

issues an appeal for help (not financial) in a cooperative research recently set on foot, particulars of which may be obtained on application to the chairman of the research committee, Eugenics Education Society, Kingsway House, Kingsway, London, W.C.

At the annual meeting of the National Education Association, held on May 2, Lord Sheffield made some interesting comparisons between the educational systems of Scotland and England. Supplementary courses are recognised for all schools in Scotland, where, at the end of August, 1911, there were 2056 such courses in 3173 primary schools, and they had 49,497 pupils above twelve years of age in average attendance, out of a total of 783,792 pupils in average attendance. The grants to pupils in these courses amount to more than 4*l.* a head, while in England the grant is 2*l.* a head to pupils in elementary schools. In Scotland 6.3 per cent. of the pupils are under advanced instruction in ordinary schools, or about 30 per cent. of the pupils above twelve years of age in ordinary elementary schools. In England there are no such pupils and no such classes, but there were, in 1911-12, 1,032,000 pupils above twelve years. There are 194 higher grade schools in Scotland, with more than 24,000 pupils in average attendance, or 3.2 per cent. of all the pupils in elementary schools. In 1910-11 there were only forty-seven such schools in England and Wales, with 8852 pupils, or less than one-twentieth of the Scotch proportion. The grants for these schools in Scotland are 2*l.* 10*s.* a head for the first year, 3*l.* 10*s.* for the second year, 4*l.* 10*s.* for the third and further years, all capable of an increase of 10 per cent. for good work. The grants of the English code for higher elementary schools are: first year, 30*s.*, second, 45*s.*, third, 60*s.*, or an average just above 2*l.* a head, and, with the fee grant and aid grant, a total of 3*l.* a head. The assimilation of the English higher elementary schools to the Scotch higher grade schools in all matters could be done by departmental action alone. The Scotch report for 1912-13 shows that more than 95 per cent. of the teachers are certificated, and 68 per cent. trained, and there is one certificated teacher to thirty-nine pupils. In England and Wales there is one certificated teacher to about fifty-two pupils, and in 1911-12 less than 65 per cent. were certificated. The average salaries of teachers certificated are, in Scotland in 1910-11, men, 138*l.*, women, 83*l.*; in England, men, 127*l.*, women, 92*l.* In Scotland the salaries work out at about 3*l.* per pupil, and in England and Wales at about 2*l.* 17*s.* 4*d.* per pupil. The total cost of board schools in Scotland for school maintenance and interest and repayment of loans is about 4*l.* 16*s.* In England it is between 4*l.* 8*s.* and 4*l.* 10*s.*

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 1.—Sir Archibald Geikie, K.C.B., president in the chair.—Prof. E. H. Griffiths and Ezer Griffiths: The capacity for heat of metals at different temperatures. The thermal capacity, at various temperatures between 0° and 100°, of the following metals has been determined:—Cu, Al, Fe, Zn, Ag, Cd, Sn, and Pb. The work at lower temperatures will be published later. The variation in the thermal capacity can be represented (over the range 0° to 100°) by the following parabolic equations, the difference between the calculated and experimental values in no case exceeding 0.2 per cent. In the large majority of cases the difference is less than 0.1 per cent.

Cu	$s = 0.09088 (1 + 0.0005341t - 0.00000048t^2)$,
Al	$s = 0.20957 (1 + 0.0009161t - 0.0000017t^2)$,
Fe (ingot)	$s = 0.10452 (1 + 0.001520t - 0.00000617t^2)$,
Zn	$s = 0.09176 (1 + 0.0005605t - 0.00000178t^2)$,
Ag	$s = 0.05560 (1 + 0.0003396t - 0.000000141t^2)$,
Cd	$s = 0.05475 (1 + 0.000520t - 0.000000725t^2)$,
Sn	$s = 0.05363 (1 + 0.0006704t - 0.000000458t^2)$,
Pb	$s = 0.030196 (1 + 0.000400t - 0.00000036t^2)$,

Many forms of equations were tried, but it was found that the experimental results were more closely represented by the parabolic than by any other form.—**A. Robertson** and **G. Cook**: The transition from the elastic to the plastic state in mild steel. The paper deals with the reduction of stress at the yield point in mild steel. Apparatus for limiting the extension during yield to a value comparable with the elastic extension, and for securing axial loading, are described. Under these conditions twelve specimens were tested, and a reduction of stress of 24 to 36 per cent. observed in eleven, and of 17 per cent. in the other one.—**F. P. Worley**: Studies of the processes operative in solutions. XXVIII., The influence of acids on the rotatory power of cane-sugar, of glucose, and of fructose. Experiments on the hydrolysis of cane-sugar by solutions of benzene-sulphonic acid have confirmed the conclusion previously arrived at from those in which sulphuric acid was used, that the ratio of the negative optical rotation at the completion of hydrolysis to the initial positive rotation increases rapidly as the concentration of the acid is increased. The increase is proportional to the concentration of the acid, and in the case of benzenesulphonic acid amounts to about 20 per cent. when the concentration is increased from zero to twice normal. It has been found that the increase is due entirely to the influence of the acid on the rotatory power of the three sugars, cane-sugar and glucose being made somewhat less dextro-rotatory and lævulose considerably more lævo-rotatory by the presence of the acid.—**H. G. J. Mosley**: The attainment of high potentials by the use of radium. A radio-active substance which emits β -radiation should, when insulated, continue to gain a positive charge until a potential of the order of a million volts is reached. Experiments have been made to test this point. A small bulb containing radium emanation was supported by a quartz rod at the centre of a highly exhausted flask. A disc suspended from a quartz spring in the neck of the flask formed a simple attracted disc electrometer. It was found that a bulb of 9 mm. diameter reached a potential of 160,000 volts in the course of a few minutes. A sudden discharge then occurred through the residual gas in the flask. A bulb of 5 cm. diameter charged up much more slowly: no discharge took place, and the final potential, 110,000 volts, was limited by a leak of electricity along the quartz support.—**E. Marsden** and **Dr. T. S. Taylor**: The decrease in velocity of α particles in passing through matter. The relative velocities of the α particles of radium C before and after passing through foils of various thicknesses have been investigated by means of the deflection caused by a magnetic field. Tables are given showing the results for gold, copper, aluminium, mica, and air.

Linnean Society, April 17. Prof. E. B. Poulton, F.R.S., president, in the chair.—**M. P. Price** and **N. D. Simpson**: Plants collected on the Carruthers-Miller-Price expedition through north-west Mongolia and Chinese Dzungaria.—**E. G. Baker**: Some British varieties of the bee-orchis, *Ophrys apifera*, Huds. In the typical form of the bee-orchis the labellum is broad convex, with a terminal, reflexed appendage, brown-purple, disc spotted with orange-yellow. In 1840 Hegetschweiler, in "Die Flora der Schweiz,"

described and figured *Ophrys Trollii*, a plant with the middle lobe of the labellum narrow lanceolate, elongated, purplish-red in the centre, gold at the edge, the three outer perianth-lobes lanceolate pointed. The plant came from Winterthur. In this country there appears to be a series of intermediate forms connecting the typical form with *O. Trollii*, some being more nearly allied to the former, some to the latter.—Dr. Hisayoshi Takeda: The flora of Shikotan. Shikotan is the southernmost of the Kurile Islands, which are distributed in the form of a chain between Kamtschatka and Yezo, and lies between about 43° 35' and 50' N. and 146° 30' and 55' E. Its area does not perhaps exceed 140 sq. m. The island is hilly, and some of the hills are covered with forests of conifers and deciduous trees, others with dwarf bamboos—species of *Sasa*. There are many streams along which bogs and swamps are often well developed. The vegetation of this island has scarcely been touched by human hands, but left in quite a primitive state. The number of the higher plants known to the author is 324, belonging to 213 genera and sixty-two families, of which 245, including eight new species, are new to the flora of this island, while 136 species are not mentioned in Miyabe's "Flora of the Kurile Islands," published in 1890, and also fifty-eight genera and eight families are additions to that publication. Among plants which are common to Shikotan (and also other islands of the Kuriles) and Yezo, or Yezo and Hondo, but not found in Saghalien, there are a number of plants which are distributed over north-eastern Asia, the Aleutian Islands, &c. These plants are believed by the author to have been introduced through the Kurile chain, but not through Saghalien.

Zoological Society, April 22.—Mr. E. T. Newton, F.R.S., in the chair.—Dr. S. F. Harmer: The polyzoa of waterworks. An account was given of the serious trouble which had been caused by the occurrence of a rich and varied fauna in the pipes of certain foreign waterworks, notably at Hamburg and Rotterdam. As was first shown by Kraepelin, the polyzoa play a prominent part in the activity of the pipe-fauna, by feeding on diatoms and other microscopic organisms, and serving in their turn as the food of other animals which prey on one another. The nutritive matter rendered available by the presence of enormous numbers of polyzoa is thus in large measure responsible for the existence of other constituents of the fauna, which may include even fishes, such as the eel and the stickleback. The organic material supplied by the disintegration of the polyzoa and other animals is believed to be important for the nutrition of iron-bacteria, which are well known to cause the most serious trouble in waterworks. An account was given of five cases of the occurrence of polyzoa in English waterworks in sufficient numbers to give rise to very serious inconvenience. In one or two of these cases the advice given by Kraepelin, in his paper on the Hamburg pipe-fauna, was being followed, by the introduction of a system of filtration, the principal object of which is to remove the microscopic organisms on which the polyzoa, and ultimately the whole assemblage of animals in the pipes, depend for their nutriment.—A. W. Waters: The marine fauna of British East Africa and Zanzibar, from collections made by Cyril Crossland, in the years 1901-2. Bryozoa—Cheilostomata. In the collection dealt with from the neighbourhood of Zanzibar there are seventy-six species or varieties of cheilostomatous bryozoa, almost all being from ten fathoms or under, so that for a shallow-water collection it is very large.—Major J. Stevenson-Hamilton: Occurrence of albino examples of the reed-buck (*Cervicapra arundinum*) in the Sabi

Reserve, Transvaal. Some interesting notes were also given on the habits and distribution of Sharpe's steenbuck (*Raphiceros sharpei*), which resembles the grysbok much more closely than it resembles the common steenbuck in mode of life, and ranges from Nyasaland to the Transvaal, but gradually dies out to the south-east of that country.

Geological Society, April 23.—Dr. Aubrey Strahan, president, in the chair.—R. H. Goode: The fossil flora of the Pembrokeshire portion of the South Wales Coalfield. Of the fifty-three determinable species of fossil plants obtained from the Pembrokeshire portion of the South Wales Coalfield, three are new species. From the palæobotanical evidence it is clear that the so-called "Pennant Grit" of Pembrokeshire cannot be regarded as the equivalent of the Pennant Grit of the main portion of the South Wales Coalfield. Until more plants have been obtained from the so-called "Millstone Grit" of Pembrokeshire, it is impossible to fix definitely the horizon of these beds. However, it is evident that the beds assigned to the Millstone Grit probably belong to the Middle Coal Measures. Thirty-two fossil plants have been obtained from the Middle Coal Measures of Pembrokeshire which have not as yet been recorded from those of the main South Wales Coalfield.—H. Kay: The Halesowen Sandstone Series of the southern end of the South Staffordshire Coalfield, and the petrified logs of wood found therein at Witley Colliery, Halesowen (Worcestershire). With an appendix on the structure of a new species of *Dadoxylon*, by E. A. Newell Arber. The Halesowen coal-seam and associated beds of blue clay form a definite intermediate horizon traceable across the coalfield. The area is folded into two anticlines with a deep central syncline ranging south-south-eastwards, and the strata have a south-south-easterly dip. The northern face is let down by a fault repeating the lower beds. Other faults throw southwards, and yet others intersect the anticlines. Mining operations show the existence of a buried anticline with the full Coal-Measure Series. The Witley Colliery railway-cutting shows big logs of petrified wood finely preserved by calcite, and of Upper Carboniferous age. The wood has been examined by Dr. Newell Arber, who finds it to have Araucarian affinities, but of a species new to science. In consequence of its Palæozoic age, it is referred to the genus *Dadoxylon*. The type of preservation is also new to this horizon in this country, and the discovery of *Dadoxylon* at Witley constitutes a new record for British Upper Carboniferous rocks.

MANCHESTER.

Literary and Philosophical Society, March 18.—Prof. F. E. Weiss, president, in the chair.—W. H. Sutcliffe: A criticism of some modern tendencies in pre-historic anthropology. During the last few years there has been a great revival of interest in the study of Palæolithic man and his instruments in Britain, some of which are of great importance on account of the care and skill with which they have been worked, whilst others appear to be founded on untrustworthy evidence. The author discussed such of these latter as lead to the necessity of demanding a pre-Pleistocene arrival of man in Britain. The Kent plateau eoliths were examined and compared with the chipped flints found by Mr. V. Comont and l'Abbé H. Breuil in the Thanetian beds of north France and those described by Mr. Hazzledine Warren from the undisturbed "clay with flints." It was pointed out that, from our extensive knowledge of the fauna of this formation (Rheims and New Mexico), it is quite certain that no tool-using animal could possibly have

been present at this remote time, and that therefore these flints, some of which closely resemble well-made implements, must be of purely natural origin. The "rostro-carinate" flints described by Sir E. Ray Lankester from the Red Crag were next examined, and it was shown that the same type occurs in the ordinary Palæolithic gravel of Hackney Downs. Lankester has also found the same type in the Middle Miocene of Aurillac. It is inconceivable that a human production should have retained exactly the same form throughout this immense period considering the rapidity of evolution of type shown among Palæolithic implements. The "rostro-carinate" flints were found to be not adapted to any likely use, and the conclusion is reached that they cannot be held to give good evidence of the existence of Pliocene man. On examining the age of the Galley Hill and Ipswich skeletons, the extreme improbability of the only two known human remains found in gravel (prior to the recent discovery of the Sussex man) each being a complete skeleton, in view of the very great rarity of even small associated sets of bones of other mammals in the same and similar gravels, was dwelt upon. The Galley Hill skeleton's authenticity depends on the evidence of two witnesses with no geological training, who contradict one another on so fundamental a fact as the nature of the bed in which it lay—one called it mould, the other gravel. As regards the Ipswich man, the author pointed out the impossibility of a human skeleton lying closely contracted on a surface of loose sand resisting the action of a glacier which is supposed to have deposited Boulder Clay over it. The conclusion was reached that both skeletons are merely burials of quite comparatively recent date.

April 8.—Prof. F. E. Weiss, president, in the chair.—W. Burton: Note on black pottery from Ashanti and the Gold Coast.—W. Thomson: The influence of moisture in the air on metabolism in the body. The author had previously pointed out that metabolism in the lungs (as indicated by the percentage of carbonic acid gas in the exhaled air) took place to a greater extent when breathing dry than when breathing damp air. He now tested this further on the effect of the various alterations in the atmosphere, viz. the combined influence of pressure, temperature, and hygroscopic state of the atmosphere on the carbonic acid gas contained in the exhaled air from the lungs. His experiments showed that some people are more sensitive than others to dry or damp air, but the general result showed that the difference of the carbonic acid gas in the exhaled air, when breathing cold damp air, amounted to about 4 per cent. increase when breathing cold dry air, whilst with warm air the difference showed an increase for the warm dry air of 7.53 per cent.

April 22.—Prof. F. E. Weiss, president, in the chair.—Prof. F. E. Weiss: A *Tylodendron*-like fossil. While agreeing in general external appearance and also to some extent in the structure of the remains of the woody tissues found outside the pith, the latter was remarkable for the considerable development of secretory canals in its thin-walled tissue. The presence of these and other considerations led the author to the conclusion that the pith was more likely to have belonged to a plant of Cycadian than to one of Araucarian affinity.—W. Robinson: Some relations between *Puccinia málvacearum*, Mont., and the tissues of its host. The general features of the pustules as shown on petiole, stem, and leaves of the hollyhock (*Althaea rosea*) were described. The relations of the distribution of the fungal mycelium to the starch content of the host were pointed out, and the relations between

the haustoria and the individual cells were dealt with. By a series of plasmolysis experiments the haustoria were demonstrated to enter cells which remained living after entry, and they were shown to lie within the protoplasm and to grow towards the nucleus. The results indicate a slow tapping of the resources of living cells by the haustoria, which are able to penetrate the protoplasm in such a way that the cells remain alive for a considerable time.

BOOKS RECEIVED.

Bergens Museum. Aarsberetning for 1912. Pp. 119. (Bergen: J. Griegs Boktrykkeri.)

Uebungsbeispiele aus der unorganischen Experimentalchemie. By H. and W. Biltz. Zweite Auflage. Pp. xi+237. (Leipzig: W. Engelmann.) 8 marks.

Ministry of Finance, Egypt. Survey Department Report on the Work of the Survey Department in 1911. Pp. 76. (Cairo: Government Press.) 10 P.T.

General Index to *The Chemical News*. Vols. i. to c. Pp. iii+712. (London: Chemical News Office.) 2s.

The People's Books:—The Science of Light. By Dr. P. Phillips. Pp. 92. Gardening. By A. C. Bartlett. Pp. 94. British Birds. By F. B. Kirkman. Pp. iv+96. (London and Edinburgh: T. C. and E. C. Jack.) 6d. each.

Malaria, Cause and Control. By Prof. W. B. Herms. Pp. xi+163. (London: Macmillan and Co., Ltd.) 6s. 6d. net.

Problems in Eugenics. Vol. ii. Report of Proceedings in the First International Eugenics Congress, held at the University of London, July 24 to 30, 1912, together with an Appendix containing those Papers communicated to the Congress not included in vol. i. Pp. 189+index. (London: Eugenics Education Society.)

La Matière. Sa Vie et ses Transformations. By Prof. L. Houllévigie. Pp. xxxii+319. (Paris: A. Colin.) 3.50 francs.

Fortschritte der Mineralogie, Kristallographie, und Petrographie. Edited by Dr. G. Linck. Dritter Band. Pp. 320. (Jena: G. Fischer.) 10 marks.

Manual of Wireless Telegraphy and Telephony. By A. F. Collins. Third edition. Pp. xv+300. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 6s. 6d. net.

The Theory and Practice of Working Plans (Forest Organisation). By Prof. A. B. Recknagel. Pp. xii+235+vi plates. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 8s. 6d. net.

Schnee und Eis der Erde. By Prof. H. Wieleitner. Pp. 198+xvi plates. (Leipzig: P. Reclam, jun.) 1 mark.

Bogen und Pfeil bei den Volkern des Altertums. By E. Bulanda. Pp. vi+136. (Vienna and Leipzig: A. Hölder.) 6.80 marks.

Gouvernement Egyptien. Administration des Arpentages. Catalogue des Invertébrés Fossiles de l'Égypte représentés dans les Collections du Geological Museum au Caire. By R. Fourtau. Pp. 93+vi plates. (Le Caire: Imprimerie Nationale.) 40 P.T.

Religious Beliefs of Scientists. By A. H. Tabrum. New edition. Pp. xxi+309. (London: Hunter and Longhurst.) 2s. 6d. net.

A Synopsis of the Classification of Insects. By Prof. H. M. Lefroy. Pp. 32. (London: Lamley and Co.) 1s. net.