of primary types, and at the moment it would seem that mining alone is likely to bring about any considerable development in the near future.

Go North

The climate will deter many persons from seeking their fortune in the north, but as a matter of fact the people in the territories suffer very little from the cold The mosquitoes and other pests generally make the summer the most unpleasant season physically. Northerners enjoy most of the comforts of life of populated areas, and one misses little except the company of numerous fellow beings. All in all, there are good livelihoods to be made in the north, but the need is for men who still retain the pioneering spirit and can do without street cars.

Many go into the north with the expectation of getting rich quickly and leaving. But a few years residence has affected many people in such a way that they never want to leave. Another point with respect to development comes in here. Many of the old Yukon sourdoughs are very much opposed to many of the possible developments that are rumoured. The country suits them as it is. That is chiefly why they live there.

Our Ignorance of The Eastern Arctic

By M. J. Dunbar

SCIENCE is at once cultural and material. The old division between "pure" and "applied" science will soon exist no longer. The fusion of the two divisions follows from the growing realization that our material progress cannot, for its own good, be separated from our cultural progress; that man's first hope for the future and his most significant production in the past is organized knowledge; and that no facts are bad and no knowledge is useless.

The application of this principle to the development of the Canadian North would remove the doubts and many of the difficulties there in short order. It is the purpose of this article to show that the slow development in the north and the fact that people are now beginning to talk seriously about Canada's right of sovereignty and of our responsibilities in the north, are due in the last analysis to our great lack of fundamental ("pure") knowledge. It is most urgent that this poverty of knowledge be removed.

In particular, this paper is concerned with the marine resources of the eastern arctic region, and with the future possibilities of the use of the eastern arctic air for civil purposes. The problems of the land are great, but must be dealt with separately. We do not have the necessary knowledge, for instance, to estimate the possibilities of stock-raising (musk-ox, reindeer, sheep) in the eastern arctic. We do not know whether the plant-life and climatic conditions make possible the development of sheep-farming communities in the Ungava Peninsula or on the shores of Hudson Bay. We cannot estimate, on our present knowledge, the probable destructive effect of wolves on such an enterprise. By the same token, we are unable to give an account of the mining possibilities of Baffin Island, or of the minerals of the arctic archipelago in general.

Marine Resources

In the sea, our position is only a very little better. We know at least which resources are declining, and we know something about the fishery potentialities of Hudson Bay. But we do not know enough at present to take really effective conservation measures, and we can do little more than speculate upon the

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reasons for Hudson Bay's poverty in fish of commercial value. Let us examine the present state of our knowledge in these fields.

The whaling industry in eastern arctic and Greenland waters dug its own coffin. The bowhead whale, the mainstay of that industry, was almost extinct shortly before the first world war, as a result of uncontrolled slaughter by the interests involved. The lack of that important resource in succeeding years has been keenly felt. An abundance of bowheads would be of immeasurable value now when the seal populations are showing signs of an incipient depletion. By killing off these whales, we deprived ourselves of a rich source of animal oils which would have been of great value to us, especially during the last war. Yet nobody saw fit to organize and finance any research on the bowhead whale or its conditions of life. There is evidence to-day that the bowhead is slowly recovering from near-extinction, thanks to the cessation of all whaling operations against it. The bowhead (also known as the Greenland whale, and the arctic white whale) has been seen with increasing frequency in the Canadian eastern arctic and in Greenland waters during the past ten years. The course of wisdom is to inaugurate intensive research *now*, before there is any possibility of whaling operations being resumed. To do the job properly will cost money, but not nearly as much as it will save.

The white whale, or beluga, is an important Eskimo resource in both Greenland and Canada. It also supplies a limited, but valuable, quantity of oil for world markets. So far as can be ascertained, the beluga is maintaining its numbers in the eastern arctic, but this is at best only a guess. We have no backlog of work on the habits and biology of the beluga in these waters; it is known that its distribution in west Greenland has been pushed north by the recent warming of the water in that area. The only study we have on this animal is that of Dr. Vladykov on the beluga in the Gulf of St. Lawrence, sponsored by the Quebec government. The need of work of the same quality in eastern arctic waters is obvious, for without it we cannot keep tabs on the beluga population or formulate any protective measures that may (as experience shows) become necessary.

The walrus is of first-line importance to the native Eskimo, and had we not allowed it to become more and more restricted in distribution, its skin and its ivory would be of some value to Canada in general. The history of the walrus population of eastern Canada is a sad one, for it seems to have gradually disappeared from every region in which white man has settled, and is now so reduced even in the extreme north that immediate protection is becoming truly urgent. But unfortunately we have almost no knowledge of the habits of the walrus on which to base those protective measures. We are therefore forced either to clamp complete protection on the walrus population, probably to the unnecessary distress of the native Eskimo population, or to admit defeat and watch the extinction of the walrus, which would distress the native population much more. We lack the necessary information to apply protective measures which would be both gradual and effective.

The ringed seal is the smallest of the Canadian seals but has the distinction of being the most important to the Eskimo in Canada and of having collected the largest number of vernacular names. It is known as the fjord seal, the rough seal and the jar seal, and the early explorers used to refer to it as the "floe-rat." There have been reports during the past few years that this most useful and charming of animals is becoming a little less common in southern Baffin Island, and decidedly less frequent in the Ungava peninsula. These reports are not based on any scientific observation or on any attempt to estimate the seal population over a period of years. They are, however, disturbing enough to warrant proper organized investigation. Such an in-

vestigation, involving not only the study of the seal numbers as such, but also its general biology and its precise significance in the lives of the Eskimos at different points in the eastern arctic, is at present in the planning stage.

Of much wider significance is the present plight of the harp seal, or saddleback seal. This is a migrant seal (which the ringed seal is not), breeding off the coast of Newfoundland and in the Greenland sea (and also in the White sea), and spending the summer and fall in the waters of the Greenland coast and to a certain extent in the Canadian eastern arctic. As a marine resource, it is of much less importance in the eastern arctic than is the ringed seal; but on the other hand it is more important than the ringed seal in west Greenland. It is the object of slaughter on a large scale by the sealing industries of Newfoundland and Norway, the latter on the ice of the Greenland sea. Both these industries kill the seal during the breeding period, and it is the newly-pupped "white-coat" seal which are most sought after.

The numbers of the saddleback seal have been decreasing greatly since the early years of this century. This is clearly shown by the figures published by the administration of Greenland and by the returns published by the sealing industries of Norway and Newfoundland. The fact that these industries together kill annually anywhere between fifteen and twenty times the number of saddlebacks killed by the Greenland and Canadian native hunters, and that the sealing industries concentrate especially on the young animals, leaves little doubt as to where the blame for this decline must be put. It is furthermore clear that a planned conservation and rehabilitation of this resource is in the interests of all concerned, and that therefore there is a need for international action. But here again we are stalled by our ignorance. Before intelligent action can be taken, we need a great deal of information on the habits, migrations and distribution of the saddleback seal. Our present knowledge is based on the pioneer work of Fridtjof Nansen, which was necessarily far from complete.

Underlying all problems of biological populations and their conservation is the physical environment. In the study of oceanography, Denmark has always been a pioneer, and maintains her eminent position to-day. We know from Danish work that the waters of south and west Greenland have been growing warmer during the past thirty years, due to the increasing influence of Atlantic Drift (Gulf Stream) water in the west Greenland current. This has drastically altered the distribution of the marine fauna of west Greenland. The ringed seal, the beluga, various fishes, and to some extent the saddleback seal, have been pushed farther and farther north. To make up for this loss, west Greenland now has a prolific population of codfish, brought in by the Atlantic water, which supports a growing fishery. On our side of Davis Strait, the hydrography of Hudson Bay and Hudson Strait was investigated by the Hudson Bay fisheries expedition of 1930. At that time there was no trace of Atlantic intrusion demonstrable by hydrographic methods, but since the hydrographic balance on the east side of Davis Strait is clearly in process of changing, it is not improbable that a similar disturbance, on a smaller scale, may exert a certain influence to-day on the marine resources of Hudson Strait and Labrador. Codfish have long been known along the whole of the coast of Labrador, and there are indications, which need not be gone into here, that there is a certain amount of Atlantic intrusion in Hudson Strait. If those indications are confirmed, then it is possible that we can take a leaf out of Greenland's book and find fishery resources, however modest, to take the place of the sea-mammals at least during the period of rehabilitation of the latter. To discover the extent of this possibility, we need detailed hydrographic and marine biological information from Hudson Strait and from the region between Cape Chid-

ley, in northern Labrador, and west Greenland. At the present rate of hydrographic change, our knowledge at the moment, never very great to begin with, is out of date.

Aviation

So much for the marine problems. That the problems of the sea and those of the air of the eastern arctic region are not unconnected, is emphasized by the hydrographic developments which I have briefly described. Since the warmth of the sea is closely connected with the climate of the shores which it washes, it follows that the warming of the west Greenland current has a most important bearing on the value of west Greenland and the Baffin bay area for aviation. The United States Army bases built in south Greenland during the war were made for two purposes: the furnishing of a short-hop route for small aircraft from North America to Europe, and the protection of part of the North Atlantic shipping routes. The second consideration necessitated their location fairly close to the southern tip of Greenland, and moreover it is doubtful whether global thinking had developed sufficiently at the time to permit the building of airfields farther north in Greenland. It takes time for the imagination to expand beyond certain temporary limits. Today, however, freed from the immediate necessities of war, we can consider the matter at longer range. Two points have become clear: for direct North Atlantic flying between North America and western Europe, the south Greenland airfields, and to a lesser extent airfields in Iceland, have become obsolete; and secondly the fields in south Greenland are in a peculiarly bad region for flying. The warming west Greenland current causes a climate characterized by high winds, much precipitation, and fog; these, combined with exceedingly mountainous terrain, make flying in the southern tip of Greenland too hazardous for normal civil uses.

In more arctic regions, however, the colder water and colder air make for much more stable flying conditions. The lesser humidity greatly decreases the danger of ice formation on aircraft. The distances from continent to continent are smaller; and the terrain is much less mountainous. If short-hop inter-continental civil aviation, either for passenger or freight services, develops in the north, it will be primarily in arctic, as opposed to subarctic, regions. The Disko Bay and Thule areas in west Greenland, central Baffic Island, Peary land and Spitsbergen, are probable sites for a future chain of airfields in such an aviation development.

We are better equipped with the fundamental knowledge necessary to evaluate such a possibility than we are in the field of marine research. There is a much greater pressure behind the search for knowledge leading to aviation development than for information in the more "academic" fields. This article will have served its purpose if it has shown that research in the northern seas is not so "academic" as was once supposed. Moreover, it is apparently forgotten that marine research has an important application to northern aviation, as has been shown here. We know that arctic conditions are favourable for flying, and the specific technological developments designed to give greater latitude and greater safety are appearing fast. But we have ignored the fact that arctic conditions are not necessarily permanent in certain areas, notably on the shores of Baffin Bay. Constant, or at least intermittent, hydrographic observations are therefore necessary.

In all fields of northern development we are handicapped, not by lack of enterprise, courage or imagination, but by lack of fundamental organized knowledge. Money spent on obtaining this knowledge will not be wasted, for without it no extensive development is possible. What is true of the marine resources of the eastern arctic, and of the future possibilities of aviation, is true also of mining, fur trapping and fur

farming, agriculture and stock-raising. The knowledge gained by the "bug-hunters" and the "long-haired professors" form the foundation of development.

The establishment of a Canadian Government research station at Baker Lake opens up new possibilities for research in that area. It is an earnest of future scientific expansion in the north. We will need more stations, more ships, more money, and above all more trained field-workers if this ignorance of our own north is to be wiped out. It is a truly Canadian responsibility.

The Old Colony: A Review Article

By A. G. HATCHER

STUDENTS of economics and government, especially in Canada, must long have felt the need of such a survey of Newfoundland as Professor R A. MacKay and his fellow-contributors have made and now published under the title "Newfoundland: Economic, Diplomatic and Strategic Studies."[1] To the Royal Institute of International Affairs, under whose auspices the volume is issued, to the Newfoundland Branch and to the Canadian Institute, and to others represented on the supervisory committee are due the the thanks of all who are interested in public affairs today. For Newfoundland's importance in the modern world is quite out of proportion to her small population and her moderate economic status, not only because of the Island's unique geographic position and that of its Labrador dependency, both so skilfully exploited in the Allied strategy of the recent war, but for at least two other main reasons.

One reason is economic. When the Great Depression began to cast its dark shadow over the world of the late 1920's, its numbing effects were soon felt in Newfoundland. This country sells abroad mainly primary products and must import —or does import—most of its own necessities of life and industry. Its economy is therefore very sensitive to changes in world conditions. While the sad tale of reduced national income, falling public revenues, loss of governmental credit, near approach to default on public debts, and the like, is not peculiar to Newfoundland, yet the remedy proposed for these ills seems a peculiar one, for it was nothing less than a complete change; not a change of economic practice or a revolution in industrial methods, but a change in the form of government. The experiment of a political remedy for economic distress is one reason why the recent history of Newfoundland affairs appears worth some attention.

A second reason is therefore political. For nearly twelve years this Dominion has been governed by a commission, appointed by the British Government and presided over by His Excellency the Governor. The commission consists of six men, of whom three are Newfoundlanders and three are British civil servants. Many will wish to know how a once self-governing dominion of the British Commonwealth fares when in the position of a special ward of the United Kingdom. Newfoundland is thus a sort of political as well as an economic laboratory where a unique experiment is now in progress. This book, in the chapters written by Dr. MacKay and Dr. S. A. Saunders, gives at least a glimpse of the experiment under way.

Now an experiment asks questions of its material. Perhaps the Newfoundland experiment may pose such questions as these: what is the influence of size on the success of self-government in the Empire? How large must a self-governing unit be if it is to prosper? Since dominion s

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1. Toronto, Oxford University Press, 1946. Price $7.50.