

THE *Mitteilungen* from German Protectorates (vol. xxv., part 3, 1912) contain the monthly and yearly summaries of the meteorological observations at stations of the second order, and at the rainfall stations in Togoland (equatorial West Africa) for the year 1911. The summaries have been very carefully prepared by Dr. P. Heidke, of the Deutsche Seewarte, and include in the accompanying text much valuable information relating to the climate of that district. It is satisfactory to note that the observers take much interest in their work; at many stations they have considerably exceeded what was required of them.

No better evidence of the paucity of scientific knowledge amongst Englishmen supposed to be well educated has ever been afforded than was given in the House of Commons during the discussion of the Bill for the adoption of the metric system five years ago. A responsible Minister of the Crown then stated that "the metric system had broken down in France," and the House appears to have believed him. To those whose information on the subject is not up to date, an article by Dr. C. E. Guillaume in the *Revue générale des Sciences* for October 15 will be of great value. It shows that the other systems have almost entirely disappeared, the only ones at present in use being the Anglo-Saxon, the Russian, and the Japanese, while Japan has recently adopted the decimal system with a view to further reform in the near future. Australia, New Zealand, and South Africa are anxious that the British Empire should adopt the system, and it begins to look as if the Mother Country would be left in sole possession of a system which the average man finds so difficult to remember that he cannot say how many multiples a pound or an ounce is of a grain, or a mile of a yard, or what is the definition of a gallon.

THE Proceedings of the University of Durham Philosophical Society for 1911-12 (vol. iv., Pt. 4) contains the following papers:—The stability of a floating triangular prism, Mr. F. H. Alexander; the effect of soil aëration on plant growth, Mr. C. Hunter; chemical reactions taking place at the kathode and anode during the electrolysis of simple salt solutions, Dr. J. H. Patterson; the preparation of benzyl mercaptan, Dr. J. A. Smythe; the preparation of acrylic ester, Dr. F. G. Trobridge; some para derivatives of phenylacetic acid, Mr. S. Robson; analysis of a Florida Clay, Dr. A. A. Hall; and the rate of fermentation as measured by difference of potential, Dr. M. C. Potter. The society includes 171 members, and held 21 meetings, at which 26 papers were read, during the session 1911-12. The sixth report of the Boulders Committee is printed in the present issue of the Proceedings.

MR. ROBERT ELLIOTT-COOPER'S presidential address to the Institution of Civil Engineers is largely composed of an interesting discussion of the labours of the civil engineer in the oversea dominions of the British Empire. Dealing with the Grand Trunk Pacific Railway in Canada, while there is much to admire in this huge undertaking and its accessories, there is one matter which will not find general acceptance in these days of picturesque town-planning, except perhaps from those who think, with Ruskin,

that railways and æstheticism are absolutely irreconcilable. The new townships which have been and are about to be established along the undeveloped lengths of the new line are, as nearly as possible, eight miles apart, centre to centre, and are all on the northern side of the railway. In each town is one main street, named so in every case, 80 ft. wide, and leading up to the precise centre of the station, while there are 60-ft. streets at exactly equal distances apart on a chess-board pattern, completing a perfect square. A few of these perhaps would not affect the traveller much, but, when 1000 miles covering 125 towns of this description are passed, it will take all the sublime diversity of the scenery of the Rocky Mountains to soothe his irritated nerves.

MR. JOHN MURRAY has published a translation by Mr. W. C. Clinton of Dr. L. Bloch's "Science of Illumination," which was reviewed in these columns on March 7 last (vol. lxxxix., p. 3). With the consent of the author, Mr. Clinton has made certain alterations and additions rendered necessary by the difference between the English and German units and standards, and by the lapse of time. The price of the English edition is 6s. net.

MR. FRANCIS EDWARDS, bookseller, of 83 High Street, Marylebone, London, W., has issued a catalogue of the geographical library of Mr. Ernest G. Ravenstein. The catalogue includes some 1197 entries of works which he has for sale. Messrs. Bowes and Bowes, 1 Trinity Street, Cambridge, have published a catalogue of books on pure and applied mathematics which they have on sale. The list deals with mathematical histories and dictionaries, mathematical works published before 1700, and works of reference.

OUR ASTRONOMICAL COLUMN.

THE BRAZILIAN ECLIPSE, OCTOBER 10.—We learn from Mr. J. H. Worthington that his private eclipse camp in Brazil was in the same locality as that of the Greenwich observers, and that rain entirely prevented observations. He further states that it would probably have been necessary to travel at least a thousand miles to escape the rain zone on the day of the eclipse.

BORRELLY'S COMET 1912c.—Circular No. 137 from the Kiel Centralstelle gives a set of elements and an ephemeris for the comet discovered by M. Borrelly on November 2. From these we see that the comet passed perihelion on October 22, when it was some 103 million miles from the sun, and is now travelling southwards through Hercules towards Aquila; on November 18 it will be about 25 m. east of ϵ Aquilæ. The distances from both the sun and the earth are increasing, and consequently the calculated magnitude, now 8.7, is decreasing.

In a letter in *The Times* of November 13, Mr. W. S. Franks states that the comet was observed on November 9 at Mr. F. J. Hanbury's observatory, Brockhurst, East Grinstead, with the 6-in. equatorial. "At 8.10 p.m., November 9, its approximate right ascension was 18h. 37m., and declination $27^{\circ} 33'$ N. It was fairly bright, and estimated as of about seventh magnitude, being easily visible in the finder. It was judged to be about 1' of arc in diameter, gradually brightening to the centre, but without a nucleus."

THE LIGHT-CURVE OF NOVA GEMINORUM, No. 2.—The results of about 270 magnitude-observations of

Nova Geminorum, No. 2 (1912), made between March 12 and the end of May, are published and discussed by Herr J. Fischer-Petersen in No. 4608 of the *Astronomische Nachrichten*. The light-curve shows oscillations somewhat similar to those of Nova Persei in 1901, but of less amplitude and longer period. The maximum magnitude, 3.8, was reached on March 14, and then there was an abrupt fall, to 5.4, on March 16; subsidiary maxima occurred on March 24, 30, April 3 and 9, that on the first-named date being very marked (mag.=4.8). After April 9 the undulations of the curve are very small.

THE DARK STRUCTURES IN THE MILKY WAY.—An interesting paper full of suggestion as to the structure of the universe is contributed by the Rev. T. E. Espin to No. 4, vol. vi., of the Journal of the Royal Astronomical Society of Canada. Mr. Espin recalls Caroline Herschel's idea that a blank region in Scorpio was believed by Sir William Herschel to indicate "something more than a total absence of stars," and then, by the examination of other blank regions, he proceeds to show that in all probability there exist in the heavens masses of dark, light-absorbing vapours, which hide from us the light emitted by stars or parts of nebulae in the background. The photographic evidence seems almost irrefutable, it being difficult to explain otherwise such observations of Dr. Kopff's that "nearly all faint stars have disappeared from the immediate surroundings of these nebulae, though they are ten times more numerous, both in the nebulae and far outside." But if we suppose the bright nebulae which are shown on our photographs to have margins which are too diffuse to become illuminated, yet dense enough to absorb, the difficulty is removed, and if this absorbing margin, or extension, is projected, by the position of our view-point, on to the main body of the bright nebula, the "holes" and "lanes" observed in such nebulae are similarly explained. A number of beautiful photographs to illustrate Mr. Espin's article are reproduced.

Dr. Chant also has a paper in the same journal, dealing with nebulae and their forms, and this, too, is illustrated by many interesting reproductions.

STELLAR ACTINOMETRY AT THE YERKES OBSERVATORY.—A paper of great importance to astrophysicists and workers in stellar photometry is published by Mr. J. A. Parkhurst in No. 3, vol. xxxvi., of *The Astrophysical Journal*. For many years Mr. Parkhurst has been working on the relations existing between photographic and visual magnitudes, and has published details of a method whereby both could be measured photographically. He now publishes the results of a much more extended research, and gives both the photographic and visual magnitudes for some 650 stars, down to magnitude 7.5, in the Potsdam Photometric *Durchmusterung*, from 73° to the pole. The photographic magnitudes were measured from extra-focal images on Seed 27 plates, and the "visual" from reflector plates taken in the focus on colour-sensitive plates, and with a specially prepared colour-filter; Mr. Parkhurst fully describes the ingenious methods of eliminating or determining the numerous errors inherent to the observations. Then in his catalogue he gives the colour index of each star and, where possible, the type of spectrum; comparisons with the results obtained by other observers show fair agreement. The relation between spectrum and colour index, using the Harvard classification for the former, is best represented by a straight line, the differences being so slight as not to warrant the introduction of any complex curve to show the relation. There were 492 stars in this catalogue bright enough to give spectra which could be classified, and, of these, exactly

half belong to the types B₂ to F₆, and half to types F₇ to M; 196, or 40 per cent., are of the A type. At the nearest approach to the galaxy, viz. 10° in R.A. 1h., each field showed some ten or twelve white stars, while at the greatest distance from it, viz. 44° in R.A. 13h., there were only two or three white stars per field.

THE IRON AND STEEL INSTITUTE.

THE autumn meeting of the Iron and Steel Institute, which was held at Leeds on September 30 and October 1-4, may fairly be described as a "practical man's" meeting, for although the programme contained approximately an equal number of "practical" and "scientific" papers, those read and discussed at the meeting belonged entirely to the former class. While this is no doubt satisfactory to a large number of members of the institute who take rather less interest in scientific metallurgy than might fairly be expected of them, it is rather hard on the authors of scientific papers and on those members who were attracted to the meeting by the array of such papers on the programme. It is true that on other occasions the programmes have erred in the opposite direction, and it may be hoped that at future meetings a judicious blending of both types of papers may be brought up for discussion.

Among the papers relating to steel-works practice, the greatest interest and importance attaches to those dealing with the question of the production of sound ingots. Sir Robert Hadfield, F.R.S., who presented papers on a method of producing sound ingots and on a new method of revealing segregation in steel ingots, introduced the subject by referring to the series of alarming rail-fractures which had occurred in America during the exceptionally severe weather of last winter. These failures, and others which occur under less severe conditions, he is inclined to ascribe to unsoundness in the steel ingots from which the rails are rolled. According to the treatment and additions which a steel has received, the resulting ingot may suffer from unsoundness of one of two distinct types; the ingot may be more or less full of cavities or blow-holes of varying size and distribution, and in that case it is a non-settling, non-piping steel in which gases have been liberated during solidification in the mould. On the other hand, by suitable additions of small quantities of silicon or of aluminium, the steel may be rendered "solid" or "settling" in the sense that the ingot will be free from blow-holes or small distributed cavities, but it will—in the absence of special treatment—have a deep central cavity or "pipe," the existence of which results either in the discarding of a large proportion of the finished steel by the rejection of the upper portion of the ingot, or, if the piped portion is not sufficiently discarded, an unsound rail may be rolled from it, possibly with disastrous consequences.

In one of his papers Sir Robert Hadfield suggests a method of studying the formation of such pipes by pouring molten copper into the ingot at a certain stage of its solidification. He illustrates this method by coloured sections of ingots thus treated, but in the discussion Dr. J. E. Stead, F.R.S., pointed out that the copper when poured in will partly alloy with the still molten steel, and will then, by its greater density, produce an upward displacement of the remaining liquid steel, so that Hadfield's pretty method is really only applicable if the copper is introduced immediately after the complete solidification of the steel. Even if introduced earlier, however, the copper makes it possible to trace the order in which the various parts of