.	Pargiter, Frederick E., B. A., C. S. <i>Jessore.</i>

Date of Election.			
1880	Jan. 7.	A.	Parry, J. W., C. E., ASSOC. M. I. C. E., Asst. Engineer. <i>Europe.</i>
1862	May 7.	L.M.	Partridge, Surgeon-Major Samuel Bowen, M. D. <i>Europe.</i>
1871	Dec. 6.	N.R.	Peal, S. E. <i>Sibsagar, Assam.</i>
1860	Feb. 1.	F.M.	Pearse, General Geo. Godfrey, C. B., R. H. A., Godfrey House. <i>Cheltenham, England.</i>
1873	Aug. 6.	R.	Pedler, Alexander, F. C. S., Professor of Chemistry, Presidency College. <i>Calcutta.</i>
1864	Mar. 2.	A.	Pellow, Fleetwood Hugo, C. S. <i>Europe.</i>
1865	Sept. 6.	N.R.	Peppé, T. F. <i>Shahabad.</i>
1881	Aug. 25.	R.	Percival, Hugh Melville, M. A., Professor, Presidency College. <i>Calcutta.</i>
1877	Aug. 1.	N.R.	Peters, C. T., M. B., Surgeon-Major. <i>Bombay.</i>
1868	May 6.	N.R.	Peterson, F. W., F. C. S. <i>Bombay.</i>
1887	Mar. 2.	R.	Pope, T. A. Assistant Superintendent, Survey of India Department. <i>Calcutta.</i>
1881	Feb. 2.	R.	Prideaux, Lieut.-Colonel William Francis, B. S. C. <i>Calcutta.</i>
1880	April 7.	N.R.	Rai, Bipina Chandra, B. L. <i>Rungpore.</i>
1887	May 4.	R.	Ráy, Prasannakumár, D. Sc., (Lond. and Edin.) Professor, Presidency College, Registrar, Calcutta University. <i>Calcutta.</i>
1880	Aug. 4.	A.	Reynolds, Herbert William Ward, C. S. <i>Europe.</i>
1884	Mar. 5.	N.R.	Risley, H. H., B. A., C. S. <i>Darjeeling.</i>
1860	Jan. 3.	N.R.	Rivett-Carnac, John Henry, C. S., C. I. E., F. S. A., Opium Agent. <i>Ghazipur.</i>
1878	Sep. 25.	A.	Robertson, Rev. J. <i>Europe.</i>
1865	Feb. 1.	A.	Robinson, S. H. <i>Europe.</i>
1881	Aug. 30.	N.R.	Roy, Nanda Kumár. <i>Giridhi.</i>
1885	Mar. 4.	R.	Rustomjee, H. M. <i>Calcutta.</i>
1880	Sep. 30.	A.	Sage, E. M., Asst. Engineer, P. W. D. <i>Europe.</i>
1887	June 1.	R.	Sandberg, Rev. Graham, B. A., Barrister-at-Law, Inner Temple, Junior Chaplain, Bengal Establishment. <i>Calcutta.</i>
1877	May 2.	N.R.	Sandford, W. <i>Somastipur, Tirhoot.</i>
1872	Dec. 4.	R.	Sarasvati, Pránnáth, Pandit, M. A., B. L. <i>Bhowanipur.</i>
1867	April 3.	R.	Sarkár, The Hon. Dr. Mahendralál, C. I. E. <i>Calcutta.</i>
1885	Mar. 4.	R.	Sarvadhikári, Rájakumár. <i>Calcutta.</i>
1885	Feb. 4.	R.	Sástri, Haraprasád, M. A. <i>Calcutta.</i>
1870	May 4.	A.	Schlich, Dr. W. <i>Europe.</i>
1884	April 2.	A.	Scotland, John Parry, C. E., Ex. Engineer. <i>England.</i>
1874	July 1.	R.	Scully, Dr. John. <i>H. M.'s Mint, Calcutta.</i>
1886	Mar. 3.	N.R.	Sen, Hirálál, Excise Department. <i>Mozufferpur.</i>
1885	April 1.	N.R.	Sen, Yadunáth. <i>Khurda, Puri.</i>

Date of Election.		
1885 April 1	R.	Sen, Narendranáth. <i>Calcutta.</i>
1879 Jan. 8.	N.R.	Sewell, R., M. C. S. <i>Madras.</i>
1879 May 7.	A.	Sheridan, C. J., C. E. <i>Europe.</i>
1881 Mar. 2.	N.R.	Shopland, E. R., Indian Marine, Port Officer. <i>Akyab.</i>
1882 May 3.	N.R.	Shyamaldáss, Mahámahopádhyaía Kaviráj, Private Secy. to H. H. the Maháráná of Udaipur. <i>Udaipur.</i>
1878 April 3.	R.	Simson, A. <i>Calcutta.</i>
1887 April 6.	R.	Simpson, Dr. W. J., Health Officer to the Municipal Corporation. <i>Calcutta.</i>
1884 Sep. 3.	R.	Singh, Kumár Indrachandra, of Paikparah. <i>Calcutta.</i>
1853 Dec. 7.	N.R.	Singh, Mahárájá Isvariprashád, C. S. I. <i>Benares.</i>
1885 April 1.	R.	Singh, Kumár Saratchunder. <i>Calcutta.</i>
1882 June 7.	N.R.	Singh, Mahárájá Kumár Harendra Kishore. <i>Bettiah.</i>
1878 Oct. 4.	N.R.	Singh, Rájá Lachman. <i>Bulandshahr.</i>
1882 Aug. 2.	N.R.	Singh, Narain, Rájá Rám. <i>Khyrah, Monghyr.</i>
1880 June 2.	N.R.	Singh, Thákur Garuradhawaya Prasád, Rájá of Beswan, Beswan Fort. <i>Aligarh.</i>
1859 Aug. 3.	R.	Siñha, Baláichánd. <i>Calcutta.</i>
1872 Aug. 5.	N.R.	Skrefsrud, Rev. L. O., Indian Home Mission to the Santháls. <i>Rampur Hát.</i>
1885 Nov. 4.	F.M.	Smith, N. F. F. <i>England.</i>
1874 June 3.	A.	Smith, Vincent Arthur, C. S., Settlement Officer. <i>England.</i>
1887 April 6.	R.	Spring, F. J. E., L. C. E., Mem. Inst. C. E., Under Sec., Govt. of Bengal, P. W. Department. <i>Calcutta.</i>
1872 July 3.	N.R.	Stephen, Carr, B. L., Judl. Asst. Commr. <i>Jullundur Cantonment.</i>
1879 Oct. 2.	N.R.	Sterndale, R. A., F. R. G. S., Asst. Commr. of Currency. <i>Madras.</i>
1882 May 3.	A.	Stewart, H. E. Sir Donald M., Bart., G. C. B., G. C. S. I. <i>Europe.</i>
1876 Aug. 2.	N.R.	St. John, Lieut.-Col. Sir Oliver Beauchamp, R. E., K. C. S. I., Agent, Governor-General. <i>Baroda.</i>
1880 Nov. 3.	N.R.	Sturt, Lieut. Robert Ramsay Napier, B. S. C., Panjab Frontier Force. <i>Kohat.</i>
1884 Mar. 5.	N.R.	Swinhoe, Lieut.-Col. C., B. S. C., Asst. Comy. Genl. <i>Poona.</i>
1864 Aug. 11.	R.	Swinhoe, W., Attorney-at-Law. <i>Calcutta.</i>
1880 Nov. 3.	A.	Swynnerton, Rev. Charles. <i>England.</i>
1868 June 3.	R.	Tagore, The Hon. Mahárájá Jotendra Mohun, K. C. S. I. <i>Calcutta.</i>
1865 Sept. 6.	R.	Tawney, C. H., M. A., Principal, Presidency College. <i>Calcutta.</i>
1874 Mar. 4.	A.	Taylor, Commander A. D., late Indian Navy. <i>Europe.</i>

Date of Election.		
1884 May 5.	N.R.	Taylor, W. C., Settlement Officer. <i>Khurda, Orissa.</i>
1860 May 2.	A.	Temple, Sir R., Bart, K, C. S. I., C. I. E. <i>Europe.</i>
1878 June 5.	N.R.	Temple, Capt. R. C., s. c. <i>Palace, Mandalay, Upper Burma.</i>
1876 Feb. 2.	A.	Tennant, Major-General James Francis, B. E., F. B. S., C. I. E., Mint Master. <i>Europe.</i>
1875 June 2.	N.R.	Thibaut, Dr. G., Principal, Sanskrit College. <i>Benares.</i>
1886 Aug. 4.	R.	Thomas, Robert Edmond Skyring. <i>Calcutta.</i>
1886 Jan. 6.	N.R.	Thomson, Colonel, W. B., B. S. C. <i>Kashmir.</i>
1847 June 2.	L.M.	Thuillier, Major-Genl. Sir Henry Edward Landor, B. A., C. S. I., F. R. S. <i>Europe.</i>
1883 June 6.	N.R.	Token, Lieut.-Col. Alliston Champion, B. S. C., C. B., Sec., Govt. of India, Military Dept. <i>Calcutta.</i>
1871 April 5.	F.M.	Treffitz, Oscar. <i>Europe.</i>
1861 June 5.	L.M.	Tremlett, James Dyer, M. A., C. S., Judge, Chief Court, <i>Lahore.</i>
1872 July 3.	A.	Trevor, Colonel William Spottiswoode, B. E., <i>Europe.</i>
1880 Mar. 3.	N.R.	Tufnell, Capt. R. H. C., M. S. C., F. Z. S., 30th M. N. I. <i>Madras.</i>
1885 May 6.	R.	Verdeau, Ivan. <i>Calcutta.</i>
1886 Sep. 30.	N.R.	Waddell, Dr. Laurence Austine, M. B., Superintendent of Vaccination. <i>Darjeeling.</i>
1865 Nov. 1.	R.	Waldie, David, F. C. S. <i>Calcutta.</i>
1865 May 3.	R.	Waterhouse, Lt.-Col. James, B. S. G., Dy. Supdt., Survey of India. <i>Calcutta.</i>
1887 Oct. 6.	N.R.	Watson, Lieut. Edward Yerbury, 5th Madras N. I. <i>Berhampore, Ganjam.</i>
1874 July 1.	N.R.	Watt, Dr. George, C. I. E., Reporter on Economic Products. <i>Calcutta.</i>
1876 Dec. 6.	R.	Webb, W. T., M. A., Professor, Presidency College. <i>Calcutta.</i>
1869 Sept. 1.	N.R.	Westland, Hon. James, C. S., Financial Member of the Governor General's Council. <i>Calcutta.</i>
1878 Aug. 29.	A.	Whittall, R., Forest Dept. <i>Europe.</i>
1880 Feb. 4.	R.	Wilson, The Hon. Arthur. <i>Calcutta.</i>
1878 Mar. 6.	N.R.	Wilson, J., C. S., Deputy Commissioner. <i>Sháhpur, Panjab.</i>
1870 Jan. 5.	R.	Wood-Mason, James. <i>Calcutta.</i>
1873 Aug. 6.	N.R.	Woodthorpe, Lieut.-Col. Robert Gossett, B. E., C. B., Deputy Supdt., Survey of India. <i>Manipur.</i>

SPECIAL HONORARY CENTENARY MEMBERS.

Date of Election.	
1884 Jan. 15.	James Prescott Joule, Esq., LL. D., F. R. S. <i>Manchester.</i>
1884 Jan. 15.	Dr. Ernst Haeckel, Professor in the University of <i>Jena.</i>
1884 Jan. 15.	Charles Meldrum, Esq., M. A., F. R. S. <i>Mauritius.</i>
1884 Jan. 15.	A. H. Sayce, Esq., Professor of Comp. Philology. <i>Oxford.</i>
1884 Jan. 15.	M. Emile Senart, Member of the Institute of France. <i>Paris.</i>
1884 Jan. 15.	Sir Monier Monier Williams, <i>Knt.</i> , K. C. I. E., C. I. E., M. A., D. C. L., LL. D., Boden Prof. of Sanskrit. <i>Oxford.</i>

HONORARY MEMBERS.

1848 Feb. 2.	Sir J. D. Hooker, K. C. S. I., C. B., M. D., D. C. L., F. R. S., F. G. S. <i>Kew.</i>
1853 April 6.	Major-General H. C. Rawlinson, K. C. B., D. C. L., F. R. S. <i>London.</i>
1858 July 6.	B. H. Hodgson. <i>Europe.</i>
1860 Mar. 7.	Professor Max Müller. <i>Oxford.</i>
1860 Nov. 7.	Dr. Aloys Sprenger. <i>Heidelberg.</i>
1860 Nov. 7.	Dr. Albrecht Weber. <i>Berlin.</i>
1868 Feb. 5.	Major-General Sir A. Cunningham, K. C. I. E., C. S. I., C. I. E., R. E. <i>Europe.</i>
1868 Feb. 5.	Professor Bápu Deva Sástri. <i>Benares.</i>
1872 May 1.	Sir G. B. Airy, K. C. B., M. A., D. C. L., LL. D., F. R. S. <i>London.</i>
1872 June 5.	Prof. T. H. Huxley, LL. D., PH. D., F. R. S., F. G. S., F. Z. S., F. L. S. <i>London.</i>
1875 Nov. 3.	Dr. O. Böhtlingk. <i>Leipzig.</i>
1875 Nov. 3.	Prof. J. O. Westwood. <i>Oxford.</i>
1876 April 5.	Col. H. Yule, R. E., C. B. <i>London.</i>
1876 April 5.	Dr. Werner Siemens. <i>Berlin.</i>
1879 June 4.	Prof. E. B. Cowell, D. C. L. <i>Cambridge.</i>
1879 June 4.	Dr. A. Günther, V. P. B. S. <i>London.</i>
1879 June 4.	Dr. J. Janssen. <i>Paris.</i>
1879 June 4.	Prof. H. Milne-Edwards. <i>Paris.</i>
1879 June 4.	Prof. P. Regnaud. <i>Lyons.</i>
1879 June 4.	E. Renan. <i>Paris.</i>
1831 Dec. 7.	Professor Hermann L F. Helmholtz. <i>Berlin.</i>
1881 Dec. 7.	Dr. Rudolph v. Roth. <i>Tübingen.</i>
1881 Dec. 7.	Sir William Thomson, <i>Knt.</i> , LL. D., F. R. S., F. R. S. E. <i>Glasgow.</i>
1881 Dec. 7.	Professor William Wright, LL. D. <i>Cambridge.</i>
1883 Feb. 7.	W. T. Blandford, A. R. S. M., F. R. S., F. G. S., F. R. G. S., F. Z. S. <i>London.</i>
1883 Feb. 7.	Alfred Russell Wallace, F. L. S., F. R. G. S. <i>Godalming.</i>
1883 Feb. 7.	Prof William Dwight Whitney. <i>Newhaven, Connecticut,</i> <i>U. S.</i>

CORRESPONDING MEMBERS.

Date of Election.		
1844	Oct. 2.	Macgowan, Dr. J. <i>Europe.</i>
1856	July 2.	Krämer, A. von. <i>Alexandria.</i>
1856	„ 2.	Porter, Rev. J. <i>Belfast.</i>
1860	Feb. 1.	Baker, The Rev. H. <i>E. Malabar.</i>
1861	July 3.	Gösche, Dr. R. <i>Berlin.</i>
1862	Mar. 3.	Murray, A., Esq. <i>London.</i>
1866	May 7.	Schlagintweit, Prof. E. von. <i>Berlin.</i>
1868	Feb. 5.	Holmböe, Prof. <i>Christiana.</i>

ASSOCIATE MEMBERS.

1874	April 1.	Lafont, Rev. Fr. E., s. j., c. i. e. <i>Calcutta.</i>
1875	Dec. 1.	Bate, Rev. J. D. <i>Allahabad.</i>
1875	„ 1.	Maulavi Abdul Hai, <i>Madrasah. Calcutta.</i>
1882	June 7.	Giles, Herbert, Esq. <i>Europe.</i>
1883	Feb. 7.	Rodgers, C. J. <i>Amritsar.</i>
1884	Aug. 6.	Moore, F., F. R. S., F. L. S. <i>London.</i>
1885	Dec. 2.	Dr. A. Führer. <i>Lucknow.</i>
1886	Dec. 1.	Babu Saratchandra Dás, c. i. e. <i>Darjeeling.</i>

LIST OF MEMBERS WHO HAVE BEEN ABSENT FROM
INDIA THREE YEARS AND UPWARDS.*

* *Rule 40.*—After the lapse of 3 years from the date of a member leaving India, if no intimation of his wishes shall in the interval have been received by the Society, his name shall be removed from the List of Members.

The following members will be removed from the next member list of the Society under the operation of the above Rule :

Sir R. Temple.
 Brigade Surgeon W. H. Kirton.
 Col. J. W. H. Johnstone.
 Rev. J. Robertson.
 F. H. Pellew, Esq., C. S.
 Surgeon Major H. Cayley.
 Surgeon Major T. R. Lewis.

LOSS OF MEMBERS DURING 1887.

BY RETIREMENT.

Col. Sir E. B. Sladen.
 Hon. H. Beverley, c. s.
 E. M. Oates, Esq.
 R. Gordon, Esq.
 D. G. Barkley, Esq., c. s.
 Capt. T. Boileau, B. s. c.
 Dr. K. G. Sirkar.
 Lt.-Col. W. F. Badgley.
 Major G. F. Marshall.
 Hon. C. T. H. Crosthwaite, c. s.
 R. H. Wilson, Esq., c. s.
 R. S. Whiteway, Esq., c. s.
 Rangalála Mukerji.
 A. Cadell, Esq., c. s.
 Kumar Debendra Mallick.
 J. R. Napier, Esq.

 BY DEATH.
Ordinary Members.

Col. G. C. DePrée.
 J. C. Douglas, Esq.
 T. G. H. Moncrieffe, Esq.
 Sir Ashley Eden, c. s.
 Dr. Rám Dás Sen.
 Lt.-Col. T. C. Plowden.
 Babu Girijábhushan Mukerji.
 Babu Rakháldás Háldár.

Corresponding Members.

Dr. E. Smith.
 J. Tailor, Esq.
 J. Neitner, Esq.
 Dr. H. Frederick.
 R. H. Barnes, Esq.

[APPENDIX.]

ABSTRACT STATEMENT
OF
RECEIPTS AND DISBURSEMENTS
OF THE
ASIATIC SOCIETY OF BENGAL
FOR
THE YEAR 1887.

STATEMENT

Asiatic Society

Dr.

To ESTABLISHMENT.				Rs.		
Salaries	...	...	...	3,899	6	8
Commission	...	...	...	879	7	0
				4,278 13 6		
To CONTINGENCIES.						
Stationery	...	...	...	104	9	6
Lighting	...	...	...	81	8	0
Building	...	...	...	2,489	10	0
Taxes	...	...	...	816	0	0
Postage	...	...	...	593	13	9
Freight	...	...	...	15	7	0
Meetings	...	...	...	102	0	0
Miscellaneous	...	...	...	122	5	6
				4,325 5 9		
To LIBRARY AND COLLECTIONS.						
Books	...	...	...	1,840	15	5
Local Periodicals	...	...	...	81	0	0
Binding	...	...	...	510	9	0
Coins	...	...	...	6	0	0
				2,388 8 5		
To PUBLICATIONS.						
Journal, Part I	...	...	...	420	8	3
Journal, Part II	...	...	...	3,000	10	3
Proceedings	...	...	...	995	4	6
				4,416 7 0		
To Printing charges of circulars, receipt forms &c.	...	...	...	119	6	0
To Extraordinary charges Miscellaneous	...	...	...	228	14	9
To PERSONAL ACCOUNT (Writes off and Miscellaneous)	...	...	...			15,757 7 5
						244 10 6
To Balance	...	...	...			1,42,735 12 7
				Total Rs....		1,58,737 14 6

Examined and found correct.
 MEUGENS & KING,
Public Accountants.
 31st January, 1888.

No. 1.

of Bengal.

				Cr.		
By Balance from last Report	...	...	...		Rs. 1,41,492	7 10
BY CASH RECEIPTS.						
Publications sold for cash	...	...	Rs.	254	5	10
Interest on Investments	...	...	...	6,280	11	7
Advances recovered	...	...	...	6	2	0
Miscellaneous	...	...	...	43	4	6
Sale Proceeds of a strip of land	...	...	...	2,116	0	0
				8,700	7	11
BY PERSONAL ACCOUNT.						
Admission fees	...	...	...	582	0	0
Subscriptions	...	...	...	7,637	0	0
Sales on Credit	...	...	...	205	0	0
Miscellaneous	...	...	...	120	14	9
				8,544	14	9
Total Income...				...	17,245	6 8

Total Bs., 1,58,737 14 6

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

STATEMENT

Oriental Publication Fund in account with

Dr.

To CASH EXPENDITURE.			
Printing charges ... ..	...	...	Rs. 9,490 4 0
Editing charges ... ..	...	...	5,400 11 0
Salaries ... ..	...	...	1,276 0 0
Advertising ... ..	...	...	110 0 0
Freight ... ..	...	...	52 15 0
Stationery ... ..	...	...	35 4 0
Postage ... ..	...	...	558 2 9
Contingencies ... ..	...	...	18 6 9
Commission on Collecting Bills ... ..	...	...	50 7 10
			16,987 3 4
To PERSONAL ACCOUNT (Writes off and Miscellaneous)			20 4 0
Total Expenditure ... ..	...	...	17,007 7 4
To Balance ... ..	...	...	12,368 2 6
			Total Rs., 29,375 9 10

Examined and found correct.
MEUGENS & KING,
Public Accountants.
 31st January, 1888.

No. 2.
the Asiatic Society of Bengal.

Cr.

By Balance from last Report Rs. 16,948 2 6

BY CASH RECEIPTS.

Government allowance	...	...	Rs. 9,000 0 0
Publications sold for Cash	...	...	744 0 10
Advances recovered	...	...	121 3 6
Interest on Investments	...	...	440 0 0
			<hr/>
			10,305 4 4
			<hr/>

BY PERSONAL ACCOUNT.

Sales on Credit	...	...	...	2,110 14 3
Miscellaneous	...	...	...	16 4 9
				<hr/>
				2,127 3 0
				<hr/>

Total Income 12,432 7 4

Total Rs., 29,375 9 10

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

STATEMENT
Sanskrit Manuscript Fund in account with

Dr.

TO CASH EXPENDITURE.							
Salaries	...	...	...	Rs.	1,362	3	0
Travelling Expenses	...	...	...		409	3	3
Purchase of MSS.	...	...	...		1,310	15	6
Copying	...	...	...		9	0	0
Commission	...	...	...		5	12	0
Printing	...	...	...		518	0	0
Postage	...	...	...		14	13	3
Contingencies	...	...	...		18	7	0
To Balance	...	...	...			1,715	5 0
				Total Rs.,	5,363	11	0

Examined and found correct.
MRUGENS & KING,
Public Accountants.
31st January, 1898.

No. 3.

the Asiatic Society of Bengal.

Cr.

By Balance from last Report	Rs.	2,121	11	0
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BY CASH RECEIPTS.

Government allowances	Rs.	3,200	0	0
Publications sold for cash	9	0	0
				<hr/>		
				3,209	0	0
				<hr/>		

BY PERSONAL ACCOUNT.

Publications sold on Credit	33	0	0
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Total Income	...	3,242	0	0
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Total Rs.,	5,363	11	0
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ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

STATEMENT

Personal

Dr.

To Balance from last Report Rs. 3,907 5 2

To CASH EXPENDITURE.

Advances for purchase of Sanskrit MSS., postage of				
books to members	...	...	...	1,161 8 8
To Asiatic Society	...	...	8,544 14 9	
To Oriental Publication Fund	...	...	2,127 3 0	
To Sans. MSS. Fund	...	...	33 0 0	10,705 1 9
			15,773 15 7	

Total Rs. ... 15,773 15 7

Examined and found correct.
 MEUGENS & KING,
Public Accountants.
 31st January, 1888.

No. 4.
Account.

Cr.

By Cash Receipts	...	...	Rs.	14,099	5	8
By Asiatic Society	...	...	...	244	10	6
By Oriental Publication Fund	...	...	...	20	4	0
				14,364	4	2

By Balances.	Due to the Society.			Due by the Society.		
Members	4,296	2	8	185	9	7
Subscribers to Publications ...	43	7	6	27	11	6
Employees	280	0	0	250	0	0
Agents	170	10	6	2,682	14	9
Miscellaneous	55	15	6	290	4	6
	4,846	3	9	3,436	8	4
						1,409 11 5

Total Rs.... 15,773 15 7

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

STATEMENT *Invest*

Dr.

		Nominal.		Actual.
To Balance from last Report ...	...	Rs. 1,56,300	0 0	1,55,820 9 10
Total		Rs. 1,56,300	0 0	1,55,820 9 10

Examined and found correct.
MEUGENS & KING,
Public Accountants.
 31st January, 1888.

STATEMENT *Trust*

Dr.

To Balance (Servants' Pension Fund) ...	...		Rs.	1,111 3 10
Total		Rs....		1,111 3 10

Examined and found correct.
MEUGENS & KING,
Public Accountants.
 31st January, 1888.

No. 5.
ments.

Cr.

		Nominal.	Actual.
By Balance from last Report ...	...	Rs. 1,56,300 0 0	1,55,820 9 10
		<hr/>	<hr/>
Total Rs.		1,56,300 0 0	1,55,820 9 10
		<hr/>	<hr/>

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

No. 6.
Fund.

Cr.

By Balance from last Report ...	...	...	...	Rs. 1,071 3 10
By Interest on Investments	...	...	...	40 0 0
				<hr/>
Total Rs.				1,111 3 10
				<hr/>

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

STATEMENT

Cash.

		Dr.			
To Balance from last Report	Rs.	1,900 10 2
RECEIPTS.					
To Asiatic Society	8,700 7 11
To O. P. Fund	10,305 4 4
To Sans. MSS., Fund	3,209 0 0
To Personal Account	14,099 5 8
To Trust Fund	40 0 0
Total Rs.					38,254 12 1

Examined and found correct.
MEUGENS & KING,
Public Accountants.
 31st January, 1888.

STATEMENT

Balance

		Dr.			
To Cash	Rs.	700 2 8
To Personal Account	1,409 11 5
To Investments	1,55,820 9 10
Total Rs.					1,57,930 7 11

Examined and found correct.
MEUGENS & KING,
Public Accountants.
 31st January, 1888.

No. 7.

Cr.

EXPENDITURE.

By Asiatic Society	...	...	...	Rs.	15,757	7	5
By O. P. Fund	...	...	...	...	16,987	8	4
By Sans. MSS. Fund	...	...	...	...	3,648	6	0
By Personal Account	...	...	...	...	1,161	8	8
By Balance	...	...	...	...	700	2	8
					<hr/>		
Total Rs.					38,254	12	1
					<hr/>		

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

No. 8.

Sheet.

Cr.

By Asiatic Society	...	...	...	Rs.	1,42,735	12	7
By O. P. Fund	...	...	...	...	12,368	2	6
By Sans. MSS. Fund	...	...	...	...	1,715	5	0
By Trust Fund	...	...	...	...	1,111	8	10
					<hr/>		
Total Rs.					1,57,930	7	11
					<hr/>		

ALEX. PEDLER,
Honorary Secy. and Treasurer,
Asiatic Society of Bengal.

UNIVERSITY OF MICHIGAN



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