

connected with the Roman Catholic mission establishment at Sikawei, near Shanghai, has good reason to suppose, after a careful study of the typhoon of July 31, that the Chinese typhoons, like the cyclones of the Bay of Bengal, do not have their centre eight points to the right from the direction of the wind (the face being turned against the latter), as is generally supposed, but from nine to ten points. It is certainly of the utmost importance to navigators that this conclusion of Père Dechevrens should be carefully investigated, to which end the cooperation of ship-masters is invited. They should forward observations of the barometer and thermometer, force and direction of the wind, mentioning the latitude, longitude, and height above the sea-level of the spot where their observations have been taken, the description of instruments used, whether the thermometer is attached to the barometer, and what corrections, if any, are to be applied, with general description of weather, &c.

We have received the seventh edition (November, 1879) of Prof. E. Morren's "Correspondance Botanique." There is no alteration this year in the plan or scope of this useful botanical directory for the whole world; but the necessary corrections and additions seem very carefully made up to the date of issue. The only noteworthy additions to the list of names for each country are in the case of France, which requires two extra pages, and Italy, which takes one page more than last year.

THE Associated *Société* of the Literary, Scientific, and Art Societies of Liverpool was held in St. George's Hall yesterday. The programme was of a varied character, both literature, science, and art, being well represented upon it. The idea of thus uniting the various classes of societies in a large town is a happy one, and deserves imitation.

WE notice from the November number of the *University College of Wales Magazine* that numerous important additions have been made to the museum of that institution, which now contains collections of very varied character.

Science Gossip for December publishes a useful list of naturalists who are willing gratuitously to assist learners of natural history and others, personally when practicable, otherwise through the post.

PROF. NEWBERRY has reprinted his article on the "Geological Survey of the Fortieth Parallel" (New York, Appleton) from the *Popular Science Monthly*. We have at various times referred to the volumes of this magnificent work; Prof. Newberry's paper gives a good *résumé* of the whole.

THE *Colonies and India* calls attention to the fact that a small quantity of flax grown in West Australia, which recently fell into the hands of an English manufacturing firm, was found to be of such excellent quality that a large demand has suddenly sprung up in the colony for both indigenous and cultivated flax.

THE additions to the Zoological Society's Gardens during the past week include three Pin-tailed Whydah Birds (*Vidua pringi-palis*) from Africa, presented by Capt. T. H. Bowyer Bower; two Common Chameleons (*Chamaleon vulgaris*) from North Africa, presented by Capt. Burke; a Mississippi Alligator (*Alligator mississippiensis*) from the Mississippi River, presented by Mr. W. G. Marshall; a Slow-worm (*Anguis fragilis*), European, presented by Mr. W. A. H. Bernard Smith; two Red River Hogs (*Potamocheirus penicillata*) from West Africa, two Elliot's Guinea Fowls (*Numida ellioti*) from East Africa, an Elephantine Tortoise (*Testudo elephantina*) from the Aldabra Island, deposited; two Prong-horn Antelopes (*Antilocapra americana*) from North America, a Slow Loris (*Nycticebus tardigradus*) from Malacca, a Laughing Falcon (*Herpetotheres cachin-nans*) from Brazil, a Bar-tailed Godwit (*Limosa lapponica*), a Common Curlew (*Numenius arquatus*), two Pomatorhine Skuas (*Stercorarius pomatorhinus*), European, purchased.

OUR ASTRONOMICAL COLUMN

ORBITS OF BINARY STARS.—In addition to elements of O. Σ . 235, which appear in the recently-published "Handbook of Double Stars," Dr. Doberck has lately investigated orbits for the binaries γ Aquarii and μ^2 Herculis, stars for which no similar computation had been previously made. He assigns a period of 129.8 years for the former, the passage of the periastræ at 1881.80, and for the latter a period of 54.25 years, the periastræ at 1877.13. The elements give the following angles and distances:—

γ Aquarii.			μ^2 Herculis.		
1880.5	Pos. 188.2	Dist. 0.32	1879.5	Pos. 241.1	Dist. 1.05
1885.5	" 242.0	" 0.22	1880.5	" 247.1	" 1.04
1890.5	" 295.9	" 0.32	1881.5	" 253.4	" 1.01
			1882.5	" 260.1	" 0.97

The extent of Dr. Doberck's investigations relative to the orbits of the revolving double-stars will be seen from the following nearly complete list of objects, for which we are indebted to him for the best systems of elements yet in our possession:— Σ 3121, μ^2 Hercules, O. Σ . 298, α Centauri, γ Coronæ Borealis, ξ Scorpii, Σ 3062, ω Leonis, ρ Eridani, Σ 1768, ξ Bootis, γ Aquarii, τ Ophiuchi, η Cassiopeæ, λ Ophiuchi, 44 Bootis, μ^2 Bootis, 36 Andromedæ, γ Leonis, σ Coronæ Borealis, α Geminorum, ζ Aquarii, O. Σ . 235. It must be borne in mind, in order to appreciate the amount of labour involved in these researches, that in the majority of cases the orbits are not the results of rough or graphical approximations, but have been worked out with a degree of refinement, which exhausts the data actually at Dr. Doberck's command. He has made this subject as much his own as Prof. Julius Schmidt has in his case that of the variable stars.

ERRORS OF THE LUNAR TABLES.—Prof. Winnecke publishes observations of the moon made by Dr. Schur at the provisional observatory of the University of Strassburg in the year 1878, and the corrections required by Hansen's tables, and by the same tables as improved by Prof. Newcomb, who showed the large and increasing deviation of the tables would almost wholly disappear if, for the empirical term, an empirical alteration of the other term due to the action of Venus is substituted, and suitable alterations made in the elements of mean motion. The advantage derived by the introduction of Newcomb's corrections is seen to be very considerable, the signs alternating in the course of the year, and the corrections being generally small, while with Hansen unaltered there is a larger and uniformly negative correction throughout.

From the same observations there is deduced a correction to the mean semi-diameter adopted in Hansen's tables amounting to $-1''.29$. Soon after the appearance of these tables, Dr. Oudemans, by a careful discussion of occultations and direct heliometric measures, inferred a correction of $-1''.09$. If the mean of these values be adopted, we shall have for the moon's mean semi-diameter, $15' 32''.16$. Dr. Oudemans' paper will be found in vol. xxvi. of the *Monthly Notices* of the Royal Astronomical Society.

RE-DISCUSSION OF ANCIENT SOLAR ECLIPSES.—The publication of recent investigations on the motion of the moon, appearing to render a new discussion of the ancient eclipses of the sun desirable, the work has been commenced under the auspices of the Smithsonian Institution, by Mr. D. P. Todd, of the American *Nautical Almanac* Office. The computations so far relate to the eclipses of Thales, Larissa, Ennius, Agathocles, and Stiklastad, and to the two eclipses of the thirteenth century, which have formed the subject of an important memoir by Celoria, of the observatory at Milan. It is proposed to extend the original scope of the research to include a large number of eclipsic dates, and great facilities are expected from the use of Newcomb's Tables of Eclipses, which have recently appeared. We shall allude further to these tables in a future column. It will be seen that this interesting research is in excellent hands.

THE SOLAR PARALLAX.—Mr. Downing, of the Royal Observatory, Greenwich, has made a determination of the sun's mean parallax from observations of Mars in declination at the observatories of Leyden and Melbourne, during the very favourable opposition in 1877, the same comparison-stars having been used at both stations. The observations were made between July and October, but Mr. Downing has only compared them on those days when planet and stars were observed at Leyden and

Melbourne on the same day or on the following day, so that the change in error of the places interpolated with second differences from the *Nautical Almanac*, has merely to be carried back for $9\frac{1}{2}$ hours or carried forward for $14\frac{1}{2}$ hours. The resulting mean solar parallax is $8''\cdot96$, and assuming that the probable error of a single observation of declination is $0''\cdot5$, the probable error of the result is $\pm 0''\cdot051$. The value obtained by Prof. Newcomb from similar observations in the year 1862 was $8''\cdot855$, nearly identical with that which Leverrier held to be pretty definitive, and which was given by the planetary theories, or $8''\cdot86$. In most of the national ephemerides, Newcomb's mean value, obtained in his paper on the sun's distance in the Washington Observations for 1865, or $8''\cdot848$, has been adopted; the *Connaissance des Temps* substitutes Leverrier's.

METEOROLOGICAL NOTES

MR. E. KNIPPING, Tokio, has written a brief account of three typhoons which occurred in the China and Japan Seas in September, 1878. In twelve charts and one diagram he sets down the paths of the three storms and the weather of each day from the 15th to 21st, when the third and most violent of the typhoons occurred. The heaviest squalls and gusts of wind were met with in the front part of the typhoon, or with north-east and south-east winds, whereas they are hardly mentioned in the ship's logs with south-west winds in the rear of the storm. The path of the typhoon was to north-west from 15th to 19th, to north on 19th and 20th, when it recurved to the north-east, following a course midway between Japan and the continent. Its rate of progress was 10 miles an hour on the average, rising to 25, and falling to $2\frac{1}{2}$ miles an hour. The diagram, which summarises the author's views regarding the behaviour of the winds, seems to raise questions which call for further inquiry. Thus the south-east wind shows, near the centre of the hypothetical typhoon, an in-curving tendency, which becomes less and less on receding from the centre, till, towards the outskirts of the storm, it is represented as blowing outwards. On the other hand, the north-east wind, immediately contiguous, very decidedly in-curves near the outskirts of the storm, but on approaching the centre the incurvation becomes less and less till it disappears. The statement is made that at a distance of 900 miles from the centre, with a north-east wind, the centre of the typhoon bears right ahead, but with a south-east wind the centre bears south. For a satisfactory examination of the points here raised, and other points, such as the remarkable changes in the form of the typhoon while off the coast of Shanghai, fuller data are required, so that the positions of the centre at different times be more accurately ascertained. The publication of details of the data in an appendix to the work is equally necessary.

PROF. NIPHER'S *Missouri Weather Service Report* for October last is to hand, and is of more than usual interest. The returns show the weather of that State to have been unprecedentedly warm for the season, the mean temperature of St. Louis, viz., $63^{\circ}\cdot1$, being the highest for any October of the past forty years. At the same time the rainfall was only $0\cdot57$ inch, being, with the single exception of 1872, when the rainfall was $0\cdot29$ inch, the driest October in forty years. The rainfall was unusually small over no inconsiderable portion of the State, extending to north-west of St. Louis, and in the extreme north-east it amounted only to about a $\frac{1}{4}$ inch, whereas, on the other hand, within a limited district immediately to southward round Cuba, and over a pretty extensive region in the west, lying to north and south of Kansas City, it exceeded 4 inches. The service is being ably and vigorously worked, eighteen new stations being added in November, so that there are now seventy-three stations, the results of whose observations are quickly sent broadcast over the State and beyond it, reaching Europe even in the third week of the following month. We observe with much satisfaction that the efficiency of this weather service is to be greatly enlarged by the active co-operation of the directors of the principal railroads, who have intimated their readiness to make meteorological observations a regular part of the duties of their station agents at points selected by Prof. Nipher himself.

IN connection with the meteorological work proper of the Missouri Weather Service, Prof. Nipher has been carrying out a magnetic survey of the State during the summers of 1878 and 1879, the expense of the survey having hitherto been met by private subscriptions. The results of this survey are given on a valuable map which accompanies the October Report, showing the lines of equal magnetic variation, and attention is directed

to the tendency of the needle to set at right angles to those river-valleys which do not run north and south. A report on the climatology of Missouri is in course of preparation by Prof. Nipher, at the request of the State Board of Agriculture. It is with some surprise we learn that the expense of organising and carrying on this service has been wholly borne by two of the directors and Prof. Nipher. But this state of things the Americans are too sharp-sighted to allow to go on, it being in the interests of the State to provide that a service which is so energetically and effectually working out the climatologies of its various agricultural centres does not run the risk of being starved out for want of the few dollars required to meet its working expenses.

CAPT. TOYNBEE, in the *Journal* of the Meteorological Society for October, gives an interesting comparison of the temperature of the Atlantic during the Decembers of 1877 and 1878 from observations made on the temperature of the sea every four hours of these months by Capt. Watson, of the Cunard steamer *Algeria*. The result shows that for the outward and homeward passages to America the part of the Atlantic traversed by the *Algeria* was $3^{\circ}\cdot2$ warmer in December, 1878, than in December, 1877. A comparison is also made of the mean temperature of the British Isles, and from observations at about forty stations it is shown that the December of 1878 was $8^{\circ}\cdot0$ colder than that of 1877, "in spite of the fact that the sea to the westward was more than $3^{\circ}\cdot0$ warmer." The higher temperature of the sea in December, 1878, would appear not to have extended far to northward, seeing that on the west of Scotland the sea was half a degree colder than in 1877, and in Farö $1^{\circ}\cdot7$ colder, whilst on the north-west of Iceland the sea during December, 1878, was $0^{\circ}\cdot2$ warmer. The interest attached to such an inquiry centres in the point that $8^{\circ}\cdot0$ greater cold over the British Isles during 1878 as compared with 1877 may have been brought about in consequence of the fact that the Atlantic to west-south-westward was more than $3^{\circ}\cdot0$ warmer. It is, for example, possible that this abnormal distribution of temperature in the Atlantic was more or less immediately connected with the more southerly course taken by our European storms since the end of October, 1878, from which have inevitably resulted the unusual prevalence of easterly and northerly winds and the cold weather we have had since. An inquiry more practically important could scarcely be suggested to meteorologists than an investigation of the point suggested many years ago by Sabine as to there being a possible connection between the temperature of the tropical and subtropical waters of the Atlantic during the autumn months and the severity or mildness of our European winters; and certainly no more suitable period could be selected for the inquiry than the last two years, a twelvemonth's warm, fine weather having set in during October, 1877, and a period of cold weather, exceptionally protracted and severe, having commenced in the end of October, 1878.

GEOGRAPHICAL NOTES

AT the meeting of the Geographical Society, on Monday evening, Mr. Wilfrid S. Blunt read a paper entitled "A Visit to Nejd," in which he gave an interesting account of a journey made last winter in company with his wife, Lady Anne Blunt, from Damascus southwards to Jöf and the Jebel Shammar in Central Arabia. The results of Mr. Blunt's expedition may be thus briefly summed up. The oases of Kâf and 'Ittery have now been visited and the Wady Sirhan explored by Europeans for the first time. By taking barometrical observations along its entire length, Mr. Blunt ascertained that the Wady Sirhan from Ezrak to Jöf lies on nearly a uniform level of 1,800 feet above the sea, from which he thinks that it was formerly an inland sea, and is miscalled a Wady or valley. Along the whole distance he roughly surveyed the pilgrim road, marking the position of the wells and the reservoirs made by Zobeide. Mr. Blunt has also constructed a map of the Jebel Shammar district. The most interesting outcome of his journey, probably, is the collection of a series of facts relating to the physical condition of the great sand desert of Nefud, and in some material respects his observations are at variance with those of Mr. Palgrave. Mr. Blunt appears to be the first to call attention to the deep horse-shoe hollows, called by the Arabs *fulj*, with which the whole surface of the plain is pitted.

IN the present critical state of affairs between China and Japan in regard to the suzerainty of the Loochoo Islands, much