

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Plans are before the University for doubling the size of the present School of Agriculture, the increase being rendered necessary in order to cope with the large accession of work entailed by the proposed assignment to the Cambridge School of Agriculture of grants from the Development Commissioners for research in plant-breeding and animal nutrition. It is suggested that the new building should extend from the western end of the present school towards Tennis Court Road.

The Site Syndicate has recommended that a site on the south-east corner of the Downing College site should be assigned for the erection of a building for the Forestry Department. The area measures 110 ft. by 36 ft.

Dr. Graham-Smith has been appointed university lecturer in hygiene until September 30, 1916.

Dr. J. Ward, professor of mental philosophy and logic, has been appointed chairman of the examiners for the Moral Sciences Tripos, 1912.

SIR DAVID GILL, K.C.B., F.R.S., will present prizes and certificates to students of the South-Western Polytechnic Institute, Chelsea, on March 15, at 8 p.m. Laboratories and workshops will be open afterward to public inspection.

It is announced in the issue of *Science* for February 9 that conditional gifts of 20,000*l.* to Washington and Jefferson College at Washington, Pa., toward a 100,000*l.* fund, and 10,000*l.* to the Emory and Henry College at Emory, Va., toward a 50,000*l.* fund, were voted at a meeting of the General Education Board of the Rockefeller Foundation last January.

MR. J. C. MAXWELL GARNETT, a son of Dr. William Garnett, educational adviser to the London County Council, has been appointed to succeed Mr. J. H. Reynolds in the principalship of the Manchester Municipal School of Technology. Mr. Garnett had a brilliant career at school and Cambridge, where he was a wrangler in 1902, in the first division of the first class of Part II. of the Mathematical Tripos in 1903, and a Smith's prizeman in 1904. He was for some time connected with the technological branch of the Board of Education, but was later made junior examiner in the elementary branch. His interests are, however, on the technical and scientific side, and he should find Manchester a congenial sphere for the exertion of his activities.

THE report of the executive committee of the Carnegie Trust for the Universities of Scotland, presented at the annual meeting of the Trust held on February 22, points out that the past year completed the first decade of the history of the Trust. The total income for the period amounted to 1,062,931*l.*, out of which 63,546*l.* was expended on research, 368,288*l.* in grants to universities and colleges, 445,373*l.* in payments of class fees for 11,480 individual students, and 30,158*l.* in administration. The income last year amounted to 108,542*l.*, and the gross expenditure to 83,160*l.*, including 7833*l.* for endowment of research, 21,182*l.* for grants to universities and colleges, 50,525*l.* for payments to students, and 3620*l.* for administration. During the year the sum of 339*l.* was voluntarily refunded on behalf of fourteen beneficiaries for whom class fees had been paid by the Trust.

GIFTS amounting to 16,260*l.* have been announced, says *Science*, by the trustees of Columbia University, including 6000*l.* from Dr. William H. Nichols for instruction and research laboratories in chemistry, and 5000*l.* from Mrs. Russell Sage for the E. G. Janeway Library endowment fund at the medical school. From the same source we learn that Transylvania University has announced that the effort to raise a fund of 50,000*l.* has been completed successfully. The largest gifts, apart from 10,000*l.* offered by the General Education Board in May, 1910, were as follows:—6000*l.* from Mr. R. A. Long, of Kansas City; three gifts of 5000*l.* each from Messrs. W. P. Bowers, of Muncie, Ind., Geo. H. Waters, of Pomona, Calif., and J. J. Atkins, of Elkton, Ky. Our contemporary also states that the completion of the 100,000*l.* endowment fund for Oberlin College has made possible the following additions

to the college resources:—the men's building, 30,000*l.*; a new administration building, 10,000*l.*; the completion of the men's gymnasium, 10,000*l.*; for higher salaries, 40,000*l.*; and other endowments, 12,000*l.*

WE regret to learn that the position of Hartley University College, Southampton, at the present time is extremely critical, and unless a further sum of 10,000*l.* is raised by April 1 it is to be feared that the college will lose its status as a university college for Hampshire, Wiltshire, Dorsetshire, and the Isle of Wight. This will mean a very serious setback to education in the south of England, especially in view of the rapid growth of secondary schools throughout the area, all of which look to Southampton as their university. Inspectors appointed by the Advisory Committee of the Treasury visited Southampton in 1909, and although their report was entirely satisfactory as regards the work and development of the college, and its educational value to the area which it is intended to serve, yet the buildings were condemned as inadequate, and attention was directed to the lack of voluntary local support. On these grounds it was proposed that the annual grant of 2250*l.* should be reduced to 1500*l.* for the year ending March 31, 1911, after which date the grant should be entirely discontinued. Eventually, however, as the result of representations made by the college, the full grant was paid, and was renewed for the year ending March 31, 1912, on the understanding that about 31,000*l.* should be raised by that date, to be apportioned approximately as follows:—(a) 5000*l.* for the purchase of the new college site; (b) 21,000*l.* for the erection of two blocks, to accommodate the arts department (including the day training department); (c) 5000*l.* to form the nucleus of an endowment fund. Strenuous efforts have been made to raise this sum, sixteen committees being formed in various districts, with the result that 15,962*l.* has been given or promised, while the college can dispose of property in Southampton estimated at 5000*l.*, making a total of 20,962*l.* An excellent site has been procured, and satisfactory plans for the new buildings obtained in open competition. The amount available is therefore about 10,000*l.* short of the sum required to be raised by April 1, and if this sum is not forthcoming the college must collapse. It has been the experience of almost all university colleges that once the early difficulties have been mastered the growth of the institution is rapid and its success assured. There is every reason to believe that the result will be the same at Southampton if the additional sum of 10,000*l.* can be secured within the limited time allowed. Donations will be gratefully received by Mr. D. Kiddle, The Registrar, Hartley University College, Southampton.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, February 7.—Prof. W. W. Watts, F.R.S., president, in the chair.—Dr. A. H. Cox: An inlier of Longmyndian and Cambrian at Pedwardine (Herefordshire). The inlier comprises a strip of country about a mile in length and half a mile in breadth, situated near the border of Herefordshire and Radnorshire, about fifteen miles south of Church Stretton. Wenlock and Ludlow beds occupy most of the area around Pedwardine, but the occurrence of Cambrian Shale yielding *Dictyonema* has long been known. The *Dictyonema* Shales dip steeply westwards towards a series of red and green conglomerates and grits, with which an occasional thin shale-band is interbedded. The latter beds, previously mapped as Llandovery, are here referred to the Longmyndian. They also dip westwards, and have suffered disturbance, accompanied by overthrusting from the west. They are unfossiliferous, and neither on lithological nor on structural grounds can they be regarded as Llandovery strata resting unconformably upon the Cambrian. The grits at Pedwardine have apparently been carried south-eastwards over the Cambrian along an almost horizontal thrust-plane. There is also present a remnant of Bala grits, which dip gently eastwards, and rest with strong unconformity upon the Cambrian shales. The undisturbed character of these Bala beds suggests that the neighbouring thrust may be

of pre-Bala date. Later faulting along a north-and-south line has brought the members of these older formations against Wenlock and Ludlow beds. From the disturbed character of the Silurian strata to the west of the inlier it would appear that this inlier is part of a barrier which has preserved the district lying to the east from the effects of the post-Silurian movements.

Linnean Society, February 15.—Dr. D. H. Scott, F.R.S., president, in the chair.—R. H. **Compton**: An investigation of the seedling structure in the Leguminosæ. The tree habit is held to be primitive in the Leguminosæ, the herbaceous habit derived; these characters are correlated, respectively, with the production of large and small seeds, and therefore of large and small seedlings. A stable type of tetrarchy is correlated with large size of seedling, and is therefore probably primitive. Since both the type of symmetry and the level of transition are clearly related to the size of the seedling, it appears that, with certain possible exceptions, these anatomical features are not likely to be of more value in solving phylogenetic problems than the size-characters themselves.

Royal Anthropological Institute, February 20.—Dr. W. L. H. **Duckworth**: Cave exploration at Gibraltar during September, 1911. The excavations commenced by Dr. Duckworth in September, 1910 (*v. NATURE*, March 16, 1911, p. 100, and *The Athenæum*, March 11, 1911), were resumed in September, 1911. In the first instance, a fissure near "Beefsteak Cave," Europa Flats, was explored. It yielded stalagmite-encrusted bones of a stag, together with comparatively recent bones of domestic animals, as well as those of seabirds and hawks. A cave on the Mediterranean aspect of the Rock was entered. This cave is marked "4a" in the illustration of Genista Cave, No. 4 in Dr. Busk's paper. Cave 4a yielded many bones, representing a long list of mammals and birds, but no human remains came to light. Attention was then directed to Sewell's Cave (cave S) on the Mediterranean side, which yielded so many bones in 1910. Sewell's Cave was not completely explored in that year, but has now been thoroughly investigated. The most interesting finds in 1911 are several very delicate flint implements, a human tooth and wrist bone, part of a shell armband, fitting on to a corresponding fragment found in 1910, a specimen of the mollusc *Nassa reticulata*, and a bone which is almost certainly that of a leopard. Fragments of pottery were also collected. Holyboy's Cave was again visited (*cf. Report*, 1910), and the hip bone of a small bear was found there on the surface of the floor. Apart from work in the caves, the fissures opening near the galleries, and the talus near the King's Lines, were inspected, some cervine bones being found *in situ* in one fissure.—A. L. **Lewis**: Some prehistoric monuments in the departments Gard and Bouches du Rhone.

EDINBURGH.

Royal Society, January 22.—Dr. J. Burgess, vice-president, in the chair.—G. H. **Gulliver**: Note upon the structure of ternary alloys. During the second period of solidification of a ternary alloy the temperature is not constant, and some liquid is always present. The crystals of the two separating phases are, therefore, enabled to grow to an appreciable size, and instead of the fine structure of a eutectic they have the form, and nearly the size, of the crystals of the primary phase.—Dr. R. A. **Houstoun** and his associates continued their researches on the absorption of light by inorganic salts: No. v. (by Dr. **Houstoun**), copper and the alkali metals; and No. vi. (by A. R. **Brown**), the cobalt chloride colour change. The former paper gave the molecular extinction coefficient for aqueous solutions of thirteen salts in the ultra-violet, visible spectrum, and infra-red. The values for the infra-red were obtained with a thermopile, and those for the ultra-violet by a new photographic photometer. This, however, did not prove so successful as the photographic photometer used in previous work along with J. S. Anderson. Part of the apparatus was a mirror spectroscopy of original design, with nickel mirrors and automatic focussing. In the experimental work described in the second paper, anhydrous cobalt chloride was dissolved in mixtures of alcohol and water, and twenty-three different solutions were prepared, the solvent varying from pure water to pure alcohol through

well-graded intermediate mixtures. The optical measurements were made with a spectrophotometer throughout the whole visible spectrum. The results were discussed mathematically with the help of the law of mass action, and it appeared that in the red aqueous solution of cobalt chloride each molecule of salt was combined with about fifteen molecules of water. Quantitative work done with a solid cobalt hexahydrate bore out this view, the absorption spectrum of the latter being quite different from the spectrum of the solution.—W. J. **Crawford**: The elastic strength of flat plates. This was an elaborate experimental investigation on the elastic strength of clamped circular and rectangular plates subject to a definite hydrostatic pressure on the one side. The analytical theory for circular plates was verified, and the results for various forms of rectangular plate were compared with Grashof's formulæ, which are purely empirical and not in harmony with fundamental principles of the theory of elasticity. Grashof's formulæ for the maximum stress and deflection were fairly well satisfied, but the experimental strength as measured by the curvature did not agree very well with Grashof's expressions.—Dr. J. H. **Ashworth**: Observations on the structure and affinities of *Branchiomaldane vincenti*, Langerhans. This small Polychæte exhibits several points of resemblance to a young ecaudate Arenicola, but differs from the latter in the position of its gills and in its nephridia, of which there are only two pairs. The second nephridium of *B. vincenti* is elongate, and extends through three or four segments. Although Branchiomaldane presents some primitive characters, it affords evidence of having undergone considerable retrogression, no doubt correlated with its tubicolous habits.

CAMBRIDGE.

Philosophical Society, January 29.—Sir George Darwin, K.C.B., F.R.S., president, in the chair.—R. H. **Clarke**: Demonstration of a stereotaxic instrument for directing insulated or other needles to any desired point in an animal's brain by graduated movement in three planes.—E. **Hindle**: Observations on fowl pest. The author has shown that the offspring of *Argas persicus* infected with *Spirochaeta gallinarum* are also infected, producing spirochaetosis in the fowls on which they feed. Moreover, the eggs laid by ticks reared in the laboratory, and which have always been fed on healthy fowls, are found to be infected. These observations show that once an Argas becomes infected, the infection is maintained not only in the first generation, but also in the second.—C. **Strickland**: Gregarines in fleas.—Major **Cornwall**: The relation between the lytic point of red corpuscles in hypotonic salt solutions and the toxicity of the serum expressed in terms of NaCl. The mean range of lysis of the red corpuscles was very nearly the same for all the species experimented with, the average of the eight being 0.144 per cent. NaCl. The majority of the red corpuscles of any particular species are lysed at or about a particular dilution of salt, and comparatively few are either much more or much less resistant than the majority. These variations probably depend on the strength of the envelopes of the corpuscles. There is no obvious relation between the resistance of the corpuscles of any species to hypotonic lysis and their resistance to lysis by normal serums of other species. No definite relation could be discovered between the resistances of the red corpuscles and the tonicities of the serums. The high toxicity of serum is probably apparent and not real, and is perhaps due to some protein.—C. **Warburton**: The genus *Rhipicephalus*. Attention was directed to the genus *Rhipicephalus* of the Ixodidæ as presenting quite unusual difficulties to the systematist. Of course, in any group forms are liable to occur concerning which it is difficult to decide whether they ought to be regarded as distinct species or merely local varieties, but the difficulty in subdividing the genus *Rhipicephalus* goes much beyond this. Two forms so distinct that—on the analogy of other genera of ticks—no one would hesitate to recognise them as different species, are found in two different localities, where each is fairly constant to its type, but presently a number of specimens are collected from a single animal in a third locality completely connecting the two; and this occurs over and over again. It is suggested that we have here a very striking case of species in the act of formation, before intermediate forms have had

time to disappear. The genus is essentially African. Only two or three so-called "species" of *Rhipicephalus* occur out of Africa, and their distribution is easily accounted for by the fact that they are dog parasites. The other principal Ixodid genera are well distributed all over the world.—Prof. **Nuttall**: The parasites of equine biliary fever. Prof. Nuttall described the two species of parasites, *Piroplasma caballi* and *Nuttallia equi*, which occur in equine biliary fever in Africa, Asia, southern Europe, and South America. It has hitherto been supposed that biliary fever is due to but one species of parasite, but studies carried on in conjunction with Mr. C. Strickland have demonstrated that two diseases, due to distinct parasites, have hitherto been confused under one name. Both parasites are very deadly in their effects; they are transmitted from horse to horse by ticks, and the blood of animals which have recovered from all symptoms of the diseases remains infective for years.

MANCHESTER.

Literary and Philosophical Society, February 6.—Prof. F. E. Weiss, president, in the chair.—William **Burton**: Note on the earliest industrial use of platinum. The author gave an account of the general history of the mineral, particularly its use for coating pottery, and he exhibited specimens of pottery illustrating the application of various metals.—Prof. E. **Rutherford**: The origin of the β rays from radio-active substances. He stated that from a study of radio-active transformations it has been found that each atom of matter, in disintegrating, emits one α particle expelled with a definite velocity, which is characteristic of the substance. In many transformations, β and γ rays are emitted, and from analogy it would be expected that one β particle should be emitted for the transformation of each atom. The experiments, however, of Baeyer, Hahn, and Miss Meitner, and of Danysz, have shown that the emission of β rays from the radio-active substances is, in most cases, a very complicated phenomenon. The complexity of the radiation is most simply shown by observing in a vacuum the deflection of a narrow pencil of β rays by a magnetic field. If the rays fall normally on a photographic plate, a number of sharply marked bands are observed, indicating that the rays are complex, and consist of a number of homogeneous sets of rays, each of which is characterised by a definite velocity. The remarkable complexity of the β radiation is well instanced by the experiments of Danysz, who found that the products of radium B and C together emitted at least twenty-seven sets of homogeneous rays. Some of these had a velocity exceedingly close to that of light. Notwithstanding this apparent complexity, general experiments have shown that the number of β particles emitted from radium B and C is about that to be expected if each atom in breaking up emits only one β particle. In order to explain this complexity of the β rays, it is necessary to suppose either that the atom breaks up in a number of distinct ways, each of which is characterised by the emission of rays of definite velocity, or that the energy of the β particle can be reduced by certain definite amounts in its escape from the radio-active atom. The latter view appears more probable and more in accordance with the facts observed. It was found from an analysis of the results given by Danysz that certain relations existed between the energies of the individual β particles composing some of the different sets of rays. The difference in the energies of the β particles from radium B and from radium C could be expressed by a relation of the form $pa+qb$, where a and b were definite constants and p and q had integral values 0, 1, 2, 3, &c. This result may be explained by supposing that the β particle initially is liberated within the atom endowed with a certain speed, but that in escaping from the atom it may pass through two or more regions in which the quantity of energy a or b is abstracted. The number of these units of energy abstracted will vary from atom to atom, each individual atom probably giving rise to only a few of the types of β rays observed. Evidence was given that the values a and b served as a measure of the energy of the γ rays emitted from radium, and were connected with the energy of the β particle required to excite the characteristic radiations in the atoms of radium B or C. Prof. Rutherford said that it is of great theoretical importance to examine

with the greatest care the nature of the emission of β rays from all the known radio-active substances, for it promises to throw a great deal of light on the interior structure of the atom.

DUBLIN.

Royal Irish Academy, February 12.—Dr. R. F. Scharff, vice-president, in the chair.—Rev. W. J. **Ryan** and T. **Hallissy**: Some new fossils from Bray Head, co. Wicklow. This paper records the discovery, by the authors, of new fossils at Bray Head, co. Wicklow, in the formation known as the Bray and Howth series. As the field-relations of these beds to the adjoining altered shales are obscure, different opinions have been held by geologists as to their stratigraphical position in the geological series, and owing to the absence from the formation of well-recognised type-fossils, it has hitherto been impossible to fix the age of the rocks with any degree of certainty. The importance of the recent discovery lies in the possibility that the new fossils may possess a zonal value such as may finally settle this interesting question. Mr. Cowper Reed, who examined some of the fossils, thinks they suggest the head-shield of a large trilobite like *Solenopleura howleyi* from the Cambrian of Conception Bay, Newfoundland. Other fossils found closely resemble Walcott's holothurians, *Eldonia ludwigi* and *Louisella pedunculata*, from the Middle Cambrian Burgess Shale (Stephen formation), British Columbia. The authors infer that it is highly probable that the green and purple slates of Bray Head in which these fossils have been found must be referred to the same horizon of the Middle Cambrian as the Burgess Shale of British Columbia.—R. A. P. **Rogers**: Some differential properties of the orthogonal trajectories of a congruence of curves. The family of curves defined by $lax+mdy+ndz=0$ are envelopes of "normal curves," i.e. those having l, m, n for normal at each point of space. Dupin's theorem, Darboux's reciprocal theorem, &c., are special cases of two simple relations connecting "normal torsions." The effect of inversion on normal torsion. The indicatrices of torsion and of curvature, and the relation between them. Expression of the condition of integrability as a relation between normal torsions. The indicatrix of form. Expression of the Curl-vector and Divergence by torsion, curvature, and the magnitude and direction of the gradient of the original vector. Second type of generalisations of Dupin's theorem, &c., arising from double generalisation of lines of curvature (Voss's *Krümmungslinien* and *Hauptkrümmungslinien*).—S. B. **Kelleher**: Poisson's equation and the equations of equilibrium of an elastic solid when the surface displacements are given.

BOOKS RECEIVED.

- Farmers of Forty Centuries, or Permanent Agriculture in China, Korea, and Japan. By Dr. F. H. King. Pp. ix+441. (Madison, Wis.: Mrs. F. H. King.) 2.50 dollars.
- Elements of Physiological Psychology. By Profs. G. T. Ladd and R. S. Woodworth. New edition. Pp. xix+704. (New York: Charles Scribner's Sons.) 4 dollars net.
- Kaiserliche Akademie der Wissenschaften. Atlas Typischer Spektren. By Profs. J. M. Eder and E. Valenta. Pp. xv+143+Plates i. to liii. (Wien: A. Hölder.)
- Carnegie Institution of Washington. Year Book No. 10, 1911. Pp. xvi+296. (Washington: Carnegie Institution.)
- The Methods of Petrographic-Microscopic Research. By F. E. Wright. Pp. 204+plates. (Washington: Carnegie Institution.)
- Feeding Experiments with Isolated Food-substances. By T. B. Osborne, L. B. Mendel, and E. L. Ferry. Part ii. Pp. 55-138. (Washington: Carnegie Institution.)
- The Absorption Spectra of Solutions of Comparatively Rare Salts. By H. C. Jones and W. W. Strong. Pp. viii+112+plates. (Washington: Carnegie Institution.)
- A New Algebra. By S. Barnard and J. M. Child. Vol. ii., containing parts iv.-vi. With Answers. Pp. x+301-731. (London: Macmillan and Co., Ltd.) 4s.
- An Introduction to British Clays, Shales, and Sands. By A. B. Searle. Pp. xi+451. (London: Charles Griffin and Co., Ltd.) 7s. 6d. net.