jection machine, which throws on a screen a shadow-like image of the screw thread, magnified a definite number of times. This image is then superposed on a diagram of the correct thread form, drawn to the same magnification. Thus variations from the true form can be seen and measured with a scale. A simple projection apparatus and another having a large field of view are described, together with some convenient accessories.

With the exception of core diameter and pitch, the elements of a screw ring gauge cannot be measured readily. The method of taking plaster casts has been tried, but such casts cannot at present be relied upon to nearer than ±0·0005 to ±0·001 in. In general, screw ring gauges are not measured, but tested between limits by "go" and "not go" check plugs, made so as to test each diameter independently.

The pamphlet is written in a very practical manner, and sufficient information and drawings are given to enable anyone interested to set up the various appliances for himself. We are also glad to note that manufacturers who contemplate the installation of measuring instruments, or have experienced difficulties in measurement, are invited to visit the laboratory by appointment to discuss their particular problems with the members of the staff.

MARINE BIOLOGY.

THE twenty-fourth report (1916) of the Danish Biological Station contains two papers of much interest to marine biologists. Dr. C. G. J. Petersen gives a useful account of the development of the external characters in three of the common species of Gobius. The great difficulty there is in discriminating between the young stages of these fishes is well known to those who have handled general collections made in European waters, and Dr. Petersen's careful descriptions will be much appreciated. The second paper in the report is by Dr. H. Blegvad, on the food of fishes in Danish waters within the Skaw. The new feature in this work is that, in addition to an account of the kind of food upon which each species was found to be feeding, the weight of each kind of food found in the fish and the weight of the fish itself were recorded. In this way a more accurate idea of the relative importance of the different kinds of food can be obtained.

In the Marine Biological Report, No. iii., 1916, for the province of the Cape of Good Hope, Dr. J. D. F. Gilchrist, in the first paper, describes the eggs and larvæ of a number of Cape fishes. Unfortunately the figures which accompany this paper appear to have lost a great deal in the reproduction, and many of them can scarcely be considered adequate for recognising these very delicate forms, the identification of which often depends on a correct representation of their minute details. The remainder of the report contains an account of some observations on marine invertebrates, made on animals living in the tanks of the Marine Station at St. James, the description of four new South African fishes, which are well figured, and a continuation of Mr. W. Wardlaw Thompson's "Catalogue of Fishes of the Cape Province," with a very full bibliography of each species.

THE DEVELOPMENT OF BRITISH AGRICULTURE AND FISHERIES.[1]

THE advances recommended during the year amounted to 334,903*l.* Since the commencement of the war advances from the Development Fund have been mainly confined to schemes already established with the expectation of continued help from the fund, for which just sufficient advances have been recommended to secure continuity.

As regards new schemes, the Commissioners have continued to recommend expenditure upon the preparation, by way of preliminary surveys and reports, of projects of development for commencement after the war when the employment of labour upon a large scale may be desirable. They have also recommended expenditure on certain new schemes in order to meet war conditions, particularly in connecton with food supply and natural products. The two most important new advances recommended by them during the year, namely, 125,000*l.* for purchase of an estate for sugar-beet growing, and 50,000*l.* for improving the fish food supply by installing motors in fishing-boats in England and Wales, fall under this heading. These two advances amount to one-half of the whole sum recommended for the year. A largely increased supply of plants for afforestation purposes, and increased growings of flax for aeroplane cloth, are other instances where war conditions have called for extra expenditure from the Development Fund.

AGRICULTURE AND RURAL INDUSTRIES.

Agricultural Research and Education, etc.—For the continuance of the research scheme in England and Wales during 1917–18 the following grants from the Development Fund to the Board of Agriculture and Fisheries have been sanctioned:—

	£
Grants to colleges and institutions in aid of—	
(*a*) Scientific research and experiments ...	19,600
(*b*) The extension of advisory and local investigation work	8,000
(*c*) Special investigations and research, and scholarships	2,400
(*d*) Inquiries and experiments, etc., by or on behalf of the Board	600
Expenses of administration	880
	31,480
Less amount not payable from the Development Fund	1,750
	29,730
Research in animal pathology to be undertaken at the Board's veterinary laboratory, 1917–18	2,000
Research Institute in Plant Pathology at Kew	1,358

The proposed expenditure in respect of the grants for research institutes and advisory centres contemplates only the carrying on of existing work, and no new work of any importance was started last year with the exception of investigations bearing directly on the war, with which some of the workers are engaged, particularly at Cambridge University.

A grant to the Board of Agriculture and Fisheries of 16,445*l.* was made in aid of agricultural and dairy education during the year 1917–18.

A grant of 3700*l.* was sanctioned to enable the Board in consultation with the Commissioners to assist new emergency schemes of an educational or quasi-educational character. A grant of 1330*l.* was made to the Imperial College of Science and Technology for an investigation during 1917 into the effect of electrical discharge on the growth of crops.

The Commissioners have recommended an advance of 400*l.* to the North of Scotland College of Agriculture for the continuation during 1916–17 of research work which is being carried out under the supervision of a joint committee of the University of Aberdeen and of the college; an advance of 315*l.* to the University of Edinburgh for the continuation during the period

[1] Abstracted from the seventh report of the Development Commissioners on their proceedings during the year ended March 31, 1917.

November, 1915, to November, 1917, of research in animal breeding; and advances of 700*l.* and 395*l.* to the Board of Agriculture for Scotland for the purpose of aiding the University of St. Andrews and the three agricultural colleges of Scotland in carrying out during the academic years 1915–16 and 1916–17 schemes of special research in agricultural science. The Commissioners also recommended the renewal in respect of 1916–17 of the annual advance of 5000*l.* in aid of "extension" work at the three Scottish agricultural colleges—*i.e.* instruction to agriculturists in the colleges' provinces.

For the year 1917–18 a grant of 4000*l.* was made to the Department of Agriculture and Technical Instruction for Ireland in aid of its scheme of technical and advisory work in connection with agriculture, and a grant of 196*l.* in aid of the maintenance of property acquired for a new veterinary research laboratory.

Eggs and Poultry.—A grant to the Board of Agriculture and Fisheries of 3200*l.* was recommended for a scheme for augmenting the production of eggs and poultry during the season 1916–17 by the establishment of 300 centres in England and Wales for the distribution of trustworthy eggs for hatching, twenty stations for the distribution of day-old chicks, and the provision of five incubating stations; and a grant of 358*l.* to the Utility Poultry Club in aid of the continuance of the Burbage breeding experiments during the year to September 30, 1916.

Cultivation and Preparation of Flax, Hemp, and Tobacco.—Two grants to the British Flax and Hemp Growers' Society were recommended: one of 4575*l.* to meet the expenses of the society during the six months to September 30, 1916, and the other of 6275*l.* to meet the expenses of the society during the year to September 30, 1917. The object of the society is to ascertain whether flax can be grown in this country with profit to the growers. The society's scheme involves the cultivation of flax in selected districts, the establishment of experimental retteries, experiments on the growth of flax as a crop for seed independent of fibre, and experiments in the breeding and selection of better strains of flax. Owing to the war and the consequent rise in the price of flax, the acreage has been increased, and it is expected that the enhanced prices will cause a considerable reduction in the cost to the Development Fund of these experiments and at the same time stimulate the revival of the industry in this country. Shortly after the close of the year to which this report relates the Commissioners recommended a supplementary grant for a considerable extension of the society's work in 1917, undertaken partly in order to ensure a future supply of material for the production of aeroplane cloth and partly to increase the growth of linseed as a feeding stuff for stock.

A grant of 1200*l.* to the British Tobacco Growers' Society was recommended for the continuance of the work of the society during the year 1916–17. The society is conducting experiments in the cultivation and preparation for market of tobacco and nicotine products in order to ascertain whether tobacco can be grown in this country with profit to the grower. Confidence in the possibilities of the tobacco crop was so far established as to enable the society for the first time in 1915–16 to make contracts with growers to grow the tobacco at their own risk and at a fixed price, with the stipulation that only sound saleable leaves would be accepted. The arrangements proposed for 1916–17 are an advance in the experimental stage. The Commissioners considered the question of the suspension of the society's work until the end of the war, but the society claimed that the experiments had reached a stage at which their abandonment or suspension would involve a serious loss of the value of all past expenditure, and a largely decreased grant was applied for to carry on the work. The Commissioners came to the conclusion that a case had been made out for the limited operations proposed.

Encouragement of a Beet Sugar Industry.—The Commissioners are of opinion that a trial on a considerable scale of a sugar beet experiment should be made, and that the present time affords particular reasons for initiating such a trial. The Kelham Estate, Nottinghamshire, is exceptionally suitable for such an experiment, and the Commissioners recommended a loan of 125,000*l.* for its purchase with a view to the establishment of the beet sugar industry in this country.

Horse and Live Stock Breeding.—The following grants were recommended:—

35,100*l.* to the Board of Agriculture and Fisheries to meet the cost during the year 1917–18 of the scheme for the improvement of heavy horses, cattle, and swine, the extension of milk recording, and the employment of live stock officers at agricultural institutions in England and Wales; 10,250*l.* to the Board of Agriculture for Scotland in aid of the scheme for the improvement of heavy horses and cattle, and the extension of milk recording in Scotland during the year 1917–18; and 2000*l.* to the Department of Agriculture and Technical Instruction for Ireland in aid of the Department's scheme for the improvement of Irish draught horses during the year 1917–18.

Organisation of Co-operation among Agriculturists.—A grant to the Agricultural Organisation Society of England and Wales for its work during the year 1916–17 was recommended; also a grant to the Scottish Agricultural Organisation Society in aid of its work during 1916–17, consisting of an advance equal to the amount spent from the society's own funds during the year, but not exceeding 1000*l.*; and a grant of 532*l.* to the Irish Agricultural Organisation Society in aid of its work during the year 1916–17.

FORESTRY.

During the year the Commissioners reviewed their policy with regard to new forestry schemes to be financed from the Development Fund, especially in relation to the alternatives of purchase and long lease of land, and to their proposals for afforesting privately owned land on the basis of a division of the proceeds when they accrue. The experience of the war has shown that the nation must in prudence be prepared to incur substantial expenditure in increasing the home-grown supplies of timber. Much of the waste land of the country can be turned to account only by putting it under timber; and there are other areas of unimproved land which can be rescued from their present unproductive condition by composite schemes of afforestation and reclamation. A forest will afford seasonal employment for men occupying or employed on small farms, and will itself be economically worked by the labour so employed.

A grant of 4300*l.* to the Board of Agriculture and Fisheries was recommended for the continuation in the year 1917–18 of the scheme for research, forestry instruction and advisory work at four centres in England and Wales, minor forestry experiments and surveys. It was represented to the Commissioners by the Board of Agriculture that in view of the large amount of timber which was being cut down in this country, the difficulties in which nurserymen were involved owing to the shortage of labour, and the fact that seed and seedlings of enemy origin, largely purchased in normal times by nurserymen, were no longer available, it was desirable to raise a supply of forest tree seedlings in case there might be a shortage for replanting after the war A grant of 200*l.* was made

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
	207,903	127,000
Total	334,903*l.*	

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
	1,924,406	677,871
Total	2,602,277*l.*	

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.