

	1916-17	1915-16
SCIENCE AND ART.		
Institutions of science and art ... ..	49,224	50,136
Schools of science and art, etc. ... ..	99,350	94,950
Geological Survey ... ..	1,749	2,171
Examinations in courses of instruction conducted in technical schools ... ..	750	850
Gross total ... ..	£151,073	£148,107
Deduct—		
Appropriations in aid ... ..	1,620	1,820
Net total ... ..	£149,453	£146,287

## UNIVERSITIES AND COLLEGES.

Grants—		
Queen's University of Belfast ... ..	18,000	18,000
University College, Dublin... ..	32,000	32,000
University College, Cork ... ..	20,000	20,000
University College, Galway ... ..	12,000	12,000
Grants—		
National University of Ireland and University College, Dublin ... ..	30,000	40,000
Additional grant to University College, Galway ... ..	2,000	2,000
Total ... ..	£114,000	£124,000

## SUMMARY.

## EDUCATION, SCIENCE, AND ART.

## United Kingdom and England.

Board of Education ... ..	15,186,732	15,481,378
British Museum ... ..	128,599	148,645
National Gallery ... ..	11,489	15,670
National Portrait Gallery ... ..	3,485	4,993
Wallace Collection ... ..	4,591	7,962
London Museum ... ..	2,570	5,465
Scientific investigation, etc. ... ..	121,671	115,582
Universities and colleges, Great Britain, and intermediate education, Wales ... ..	321,200	316,200
Universities, etc., special grants ... ..	—	145,000

## Scotland.

Public education ... ..	2,544,742	2,609,905
National galleries ... ..	4,522	4,878

## Ireland.

Public education ... ..	1,812,704	1,805,919
Intermediate education (Ireland) ... ..	40,000	40,000
Endowed Schools Commissioners ... ..	905	900
National Gallery ... ..	1,845	2,165
Science and art ... ..	149,453	146,287
Universities and colleges ... ..	114,000	124,000

Total ... ..	£20,448,508	£20,974,949
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## UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

A PRIZE fellowship of about 100*l.* is offered by the Federation of University Women for research of direct national value in the present crisis. Candidates must have published original work. Applications will

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be received during the present month. Full particulars will be furnished, on request, by the honorary secretary of the federation, 28 College Court, Hammersmith.

THE President of the Board of Education will address a meeting to be held at Caxton Hall, Westminster, at 6.30 on Friday, April 14, on the future development of education in relation to science and commerce. Applications for tickets should be addressed to the secretary, Teachers' Registration Council, 47 Bedford Square, W.C.

At the invitation of the Hon. Rupert Guinness there was an inspection of the new chemical laboratories of University College, London, on Friday last. The building is complete except in a few minor details, but much remains to be done before it can be fully used for the purposes for which it has been designed. To fit up the "William Ramsay Library," provide electric current throughout the building, and equip the important department of physical chemistry, the sum of 14,000*l.* is needed at once; and a further amount of at least 6000*l.* will be required for the development of research work, making 20,000*l.* in all. Of this amount, Sir Ralph C. Foster, Bart., the generous benefactor who had previously given 34,500*l.* towards the cost of the laboratories, has already contributed 5000*l.*, and Dr. R. Messel has given 500*l.* for the installation and equipment of the joint workshop for the departments of chemistry and physics. The provision of such a workshop as common ground for two branches of science, each of which formerly kept within its own compartment, is a sign of the times. Many of the most important advances made in chemical science of late years belong to physical chemistry, and the future rests largely with workers in this joint domain. When the laboratories at University College are properly equipped, the best possible provision will have been made for satisfactory instruction in all branches of chemistry. There will be a technical laboratory in which chemical processes can be tested on a large scale, with a view to their utilisation for manufacturing purposes, and several separate rooms are provided for general chemical research. The sum required to equip all the new laboratories as they ought to be equipped is small in comparison with the national gain which it will ensure. We trust that a few generous benefactors will see that it is speedily forthcoming. Donations should be sent to the Hon. Rupert Guinness, treasurer of the equipment and endowment fund, University College, W.C.

## SOCIETIES AND ACADEMIES.

## LONDON.

**Royal Society**, March 30.—Sir J. J. Thomson, president, in the chair.—Prof. W. J. Sollas: Skull of Ichthyosaurus, studied in serial sections. The anatomy of the palate, including the form and disposition of the vomer, is described; there is no transverse bone. The parietal is split into two wings, an inner, which contributes to the roof of the cranial cavity, and an outer, which unites with the post-frontal and pre-frontal to form a part of the orbital arch. This feature and the separate opisthotic recall the Chelonia. The columella cranii is an important bone which rises from the surface of the pterygoid to meet the descending limb of the parietal. A rather large pre-articular or goniale is present in the lower jaw. The hyobranchial apparatus proves more complicated than had been supposed, and is more akin to the Amphibia than the Reptiles. The relations of the bones in general are also more complicated. The prevalent squamous

sutures are remarkable for their excessive overlap, an adaptive character met with also in the Cetacea. Ichthyosaurus, though a true reptile, possesses many characters in common with the stegocephalous Amphibia, so that a close comparison of the roof of the skull and the palate may be made with *Loxomma*, so well described by Dr. Watson. But it shares these characters with the Cotylosaurian reptiles also, and from this group it is probably descended. The nature of the material which enters into the composition of the Ichthyosaur bones, when these are of a black or deep brown colour, has been investigated, and is found to consist largely of coal. This had already been proved in the case of *Cocosteus*. As the bones of the Palæozoic *Cocosteus* have become converted into "stone" coal of the same nature as that furnished by Palæozoic plants, so the bones of the Mesozoic Ichthyosaurus have been converted into "brown" coal of the same nature as that furnished by Mesozoic plants.—**Dorothy J. Lloyd**: The relation of excised muscle to acids, salts, and bases. (1) Acids and alkalis both cause swelling in excised muscle. The degree of swelling is not directly proportional to the concentration of acid on alkali in the surrounding fluid, but has a maximum at 0.005 normal for hydrochloric acid and for caustic soda. Alkalis first coagulate and then re-dissolve the muscle substance. (2) The chlorides of the alkali and alkaline earth metals all ultimately coagulate the protoplasm of an excised muscle in isotonic solutions. The bivalent cations show this effect much more rapidly than the monovalent. (3) The iso-electric point for muscle is between  $P_H = 5$  and  $P_H = 7$ . (4) It is suggested that the swelling and shrinking of muscles, both in the body and out, is an osmotic phenomenon, and that the state of aggregation of the colloids of the muscle substance is the chief determining factor which fixes the degree of swelling. Lillie's demonstration that acids and alkalis raise the osmotic pressure of gelatin, while the neutral salts lower it, is in harmony with this view. (5) The osmotic phenomena of muscle can be fully explained without assuming the presence of a semi-permeable membrane round the muscle fibres.—**J. C. Willis**: The endemic flora of Ceylon, with reference to geographical distribution and evolution in general.

**Physical Society**, March 10.—Prof. C. Vernon Boys, president, in the chair.—**S. Skinner**: Experiments illustrating the flow of heat in conducting sheets. If a sheet of tinned iron be heated locally by means of a Bunsen burner or blowpipe the tin is melted for a certain distance from the heated region. On allowing the sheet to cool the resolidified tin is separated from the unmelted tin by a very sharp line of demarcation. This line gives the equi-temperature curve corresponding to the melting point of tin. By pushing the heating to a greater or less extent a series of such equi-temperature curves can be obtained for a sheet of any particular shape heated at any given point. The cases shown illustrated the flow of heat into a rectangular plate from a heated tongue; into a circular disc from a heated tongue; round the corner of an L-shaped strip and into the vanes of an air-cooled cylinder. The results were shown to be closely analogous to the flow of electricity in similarly shaped conductors.—**Dr. R. S. Willows** and **H. T. George**: The absorption of gases by quartz bulbs. The experiments are a continuation of those of Willows (*Phil. Mag.*, April, 1901) and Hill (*Phys. Soc.*, December, 1912) on the absorption of gas which is brought about by electrical discharges. A new quartz bulb does not absorb air, but if it be fed with repeated doses of hydrogen—which are absorbed when an electrodeless discharge is passed—it then becomes very active. If discharges in hydrogen are alternated with those in air the bulb

can be made to absorb large quantities of either gas, and the activity with each gradually increases. The authors reject the theory of surface absorption and, in their own experiments at least, also Swinton's theory that the gas is shot into the walls and held there. It is supposed that chemical actions occur with air, and oxidation products are formed; these are reduced by hydrogen.

**Linnean Society**, March 16.—Prof. E. B. Poulton, president, in the chair.—**C. C. Lacaita**: Plants collected in Sikkim, including the Kalimpong district, April 8 to May 9, 1913. The author gave an account of his circular journey from Darjiling to his starting point, part of it with the party of H.E. the Governor of Bengal. The monotony of the forest region was mentioned, and the marvellous abundance of the Aroids.

PARIS.

**Academy of Sciences**, March 20.—M. Paul Appell in the chair.—**Pierre Duhem**: The hypothesis of Faraday and Mossotti, and on certain conditions verified at the contact of two dielectrics.—**J. Comas Solà**: Some remarks on the great nebula in Orion (1976 N.G.C.). The results of stereoscopic observations and photographic comparisons are given, from which it would appear that there is a proper movement of the more brilliant parts of the nebula of the order of 0.025" per annum. Internal transversal movements of the filaments of the above nebula and also of the nebula H.V. 30, 1977 N.G.C. were also detected with certainty.—**T. H. Gronwall**: A functional equation in the kinetic theory of gases.—**M. Riquier**: Partial systems of the first order to which the Jacobi method of integration applies, and the analytical prolongation of their integrals.—**L. Reutter**: Lacustral ambers. An account of analyses of five pieces of amber of well-authenticated origin, three from the Baltic, two from Italy. Clear differences could be detected between the German and Italian ambers.—**N. Arabu**: The existence of the Hipparion fauna in the Sarmatian of the basin of the Sea of Marmora and its consequences for the classification of the Neogene in south-eastern Europe.—**Maurice Lugeon**: The rose coloration of certain rocks of the massif of the Aiguilles Rouges. The coloration is shown to be due to iron and its peculiarities are described. A theory of the cause of its origin is proposed.—**Ph. Glangeaud**: The Pavin crater lake and the volcano of Montchalm, Puy-de-Dôme.—**Mlle. Yvonne Dehorne**: A milleporoid Stromatopore of the Portlandian.—**Henri Fouqué**: The ferments of pineapple wine. Of four yeasts isolated, two were certainly *Saccharomyces*, and two were doubtful yeasts between *Mycoderma* and *Torula*.—**E. Demoussy**: The influence of hydrogen peroxide on germination. Old seeds, which may have preserved their germinating power, may fail to germinate under conditions favourable to the growth of young seeds if these conditions are more favourable to the development of parasitic micro-organisms requiring oxygen for their growth. In the presence of dilute solutions of hydrogen peroxide a considerable proportion of such seeds will germinate. A result of practical importance follows from this, that tests of germinating power carried out under laboratory conditions may lead to seeds being regarded as bad, whilst the same seed, grown in the soil, may prove to be of average quality. This conclusion is confirmed by results obtained in practice with seeds of beetroot.—**V. Ferrand**: A modification of the method for the sterilisation of drinking water by sodium hypochlorite. Hydrogen peroxide is proposed for the removal of the excess of hypochlorite instead of the commonly used sodium thiosulphate. There is a saving of time in the sterilisation.—**MM. Dalimier and Lévy-Franckel**: The

102 of Danysz in the treatment of malignant or grave syphilis. Cases which followed the ordinary course are not dealt with in the present paper, which is concerned with twenty-two cases of abnormal, or particularly severe syphilis. The results are strongly in favour of the treatment.—E. Bataillon: New experiments on the fecondation membrane in the eggs of Amphibia.

### BOOKS RECEIVED.

Our Cottage and a Motor. By W. Moncreiff. Pp. 163. (London: G. Allen and Unwin, Ltd.) 3s. 6d. net.

Meteorites: their Structure, Composition, and Terrestrial Relations. By Dr. O. C. Farrington. Pp. x+233. (Chicago: The author.) 2 dollars.

Rambles of a Canadian Naturalist. By S. T. Wood. Pp. vii+247. (London: J. M. Dent and Sons, Ltd.) 6s. net.

The Germans. By Rt. Hon. J. M. Robertson. Pp. viii+291. (London: Williams and Norgate.) 7s. 6d. net.

Women and the Land. By Viscountess Wolsey. Pp. xi+230. (London: Chatto and Windus.) 5s. net. Report for 1915 on the Lancashire Sea-Fisheries Laboratory at the University of Liverpool and the Sea-Fish Hatchery at Piel. Edited by Prof. W. A. Herdman. No. xxiv. Pp. 62. (Liverpool: C. Tinsling and Co.)

Cambridge Tracts in Mathematics and Mathematical Physics. No. 2: The Integration of Functions of a Single Variable. By G. H. Hardy. Second edition. Pp. viii+67. (Cambridge: At the University Press.) 3s. net.

Hydrodynamics. By Prof. H. Lamb. Fourth edition. Pp. xvi+708. (Cambridge: At the University Press.) 24s. net.

Catalogue of the Ungulate Mammals in the British Museum (Natural History). Vol. v. By R. Lydekker. Pp. xlv+207. (London: Longmans and Co., and others.) 7s. 6d.

British Museum (Natural History). Report on Cetacea stranded on the British Coasts during 1915. By Dr. Harmer. Pp. 12. (London.) 1s. 6d.

The Involuntary Nervous System. By Dr. W. H. Gaskell. Pp. ix+178. (London: Longmans and Co.) 6s. net.

The Deposits of the Useful Minerals and Rocks: their Origin, Form, and Content. By Profs. F. Beyschlag, J. H. L. Vogt, and P. Krusch. Translated by S. J. Truscott. Vol. ii. Pp. xxi+515-1262. (London: Macmillan and Co., Ltd.) 20s. net.

### DIARY OF SOCIETIES.

#### THURSDAY, APRIL 6.

ROYAL SOCIETY, at 4.30.—The Instability of the Pear-shaped Figure of Equilibrium of a Rotating Mass of Liquid: J. H. Jeans.—A Hypothesis of Molecular Configuration in Three Dimensions of Space: Sir William Ramsay.—The Motion of Solids in a Liquid Possessing Vorticity: J. Proudman.—The Occurrence of Gelatinous Spicules and their Mode of Origin in a New Genus of Siliceous Sponges: Prof. A. Dendy.—The Ultra-Violet Absorption Spectra of Blood Sera: Dr. S. J. Lewis.

LINNEAN SOCIETY, at 5.—On Five New Species of Edwardsia, Quatr.: Prof. G. C. Bourne.—A New Species of Enteropneusta from the Abrolhos Islands: Prof. W. J. Dakin.—The Southern Elements of the British Flora: Dr. O. Stapf.

FARADAY SOCIETY, at 8.—The Making of a Big Gun: Dr. W. Rosenhain.

#### FRIDAY, APRIL 7.

GEOLOGISTS' ASSOCIATION, at 7.30.—Notes on the Corallian of the Oxford District: M. Odling.—The Glacial Geology of the Hudson Bay Basin: J. B. Tyrrell.

#### SATURDAY, APRIL 8.

ROYAL INSTITUTION, at 3.—Radiations from Atoms and Electrons: Sir J. J. Thomson.

#### MONDAY, APRIL 10.

ROYAL SOCIETY OF ARTS at 4.30.—Surveying: Past and Present: E. A. Reeves.

ARISTOTELIAN SOCIETY, at 8.—Parmenides, Zeno, and Socrates: Prof. A. E. Taylor.

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#### TUESDAY, APRIL 11.

ROYAL INSTITUTION, at 3.—Modern Horticulture—Old and New Methods of Forcing (The Breaking of Rhythm): Prof. F. Keeble.

ROYAL SOCIETY OF ARTS, at 4.30.—The Forest Resources of Newfoundland: Sir Daniel Morris.

#### WEDNESDAY, APRIL 12.

INSTITUTION OF NAVAL ARCHITECTS, at 11 a.m.—President's Address.—The Work of the Load Line Committee: Sir Philip Watts.—Some Questions in Connection with the Work of the Load Line Committee: W. S. Abell. At 3.—The Laws of Skin Friction of a Fluid in Stream Line and in Turbulent Motion along a Solid of Great Length: Dr. C. H. Lees.—Skin Friction Resistance of Ships and our Useful Knowledge of the Subject: G. S. Baker.—Experiments to Determine the Resistance of Bilge-keels to Rolling: Prof. T. B. Abell.—An Experimental Tank Reproducing Wave Motion: Col. G. Russo. At 7.30.—A Brief Summary of the Present Position of the Marine Diesel Engine and its Possibilities: Eng. Lieut. W. P. Sillince.—The Co-ordination of Propeller Results: J. D. Young.—Note on Maximum Propulsive Efficiency of Screw Propellers: T. C. Tobin.

#### THURSDAY, APRIL 13.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Discussion: The Present Position of Electricity Supply in the United Kingdom; and the Steps to be taken to Improve and Strengthen it.

CHILD STUDY SOCIETY, at 6.—Experiments on Hand-writing in Schools: Dr. C. W. Kimmins, Mrs. Grainger, and Miss Golds. At 7.30.—Annual Meeting.

INSTITUTION OF NAVAL ARCHITECTS, at 11 a.m.—Subdivision of Merchant Vessels: Reports of the Bulkhead Committee, 1912-1915: Sir Archibald Denny.—Strength of Watertight Bulkheads: J. F. King.—Some Effects of the Bulkhead Committee's Reports in Practice: A. T. Wall. At 3.—Notes from a Collision Case: J. Reid.—Shipyards Cranes of the Rotterdam Dockyard Company: M. G. de Gelder.

#### FRIDAY, APRIL 14.

ROYAL INSTITUTION, at 5.30.—The Genesis and Absorption of X-Rays: Sir J. J. Thomson.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Theory and Practice in the Filtration of Water: W. Clemence.

ROYAL ASTRONOMICAL SOCIETY, at 5.

#### SATURDAY, APRIL 15.

ROYAL INSTITUTION, at 3.—Radiations from Atoms and Electrons: Sir J. J. Thomson.

OPTICAL SOCIETY, at 8.—Practical Workshop and Laboratory Measurements: S. D. Chalmers.—Some Further Notes on Focometry: T. F. Connolly.

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