

the members through the Palæontological Galleries, and gave most interesting demonstrations of many of the more remarkable fossils. Dr. Henry Woodward and Prof. Morris were also present, and did all in their power to interest the visitors. Afterwards the Club adjourned to the Exhibition Galleries, Cromwell Road, where General Pitt-Rivers, F.R.S., gave a demonstration of portions of his Anthropological Museum, particularly dwelling upon the developmental ideas underlying the inception and arrangement of that unique collection. The two meetings were entirely successful, considerably over 100 Members and friends being present.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Miss Richards; two Common Marmosets (*Hapale jacchus*) from Brazil, a Silky Hangnest (*Amblystampa holosericeus*) from Buenos Ayres, presented by Mr. George Jacobs; a Puffin (*Fratercula arctica*), British, presented by Miss Lane; a Smooth Snake (*Coronella levis*), British, presented by Mr. Wm. Penney; twenty-five Madeira Snails (*Helix maderensis*), four Undated Snails (*Helix undata*) from Madeira, presented by Mr. George French Angas, C.M.Z.S.; a Diana Monkey (*Cercopithecus diana* ♂), a Talapin Monkey (*Cercopithecus talapin* ♀), a Water Chevrotain (*Hyomochus aquaticus*) from West Africa, two Green-billed Toucans (*Ramphastos dicolorus*) from Guiana, a Yellow-lored Amazon (*Chrysotis xantholora*) from Central America, two Maguari Storks (*Dissura maguari*), an Orinoco Goose (*Chenalapex jubata*) from South America, a Common Night Heron (*Nycticorax griseus*), European, a Monitor (*Monitor*, sp. inc.) from Africa, purchased; two Little Bustards (*Tetrax campestris*), European, deposited; a Radiated Fruit Cuckoo (*Carpococcyx radiatus*, from Sumatra, received on approval.

OUR ASTRONOMICAL COLUMN

COMET 1882 a.—The following elements of the comet discovered in America on March 18, have been calculated by Mr. Hind from observations on March 19, 22, and 25, the first telegraphed from America, the two others made at the Observatory of Kiel:—

Perihelion passage 1882, June 12^o07195 G.M.T.

Longitude of Perihelion	52 6 31	} App. Eq.
ascending node	204 59 31	
Inclination	73 42 44	
Log. perihelion distance	8.870371	

The heliocentric arc described between the extreme observations is only 33°, and the orbit is therefore to be regarded as a first approximation. Another orbit calculated by Dr. Oppenheim from observations on March 19, 23, and 27, gives the epoch of perihelion-passage, June 16^o5818 G.M.T., and the log. least distance 9.07186. It is evident, therefore, that the comet will greatly increase in brightness as it draws near to the sun, and we may look for a naked-eye object a fortnight or so before perihelion. The elements, however, will not be well determined in this case, without a much wider extent of observation.

Dr. Oppenheim finds the following places for Berlin midnight. We are indebted for them to Prof. Krueger, the editor of the *Astronomische Nachrichten*:—

	R.A.			Decl.	Log. distance from Earth.
	h.	m.	s.		
April 6	18	28	53	+44 43.4	... 0.2500
7	—	31	14	45 29.4	
8	—	33	41	46 16.2	
9	—	36	13	47 3.9	
10	—	38	50	47 52.5	... 0.2323
11	—	41	32	48 42.0	
12	—	44	21	49 32.4	
13	—	47	16	50 23.6	
14	—	50	19	+51 15.7	... 0.2134

The mean of the above perihelion-distances is less than a tenth of the mean distance of the earth from the sun, and comparatively few comets out of the number calculated have approached

the sun so closely; indeed, between the commencement of the seventeenth century and the present time we find only nine or ten cases that can be relied upon, in upwards of two hundred and twenty which have been computed.

VARIABLE STARS.—Amongst the objects of this class now in a favourable position for observation is one observed on the meridian at Bonn in May, 1864, and rated 9^o; its position for 1855.0 is in R.A. 13h. 22m. 58^s.1s., N.P.D. 98° 48' 54". It was 8.5 on April 16, 1855, 9.5 on April 30, 1853, and is entered 10m. on Chacornac's Chart, No. 41; on one occasion previous to 1853, it had been noted 8m. On April 5, 1874, it was a faint 9m. It was not observed either by Lalande or Bessel. It is 9m. on Bremicker's chart of the Berlin series. An eighth-magnitude (Santini calls it a sixth) follows about 10' to the south.

Mira Ceti attains a maximum on May 23. A minimum of S Cancri occurs on April 14, at 9h. 9m. G.M.T.

GEOGRAPHICAL NOTES

THE following papers will be read at the German "Geographentag" which will meet at Halle on April 11-14:—On some scientific results of the voyage of the *Gazelle*, particularly from a zoogeographical point of view, by Prof. Studer (Berne); on the progress of our knowledge of Sumatra, by Prof. Kan (Amsterdam); on the alleged influence of the earth's rotation upon the formation of river-beds, by Prof. Zöppritsch (Königsberg); on the colonies of Germans and their neighbours in Western Europe, by Herr Meitzen (Berlin); on the historical development of geographical instruction, by Dr. Kropatschek (Brandenburg); on the treatment of subjects relating to conveyance in geographical instruction, by Prof. Paulitschke (Vienna); on the introduction of metrical measures in geographical instruction, by Prof. Wagner (Göttingen); on the relation between anthropology and ethnology, by Prof. Gerland (Strassburg); on the ethnological conditions of Northern Africa, by Dr. Nachtigal (Berlin); on the Polar question, by Prof. Neumayer (Hamburg); on the geographical distribution of Alpine lakes, by Prof. Credner (Greifswald); on the true definition of the development of coasts, by Prof. Günther (Ansbach); on geographical instruction in its relation to natural sciences, by Prof. Schwalbe (Berlin); on the Guldberg-Mohn theory of horizontal air currents, by Prof. Overbeck (Halle); on the systematic furtherance of the scientific topography of Germany, by Herr Lehmann (Halle). The meeting will be combined with a geographical exhibition.

WITH the sixth part of the volume for 1881 of the *Zeitschrift* of the Berlin Geographical Society we have the usual exhaustive Catalogue of geographical literature for the year, including works and papers in all departments of geography, systematically arranged, and covering about 150 pages. No such complete list is to be found anywhere else. Dr. Konrad Ganzenmüller has a paper in this number on the Climate, Flora, and Fauna of the Central Range of the North-West Himalayas. The first part of the *Zeitschrift* for the present year contains papers by Dr. Theo. Fischer, on the Italian Sea-Chart and Maps of the Middle Ages; on the Sierra of Cordoba, by Dr. Wien; on the Antarctic Flora compared with the Palæozoic, by Dr. Joh. Palacky; and on the Cartography of Bolivia, by Dr. R. Kiepert. No. 2 of the *Verhandlungen* of the Society for 1882 contains a long lecture by Herr Buchner on his three years' exploration in South-West Africa.

THE March number of *Petermann's Mittheilungen* contains an account, by Mr. Knipping, of a recent journey through the central mountainous part of the chief island of Japan; a paper on Capt. Gallien's mission to the Upper Niger, 1880-81; an analysis, by Prof. Zöppritsch, of Mr. Stanley's thermo-barometric observations on his journey across Africa; and a necrology for the year 1881.

THERE have been several books recently published on Manitoba, to which, at present, there is a great rush of emigrants. As a rule, such books give only the bright side of the emigrant's life and prospects in the colony, and it is difficult to get a perfectly trustworthy account of what the emigrant may expect. Two Manitoba books are before us: one by the Rev. Prof. Bryce, of Manitoba College—for education has been well provided for in Winnipeg already—is mainly historical, giving pretty full details of the Earl of Selkirk's attempts at settlement. Messrs. S. Low and Co. are the publishers. The other modest

little volume ("A Year in Manitoba, 1880-81") is published by Messrs. W. and R. Chambers, and contains a full and concise statement of the experience of an officer and his sons on a small farm which they took, about ten miles from Winnipeg. There were not a few hardships certainly, and these are clearly brought out; but the other side is quite as clearly and fairly stated, with a considerable balance in its favour. For any one contemplating emigration to the Canadian North-west, this is the book to get.

BESIDES Mr. O'Neill's paper on his three months' journey inland from Mozambique, the April *Proceedings* of the Geographical Society contain a *résumé* of the information just laid before Parliament on the subject of the Russo-Persian frontier east of the Caspian, accompanied by a map, which can only pretend to reproduce the Russian view of the question. The other paper describes the journey of a Russian officer from Geoktepeh to the Khivan oasis, and is a translation from the Russian. Perhaps the most notable matter in the geographical news is the treaty which M. de Brazza imposed on the native chiefs at Stanley Pool, and by which they undertook to admit none but Frenchmen; some late news is also given respecting Dr. Junker's journey in Central Africa, and Mr. J. M. Schuver's progress to the south-west of Abyssinia. We are glad to see, too, that the international polar meteorological expeditions are not neglected, some very interesting information being furnished respecting those of the Danes to Godshaab, in West Greenland, and of the Dutch to the mouth of the Yenisei. A note is also devoted to the recent Danish explorations at Mear, the Jacobshavn fjord. The French Geographical Society's meetings are very fully reported, as, indeed, they generally are.

A NEW Geographical Society was formed last month at Greifswald, in Pomerania.

A CORRESPONDENT points out, in reference to Dr. Rae's correction of last week, that a gold medal was awarded to Nain Singh in 1877, as will be found by reference to the *Journal* for that year, or in the *Proceedings* (old series), vol. xxi. A gold watch had previously been awarded to Nain Singh in 1868, for his route-survey from Lake Mansarowar to Lhasa.

MR. R. ARTHINGTON, of Leeds, who is well-known as the munificent benefactor of African missions, has just presented to the Baptist Society a further sum of 1000*l.* towards the cost of building a steamer for the Upper Congo.

THE Constantine gold medal of the Russian Geographical Society was not awarded this year; the medal of Count Lütke was awarded to Major-General Ernfeldt and Col. Lebedeff, for their geodetical and topographical work in the Balkan Peninsula; the great gold medal of the Ethnographical Section was awarded to M. Potanin for his explorations in North-Western Mongolia; that of the Statistical Section to M. Romanoff for his work on emigration from the Government of Vyaka. The small gold medals were awarded to the astronomer, F. F. Schwartz, the well known explorer of Eastern Siberia, for his determinations of positions in Turkestan and Central Asia; to M. Domojoff, for anemometrical observations on board of ships; to M. Malakhoff, for ethnographical explorations on the Ural; and to M. Yadrintseff, for his work, "Travels in Western Siberia and on the Altai." Silver medals were awarded to Mydame L. Poltoratzkaya, for her album of photographs from Western Siberia; to M. Lakhmayer, for photographs of Caucasus and Ural; to M. Kalitin, for maps of the route between Khiva and Akhal-Teke; to M. Ivanoff, for explorations of the Zerafshan glacier; to M. Agapitoff, for explorations of the black earth and loess, in the Government of Irkutsk; to M. Roubach, for meteorological observations on the island of Oesel; to M. Zagursky, for his works on the Caucasian languages and his biography of the well-known explorer of these languages, R. K. Uslar; and to MM. Stevanovsky and Rudinsky, for collections of Russian songs.

THE last number of the *Izvestia* of the Russian Geographical Society contains, among other interesting materials, two lists of points whose latitudes and longitudes were determined by the indefatigable explorer of Eastern Siberia and Turkestan, F. F. Schwartz, the Dorpat astronomer, during the years 1879 and 1880. After having determined, in 1879, the positions of ten points in Eastern Turkestan, he now publishes a list of twenty-four points in the Kulja territory, from Kulja along the two long valleys of the Kash and of the Kunghe rivers, which cross this territory from east to west, that of Kunghe having been ex-

plored to its source, and the most eastern point reached by M. Schwartz being the Narat Pass, at the south-eastern frontier of the Kulja territory. A series of determinations between Vernyi and the Narat Pass, along the Tekes river, were made during the same year. The numerous magnetic observations made by M. Schwartz during these two journeys, will be published as soon as calculated.

MATTER AND MAGNETO-ELECTRIC ACTION¹

THE late Prof. Clerk Maxwell, in his work on "Electricity and Magnetism" (vol. ii, p. 146), lays down as a principle that "the mechanical force which urges a conductor carrying a current across the lines of magnetic force, acts, not on the electric current, but on the conductor which carries it. If the conductor be a rotating disk or a fluid it will move in obedience to this force, and this motion may or may not be accompanied with a change of position of the electric current which it carries. But if the current itself be free to choose any path through a fixed solid conductor or a network of wires, then, when a constant magnetic force is made to act on the system, the path of the current through the conductors is not permanently altered, but after certain transient phenomena, called induction currents, have subsided, the distribution of the current will be found to be the same as if no magnetic force were in action. The only force which acts on electric currents is electromotive force, which must be distinguished from the mechanical force which is the subject of this chapter."

In the investigation on electric discharges, on which Mr. Moulton and myself have been long engaged, we have met with some phenomena of which the principle above enunciated affords the best, if not the only, explanation. But whether they be regarded as facts arising out of that investigation, or as experimental illustrations of a principle laid down by so great a master of the subject as Prof. Clerk Maxwell, I have ventured to hope that they may possess sufficient interest to form the subject of my present discourse.

The experiments to which I refer, and of which I now propose to offer a summary, depend largely upon a special method of exciting an induction-coil. This method was described in two papers, published in the *Philosophical Magazine* (November, 1879), and in the *Proceedings* of the Royal Society (vol. xxx, p. 173), respectively; but as its use appears to be still mainly confined to my own laboratory, and to that of the Royal Institution, I will, with your permission, devote a short time to a description of it, and to an exhibition of its general effects.

The method consists in connecting the primary circuit directly with a dynamo- or magneto-machine giving alternate currents. In the present case, I use one of M. de Meritens' excellent machines driven by an Otto gas-engine. The speed of the de Meritens machine, so driven, is about 1100 revolutions per minute.

In this arrangement the currents in the secondary are of course alternately in one direction and in the other, and equal in strength; so that the discharge appears to the eye, during the working of the machine, to be the same at both terminals.

The currents in the primary are also alternately in one direction and in the other, and consequently, at each alternation, their value passes through zero. But they differ from those delivered in the primary coil with a direct current and contact breaker in an important particular, namely, that while the latter, at breaking, fall suddenly from their full strength to zero, and then recommence with equal suddenness, the former undergo a gradual although very rapid change from a maximum in one direction through zero to a maximum in the opposite direction. The ordinary currents with a contact breaker would be represented by a figure of this kind,  while those from the alternate machine approximately by a curve of the following form. The rise and fall of the latter are, however, sufficiently rapid to induce currents of high tension and of great quantity in the secondary. 

From these considerations it follows: first, that as the machine effects its own variations in the primary current, no contact breaker is necessary; secondly, that as there is no sudden rupture of current, there is no tendency in the extra current to produce a spark or any of the inconveniences due to an abrupt opening of the circuit, and consequently that the conden-

¹ Lecture at the Royal Institution, March 31, by Dr. W. Spottiswoode, Pres. R. S.