

charge, (2) the "semi-brusque" discharge, and (3) the "brusque" discharge, of which the respective durations are of the order of 0.01 sec., 0.0001 sec., and 0.00001 sec., and M. Millochau briefly describes the different types of spectra produced in various gases by each. Thus in CO<sub>2</sub> the first produces the "Swan" spectrum, while the second produces the spectrum of carbonic oxide in place of the "Swan." With the "brusque" discharge, "line" spectra are produced, the lines of hydrogen and helium being always broad. Finally, M. Millochau arrives at the most important conclusion that his results favour the dissociation hypothesis, inasmuch as they appear to show that the production of the various spectra depend upon the temperature of the vibrating molecule and upon the dissociation effects which correspond to this temperature.

#### OUR ASTRONOMICAL COLUMN.

##### ASTRONOMICAL OCCURRENCES FOR MARCH:—

- March 2. 2h. om. Mercury in superior conjunction with the Sun.
4. 5h. om. Mars at quadrature to the Sun.
4. 16h. om. Jupiter at quadrature to the Sun.
9. 22h. 36m. Jupiter in conjunction with the Moon (Jupiter 4° 59' N.).
13. 19h. 12m. Uranus in conjunction with the Moon (Uranus 4° 43' N.).
15. 19h. 6m. Venus in conjunction with the Moon (Venus 3° 43' N.).
19. 16h. 44m. Mercury in conjunction with the Moon (Mercury 1° 47' N.).
20. 11h. 30m. Sun enters Sign of Aries; Spring Equinox.
22. 6h. 14m. Saturn in conjunction with the Moon (Saturn 1° 36' N.).
24. 20h. 30m. Mars in conjunction with the Moon (Mars 2° 44' S.).
26. 16h. 19m. Neptune in conjunction with the Moon (Neptune 5° 53' S.).
27. 14h. om. Mercury at greatest elongation east of the Sun. (18° 51' E.).
31. 17h. om. Venus in aphelion.

THE ECLIPSE OF THE SUN ON APRIL 17.—In a memoir prepared by the Madrid Observatory there is an excellent account of the conditions for the total and annular eclipse which will be visible in the peninsula on April 17 next. Intended for popular information, the memoir contains not only the data calculated for the eclipse in general and for several favourable localities, but also gives an account of the geometry of eclipses, the methods of calculation, the results, and some excellent diagrams and maps showing the track of the shadow.

As an example of the application of the method of calculating the values for any particular place, Cacabelos (long. = 6° 42' 57" W. of Greenwich; lat. = 42° 35' 53" N.) is selected, and for this place it is found that totality will last 4.6 seconds, the middle of the eclipse occurring at 23h. 48m. 54.7s. Other places where the eclipse will be total were selected, and, in order to ensure accuracy, a commission was appointed to determine their geographical coordinates. They are Barco de Valdeorras and Verin, and their positions were found to be:—long. 3° 17' 43.5" W. of Madrid, lat. 42° 25' 5.4" N., and long. 3° 45' 12.0" W. of Madrid, lat. 41° 56' 29.0" N., respectively. The track of the eclipse across the peninsula is shown on a large-scale map (1:500,000) at the end of the memoir, the central line passing from immediately north of Ovar, in Portugal, to Oviedo, and leaving the northern coast slightly to the east of Gijon.

THE EARLY BABYLONIAN ECLIPSE OF THE SUN.—In a paper appearing in part iii., vol. ii., of the Transactions of the Royal Society of South Africa, Mr. Nevill discusses at length the vexed question of the date to be assigned to the eclipse of the sun recorded on Tablet No. 35968 of the British Museum collection, which Dr. Cowell has identified with the eclipse of -1062, July 31. He describes the broken tablet, and discusses Mr. King's reading of the same from several aspects, arriving at the conclusion that the internal evidence does not preclude a date in the

twelfth century B.C., or even earlier. After examining every eclipse occurring between 1250 and 920 B.C., Mr. Nevill, by several processes of elimination, finds that, without assuming any secular acceleration of the sun's motion, the eclipses which fit the various conditions, of time, date, place, &c., best are those of June 5, 1217, May 18, 1123, and May 31, 956 B.C., and of these three the first most closely corresponds with theory and observation.

Finally, he points out that Dr. Cowell's hypothesis of secular acceleration, permitting a number of ancient eclipses to be recognised, constitutes a strong case if no other hypothesis can be found, but its adoption raises several questions which for the present cannot be satisfactorily answered.

THE PROPER MOTIONS OF THE STARS IN THE CLUSTERS  $\eta$  AND  $\chi$  PERSEI.—Vol. v. of the *Recherches Astronomiques de l'Observatoire d'Utrecht* is devoted to a thesis prepared by M. A. van Maanen dealing with an investigation of the proper motions of 1418 stars in and near the famous double cluster  $\eta$  and  $\chi$  Persei.

The object of the investigation was twofold: first, to find the proper motion of the two clusters; secondly, to determine the frequency of the proper motion according to its amount and to the magnitudes of the stars for this region of the sky. From a number of plates six were selected, two pairs taken by Kostinsky in 1896 and 1908, and one pair by Donner in 1892 and 1909, and among the conclusions arrived at it is maintained that this method of using pairs of plates is not inferior to that where the images are impressed upon the same plate at different epochs. The proper motions resulting from the discussion are so small as to render it impossible to make out which stars are, and which are not, members of the groups. In determining the frequency of the proper motions, it was found that, of the 763 stars considered, 300 had P.M.'s between 0.010" and 0.010", while only 142 had motions less than 0.010"; no sufficient reason has yet been found for the relatively small number of small proper motions.

THE TERRESTRIAL MAGNETIC EFFECTS OF SOLAR RADIATION.—In an extract from *Ciel et Terre* (No. 12, 1911) Dr. A. Brester discusses the causes which produce the diurnal oscillation of the magnetic needle and other terrestrial magnetism effects. In the place of the vortices produced by the heating effects of the solar radiation, he would substitute vortices produced by solar kathode rays, and he shows how the action of these would be concentrated in the neighbourhood of the earth's poles where the greatest oscillations of the needle are recorded. Further, he points out that electrical tourbillons would not be disturbed by ordinary atmospheric disturbances, and thus would give regular changes such as are observed, and, also that, the electrical state of the sun depending on the solar activity, his theory would account for the observed relation between the diurnal oscillations of the needle and the number of sun-spots.

ABSORPTION OF LIGHT IN SPACE.—The January number of the Monthly Notices contains an interesting paper by Mr. F. G. Brown, in which the author discusses the absorption of light in interstellar space. Taking all the nebulae given in the N.G.C., he found approximate measures of the intrinsic brightness of each by comparing the total brightness, or conspicuousness, as given in the N.G.C. with the diameter. Although this method of dealing with the subject cannot be regarded as final, the results are very striking, and indicate that the small nebulae appear less bright per unit area than do the large nebulae, or, in other words, the probably distant are fainter than the probably near. Mr. Brown's preliminary investigation also suggests that the absorption is different in different directions through space.

AN OBSERVER'S HANDBOOK.—"The Observer's Handbook for 1912," published by the Royal Astronomical Society of Canada, is a valuable compendium of the data likely to be required by the isolated amateur. It contains various ephemerides and tables, useful star-charts, notes on the constellations and phenomena for each month, tables showing the times of sunrise and sunset for each day in latitudes 44°–52°, and brief accounts of the eight comets of 1911. The handbook contains sixty-four pages, and is sold for 25 cents at the society's rooms, 198 College Street, Toronto.