

we learn that during 1886 Mr. Percy Smith continued the measurement of position-angles and distances of double stars, 88 sets of measures having been secured. These stars have been divided into three categories for future re-measurement, viz. rapid binaries, to be observed every year; slower binaries, to be observed every 4 years; and long-period binaries, to be observed every 10 years. Mr. Seabroke himself has continued the measurement of the motion of stars in the line of sight with the spectroscope on the reflector, and has completed 100 sets of measures. These observations, together with the corresponding ones for previous years, have been published in the January number of the *Monthly Notices*.

**DISCOVERY OF A NEW COMET, 1887d (BARNARD 2).**—A new comet was discovered on February 15 by Mr. E. E. Barnard, Nashville, Tennessee. It was very faint, and was moving rapidly in a north-westerly direction. At midnight (local time) its position was R.A. 8h. 4m., Decl. 16° 10' S.

**PROBABLE NEW VARIABLE.**—We learn from Circular No. 15 of the Liverpool Astronomical Society, that Mr. Backhouse finds 28 Andromedæ to be probably variable within small limits. The observations yet obtained are insufficient to fix the period, which must, however, be short. It is possible that the star is of the Algol type.

**NAMES OF MINOR PLANETS.**—Herr J. Palisa has named Minor Planet No. 256 Walpurga.

**BRIGHTNESS AND MASS OF BINARY STARS.**—The current number of the *Observatory* contains an article on this subject by Mr. W. H. S. Monck, in which he attempts to deduce the relative brilliancy of those binaries for which the orbits are best determined. Assuming that the mass of the companion-star is very small as compared with that of its primary, he shows that the relative brilliancy of any two pairs of binaries may be found by the following formula:—

$$\frac{k_1}{k_2} = \left( \frac{I_1}{I_2} \right) \cdot \left( \frac{P_1}{P_2} \right)^{\frac{4}{3}} \cdot \left( \frac{a_2}{a_1} \right)^3,$$

where  $I_1 I_2$  stand for the total amount of light, as determined photometrically, which we receive from the two pairs respectively;  $P_1 P_2$  for their periods; and  $a_1 a_2$  for the angular radii of their orbits.

By, apparently, a printer's error, the index of  $\left( \frac{P_1}{P_2} \right)$  is omitted in the formula in the *Observatory*. Adopting  $\xi$  Ursæ Majoris as his unit of comparison, Mr. Monck finds the brilliancy of  $\gamma$  Leonis 93.29; of Castor, 38.24;  $\delta$  Cygni, 35.52; of Sirius, 7.17; 42 Comæ, 2.79; 6 ( $\rho$ ) Eridani, 0.20; and 61 Cygni, 0.08. It is noteworthy that Prof. E. C. Pickering, in a paper which appeared in the Proceedings of the American Academy of Arts and Sciences, vol. viii. No. 1, obtained very similar results for many of the same stars, but by a somewhat different process. In both lists  $\gamma$  Leonis figures at the head, followed by Castor and  $\delta$  Cygni, whilst the smallest values are found for  $\rho$  Eridani and 61 Cygni. The weak point in Mr. Monck's computation is the assumption that the mass of the smaller star is comparatively insensible; the near equality in magnitude of many of the binaries selected would seem to indicate that the assumption was not a safe one. Mr. Monck repeats Prof. Pickering's suggestion that series of careful measurements should be made between each component of the binary systems and some neighbouring stars, so that the ratio of the masses of the two components may be determined. It is to be hoped that some double-star observers may be induced to take up this interesting subject, now that attention has again been called to its importance. The research might also possibly supply us in some cases with a determination of the distance of the binary.

**THE LIVERPOOL ASTRONOMICAL SOCIETY.**—The Pernambuco branch of this Society now numbers more than eighty members, and has been accorded permission to elect a local executive. The Emperor of Brazil has been elected a member of the Society.

#### ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 FEBRUARY 27—MARCH 5

(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 February 27

Sun rises, 6h. 52m.; souths, 12h. 12m. 56' os.; sets, 17h. 34m.; decl. on meridian, 8° 21' S.: Sidereal Time at Sunset, 4h. 3m.

Moon (at First Quarter March 3) rises, 8h. 50m.; souths, 15h. 30m.; sets, 22h. 21m.; decl. on meridian, 7° 9' N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury ...	7 17 ...	13 13 ...	19 9 ...	1° 36' S.
Venus ...	7 34 ...	13 31 ...	19 28 ...	1° 23' S.
Mars ...	7 19 ...	13 1 ...	18 43 ...	4° 11' S.
Jupiter ...	22 48* ...	3 49 ...	8 50 ...	12° 8' S.
Saturn ...	12 30 ...	20 39 ...	4 48* ...	22° 25' N.

\* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

#### Occultations of Stars by the Moon (visible at Greenwich)

March	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from ver- tex to right for inverted image
2 ...	Aldebaran ...	1 ...	17 47 ...	18 4 ...	182° 21' 0"
4 ...	130 Tauri ...	6 ...	2 30 ...	2 38 ...	43° 25'

March	h.	
3 ...	3 ...	Mercury at least distance from the Sun.
5 ...	11 ...	Mercury at greatest elongation from the Sun, 18° east.
5 ...	14 ...	Saturn in conjunction with and 3° 29' north of the Moon.

#### Variable Stars

Star	R.A. h. m.	Decl.		h. m.
U Cephei ...	0 52.3 ...	81° 16' N. ...	Mar. 2,	19 57 <i>m</i>
Algol ...	3 0.8 ...	40° 31' N. ...	Feb. 28,	2 54 <i>m</i>
			Mar. 2,	23 43 <i>m</i>
U Monocerotis ...	7 25.4 ...	9° 33' S. ...	Feb. 28,	<i>m</i>
T Canis Minoris...	7 27.7 ...	11° 59' N. ...	" 28,	<i>M</i>
S Cancri ...	8 37.5 ...	19° 26' N. ...	Mar. 2,	23 26 <i>m</i>
R Leonis ...	9 41.5 ...	11° 57' N. ...	" 2,	<i>m</i>
U Virginis ...	12 45.4 ...	6° 10' N. ...	" 5,	<i>m</i>
W Virginis ...	13 20.2 ...	2° 48' S. ...	" 4,	0 0 <i>m</i>
S Boötis ...	14 19.3 ...	54° 20' N. ...	" 2,	<i>M</i>
$\delta$ Libræ ...	14 54.9 ...	8° 4' S. ...	" 3,	0 5 <i>m</i>
U Coronæ ...	15 13.6 ...	32° 4' N. ...	Feb. 27,	21 2 <i>m</i>
U Ophiuchi...	17 10.8 ...	1° 20' N. ...	Mar. 3,	1 8 <i>m</i>
			and at intervals of	20 8
W Sagittarii ...	17 57.8 ...	29° 35' S. ...	Mar. 3,	4 0 <i>m</i>
R Scuti ...	18 41.5 ...	5° 50' S. ...	" 3,	<i>M</i>
$\beta$ Lyræ...	18 45.9 ...	33° 14' N. ...	" 5,	20 0 <i>M</i>
R Lyræ ...	18 51.9 ...	43° 48' N. ...	Feb. 28,	<i>M</i>
$\delta$ Cephei ...	22 25.0 ...	57° 50' N. ...	Mar. 2,	23 0 <i>M</i>

*M* signifies maximum; *m* minimum.

#### Meteor-Showers

Amongst the meteor-showers of the season are the two following:—Near  $\delta$  Virginis, R.A. 192°, Decl. 1° N; near  $\xi$  Sagittarii, R.A. 280°, Decl. 17° S. The latter radiant gives very swift streak-bearing meteors.

#### GEOGRAPHICAL NOTES

Two letters have been received in Vienna from Dr. O. Lenz, dated, one from Lake Tanganyika in September, and the other from the River Shiré in December. This indicates that the Austrian Expedition has taken an unexpected route to the east coast. When Lenz and his companions left Kasonge, on the Upper Congo, on June 30, they made for Tanganyika, arriving at Capt. Hore's station on the west shore on August 7. Crossing to Ujiji, Dr. Lenz found that it was impossible to proceed northwards to the Albert Nyanza and Emin Pasha, on account of the Arab raids and the state of things in Uganda. Instead, therefore, of proceeding eastwards to Zanzibar, he travelled, by land apparently, to the south end of Lake Tanganyika, along the Stevenson road to Lake Nyassa, down that lake to the Shiré, and thence by the Zambesi to Quillimane. The two letters will be published in the next number of the *Mitteilungen* of the Vienna Society, and will doubtless contain a good deal of information of interest.

TIPPOO TIP, about whom we have heard so much recently in connection with the Emin Pasha expedition, seems to be rather