THREE letters on "Science in the School," contributed during last autumn to the *Educational Supplement of the Times* by Sir Clifford Allbutt, K.C.B., have been published in pamphlet form by Messrs. W. Heffer and Sons, Ltd., of Cambridge, at the price of 6*d*. net. Attention has been directed already in these columns (vol. xcviii., p. 241) to the argument of the letters, and it will be sufficient here to point out that the first letter may be summarised by quoting its concluding sentence:—"The 'science' we need in schools is a scientific method of teaching all things." The subsequent letters elaborate this definition. "It matters less," says the second letter, "what a boy is taught than how it is taught." "We need science in our 'classics' as we need humanity in our science." Similarly, in the third letter, we find:—"The cry of *what* is to be taught to boys is of less importance than the vision of *how* things are to be taught." "To regenerate all teaching by the spirit and method of science is far more important than the inculcation of special sciences." It may be hoped that the pamphlet will secure a wide distribution, for its lessons deserve frequent repetition in view of the reconstruction which the coming of peace will bring.

AT the opening of the New York State Museum in the State Education Building, Albany, New York, on December 29 last, Mr. Theodore Roosevelt gave an address on productive scientific scholarship, which is published in the issue of *Science* for January 5. Describing the functions of a museum, Mr. Roosevelt laid special emphasis on the need for it to give research facilities to the extraordinary and exceptional student, "the man who has in him a touch of the purple; the man who can supply that leadership without which it is so rare for even the laborious and well-directed work of multitudes of ordinary men to realise the ideal of large productive achievement." Later, in contrasting utilitarian with pure science, he said there is a twofold warrant for the encouragement of the study of pure science by the State. First, the knowledge justifies itself. Secondly, the greatest utilitarian discoveries have often resulted from scientific investigations which had no distinct utilitarian purpose. It is impossible to tell at what point independent investigation into the workings of Nature may prove to have an immediate and direct connection with the betterment of man's physical condition. The greatest need to-day, and the need most difficult to meet, is to develop great leaders, and to give full play to their activities. But it must also be our aim to develop men who, if they do not stand on the heights of greatness, shall at least occupy responsible positions of leadership.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Meteorological Society, January 17.—Major H. G. Lyons, president, in the chair.—Major H. G. **Lyons** (presidential address): The winds of North Africa. It is now thirty years since the distribution of pressure over the region lying to the south of Europe was discussed, and during this period many new stations have been established. From the Mediterranean to the equator material is now available from about eighty stations, and a more trustworthy estimate of the distribution of pressure over North Africa and the consequent flow of the air currents can now be formed.

Geological Society, January 24.—Dr. Alfred Harker, president, in the chair.—Dr. Aubrey Strahan said that in 1914 a proposal was made to subscribe for a bust of Sir Archibald Geikie which would be presented to the Board of Education for preservation in the Museum of Practical Geology. A marble bust, executed by Prof. E. Lantéri, was presented to the board on March 14, 1916, and placed in the museum. The staff of the Geological Survey and Museum, thinking that a copy of the original model of the bust would be a suitable gift to the Geological Society of London, had caused a cast to be made, and Dr. Strahan, on their behalf, offered it for the acceptance of the society. The president gratefully accepted the gift on behalf of the fellows.—**Scoresby Routledge**: An account of Easter Island. An expedition was organised so that Easter Island, and other islands most near to it, should be thoroughly examined, and all information and material should be considered on the spot, or, if possible, be brought back for comparative study. The geologist of the expedition, the late Mr. F. L. Corry, contracted typhoid fever on the Chilean coast and never recovered sufficiently to rejoin the expedition. Hence no formal geological report on the island could be submitted. The conditions on Easter Island were illustrated by a series of photographs taken to illustrate geological features. The island was described as a plateau of basalt raised from 50 to 100 ft. above the sea. Superimposed on this were numerous cones ranging up to nearly 2000 feet. The plateau was covered but sparsely with soil, and could only be crossed with difficulty in any direct line. The cones, on the other hand, were generally smooth of surface, with a good depth of soil.

MANCHESTER.

Literary and Philosophic Society, January 9.—Prof. S. J. Hickson, president, in the chair.—F. **Jones**: Note on the action of hydrogen on sulphuric acid. Many years ago the author noticed that pure hydrogen, when left in contact with strong sulphuric acid, had a strong odour of sulphur dioxide. It appeared that hydrogen had reduced the acid in accordance with the equation $H_2SO_4+H_2=SO_2+2H_2O$. The action of *nascent* hydrogen on the acid was examined by Faraday in 1834. He found that when the strong acid was submitted to electrolysis, oxygen appeared at the anode, and hydrogen and sulphur at the cathode. Subsequent observers stated that no action took place between hydrogen and sulphuric acid at ordinary temperatures, but Berthelot maintained the opposite view. The author devised an experiment to show that action does take place at ordinary temperatures. Sulphuric acid is placed in the bulb of a non-tubulated retort containing hydrogen. The point is dipped under water, which slowly rises in the neck of the retort as the formation of sulphur dioxide proceeds.—T. A. **Coward**: An undescribed habit of the field vole. Mr. Coward said that towards the close of 1916 he found three field voles in nests, three to six feet above ground, in an osier-bed at Rostherne, Cheshire. One nest had probably been entirely constructed by the vole; the others were built upon old nests of birds. The voles were dead—one so recently that the fleas had not left it. The field vole, though capable of climbing, is terrestrial in habits, nesting on or beneath the ground; it is not known to hibernate, and is constantly abroad in hard weather. Collett records a bank vole making a similar elevated nest in Norway, but as an exceptional case. The osier-bed is frequently flooded, and during the frosts and thaws in December underground nests would have been death-traps, and the cause of death may perhaps be explained by the rapid changes in the weather, driving the voles to the elevated but exposed positions, where from habit they gathered only the quantity of material which would have sufficed to protect them in a burrow.

EDINBURGH.

Royal Society, December 4, 1916.—Dr. J. Horne, president, in the chair.—Miss Margaret **Ferguson**: The family budgets and dietaries of forty labouring-class families in Glasgow in war-time. The paper was founded upon statistics which had been gathered in connection with the investigation into the causes of rickets now being carried out by the Medical Research Committee of the National Insurance Act. The average income in war-time was about 42 per cent. higher than in the years preceding the war, and the average expenditure for food and rent was 37 per cent. higher. The supply of food energy was much the same. The consumption of proteins had fallen, that of fats risen, the latter fact being explained as due to the increased consumption of margarine. While the cost of food had risen about 50 per cent., the cost of living had increased only 36 per cent., thus leaving a greater surplus for other expenditures.—P. **MacNair**: The Hurlet sequence in the east of Scotland. The purpose of the paper was to correlate various members of the lower Limestone series of the Carboniferous rocks in the east and west of Scotland, and, in particular, to compare certain sections in the east with the well-known sequence at Hurlet between Glasgow and Paisley. The various Limestone horizons which were so correlated were characterised by a faunal association by means of which they could be traced over wide areas. This faunal association had been discovered by the author everywhere in the same position throughout the west of Scotland, and a similar fauna existed at Abden, in Fife, and in other localities in the Lothians. Its importance lay in the fact that it formed a well-marked datum line from which to determine the positions of the other members of the series.

December 18, 1916.—Dr. J. Horne, president, in the chair.—G. P. **Darnell-Smith**: The gametophyte of Psilotum. This formed one of a series of investigations now being carried out in the University of Sydney.—J. **Russell**: Transverse and codirectional induction changes in demagnetised iron and nickel in relation to the molecular theory of magnetism. When a rod of iron or nickel has been demagnetised by reversals, the application of a magnetising force at right angles to the original direction of magnetisation produces induction changes in that direction. The experimental results were compared with theoretical deductions based upon certain assumptions concerning the distribution as regards orientation of the molecules constituting the magnetic matter. Good agreements were obtained.—Prof. W. **Peddie**: The magnetic test of molecular arrangement in crystals: Magnetite and the α, β, and γ forms of iron. Iron exists in these three crystalline forms, of which α is the magnetic one. The author previously showed that the magnetic quality of α crystals, as tested by Weiss, proved that the arrangement of the magnetic molecules could not be on a simple cubic lattice, but might be on a face-centred lattice. The only other possible lattice is that of the centred cube. In the present paper it is shown that this lattice also could not give the observed characteristics. Therefore, the arrangement is on the face-centred lattice. The X-ray test has already led to this conclusion. It is shown also that the centred cubic lattice arrangement readily gives a non-magnetic grouping of molecules, and, therefore, presumably exists in the β form. This leaves the open cubic arrangement as a possibility in the γ form. The value of the magnetic test is further illustrated by the possibility of a magnetic molecular arrangement in magnetite different from that given by Bragg, but also fairly well satisfying the X-ray test.

DUBLIN.

Royal Irish Academy, January 8.—The Most Rev. Dr. J. H. Bernard, president, in the chair.—D. **McArdle**: Musci and Hepaticæ of the Glen of the Downs, Co. Wicklow. The paper dealt with the moss and liverwort flora of the Glen of the Downs, a wooded Glacial "dry gap" near Bray, Co. Wicklow. Of mosses eighty species, and of hepatics thirty-seven species, were enumerated, of which about one-half were previously unrecorded from the county.

January 22.—The Most Rev. Dr. J. H. Bernard, president, in the chair.—F. L. **Hitchcock**: The simultaneous formulation of two linear vector functions. The author considers Joly's expressions for two linear vector quantities in terms of six vectors. The possibility of such reduction fails in certain cases, and methods are explained for proceeding in each case. Geometrical applications to the curve of intersection of two quadrics are given. The theorem, fundamental in the theory of quadratic vector functions, that the locus of the *irreducible* vector $V\phi\rho\theta\rho$ cannot be a fixed plane is proved.

NEW SOUTH WALES.

Linnean Society, November 22, 1916.—Mr. C. Hedley, vice-president, in the chair.—D. B. **Fry**: A new Batrachian genus from New Guinea, with comparative notes on the pectoral musculature. The new genus belongs to a group comprising sixteen out of the twenty-six genera of Brevicipitidæ (Engystomatidæ auct.) recorded from the Oriental and Australian regions, characterised by having a highly specialised, sternal apparatus, modified by the loss of the procoracoid cartilage and clavicles. Apart from sternal characters, its affinities appear to be about equally divided between Hylophorbus, Macleay (Mantophryne, Blgr., et auct.), and Metopostira, Méhely.—Dr. J. M. **Petrie**: The chemical investigation of some poisonous plants in the N.O. Solanaceæ. Part iii., The occurrence of nor-hyoscyamine in *Solandra longiflora*. The leaves are found to contain nor-hyoscyamine as the chief alkaloid. This was previously isolated and described by the author as a new alkaloid in 1907, under the name of "solandrine," and is now identified with the alkaloid which Carr and Reynolds isolated in 1912 from other solanaceous plants. Solandra also contains hyoscyamine in smaller amount, but scopolamines are absent. The total amount of alkaloid obtained was 0·17 per cent. in the leaves (dried at 100° C.).—G. I. **Playfair**: Australian fresh-water phytoplankton (Protococcoideæ). One new genus is proposed, and descriptions are given of sixty-one forms which appear to be new, eighteen being classed as species, thirty-seven as variations, and six as forms.—Dr. H. S. H. **Wardlaw**: The change of composition of alveolar air after the stoppage of normal breathing. When normal ventilation of the lungs is stopped, (*a*) by holding the breath, (*b*) by rebreathing the same quantity of air, the changes in the alveolar tensions of CO_2 and O_2 are exponential functions of the time for which ventilation is stopped. When the same air is rebreathed, the rates of change of the tensions are greater, and the final values approached are further removed from the original tensions than when the breath is simply held. In the latter case, (*a*), the values reached are close to those which have been given for the tensions in venous blood. In the former case, (*b*), the tension of CO_2 approached is considerably higher, while that of O_2 is considerably lower, being zero. Holding the breath under positive pressure seems to have no effect on the rate of change of composition of alveolar air, while negative pressure accelerates the change to the same extent as rebreath-

ing.—Dr. J. B. **Cleland** and E. **Cheel**: Records of Australian fungi, No. 1.—R. J. **Tillyard**: Further researches upon the problems of the radial and zygopterid sectors in the wings of Odonata, and upon the formation of bridges. In studying the tracheation of the rare larva of Neosticta (Protoneurinæ), the structure of the zygopterid sector (Ms) was found to be normal. But occasionally a peculiar abnormality occurs in one wing, trachea M_3 becoming hitched on to Ms near its base, while the supervening imaginal venation remains normal, so that the base of M_3 appears on the larval wing as a true bridge. This suggests that bridges in general are not cænogenetic developments in the venation, as held by Needham, but that they are the archaic condition, from which the tracheation has departed by specialisation. The question of the homology between Rs in Anisoptera and Ms in Zygoptera is dealt with by a complete marshalling of all the known evidence, both structural and ontogenetic. This is shown to be absolutely against the supposed homology. As a more probable explanation, the author suggests that the presence of two oblique veins in the archaic Petalurinæ and Cordulegastrinæ indicates the presence of both Ms and Rs in these forms, but that the Zygoptera, as a whole, have lost Rs by suppression at the subnodus, while all the rest of the Anisoptera only retain Ms as the bridge-vein basally, the more distal portion having become fused with Rs.

BOOKS RECEIVED.

How We Learn. By W. H. S. Jones. Pp. vii+64. (Cambridge: At the University Press.) 1*s.* 6*d.*

Nature Study Lessons seasonably Arranged. By J. B. Philip. Pp. ix+147. (Cambridge: At the University Press.) 2*s.* 6*d.* net.

Elementary Physics for Engineers. By J. Paley Yorke. Pp. viii+165. (Cambridge: At the University Press.) 4*s.* net.

Annuaire pour l'an 1917 publié par le Bureau des Longitudes. Avec des Notices Scientifiques. (Paris: Gauthier-Villars et Cie.) 2 francs net.

The Mythology of All Races. Oceanic. By Prof. R. B. Dixon. Pp. xv+364+plates xxiii and map. (Boston, Mass.: Marshall Jones Co.)

The Problem of Pain in Nature. By C. F. Newall. Pp. 131+7 illustrations. (Paisley: A. Gardner.) 3*s.* 6*d.* net.

Science in the School. By Sir Clifford Allbutt. Pp. 20. (Cambridge: W. Heffer and Sons, Ltd.) 6*d.* net.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 8.

ROYAL SOCIETY, at 4.30.—The Dynamics of Revolving Fluids: Lord Rayleigh.—Deflection of the Vertical by Tidal Loading of the Earth's Surface: Prof. H. Lamb.—Spontaneous Generation of Heat in Recently Hardened Steel: C. F. Brush and Sir R. Hadfield.

ROYAL INSTITUTION, at 3.—The Mechanism of Chemical Change: Prof. F. G. Donnan.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Frequency Changers: R. Townend.

OPTICAL SOCIETY, at 7.30.—Annual Meeting.—More Notes on Glass Grinding and Polishing: J. W. French.

FRIDAY, FEBRUARY 9.

ROYAL INSTITUTION, at 5.30.—Experimental Phonetics and its Utility to the Linguist: D. Jones.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Anniversary Meeting.

MALACOLOGICAL SOCIETY, at 7.—Annual Meeting. Presidential Address: Systematic List of the Marginellidæ: J. R. le B. Tomlin.

PHYSICAL SOCIETY, at 5.—A Special Test on the Gravitation Temperature Effect: Dr. P. E. Shaw and C. Hayes.—To Measure Pressure in a High Vacuum by Observation of Logarithmic Decrement: Dr. P. E. Shaw.—Note on the Calculation of the Coefficient of Diffusion of a Salt at a Definite Concentration: Dr. A. Griffiths.

SATURDAY, FEBRUARY 10.

CERAMIC SOCIETY, at 7.—Acid and Basic Furnace Lining.

MONDAY, FEBRUARY 12.

ROYAL SOCIETY OF ARTS, at 4.30.—Town Planning and Civic Architecture: Prof. A. Beresford Pite.

TUESDAY, FEBRUARY 13.

ROYAL INSTITUTION, at 3.—Pain and its Nervous Basis: Prof. C. S. Sherrington.

WEDNESDAY, FEBRUARY 14.

ROYAL SOCIETY OF ARTS, at 4.30.—Highways and Footpaths: Lawrence Chubb.

THURSDAY, FEBRUARY 15.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Structure and Development of the Tubular Enamel of the Sparidæ and Labridæ: Dr. J. H. Mummery.—(1) Distribution in Wheat, Rice and Maize Grains of the Substance the Deficiency of which in a Diet causes Polyneuritis in Birds and Beriberi in Man. (2) Effect of Exposure to Temperature at or above 100°C upon the Substance (Vitamine) whose Deficiency in a Diet causes Polyneuritis in Birds and Beri-beri in Man: Harriette Chick and E. M. Hume.

ROYAL INSTITUTION, at 3.—The Mechanism of Chemical Change: Prof. F. G. Donnan.

SOCIETY OF GLASS TECHNOLOGY, at the University, Western Bank Sheffield, at 4.30.—The Annealing of Glass: F. Twyman.

ROYAL SOCIETY OF ARTS, at 4.30.

INSTITUTION OF MINING AND METALLURGY, at 5.30.—The Wet Assay of Tin Concentrate: H. W. Hutchin.—Hydraulic Tin Mining in Swaziland: J. Jervis Garrard.

FRIDAY, FEBRUARY 16.

ROYAL INSTITUTION, at 5.30.—Authors' Dedications in the Seventeenth Century: The Dean of Durham.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Annual General Meeting.

GEOLOGICAL SOCIETY, at 3.—Annual General Meeting.

SATURDAY, FEBRUARY 17.

ROYAL INSTITUTION, at 3.—The Mystery of Counterpoint: Dr. H. Walford Davies.

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