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THE SCIENTIFIC DEVELOPMENT OF THE FALKLAND ISLANDS DEPENDENCIES

Report of the Interdepartmental Committee on Research and Development in the Dependencies of the Falkland Islands, with Appendices, Maps, etc. London: published by H.M. Stationery Office. 1920 [Cmd. 657]. 2s. 6d.

IT has been evident to those who have followed events in South Georgia and the South Shetland Islands during the last fifteen years that the area included by the Dependencies of the Falkland Islands constitutes a national asset of great value, but that it would be unsafe to assume that it would retain that value if its exploitation were not subjected to some control. In 1904, as the result of Norwegian enterprise, a period of whaling activity on a scale far exceeding anything previously accomplished was inaugurated, by the formation of the *Compania Argentina de Pesca*, which began operations at South Georgia in December of that year. An expedition visited the South Shetland Islands, with similar objects, during the season 1905-6.

The pursuit of whales is an occupation of considerable antiquity, the Atlantic Right whale having been hunted in the Bay of Biscay at least a thousand years ago. After the numbers of this species had been very seriously reduced, as the result of operations in various parts of the Atlantic, the attention of the whalers was turned to the Greenland whale, at first off the coasts of Spitsbergen about the beginning of the seventeenth century, but later, when its numbers had declined in that neighbourhood, in Davis Straits; and at a still more recent period in the North Pacific and the adjacent parts of the Arctic Ocean. The Atlantic Right whale is said to have been saved from extermination by the discovery of the Greenland whale, which in its turn was reduced to a vanishing point in each of the three districts where it was successively hunted.

The Right whales so far considered, and the Sperm whale which was pursued in warmer seas, could be attacked successfully by small boats in the open sea. This was partly because their carcasses floated as a rule, so that the operation of stripping off the blubber could be carried out from the parent ship.

In 1865 a new era in the history of whaling was inaugurated as the result of the invention, by Svend Foyn, a Norwegian captain, of a harpoon fitted with a charge timed to explode on impact, which could be fired from a small cannon placed in the bows of the ship. This invention made it possible to capture the Rorquals or Fin whales, including the Blue whale, the giant of the group, which may reach a length of more than 100 feet. These whales had previously enjoyed a complete immunity from pursuit. The first Rorqual "fishery" took place in the Varanger Fjord, but others were started later off Newfoundland and in other localities. In every case the history of the operations has been identical, the period of prosperity with which they opened having been succeeded by a notable fall in the numbers caught, so that in most of the localities where whaling was once profitable the industry has become a thing of the past.

This was the position in 1904, when the vast schools of Sub-Antarctic waters began to be attacked. Modern methods can be most successfully employed when it is possible to hunt the whales at a moderate distance from shore and to tow their carcasses, artificially inflated with air, to land stations,

where the oil can be extracted from the blubber and the other products of the whales can be manufactured. For these purposes the island of South Georgia offered exceptional advantages, owing to the abundance of whales found off its shores and to the presence of good ice-free harbours where land factories could be erected. The South Shetlands possess one excellent land-locked harbour in Deception Island, but it has only one ice-free beach; and the preparation of the oil is accordingly carried on almost entirely by means of "floating factories," which are vessels larger than those used in hunting the whales and fitted with boilers for the extraction of the oil. At both these localities whaling has been extraordinarily successful, and in a single year the total catch of both together has exceeded 10,000 whales; a number which should be contrasted with 1437 Greenland whales captured in 1814, a year described by Scoresby as a specially good one.

Taking into consideration the admitted reduction of the whales in the districts previously hunted, and the fact that this reduction was accomplished by methods which would now be considered primitive, it was natural to regard the future of the Sub-Antarctic grounds with anxiety. This was all the more justified by the evidence with regard to the Humpback, a species allied to the Rorquals, but of smaller size than the Fin whale and the Blue whale which at present constitute the greater part of the catch. At the commencement of Sub-Antarctic operations, the Humpback was the principal object of the whalers' pursuit, having constituted more than 90 per cent. of the total catch in the seasons 1910-11 and 1911-12. In 1916-17 it fell to less than 10 per cent. There is some reason to believe that a contributory cause to its reduction has been the establishment of whaling off the coasts of Africa, South America, and elsewhere in Southern seas, leading to the destruction of considerable numbers of Humpbacks which may well belong to the schools that frequent Sub-Antarctic waters at other times in the year.

In 1917 the first practical steps were taken for the investigation of these and other questions, resulting in the constitution of an Interdepartmental Committee by Mr. Secretary Long "To consider what can now be done to facilitate prompt action at the conclusion of the War in regard to the preservation of the whaling industry and to the development of other industries in the Dependencies of the Falkland Islands." The Departments represented on the Committee were the Board of Agriculture and Fisheries, the Colonial Office, the British Museum (Natural History), the Department of Scientific and Industrial Research, and the Admiralty, with Mr. H. T. Allen, of the Colonial Office, as Secretary. The Chairman of the Committee was Mr. P. C. Lyon, C.S.I., and the result of its labours has been the issue of a Report containing much information with regard to the problems considered. Valuable help was afforded to the Committee by evidence given by authorities on whales, by representatives of the whaling industry, by Sir Napier Shaw, F.R.S., of the Meteorological Office, by Sir F. W. Dyson, F.R.S., Astronomer Royal, by Dr. J. W. Evans, F.R.S., Adviser on Geology to the Colonial Office, and by other experts. The assistance given by Dr. W. S. Bruce and Dr. R. N. Rudmose Brown, of the *Scotia* Antarctic Expedition, should be specially mentioned.

The Committee were fully in agreement with the scheme which had been indicated in the original terms of reference to employ a research vessel for the investigation of the numerous problems involved, but they arrived at the conclusion that it would be necessary to have two vessels, provided with motor-boats and the scientific staff, crews, and equipment necessary for carrying on the proposed researches as completely as possible. They con-

template an investigation which would last for a period of years. Provision is also to be made for publishing the scientific results of the expedition.

The section of the Report in which the Royal Geographical Society will probably be most interested is Part V., Hydrography. It is pointed out that our knowledge of this subject is exceedingly meagre, and that much geographical work remains to be done, in the preparation of accurate surveys of practically all the islands. The importance of this subject to navigation in these waters was specially emphasized in evidence given to the Committee. Uncharted rocks remain to be localized, while further evidence as to harbours, particularly in the outlying groups, is greatly required. Tides and tidal streams, ice-conditions, and deep-sea soundings are other subjects included in the scope of this part of the Committee's recommendations.

Part I. of the Report defines the area of the Dependencies of the Falkland Islands, amounting to about 3,000,000 square miles, and adds information with regard to the history, physical characters, and government of the islands, with notes on scientific expeditions which have visited these waters. The whaling industry, which occupies a considerable proportion of the entire Report, is next considered, the importance of whale-oil as a source of glycerine during the war being emphasized. This is illustrated by the statement that about three and a quarter million barrels of oil were produced during the nine years 1909-10 to 1917-18, valued locally at from ten to eleven millions sterling. Making allowance for the rise of prices during the war, the valuation exceeds twenty millions. Six barrels of oil are approximately equal to one ton. The great predominance of Norwegian participation in the industry is noted, and information is given as to the regulations in force for controlling it. The next sections indicate the species of whales captured, with remarks on their breeding and migration and on their food. In order to obtain definite facts with regard to migration, as well as to the rate of growth, the age at which the animals become capable of breeding and their longevity, a system of marking the whales is recommended, on the analogy of the methods which have been successfully used in connection with the fishing industry. Researches required to supplement existing knowledge are suggested, while other sections deal with the danger of depletion of the stock of whales, the future control of the industry, the introduction of British personnel, and the products of whales, with a special section on the possibility of utilizing whale-meat as human food.

The Report next proceeds to discuss the sealing industry. The Fur seal was formerly abundant; and it was stated by Weddell (see Appendix II.) that 320,000 individuals were taken during 1820-21 and 1821-22 at the South Shetlands, where the species was practically exterminated as the result of the operations of these two years. In the words of Dr. W. S. Bruce, "This is a most important economic disaster that should not be forgotten, and should at least not be allowed to be repeated (Appendix I.). A single specimen of this species was killed in South Georgia in 1915, and the Committee recommend that the attempt should be made to restock the earlier breeding-grounds by the introduction of specimens from other localities. The magnificent Elephant seal, hunted for its oil, is still taken in large numbers at South Georgia; but although there appears to be no immediate reason for anxiety on its behalf, the Committee are fully aware of the importance of watching events closely, and recommend that special attention should be given to its life-history and habits, and to the methods which should be adopted for hunting it.

Fisheries, penguins, and the acclimatization of animals in South Georgia are the remaining zoological subjects considered, special attention being called

to the success which has attended efforts to introduce the reindeer into that island, and to the regrettable increase of the brown rat, another colonist of the same locality.

The later parts of the Introduction deal respectively with Hydrography, Meteorology and Magnetism, Geology and Mineralogy, Botany, Research Vessels, Management of the proposed investigations and Finance, with a concluding part summarizing the Committee's recommendations.

The Committee think that the first cost of the two proposed vessels would be not less than £85,000, and that the maintenance expenses would be not less than £28,000 to £33,000 a year, which would provide for an adequate naval staff, in addition to five scientific members of the permanent staff. The probability that certain additional expenses would have to be contemplated is indicated. It is assumed that the vessels and survey equipment would be provided by the Admiralty, and that the cost of maintenance and the pay of the naval staffs and crews would be borne by naval funds. The hydrographic work, including surveys and the investigation of currents, tides, sea-temperatures, ice-conditions and soundings would thus be provided for. Economic development, including whaling, is a matter affecting the Dependencies, which may thus be expected to find most of the remainder of the funds; and it is proposed to raise the money required by increased taxation of the whaling and sealing industries. The executive control of the expedition is to be left in the hands of the Admiralty and the Colonial Office, the Departments through which the investigation will be financed. An Advisory Committee is to be set up, including representatives of these two Departments, of the other Departments represented on the reporting Committee, with the addition of a representative of the Board of Trade or the Department of Overseas Trade; and it should have the power to co-opt scientific experts in consultation with the Royal Society or otherwise; and also one or two other persons who have practical experience of the regions to be investigated and of the methods of conducting researches of the nature contemplated.

The writer of this review, who was himself a member of the Interdepartmental Committee, may perhaps be pardoned for thinking that the Report demonstrates the national and scientific importance of the proposed inquiries, and that it outlines a thoroughly practical scheme by which the expedition can be financed. The Appendices, which constitute the major part of the Report, contain a large mass of information which should be of the greatest use in facilitating the further development of the scheme. With regard to the whaling and sealing industries the Committee adopt a conservative attitude. While recognizing the urgent importance of preventing anything like extermination of the animals on which the industries depend, and also the possibility or even the probability that the number of whales captured during recent years has been excessive, they consider that the future regulation of both whaling and sealing should depend largely on the results of a scientific investigation of the subject on the spot. This examination is to be conducted on broad lines. It is already clear that the whales visit the Sub-Antarctic waters mainly to profit by the vast quantities of food found there during the southern summer; this consisting of "plankton," a term used to indicate collectively the animal and vegetable organisms, many of them of microscopic size, which float at or near the surface of the sea. Although the larger whales feed principally on small crustacea found in enormous numbers as constituents of the plankton, the *ultimate* source of their food consists in the main of microscopic vegetable organisms, and primarily of the plants known as Diatoms. The number of

these and their distribution depend on physical factors, such as light, temperature, and currents ; and the whole whaling problem is thus closely associated with the study of these factors. The question is further complicated by the fact that whales undertake extensive migrations, more or less seasonal in character ; and there is reason to believe that these are largely connected with the fact that some of them, and perhaps all, visit lower latitudes in order to breed and to bring forth their young in warmer water. The whaling industry of South Georgia thus has a direct interest in what takes place in the waters adjacent to the coasts of Africa, South America, Australia, and New Zealand. Much remains to be ascertained with regard to the rate of growth of whales, the age at which they become sexually mature, their breeding seasons, the length of their period of gestation, the frequency with which they produce their young, and the length of their life. On some of these questions evidence has been obtained by means of the statistical returns which have been furnished by the whaling companies for some years to the British Museum (Natural History). The Committee recognize the importance of this study and recommend its continuation.

The interest of certain other branches of the proposed inquiries is by no means confined to the area of the Dependencies. Attention may be directed to the work which has been done by Mr. R. C. Mossman on the correlation said to exist between the meteorological conditions of Antarctic regions and those of other countries as distant as South Africa, Egypt, and India. Tidal observations in the area of the Dependencies are also of the highest importance in connection with ocean tides in general. The accurate survey of the waters of the Dependencies should result in increased security of navigation, and would constitute a material advance in our knowledge of a large area which is at present insufficiently charted.

It may be hoped that the scientific societies will not be slow to recognize the unique opportunity which would be provided by the successful inauguration of the scheme recommended by the Committee, and that the Royal Geographical Society in particular will lend its influence in cordial support of proposals made not only for the development of the economic importance of a large area in which this country is directly interested, but also with the view of increasing our knowledge of many scientific problems which urgently require study. It may be added that the proposed expedition differs in one very important respect from others which have explored Antarctic waters. The area to be investigated is visited annually by a considerable whaling fleet, which will no doubt be utilized largely in obtaining evidence on some of the problems to be investigated. This is in itself a matter of considerable importance, but it has this further advantage, that, in the event of accidents occurring to the research vessels, it may be possible to find assistance near at hand.

SIDNEY F. HARMER.

REVIEWS

EUROPE

Middlesex in British, Roman, and Saxon Times.— M. Sharpe. London : Bell. 1919. 12s. 6d. net.

APART from a brief account of the pre-Roman antiquities of the country, and a description of the ford at Brentford where it is now generally agreed Cæsar crossed the Thames, this work is devoted to an attempt to determine the

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