

### Research and Industry in South Africa.

THE Union of South Africa, although possessing so small a population (only 7,200 whites), employs the scientific worker and the engineer to an exceptional extent; and progress in the Union is correspondingly remarkable. Forty years ago the country was sparsely populated and scarcely possessed a factory. In 1925 the gross value of the output of its industries was estimated at £79,789,000, and that of its mines at a further £50,000,000.

Much of this progress is directly due to the intelligent employment of scientific and engineering skill. In gold-mining, the discovery of the cyanide process made possible the present output of more than £40,000,000 a year. The handsome profits obtained, in spite of the low grade of most of the mines, have been made possible by the application of years of research and experiment to the development of metallurgical processes, the cheap production of electricity, explosives, and compressed air, and to the design and handling of rock drills and jack-hammers.

Fortunately, this is now fully realised by the financial heads of the mining industry. Apart from the central research laboratories of the groups, some of the larger mines have their own 'study departments,' the staffs of which devote their full time to research, experiment, and instruction in methods likely to reduce costs. In the best mines only men with technical training as well as practical experience are employed on this work; and they are well paid.

In some countries agriculture is popularly regarded as one of the most empirical industries. In South Africa the local peculiarities of soils, the varieties and virulence of pests and diseases, and the irregularity of the rainfall, early led to a special call on the services of the research worker and of the civil engineer. In spite of the disadvantages mentioned, South Africa now exports more than ten million pounds worth of farm products a year.

So long ago as 1911, four highly paid posts were created for research on the fertility of seeds, whilst the large veterinary research institute near Pretoria was founded in 1908. There are now, in addition, five schools of agriculture with experimental farms, and also a national herbarium. There is a department for the study of bacterial diseases of plants at Pretoria, and a government laboratory at Durban for the study of the sub-tropical diseases of the sugar-cane and allied plants. Durban also possesses a private institution for research on problems met with in the sugar-cane industry. At Cape Town there is a government laboratory for the study of the diseases of deciduous fruit trees.

The Department of Agriculture maintains a special experimental farm for the study of the resistance of plants to drought and frost, and also two chemical laboratories (Cape Town and Johannesburg), equipped for both analytical work and research.

Students who wish to take up the scientific study of agriculture complete a preliminary three years in South Africa and then proceed for a further two years, usually aided by a government scholarship, either to Guelph, Ontario, or to Denmark or Sweden. Those taking up veterinary sciences for the degree of B.V.Sc. take a two-years' preliminary course at an approved college or university in South Africa, and then a three-years' course at the Institute at Onderstepoort near Pretoria.

That the application of the results of such study and research may be made to yield good profits or, alternatively, to prevent heavy losses, is now widely appreciated by the majority of the farmers in South Africa, but not by all. A story is told of one old cattle

farmer, the local oracle of his district, who did not believe in blood tests for disease. Such tests are carried out free of charge if the suspected animal is found to be infected, whilst a small fee is charged if a negative is obtained. This farmer sent a sample of his own blood to the government laboratory and widely proclaimed his cleverness in devising this pitfall for the —! (gentlemen) who spend the poor farmers' taxes in such foolery. In due course the report was received by him. It stated that a mistake had been made; the blood sample was not from any farm animal but appeared to have been taken from an old gorilla which was suffering from the list of diseases attached and was apparently in such a bad condition that it should be killed at once. The report also stated that, in accordance with the regulations, no fee would be charged for the examination of the sample submitted. The farmer was not heard proclaiming his views on this subject any more.

In connexion with forestry, as apart from farming, a small sylvicultural research station has been established near Knysna in Cape Colony and the establishment of similar stations is contemplated in other districts. Timber investigations are carried out at Pretoria by the Department of Agriculture in co-operation with the Railway Administration. Relevant inquiries from the public are dealt with by the officer of this section.

Medical research has received particular attention in South Africa, and expenditure has been on a lavish scale. Apart from the outstanding investigations on the prevention of silicosis and pneumonia on the mines, much work has been done on epidemic influenza by the South African Institute for Medical Research. Eighteen memoirs have been published on these and other subjects. The chief medical school of the Union is at Johannesburg.

In mining, apart from the central laboratories of the mining groups and the efficiency and study departments of the larger mines, the Department of Mines and Industries carries out much research work. Health, safety, and particularly the prevention of miner's phthisis, are the subjects dealt with by the latter. Recently, in conjunction with the Geological Survey, special attention has been given to exploring the commercial possibilities of mineral deposits, particularly those of the base metals and the non-metallic minerals. The subject of uses and markets overseas receives special attention.

In chemical industry, still in its infancy in South Africa, private enterprises have carried out a large amount of work on local problems such as the manufacture of wattle bark extract, refractories, phosphates, caustic soda, acetates, paper, starch, wood and coal distillation products, and rubber from the raw materials occurring in the Union. Promising local research is now being carried out on yet another process for the 'liquefaction' of coal, and on the distillation of oil from the local shales and torbanite. Practical experience and systematic experiment have been successful in establishing the local manufacture of leather, soap, candles, calcium carbide, cement, glass, tiles, and earthenware.

The production of iron, steel, and alloy steels from local ores is only just commencing, although the utilisation of the immense supplies of scrap metal from the mines was more or less perfected during the period of the War.

With so much interest in research, and so much development in industry, it is not surprising that South Africa has many scientific societies, most of which publish their own proceedings and maintain a high

standard in the contributions of their members. In Johannesburg an interesting venture is the Technical Club, an attempt at a social club for the members of the scientific societies which contribute to its upkeep. The club successfully houses the offices of the secretaries of the contributing societies; but as in London, scientific workers do not seem to be anxious to see each other in the evenings except at the meetings of their respective societies. At the universities, on the other hand, there is a considerable amount of social intercourse, a good esprit de corps, and keen competition in games; but in both the scientific societies and the universities the importance of research to industry and of industry to the country is keenly appreciated.

Industry already employs many thousands of whites and blacks in addition to the thousands employed by the mines. With its firmly established agriculture, its fine geographical position with regard to the growing markets of the East, its vast national resources of coal and iron, its fine railways and good harbours, and its wide appreciation of the value of research, the future of the South African industries should be bright indeed.

### The Food of Young Herring.

IN the investigation of the food contents of large batches of young herring (Fishery Board for Scotland, Scientific Investigations, 1927, No. 1, "Observations on the Food of Post-Larval Herring from the Scottish Coast"), Miss Helen S. Ogilvie, of the Fishery Board for Scotland, has an exceptional opportunity. The fishes examined measured about 30 mm. to 45 mm., and were metamorphosing, having a more or less transparent body with, in the larger specimens, scales in the process of formation. Hitherto it has been far more difficult to find such stages than to find the fully scaled forms which are slightly older and larger and constitute the 'white-bait'. These post-larval stages have now been found in abundance in the coastal waters and up the estuaries in the neighbourhood of Aberdeen. Lot No. I was taken outside Aberdeen Breakwater, Lot No. II off North Pier, and Lot No. III, examined for comparison with the other two, from Kincardine-on-Forth.

Observations have been made on the food of very young herring and of those of whitebait size, but not so far to any extent on post-larval herring between these stages. The present work is therefore extremely valuable. As was to be expected, the food found consisted almost entirely of copepods, the commonest species being *Pseudocalanus elongatus* and *Oithona similis*, and, in those from Kincardine, *Eurytemora hirundoides* in great abundance, which last is a brackish water copepod, the station where the third sample was caught being an estuarine one. One fish belonging to this group measuring 45.5 mm. contained 369 copepods. Another from Lot II measuring 40 mm. contained 479.

Miss Ogilvie finds, contrary to those workers on the younger stages who found many empty, that nearly all the herring examined were feeding. Out of 345 individuals, 95.4 per cent. contained food. In fishes of the same size examined by Hardy from the North Sea, only 46 per cent. contained food. Moreover, more food was found in the Scottish herring than in those from England. One particular copepod was the chief food in each lot. Thus in Lot I *Pseudocalanus* was predominant, in Lot II *Oithona*, and in Lot III *Eurytemora*. All three copepods are some of the commonest present where the fishes were respectively taken, and it seems more a matter of size than anything else which determines the species eaten.

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### University and Educational Intelligence.

LONDON.—Applications are invited for the William Julius Mickle fellowship, value not less than £200 and open to men and women graduates of the University, resident in London. The fellowship is for the student who, in the opinion of the senate, has done most for the advancement of medical art or science during the preceding five years. Applications should reach the Academic Registrar, South Kensington, S.W.7, not later than Sept. 30.

DR. R. M. WENLEY, who has been acting as director of the British division of the American University Union, is about to return to the headship of the Department of Philosophy and Psychology in the University of Michigan.

APPLICATIONS are invited by the Wigan and District Mining and Technical College for the A. M. Lamb scholarship in mining, value £30 annually and tenable for three years at the full-time courses of the college. Particulars can be obtained until Sept. 7 from the principal.

NOTICE has been received of the Prof. Aurelio Bianchi International Prize of 10,000 lira (about 100 guineas) for "works in phonendoscopy, phonendography, phonometry" of an experimental character. The prize is open to persons of all nationalities and to individual workers or several persons working in collaboration. Memoirs must not have been published before, and may be in Italian, English, French, German, Spanish, or Portuguese. The competition closes on May 24, 1928. Further particulars can be obtained from the Rector, Royal University of Perugia.

TITLES of theses for doctorates conferred in the sciences by American universities in 1925-26 are given in a list published by the National Research Council as *Report and Circular No. 75* (N.R.C. Washington, D.C., 50 cents). The list is classified under twenty-one subject headings, and statistics of doctorates conferred under each of these headings are given for the past ten years. During this period the number of doctorates conferred annually has increased from 373 to 740, the increase being greatest under chemistry (from 108 to 256). The Council expresses the hope that those who find the data of interest will write, so that the Council may judge whether the publication should be continued.

BRADFORD Technical College opens this year a new department of pharmacy, particulars of which are given in the college prospectus for 1927-28. The courses are recognised by the University of London and the Pharmaceutical Society of Great Britain for the purpose of training for the degree of bachelor of pharmacy and for the Society's professional examinations respectively. A special feature of the College is the provision made in its department of commerce and banking, established in 1925, for meeting the needs of students who will enter the commercial side of industrial undertakings or such professions as accountancy, and for equipping students in all branches of technology with a useful knowledge of economics. Three research scholarships of £100 each are offered to students proposing to stay on at the College after completing diploma courses.