THE additions to the Zoological Society's Gardens during the past week include an Egyptian Gazelle (*Gazella dorcas*) from Egypt, presented by Capt. Robbins; two Red-under-winged Doves (*Leptopila rufaxilla*) from Guiana, presented by Mr. S. Wells; a Barn Owl (*Strix flammea*), British, presented by Sir Henry Tyler; two Great Eagle Owls (*Bubo maximus*), bred in Shropshire, presented by Viscount Hill; three Yellow-headed Conures (*Conurus jendaya*) from South-East Brazil, presented by Mr. C. Rudge; a Raven (*Corvus corax*), British, presented by Mrs. Tatham; a Martinique Gallinule (*Porphyrio martinicus*) from South America, presented by Mr. J. M. Booker; two Common Boas (*Boa constrictor*) from South America, presented by Mr. T. H. Church; a Common Viper (*Vipera berus*), British, presented by Mr. R. B. Spalding; four Ruscon's Newts (*Molge rusconi*) from Sardinia, presented by Prof. H. H. Giglioli, C.M.Z.S.; two Black-eared Marmosets (*Hapale penicillata*), a Feline Dourocouli (*Nyctipithecus vociferans*), two Yarrell's Curassows (*Crax carunculata*), two Magpie Tanagers (*Cissopis leveriana*), two Ariel Toucans (*Ramphastos ariel*), two Laughing Gulls (*Larus atricilla*), a White-faced Tree-Duck (*Dendrocygna viduata*) from South-East Brazil, purchased; three Aldrovandis Skinks (*Plestiodon auratus*) from North-West Africa, two Common Slow-worms (*Anguis fragilis*), British, received in exchange; six Ribbon Snakes (*Tropidonotus saurita*), born in the Gardens.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 AUGUST 29—SEPTEMBER 4

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on August 29

Sun rises, 5h. 9m.; souths, 12h. 0m. 46·9s.; sets, 18h. 52m.; decl. on meridian, 9° 18′ N.: Sidereal Time at Sunset, 17h. 24m.

Moon (New) rises, 4h. 51m.; souths, 11h. 58m.; sets, 18h. 52m.; decl. on meridian, 9° 21′ N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury ...	3 37	10 54	18 11	14 4 N.
Venus	2 48	10 27	18 6	17 51 N.
Mars	10 45	15 38	20 31	13 40 S.
Jupiter... ...	8 5	13 59	19 53	2 0 S.
Saturn... ...	0 46	8 51	16 57	21 47 N.

Occultation of Star by the Moon (visible at Greenwich)

Sept.	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
3 ...	γ Libræ	4½ ...	21 19 ...	22 13 ...	143 273

August 29.—Total eclipse of Sun: not visible in Europe. The central line crosses the West Indies, the Atlantic, and Southern Africa. The members of the British Expedition are prepared to observe the eclipse at Grenada, one of the Windward Isles, where the eclipse will occur soon after sunrise, having a duration of totality of about 4 minutes. In mid-Atlantic the duration will be 6 minutes. In Africa the eclipse occurs near to sunset, with a duration of totality of about 4 minutes.

Sept. 2 ... h. 11 ... Mercury at greatest elongation from the Sun, 18° west.

Variable Stars

Star	R.A. h. m.	Decl. ° ′			h. m.	
U Cephei	0 52·2	81 16 N.	... Sept.	1,	20 27	*m*
U Ophiuchi	17 10·8	1 20 N.	... ,,	2,	1 22	*m*
					21 30	*m*
W Sagittarii ...	17 57·8	29 35 S.	... ,,	2,	0 0	*m*
T Serpentis	18 23·3	6 13 N.	... ,,	4,		*M*
η Aquilæ	19 46·7	0 43 N.	... Aug.	29,	21 0	*M*
R Vulpeculæ ...	20 59·3	23 22 N.	... Sept.	3,		*m*

M signifies maximum; *m* minimum.

Meteor Showers

Amongst the radiants that have been observed at this season are the following:—Near γ Pegasi, R.A. 6°, Decl. 11° N.; near ψ Cygni, R.A. 306°, Decl. 54° N.; near λ Cygni, R.A. 311°, Decl. 35° N.; near ε Cephei, R.A. 335°, Decl. 52° N.; and near β Piscium, R.A. 345°, Decl. 0°. Fireballs are of frequent occurrence during this week.

Stars with Remarkable Spectra

Name of Star	R.A. 1886·0 h. m. s.	Decl. 1886·0 ° ′	Type of spectrum
71 Pegasi	23 27 46 ...	21 52·3 N. ...	III.
19 Piscium	23 40 34 ...	2 51·3 N. ...	IV.
φ Pegasi	23 46 41 ...	18 29·2 N. ...	III.
D.M. – 0° 4585 ...	23 48 55 ...	0 31·6 S. ...	III.
30 Piscium	23 56 7 ...	6 38·9 S. ...	III.
47 Piscium	0 22 6 ...	17 15·6 N. ...	III.
57 Piscium	0 40 34 ...	14 51·2 N. ...	III.
7 Schjellerup	1 9 49 ...	25 9·9 N. ...	IV.
R Piscium	1 24 45 ...	2 17·6 N. ...	III.

GEOGRAPHICAL NOTES

IN a lecture delivered at Cooktown (published in the *Daily Observer* of Brisbane), Mr. H. O. Forbes described his work in New Guinea during the six months he remained there. He set up his winter camp at Sogere, three days' march from the coast, though only 25 miles in a straight line, on the slope of a steep mountain. His work here was varied and important. The meteorological station which was erected was placed under the charge of Mr. Hennessy, and the observations were continued down to the end of his stay. These consisted of records of the mercurial barometer, maximum and minimum, dry- and wet-bulb thermometers, and rainfall, and were recorded without interruption six times in every twenty-four hours. The mass of observations thus accumulated will take a considerable time to tabulate, especially those referring to the atmospheric humidity. Then there was the collecting of zoological and botanical specimens. A large portion of the herbarium consists of giant trees of the forest. It contains about one thousand specimens, one set having been sent to Baron von Müller to Melbourne. A great part of Mr. Forbes's own time was devoted to the survey and delineation of the geographical features of the country. He obtained angles from about fifty different stations and established a base of several miles in length, on which he had hoped to found the triangulation of the country between Sogere and Owen Stanley, and the north-east coast. He also paid a visit to the latter place, and there, as elsewhere, with a little management, found the natives extremely friendly and well-disposed. When Mr. Forbes found his funds failing, he determined, with Mr. Chalmers, on making a dash for Mount Owen Stanley, but the natives who were to have aided him fled in the night, apparently on account of the terrors inspired by the journey. He only got as far as Kaukari, a village two days' journey beyond Sogere. He says that no words can give a true idea of the break-neck, shattered, disrupted condition of the country between Sogere and the central ridges. Beyond the natural obstacles, however (and they appear to be very great), there appears no reason why British New Guinea should not be thoroughly explored, provided the natives are treated with conciliation and tact.

THE Hon. Duncan Gillies, Premier of Victoria, has received a deputation, consisting of members of various learned societies, who urged the expediency of Antarctic exploration. The deputation represented that whale-fishing would make the enterprise remunerative, but at the same time asked the Victorian Government to give encouragement to the project. The Premier, in reply, said that the Government would be willing to grant a subsidy to aid scientific discovery, and that he would ask the other colonies to do the same. In the meantime he would instruct the Agent-General in London to inquire whether steam-whalers would be disposed to embark in the enterprise, and what subsidy would be required.

THE annual meeting of the Association of Swiss Geographica Societies took place at Geneva, at the same time as that of the Society of Natural Sciences. Prof. Chaix was President. Geographical Societies exist now in Geneva, Berne, St. Gall, Aarau, and Neuchatel, and others are about to be established in Zurich, Basle, and Lausanne. Those in existence count altogether more

than a thousand members. The paper which attracted most attention was one by Prof. Forel, on Lake Leman. He gave an historic sketch of the examination of the bed of the lake from Delabêche in 1819 down to the present day, from which it appeared that the knowledge of the central portion is very incomplete, while the rest of the lake is now well known. It is clear that there are two parts in the lake of wholly different character —one small and shallow, the other large, deep, and Alpine in its character. These two are separated by the Yvoise bank or bar, which is really a glacial moraine, as shown by the flints dredged up. These fragments of rock, found sometimes at a depth of 61 metres, are covered with moss of a beautiful green—a fact which appears to demand a reconsideration of the theory that light will not penetrate to more than 25 metres. A discovery in connection with the lake which M. Forel regards as a most interesting one in physical geography is that of a sub-lacustrine ravine through which the Rhone flows. Prof. Forel's long and laborious study of the lake entitled him, the President said, to the title "Prophet of Leman." Dr. Dufresne described the orohydrography of Brazil, and M. Brun recounted his adventures on the Gran Chaco. The Association discussed at some length various questions connected with the teaching of geography, especially the compilation by the allied societies of a manual of geography, and the establishment of geographical museums.

THE current number of the *Verhandlungen* of the Berlin Geographical Society (Bd. xiii. No. 6) contains two papers on the Congo region: one by Dr. Büttner on his journey from San Salvador to the Quango, and thence to Stanley Pool; the other by Lieut. Kund, who, with Lieut. Tappenbeck, was sent out by the German African Society in 1884. Their task was to explore the southern tributaries of the Congo, and to study their navigable qualities between Koango and Kassai. The length of the journey was, in all, 800 German miles, of which 340 was by water, and 460 by land. They succeeded in finding, between Koango and Kassai, three navigable rivers, the Wambu, Saie, and Kiulu; and they regard Lukenje, with its people, as practically a new discovery in the Congo basin. Dr. Joest writes on Minahassa, a peninsula in the north-east Celebes.

THE *Zeitschrift* (Bd. xxi. Heft 3) contains less matter of specially geographical interest than usual. A short paper, with an excellent map, discusses the improvements, which appear to have been great, made in recent years in roads and other means of communication in Asiatic Turkey. The greater part of the number is occupied with an exhaustive examination, by Herr Jung, of the census of India for 1881. The only real geographical paper is a summary of the report presented to the Brazilian Government on the surveys made for the purpose of the frontier between that empire and Venezuela.

THE last number of the *Izvestia* of the Russian Geographical Society (1886, ii.) is of great interest. It contains a beautiful map of the upper course of the Amu-daria, on the scale of 20 miles to an inch, including the space between the 36th and 41st degrees of latitude, and the 66th and 76th degrees of longitude. The whole of the Pamir appears on this map according to the recent surveys and barometric levellings of the Pamir Expedition, while a number of other surveys, including those of M. Kosyakoff (who accompanied Dr. Regel), the astronomical determinations of MM. Scharnhorst, Bansdorf, Schwartz, Skassi, Putyata, and Mr. Forsyth, as also the sketch map "of M. S. in and around Badakshan," have been taken into account. The same issue contains a very interesting paper by M. Grum-Grzymailo on the Pamir region; a paper, by M. Makaroff, on the double currents in straits, and especially in the Bosphorus (being a summing up of papers on this subject published in the *Memoirs* of the St. Petersburg Academy of Science); a most interesting account of the earthquakes at Tokmak in 1885; and, finally, the minutes of the proceedings of the Society brought up to a recent date, that is, embodying the sittings of the Society and its Sections as far as April last.

THE last issue (Nos. 5 and 6, 1885) of the *Journal* of the North China branch of the Royal Asiatic Society has a paper by Mr. Phillips on the seaports of India and Ceylon, described by Chinese voyagers of the fifteenth century, with an account of Chinese navigation. It is illustrated by a very curious old chart said to have been used by Chinese sailors who visited these distant places. In the present paper the route from Sumatra by the Nicobars to Ceylon is described; at a future time the writer will continue the maps to Arabia and Persia. The method of navigation by star charts, one of which is given, is very interesting. The whole paper shows that the Chinese visited these seas long before European navigators found their way there.

THE INSTITUTION OF MECHANICAL ENGINEEERS

THE summer meeting of this Institution for the reading and discussion of papers was held on the mornings of the 17th and 18th inst., at the Theatre of the Institution of Civil Engineers. On the afternoons of these days, and on the 19th and 20th, various works in and about London were visited. The Institution was entertained three years ago by the Belgian Engineers at Liége, and on this occasion Belgian Engineers have enjoyed the hospitality of the London members of the Institution.

The proceedings commenced with a few introductory remarks and a welcome by the President, Mr. Jeremiah Head, after which he read an address, taking as the text of his discourse the "Depression of Trade," to which Dr. Percy referred at the meeting of the Iron and Steel Institute in Glasgow last autumn, attributing it to over-production.

Mr. Head drew attention to the circumstance that mechanical engineers had done their utmost to make possible what had actually occurred, illustrating his remarks by recalling to the minds of the members some of their recent visits to works in various parts of England, where "the advantages of adhesion to a few types, and to but a few sizes of each type, of working to gauges throughout, of the piece-work system, of making for stock as regards all details, and taking from stock when erecting so as to avoid delays, impressed themselves strongly upon the members, who realised what rapid strides had been made in the direction of increased production at diminished cost." He instanced a steam-navvy, which was capable of doing the work of 80 to 120 human navvies, thus turning them into the ranks of the unemployed, and the flooding of our markets with American and Swiss watches, which, according to the evidence of a Liverpool watchmaker, was killing the British industry. The probable causes of these unfortunate circumstances were "diffusion instead of concentration, and adherence to old habits instead of quick appreciation of new and better ones."

Passing from the subject of the aid rendered by mechanical improvements towards over-production, the speaker referred to various commodities we send abroad as affecting our trade. "Some of these commodities may, in their production and sale, beneficially affect us now, and may also bring other benefits in the future; others may be profitable for the time being, but may tend to destroy future trade."

The address was listened to with interest and attention by the members, the meeting being one of the largest that has taken place in the metropolis for some time.

Two papers only were read on this occasion, the one by Mr. Borodin, of Kieff, and the other by Mr. Sandiford, of Lahore, both being on the working of compound locomotives, Mr. Borodin's paper also having reference to steam-jacketing. Mr. Borodin employed Mr. G. A. Hirn's system of investigation, with some modifications necessary to adapt it to locomotives working without condensation. Tests were first made in the locomotive testing-shop, where there was no dynamometer, and as only 90 per cent. could be utilised, high grades of expansion and comparatively low pressures had to be employed. The arrangements made were very complete; pressure-gauges and counters were observed, and indicator-diagrams taken at frequent intervals, the readings of which were tabulated. The results of each one and of all the tests, without exception, indicated a decreased consumption of moist steam when the jackets were working, the effect of the jackets including a decrease in the quantity of steam condensed during admission, a decrease in re-evaporation of water during expansion, and an increase of mean pressure in the cylinders. When variable rates of expansion were employed it was found that the consumption of steam per effective horse-power was larger at the higher rates of expansion, from which the conclusion may be drawn that when cylinders are too large they prevent economy in the consumption of steam.

The second set of trials was made with experimental trains, on ordinary and compound locomotives respectively, with jackets working and not working, but unfortunately as regards these experiments "the great want of success in the attempts to measure the quantity of water condensed in the jackets, as well