

THE additions to the Zoological Society's Gardens during the past week include a Mozambique Monkey (*Cercopithecus pygerythrus*, ♂) from East Africa, presented by Mr. R. Hughes; a Bonnet Monkey (*Macacus sinicus*, ♀) from India, presented by Mr. W. Yeoman; two Herring Gulls (*Larus argentatus*) British, presented by Mr. J. S. Williams; an Ariel Toucan (*Ramphastos ariel*) from Brazil, presented by Mr. Ellis Edwards; a Great Eagle Owl (*Bubo maximus*) European, presented by Commander E. G. Rason, R.N.; two Spengler's Terrapins (*Nicoria spengleri*) from Okinawa Shima, Loo Choo Islands, presented by Mr. P. Aug. Holst; two Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, presented by Capt. Worster; a Spiny-tailed Mastigure (*Uromastix acanthinurus*) from Algeria, presented by Miss Rigley; a Cuming's Octodon (*Octodon cumingi*) from Chili, deposited; an Eland (*Oreas canna*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET BROOKS (NOVEMBER 19, 1892).—The following ephemeris has been computed by Ristenpart (*Astronomischen Nachrichten*, 3154) from five normal places of this comet, using the elements—

$$T = 1893, \text{ January } 6^{\circ}529304 \text{ M.T. Berlin.}$$

$$\begin{aligned} \omega &= 85^{\circ} 12' 51'' \\ \varrho &= 185^{\circ} 36' 29'' \\ i &= 143^{\circ} 51' 45'' \end{aligned} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} 1890^{\circ}0$$

$$\log q = 0^{\circ}0774148$$

12h. Berlin M.T.

1893.	R.A. (app.) h. m. s.	Decl. (app.)	Log r.	Log Δ	Br.
Mar. 2 ...	0 39 35 ...	+22 18'6"			
3 ...	40 37 ...	22 4'1"			
4 ...	41 37 ...	21 50'1"			
5 ...	42 37 ...	21 36'5"	0'1738	0'3379	0'54
6 ...	43 36 ...	21 23'3"			
7 ...	44 34 ...	21 10'5"			
8 ...	45 31 ...	20 58'1"			
9 ...	46 27 ...	20 46'1"	0'1842	0'3563	0'47

The unit of brightness occurred on November 21'5, 1892.

COMET HOLMES (1892, III.).—M. Schulhof, in *Astronomischen Nachrichten*, No. 3153, continues the ephemeris for Comet Holmes, from which we make the following extract:—

12h. Paris Mean Time.

1893.	R.A. (app.) h. m. s.	Decl. (app.)
March 2 ...	2 30 59'8"	+34 49'0"
3 ...	32 42'7"	51 41'
4 ...	34 26'0"	54 24'
5 ...	36 9'6"	57 7'
6 ...	37 53'5"	34 59 52"
7 ...	39 37'7"	35 2 37"
8 ...	41 22'2"	5 24'
9 ...	43 7'1"	35 8 11"

NOVA AURIGÆ.—Last week we mentioned that Mr. Fowler's observation of this nova consisted of two bright nebula lines situated near wave-lengths 5006 and 4956, the former being only slightly brighter than the latter. In *Astronomischen Nachrichten*, No. 3153, Mr. Huggins, in a note dated February 11, writes with respect to his observations on February 7, 8, and 10, using a 4-inch Rowland grating (14,438 lines to the inch) and the second order, that the band was "resolved into a long group of lines extending through about 15 tenth-metres. The lines appeared more or less bright upon a faintly luminous background which could be traced a little beyond the lines at both ends of the group. Two lines, the brightest in the group and about equally bright, formed the termination of the group towards the blue; and a line nearly as bright as these was seen about the middle of the group. The group is therefore brighter at the blue end, but it does not possess any of the features of a fluting. No contrast in the spectroscopy could well be more striking than that which this extended group of lines forms with the narrow and defined principal line in the nebula of Orion."

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HYDROGEN LINE Hβ IN THE SPECTRUM OF NOVA AURIGÆ.—Owing to the curious appearance of the Hβ line in the spectrum of Nova Aurigæ, this line first appearing double and then afterwards quadruple, various explanations have been put forward to account for this peculiarity. From the hypothesis of two bodies, which did not agree with the facts observed, that of three or more bodies was suggested, until at last it was supposed that six bodies in all were in question. This supposition seemed most improbable, and since then the matter has been allowed to lie dormant. With reference to the behaviour of this line in the spectrum of vacuum tubes, Herr Victor Schumann (*Astronomy and Astrophysics* for February) has made some very interesting experiments, taking great care to use the hydrogen in as dry and pure a state as possible. We will here only refer to the most important part of the paper, leaving the reader to refer to the article itself for the apparatus, &c., employed. The photographic plates employed were made by himself according to the "silberoxydammonmethode" of Dr. Eder, of Vienna. Working with pressures from 1 to 100 mm. of mercury, the results obtained at those of 65, 80, and 100 gave the following results:—At 65 mm. Hβ and Hγ were most prominent, and in the negatives they were well defined, "although the sharpness of their edges is injuriously affected by broad, hazy fringes of considerable intensity, which shade off into the background from both sides of the line." Under a pressure of 80 mm. Hβ lost most of its definition, and close to it on each side were observed two fine thin lines, the fringe also being present but a little wider than before. Hγ, although increased in breadth, has lost its definition. With a pressure of 100 mm., "the more refrangible component of the pair of lines just mentioned as belonging to Hβ, has disappeared, and in its place has appeared Hβ itself, broad, but very weak; near by on the lower side one observes a thin line twice." With reference to the fringe of Hβ he says, it has now "spread itself out more towards the blue than the red, thus displacing the middle of it towards the blue." Hγ remains a very weak line. These observations showed that of all the hydrogen lines Hγ was the only one that showed reversal as well as displacement, and he concludes with the remark that "if it be asked whether the phenomena of reversal as observed in my hydrogen spectra furnish in themselves an explanation of the reversal of the lines in the spectra of Nova Aurigæ, the answer must be decidedly in the negative."

COINCIDENCE OF SOLAR AND TERRESTRIAL PHENOMENA.—Since Prof. G. E. Hale commenced his solar researches at the Kenwood Observatory, much has been added by him to our knowledge of the physics of the sun. Faculæ, for instance, which were supposed to be scattered only here and there on the solar surface, are now found, by means of the fine spectroheliograph, to occupy largely both hemispheres, and sometimes to extend in almost unbroken belts across the disc. This fact has led him to consider the question of the probability of chance coincidence between terrestrial magnetism and spots and faculæ (*Astronomy and Astrophysics*, for February), his attention being especially brought in this direction through a paper communicated to the Paris Academy of Sciences by M. Marchaud. M. Marchaud, in summing up his results after an examination of both solar and magnetic observations, says, with reference to the curve of magnetic intensity, that "each of these maxima sensibly coincides with the passage of a group of spots or a group of faculæ at its shortest distance from the centre of the disc." From an examination of 142 photographs of the sun, obtained between January 25 and December 3, 1892, at the Kenwood Observatory, Prof. Hale finds that no less than 132 show "one or more groups of faculæ on the central meridian, i.e. at their shortest distances from the centre of the solar disc." The chances, therefore, that at any given time one or more groups may be located at the central meridian, he finds as 0'93. This value, as he remarks, will be reduced for periods of decreased solar activity, but "coincidences noted in epochs like the present can hardly be regarded as of great importance."

"ASTRONOMICAL JOURNAL" PRIZES.—In addition to the prizes already offered, and to which we have previously referred (*NATURE*, vol. xlvi., *Astronomical Column*, p. 282), two extra ones, subject to the same conditions, are now to be pre-ented. The first is to be given to "the observer making, by Argelander's method, the best series of determinations of maxima and minima of variable stars during the two years ending 1895, March 31." The sum in this case is two hundred dollars. It is stated that "a principal basis for the award is to be the extent to which the de-



terminations will contribute to our better knowledge of the periodic variables by furnishing the largest number of maxima or minima of the largest number of stars, having especial regard to stars whose characteristics are at present not very well known." The award of four hundred dollars will be given for the "most thorough discussion of the rotation of the earth, with reference to the recently discovered variations of latitude." The manuscript (which will be returned to the author) is to be transmitted to some one of the judges not later than March 31, 1895.

For the award of these prizes the judges are Messrs. Asaph Hall, Seth C. Chandler, and Lewis Boss.

#### GEOGRAPHICAL NOTES.

THE Liverpool Geographical Society has issued its first annual report, which, although not showing a very cordial reception of the new society by the public, is not without some promise of future growth. The Earl of Derby is President, there are twenty-two Vice-Presidents, a substantial Council, and a staff of honorary officials. Staff-Commander E. C. Dubois Phillips has been appointed Secretary. The second year of the society was inaugurated by a lecture on the Discovery of the Alps, by Mr. D. W. Freshfield, President of the Alpine Club, and one of the Secretaries of the Royal Geographical Society. Other lectures have been arranged for, and it is to be hoped that the membership of the society will rapidly increase.

THE tenth German Geographentag is announced to meet in Stuttgart on April 5, 6, and 7. The programme includes (1) The special geography of Würtemberg and the researches on the lake of Constance; (2) Recent geographical investigations with special reference to desert phenomena; (3) Cartography; (4) Economic or applied geography; and (5) School geography. An exhibition will be held at the same time, mainly of objects illustrative of the geography of Würtemberg.

PROF. PENCK has a long paper in the March number of the *Geographical Journal*, describing in detail his scheme for a map of the world on the scale of 1 : 1,000,000. The importance of having maps of every country on one scale has long been recognised by working geographers; but, with the exception of the little atlas on gnomonic projection by the late R. A. Proctor, we do not know of any effort having been made to place such maps before the public. The minute scale of the work referred to reduced its value to a minimum. Prof. Penck's scheme is one of great magnitude. He would allocate the production of the map to the Governments or public bodies of each country. On this principle, 769 sheets would be required to represent the land-surface of the globe, each sheet containing 5° square between the equator and 60°, and between 60° and the poles 5° of latitude and 10° degrees of longitude. The British Empire would be responsible for 222 sheets, Russia for 192, United States for 65, France 55, Scandinavia 54, China 45. Five countries would have from 20 to 30 sheets each, six more would have over 10, and ten countries would require a smaller number, Belgium, Switzerland, and Greece having only one each. One advantage of the proposed scale is that it corresponds within the limits of the shrinkage of paper with the 16 miles to an inch Survey of India maps (1 : 1013760) and with the 25 versts to an inch Russian maps (1 : 1050000).

#### MONGOLIA AND CENTRAL TIBET.

AT the meeting of the Royal Geographical Society on Monday Mr. W. Woodville Rockhill gave an interesting account of a journey in Mongolia and Central Tibet. Leaving Peking on December 1, 1891, Mr. Rockhill travelled to the frontier town of Kalgan, then, entering Mongolia, he passed through the pasture-lands of the Ch'ahar Mongols. After a few days spent at Kuei-hua Ch'eng, the traveller continued westward, and crossing the Yellow River on the ice at Ho-k'ou, he crossed the Ordos Mongols country, and afterwards Alashan. Again entering China proper the route led through Ning-hsia, Lanchow, and Hsi-ning, the westernmost town in China, on the high road to Tibet. On March 14 Mr. Rockhill left for Tibet by an unexplored route, passing south of the Koko nor and

along the foot of the mountains to the south side of the Ts'aidam, making several excursions on the way, one of special importance from the Mongol village of Shang to 'Tosu Nor to determine by astronomical observations the position of this sheet of water discovered by him in 1889. Mr. Rockhill's party consisted originally of five Chinese, but one had to be invalidated home a few days after leaving Kumbum, and two others deserted him at Shang. He was able to hire at this place an old Chinese trader, and with these three men, assisted for a while by a Mongol and then by a Tibetan guide, he travelled till he reached China again in October, 1892. On May 27 the final start for Tibet was made from the Naichi gol in western Ts'aidam, and a general south-westerly direction was followed until July 7, when a point some 30 miles from the north-west corner of the great central Tibetan lake, called Tengri nor by the Mongols, was reached. Between the Naichi gol and the Ts'aidam the party had to endure great hardships, the great altitude ranging from 14,000 to 17,000 feet above sea-level, terrible daily snow and hail-storms, fierce winds and frequent absence of fuel, and towards the end starvation. The route, moreover, led them through vast salt marshes, bogs, and across numerous rivers, in which quicksands were frequently found. The geographical results of this portion of the journey were important. (1) The determination of the limits of the basin of the Murus (the great Yang-Tzu Kiang of China) and the discovery of the sources of the main branch of this river in the snow-covered flanks of the great central Tibetan range of mountains known as the Dangla. (2) The discovery of the eastern limit of the lake-covered Central Asian plateau which becomes some 600 miles west of the route Mr. Rockhill followed the Pamir, but is in the section he crossed of it called Naktang, and sometimes, though apparently erroneously, Chang T'ang or "Northern Steppe."

Game was scarce in the great part of this region, and so wild that it could not be approached.

On July 2 the last provisions were eaten, and from that date to the 7th the party subsisted solely on tea. On the latter day a small encampment of Tibetans was reached, and a little food purchased. The next day a valley was entered dotted over with tents; it was the pasture lands of the Namru Tibetans and Lh'asa governed territory. The headman refused to give the party food unless Mr. Rockhill agreed to await the arrival of the head chief, who would decide as to whether he should be allowed to proceed southward, or be sent back to the north.

After six days' discussion with the chief and several officials from Lh'asa a compromise was effected; and Mr. Rockhill, with an escort of ten Tibetan soldiers, started eastward to reach the frontier port of Nagchuká, on the highroad to Lh'asa from the Koko nor.

On July 27 Mr. Rockhill crossed the Dangch'u and found himself on the territory of Jyadé, or "The Chinese Province," which is governed by native chiefs appointed by the Chinese Minister, resident at Lh'asa (or Lh'asa Amban). This important province was separated from Lh'asa by the Chinese in the seventeenth century, in view of the enmity existing between its people, who profess the Bonbo religion, a form of the devil worship or shamanism, though now mixed up with lamaism to such an extent, that it is hardly distinguishable from it, and the followers of the yellow and red sects of Buddhism living on Lh'asa soil.

Passing to the south of the city of Ch'amdo, to which town Mr. Rockhill, like his predecessor, Captain Bower, was refused admittance, the high road to China was reached at Pungdé (two stages south of Ch'amdo), and from this point to China a Chinese escort was given the traveller, and he was able to enjoy (!) all the luxuries of Chinese travel. Stopping at Draya, at Gartok, Bat'ang and Lit'ang, Ta-chien-lu, in Ssu-ch'uan, was reached on October 2. Here, on the eastern border of Tibet the journey was practically ended, for, though several thousand miles still separated Mr. Rockhill from the seaboard, they could be travelled in comfort and rapidity. Leaving Ta-chien-lu on October 5, he was in Shangai on the 29th, exactly eleven months from the time he had left it. "In that time I had travelled about 8000 miles, surveyed 3417, and during the geographically important part of the journey crossed sixty-nine passes, all of them rising over 14,000 feet above sea-level, and not a few reached 18,000. I had taken series of sextant observations at a hundred points along the road, determined one hundred and forty-six altitudes by the boiling point of water, taken three hundred photographs, and made important ethno-