

which London now enjoys for secondary education are insufficiently appreciated both by the parents and their children.

THE second volume of the report of the U.S. Commissioner of Education for the year ended June 30, 1908, has been received from Washington. An important chapter, running to some 122 pages, provides exhaustive statistics relating to the universities, colleges, and technological schools of the United States. The total value of all gifts and bequests reported by the institutions, of which the Washington Bureau takes cognisance, during the year under review, amounted to 2,964,200*l.* Of this amount 1,029,600*l.* was given for buildings and improvements, 1,468,300*l.* for endowment, and the remainder for current expenses. Twenty-four institutions received 20,000*l.* or more during the year, the most fortunate of the universities being Chicago, which benefited to the extent of 419,700*l.*; Princeton, 200,350*l.*; California, 187,200*l.*; and Harvard, 138,400*l.* The statistics deal with 464 American universities, colleges, and technological schools. For the year 1907-8 these institutions received 3,448,500*l.* from students' fees, 811,000*l.* being for board and lodging. The grand total of the receipts of the institutions reached the large sum of 13,360,000*l.* In their libraries were 12,636,656 volumes. The value of their scientific apparatus, machinery, and furniture was 5,588,300*l.*; their grounds, 11,714,300*l.*; their buildings, 42,878,000*l.*; and their productive funds, 51,954,000*l.* The institution had a teaching force of 21,960, the number of men being 19,254. The number of students under the tuition of this large staff was 265,966.

ON July 21 Lord Monk Bretton asked in the House of Lords what steps had been taken to define the spheres of the Boards of Agriculture and Education, respectively, in the matter of agricultural education. At the same time he referred to the memorandum recently issued by the Board of Education, which implied that a sum of 21,000*l.*, in part at any rate, is available for agricultural education. He stated that he has been in communication with the university authorities and others, and can find no evidence that the money is used for this purpose. Similarly, the Treasury grants and the block-grant system of the Board of Education have not helped agricultural education; money from the latter source, indeed, goes to the relief of the rates. British agriculture, he pointed out, receives much less money than the amount granted in foreign countries, a result due to the absence of agreement and coordination between the Board of Education and the Board of Agriculture. Earl Carrington, in reply, stated that an understanding had that morning been arrived at by the two Boards as to the general lines of their future policy. There will be direct cooperation in regard to educational work, and in particular with the view of improving and extending specialised agricultural instruction. An inter-departmental committee of officers of the two Boards will consider the questions that may arise as to the correlation of work and of grants. Everything is working harmoniously between the two departments. Lord Belser strongly urged that any arrangement between the two Boards should follow the recommendation of the Agricultural Education Committee that agricultural education provided by colleges, farm institutes, and winter schools should be under the direction of the Board of Agriculture, while agricultural instruction given at evening classes connected with elementary schools should be under the Board of Education. The Marquis of Lansdowne emphasised the great importance of the subject. Quoting Sir Horace Plunkett's dictum, that what is wanted in these days is not merely economic holdings, but an economic system and an economic man to carry it out, he went on to say that we cannot get the economic man to carry out the economic system unless the Government takes some pains to give him a proper education.

THE Staffordshire County Council Education Committee has issued its scheme of agricultural education, and a perusal of the circular shows that the committee is fully alive to the difficulties involved. Provision is made (a) for those already engaged in agricultural pursuits, and who therefore can only devote their evenings to study, or, at most, a few weeks during the slack winter time; (b) for boys and girls

leaving elementary schools. The former class always proves difficult to get at. Lecturers in agricultural and horticultural subjects are provided, at a merely nominal cost to the locality, to give courses of six to twenty lectures. Practical demonstrations are also arranged in cooperation with the Harper Adams College. These include:—(1) Manurial experiments to show the effect of different manures on crops and to compare different varieties of crops; (2) hedge-layering and ditching courses, which are necessarily held in the day-time, and for which prizes are therefore given by way of recompense; (3) horticulture and fruit-growing. There are also scholarships for short winter courses, tenable at the Harper Adams College or the Midland Dairy College, which, however, have been very inadequately taken up in the past. Coming now to provision for children leaving school, we find:—(1) Minor scholarships awarded for the Brewood Grammar School (agricultural side); (2) major scholarships for the Harper Adams or Holmes Chapel College, or, in the case of women, the Swanley Horticultural College. Farmers are apt to grumble because boys who take up agricultural scholarships subsequently find something they are better fitted for. Such grumbling is, of course, wholly unreasonable, and shows a want of appreciation of the true meaning of education. We are therefore sorry to see a proviso that "candidates who accept Brewood scholarships are expected to take up agriculture on leaving school. No appointment as pupil-teacher in any elementary school under the county committee will be given to boys who have held Brewood scholarships." How can a boy of fourteen be expected to know just what career he will succeed at best? Why should he be penalised if he elects to go in for farming, and discovers, two years later, that his bent is for teaching? Does not the education committee know that to discover what a boy can do, and to set him at it, is one of the great objects of all education?

## SOCIETIES AND ACADEMIES.

### EDINBURGH.

**Royal Society, June 28.**—Dr. R. H. Traquair, F.R.S., vice-president, in the chair.—At the request of the council Prof. Louis Dollo, of the Royal Museum at Brussels, delivered an address on the extinct gigantic reptiles of Belgium. The history of their discovery and the manner of their preservation were detailed in a most interesting and racy lecture, the peculiar skeletal arrangements of the iguanodon being specially dwelt upon.

July 5.—Prof. Cossar Ewart, F.R.S., vice-president, in the chair.—Notes on the skeleton of a Sowerby's whale (*Mesoplodon bidens*) stranded at St. Andrews, and on the morphology of the manus in Hyperoodon and in the Delphinidæ: Sir William Turner, K.C.B. This species of whale was first recognised in 1800 from a specimen cast ashore on the Moray Firth, and described by Sowerby. Not until 1872 were other specimens found on the Scottish coast. The present specimen led to some corrections of former conclusions, especially in regard to the differences of sex. Some interesting results were given in regard to the comparative anatomy of the hand in this whale and the allied genera of Hyperoodon and dolphins. The occurrence of five distal carpal bones in the Sowerby's whale disposed of the theory that this number did not occur in mammals.—Current and temperature observations in Loch Ness: E. M. Wedderburn and W. Watson. The observations were complicated, and at times conflicting, secondary currents and cross-currents being frequent, and evidently forming part of the circulation of the lake. Of the general conclusions the following may be mentioned. When the lake is of uniform temperature the direct current produced by wind is felt to considerable depths, and the return current is also felt in the deepest parts. When the lake has become stratified and the temperature discontinuity has appeared, the return current is almost always above the discontinuity. When the wind changes direction or follows a calm, the direct surface current is felt to considerable depths, but after the wind has been blowing for about twelve hours the return current asserts itself, and the direct current is restricted to a narrower zone.—Pettersson's observations on deep-water oscillations: E. M.

**Wedderburn.** In the Gullmar Fjord, off the Skagerack, Petterson observed oscillations of temperature and salinity with a period of fourteen days. This he attributed to the action of the moon, although he admitted that he could not give any reason for the effect. Mr. Wedderburn suggested that it was due to a temperature seiche in the Skagerack. When a layer of depth  $h$  and density  $\rho$  floats on a layer of depth  $h'$  and density  $\rho'$  in a land-locked bay of length  $l$ , the period is given by the formula

$$T = 4\pi l \sqrt{g(\rho + \rho') / (\rho/h + \rho'/h')}$$

With  $l=250$  metres,  $h=20$  metres,  $h'=100$  or 200 metres,  $\rho=1.023$  and  $\rho'=1.027$ , the calculated periods are 13.9 days for  $h'=200$  metres and 14.2 days for  $h'=100$  metres.—A Carboniferous fauna from Novaia Zemlya: Dr. G. W. Lee. This was an account of a collection of fossils found by Dr. W. S. Bruce during a cruise with Major Andrew Coats in the yacht *Blencathra*. The fossils were found at Cape Cherney in  $71^\circ$  north latitude, and proved that the Carboniferous seas had extended some six hundred miles further north than had hitherto been supposed. The collection contained more than thirty species similar to the fauna of the lower limestone of the Scottish coal-fields and of the Yoredales of England.—Note on the flight of Nigerian arrows: Dr. C. G. Knott. These were unprovided with feathers, and rotation seemed to be given to the arrow by the action of the air upon the head, the asymmetrical form of which was probably originally occasioned by the manner in which the wings and bars were forged. Experiments on the rotation were described.—The development of the auditory ossicles in the horse, with a note on their possible homologues in the lower Vertebrata: Ray F. Coyle. The malleus, stapes, and lucus were developed from an area which is originally homogeneous, and lying between the proximal ends of the first two visceral bars. Later the malleus and lucus are split off, bearing a close relation to the first bar. The stapes is related neither to the first or second bar nor to the auditory capsule, arising as an element peculiar to the Mammalia.

July 12.—Dr. Horne, F.R.S., vice-president, in the chair.—A further contribution to a comparative study of the dominant phanerogamic and higher cryptogamic flora of aquatic habit in Scottish lakes (Scottish Lake Survey): George West. The lochs studied were those of Kirkcudbrightshire, Wigtonshire, Fife, and Kinross. In north-west Kirkcudbrightshire the lochs are of highland character, but the flora, though resembling that of the Ness district, does not thrive to so great a depth. This is due partly to the comparative shallowness of the Gallo-way lochs and to the deposit of dead leaves of grasses over the floor of the loch. The lochs of south-east Kirkcudbrightshire are of lowland type, and have in many cases a rich and luxuriant flora. In Wigtonshire both types of lochs are found, those in the open moor being scanty in flora, while those within the zones of active agriculture are of lowland type and of rich and varied vegetation. The populous mining, manufacturing, and agricultural regions of Fife and Kinross are characterised by many lochs of the lowland type, some of them being very luxuriant in aquatic flora, because the non-peaty water contains a rich supply of food-salts, due in many instances to the activity of man in the surrounding district. The paper enumerated about 250 species of plants found in the lochs of the areas named.—Osteology of Antarctic seals (Scottish National Antarctic Expedition): Dr. R. B. Thomson. The seals brought home by Dr. Bruce numbered in all forty-four, and included all the Phocidæ except the elephant seal. The most interesting capture was that of two Ross seals, the dentition of which differs markedly from that of other Antarctic seals. The dentition is remarkably feeble. The chief food being soft-bodied cephalopods, the incisors and canines have developed into needle-pointed re-curved hooks of great delicacy, while the post-canines have been allowed to degenerate. Other anatomical peculiarities were described, one interesting anomaly being presented by the fifteenth dorsal or last rib-bearing vertebra. On one side there is the normal condition, an articular facet bearing a feebly developed rib; on the other there is a well-marked process representing the absent rib, showing that the costal processes in the

lumbar vertebræ are the homologues of the ribs.—A negative attempt to detect fluorescence absorption: Dr. R. A. Houstoun. Results which seemed to indicate fluorescence absorption have been obtained by Burke, by Nichols and Merritt, and by Miss Wick, but, after careful experimenting and making every allowance for the uncertain nature of the phenomenon studied, the author is inclined to refer these positive results to systematic errors in the photometric arrangement.—The effect of internal friction in cases of compound stress: G. H. Gulliver. The minimum resistance to deformation and the inclination of the surfaces of sliding were given for any system of stress in a body, the internal friction being supposed to be operative. The application of the formulæ to experimental data did not yield very consistent results. With internal friction taken into account, the modified expression for the equivalent bending moment of a shaft under combined bending and twisting gives values intermediate between those given by the formulæ of Rankine and Guest.—A new experimental method of investigating certain systems of stress: G. H. Gulliver. The lines of maximum shear in a strained solid, as indicated by surface changes in the manner already described by the author, were compared, by superposition, with the stream lines of a viscous fluid in channels of definite shape obtained by the method of Hele Shaw. The comparisons were extremely satisfactory, and showed how analogous the equations of strain in the one case are to the equations of flow in the other.—Motion of Neptune's satellite: David Gibb. The calculations were made under Prof. Dyson's supervision, and were based upon the numerous observations which have been made in the American observatories since 1892, when Struve discussed all that had until then been made. From 650 equations of condition, twenty-two sets of normal equations were formed and solved. The results led to various corrections to be applied to Struve's elements. The eccentricity of the orbit of the satellite was found not to exceed 0.001. From the changes in the node and inclination, which are due to the spheroidal form of Neptune, the inclination of the orbit to Neptune's equator could be found—about  $21^\circ$ . The longitude of the node of Neptune's equator on the earth's equator was found to be about  $205^\circ$ , and the inclination of the two equations  $132.8^\circ$ . From these it was deduced that the pole of the satellite's orbit describes a small circle about the pole of Neptune in about 580 years, and that Neptune's equator is inclined at an angle of about  $27^\circ$  to the plane of its orbit round the sun.—The monsoons of the Chilian littoral: R. C. Mossman. The paper was a general discussion of the prevailing winds in this region of the southern hemisphere, showing how they are influenced by the circumpolar distribution.—The superadjugate determinant and skew determinants having a univariial diagonal: Dr. Thomas Muir.—The illuminating power of groups of pin-hole burners: R. G. Harris. The variation of the illuminating power of symmetrical groups of two, three, and four burners with the distance between contiguous members of the groups was found to require somewhat complex equations for its expression. The graphs were of the same general form, and could be accounted for qualitatively on the assumption that the variation of illuminating power was due, for the most part, to a two-fold effect of the increase of distance between the burners on the supply of oxygen. The more open distribution of burners increased this supply, but the diminished draught attending such open distribution diminished it.—The life-history of *Hydrolius fuscipes*, L.: F. Balfour Browne. A complete and detailed monograph on this common and interesting form of life.

PARIS.

Academy of Sciences, July 19.—M. Émile Picard in the chair.—Researches on the movements of the upper layer of the solar atmosphere: H. Deslandres. Details of the spectroheliograph at the Observatory of Meudon are given, together with some of the results of a study of the calcium line  $K_3$ .—The determination of the displacements of the axis of rotation of meridian telescopes: Maurice Hamy.—The reduction of plant assimilation during cloudy weather: A. Müntz and H. Gaudechon. During direct exposure to sunlight the quantity of carbon fixed by plants is about five times as great as during

cloudy or rainy weather.—The determination of the bovine or human origin of Koch bacilli isolated from tuberculous lesions in human beings: A. Calmette and C. Guérin (see p. 135).—The origin of the contrasts of colour and sudden changes of level which are found in the moon: P. Puiseux. The hypothesis of snow or ice being the cause of bright spots on the moon is considered and rejected, as is also the suggestion that the dark spots are caused by deposits of cosmic material.—Observations of the comet 1909a (Borrelly-Daniel) made at the Observatory of Marseilles with the comet finder: A. Borrelly. Positions are given for June 21, 26, and July 8 and 13.—Observations of the comet 1909a (Borrelly-Daniel) made at the Marseilles Observatory with the Eichens equatorial of 26 cm. aperture: M. Coggia. Positions are given for June 18, 20, 24, and 25.—Systems of differential equations: Edmond Maillot.—The existence, in the magnetic decomposition of the absorption bands of a uniaxial crystal, of dissymmetry of positions observed parallel to the lines of force, the field, and the optical axis of the crystal: Jean Becquerel. The author has repeated his earlier experiments on this subject with a more powerful magnet (field-strength, 34,000 Gauss). The unsymmetrical change of position, as also the changes in the intensities of the lines, are in accord with the theory of W. Voigt.—The relation between the electric double refraction of mixed liquids and the optical double refraction of the solid constituents of these solutions: J. Chaudier.—Harmonic analysis and resonance: Henri Abraham.—The application of the magnetic properties of metals to automatic coin machines: Antal Fodor and M. de Büty. The use of a permanent magnet in a coin slot machine is applied in such a manner that the machine only works when a nickel coin is used. Discs of copper, zinc, or tin drop through without affecting the mechanism: iron blocks the machine, and prevents it being further used.—Researches on the phosphates of thorium: A. Colani. A description of the preparation of thorium chlorophosphate and double phosphates of calcium and strontium with thorium.—The synthesis of papaverine: Amé Pictet and A. Gams. The steps in this important synthesis are as follows:—veratrol, acetoveratrone, amino-acetoveratrone hydrochloride, homo-veratroyl-amino-acetoveratrone, and homoveratroyl-oxy-homoveratrylamine. This last substance is dehydrated in xylene solution with phosphorus pentoxide, and the base thus obtained is identical in all respects with natural papaverine.—The catalysis of the fatty acids: J. B. Senderens. It has been shown in a previous paper that thoria and alumina, heated to a suitable temperature, convert the vapours of the fatty acids into the corresponding ketone. The properties of the oxides of chromium, calcium, zinc, copper, and cadmium have been investigated from this point of view, but none of these oxides is so advantageous as thoria in this reaction.—The presence of dimethoxy-2:3-methylene-dioxy-4:5-allyl-1-benzene in the essence of *Criihnum maritimum*: Marcel Delépine.—Some reactions of anthranol: Robert Padova.—The di-iodine addition derivatives of the higher fatty acids of the series  $C_6H_{2m-4}O_2$ : A. Arnaud and S. Posternak. The fixation of two atoms of iodine is nearly instantaneous in acetic acid solution.—A new base extracted from rye containing ergot; ergothioneine: C. Tanret. The method of extraction and the chemical and physical properties of this new base are described; its composition is  $C_9H_{11}N_3O_2S$ .—The constitution of perseulose: Gabriel Bertrand.—Contribution to the study of cultivated oats: M. Trabut.—The influence of the radium radiations on the chlorophyll and respiratory functions of plants: Alexandre Hébert and André Kling. No direct effects on these two functions can be traced; some secondary effects appear to be due to the slight changes induced in the plant cells.—The muscular work electrically provoked in the cure of diseases by reduction of the nutrition, and in particular the cure of obesity: J. Bergonié.—The anti-rabic properties of the cerebral substance: A. Marie.—The action of the pancreatic juice on esters: L. Morel and E. Terroine. The action of the pancreatic juice on esters is very slight, but is considerably reinforced by the addition of bile salts.—A new endoparasite of insects: Louis Léger.—The instability of the Swiss plateau in post-Glacial times: E. Romer.

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## CALCUTTA.

Asiatic Society of Bengal, July 7.—Some notes on mineralogy: Prof. E. Sommerfeldt. (1) Measurement of angles in crystals. An apparatus is shown (devised by the author) which permits the use of a simple goniometer like a theodolite-goniometer. (2) Isomorphism between anhydrite and barites. The method of Ostwald for recognising isomorphism was used for answering the question, Are the sulphate of barium and calcium isomorphous? The answer is that one salt is not able to remove the super-saturation of the other, and that, therefore, no isomorphism exists between them.—The Shou (pronounced Siau) or Tibetan stag: Lieut.-Colonel J. Manners-Smith. A note on the distribution and habits of *Cervus affinis*, and on specimens living in captivity in Nepal.—The Loranthus parasite of the Moru (*Quercus dilatata*) and Ban (*Quercus incana*) oaks: E. P. Stebbing. Mistletoes are exceedingly abundant on these two species of oak in certain parts of the north-western Himalaya. They attack the trees about Naini Tal and throughout Kamaon so extensively as, with the aid of boring beetles which follow them, to cause at times their death. It seems that moss aids the mistletoe seeds in obtaining a lodgment.—Decomposition of ammonium platinichloride and platinibromide under the influence of heat: Prafulla Chandra Ray and Atul Chandra Ghosh.

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