

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

AN association of American Universities has been formed for the purpose of considering matters of common interest relating to graduate study. The association includes most of the leading universities of the United States.

It has already been announced that a school of forestry is about to be established at Yale University. We now learn from *Science* that, at a meeting of the corporation on March 16, a gift of 150,000 dollars for this purpose was acknowledged. Mr. Henry S. Graves, assistant in the Division of Forestry, U.S. Department of Agriculture, has been appointed professor of forestry.

SIR GEORGE W. KEKEWICH, K.C.B., has been appointed Secretary of the Board of Education, which came into existence on April 1. A circular letter has been issued stating that in future all communications relating to elementary education should be addressed to the Secretary, Board of Education, Whitehall, London, S.W., and letters concerning science, art, and technical education should be addressed to the Secretary, Board of Education, South Kensington, London, S.W.

As the subjects which should form part of elementary education in rural districts have recently been much under discussion, it is of interest to call attention to a chapter on methods of instruction in agriculture, included in vol. ii. of the Report of the U.S. Commissioner of Education, for 1897-98. The chapter includes reprints of leaflets illustrating the educational work done at the Cornell Agricultural Experiment Station, and at Purdue University. The volume also includes reports of U.S. Consuls on school gardens and gardeners' schools in Russia.

THE Cambridge Summer Meeting will be held on August 2-15, and August 15-27. Among the lectures to be delivered in the section on scientific progress are the following: *Physical Science*.—The development of the nebular theory in the nineteenth century, by Sir Robert Ball, F.R.S.; the spectroscopy in astronomy, by Mr. Arthur Berry; the wave-theory of light, by Sir George Stokes, Bart., F.R.S.; advances in the science of electricity, by Prof. J. J. Thomson, F.R.S.; the conservation of energy, by Prof. J. A. Ewing, F.R.S.; chemistry and its applications, by Mr. M. M. Pattison Muir; electro-chemical methods, by Mr. D. J. Carnegie. *Biological Science*.—The theory of evolution and its influence on thought and research, under arrangement; researches on the brain, by Dr. Alex. Hill. There will also be lectures on some aspects of advance in the following sciences:—geology, by Prof. T. McK. Hughes, F.R.S.; anthropology, by Prof. A. Macalister, F.R.S.; agriculture, by Prof. W. Somerville; bacteriology, by Prof. Sims Woodhead. Mr. H. Yule Oldham will give a lecture on geographical exploration in the nineteenth century; Prof. W. M. Davis, of Harvard, U.S.A., will give six lectures on the study of the development of land forms. The study of special points in the following departments will be undertaken in sectional meetings:—chemistry and physics, under the direction of Mr. A. W. Clayden; evolution, under the direction of Mr. F. W. Keeble, Mr. C. Warburton, and others; anthropology, under the direction of Prof. A. C. Haddon, F.R.S. There will in addition be arranged, primarily for teachers, practical courses in chemistry and geography.

THE Passmore Edwards Museum in the Romford-road, Stratford, is now approaching completion, and arrangements for the opening will shortly be made. The museum has been built and furnished by the Council of the County Borough of West Ham at a cost of about 9000*l.*, of which 4000*l.* was the gift of Mr. Passmore Edwards. The main portion of the museum will be devoted to the Essex Museum of Natural History, belonging to the Essex Field Club, which is deposited in the building under agreement between the club and the Borough Council. The remainder of the building will be used as an educational museum in connection with the adjoining Municipal Technical Institute. The scientific control of the Essex Field Club collections remains with the club, and they contribute 50*l.* a year towards the curatorial expenses, the council contributing 100*l.* a year. The club appoints the curator. At their meeting on March 27, the council resolved to set aside annually out of the Estate Duty Grant the sum of 1000*l.* for museum purposes. It is expected that from 500. to 600*l.* of this will be needed for the up-keep and maintenance charges, the balance being placed to the credit of a museum purchase fund, which will be treated as a capital fund,

from which payments may be made from time to time for the purchase of objects and of the necessary cases, &c., in which to exhibit them. The Essex Field Club have appointed Mr. W. Cole as curator of their Natural History collections. The building itself and the educational collections of the council are under the charge of the principal of the Technical Institute, Mr. A. E. Briscoe.

SCIENTIFIC SERIALS.

Bulletin of the American Mathematical Society, February.—The opening articles respectively give abstracts of the proceedings and papers read at the sixth annual meeting, at New York, December 28, 1899, by Prof. F. N. Cole, and at the sixth semi-annual meeting, at Chicago, December 28 and 29, 1899, by Prof. T. F. Holgate.—On cyclical quartic surfaces in space of n dimensions, by Dr. V. Snyder, was read at the first of the above meetings. The method employed is a generalisation of that first employed by Darboux, using Lie's more general co-ordinates. For $n = 2$ (bicircular quartic curves) reference is made to memoirs by Casey, Darboux, Cox, Loria and others, where the curves have been discussed from a different point of view, and for $n = 3$ (cyclides) reference is again made to Casey, and to Maxwell, Cayley, Darboux, Reye, Loria, Bôcher and others. In the case of $n = 4$, the number of distinct types is 58, and of $n =$ higher numbers, the number of types has not been determined.—At the same meeting, Prof. H. Taber read a paper on the singular transformations of groups generated by infinitesimal transformations, and Prof. Dickson gave a proof of the existence of the Galois field of order p^r for every integer r and prime number p . Existence proofs have been given by Serret (*Alg. Sup.* vol. 2) and by Jordan (*Traité des Substit.* pp. 16, 17). The developments used by Serret are lengthy, and the short proof by Jordan assumes with Galois the existence of imaginary roots of an irreducible congruence modulo p . The present proof proceeds by induction. Assuming the existence of the GF[p^n], it derives that of the GF[p^{nq}], q being an arbitrary prime number. Since the GF[p] exists, being the field of integers taken modulo p , it follows that the GF[p^n] exists, and by a simple induction that the GF[p^r] exists for r arbitrary.—Dr. Lovett contributes a lengthy review of the "Leçons nouvelles sur l'analyse infinitésimale et ses applications géométriques" of Ch. Méray (1st part, 1894; 2nd part, 1895; 3rd part, 1897; and 4th part, 1898).—Varied information of interest to mathematicians occupies the "Notes" and "New Publications."

Annalen der Physik, No. 2.—Solubility of carbonic acid in alcohol between -67° and $+45^\circ$, by C. Bohr. The absorption of carbonic acid in alcohol increases rapidly at low temperatures. The coefficient is 1.97 at 47° , 4.46 at zero, and 39.4 at -65° . The coefficient of evasion at zero is 0.524, and the coefficient of invasion 2.375.—Specific heats of metals, alloys and graphite at low temperatures, by U. Behn. This paper deals with the specific heats of antimony, tin, cadmium, silver, zinc and magnesium, brass, graphite and three tin-lead alloys. Of these, only graphite and magnesium show a very considerable fall of specific heat down towards the temperature of liquid air. Many of the curves are probably parabolic, and concave towards the axis of temperatures.—Heat of sublimation of carbonic acid, and heat of evaporation of air, by U. Behn. The former is 142.4 calories, and the latter 50.8 calories.—A vacuum electrocope, by H. Pflaum. By exhausting a gold-leaf electrocope to such a degree that no vacuum discharge was able to traverse it, the author proved that an extreme vacuum is a perfect insulator, and that electrostatic forces act across it with great intensity.—The experimental basis of Exner's theory of atmospheric electricity, by G. Schwalbe. The author has made further experiments to show that a vapour arising from an electrified liquid is incapable of conveying away any of the charge. He explains the contrary results obtained by Pellat, on the ground of loose particles adhering to the vessels used. Solid particles are capable of conveying away the charge. Exner's theory of atmospheric electricity, as derived from the evaporation of natural bodies of water, is not confirmed.—Discharge of static electricity from points, by H. Sieveking.—Negative electricity begins to be discharged from a point at a lower potential than positive electricity, and the quantity discharged is also greater. Positive electricity is chiefly discharged along the axis of the point. Gases may be arranged in accordance with their capacity of encouraging the

radiation of negative electricity. Oxygen is at the top of the series, and carbonic acid at the bottom.—Reflective power of metals and glazed mirrors, by E. Hagen and H. Rubens. The authors study the reflecting powers of silver, platinum, nickel, steel, gold and copper for the various parts of the visible spectrum. They also test various speculum metals. That of Brandes and Schünemann has a reflecting power of only 50 per cent., but is eminently durable. It consists of 41 parts copper, 26 nickel, 24 tin, 8 iron and 1 antimony. Mach's aluminium-magnesium alloys have the highest reflective power.—Electrostatic effects in connection with vacuum discharges, by J. Stark. When a continuous current is sent through a vacuum tube, and matters are so regulated that the discharge is only just able to pass, the current becomes a periodic one. The kathode is set into a state of vibration, and gives a musical note. The vibrations are due to the periodical attractions of the charges on the wall of the tube.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 7.—“*Polytremacis* and the Ancestry of Helioporidæ.” By Prof. J. W. Gregory, D.Sc. Communicated by Prof. Ray Lankester, F.R.S.

The Blue Coral, *Heliopora caerulea* (Pall.) is one of the most isolated of living animals. It is the only known species of its genus, and it has recently been described as the only member of its family. Some Palæozoic corals have a very similar structure; but the view that these extinct Heliolitids are allied to the Helioporids is strongly opposed by some eminent palæontologists. If these authorities be right, then *Heliopora* is an animal with no close living relations and with no known ancestors. The only fossil that has been regarded with any probability as a possible link between *Heliopora* and the extinct Heliolitidæ is the Cretaceous coral *Polytremacis*. This genus was founded by d'Orbigny in 1849, but unfortunately its affinities and structures are still in doubt.

In preparing a description of a new species of *Heliopora* from Somaliland, the author was led to examine the material in the British Museum collection. The results seem to confirm the old view of the affinity between the Heliolitidæ and the Helioporidæ, by showing that *Polytremacis* is truly intermediate between the two families. In that case *Polytremacis* is of considerable phylogenetic interest as an ancestor of *Heliopora*.

Linnean Society, March 15.—Mr. G. M. Murray, F.R.S., in the chair.—Prof. Farmer exhibited (as lantern-slides) several photographs of dissections of flowers, and made remarks on the utility of such illustrations for teaching purposes.—Mr. R. A. Rolfe exhibited specimens and drawings of *Paphiopedilum*, both of species and hybrids, with their capsules, to illustrate remarks on the hybridisation of orchids.—Mr. I. H. Burkill gave an abstract of a report on the botanical results of an expedition to Mount Roraima, in British Guiana, undertaken in 1898 by Messrs. F. V. McConnell and J. J. Quelch. Acknowledged authorities on plant-geography had considered it probable that the vegetation of the summit of Mount Roraima, when better known, would compare well with that on the Paramos of Venezuela; but this was not the case. The characteristics of the treeless Paramos were absent from Roraima; and *Bonnetia Roraimae*—the commonest of species on the summit—attained, where sheltered, a height of forty feet. Lower than the Paramos on the slopes of the Andes was the *Befaria* zone, and to this the upper flora of the mountain was to be ascribed, the rest of the vegetation being of a Brazilian type. Many of the plants collected were of anatomical interest; the huge mucilage-cells of the leaf of *Bonnetia Roraimae* and the quaint pitchers of some of the *Utriculariæ* were especially noteworthy. The complex chain of mountains to which Roraima belongs includes other peaks of similar height, such as Duida over the Upper Orinoco; but in this direction the chain terminates with the low-lying forests of the Casiquiare, which has barred immigration from the higher Andes. The additions to botanical knowledge now made by Messrs. McConnell and Quelch might be said to emphasise the remarkable similarity which had been found to exist in the floras of Roraima and the Kaieteur Savannah.

Zoological Society, March 20.—Dr. W. Blanford, F.R.S., Vice-President, in the chair.—Prof. F. Jeffrey Bell exhibited a collection of Land-Planarians made by Dr. Goeldi in Brazil.

This, like many other collections of Land-Planarians, had been confided to Prof. Graff for description, and some of the specimens were the types of new species described by that author in his magnificent monograph on these animals. The collection before the Society had been sent to Mr. Sclater with the request that he would deposit it in the British Museum, where it would be a valuable and welcome addition to the already good collection in that institution.—Mr. G. A. Boulenger, F.R.S., exhibited a specimen of *Polypterus lapradii*, Steindachner, with large external gills, recently brought home from the Senegal by M. P. Delhez. The fish measured 390 millimetres, and was therefore the largest on record in which this larval character had been retained. In connection with this interesting example, Mr. Boulenger also exhibited a full-grown female of the Common Newt (*Molge vulgaris*), from the environs of Vienna, bearing well-developed external gills.—Mr. S. L. Hinde read a series of field-notes on the mammals which he had met with during five years' residence in East Africa, and illustrated with lantern-slides from photographs of the animals taken in their native surroundings. Some of the points specially dwelt upon were the preservation of game-animals in East Africa, and the possibility of the acclimatisation of East African animals in the British Isles.—Mr. W. Bateson, F.R.S., exhibited a specimen of an Isopodous crustacean, *Asellus aquaticus*, in which one of the antennules was replaced by a well-formed mandible. The case was to be regarded as an instance of Homœosis, or the transformation of one organ into the likeness of another with which it is in serial homology.—A communication was read from Mr. F. P. Bedford on the Echinoderms collected by himself and Mr. W. F. Lanchester in Singapore and Malacca.—Mr. F. E. Blaauw gave an account of the Zoological Garden of Berlin and of the progress which it had made under the management of the last three Directors—Dr. Bodinus, Dr. Max Schmidt and Dr. L. Heck.

Royal Meteorological Society, March 21.—Dr. C. Theodore Williams, President, in the chair.—Reference was made to the loss which the Society had sustained by the death of Mr. G. J. Symons, F.R.S., and a note of condolence with his relatives was passed by the meeting.—Twenty-seven new fellows were elected, as well as two honorary members, viz. M. Albert Lancaster, Director of the Belgian Meteorological Service, Brussels, and General M. A. Rykatcheff, Director of the Central Physical Observatory, St. Petersburg.—The following papers were read:—The ether sunshine recorder, by Mr. W. H. Dines.—Remarks on the weather conditions of the steamship track between Fiji and Hawaii, by Captain W. W. C. Hepworth.—Comparison by means of dots, by Mr. A. B. MacDowall.

PARIS.

Academy of Sciences, March 26.—M. Maurice Lévy in the chair.—Deviation of the radiations of radium in an electric field, by M. Henri Becquerel. Previous experiments on the behaviour of that portion of the radium rays deviable in the magnetic field showed that this part of the radiation had the greatest analogy with the cathode rays. To demonstrate the complete identity of these two kinds of rays, it was necessary to establish the existence for the rays from radium either of a transport of a negative charge or a deviation in an electric field. M. and Mme. Curie have recently proved the existence of the former property, and in the present paper experimental proof is given of the latter.—On apparatus in fused quartz, by M. Armand Gautier. Remarking on the paper of M. Dufour in the last issue of the *Comptes rendus*, M. Gautier recalls that he used tubes and spirals of quartz in 1869. In conjunction with M. Moissan, the author attempted, unsuccessfully, to prepare quartz connecting tubes for the fluorine apparatus.—On the transformation of fat into glycogen in the organism, by MM. Ch. Bouchard and A. Desgrez. In previous papers, it has been shown that a person receiving no food may gain as much as 40 grams in an hour, a gain for which it is only possible to account by assuming an absorption of oxygen above that required for the formation of respiratory carbon dioxide. The hypothesis was put forward that this increase of weight is due to an incomplete oxidation of fat, probably to glycogen. The experiments now given show that it is the muscular, and not the hepatic glycogen which arises from the incomplete oxidation of fats.—M. Hittorf was elected a correspondent for the section of physics in the place of the late M. Wiedemann.—Remarks on an earthquake at Batavia on September 30, 1899, by the French Consul at Batavia.—On surfaces for which the lines of curvature