

to the Commissioners of Woods towards the cost of the maintenance of the Forest of Dean Demonstration Area during 1916-17, on the condition that the land revenues of the Crown should continue as hitherto to bear the cost of general improvements and maintenance of Dean Forest and adjoining woodlands.

A grant of 1000*l.* for 1917-18 was recommended for the salaries and expenses of three forestry officers for advisory, survey, and research work, one at each of the three Scottish agricultural colleges.

During the year the Commissioners have reviewed the terms on which advances from the Development Fund have been made or promised for the purchase of land in Ireland and its afforestation. A provisional agreement was reached between the Commissioners and the Department of Agriculture, and in March last the revised terms were submitted for the approval of the Lords Commissioners of the Treasury.

DEVELOPMENT AND IMPROVEMENT OF FISHERIES.

The development of sea fisheries and the increase of the fish food supply have been among the most important of the matters for which advances have been made during the year. The following advances for these purposes have been sanctioned, viz.: In January, 1917, an advance not exceeding 50,000*l.* to the Board of Agriculture and Fisheries for the provision of motor-power in fishing-vessels in England and Wales. The administration of this advance is in the hands of a small central executive committee appointed by the Board in consultation with the Development Commission. Not the least part of the Committee's work has been that of arranging for the necessary fuel, boxes, and other fishing supplies. During the time that this scheme has been in operation the results obtained have been satisfactory, and they promise to prove still more fruitful in the future. In January, 1917, an advance not exceeding 2000*l.* to the Cornwall Sea Fisheries Committee to enable fishermen at the Mount's Bay Ports and St. Ives to instal mechanical power in their boats. In March, 1917, authority was given for the unexpended balance of the grant of 2000*l.* to the Devon Sea Fisheries Committee for the purpose of experiments with motor-power in trawlers, etc., to be used in making loans to fishermen to enable them to instal motors in their boats. The unexpended balance in question was about 1900*l.*

An advance of 510*l.*, the available balance of the sum of 3000*l.* originally made applicable for the development of motor-boat fishing in Ireland, was sanctioned for the same purpose during the year 1917-18.

For the purposes of fishery research in 1917-18 a grant of 675*l.* was sanctioned, being 250*l.* less than the amount sanctioned for 1916-17. This sum was to be allocated by the Board of Agriculture and Fisheries, when the nature of the work had been definitely settled, between the following institutions: The Marine Biological Association, the Lancashire and Western Local Fisheries Committee, Liverpool University, University College of Wales, and the Armstrong College, Durham.

FINANCE OF THE DEVELOPMENT FUND.

The total sum guaranteed to the fund is 2,900,000*l.*, which has all been paid over; in addition, interest on investments and other receipts up to March 31, 1917, amounted to 390,000*l.*, a total of 3,290,000*l.*

As will be seen from the table below, the total advances recommended to March 31, 1917, amounted to 2,602,277*l.* This sum cannot, however, be taken as the effective demand upon the fund: some of the recommended advances included in earlier schedules were not ultimately sanctioned by the Treasury, and in the case of several schemes for which assistance is sought

annually the amounts sanctioned were not wholly spent within the year for which the grants were sanctioned.

The Commissioners estimate that the effective total of the advances sanctioned up to March 31, 1917, amount approximately to 2,085,000*l.*, leaving therefore a balance of 1,205,000*l.* then available to meet recurrent annual grants for existing schemes, new projects, and for an emergency programme of development works which is being prepared as suitable to be started at the end of the war.

Summary of Recommendations, 1916-17.

	Grant.	Loan.
	£	£
Agriculture and rural industries ...	139,348	125,000
Forestry	15,676	—
Reclamation and drainage of land ...	850	—
Harbours	844	—
Fisheries	51,185	2,000
	<u>207,903</u>	<u>127,000</u>
Total	334,903 <i>l.</i>	

Sum. Total of Advances Recommended up to March 31, 1917.

	Grant.	Loan.
	£	£
Agriculture and rural industries ...	1,492,172	128,500
Forestry	101,833	153,411
Reclamation and drainage of land ...	6,565	4,000
Rural transport	—	80,000
Harbours	214,539	171,410
Inland navigations	—	109,500
Fisheries	109,297	30,250
Sea, defence works	—	800
	<u>1,924,406</u>	<u>677,871</u>
Total	2,602,277 <i>l.</i>	

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

UNDER the auspices of the Council of the Library Association, the Athenæum Press has issued a Subject Index to Periodicals for 1916, the Historical, Political, and Economic Sciences, including the European war, geography, anthropology, and folklore. The catalogue is well arranged, and contains a wide survey of periodical literature. Owing to the high cost of printing and paper, the list of periodicals cited has been omitted, but in the present list 305 publications are indexed. The present catalogue can be regarded as only tentative, the Proceedings of some societies being in arrear, and most of those from the Continent unprocurable. But the idea is good, and in quieter times the catalogue will be more comprehensive.

At the annual meeting of the Headmasters' Association, Mr. A. P. M. Fleming (British Westinghouse Electric and Manufacturing Co.) gave an address on the increasing part which democracy would play in the near future in industry and public life. He said that industrial progress had been greatly accelerated in some directions, but that unity of aim and purpose among industrial workers was essential to continued advance. Industrial progress was incompatible with industrial unrest, and teachers should put industrial problems before their pupils in the right way, thus contributing to their right solution. Industrial harmony must be based on a sense of justice and of individual responsibilities as well as of individual rights.

A COURSE of nine lectures on "The Practical Applications of the Study of Weather" has been arranged and will be given at the Meteorological Office, by Sir Napier Shaw, on Fridays at 3 p.m., beginning on January 25. Each lecture will be followed by a conversation class for the discussion of practical details. The fortnightly meetings at the Meteorological Office for the discussion of contributions to current meteorology in colonial or foreign journals will be resumed at 5 p.m. on Monday, January 14, and will be continued on alternate Mondays until March 25. Students wishing to attend should communicate with Sir Napier Shaw at the Meteorological Office. The lectures are for advanced students and others interested in the subject. Admission is free, by ticket, to be obtained on application at the Meteorological Office, South Kensington, S.W.7.

THE University of London has arranged for the second term of the current session a series of public lectures in Imperial studies. A course of ten lectures on some biological problems of to-day will be given at University College, Gower Street, beginning on January 21, at 4 p.m., when Prof. W. M. Bayliss will lecture on the problem of food. Lectures will be given on future Mondays on other problems by distinguished authorities in biology. At King's College, Strand, and at King's College for Women, nine lectures on animal life and human progress will be given at 5.30 p.m. on the Wednesdays beginning January 30, when Prof. Arthur Dendy will take for his subject "Man's Account with the Lower Animals." In later weeks lectures on other matters of biological importance will be given by other well-known zoologists. Seven public lectures on "The Empire: its Commerce and Commercial Requirements," will be delivered at the London School of Economics, beginning at 5 p.m. on January 18, when Sir Alfred D. Hall, K.C.B., will speak on artificial manures.

THE Association of Science Teachers held its annual business and open meetings in connection with the Education Conference at University College, London, on January 3. At the business meeting a project was discussed for starting branches of the association in various parts of the country, and a committee was elected to draw up a scheme. A resolution was passed, and forwarded to the Headmistresses' Association, urging the necessity for allotting more time to science in girls' schools, and suggesting that physics be made the basic science. The growing tendency to limit the science in girls' schools to little more than botany was deprecated. At the open meeting, both the address from Prof. Davidge, of the Ordnance College, Woolwich, and the discussion in the afternoon opened by Prof. Womack, dealt with physics. Prof. Davidge described field telephones used on the battlefield, and exhibited a visible buzzer similar to one captured from the Germans, which solved the problem of the "ring-off" in the trench exchange. His audience was interested in what he had to say of the ignorance of science among men who came to him at the Ordnance College, an ignorance which suggested that the "fairytales of science" have not been making a wide appeal. Prof. Womack dealt with the teaching of physics in girls' schools. He advocated humanistic treatment; mechanics, which he considered specially important, should not be treated as a mathematical subject, but experimentally, with direct reference to the environment. In the discussion which followed, the views of Prof. Womack were supported by Miss Lees and other science teachers in girls' schools.

ONE serious omission in most recent schemes for educational reform is the absence of any proposal for ascertaining what educational facilities are at present

in existence. Similarly, in Mr. Fisher's Bill the local authorities when preparing schemes of educational organisation are instructed to consult with other local education authorities, but no mention is made of autonomous institutions, such as private schools. Yet the various types of private schools and cognate institutions provide for a large number of boys and girls, and a recognition of this fact is important for many reasons. Lady Napier Shaw has therefore done good service by directing attention in the December number of the Journal of the British Science Guild to the need for a register of all existing schools. She gives the text of a draft Bill which has been considered by the Guild, intended to secure the formation and maintenance of a register of all colleges and schools in England and Wales, giving particulars of their constitution, staffs, pupils, accommodation, and provision for recreation. This draft Bill differs from Clause 24 in Mr. Fisher's Bill in that it provides that each education authority shall compile its own register, which is then to be forwarded to the Board of Education. Further, schools are to be induced to register by the denial to unregistered schools of the right to recover fees from pupils, and by the liability of such pupils to be proceeded against under the Compulsory Education Act. No one knows at present how many schools there are in England or how many of them are reasonably efficient, and some such measure as that proposed by Lady Shaw is urgently required. We ought to know the relevant facts before proceeding to take action.

OUR readers will remember that in the summer of 1915 the University College of Wales, Aberystwyth, became the possessor of the library and lifelong collections of the late F. W. Rudler, who was professor and dean of the college in the years 1876-80, and afterwards became curator of the Museum of Practical Geology, Jermyn Street, London. His library, consisting of about 2000 volumes and 4000 pamphlets, has been tabulated and cross-indexed, and his extensive collection of rocks, fossils, etc., carefully labelled. The mineralogical collection has been made available for teaching and demonstration purposes, while the archæological and other specimens have been added to the college museum. The additions thus made to the college collections, further assisted by the foundation of the "F. W. Rudler Geological Research Scholarship," have greatly increased the facilities for research work, particularly in the subject of geology. M. Jules Bernaerts, the eminent Belgian sculptor (of the Royal Academy of Brussels), has executed a life-size medallion of Prof. Rudler, which has been framed in oak and placed in the wall of the college quadrangle, and below it a brass tablet bearing the inscription:—"In memory of F. W. Rudler, I.S.O., F.G.S., 1840-1915. Professor in this College 1876-80, and Founder of the College Museum," has been affixed to a polished slab of Welsh marble specially cut for the purpose from the Narberth Quarries, Pembrokeshire. Prof. Rudler's numerous friends and all concerned in the welfare of the college will be pleased to know that the collections which he formed with so much ability have thus been made available for the furtherance of those studies in which he was so deeply interested, and to which he devoted the labours of a lifetime.

At the annual meeting of the Geographical Association the president, Sir W. M. Ramsay, gave an address entitled "The Great Goddess Mother Earth," and as arising out of it various speakers from the Classical and Geographical Associations urged the closer co-operation of these mutually complementary lines of teaching and research. It is hoped that the classical geographers will be studied afresh, and that new in-

sight into the history of civilisation may be gained by combination of the points of view. The annual lecture was upon the crafts of Britain, past and future, and in it Mr. Henry Wilson, president of the Arts and Crafts Society, pleaded with geographers for spiritual maps, maps of the spread of forms of spiritual expression in handwork, maps of the spread of ideas and enthusiasms. In this way, the lecturer urged, we should work effectively towards a genuine revival of folk-life and of taste and creative power that would go with it. Mr. W. E. Whitehouse (University College, Aberystwyth) opened a discussion on map-reading as an element in both geographical and military education, and gave the results of his experience in training O.T.C. cadets and teachers. A session was devoted to papers sketching advanced courses for pupils in secondary schools (sixteen-eighteen), and the association's view was strongly expressed that an attempt must be made to diminish the separateness of the faculties of study. It would be highly desirable to have an "advanced course," including history on one hand and science on the other, and pivoting upon geography as essentially the regional study of human experience. The association is glad to be authoritatively assured that a course planned on these lines would receive sympathetic consideration from the Board of Education whatever the wording of the present regulations.

SOCIETIES AND ACADEMIES.

LONDON.

Faraday Society, December 12, 1917.—Mr. W. R. Bousfield, vice-president, in the chair.—Prof. A. W. Porter: The thermal properties of sulphuric acid and oleum. The object of this paper is to supply data at various temperatures for the heats of solution and dilution and evaporation, both of sulphuric acid and oleum. Pre-existing data apply only to atmospheric temperatures; but technical processes take place at various temperatures up to 200° C. or above. These additional data are obtained by indirect methods either from vapour pressures (of H₂O or SO₃) by means of Clapeyron's formula or from thermal capacities.—W. R. Bousfield: Isopiestic solutions. Solutions of KCl, LiCl, NaCl, and KNO₃ of equal vapour pressure are placed together in an exhausted vessel, so that interchange of aqueous vapour may take place. Hence is indicated an accurate method of determining the vapour pressure of an aqueous solution, by comparison with the equal vapour pressure of a solution of LiCl. The observations lead to the conclusion that for a pure salt without water of crystallisation there is, at a given temperature, a certain vapour pressure of water below which the dry salt surrounded by aqueous vapour will not take up water, and will, if it is not dry, become dried. This pressure may be called the *critical hydration pressure* of the salt at the given temperature.—Dr. J. W. McBain: Notes on the system of recording rate of chemical reaction. The usual equation representing rate of reaction may be written in the form $kt = (\text{remainder of expression})$. The author proposes so to choose the unit of time that k is always unity. A single number will then completely record the rate of reaction.—A. L. Feild: The viscosity of blast-furnace slag and its relation to iron metallurgy (seep. 373).—G. Le Bas: The refractivities of saturated and unsaturated compounds. The refractivities of unsaturated compounds, together with unsaturated systems containing conjugated unsaturated groups, have been considered. Benzene has been shown to be possessed of no anomaly. Cross-linking has been assumed in some

cases. The effects of conjugation of ethenoid and carbonyl groups have been shown, whilst nitrates, nitrites, and nitro-compounds have been studied. The oximino-group especially has been taken into consideration. The cyclo-paraffins, substituted and unsubstituted, have been considered, together with a number of *p*-terpenes and derivatives. Anomalies have been connected with the side-chains or substituents and the appropriate numbers ascertained. The larger anomalies are connected with the trimethylene ring. Those for benzene derivatives have been ascertained. The unsubstituted hydrocarbons show no anomalies.—Dr. E. B. Ludlam: The effect of hydrogen chloride on the nitrogen-hydrogen equilibrium. The paper records an experimental attempt to simplify the difficult conditions of high temperature at high pressure under which the Haber synthesis takes place. It was thought that the presence of hydrochloric acid during the synthesis would displace the equilibrium in the direction of the formation of ammonia. The result of the experiments was negative.—Dr. H. B. Maxted: The influence of carbon monoxide on the velocity of catalytic hydrogenation. The inhibitive effect of small percentages of carbon monoxide on the velocity of hydrogenation of olive oil in presence of nickel has been studied quantitatively.

Geological Society, December 19, 1917.—Dr. Alfred Harker, president, in the chair.—B. Smith: The Chellaston gypsum-breccia considered in its relation to the gypsum-anhydrite deposits of Britain. (1) At Chellaston the gypsum was laid down as such, and has suffered no appreciable alteration or addition since the time of its original deposition and brecciation. There is no evidence that the rock was ever anhydrous. (2) By comparison with this deposit, and also by independent evidence, it seems probable that most of the important beds of gypsum in the country were laid down as gypsum, and have behaved throughout as stratified deposits. (3) When anhydrite is present, the evidence favours the view that it is original, and was deposited in a stratiform manner in sequence with gypsum. (4) Microscopic evidence shows that there has been, in some cases, an alteration of anhydrite into gypsum where the two minerals were in original juxtaposition; this alteration, however, is considered to have occurred at, or immediately after, the time of deposition, and to be confined to the existing plane of contact of the two minerals.

PARIS.

Academy of Sciences, December 17, 1917. M. Ed. Perrier in the chair.—L. Guignard: The development of the structure of the ovule in the Apocynaceæ and the Asclepiadaceæ. After a summary of contradictory conclusions arrived at by previous workers on this subject, the author gives the summarised results of his researches on twenty species.—G. A. Boulenger: The conformation of the phalanges in certain African frogs.—M. Balland: The alterations in war-bread: an investigation into the cause of war-bread going mouldy. The moisture ought to be from 10 to 12 per cent., but it generally amounts to more, 13 to 15 per cent., and in some of the mouldy bread up to 18 per cent. An alteration in the shape of the loaf is suggested as a provisional measure.—P. Fatou: Rational substitutions.—E. Baticle: The determination of the most advantageous dimensions of the principal elements of a hydraulic power installation.—M. Mesnager: A rigorous demonstration of the formulæ of beams and plates.—J. Guillaume: Observations of the sun made at the Lyons Observatory during the second quarter of 1917. Observations were made on eighty-six days, and the re-