

from the shoulder, even in the variety of drawing called writing; and gives a wonderful list of artistic effects which pupils who have had only short instruction in these arts are competent to produce. Education of this sort is valuable as simply affording healthy occupation of body and mind to some classes; it opens the eyes of the mind, which will tend to make work popular instead of idleness. He teaches that nothing made by machinery can be artistic; physical comforts may be supplied by it, but works of taste and refinement must be hand-made, and among the poorer classes should be the produce of home art, like the carved oak of Ann Hathaway's cottage. Mr. Leland was one of the first to point out that the decay of the apprentice system must soon necessitate industrial education, and he has prepared a series of cheap art-work manuals on decorative design, ceramic or porcelain painting, tapestry or dye-painting, outline and filled-in embroidery, decorative oil-painting, wood-carving, *repoussé* or sheet-brass work, leather work, papier mâché, modelling in clay, with underglaze faience decoration, and stencilling.—No. 5 of the "Circulars" is on the subject of Maternal Schools in France, which answer to our Infant Schools. The value of them as laying the foundations of education is urged by the Commissioners. Excellent suggestions for object lessons, whose subjects are supplied by the season of the year, and also for the arrangement of school buildings are given. The result of such schools should be a slight training of the senses by object-lessons; the beginnings of habits and dispositions favourable to future education; a taste for gymnastics, for singing, and for drawing; an eagerness to listen, observe, question, and answer; the power of attention; a generally quickened intelligence, and a mind open to receive good moral influences. In other words, education is a "bringing forth" of the powers of the mind, and not a making it a live cyclopædia. No. 6 is a full copy, with a few useful notes for comparison, of the English Report of the Royal Commission on Technical Education in France, presented by Mr. Samuelson and his coadjutors in February, 1882.

WITH the May number the *Journal of Forestry* changed both its title and the colour and design of its cover, and it now appears under the simple name of *Forestry*. It is an acknowledged fact that changes of this character are generally inadvisable in a journal of long-established reputation, but under the editorship of Mr. Francis George Heath we have no doubt that *Forestry* will at least maintain the reputation and circulation it had attained under its old management, if it does not increase them, which indeed it is most likely to do. The May number opens with an editorial note entitled "A May Note," in which the glories of spring and summer in woodland glades and forest are set forth. Then Mr. R. D. Blackmore gives us "A Cuckoo Song." Amongst other readable articles may be mentioned "Lord Somerville; a forgotten President of Agriculture," by Mr. R. A. Kinglake; Mr. Boulger's "Beauties of British Trees," and Mr. Guillemard's "Forest Ramble in New South Wales." In the June number the same amount of interest and variety is maintained. Mr. Guillemard gives "A Forest Ramble in Norway." The article on "Epping Forest and its Future Management" will however, we have no doubt, be read by most readers, as any one having the slightest inclination towards any branch of natural history cannot fail to be interested in maintaining the Forest in all its native beauty, and if *Forestry* is able by its advocacy, backed up by the opinions of those who are now taking a lead in the matter, to stem the tide of improvements so-called in Epping Forest, it will have fulfilled a work for which thousands will be thankful.

THE additions to the Zoological Society's Gardens during the past week include a Crab-eating Raccoon (*Procyon cancrivorus* δ) from Brazil, presented by Mr. Theo. Walsh; a Ring-tailed Coati (*Nasua rufa* δ) from Brazil, presented by Mr. R. G.

Hamilton; two Common Hedgehogs (*Erinaceus europæus*), British, presented by Mr. S. Mummery; four Restless Cavies (*Cavia capreva*) from Brazil, presented by Mr. E. H. Draper; a Ring-necked Parrakeet (*Palæornis torquatus*) from India, presented by Mr. W. Quail; two Common Kingfishers (*Alcedo ispida*), British, presented by Mr. T. E. Gunn; three Common Vipers (*Vipera berus*), British, presented by Mr. C. Taylor; two Common Snakes (*Tropidonotus natrix*), European, presented by Lord Arthur Russell, F.Z.S.; a Puma (*Felis concolor* \varnothing) from South America, a Goffin's Cockatoo (*Cacatua goffini*) from Queensland, deposited; two West African Love Birds (*Agapornis pullaria*) from West Africa, an Indian Python (*Python molurus*) from India, purchased; two Vulpine Phalangers (*Phalangista vulpina*), eight Gold Pheasants (*Thaumalea picta*), six Prairie Grouse (*Tetrao cupido*), a Herring Gull (*Larus argentatus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE NEXT TOTAL SOLAR ECLIPSE.—In NATURE, vol. xiv. p. 450, we gave some results of an approximate calculation of the total eclipse of the sun on September 8-9, 1885, wherein the central line traverses New Zealand, but does not encounter land in any other part of its course. The correction required to the moon's place there employed is sufficiently important to render a new calculation of interest, and we shall accordingly present here some of the circumstances of the eclipse, resulting from the substitution of the lunar places in the *Nautical Almanac*, which are founded upon Hansen's Tables, with Prof. Newcomb's corrections. The elements of the eclipse as given in the ephemeris are employed, excepting that in place of Hansen's semidiameter of the moon, we infer the semidiameter from the ratio, 0.2725 of the horizontal parallax.

At a point in longitude 11h. 40m. 0s. E. of Greenwich, with 40° 49' 4" south latitude (nearly on the central line) the total eclipse begins, September 9, at 7h. 44m. 9s. local mean time, and continues 1m. 51s., and this will be about the longest duration of totality available for observation upon land in this eclipse. For any place near the above point, the Greenwich mean times of beginning and ending of totality may be obtained from the following formulæ:—

$$\begin{aligned} \cos. w &= -116'3108 - [2'10869] \sin. l + [1'64777] \cos. l \cos. (L - 161^{\circ} 16' 5) \\ l &= 8h. 58m. 21s. \mp [1'74578] \sin. w - [3'37987] \sin. l \\ &\quad - [3'85619] \cos. l \cos. (L - 145^{\circ} 49' 6). \end{aligned}$$

Here L is the longitude from Greenwich, reckoned *positive*, and l the geocentric latitude, which may be deduced from Mr. Stone's valuable table in the *Monthly Notices of the Royal Astronomical Society* for January last, a table it might have been worth while to publish separately. The quantities in square brackets are logarithms.

As one result of the introduction of the more accurate place of the moon, it is found that the central line approaches much nearer to Wellington; a direct calculation for that place shows that the total eclipse begins there at 7h. 44m. 23s. a.m., and ends at 7h. 45m. 46s. local mean time, thus continuing 1m. 23s., and the same figures are given by the above equations. At Nelson totality commences at 7h. 37m. 16s. a.m. local mean time, and continues 1m. 3s.

It may be noted that during the totality of this eclipse the planet Jupiter will be situated only 45' from the sun's limb, on an angle of about 26° with the circle of declination at his centre.

THE ANNULAR SOLAR ECLIPSE OF OCTOBER 31, 1883.—In May last we had a case where the track of a total eclipse of the sun was almost wholly an ocean-track, and where it was consequently necessary to send expeditions to the Mid-Pacific, to obtain observations. The annular eclipse in October next is similarly circumstanced; excepting possibly one or two mere rocks in the Pacific, it will not be observable on land, elsewhere than on the island of Nippon, Japan. If we calculate from the *Nautical Almanac* elements for longitude 9h. 20m. 48s. E. and latitude 38° 11' N., we find the annular phase commences at 7h. 28m. 2s. a.m., and ends at 7h. 35m. 23s., a duration of 7m. 21s., and the sun will be at an altitude of about 12°. At the capital, Tokio, the eclipse will not be annular; the greatest phase is at 7h. 28m. a.m., magnitude 0.88 (the sun's diameter being taken as unity).

THE GREAT COMET OF 1882.—In No. 2521 of the *Astronomische Nachrichten* is an elliptical orbit of this comet by Mr. John Tatlock, jun., of Williamstown, Mass., with a period of 1376 years, which, as Prof. Krueger remarks in a note, differs materially from the results of Kreutz, Frisby, and Fabricius. It may be added that the new calculation can have little weight, being founded upon normals for October 8, November 24, and January 29, so that at the date of the first normal the comet was already far past the perihelion, and in fact during the whole interval only described a heliocentric arc of about $5^{\circ} 10'$. Dr. Kreutz has shown the possibility of closely representing by the same orbit the anteperihelion observations and those made subsequently to perihelion passage, though there may be need of much more minute discussion before it can be safely assumed that there was absolutely no appreciable effect from the comet's passage through the solar coronal region.

GEOGRAPHICAL NOTES

Science announces that Lieut. Schwatka, accompanied by Assistant-Surgeon Wilson, C. A. Homan, U.S. Engineer Corps, and three private soldiers, left for Chilkat, Alaska, May 22, from Portland, Or., on the steamer *Victoria*. They are provisioned for a six months' cruise, will employ Indians for packers, &c., and intend to ascend the Chilkat River to its head, make the passage to the head waters of the Lewis River, and descend the same to its junction with the Yukon, and descend the Yukon River to its mouth. It is said to be their intention to survey the course of these rivers; and there is no doubt that a properly qualified and equipped party would find abundance of useful work ready to their hands. The whole route has been travelled before, but not by persons in search of and qualified to obtain geographical information, except in very small part. The explorations of the Krause brothers on the Chilkat and vicinity have been alluded to before. The Yukon has been superficially examined by McMurray, Ketchum, Zagoskin, Dall, Whympier, Raymond, Nelson, and others, and a few points have been astronomically determined; but nothing like an exact map has been attempted, nor do the data for it exist. Astronomical and magnetic observations anywhere along its banks, and especially any data for a map of the Lewis River and its feeders (which are only known from the reports of prospectors and natives), would be of the highest interest.

AT last news has again been received by Dr. Schweinfurth from the well-known African explorer, Dr. W. Junker. He was still in the Nyam Nyam country, and his last news was dated October 16, 1882, from the residence of a chief named Semio some days' journey south of the Mosio district of the present maps. Dr. Junker, who has travelled through vast districts hitherto unexplored, will now soon return home. The last time he had spent principally in various excursions, during which he repeatedly crossed the Uëlle River to the south, and also the third degree north latitude, leaving his provisions in the care of his companion, Herr Bohndorff. On September 27 he again joined the latter after an absence of eighteen months, but found him so poorly that he had to send him home with the collections made up to that time. Bohndorff started with thirty-two porters, who carried the natural history and ethnographical collections. Of special interest for geographers was an excursion of Dr. Junker's, which he made south of the former Munsa district of the Monbuttu. Some seven days' journey (about 60 kilometres) south of this place he reached a large river named the Nepoko, which the traveller identified with Stanley's Aruwimi, one of the main northern tributaries of the Congo in the middle course of the latter.

DR. POGGE has sent a report from the Mukenge station on the Lulua regarding his return journey from Nyangwe, showing that this was not quite as peaceable as the journey to Nyangwe, and that he had frequently to defend himself seriously against the enmity of the natives. From the Lualaba to the Lomani, Dr. Pogge travelled by the same route as he had previously come with Lieut. Wissmann.

ONE of the most recent additions to the "Bibliothèque d'Aventures et de Voyages" published by Dreyfous of Paris is a volume containing the letters and journals of La Perouse during his famous voyage round the world in 1785-88, which ended in the disappearance of the circumnavigator among the islands of the South Pacific. The volume is annotated by M. George Mantoux, who also supplies a prefatory memoir of the great sailor.

"IM Reiche des Æolus" is the title of a little book by Adolf von Pereira, published by Hartleben of Vienna, and containing reminiscences of a tour the author undertook to the Lipari Isles. It is profusely illustrated and contains a map.

AUSTRIAN papers report that a mountain in the neighbourhood of Czernowitz, in the Bukovina, is manifesting singular symptoms of disturbance. The ground around its base, to the extent of over 1000 fathoms, has opened out in wide and deep chasms. Most of the houses of a village on the spot (Kuczumare) have fallen down.

THE Thuringian Geographical Society met at Jena on the 17th inst., when Prof. Hæckel read a paper on the flora of Ceylon, and Herr G. Kurze one on the outposts of European civilisation on the way from Zanzibar to Lake Tanganyika.

THE SPECTRUM OF THE AURORA

IN view of the increased frequency of auroras, an inquiry into the present position of our knowledge as to their spectra has seemed to me desirable.

The accompanying table gives in wave-lengths all the observations I could find of the position of the bright lines of the auroral spectrum. J. R. Capron's "Auroræ and their Spectra," goes more fully into the subject than any other work I know, and therefore many of the positions are taken from it, being found on the page or plate indicated in the column headed "Page, &c." The authorities for other observations are given in the notes, but in other cases again I cannot now state whence I obtained them.

They are arranged approximately in order of accuracy,¹ but this is manifestly a very difficult matter to decide: if, as is very likely, I have made mistakes in this respect, I hope I shall be excused. I have gone very carefully into the matter, judging of the accuracy of the observations partly by their internal evidence, and partly by the weights which are in some cases attached to them by the observers themselves. The observers' probable errors are given in the table after the positions of the lines. I consider J. R. Capron has attributed too much accuracy to most of the observations of the auroral spectrum that have hitherto been made; certainly he has to mine. Nearly all the observers have measured the principal line; and, as its position is very well known, the measurements of it are to a considerable extent a guide to the amount of dependence that may be placed on the rest. Of course it may happen to be measured correctly by accident, while the rest are incorrect; but, on the other hand, if it is incorrectly measured, it is not likely that the rest will be correct. It is, therefore, very desirable that observers should measure this line at the same time as they measure any of the others; not necessarily in order to ascertain its position, but as an indication of the correctness of the rest; although it does not always happen that all the lines are by any means equally accurate.

The most probable positions of the lines, given at the foot of the table, are derived from the most accurate of the observations of each. Below are indicated the observations which have been used in the calculation in each case, with the weight given to each; for I have not taken the simple average of those used, but have given higher weights to those that seemed the best. The "Probable Error," as given below the "Probable Average," is partly calculated and partly estimated; it seems rather large; perhaps it should not really be so large.

My second series of observations (No. 18 in the table) are not absolute measurements, but only comparisons with α and γ . I have therefore not used them in the calculation of the general averages. This series is most likely affected by constant errors much larger than the probable errors given in the table from calculation. It seems rather curious that the actual errors of my first series (No. 17) are nearly all so much greater than the probable errors; and possibly the same thing may occur in some other cases.

E. B. Kirk's observation (No. 28) (though a very rough one as regards position) is one of the most striking of all; and, being unique, confirmation of it is very desirable. It will be described under the different lines, &c., concerned.

Where I have attached to an observation a Greek letter with a note of interrogation, it means that it is uncertain whether the

¹ But the observations of each observer are placed together, however unequal in accuracy they may be.