

to seek employment in other directions, and science has been consequently the poorer.

The fundamental idea which has inspired the Salters' Company may be illustrated by one or two examples. Suppose a man to have taken his degree with distinction in chemistry, and in physiology as a second subject. Elected to a Salters' fellowship, he may undertake a research on some subject of a biochemical nature. This may be carried on at his own university or at any other possessing a special school for this class of work in England or some other country. In due time arrangements may be made by the director for the fellow to take a course of chemical engineering, perhaps in America, and afterwards to obtain technical and industrial experience. In a very short time a man so trained and experienced will be in a position to demand, and will certainly be worth, a very high salary. It would be easy to provide a similar course with the necessary modifications adapted to the case of a man whose original bent is in the direction of physical chemistry or pure organic or metallurgical chemistry. The printed scheme issued by the Salters' Company gives no information as to the pecuniary value of the proposed fellowships. In estimating the annual amount which should be assigned to each fellowship, it must be remembered that the holder, while required to live simply and carefully, must be free from difficulties about books, travelling expenses, and laboratory outlay. Probably 300*l.* a year under present conditions and for some time to come will not be found too much, though perhaps expenses will depend to some extent on whether the student remains at home or is required to reside at a foreign university or centre. When operations are to commence at the institute will depend on the discovery of the right man for the office of director, and doubtless he will have a good deal to say about working details.

The two classes of fellowship referred to in the scheme have been in principle anticipated. For the former, which provides for post-graduate study without at first direct reference to technical applications, the Ramsay Memorial, which has been before the public for the greater part of the last two years, has adopted essentially the same plan, and is only waiting for funds to carry it into effect.

With regard to the institution of industrial fellowships, nothing of the kind has yet been attempted in this country. But the Kennedy Duncan scheme in connection with the Universities of Kansas and Pittsburgh has been in operation for some few years, and is reported to have been satisfactory and successful. Mention of these facts, however, is not intended to disparage in any way the wise forethought and liberal intentions of the Salters' Company, which, by the action now contemplated, is rendering a very important service to national interests, both by the example thus set and by the generous application of its funds.

One other point may here be mentioned. The scheme under consideration seems to avoid the difficulty which has always been associated with

other schemes for the encouragement of post-graduate work—namely, that the career of the student after the first few years was indeterminate, and often ended in disappointment. The scheme, once talked of, for providing valuable fellowships with the object of tempting a few specially endowed researchers to devote the rest of their lives to research seems to have been lost sight of, or, after consideration, to have been given up.

It is, however, to be hoped that nothing in the plans proposed for associating science with industry will result in discouragement to scientific genius. Researches undertaken with specific objects, especially with a view to improvements in manufacturing processes or to the invention of new ones, and in the investigation of properties of materials and products, will probably not lead to the discovery of new fundamental principles. In the past these have almost always been the fruit of labours undertaken under the stimulus of that kind of curiosity concerning Nature, her laws, purposes, and operations, which is sufficient to satisfy the ambition of a Davy or a Faraday. Whatever Ramsay might have done had he devoted his working life to researches designed to assist industry, the results of his studies concerning the source and properties of the inert gases, themselves of no use in human affairs, are of greater permanent interest and importance by reason of the new light thrown on the nature of the elements and the constitution of matter. After all, a knowledge of the materials and powers in which life is immersed, and of which it is a part, is in the long run more useful than the applications which may be made to the purposes of mankind. The student of Nature is concerned only about the means of carrying on his work without anxiety as to the future of himself or his family. His discoveries cannot immediately become the subjects of sale or pecuniary reward, and as a rule he does not look for anything of the sort. It will, however, not be forgotten that for the few there are the Nobel prizes.

#### THE RECONSTRUCTION OF THE FISHING INDUSTRY.

IT is no secret that a most vigorous propaganda for the reconstruction of the entire fabric of fishery control is now being carried on by those engaged in the industry, and that this movement gathers force as the end of the war appears to come nearer. The English propaganda takes the form of proposals for the unification of fishery control by the creation of a Ministry having all the powers now exercised by branches of several Public Departments and by the local Fishery Committees. Its suggestions relate mainly to administrative and regulative reforms, to problems of marketing, transport, distribution, exploitation, and technical education. The Scottish proposals, which have just become public,<sup>1</sup> devote but slight attention to administrative changes, but

<sup>1</sup> Memorandum on the Reconstruction of the Fishing Industry after the War. Prepared by the Scottish Steam Drifters' Association, Aberdeen, at the *Daily Journal* Office, September, 1918.

emphasise in the strongest manner the necessity for the organisation on a large scale of *scientific research and education*. Proposals for the reform of the Fishery Authority consist of the suggestion that the existing Fishery Board should cease to exist, or, rather; that it should be "assimilated in form to that of other Public Departments," being "completely manned by Civil Servants and with a permanent head," and coming into relation with the industry through a Consultative Board.

The Memorandum before us gives a short account of the pre-war yield of North European sea-fisheries. In the year 1912 Europe took about 7000*l.* per 100,000 inhabitants, Norway 128,000*l.*, Germany 3000*l.*, Great Britain 29,000*l.*, and Scotland 73,000*l.* This position of Great Britain it is our duty to maintain.

The scheme for the organisation of scientific research and fishery education exhibits a degree of insight into the conditions of the industry and a familiarity with the problems involved such as no previous recommendations have disclosed. The whole situation has materially changed since pre-war days. Ought our participation in international schemes of fishery investigation to terminate? Should any scheme of scientific research aim at the co-ordination of the English, Scottish, and Irish Authorities? The Memorandum says "Yes" to both questions. British interests in North European fisheries are so outstanding that they call for adequate attention; some other nations may not be prepared to go on with the work of the International Council, and if they do the Continent will again become the centre of gravity of the organisation, while in the industry itself Great Britain will remain the predominant partner; and, finally, the expense of time and money entailed by the frequent conferences under the old scheme was unattended by proportionate results. But all this need not imply isolation in matters of investigation—only formal withdrawal from the existing scheme.

In place of the three national Fishery Departments and some of the local Fishery Committees, which before the war instigated scientific research, the Memorandum suggests a single central council having the control of the funds voted by Imperial Parliament. The Council ought to contain representatives of each national Department, of the Meteorological Office, of the fishing-vessel owners, and of the industrial concerns dealing with curing, preserving, by-products, transport, and refrigeration. Recognising the movement in the public mind towards devolution of authority and administration, the "vital importance of combining scientific research with industry," and the necessity for close co-operation between the expert and the *entrepreneur*, the drafters of the Memorandum regard centralisation in London as detrimental. "It could not be accepted." The Council, the head of which ought to be a chairman and director, a man conversant with fishery matters, "and not appointed for political reasons," would expend, direct and allocate the administration of funds, publish reports, memoirs, and results of

research, advise on supporting scientific work carried on in unofficial laboratories, devise schemes of investigation and systems of statistical collection, conduct propaganda, appoint agents abroad, publish intelligence, and conduct a fishery journal.

But the Central Council would not establish laboratories or actually conduct scientific investigation. That would be the work of the English, Scottish, and Irish Fishery Departments, and of the Marine Biological Association of the United Kingdom (for "in respect that pure science is the fountain from which applied science draws its life and force, the Marine Biological Association should receive a generous grant yearly out of the funds received by the Central Council"). Each of these four organisations would establish and maintain laboratories, and conduct research in accordance with the schemes submitted to them and the funds allocated. They would also organise schemes of fishery education and co-operate with educational authorities for that purpose.

Some matters dealt with apply specially to Scotland. The Department should seek to develop the new Education Act, which appears to provide for continuation and technical instruction, but not for higher fishery education. For the latter purpose a college of fisheries at Aberdeen is suggested, similar in scope to the Scottish College of Agriculture. This would provide for the education—"that is now a clamant necessity"—of those holding responsible positions in industry in all subjects that are relevant. It would provide for training in research, conduct bureaux of scientific and economic information, maintain a museum, and carry on a sub-department for co-operating with local schools and "encouraging pupils of ability."

Here we have the real grip of essentials. "The future of the industry depends on knowledge"; "Nothing will so surely secure this as opportunities for scientific knowledge." If the outlined schemes for education and scientific research are carried out, "the Scottish fishing industry will continue to hold its high place among the nations of Europe."

#### NOTES.

The inauguration of the first boring for petroleum in this country, which took place at Hardstoft, near Chesterfield, on October 15, was an event of more than economic interest by reason of the confirmation it may afford of the speculations of competent oil-field geologists of the existence of oil in this country. Forty American drillers are engaged on the first boring, but provision of the necessary plant for drilling ten wells has been made; seven of these drillings are to be made in the vicinity of Chesterfield. Each of the wells will be fully equipped for a maximum depth of 4000 ft., and the principal occurrence of oil is expected to lie between 2000 ft. and this maximum. Lord Cowdray, to whom the nation is so much indebted for the assistance he has rendered in this pioneer work, claimed that although in America such experimental drilling would be known as "wild-cattling," yet it was more