

Subject to the limitations imposed on any comparative treatment of the results recorded for the towns which have taken part in the inquiry, it may be of interest to point out that, after allowances have been made for differences in rainfall, Sheffield, according to the analytical data published in the *Lancet*, is a less smoky city than Manchester. This conclusion follows from a comparison of the figures for the six stations, N., E., and S., situated within three miles of Manchester Town Hall (Salford, on the west, did not take part in the inquiry), with those for the four stations, roughly, N., E., S., and W., situated within two miles of the Sheffield Town Hall. How far such evidence justifies the conclusion that Manchester chimneys pour into its atmosphere a correspondingly larger amount of impurity is doubtful; the contour of the land as promoting or retarding the dispersal of smoke is one of many factors to be taken into account before a definite opinion should be hazarded, and no two towns could differ more than Manchester and Sheffield in this respect.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

It is stated in the issue of *Science* for November 26 that approximately 200,000. is to go to Yale University under the will of the late Mr. Justus S. Hotchkiss, of New Haven. The trust fund thus established is to be shared equally among the academic, law, and theological departments.

THE Cambridge University Press has published "The Book of Matriculations and Degrees: a Catalogue of those who have been matriculated or admitted to any Degree in the University of Cambridge from 1901 to 1912." With the present volume the period covered, so far as a record of degrees is concerned, is from 1544 to 1912. Honorary titles of degrees conferred from 1901 to 1912 are included. The catalogue has been prepared for the press by Mr. B. Benham, the assistant registrary, and Mr. C. J. Stonebridge, the registrary's clerk. The price of the volume is 12s. 6d. net.

DR. JOHN READ, lecturer and demonstrator in chemistry in the University of Cambridge, has been elected to the chair of organic chemistry—pure and applied—in the University of Sydney, in succession to Prof. R. Robinson, lately appointed to the chair of organic chemistry at Liverpool. Dr. Read was educated at Sexey's School, Bruton, Somerset, passed through the Finsbury Technical College, under Prof. R. Meldola, in 1901–1904, was at Zürich with Prof. Alfred Werner, 1905–7, and has since been associated with Prof. W. J. Pope at Manchester and Cambridge, having published in collaboration with him a considerable number of papers of stereochemical interest.

THE sixteenth annual meeting of the Association of Public School Science Masters will be held on January 4 and 5, under the presidency of Sir William Osler, who will open the proceedings with an address entitled "The Fateful Years, 1915–1917," in which he will make a plea for earlier and more intensive work in science subjects so as to save time at the universities. The programme also includes the following papers and subjects for discussion:—"Desirability of Giving a Bias towards Agriculture in the Science Teaching in Schools," C. Turnor; "School Museums," M. D. Hill; "War-Work in Schools," S. J. Hough; "The Extent to which it is Desirable to Modify the Teaching of Science in Schools to Meet the Requirements of War," C. L. Bryant.

DR. E. FOX NICHOLS has resigned the presidency of Dartmouth College, New Hampshire, which he has

held since 1909, in order to accept an invitation to a chair of physics at Yale. In his letter to the Dartmouth trustees he explains that the special needs of the college which led him to accept the headship have now been largely met, and that there seems therefore no compelling reason why he should not go back to his earlier work, the duties and recompenses of which are in fuller accord with his individual taste and preference. The incident has aroused a good deal of favourable comment in the American Press, as indicating a break in the general tendency, in American academic circles, to prefer the attractions of an administrative post to the claims of scientific research and teaching.

THE approaching retirement of Dr. William Garnett from the post of educational adviser to the London County Council demands some grateful reference to years of work that have left a permanent mark upon London education. A student of the Royal School of Mines and a Whitworth scholar, a fellow of St. John's and first demonstrator under Clerk Maxwell in the Cavendish Laboratory, Dr. Garnett illustrated in his training the happy union between pure and applied science upon which the well-being, and even the security, of our national life depend. His principalship of the Durham College of Science showed how clearly he had grasped the essential principles of technical education; his opportunity of applying those principles on a large scale came with his appointment, in 1893, as secretary and educational adviser to the Technical Education Board of the London County Council. The eleven years of the board's activity must always be regarded as of momentous importance in the history of London education. Polytechnics sprang into being or were revived, a clearly conceived system of central and local technical institutes materialised, the conditions of science teaching in secondary schools were enormously improved, and the scientific and technical work of the University was greatly stimulated and aided. The hand of Dr. Garnett was plainly visible in all these good works, and they will be his enduring monument.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, November 26.—Dr. A. Russell, vice-president, in the chair.—J. Guild: Obtaining and maintaining a bright hydrogen spectrum, with special reference to the 4341 line. The paper treats of the conditions of pressure, discharge, etc., most suitable for the production of a bright hydrogen spectrum, such as is required for refractometry and similar purposes. The rapid deterioration of the tubes with use is shown to be caused by a rise of pressure due to the evolution of hydrogen by the electrodes. The trouble may be obviated by sealing an auxiliary bulb of $1\frac{1}{2}$ or 2 litres capacity to the discharge tube. This reduces the rate of pressure variation and prolongs the useful life of the tube nearly a hundredfold. The use of capacity and inductance is shown to be very helpful with partially deteriorated tubes.—A. Griffiths, J. M. Dickson, and C. H. Griffiths: The determination of the coefficient of diffusion of potassium chloride by an analytical method. This paper represents an attempt to develop an analytical method of determining the coefficient of diffusion of a salt in water capable of giving consistent and accurate results. The lower ends of a number of vertical and parallel diffusion tubes terminate in a reservoir of large capacity containing a solution of potassium chloride. The greater part of the reservoir is above the lower ends of the tubes, and by gravity the solution at the lower ends is kept at an approximately constant concentration. The upper

ends of the tubes are covered with a cap provided with an outlet and an inlet tube. Water enters the cap by the inlet tube, and a weak solution containing the diffused salt leaves the cap by the outlet tube. Time, which may be as long as a fortnight, is allowed for the attainment of the steady state, and an individual experiment may last six weeks. The quantity diffused is obtained by chemical analysis. In the case of a solution containing 0.2237 gram of potassium chloride to the cubic centimetre (a 3N solution) the "mean diffusivity" with respect to water is 1.703×10^{-5} (C.G.S. units) at a temperature of 18.5° C.

Royal Astronomical Society, December 10.—Prof. R. A. Sampson, president, in the chair.—H. H. Turner and Miss Blagg: Baxendell's observations of variable stars; continuation, including T Herculis, R Leonis, and S Orionis.—F. A. Bellamy: The number of faint stars with large proper motions in zone $+29^{\circ}$, and on the accuracy of Hagen's chart of variable stars.—H. H. Turner: Ninth note on the astrographic magnitude scales: the Toulouse and Cape magnitudes, with further remarks on the obscured patch in the sky, considered as a spiral. The data for the southern hemisphere were unfortunately very incomplete, as there is a gap in the observations between -1° and -31° .—J. H. Jeans: The theory of star-streaming and the structure of the universe. Various hypotheses were considered, and it was concluded there is no hope of unravelling the mechanism of the universe by assuming that it is in a steady state, or of using the observed phenomena of star-streaming for exploring its structure.—J. H. Reynolds: Photographs of Jupiter, taken in November with the 28-in. reflector.—G. E. Hale: Spectroheliographs of a remarkable disturbed region of the sun, August 7, taken at the Mount Wilson Solar Observatory, California.—W. H. Wright: Series of photographs of the spectra of nebulae taken at the Lick Observatory. It was hoped that they would assist in a proper classification of nebulae by their bright-line spectrum. The nuclei of most nebulae stood high on the temperature scale, and red stars are not associated with nebulae. An important circumstance was the appearance in the spectra of lines of carbon and nitrogen.—H. C. Plummer: The distribution of stars in globular clusters; and on the motions and distances of the bright stars of type F. In the latter investigation the author was greatly assisted by a table of stellar motions in equatorial co-ordinates, and other data, for stars of type F, by Mr. O. R. Walkey.

CAMBRIDGE.

Philosophical Society, November 22.—Prof. Newall, president, in the chair.—Prof. Hughes: Notes on oysters, recent and fossil. The author exhibited and described a large collection of recent and fossil oysters, pointing out how the modification of shape to suit changing conditions, as observed in recent specimens, suggested explanations of the evolution of species, in accordance with environment, among similar fossil forms.—Dr. Marr: Fossil zones and geological time. An attempt is made to estimate the time required for the accumulation of the fossiliferous rocks by taking the case of the chalk, comparing its rate of accumulation with that of the modern globigerinoid ooze, and then calculating the number of fossil-zones in the chalk and in the whole of the fossiliferous strata. The result obtained suggests a minimum period of not fewer than 21,000,000 years for the formation of the fossiliferous strata. The controlling factors are too uncertain to permit much stress to be laid on this estimate, which is probably much too low, but according to it the evolution of organisms from the beginning of Cambrian times onwards need not have occupied a period of time greater than that which on

various grounds is granted to geologists by followers of other sciences. The method may be applied with nearer approximation to accuracy, in estimating the relative importance of different groups of strata; thus the number of zones in Palaeozoic and Mesozoic rocks respectively indicates that the period during which the former were being laid down was not necessarily much longer than that required for the accumulation of the latter.—H. B. Fantham and Miss Annie Porter: Induced herpetomoniasis in birds. All the great classes of European vertebrates, except birds, have been infected by the authors previously with flagellates found in various insects. Results are now given of some experiments in which birds have been similarly infected. Herpetomoniasis can be induced in birds, for example, canaries (*Serinus canarius*), sparrows (*Passer domesticus*), and martins (*Chelidon urbica*) by feeding them on insects containing herpetomonads, or on food contaminated with insect faeces containing herpetomonads. *Herpetomonas culicis* from the gnat, *Culex pipiens*, and *H. jaculum* from *Nepa cinerea*, have fatally infected birds when fed to them. Both flagellate and non-flagellate herpetomonads have been found in the internal organs of the infected hosts. The cycle of the flagellates in the avian hosts resembled that in the insects. Members of all classes of vertebrates may be capable of acting as reservoirs of herpetomoniasis, and the virus may exist in a very attenuated condition and so be difficult of detection.—H. B. Fantham and Miss Annie Porter: Notes on certain Protozoa which may be found in cases of dysentery from the Mediterranean war zone. The authors dealt briefly with the morphology and life-histories of *Entamoeba histolytica*, *E. coli*, *Trichomonas hominis*, *Chilomastix (Tetramitus) mesnili*, *Giardia (Lambli) intestinalis* and *Balantidium coli*. The pathogenic actions of these parasites were discussed. Various preventive measures, the occurrence of carriers and of reservoirs were indicated. The modes of treatment successfully used by recent workers were mentioned.—Dr. Arber: A little-known concealed coalfield in Oxfordshire. The results of the Burford and Batsford borings appear to show that, in this concealed coalfield, the Coal Measures are red-grey productives, probably belonging to the Transition Coal Measures. These beds overlie Silurian rocks. The measures appear to be related to those of the Newent and Wyre Forest Coalfields, both lithologically and as regards horizon.

PARIS.

Academy of Sciences, November 29.—M. Ed. Perrier in the chair.—The President announced the death of Charles René Zeiller.—Maurice Hamy: The determination of radial velocities with the prism objective. In a preceding communication a method was sketched for the determination of the radial velocities of stars, making use of a prism objective. Detailed calculations are now given.—H. Douvillé: The Orbitoids: their development and embryonic phase. Their evolution during the Cretaceous period.—M. de Séguier: The equations of certain linear groups in a Galois field.—M. Pigeaud: The elastic equilibrium of an indefinite plate of uniform thickness, compressed by two equal and opposite forces, uniformly distributed along two parallel right lines situated in a plane normal to the bases.—Echsner de Coninck and Gerard: The atomic weight of cadmium. Details of the method employed for the purification of the commercial cadmium are given. The experimental ratio determined was cadmium oxide from cadmium carbonate, and the mean of five determinations was 112.32, as against the atomic weight adopted by the International Commission, 112.40.—O. Bailly: The mechanism of the action of the tribasic sodium phosphate on the α -mono-

chlorohydrin of glycerol.—E. A. Martel: The contamination of subterranean waters as a consequence of the war. An example is given of contamination of a water supply persisting for a whole year, and the necessity of special precautions in maintaining the purity of potable water is pointed out. It must not be taken for granted that after a certain lapse of time processes of self-purification are sufficient.—J. Bergonié: A new method of surgical radioscopy in red light.—A. Renault, L. Fournier, and L. Guénot: Five hundred and fifty cases of syphilis treated by an organic compound of arsenic, silver bromide, and antimonyl. Further experiments on treatment of syphilis with the compound proposed by M. Danysz under the name of "102." It has the special advantage that there is a wide range between the parasitic dose and the toxic dose. The therapeutic effects are comparable with those of arseno-benzene. The preparation possesses great stability, the treatment is simple and without danger, and extremely efficacious.

BOOKS RECEIVED.

A Text-Book of Inorganic Chemistry. Edited by Dr. J. Newton Friend. Vol. viii.: The Halogens and their Allies. By Dr. G. Martin and E. A. Doncaster. Pp xviii+337. (London: C. Griffin and Co., Ltd.) 10s. 6d. net.

The British Warblers. By H. E. Howard. Two vols. (London: R. H. Porter.) 10l. 10s. net.

The Book of Matriculations and Degrees. Pp. xvi+315. (Cambridge: At the University Press.) 12s. 6d. net.

Memoirs of the Queensland Museum. Vol. iv. Edited by Dr. R. Hamlyn-Harris. Pp. 365. (Brisbane: A. J. Cumming.)

Submarines: their Mechanism and Operation. By F. A. Talbot. Pp. x+274. (London: W. Heinemann.) 3s. 6d. net.

Archaic Sculpturings. By L. M. Mann. Pp. 52. (Edinburgh and London: W. Hodge and Co.) 2s. 6d. net.

Roald Amundsen's Antarctic Expedition. Scientific Results: Meteorology. By H. Mohn. Pp. 78. (Kristiania: H. J. Dybwad.)

Rural Sanitation in the Tropics. By Dr. M. Watson. Pp. xvi+320. (London: J. Murray.) 12s. net.

Ticks. Part ii., Bibliography of the Ixodoidea II. By Prof. G. H. F. Nuttall and L. E. Robinson. Pp. 32. Part iii., The Genus *Hæmaphysalis*. By Prof. G. H. F. Nuttall and C. Warburton. Pp. xiii+349+550+plates viii-xiii. (Cambridge: At the University Press.) 4s. 6d. net and 12s. net respectively.

Carnegie Endowment for International Peace. Year Book for 1915. Pp. xvii+177. (Washington, D.C.)

My Growing Garden. By J. H. McFarland. Pp. xiii+216. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd.) 8s. 6d. net.

Transactions of the Royal Society of Edinburgh. Vol. ii. Part i. (No. 4): The Temperatures, Specific Gravities, and Salinities of the Weddell Sea and of the North and South Atlantic Ocean. By Dr. W. S. Bruce, A. King, and D. W. Wilton. Pp. 71-169. (Edinburgh: R. Grant and Son; London: Williams and Norgate.) 8s. 3d.

A Manual of Soil Physics. By Prof. P. B. Barker and H. J. Young. Pp. vi+101. (Boston and London: Ginn and Co.) 3s.

A Treatise on the Theory of Invariants. By Prof. O. E. Glenn. Pp. x+245. (Boston and London: Ginn and Co.) 10s. 6d. net.

A Voyage in Space. By Prof. H. H. Turner. Pp. xvi+304. (London: S.P.C.K.) 6s. net.

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DIARY OF SOCIETIES.

THURSDAY, DECEMBER 16.

ROYAL SOCIETY OF ARTS, at 4.30.—The Indian Jute Industry: C. C. McLeod.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Design of High-pressure Distribution Systems: J. R. Beard.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—The Nature and Formation of Sand Ripples and Dunes: W. J. Harding King.

LINNEAN SOCIETY, at 5.—The Structure and History of Play: The Floating Fen of the Delta of the Danube: Miss Marietta Pallis.—The Seed-mass and Dispersal of *Helleborus foetidus*, Linn.: T. A. Dymes.—Sample of "Figured Ebony," with Specimens of Walking-sticks Manufactured from it: B. Daydon Jackson.—The Reproduction of *Protodrilus*: E. S. Goodrich.

INSTITUTION OF MINING AND METALLURGY, at 8.—Influence of Heat in Cyaniding Gold Ores: E. A. Wraight.—Clay: Its Relation to Ore Dressing and Cyaniding Operations: A. W. Allen.—Wolframite Mining in the Tavoy District, Lower Burma: E. Maxwell-Lefroy.

FRIDAY, DECEMBER 17.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Engineering Colleges and the War: Dr. R. Mullineux Walmsley and C. E. Larard.

MONDAY, DECEMBER 20.

ARISTOTELIAN SOCIETY, at 8.—The Common-sense Criterion of Reality: J. W. Scott.

TUESDAY, DECEMBER 21.

INSTITUTION OF PETROLEUM TECHNOLOGISTS, at 8.—The Uralsk Province and its Oilfields: F. A. Holiday.

ROYAL STATISTICAL SOCIETY, at 5.15.

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