

WORK OF COUNCIL FOR SCIENTIFIC RESEARCH

EFFECTIVE WORK DONE IN VARIETY OF RESEARCHES

Investigations Included Reduction of Low Grade Iron Ores, Wheat Genetics, Discoloration of Canned Lobster, Fish Curing and Industrial Alcohol

[Continued from page 9.]

means remove all the fat, and, therefore, the residue which should consist mainly of proteins is fat-containing and to a considerable extent. This difficulty intruded itself in the operation of the dog-fish reduction plants at Canso and Clark's Harbour, N.S. To utilize dog-fish for the production of oil fertilizer these plants were operated under the auspices of the Department of the Naval Service, but are now closed owing to the failure to make them pay. The residue could not be directly used as a fertilizer because the oil contained therein on decomposition in the soil "sour" it and rendered it more or less unproductive. To dry it, the residue was roasted which caused, however, a loss of a considerable part of its fixed nitrogen, and it was thereby, and proportionately to the degree to which the roasting has been carried out, less valuable as a fertilizer. For the preparation of a good animal food also, the separation of the greater part of the oil is necessary, as the presence of it to any considerable extent in the food tends to give a "fishy" taste to the flesh of the animal fed on it.

The more or less imperfect character of these and other methods of the treatment of fish waste had deterred ventures into this line of industry, and, in consequence, the fundamental work on which success in it must be based is still to be done.

The utilization, however, of this waste will be of imperative urgency in the very near future. Even now there is a very serious deficiency in the world's supply of food, including specially fats. It will take twenty years at least to restore the annual supply to what it was before 1914 and, therefore, any source of protein and fat at present untapped should, if it is at all industrially feasible, be made to contribute its quota of these indispensable nutrient compounds. The proteins so obtained would, mixed with other foods less nourishing, give a product which, as stock food, would enhance the supply of meat of various kinds, beef and pork, while the fat could be employed to the extent of its supply in the production of the cheaper and commoner kinds of soap for which so much of more valuable fat is used to-day. The consideration of the question of taking measures which might lead to the utilization of fish offal for this purpose ought not to be postponed if there is at all a possibility of employing the waste economically.

The Council on the recommendation of Professor R. P. Ruttan, Chairman of its Associate Committee on Chemistry, gave full consideration to this question. It collected data on the subject and appointed Mr. J. B. Fielding, who had in 1915, under the auspices of the Conservative Commission, carried out demonstrational work in this line in a provisional plant at Port Stanley, to make a tour of a number of centres in the United States for the purpose of gathering information regarding the utilization of fish waste elsewhere. The Council ultimately came to the conclusion that a project for the utilization of the offal could be successfully carried out, and that the results would blaze the way to the development of a new line of industry in Canada which would ultimately involve an output of several millions of dollars annually.

There are centres along the Atlantic coast where the quantity of fish offal readily collectible at comparatively low cost, from nearby points, is very considerable and where consequently it is possible on an adequate scale to test the commercial feasibility of a selected process for the treatment of the offal. Such a centre in Canso, N.S., where the quantity of offal accessible during the season is at least thirty tons and may be increased, at need, to double or

treble that amount. If it was decided to erect a plant for this purpose it was clear that Canso would be the most suitable location for it.

A consideration of all the facts and the information which the Council on the subject led it to consider that the utilization of fish waste was an industry which could be made to give profitable returns and that it was necessary only to demonstrate this on a modest scale by the installation of a plant and the operation of it for a year or so, in order to induce private companies or firms organized for that purpose to undertake this utilization. To provide this demonstration it recommended to the sub-committee of the Privy Council for Scientific and Industrial Research that an appropriation of \$50,000 should be made to carry on this demonstration for one year under a commission which would control the equipment of the necessary plant and its operation for that period. It was recommended that the equipment be installed in the disused lobster hatchery at Canso, which could be granted for this purpose, and further that one of the steam trawlers at the disposal of the Government and for part of the year not on duty in the fishery service, be available for the collection of the fish waste in the locality and even for catching by trawling of such kinds of fish of the vicinity, skate for example, as are not at present used for food.

PRACTICAL EXPERIMENT.

These recommendations were also advanced to the Reconstruction and Development Committee of the Privy Council and were under consideration by that Committee when it developed that the project might be undertaken and carried on by private enterprise. Eventually, Mr. J. S. Myers, President of the Peerless Cereal Milling Company, of Woodstock, Ontario, organized a company with a considerable amount of capital, which purchased the lobster hatchery from the Department of Fisheries and is now installing in it the necessary machinery and equipment. One of the Government trawlers or drifters is, it is understood, to be placed at the service of the company for a limited period in order to provide for the collection of the fish waste and the catching of fish, of the class not used as food. Mr. Myers proposes to use the plant for the production not only of fish oil, but also for the preparation of protein material suitable for mixture with the offal of cereal mills to make special cattle food.

The results of this undertaking will, it is hoped, serve to encourage other ventures of a like character elsewhere, eventually leading to a complete utilization of a very large part of the present amount of fish waste.

The Research Council proposes to give further attention to the utilization of fish waste, because it considers that the last word has not been said either in regard to the processes now followed in this utilization or to the character of the product. The processes involve biochemical problems of a highly intricate nature, and the solution of these must greatly enhance the success of the utilization. It may be pointed out, incidentally, that in this utilization cheap industrial alcohol must prove a very valuable factor.

The report deals as follows with the subject of a National Research Institute:—

The Research Council early in 1918, as shown in the last report of the Administrative Chairman, after full consideration of the question of the right organization to provide for systematic research on the natural resources of Canada and on the problems which concern the development of Canadian industries, came to the conclusion that this organization should be that of a National Research Institute, constituted

to deal with standards of all kinds, like the Bureau of Standards at Washington, and to have also the function of providing facilities for research on and maintained by Associations or Guilds for Research formed in the various lines of industry.

INSTITUTE RECOMMENDED.

Since then the Council has placed before the Sub-Committee of the Privy Council for Scientific and Industrial Research, and the Reconstruction and Development Committee of the Government, a report recommending the establishment at the earliest possible date of such an Institute and that an appropriation of \$500,000 be made for a building, of the laboratory type, for such institute to be erected on a fifty-acre site near Ottawa and further that \$100,000 for its scientific equipment and \$100,000 for salaries of the staff during the first year be also provided. The memorandum embodying this report is reproduced in Appendix 'J.' The report has been accepted by the two committees, but has not as yet been approved by the Government. The subject is now under consideration by a special committee of the House of Commons appointed 'to consider' the matter of the development in Canada of Scientific Research, with power to call for persons, papers and records, to examine witnesses under oath and to report from time to time.

The question of establishing such a National Research Institute is discussed in Section 11.

The Council has given consideration to the question of the control of this Institute which, it holds should be vested in the Research Council and subject to approval and supervision of the Sub-Committee of the Privy Council for Scientific and Industrial Research. In support of that may be adduced the results of past experience in the matter of direct Government control of scientific organizations and the precedents created elsewhere in the case of National Research Institutes, as, for example, the National Physical Laboratory of Great Britain, the National Research Institute of Japan and the proposed Institute of Science and Industry for Australia, a Bill to establish which is now before the Parliament of the Commonwealth (Appendix 'Q'). The control of the National Physical Laboratory of Great Britain was vested in the Royal Society which appointed a Board of which the President of the Society was the chairman and the executive committee of which constituted the real governing body of the laboratory. Under the new provisions for the future control of the laboratory this control is still to be exercised by the President and Council of the Royal Society as indicated in the appendix to the report of the executive committee for 1918, and reproduced as Appendix 'R.' The budget of expenditure of the laboratory will be met, as for the last three years by grants from the Government Department of Scientific and Industrial Research.

To indicate, in as concrete a form as possible, the views of the Research Council as to the provisions it recommends for the control of the proposed National Physical Laboratory a draft of a Bill to establish this institute, to be offered for the consideration of the Government is reproduced in Appendix 'K.' This draft is the result of a long and careful consideration by the Research Council.

FORESTRY STUDIES.

On the subject of "Forestry Studies," the following observations are made: "The work undertaken in 1917, by the Forestry Branch of the Department of the Interior with the object of obtaining data regarding the rates of growth in volume of our more important timber trees notably the white pine and spruce and the possibilities and successful methods of securing their reproduction, and to which extended reference is made in the Administrative Chairman's report for the year ending March 31, 1918, was continued on the cutover area of the Petawawa Reserve last season and a large number of data were obtained which are of great value in determining the lines along which these forestry studies are to be conducted in the future."

The results already obtained from

this survey have enabled the Forestry Branch to elaborate a system of forest organization which is specially adapted to the conditions which in Eastern Canada and which permit the inauguration of the best silvicultural practice to provide efficiently for reforestation.

In the comprehensive report of the work carried on for the last season prepared by the Forestry Branch of the Department of the Interior, a summary of which is given in Appendix 'M,' it is pointed out that if the organization of the Petawawa Military Reservation is completed and the tract placed under permanent management a concrete example of the value of intensive organization in forestry conservation will be continually available for Canadian lumbermen. It is also urged in that report that if the Government can develop such a system and make it a financial success lumbermen should not hesitate to adopt in the management of their own areas a similar system of intensive organization for conservation of their lumber supplies.

The expenses involved in these investigations under the control of the Forestry Branch were met by a grant from the Research Council amounting to \$6,214.57. A grant has been made to cover the expenses of the investigation for the season of 1919.

The Research Council regards these investigations as of fundamental importance in determining the data which must be ascertained regarding the rates of growth in volume and the possible quantity of reproduction of our more valuable timber trees, in order that a comprehensive and successful attack on the problem of reforestation in Eastern Canada be undertaken. Without such data it will be impossible to take any effective measures to prevent the exhaustion of our lumber supplies especially of white pine and spruce.

BURSARIES FOR STUDENTS.

The establishment of Bursaries and the provision for training research students in Canada is treated as follows: "Early in 1917, the Council recognized the limited number of highly trained researchers in Canada and that it was necessary to increase the supply of such if the application of research to Canadian industrial problems is to be successfully fostered. To accomplish this object more quickly it established twenty studentships and five fellowships, with the understanding that the numbers of both should be increased when the supply of candidates for them should be sufficient to justify this action.

The cardinal qualification of a candidate for studentship is the possession of initiative and independent action in prosecuting research on some special scientific problem, a qualification the possession of which he can demonstrate only by having carried on to a successful termination a research of some distinction. He must indeed, have also other qualifications. He must for example, be a university or college graduate, with a special knowledge of the science to research in which he is to devote himself and have a good general knowledge of the cognate science. These are, however, not in themselves enough for without the initiative and the capacity for independent thought no student may ever become a purchaser.

The fellowships are awarded to those who are holders of studentships for one or two years, or independently, have shown in a high degree capacity for research.

Now the demonstration on the part of any candidate for a studentship of his capacity for research implies a year or so spent in post graduate study during which he must attempt some research work. As a rule there are few of those who have just graduated in a position to afford the additional expense and consequently they may be unable to qualify for studentships. The Council decided to institute Bursaries, ten in number, for such to be awarded for 1919-20 to as many graduates whose attainments in science and whose expressed aims are such as to justify their being awarded such bursaries. A Bursary which is \$500 in amount is tenable only for a year and if the holder of one during that time demonstrates the possession of a capacity for research be awarded a studentship for the following year.