OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR JUNE:—

June 1. 5h. 0m. Mercury at greatest elongation W. of the Sun (24° 30′ W.).
6. 15h. 0m. Mars at greatest heliocentric latitude S.
7. 17h. 6m. Jupiter in conjunction with the Moon. (Jupiter 1° 0′ N.).
14. 14h. 16m. Uranus in conjunction with the Moon. (Uranus 4° 35′ N.).
20. 12h. 44m. Mars in conjunction with the Moon. (Mars 0° 12′ N.).
22. 1h. 35m. Sun enters Sign of Cancer. Solstice.
22. 22h. 38m. Saturn in conjunction with the Moon. (Saturn 3° 3′ S.).
25. 9h. 14m. Mercury in conjunction with the Moon. (Mercury 3° 32′ S.).
27. 2h. 38m. Neptune in conjunction with the Moon. (Neptune 5° 28′ S.).
29. 5h. 8m. Venus in conjunction with the Moon. (Venus 3° 40′ S.).
29. 13h. 0m. Mercury in perihelion.

THE TAIL OF HALLEY'S COMET ON MAY 20, 1910.—No. 4496 of the *Astronomische Nachrichten* contains further notes on the question of the direction of the tail of Halley's comet on the evening of May 20, 1910. Prof. Eginitis returns to the discussion, with M. Antoniadi, concerning the appearance of a tail directed *towards* the sun, and suggests that the latter has failed to recognise the exceptional position of the tail, with regard to the earth and sun, at the time, and also its curvature; such conditions would account for the phenomena observed at Athens about which Prof. Eginitis has no doubt and M. Antoniadi contends were impossible.

THE SPECTRUM OF THE RING NEBULA IN LYRA.—Some interesting spectra of the Ring Nebula are published by Mr. Keivin Burns in No. 193 of the Lick Observatory Bulletins. The photographs were taken with a slitless spectroscope attached to the Crossley reflector, in order to determine the spectral type of the central star. Stained and unstained plates were employed, and, in passing, it is interesting to note that a "Cramer Crown" plate stained twenty-one days previously was 50 per cent. faster in the red than a newly stained plate from the same box. The length of the spectrum is only 3·3 mm. between λλ 6560 and 3730, and the width of the image of the Ring is 1·6 mm. in declination.

A comparison of adjacent stellar spectra with the spectrum of the central star showed that while between λλ 6600 and 5800, the latter was only as bright as a 14·2 mag. star of type A or F; at λ 3300 it was as bright as an F-type star of magnitude 12·4. In fact, the spectrum of the central star is relatively stronger in the ultra-violet than that of the bluest of the many Orion-type stars which have been photographed with the same instrument; yet there is not the great difference between the visual and photographic magnitudes of this star that there is generally thought to be. Mr. Burns states that, if isolated, both the central star and the other star within the Ring would be easy objects for moderately large telescopes; he finds their visual magnitudes, by photographic methods, to be 14·1 and 14·7, while their photographic magnitudes are 13·2 and 14·5 respectively. The similarity of the spectrum of the central star to the spectra of central stars, or condensations, in other nebulæ removes any doubt as to its connection with the nebula.

The following radiations were found in the spectrum of the nebula itself:—λλ 3450, 3730, 3870, 3970 (Hε), 4100 (Hδ), 4340 (Hγ), 4690, 4860 (Hβ), 4960–5010 (chief nebula line), 5880 (D_3), and 6560 (Hα). Of these, the radiation at λ 3730 is by far the strongest, on the ordinary plate, and is followed by the chief nebula line; the hydrogen lines are relatively faint. The sizes of the rings due to λ 3730 and the hydrogen lines appear to be the same, while those due to the nebula lines λλ 3870 and 500 appear to be smaller. The monochromatic images of the ring show far more detail than a composite image, a fact which suggests that they differ in detail.

PROPER MOTIONS OF STARS BETWEEN +75° AND +80° DECLINATION.—By the comparison of the positions determined at the Kasan Observatory with those given in twenty-two earlier catalogues, Prof. Dubiago has determined the proper motions of some 730 stars, and publishes them in No. 4496 of the *Astronomische Nachrichten*. All these stars occur in the Kasan A.G. zone between declinations +75° and +80°, and the complete results are to appear in No. xv. of the Publications of the Kasan Observatory.

THE GYRO-COMPASS.—A brief description of the gyro-compass, which was exhibited at a recent meeting of the Royal Astronomical Society, appears in the May number of *The Observatory* (No. 435, p. 190). This compass is quite independent of the earth's magnetism, and may therefore be employed in many positions where an ordinary magnetic compass would be useless. It was, in fact, primarily designed for use in polar research, but now proves to be quite unsuitable; it is, however, trustworthy between latitudes 70° N. and S., and is being adopted by several Governments for use in their navies.

The rotating disc is floated on mercury, so that it is free to move in two directions, and the rotation of the earth causes the axis to set itself due north and south. The axis is geared up to an indicator, so that the needle always points N. and S. when the gyro is running. The rotation of the disc is produced by an ingenious electric motor of which the disc forms part, and the inherent tendency to prolonged oscillation is overcome by a most ingenious system of damping by currents of air, the application of the blasts depending upon the amplitude of the oscillation at the moment.

A fuller description of the instrument is given by Mr. G. K. B. Elphinstone in a book, "The Anschütz Gyro-Compass," published by Hugh Rees, Ltd.

ANCIENT OBSERVATORIES IN INDIA.—An illustrated description of the five astronomical observatories erected at the beginning of the eighteenth century by Saway Jay Singh, the Maharaja of Ambhery in Rajputana, is one of the interesting papers in the May number of *L'Astronomie*. M. Ducret, who describes the equipments, states that the observatories were situated at Benares, Muttra, Delhi, Ujjain, and Jaipur, but with the exception of the last named they are in a sad state of ruin. A photograph of the Jaipur Observatory shows huge masonry erections by which the altitudes and azimuths of the celestial bodies could be determined. The installation shows that in 1718–34, when the observatory was erected, the study of astronomy of position was well advanced in India.

THE BRITISH SOLAR ECLIPSE EXPEDITION.

March 30, 1911.

AT the moment of writing we are fifty-five days out from home, and are steaming along steadily in H.M.S. *Encounter* towards the island of Vavau, which we hope to reach on Sunday evening next (April 2). Since leaving Sydney, on March 25, we have experienced a N.E. or head wind all the time, which has somewhat reduced our speed. To-day we are in lat. 25° 20·5′ and long. 174° E., *i.e.* we are well to the north-east of Norfolk Island and to the south of Hunter or Fearn Island.

When boarding the ss. *Otway* at Tilbury on February 3, I was the sole representative of the Solar Physics Observatory's expedition on board, for Father Cortie and Brother McKeon, who joined the ship at the same time, represent the party sent out by the Joint Eclipse Committee. It was not long before I discovered that many cases containing self-recording instruments, books, photographic materials, lantern-slides, &c., for use on the voyage, were not placed in my cabin, and it was only at Port Said that I finally heard by cable that they were all neatly stowed away in No. 2 hatch with hundreds of tons of cargo above them, and therefore inaccessible until Sydney was reached. Fortunately, I had my 5×4 Kodak with me, and supplies of films were easily obtained at Marseilles, Naples and Colombo *en route*.

On the whole, the weather was cold for the time of year on the way out to Australia, and it was only in the doldrums that a high temperature and moisture-laden