

A SHOCK of earthquake was felt in the district of Beira Alta on the 11th inst.

THE additions to the Zoological Society's Gardens during the past week include a Patas Monkey (*Cercopithecus patas*), from West Africa, presented by Mr. Thomas Baily; a Yellow Baboon (*Cynocephalus babouin*), from West Africa, presented by Capt. J. Henderson Smith, R.A.; two Goshawks (*Astur palumbarius*), European, presented by the Baron d'Eprenesnil; a Hobby (*Falco subbuteo*), caught in the Indian Ocean, presented by Dr. Rivis Mead; two Java Sparrows (*Padda oryzivora*) from Java, four St. Helena Seed-Eaters (*Crithagra butyracea*), from South Africa, presented by Mrs. Conrad Pile; two Sing-sing Antelopes (*Cobus sing-sing* ♂ ♀), from West Africa, received in exchange; a Woodcock (*Scolopax rusticula*), European, purchased; an Ocelot (*Felis pardalis*) from America, a Bactrian Camel (*Camelus bactrianus* ♀) from Central Asia, two White-backed Piping Crows (*Gymnorhina leucanota*) from South Australia; a Banded Parrakeet (*Palaornis fasciatus* ♂), from India, deposited; a Vinaceous Turtle Dove (*Turtus vinaceus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE INFLUENCE OF ASTIGMATISM IN THE EYE ON ASTRONOMICAL OBSERVATIONS.—Prof. Seeliger has published, in the *Abhandlungen der k. bayer Akademie der Wiss.*, ii. Cl., xv. Bd., 3 Abth., an interesting paper on this subject. The paper is divided into four sections. The first part treats of certain details connected with the refraction of light which are used in the subsequent investigations. The second part gives the theory of the formation of images in an astigmatic eye, and its application to measures made with an altitude instrument. In the third and fourth parts the author treats of the application of his theory to the heliometer and wire-micrometer respectively. It appears, from Prof. Seeliger's researches, that this malformation in the eye, which is far from uncommon, exerts a larger influence on astronomical measurements than is commonly supposed. Thus, he shows that a systematic error in a series of observed declinations amounting to 0".26 may very well be due to it. And it appears that the discordances in observed position-angles of double stars, depending on the inclination of the line joining the components to the vertical, with which the measures of some observers are affected, may in part be referred to the same cause. Prof. Seeliger's paper is one which may be profitably studied by those who aspire to the attainment of greater accuracy in astronomical observations.

THE KALOCSA OBSERVATORY.—Dr. C. Braun has recently published a report of this Observatory, founded by Cardinal Haynald, Archbishop of Kalocsa. The equipment of the Observatory consists of a refractor, by Merz, of 7 inches aperture; another of 4 inches; a transit by Cooke, aperture 2.3 inches; an altazimuth by Breithaupt, of Cassel; a chronograph, three clocks, and a chronometer; several spectroscopes, of which a large solar spectroscope with automatic adjustment to minimum deviation is the principal; a star photometer by Zöllner, and a spectro photometer by Vogel and Glan. The two most important works effected at the Observatory have been the determination of the geographical position of the Observatory, and the observation of sunspots. A special value attaches to the former, as hitherto the position of no place in Hungary had been fixed by direct astronomical methods. The latitude of the standard pillar of the Observatory was determined by geodetic observations to be 46° 31' 41".92; the astronomical methods made it 0".07 greater. The longitude was found to be 1h. 15m. 54".343s. east of Greenwich. The observations of sunspots extend from May 14, 1880, to January 31, 1884, and form a useful record of an interesting period. The method of projection was employed in observing; the observations were reduced first by means of a projection of the sun, and secondly by calculation. In the latter method Dr. Braun employed an instrument of his own device, which he terms a trigonometer, for the direct solution of spherical triangles. From his observations Dr. Braun deduces the following expression for the velocity of rotation— $365^{\circ} \cdot 33 - 209^{\circ} \cdot 86 \sin^2 \lambda$. He also shows the downward tendency in latitude of the mean spotted area, and points out the

curious partial effort at recovery which shows itself at tolerably regular intervals. The observations of each rotation are grouped together and given in short tables, and diagrams similar to Carrington's, showing the spots of each rotation in shape and position, are also added. The volume concludes with full descriptions of a number of ingenious instrumental devices, some actually employed at Kalocsa, others still only projected. Amongst these is an ingenious transit micrometer for eliminating personal equation in the observation of transits.

♄ CASSIOPEIÆ.—The *Sidercal Messenger* reports, on the authority of Prof. Colbert of Chicago, that this star appeared to increase its brilliancy by quite half a magnitude on the night of August 20. The most remarkable point of the observation was the shortness of duration of the phenomenon: for, about half an hour after it was first noticed, the star began to return to its normal magnitude. It will be interesting to learn if the change was observed elsewhere.

NEW MINOR PLANETS.—Prof. Peters discovered a new minor planet, No. 261, on October 31, and Herr Palisa two—Nos. 262 and 263—on November 3.

COMET FINLAY.—The following ephemeris for Berlin midnight is in continuation of that given in NATURE for November 4 (p. 17):—

1886	R.A.	Decl.	log r	log Δ
	h. m. s.			
Nov. 16	19 59 51	23 22'7 S.	0.0697	0.0899
18	20 8 42	22 53'7		
20	20 17 38	22 22'4	0.0589	0.0874
22	20 26 37	21 48'8		
24	20 35 39	21 13'0 S.	0.0693	0.0856

COMET BARNARD.—The following ephemeris for Berlin midnight is given by Dr. E. Lamp (*Astr. Nachr.*, No. 2753):—

1886	R.A.	Decl.	log r	log Δ	Brightness
	h. m. s.				
Nov. 18	13 16 59	13 12'4 N.	9.9433	0.0637	10.8
20	13 31 51	14 5'9	9.9306	0.0485	12.3
22	13 47 57	14 58'3	9.9180	0.0340	13.9
24	14 5 20	15 47'7	9.9055	0.0207	15.7
26	14 24 2	16 32'5	9.8934	0.0089	17.5
28	14 43 57	17 10'3	9.8817	9.9990	19.3

The brightness at the time of discovery is taken as unity.

GOULD'S "ASTRONOMICAL JOURNAL."—The first number of the new issue of this journal appeared on November 2. It contains the following papers:—On the light-variations of Sawyer's variable in Vulpecula, by S. C. Chandler, Jun., in which the elements of the star are given as Max. = 1885 Nov. 2d. 20h. 35m. G.M.T + (4d. 10h. 29.0m.) E. The minimum is 1.060d. earlier. The rapidity of the rise is a striking characteristic of this star.—A new short-period variable, by E. F. Sawyer. The star, 57 Sagittarii, has a period of not more than 6 days; the variation is from 5.6 mag. to 6.6. Place for 1875.0, R.A. 18h. 14m. 2s.; Decl. 18° 54' 8".—Elements and ephemerides and observations of Comets Finlay and Barnard, by Profs. Winlock, Boss, and Frisby.—Observations of U Ophiuchi, by E. F. Sawyer; and the first part of a paper on the lunar theory, by Prof. Stockwell.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 NOVEMBER 21-27

(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 November 21

Sun rises, 7h. 31m.; souths, 11h. 46m. 3".1s.; sets, 16h. 1m.; decl. on meridian, 19° 58' S.; Sidereal Time at Sunset, 20h. 3m.

Moon (New on November 25) rises, 1h. 37m.; souths, 8h. 4m.; sets, 14h. 18m.; decl. on meridian, 1° 57' N.

Planet	Rises	Souths	Sets	Decl. on meridian
	h. m.	h. m.	h. m.	
Mercury	... 9 30 ...	13 11 ...	16 52 ...	25 2 S.
Venus	... 7 12 ...	11 35 ...	15 58 ...	18 46 S.
Mars	... 10 33 ...	14 18 ...	18 3 ...	24 32 S.
Jupiter	... 4 15 ...	9 34 ...	14 53 ...	8 45 S.
Saturn	... 19 34* ...	3 36 ...	11 38 ...	21 22 N.

* Indicates that the rising is that of the preceding evening.

Occultations of Stars by the Moon (visible at Greenwich)

Nov.	Star	Mag.	Disap.		Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.		
22 ...	46 Virginis	... 6	... 4 42	... 5 31	... 72	176
22 ...	48 Virginis	... 6	... 4 58	near approach	304	—
22 ...	48 Virginis	... 6	... 6 36	... 7 8	... 104	163
23 ...	B.A.C. 4647	... 6	... 4 42	... 5 40	... 24	222

Nov. h.
23 ... I ... Jupiter in conjunction with and 3° 0' south of the Moon.
23 ... 14 ... Mercury stationary.

Variable Stars

Star	R.A.		Decl.		h. m.
	h. m.	°	h. m.	°	
U Cephei ...	0 52.2	81 16 N.	Nov. 28,	2 27	m
ζ Geminorum ...	6 57.4	20 44 N.	,, 23,	21 30	M
S Canis Minoris ...	7 26.5	8 34 N.	,, 24,		M
S Sagittarii ...	19 12.8	19 14 S.	,, 21,		M
η Aquilæ ...	19 46.7	0 43 N.	,, 24,	0 0	M

M signifies maximum; m minimum.

Meteor Showers

The *Andromedes*, maximum November 27, R.A. 24°, Decl. 44° N., form the most interesting shower of the week. A radiant near μ Persei, R.A. 60°, Decl. 49° N., supplies very swift meteors; swift meteors are likewise seen from a radiant near η Ursæ Majoris, R.A. 208°, Decl. 43° N.

GEOGRAPHICAL NOTES

THE *Bulletin* of the Paris Geographical Society for the present year (Nos. 1 and 2) contain several papers of interest. We need do no more than mention M. Ch. Mannoir's annual report on the progress of geography during the past year, which fills 130 pages. M. Grandidier writes on the rivers and lagoons of part of the east coast of Madagascar, and M. Gouin, of Nam-dinh, contributes a long paper on Tonquin, which deals with the commercial geography of the country rather than with the geography proper. No. 2 opens with the report of a strong Committee of the Society on the orthography of geographical names, which will be read with interest. No elaborate or exhaustive reforms are proposed; the suggestions are rather a series of simple modifications "based on good sense rather than on high philological science, which is only accessible to the few initiated." The Committee take up the programme of the Royal Geographical Society, "completing it in some respects, and making some additions sensible to musical ears." The bases of the proposals are the same as those of our own Society: (1) not to seek an absolute perfection in the representation of sounds; (2) to preserve in European names the form of the country of their origin; (3) to retain in the case of other places the mode commonly employed. M. Rolland contributes a long paper on the hydrography and orography of the Algerian Sahara; and M. Martell examines the map of the French establishments on the Senegal recently issued by the Ministry of Marine. Lieut. Baudens describes a trip which he made last year along the Black River of Tonquin; and finally there is an account written by Dr. Potagos in 1880 of a journey which he made in the Pamir in 1870, including a visit to the famous Yakub Beg of Kashgar.

WE have received the *Verhandlungen* (Bd. xiii. No. 8) and the *Zeitschrift* (Bd. xxi. Nos. 4 and 5) of the Geographical Society of Berlin. The first contains only one paper, but that an interesting one, by Dr. Sievers, on a recent journey in the Sierra Nevada de Santa Marta, in Columbia. The object of the journey was to study the geology and physical geography of the region, and especially to ascertain whether these mountains belong to the system of the Andes or not. As Dr. Sievers has only been back for a short time, he was unable to give any definite results, and he confines himself to describing the course of the journey, and to mentioning important points necessary for a proper understanding of the physical geography of the region. In the *Zeitschrift*, Herr Jung continues and concludes his analysis of the Indian census of 1881; this is followed by a translation, from the *Proceedings* of the Russian Geographical Society, of Dr. Iwanow's paper on certain ancient monuments discovered by him in the course of a geological examination of Turkestan. Prof. Gelcich has a highly technical history of the

methods of ascertaining the area of a country, and Dr. von Danckelmann one on the frequency of rain in the Indian Ocean. Herr Sandler makes a contribution to the history of cartography by giving an account of the life and works of Johann Baptista Homann, a geographer of the latter part of the seventeenth century. A curious map appended to this paper (which is of considerable length) shows, by means of white and red outlines, the world according to present cartography and according to Homann's maps. The number concludes with a short paper on the hot springs of Kamchatka.

IN a recent work on the geology and geography of Sumatra, M. Verbeek, a Dutch engineer, says that sixty-seven volcanoes are known to exist on that island. There may be more even than this, for parts of the north-west, which are covered with primæval forests, have never been penetrated. Two only of these are active, Merapi and Talang (or Soclau), the former being 2892, and the latter 2542 metres in height.

THE October issue of the *Bollettino* of the Italian Geographical Society contains an account of an excursion made during the summer by E. Modigliani to the rarely visited island of Nias, which lies some thirty miles from the west coast of Sumatra, a little north of the equator. The explorer spent two months in the place, but owing to local feuds was unable to penetrate beyond Fadoro, a large village near Telok Dalam Bay on the south side. The natives, apparently of Malayan or Indonesian stock, but speaking a language quite different from Malay, and by Crawford described as "a simple, mild, and primitive people," he found on the contrary to be fierce and treacherous savages, everywhere addicted to head-hunting. Their hostility was such, that he failed to make any botanical or zoological collections; but fortunately secured eleven human skulls from the southern districts, which have been sent to the Anthropological Museum of Florence. No similar specimens appear to have hitherto reached Europe, nor are any found even in the Batavian collection. Head-hunting is taken so much as a matter of course, that on Sig. Modigliani offering to purchase some skulls, the rajah of Bavalovani on the south coast quietly remarked that it would be rather an expensive business, as an expedition would have to be specially fitted out and sent to the hills to raid upon some neighbouring tribes and carry off the required number of heads. He had no idea of craniological specimens being collected except from the living subject. The interior of Nias still presents a promising field of exploration, never having been visited by any European travellers.

LIGHTHOUSE ILLUMINANTS¹

II.

V.—Range of Lights in Hazy Weather

THE observations on this subject of the Trinity House Committee have served to confirm the conclusions announced by M. Allard in his "Mémoire sur l'intensité et la portée des phares," 1876, and in his more recent "Notes sur quelques objections relatives à l'emploi de la lumière électrique dans les phares." The Committee find that the gas and oil lights which are equal in clear weather are equal also in fogs; that in rather dense fog the more powerful light had but little advantage over the less powerful, for example, "the triform electric appearing at 1500 feet, while the quadriform gas and triform oil showed up together a little before the observers reached 1400 feet," and that the electric light, while suffering, according to the photometric results, a somewhat greater loss in hazy weather than the flame lights, is "visible at a greater distance than the highest powers tried in gas or oil." Using M. Allard's formula, which appears to rest on well-established physical and physiological data, I have calculated the range in fogs of various degrees of thickness of some of the lights exhibited at the South Foreland. The range of a light, or the limit at which it is just lost or just picked up, is that limit at which its intensity is diminished by distance and haze to the minimum intensity perceptible by a good eye, such as the practised eyes of seamen are. M. Allard gives this minimum intensity, on the authority, of "des expériences qui ont été faites sur ce sujet au Champ de Mars," as that of 1/100 Carcel at a distance of one kilometre on a perfectly clear night. This corresponds to $\frac{1}{3}$ candle at a distance of one nautical mile. When the air is not perfectly clear,

¹ Further Report of Mr. Vernon Harcourt to the Board of Trade on the Experimental Lights exhibited at the South Foreland. Continued from p. 46.