Solar Eclipses.

[*Eclipses of the Sun and Moon.* By Sir Frank Dyson and R.v. d.R. Woolley, *The International Series of Monographs on Physics.* (Clarendon Press, Oxford), 1937, pp. viii + 160; 15*sh.*]

THE accidental circumstance that the Sun and the Moon have very nearly the same apparent diameters as seen from the Earth converts what might otherwise be a rather trivial astronomical phenomenon into a thrilling spectacle and a magnificent scientific opportunity. The total obscuration of the Sun's disk by the Moon when it occurs brings about a dramatic change in the appearance of our luminary. The overpowering light of the Sun's photosphere and the consequent illumination of the Earth's atmosphere are both shut off with the result that the solar atmosphere and its appendages, namely, the chromosphere, the prominences and the outlying corona with its streamers, suddenly stand revealed. The field of stars surrounding the Sun can also be seen or photographed. For the last one hundred years, the scientific value of the opportunities for investigation provided by a total solar eclipse has been steadily and increasingly realised. No fewer than some fifty organised expeditions to observe total solar eclipses have been made during these years. As the total phase is observable only over a restricted area of the Earth's surface, the investigator has to travel to distant parts of the Earth, sometimes even to remote and uninhabited places. Much effort and expense is involved in getting together and setting up the elaborate instrumental equipment necessary, and in endeavouring to make the best possible use of it during the few precious minutes of the total phase. Everything, of course, depends upon the sky remaining unclouded during that brief interval. The observers have, in fact, to go hoping for the best and prepared for the worst of weathers. One cannot but admire the scientific enthusiasm which evokes and sustains effort under such difficult conditions.

It is a remarkable fact that the stream of new knowledge which has resulted from eclipse expeditions has, at the same time, led to the development of methods by which phenomena which at first could only be observed at such times can now be studied as a matter of daily routine under ordinary conditions. The invention of the spectro-heliograph and the spectro-helioscope, has, for instance, made it possible to keep the forms of the solar prominences continuously under observation. The bright line spectrum of the solar chromosphere may nowadays be photographed in full daylight under favourable conditions. Quite recently, also, Lyot, by using special optical equipment and a high level station for his observations, has succeeded in photographing the corona and has also secured spectro-heliograms of it in the light of its green line radiation. These developments, however, so far from diminishing the interest of eclipse studies have rather enhanced them, if one might judge from the number of expeditions organised from all sides to make use of the specially favourable opportunities provided by each successive eclipse of the Sun.

It is now fully fourteen years since the American astronomer Mitchell wrote his well-known volume on "Eclipses of the Sun". During the interval, of course, the subject has advanced greatly and numerous technical publications of great importance have appeared. The monograph now under review gives a compact and at the same time comprehensive and stimulating account of the knowledge that has come to us from the study of the lunar and solar eclipses. The earlier chapters of the book deal with the prediction of the time of eclipses and with important connected topics such as for example, the secular acceleration of the longitudes of the Moon and the Sun and their dynamical explanation. The seventh chapter contains a very clear statement regarding the observed deflection of star-images by the gravitational field of the Sun. From this account, it appears that Einstein's prediction from his general relativity theory is verified by the observations. This chapter should be of special interest to those readers in India who may have been inclined to give credence to the numerous reports and publications emanating from Allahabad regarding the alleged demolition of Einstein's theory of relativity. The subsequent chapters give a very clear account of the methods and results of eclipse studies of the solar atmosphere. Chapter XII contains an interesting discussion of the dynamical theory of the

chromosphere put forward by Dr. S. Chandrasekhar. The last five chapters deal with the unsolved problems of the corona and discuss various aspects of the subject, namely, the forms of the corona, the intensity and polarisation of the coronal light, its spectrum and the origin of the entire phenomenon.

The attractive way in which the whole subject has been handled, the beautiful and well-chosen illustrations and the excellence of the account given of the more important recent developments, make the reading of this book a pleasant and profitable undertaking. Its appeal should extend far beyond the circle of specialists interested in astro-physics. Indeed, the reviewer has no hesitation in recommending the volume as one that should be read by every aspiring young physicist who wishes to imbibe the spirit of scientific research and discovery. The book brings out clearly the dominating rôle which physics plays in present-day astronomy.

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ASTRONOMICAL NOTES.

Planets during October 1937.—Mercury will be visible as a morning star during the early part of the month and will reach superior conjunction with the Sun on October 29. Venus will continue to be a bright object in the eastern sky before sunrise. On October 11, the planet will be very close to Neptune, the distance being only about three-tenths of a degree; the phenomenon can be seen with the aid of a small telescope.

Mars and Jupiter will be prominent objects in the sky immediately after sunset. The two planets will be approaching each other and on October 29, the angular distance between the two will be only one and a half degrees. Jupiter will attain quadrature with the Sun on October 12.

Saturn who is in opposition to the Sun on September 25, will be moving westwards in the sky and can be seen practically throughout the night. The ring ellipse is again getting edgewise, the major axis being $43''\cdot8$ and the minor axis $2''\cdot4$. Uranus will be about 2° west of the star σ Arietis (magnitude 5·5) and will cross the meridian an hour after midnight.

Comets (1937 *f*) which was discovered by Finsler in July, increased in brightness and has since become visible to the naked eye. At the beginning of September, it was in the constellation Bootes and moving southwards. Comet Whipple (1937 *b*) is gradually decreasing in brightness but is still within the reach of moderate instruments. Another new comet (the seventh for the year 1937) is reported to have been discovered on August 4 by Dr. Hubble at Mount Wilson (U.S.A.). At the time of discovery, the comet was faint, of magnitude 13,—and situated in the constellation Aquarius. It is moving in a southwesterly direction; from the computed ephemeris, it is found that the comet is approaching the earth, so that an increase in brightness may be expected.

Nova Herculis and the three novae discovered last year are still bright enough to be observed with small telescopes. Nova Herculis is slowly declining, its magnitude on September 8 was 8·6. With powerful instruments, the star has been found to be a close double, the separation being about $0''\cdot6$ in March 1937. The distance between the components appears to be gradually increasing; the measures obtained during the last two years are discussed by Kuiper in a paper in the *Astrophysical Journal*, July 1937. No appreciable change seems to have happened in the brightness of Nova Lacertæ since June. On September 8, its magnitude was 10·7 while that of Tamm's first nova in Aquila has definitely declined to 11·5.