

work ; in reality it is far more conducive to fertility than that of Germany," Dr. Liebscher maintains that in his book the very contrary of what Mr. Kotô implies will be found, indicating especially the conclusion of what he says on the natural foundation of agriculture in Japan (p. 58). There it is stated that, "owing to the climate rather than to the rich soil, an amazingly large number of people can live in Japan on the produce of one field." Similar misunderstanding, Dr. Liebscher writes, has been shown by Mr. Kotô in his remarks on the geology and the soil of Japan, in his opinion concerning the Japanese land-tax system, in what he says on the religion of his countrymen, and in denying the existence of polygamy among them.

A SHARP shock of earthquake was felt at 8 o'clock on September 2 at Frascati, on the Alban Hills, twelve miles from Rome. The movement was undulatory and lasted several seconds, but without causing any damage. The instruments in the observatory of the Roman College noted at the same hour a sensible undulatory movement, in the direction of from north-east to south-west. The earthquake was felt simultaneously at Albano, Ariccia, Genzano, Rocca di Papa, Monte Porzio, and other towns on the Alban Hills. At Rocca di Papa a slight shock also occurred a few days ago. New York papers report an earthquake at Pachuca, in Mexico, by which twenty persons lost their lives. A shock was felt at Fjøsanger in Bergens Stift, Norway, on August 17, at 10 p.m.

A CORRESPONDENT points out that an account of Prof. Edlund's theory of the connection between thunderstorms and auroræ will be found in *Petermann's Mittheilungen* for 1879, p. 76.

It is stated that an important oyster bed has been discovered in the Medway. It is estimated to contain over a quarter of a million of young oysters. The Medway was formerly a famous oyster fishery, and it is hoped from this discovery that it is about to become so again.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus erythraeus* ♀) from India, presented by Miss Garwood ; a Golden Eagle (*Aquila chrysaetos*) from Scotland, presented by Mr. Bertram B. Hagen ; two Long-eared Owls (*Asio otus*), British, presented by Mr. Percy F. Fordham ; a Mocking Bird (*Mimus polyglottus*) from North America, presented by Mr. A. Townsend ; two Marsh Harriers (*Circus aruginosus*), European, presented by Lieut.-Col. E. Delme Radcliffe ; two Barbary Apes (*Macacus inuus*) from North Africa, deposited ; a Silvery Gibbon (*Hylobates leuciscus* ♂) from Java, an Indian Muntjac (*Cervulus muntjac*) from India, four Passerine Doves (*Chamaepelia passerina*) from America, a Malabar Parrakeet (*Palæornis columboides*) from Southern India, a Boatbill (*Cancroma cochlearia*), an Anaconda (*Eunectes murinus*) from South America, a Sharp-nosed Crocodile (*Crocodilus cataphractus*) from Central America, purchased ; two Ostriches (*Struthio camelus* ♂ ♀) from Africa, received on approval.

OUR ASTRONOMICAL COLUMN

TEMPEL'S COMET, 1873 II.—M. Schulhof of Paris has published elements and an ephemeris of this comet for the approaching return to perihelion. The following is the predicted orbit :—

Epoch, 1883 October 20^o M.T. at Berlin

| | | | | |
|-----------------------------------|----------|------|------|---------------------------------|
| Mean anomaly... .. | 354 | 5 | 43.5 | } M. Eq. 1880 ^o . |
| Longitude of perihelion | 306 | 7 | 4.4 | |
| " a-cending node... .. | 121 | 2 | 8.5 | |
| Inclination | 12 | 45 | 17.1 | |
| Angle of eccentricity | 33 | 32 | 29.5 | |
| Mean daily sidereal motion | 681" | 1068 | | |
| Log. semi-axis major | 0.477861 | | | |

From these elements we find the time of perihelion passage November 20^o17155 G.M.T., and the period of revolution 1902.77 days. M. Schulhof's ephemeris so far published extends from August 28 to November 8 ; during which period the comet is slowly receding from the earth. We extract a few positions :—

At Berlin Midnight

| | R.A. | | | N.P.D. | | | Log. distance from | |
|--------------|------|----|----|--------|----|---|--------------------|--------|
| | h. | m. | s. | | | | Earth. | Sun. |
| Sept. 21 ... | 15 | 19 | 50 | 101 | 51 | 0 | 0.2732 | 0.1739 |
| 23 ... | 15 | 25 | 3 | 102 | 24 | 8 | | |
| 25 ... | 15 | 30 | 22 | 102 | 58 | 3 | 0.2739 | 0.1687 |
| 27 ... | 15 | 35 | 47 | 103 | 31 | 8 | | |
| 29 ... | 15 | 41 | 17 | 104 | 4 | 6 | 0.2744 | 0.1637 |
| Oct. 1 ... | 15 | 46 | 53 | 104 | 37 | 2 | | |
| 3 ... | 15 | 52 | 35 | 105 | 9 | 4 | 0.2750 | 0.1589 |
| 5 ... | 15 | 58 | 22 | 105 | 41 | 2 | | |

Unless the comet is observed at the present return, observations will hardly be possible before the spring of 1894.

THE GREAT COMET OF 1882.—Dr. B. A. Gould, director of the Observatory at Cordova, informs us that this comet was last seen there with the naked eye on March 7, when Mr. Thome found it already very faint in the telescope, and no nuclear condensation perceptible. His last observation was on June 1, but it was not possible to use the filar micrometer, and he had to depend upon the circles of the equatorial. Had it not been less than an hour high at nightfall, he thinks he could have observed it for a month longer. The Cordova refractor is of ten inches aperture. On March 7 the distance of the comet from the earth was 3^o07.

THE MINOR PLANET, No. 234.—Prof. Krueger communicates in a circular two observations of the small planet last discovered, telegraphed by Mr. O. C. Wendell, from which it appears that the daily motion in N.P.D. is as much as 21', or, reducing the places for August 12 and 24 to longitude and latitude, we find a change of latitude of 3° 13' in the interval, the descending node being passed on August 23. This seems to point to a considerable inclination of the orbit. The Harvard positions are as follow :—

| G.M.T. | R.A. | N.P.D. |
|--|-----------|-----------|
| 1883, August 21 ^h 747 ^m 0 ^s ... | 318 57 43 | 105 24 9 |
| 24 ^h 727 ^m 4 ^s ... | 318 36 0 | 106 20 34 |

Of the large number of these bodies now known, *Pallas*, the second in order of discovery, still retains the greatest orbital inclination, 34° 44' at present.

GEOGRAPHICAL NOTES

IN the interests of anthropology, Dr. A. B. Meyer, curator of the Dresden Ethnological Museum, has just issued some practical suggestions addressed to the officers of the German Imperial Navy visiting the Indo-Pacific waters. The chief object of this "Denkschrift" is the completion of the Dresden ethnographic collection, whose desiderata are mentioned in detail, and special instructions are given as regards the Chinese seaboard, the South Sea Islands, the north-west coast of America, Madagascar, the Eastern Archipelago, and in general such places as lie on the ordinary route of the German Navy. Here is still to be gathered a rich harvest of materials illustrating the usages, traditions, religions, and social culture, especially of the Polynesian, Papuan, Indo-Chinese, Malay, and North American races. Many objects may thus be brought together calculated to throw light on such important historic and religious movements as the spread of Buddhism from India throughout East Asia, and the influence of Hinduism in past times on the local cultures in Further India and Malaysia. Amongst the miscellaneous wants particular mention is made of fishing gear, boat models, and musical instruments from Formosa ; blowpipes, krisses, shields, and brass armour from the Sulu Archipelago and Palawan ; nets, harpoons, magic wands from Corea and Yesso ; wood carvings and idols from New Guinea and New Britain ; clubs, spears, stone hatchets, tattoo designs, figures of men and animals in wood or stone from Melanesia ; objects of fetish worship from Micronesia ; jade ornaments from Polynesia ; carved wooden masks of men and animals, clay or stone vessels, tobacco pipes and nephrite objects from the north-west coast of America ; talismans, idols, house utensils, and weapons from Madagascar ; wicker-work, burnt clay figures of evil spirits, woven materials

from Ceylon; specimens of figure or picture writings on palm leaves from the Nicobar Islands. Some of these hints may be found useful by English travellers and others willing to promote anthropological work in the Indo-Pacific regions.

MR. J. T. LAST contributes a paper of unusual interest to the September number of the *Proceedings of the Royal Geographical Society*; he describes a visit to the little known Masai country, the region through which Mr. Joseph Thomson had to pass. Mr. Thomson himself sends a long letter giving an account of the first part of his journey and his forced return to the coast. He was to set out again on July 8, *viâ* the north side of Kilimanjaro for Mosera, far on the way to the south shore of Victoria Nyauza. Meantime it is announced that Dr. Fischer, the German explorer who preceded Mr. Thomson on the same route and excited the hostility of the people, has returned to the coast. It seems impossible that he can have reached his proposed goal, and probably, like Mr. Thomson, has been compelled to turn back.

ON August 28 the gunboat *Urd* arrived at Tromsø with the members of the Swedish Circumpolar Expedition on board, who have wintered at Spitzbergen. During the *Urd's* voyage to the island she encountered a fog off Beeren Island, which continued to Spitzbergen, but only a small quantity of ice was seen, viz. at South Cape. The vessel arrived at Cape Thordsten on August 10. The observations were continued until 12 midnight on August 23, in order to have a full year's magnetical observations. On the 24th the houses were cleared, the windows nailed up, and the doors locked, and on the 25th the *Urd* steamed out of the Icefjord. In Green Harbour the post was taken on board from the Norwegian hunters, and steering west of the Beeren Island the coast of Norway was sighted on the 28th. No ice was encountered. The ship is expected in Gothenburg on the 6th inst.

WE are glad to learn that both the Dutch International Polar Expedition and the Danish Expedition under Lieut. Hovgaard are safe. A Reuter's telegram from Vardoe says:—The steamer *Obi*, belonging to M. Sibiriakoff, has arrived here. The captain picked up on the 25th ult., near Waigatz, the members of the Dutch Polar Expedition steamer *Varna*, which foundered on July 24 in lat. 71, long. 63. The captain further states that the Danish exploring vessel *Dijmphna* had been ice-bound in that region throughout the winter. All was, however, well on board, and the captain of the *Dijmphna* felt confident of getting into open water. The crew of the *Varna*, which left the *Dijmphna* on the 1st ult., will be brought to Hammerfest by the steamer *Noraenskjöld*. The *Varna* had on board the Dutch section of the International Polar Expedition. She left Amsterdam on July 5, 1882, bound for Dickson's Harbour, at the mouth of the Yenisei. The Danish Polar steamer *Dijmphna*, under command of Lieut. Hovgaard, left Copenhagen on July 18, 1882, also bound for the Arctic Seas, and the *Nordenskjöld*, Swedish exploring steamer, left Tromsø about July 3, 1882, bound for Novaya Zemlya. The *Louise* is a trading steamer which left Bremen of June 27 last, and Hammerfest on July 17, bound for the Yenesei.

ELECTRICAL UNITS

THE following is the Report (omitting the appendix) to the Lords of the Committee of Council on Education by the Committee of Advice¹ with respect to the International Congress for the Determination of Electrical Units to be held at Paris in October, 1883.

The first International Electrical Exhibition was held in Paris during the months of August, September, and October, 1881, under the auspices of the French Government, who supplemented it by calling together a Congress of the leading scientific and practical electricians of all countries. England was represented by the following official delegates:—

The Ambassador to France, Sir F. Abel, C.B., F.R.S., Prof. W. G. Adams, F.R.S., Lieut. R. W. Anstruther, R.E., Prof. W. E. Ayrton, F.R.S., Prof. W. F. Barrett, Sir Charles Bright, M.I.C.E., Commissioner at the International Electrical Exhibition, Paris, Prof. Chrystal, F.R.S., Mr. Latimer Clark, M.I.C.E., Prof. R. B. Clifton, F.R.S., the Earl of Crawford

¹ The President of the Royal Society, the late Mr. W. Spottiswoode, was a member of the Committee, but his illness and death prevented his taking part in its proceedings.

and Balcarres, F.R.S., Commissioner-General at the International Electrical Exhibition, Paris, Mr. W. Crookes, F.R.S., Mr. Warren de la Rue, D.C.L., F.R.S., Prof. J. Dewar, F.R.S., Prof. J. D. Everett, F.R.S., Prof. G. Fitzgerald, F.R.S., Prof. G. Carey Foster, F.R.S., Dr. J. H. Gladstone, F.R.S., Mr. J. E. H. Gordon, Mr. E. Graves, Engineer-in-Chief, Postal Telegraphs, Dr. J. Hopkinson, F.R.S., Prof. Hughes, F.R.S., Commissioner at the International Electrical Exhibition, Paris, Prof. Fleeming Jenkin, F.R.S., Mr. J. F. Moulton, F.R.S., Mr. W. H. Preece, F.R.S., Lord Rayleigh, F.R.S., Sir W. Siemens, D.C.L., LL.D., F.R.S., Prof. H. Smith, F.R.S., Mr. Willoughby Smith, Mr. C. E. Spagnoletti, Mr. W. Spottiswoode, D.C.L., LL.D., P.R.S., Mr. A. Stroh, Prof. P. G. Tait, F.R.S.E., Sir William Thomson, LL.D., F.R.S., Prof. J. Tyndall, D.C.L., LL.D., F.R.S., Mr. Cromwell Varley, F.R.S., Mr. C. V. Walker, Lieut.-Col. Webber, R.E., Commissioner at the International Electrical Exhibition, Paris.

Many very important electrical questions were fully discussed, and a universal and international system of units for expressing the results of electrical measurements and observations was determined upon. All parts of the globe being now connected together by a great network of telegraphy, constructed and maintained by every civilised nation, it has become a matter of great commercial as well as scientific importance that uniformity should be introduced in modes of working, measuring, and observing throughout the world. The Paris Congress of 1881 has laid the foundation of such a desirable result.

The Congress of 1881 referred certain questions to a second Conference, held in the month of October, 1882.

This second Conference was divided into three Sections (*i.e.* Commissions); the first dealing with "Electrical Units"; the second with "Earth Currents and Lightning Protectors"; and the third with the question of "A Standard of Light."

Lord Rayleigh, Sir William Thomson, Prof. Carey Foster, Prof. Fleeming Jenkin, and Dr. Hopkinson were nominated as delegates from England, but Sir William Thomson was the only one present, and he devoted his time principally to the first question.

FIRST COMMISSION.—The Electrical Congress of 1881 adopted, as the fundamental system of units for scientific purposes, a system founded upon the employment of the Centimetre, the Gramme, and the Second as units of length, mass, and time respectively, and hence known as the C.G.S. system of units. The Congress also defined, and adopted a nomenclature for, a system of electrical standards of such magnitudes as to be as far as possible generally convenient for practical use, each practical standard being a decimal multiple or submultiple of the corresponding C.G.S. unit.¹ Of these standards, those to which reference is most frequently required are the following, namely:—

The Ohm, defined as one thousand million C.G.S. units of electric resistance.

The Volt, defined as one hundred million C.G.S. units of electromotive force.

The Ampere, defined as one-tenth of a C.G.S. unit of electric current, being the current maintained by an electromotive force of one volt in a conductor of resistance one ohm.

It was further agreed by the Congress that, with a view especially to facility of reproduction, the resistance denoted by the ohm should be stated as being the resistance of a column of mercury at the temperature of melting ice, of one square millimetre in cross-section, and of a length to be ascertained by experiment.

Accordingly the principal question referred to the first section of the Conference of 1882 was the determination of the length of a column of mercury, of the above-mentioned cross-section and temperature, which had an electrical resistance of one thousand million C.G.S. units. In reference to this question the Conference adopted the following resolutions, namely:—

First Resolution.—"The Conference considers that the determinations hitherto made do not present the necessary degree of concordance for fixing the numerical value of the ohm in terms of a column of mercury.

¹ It is satisfactory to your Committee to be able to say that the C.G.S. system of units was widely used among English physicists before its adoption by the Electrical Congress in 1881, it having been recommended by a Committee of the British Association in 1875; and also that the system of practical standards adopted by the Congress is nearly identical with that previously in use in England and first suggested in a paper by Mr. Latimer Clark and Sir Charles Bright read before the British Association in Manchester in 1867.