

equipped for current capacities up to 20 amps. The ammeter is of the iron vane type, the voltmeter and wattmeter being dynamometric instruments. All windings are magnetically shielded and a new type of air-damper is fitted, rendering the needle very dead-beat. The weight of the instrument, complete in case, is less than 2 lb.

A RECENT German patent (*Glückauf*, August 3, 1918) describes a process for rendering powdered coal and charcoal insensitive to moisture. Finely ground and well-dried coal or charcoal powder is mixed with finely divided powdered peat, which, before grinding, is dried artificially at not less than 100° C.

#### OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF SOLAR PROMINENCES.—A summary of the observations of prominences made at Kodikanal during the second half of the year 1917 is given by Mr. Evershed in Bulletin No. 58. The mean daily frequency, mean height, and mean extent along the sun's limb were respectively 20.0, 37.3", and 358°, differing but little from the corresponding figures for the first half of the year. There were three principal zones of activity: one about the equator, a mid-latitude zone between ±30° and 40°, and a high-latitude zone between ±70° and 80°. More than half of the nineteen metallic prominences recorded were observed during December, which was also the most active month magnetically. In observations on the disc of the sun, 239 bright reversals of H<sub>α</sub> and eighteen dark reversals of D<sub>3</sub> were noted, and photographs of H<sub>α</sub> absorption markings were obtained on 117 days. The areas and numbers of the absorption markings showed a large increase on the previous half-year, indicating an increase in the density of the prominences except in the case of those occurring about latitude 60°, which have seldom given evidence of their presence on the disc. The distribution of the markings showed the usual excess on the eastern side of the central meridian.

Details of the observations of prominences made at Catania during 1916 have recently been published by Prof. A. Riccò (*Mem. Soc. Spett. Ital.*, vol. vii., series 2a). The mean daily number of prominences was 9.8, the mean height 49", and the mean extent of base 3.1°. There was a considerable increase in the frequency as compared with 1915.

PARALLAXES OF HELIUM STARS.—The recent determinations at Greenwich of the proper motions of stars down to 9th magnitude in the zone +24° to +32° have been utilised by Sir F. Dyson and Mr. W. G. Thackeray in an investigation of the parallaxes and intrinsic magnitudes of some of the B (helium) stars (*Monthly Notices, R.A.S.*, vol. lxxviii., p. 651). The region studied is that portion of the galaxy intercepted by the zone between 4h. and 8h. R.A. The stars near 6h. have a large parallactic factor almost wholly in declination, and on the assumption that they have no systematic motion other than that due to the sun's motion, the mean parallaxes of B stars of different magnitudes can be calculated. For 113 stars of types B8 and B9, ranging in mean apparent magnitude from 1.78 to 8.46, the mean proper motions in declination range from 0.1770" to 0.0066", the mean parallaxes from 0.05" to 0.02" and the intrinsic magnitudes (corresponding with the parallax 0.1") from +0.4 to -0.5. The extension of the investigation to faint stars thus confirms the view that stars of types B8 and B9 have not a great range in absolute luminosity. A similar conclusion is derived from the fainter stars of type A<sub>0</sub>, the mean intrinsic magnitudes having values ranging from +0.9 to +1.5 for 212 stars of apparent magnitude 5.32 to 8.67.

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STELLAR DISTANCES AND SPECTRAL TYPES.—A paper on "The Mean Distances of Stars of Different Spectral Types," by Mr. Shin Hirayama, appears in the *Annales de l'Observ. Astron. de Tokyo*, appendix 7. The purpose of the author is to test Kapteyn's formulæ connecting a star's parallax with its magnitude, spectral type, and proper motion. He uses 322 stars, for which both measured and spectroscopic parallaxes are available; as the latter are wanting for types A and B, he uses van Rhijn's constants for them. For stars of magnitude 4.8 he finds the mean parallax 0.029" for type M; as the type changes from M through K to G<sub>0</sub> it rises steadily to a maximum of 0.054", and then falls again as we pass through types F and A, being 0.008" for type B<sub>3</sub>. His values agree with those of Kapteyn for types B<sub>5</sub> and A<sub>0</sub>, but for the remaining types they are about twice as great.

#### ENTOMOLOGICAL RESEARCH IN AUSTRALIA.

MR. R. J. TILLYARD, whose admirable book on "The Biology of Dragonflies" was recently reviewed in NATURE, has made a further contribution of importance to the study of this order of insects in a series of papers on "The Morphology of the Caudal Gills of the Larvæ of Zygopterid Dragonflies," published in the Proceedings of the Linnean Society of New South Wales (vol. xlii., 1917, parts 1 and 3). Zygopterids are the slender-bodied dragonflies, often distinguished as "demoiselles," the larvæ and nymphs of which are provided with three conspicuous appendages, at the hinder end of the body, traversed by branching air-tubes. A careful comparative study of the structure of these organs in various genera and in successive stages of growth has been made by the author, who concludes that the median dorsal gill-plate in these insects is analogous with the telson in Crustacea, while the paired lateral appendages are cerci, and "therefore the true homologues of the uropods of Crustacea." These latter are compared with the filamentous cerci of the well-known stonefly (Perlid) larvæ and nymphs, which they resemble in form in the early stages, becoming more highly specialised as growth proceeds. From his comparative studies Mr. Tillyard is convinced that in the evolution of this group of dragonflies a primitive filamentous condition of the larval telson and cerci was succeeded by the "sacoid" type, which persists in a few genera such as *Diphlebia* and *Neosticta*, this by the "triquetro-quadrate" type, found in the *Calopteryginæ*, where the median gill is trapezoidal and the lateral ones are triangular in cross-section, and this by the specialised "lamellar" type characteristic of the larvæ of the great majority of the group, including the familiar *Agrioninæ*. The author promises further studies on the physiology of these interesting structures, for although their function is doubtless respiratory, the aquatic larvæ which possess them continue to breathe in some way when artificially deprived of them.

The remarkable insect-fauna of the Australian region has provided material in other orders for Mr. Tillyard's researches. In Tasmania, New South Wales, and New Zealand he has discovered various species of small scorpion-flies (Mecoptera), which he describes (*Proc. Linn. Soc., N.S.W.*, vol. xlii., part 2, 1917) as representing a new family (*Nannochoristidæ*), with the jaws apparently piercing and suctorial, closely parallel to the condition found in many Diptera, and combining remarkably archaic with specialised characters. In a paper on Permian and Triassic insects from New South Wales (*t.c.*, part 4) Mr. Tillyard describes a closely allied extinct type