

MESSRS. HARPER AND BROTHERS announce for publication during June "The Science of Happiness," Dr. Henry S. Williams; "The Elements: Speculations as to their Nature and Origin," Sir William A. Tilden, F.R.S.; "Religion and Art in Ancient Greece," Prof. E. A. Gardner; "Electric Trains," H. M. Hobart; and "Continuous Current Machine Design," W. Cramp.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN JUNE:—

- June 9. 5h. 3m. Neptune in conjunction with the Moon (Neptune $4^{\circ} 40' S.$).
- ,, 16h. 16m. Mars in conjunction with the Moon (Mars $3^{\circ} 6' S.$).
- 15. 1h. 56m. Jupiter in conjunction with the Moon (Jupiter $3^{\circ} 9' S.$).
- 17. 2h. om. Mars at greatest heliocentric latitude N.
- 19. 1h. om. Venus at greatest heliocentric latitude S.
- ,, 14h. om. Mercury at greatest elongation ($22^{\circ} 43' W.$).
- 21. 19h. 49m. Sun enters sign of Cancer.
- 24. 3h. 58m. Uranus in conjunction with the Moon (Uranus $3^{\circ} 50' N.$).
- 27. 17h. om. Jupiter at quadrature to the Sun.

HALLEY'S COMET.—With clear intervals between clouds during the past week, Halley's comet has not been a difficult naked-eye object for anyone who knew its position approximately.

Mr. Langton Cole reports that it was well seen at Sutton, Surrey, on May 22 and 31, and on the former occasion a short tail was visible to the naked eye; he estimates that on May 31 the comet was about as bright as a star of the third magnitude. At Gunnersbury on June 1 a naked-eye observation revealed the comet as early as 9:15 p.m., when it was apparently fainter than η Leonis (mag. 3.6).

A number of interesting notes on observations of the comet at various European observatories appears in Nos. 4413 and 4414 of the *Astronomische Nachrichten*. In the earlier number Dr. Franz records that on May 13, at the Breslau Observatory, the comet did not appear to be so bright as on earlier days; a variability of brightness is suggested, and it will be interesting to see if this is confirmed by other observers.

In No. 4414 many observers record that no trace of the comet could be detected on the solar disc during the time of transit. Dr. Wolf directs attention to the Bishop's rings surrounding the sun and moon on May 19, and suggests that they were more intense than if due solely to atmospheric effects. Meteors and auroræ were looked for at the Königstuhl Observatory, but were not seen.

Polariscope observations at several observatories gave similarly negative results. Prof. Franz records that on May 19 two bright arcs of light were seen in the northwest at Breslau, and may have been due to the comet. According to a telegram from Prof. Sykora, the projection of the comet on the sun was observed at Tashkent at 21h. on May 18. An increased intensity of the twilight at Odessa on May 18 is ascribed by Prof. Donitch as possibly due to cometary matter. Herr Archenhold reports a second comet-like object 1° south of Halley's comet at 9h. 30m. (Berlin M.T.) on May 22, but the observation is not confirmed by special reports from Bergedorf and Heidelberg. At Sonnwendstein, where, at an altitude of 1523 metres, several German observers had gathered for observations of the comet, the tail was observed from May 12 to 19. During this period its apparent length increased from 32° to 140° ; its apparent position was the same on May 19 as on May 18. Dr. Hartmann, who was one of the party at Sonnwendstein, submits a special report dealing with the various aspects of the tail, and directs attention to the yellowish colour of the nucleus on May 20.

A number of notes dealing with observations of the comet were read at the meeting of the Paris Academy of Sciences on May 30, and appear in No. 22 of the *Comptes rendus*.

M. E. Marchand reports that observations made on the Pic du Midi and at Bagnères-de-Bigorre were badly interrupted by clouds. No striking special phenomena were witnessed on May 18 and 19, but it was noted that the dawn was especially bright and the sky tinted, as though

there were an exceptional amount of dust in the atmosphere; the appearance is likened to that which was observed in 1902 and 1903 after the Martinique eruption. The unusual halos around the sun and moon support this view, as do also the observations of solar radiation subsequently made at the Pic du Midi station. Observations of the sun and of terrestrial magnetic and electrical effects revealed no abnormal condition attributable to the presence of the comet.

M. Popoff reports on the observations made at the Sofia Observatory (Bulgaria), and could not detect the comet projected on the sun's disc.

Further observations made at Athens are dealt with by M. Eginitis, who describes the forms of the nucleus and tail on May 18-20. No extraordinary atmospheric effects were recorded, and only two meteors were seen during the night of May 18. A splendid bolide was observed in Thessaly at 13h. 15m. (M.T. Athens), but is not connected with the comet. Between 7 p.m. and 8 p.m. on May 20 the comet's tail was seen with the equatorial, and was still apparently directed towards the west. The curvature was so great that the earth could not pass through the tail before the night of May 20.

MM. J. Baillaud and G. Demetresco describe photographs taken at the Paris Observatory on May 23, 24, and 28. Only very short exposures (thirty seconds to five minutes) were possible, and the tail is not shown. The nucleus is shown as an ellipse, the axes being $18''$ and $14''$ long. On May 23 this ellipse, otherwise uniformly dense, showed a condensation of $6''$ diameter at its N.E. extremity, but this had disappeared on May 24. The nebulosity surrounding the nucleus showed changes from one day to another, and on May 24 recalled that surrounding the Pleiades star Maia.

THE SPECTROSCOPIC BINARY β AURIGÆ.—In No. 22, vol. i., of the Publications of the Allegheny Observatory Mr. R. H. Baker discusses at length the observations of β Aurigæ as a spectroscopic binary. Since the duplex character of this star was announced by Miss Maury in 1889, many observations have been made at Harvard, Potsdam, Pulkowa, and Allegheny in an endeavour to remove certain apparent anomalies from the observed orbit. Assuming that the period was 3.9838 days, Miss Maury found, from the discussion of some 200 plates taken at Harvard, that there was an apparent reciprocal variation of intensity between the two components, but Mr. Baker now shows that this is not so; owing to the assumed period being slightly in error, the two components were alternately misidentified. The discussion of the Allegheny observations with those previously published shows that the orbit is practically circular ($e=0.0\pm 0.057$), and that there is probably a slight variation in the period, amounting to 0.000010 day, or 0.86 sec. per annum. The period now given is 3.960027 days $\pm 0.000010 \pm 0.000004$ days, the present elements being referred to the epoch 1905 September 11.7324, G.M.T.

An investigation of the secondary oscillation found by some observers is not confirmed, nor was Mr. Baker able to find evidence for the dispersion of light during its passage through space from β Aurigæ to the earth.

THE BRIGHTNESS OF THE SKY.—Commenting upon M. Fabry's recent determination of the brightness of the sky, Mr. Gavin Burns brings together, in No. 422 of the *Observatory*, the results obtained by various observers; they are as follows, each value being the brightness of one square degree of non-galactic sky expressed in terms of a fifth-magnitude star:—Newcomb, 1.15; Burns, 2; Townley, 2; Yntema, 5.76; Fabry, 1.46. Mr. Burns remarks that if, as seems probable, the brightness is a variable quantity, the results obtained by different observers are bound to vary considerably *inter se*.

THE ACCURACY OF RADIAL-VELOCITY DETERMINATIONS.—In No. 4, vol. xxxi., of the *Astrophysical Journal* Prof. Frost issues a timely warning against attributing too great an accuracy to present-day determination of radial velocities. A tabulation of twelve values recently obtained by various observers for Arcturus, a simple problem, shows that they vary between -3.7 km. and -6.6 km., whilst the extreme range for any one observer varies from 1.2 km. to 4.5 km. Prof. Frost questions if we know the radial velocity of any star to the nearest kilometre.