LABRADOR

THE COUNTRY AND THE PEOPLE

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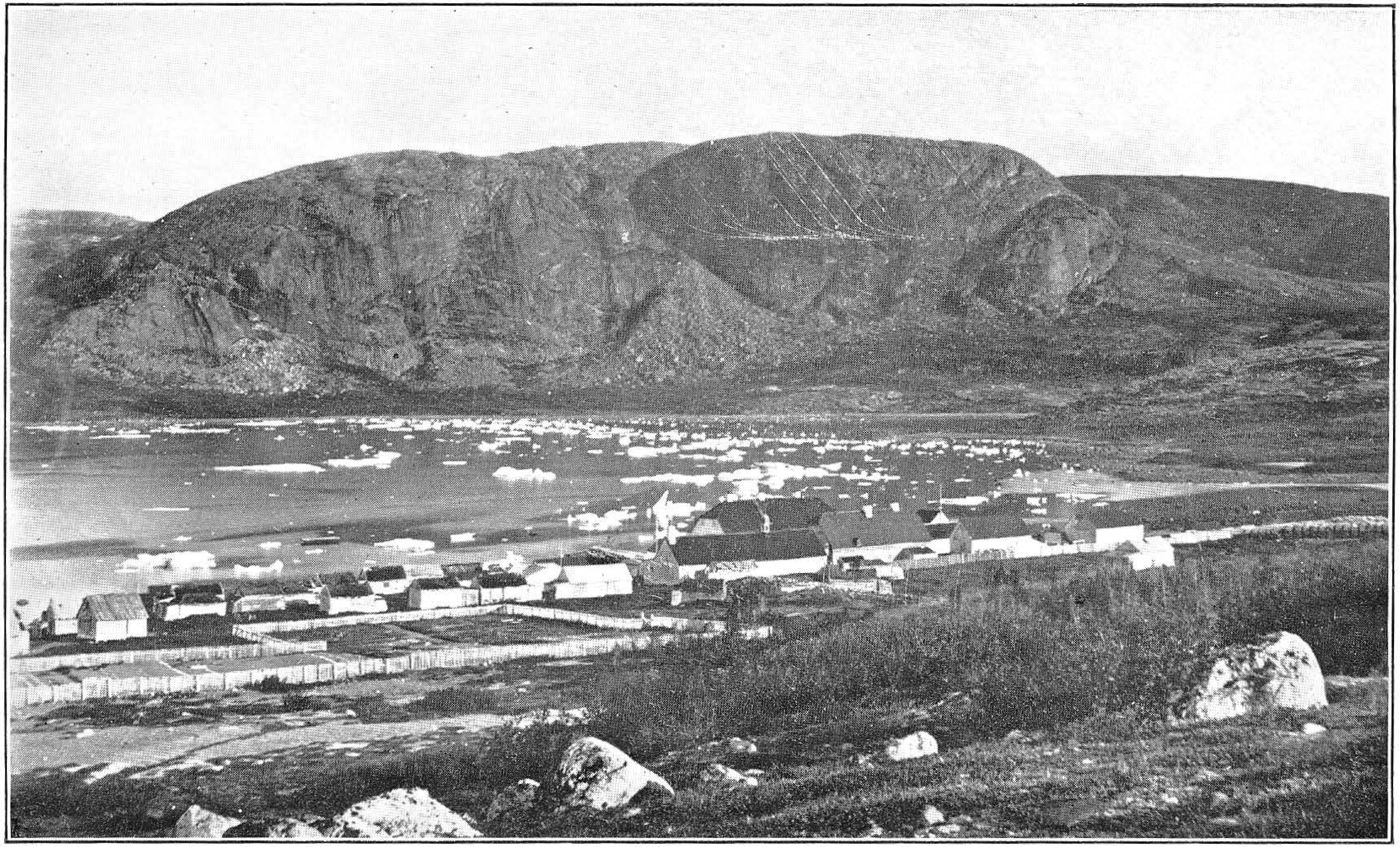

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LABRADOR

THE COUNTRY AND THE PEOPLE

BY

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M.D. (OXON.)

AND OTHERS

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FOREWORD

By Wilfred T. Grenfell

Having selected for myself a rôle in life that compels me to pass most of my days along the coasts of Labrador, I have come to love the rugged fastnesses of my adopted country, and to lament the amount of almost Stygian darkness that hangs still over it and its resources. With regard to the future of this vast area, nearly half a million square miles, I am myself an optimist. True it is that the great tide of humanity flowing ever westward has for the most part passed it by, leaving it lone and frigid in its polar waters. But the hand of man has grappled with harder problems than this presents.

A scientific man has but recently transformed the useless flora of hitherto arid deserts into food for man and beast; at the bidding of an engineer water is now flowing over the sands of Southern California, and land of perhaps unrivalled fertility is the result. Man's hand has dammed the royal Nile, so long prodigal of her unfettered waters; and a vast, new kingdom is springing into being. A college man has given his skill to acclimatizing fruit and vegetables to Dakotan frosts, and we have a plum that withstands a temperature of forty degrees below zero Fahrenheit, and strawberries that will live in the open all winter even in that climate.

The coming granary for the world's wheat supply was yesterday despised as "the land of snows"; to-day the subsoil of the world's best wheat land never thaws out, and the frozen valley of the Peace River is vying with the "corn" lands of the Pharaohs.

To us here, away out of the world's hum and bustle, it seems only a question of time. Some day a railway will come to export our stores of mineral wealth, to tap our sources of more than Niagaran power, to bring visitors to scenery of Norwegian quality yet made peculiarly attractive by the entrancing colour plays of Arctic auroras over the fantastic architecture of mountains the like of which can seldom be matched on the earth. Surely it will come to pass that one day another Atlantic City will rise amidst these unexplored but invigorating wilds to lure men and women tired of heat and exhausted by the nerve stress of overcrowded centres.

It has seemed appropriate, in this belief, to try to collate available information in the form of a book that should bring within easy reach of the public the facts that are of interest concerning Labrador. It is hoped, also, that such a book will act as an incentive to others to come and pursue still further the studies and explorations herein described. With these objects in view I sought the help of friends skilled in the various branches of science, as it can now declare the meaning of Labrador, the land and the people.

Dr. Reginald A. Daly, Professor of Geology at the Massachusetts Institute of Technology of Boston, had, during an extended trip in a schooner along the Labrador coast, expended considerable work upon its rock formations, and to him has been intrusted not only the chapter on Geology, but also the task of editing the whole work.

Dr. E. B. Delabarre, Professor of Psychology at Brown University, accompanied Dr. Daly on his journey along the coast, and has described the flora from an ecological point of view as most likely to be of interest to the average reader. His exhaustive list of plants has been omitted from the book, but is preserved at Brown University.

Dr. C. W. Townsend of Boston and Mr. G. M. Allen, who have written on the ornithology, made a special journey to Labrador to study its birds. Dr. Townsend has already published a book entitled *Along the Labrador Coast* as a further result of their expedition.

Mr. Charles W. Johnson, Curator of the Boston Society of Natural History, has undertaken the insects (Mr. John Sherman, Junior, expert on the beetles, has described this special group) and mollusks from a collection of Mr. Owen Bryant of Harvard, made in 1908.

Mr. Outram Bangs has supplied the list of mammals. Miss Mary J. Rathbun, the well-known expert at the United States National Museum at Washington, supplied all the information we have about the crustaceans, including a study of those collected by Mr. Bryant.

Dr. A. P. Low, Deputy of Minister of Mines in Canada, has contributed a chapter on the interior of this little-known land.

Mr. William B. Cabot of Boston, who for several years has made an annual visit to the Montagnais Indians of Labrador, and who has edited a dictionary of their language, has had unique opportunities for observing their habits. He has contributed a valuable monograph from his special experiences.

The chapter on History was to have been prepared by Mr. W. G. Gosling of St. John's, Newfoundland, who had devoted some years, and gone to no small expense, on a special study of this subject. But his results involved such an extended treatise that it was thought wiser to issue them under a separate cover than unduly to enlarge this volume, and Mr. W. S. Wallace, of Balliol College, Oxford, has prepared a brief historical introduction.

For seventeen years I have been collecting such facts as my regular work permitted. From them I have selected material for certain chapters. To many friends who have supplied such information I wish to acknowledge my indebtedness. Incomplete as this book surely is, it is issued from a desire to record the more interesting facts, the coins of science, which might otherwise need rediscovery. It is hoped that the book may be of use even to those familiar with Packard's excellent work.

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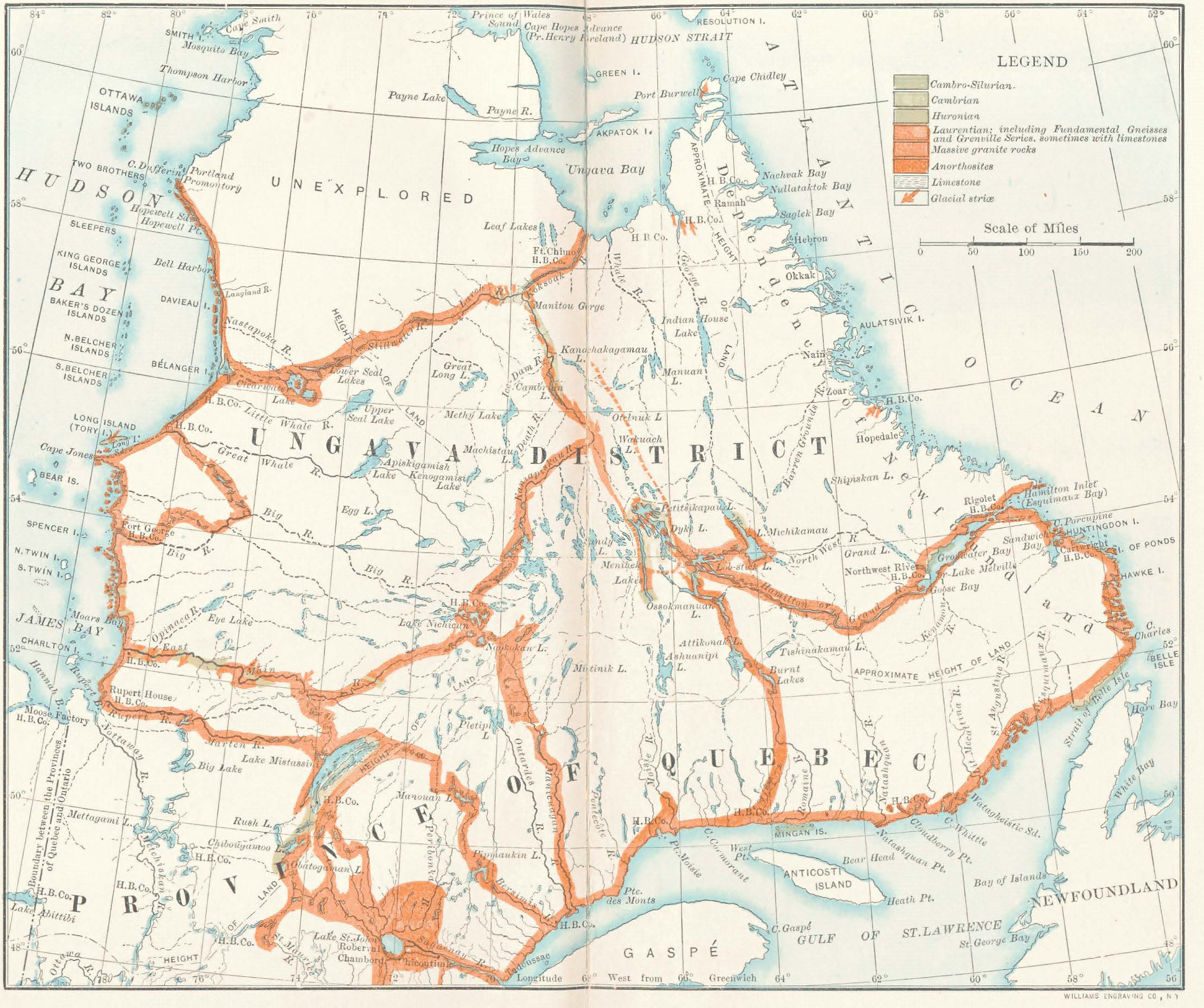

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LABRADOR

CHAPTER I

HISTORICAL INTRODUCTION[1]

By W. S. Wallace

Labrador has not much history. So far as we know, it was first seen by European eyes in 986. From that time until about 1700 it almost enjoyed the happiness of the country which has no history. There is nothing to record but the voyages of navigators who came and saw the land, and sailed away. Labrador, said Jacques Cartier, was "the land God gave to Cain"; there was "not one cart-load of earth on the whole of it." No one came to live on the coast until about 1700. But if the history of Labrador is deficient in quantity, it is marked by an infinite variety. Across the stage there pass in succession the savage bands of the Eskimos, an earlier race than ours; the storm-driven "dragons" of the Vikings; the early navigators, Venetian, Portuguese, English; whalers and fishermen from the Basque Provinces, from France, from the west of England; French-Canadian *seigneurs* and *concessionaires* along the *Côte du Nord;* English settlers after 1763 above the Strait of Belle Isle (among them

[1] I wish to express my indebtedness to Mr. W. L. Grant, Beit Lecturer in Colonial History in the University of Oxford, and Mr. H. P. Biggar, representative in Europe of the Dominion Archives, for assistance kindly rendered in the preparation of this chapter.—W. S. W.

the strange figure of an English staff-officer;) American privateers in 1778, French warships in 1796; the Hudson's Bay Company; Acadian refugees from the Magdalen Islands; and the devoted figures of the Moravian missionaries. The *dramatis personæ* are numerous, but the play has little plot or sequence; it is more a pageant than a drama.

The story begins in the year 986 in Iceland. Bjarni Herjulfson in that year, after a long absence on the high seas, came home to drink the Yuletide ale with his father. Finding that his father had gone with Eric the Red to Greenland, to found there that colony of which the ruins still stand upon the bleak and desolate coast, Bjarni weighed anchor and started off to Greenland after him. On the way he encountered foggy weather, and sailed on for many days without seeing sun or stars. When at length he sighted land, he was in waters of which he had never heard.

> "He was the first who ever burst
> Into that silent sea."

The land was not the coast of fiords and glaciers for which he was looking; it was a shore without mountains, showing only small heights covered with dense woods. Bjarni put about and sailed to the north. The sky was now fair, and after sailing for five or six days he saw land again on the larboard, "but that land was high, mountainous, and covered with glaciers." Then the wind rose, and they sailed four days to Herjulfsness. There is no doubt that the high, mountainous land, covered with glaciers, was the coast of Labrador.

Nothing came of Bjarni Herjulfson's adventure till the year 1000, the *annus mirabilis* of mediæval history, when Leif, the wise and stately son of Eric the Red, "made up his mind to go and see what the coasts to the south of Greenland were like." He sailed from Brattahlid with a crew of thirty-five men. "First they found the land which Bjarni had found last. Then sailed they to the land and cast anchor, and put off a boat and went ashore, and saw there was no grass. Mickle glaciers were over all the higher parts; but it was like a plain of rock from the glaciers to the sea, and it seemed to them that the land was good for nothing." Leif gave the place the name of Helluland (flat stone land). He then sailed on to countries which he names Markland and Vinland. The location of these places has been a subject of the warmest controversy. Helluland, however, it is perhaps safe to say, was either Labrador or the northern coast of Newfoundland.

This is not the place to describe the expeditions of the Northmen to Vinland, which took place after the return of Leif Ericson. At first there were several attempts to found a colony, but the hostility of the Indians and the jealousies of the settlers brought them to naught. In 1121 Eric Gnupsson, who was appointed by Paschal II "bishop of Greenland and Vinland *in partibus infidelium*," went in search of Vinland; it is so recorded in at least six vellums. His is the last Viking expedition of which we have authentic information. But it is extremely probable that there were voyages of which we have no record. To these daring sea-farers the sea had no terrors; in their beautiful open ships, which were probably stronger and certainly swifter than the Spanish vessels of the time of Columbus, they were accustomed to traverse long stretches of open sea without compass or astrolabe. They went everywhere.[1] In 1824 there were found on an island in Baffin Bay, in a region supposed to have been unvisited by man before the modern age of Arctic exploration, a stone inscription: "Erling Sighvatson and Bjarni Thorharson and Eindrid Oddson raised these marks and cleared ground on Saturday before Ascension week, 1135." There is a strong probability that the Northmen made voyages to the coast of America oftener than we imagine. Timber was scarce in Greenland; what more likely than that they should have cut their timber on the shores of Newfoundland or in places like Hamilton Inlet on the Labrador coast, where there is still timber of the finest sort?

The voyages of the Northmen, however, were quite barren of results of either historical or geographical importance. The very tradition of Vinland seems to have died out in Europe. There are, indeed, accounts of voyages made to the coast of America in the fourteenth and fifteenth centuries; but these are almost wholly, if not entirely, mythical. Antonio Zeno, a Venetian gentleman, writing to his brother Carlo about 1400, tells of some fishermen who had been blown out to sea twenty-six years before, and had been thrown up on a strange coast, where they were well received by the people. The land was an island with a high mountain whence flowed four rivers. There was a populous city surrounded by walls; and the king had Latin books in his library which nobody could read. All kinds of metals abounded, and especially

[1] A stone bearing a Runic inscription and the date 1362, has been found in the heart of North America, at Kensington, Minnesota; but very strong doubts have been cast on its genuineness.

gold. The name of the country was Estotiland. Some scholars have attempted to find grains of truth in this fisherman's yarn; Estotiland has been identified as Newfoundland, and the populous city with walls about it has been explained as an Indian encampment surrounded by a palisade. But it is better to reject the story altogether; there is, indeed, strong evidence that the whole of the Zeno narrative is a forgery. Another supposed pre-Columbian voyage to America is that of the Polish pilot, John Szkolny, who is said to have sailed in 1476 to Greenland, in the service of Christian I of Denmark, and to have touched upon the coast of Labrador. This also has been shown to be a myth; no such voyage was ever made.

It was the opinion of the late Mr. John Fiske that there were more voyages to America before 1492 than we have been wont to suspect. There has been, he pointed out, a great deal of blowing and drifting done at all times and on all seas. "Japanese junks have been driven ashore on the coasts of Oregon and California; and in 1500 Pedro Alvarez de Cabral, sailing down the coast of Africa, found himself on the shores of Brazil." He argued that occasional visitors such as these "may have come and did come before 1492 from the Old World to the New." It is a pleasing fancy. Unfortunately, the voice of authentic history is silent and cannot be made to speak.

The true discoverer of Labrador, for practical purposes, was John Cabot. Cabot was a Genoese by birth (and so a compatriot of Christopher Columbus), but in 1476 he became a naturalized citizen of Venice. In his earlier days he had traded as far east as La Tana, Alexandria, and even Mecca. There he had seen the spice caravans from

China. They seem to have set him thinking. Like other men of his day, he had "studied the sphere," as the saying went; and he seems to have conceived the idea, independently of Columbus, of reaching the country where the spices grew by sailing westward. In quest of merchants who would furnish him forth he went to the west of England. There he found, in the matter of the new route, affairs much farther advanced than he could have supposed. In 1480 two ships had sailed from Bristol to discover the fabulous islands of Brazil and the Seven Cities which were supposed to lie between Ireland and the east coast of Asia. The expedition was fruitless, but it shows that the project of the westward route was already in the air.

From Bristol Cabot made a long series of attempts to reach the islands which the ships that sailed in 1480 had failed to find. He believed they would prove stepping-stones to the coast of Asia. Year after year expeditions went out under his direction; autumn after autumn they returned to Bristol empty-handed. Cabot's patrons were already beginning to withdraw their support, when in the summer of 1493 news came to England that Christopher Columbus, with three Spanish ships, had reached the islands of Asia.[1] Cabot renewed his efforts, and on May 2, 1497, he sailed under royal patent on the voyage which brought him out on the shores of North America.

The voyages of the Cabots have been a storm-centre of

[1] The reason why Columbus succeeded where Cabot failed, is that Columbus crossed the Atlantic in a region where the trade-winds blow steadily from the east; whereas the tract of ocean from Ireland to America is one of the most unquiet in the world, and a vessel on its westward course in those latitudes has to contend, not only with adverse winds and broken weather, but with frequent and dense fogs.

controversy for many years. The question where John Cabot had his landfall in 1497 depends almost wholly on the interpretation of the old maps. The fact that these charts were drawn to magnetic meridians, and not like our maps to the true meridian, sometimes alters the lie of a coast or the direction of a course by over 45°. Apart from this, also, mediæval reckonings were often far astray. Chronometers had not yet been invented, and it was only on rare occasions that longitude could be reckoned with the least degree of accuracy. Determinations of latitude were fairly correct when made on dry land, but made from the deck of a vessel with the imperfect instruments of that period they were liable to be wrong. Consequently, it is very difficult to be sure of the course to which a mediæval mariner held. It used to be thought that in 1497 John Cabot's landfall was on Labrador. It is now certain that wherever his landfall was, it was not there. Probably it was on the shores of Cape Breton Island.

It was on his second voyage, in 1498, that Cabot touched at Labrador. A Canadian scholar, Mr. H. P. Biggar, in his *Voyages of the Cabots and Corte-Reals*, has attempted a brilliant reconstruction of this voyage. He thinks that Cabot explored first the coast of Greenland, and that then he sailed south along the coast of Labrador. He attempts even to identify the places which Cabot describes; Hamilton Inlet, for instance, and the Strait of Belle Isle, which Cabot took to be a deep bay. Cabot seems to have done some bartering with the Indians, for the Corte-Reals three years later found the natives in possession of a broken gilded sword and a pair of ear-rings, both apparently of Venetian manufacture.

John Cabot probably regarded his expeditions as financial failures. He had set sail expecting to bring back the wealth of Ormuz and of Ind; he had found only the rock-bound coasts of North America. He had not even been able to discover the passage to the country where the spices grew. King Henry VII and the merchants of Bristol withdrew from a venture that swallowed up so much capital and offered such small profits; and shortly afterwards John Cabot died.

Others, however, were not long in following in his wake. In the summer of 1500 Gaspar Corte-Real, a Portuguese gentleman from the island of Terceira in the Azores, set sail from Lisbon for the coasts which Cabot had discovered. On his first voyage Corte-Real explored only the coast of Greenland. On his second, which was made the next year, he came out at Labrador in about 58° of north latitude. The coast here is 3000 feet high, and there is nothing to the north but a barren, precipitous shore of the same sort. Corte-Real therefore turned south, no doubt in hope of reaching in that direction the land of spices. As he followed the shore, he explored every bay and inlet. He examined Hamilton Inlet as far up as the Narrows, and he seems to have explored Hawke Bay and the Gilbert and Alexis rivers. The Strait of Belle Isle, however, he mistook (as Cabot had done) for an ordinary inlet; it remained for others to discover its real nature. He named a number of bays and capes, but nearly all his names have been superseded. Some have died out, and some have been shifted by ignorant geographers down to the Newfoundland coast. Cape Freels (*Cabo de Frey Luis*) is an example of the latter class; originally it was a cape on the Labrador, named possibly after the chaplain of Corte-Real's ships.

In one of the inlets of Labrador Corte-Real came upon a band of Nasquapee Indians, a tribe which still inhabits that neighbourhood. The African slave-trade, which was carried on principally from Lisbon, had taught the Portuguese to look upon all natives as fair spoil; and the sailors kidnapped some sixty of the Indians, and stowed them away below hatches. Two of the three ships were sent back to Lisbon with the Indians on board; they arrived there in little more than a month, and their arrival created the greatest excitement. King Manoel was delighted. Not only did the Indians promise to prove excellent slaves, all the more valuable since the African negro had become so wary that his capture was a matter of difficulty, but the new country produced, also, timber in abundance, which could be brought to Portugal at the cost of a month's voyage.

This slave-hunting episode has been fixed on by some historians as affording the true explanation of the name Terra Labrador, or *Terra del Laboratore*. King Manoel had expressed the opinion that the new slaves would be "excellent for labour"; obviously "*Terra del Laboratore*" meant "labourers' coast," or, as we might say, "slave coast." Unfortunately, there are difficulties about this ingenious theory. In the first place, the words *del Laboratore* are in the singular; in the second place, the Portuguese word *llavrador* does not mean a labourer, but something like a yeoman farmer; and in the third place, the original Labrador was not what we know now as Labrador — it was Greenland. In nearly all the maps of the first half of the sixteenth century Greenland is Labrador; it was only owing to the fact that the early geographers thought that Davis Strait was a gulf, and that the mainland continued all the way, that the name got shifted down to the northeast coast of North America. For many years what is now known as Labrador was merely designated "*Terra Corterialis*."

The real explanation is to be found in the Wolfenbüttel map of 1534, which bears along the coast of Greenland the legend: "Country of Labrador, which was discovered by the English of the port of Bristol, and because he who first gave notice of seeing it was a farmer (*llavrador*) from the Azores, this name became attached to it." We have even a suspicion as to who this *llavrador* was. He was probably one João Fernandes, who accompanied Cabot on his second voyage, who was born on the same island of the Azores as Gaspar Corte-Real, and who was probably instrumental in 1500 in persuading Corte-Real to make his first expedition. In 1499 he himself obtained letters patent from King Manoel, but he does not seem to have used them.

On his third voyage, in 1502, Gaspar Corte-Real was lost. His brother Miguel went in search of him, and he too disappeared. No trace of the two brothers has ever been found. They may have gone down in the broad Atlantic, or they may have been lured to their fate by the unforgetting Indians. They pass from history.

For the next fifty years the exploration of Labrador was at a standstill. So far as the contour of the coast is concerned, the map of Salvat de Pilestrina (1503) is nearer the truth than any map up to Mercator's great chart of

1569. The first official explorer to reach Labrador after Corte-Real was John Rut. Rut was an officer of the incipient Royal Navy of Henry VIII; in 1527 he set out to discover the regions of the Great Khan by going "farther to the west." One of his two ships was wrecked near the Strait of Belle Isle, where he encountered "many great islands of ice," and had to turn back. In 1534 Jacques Cartier explored the coast inside the Strait of Belle Isle. It has been said that he discovered the Strait of Belle Isle, but it is certain that the Strait was well known before 1534. It was called "*le destroict de la baye des Chasteaux*" (the strait off Château Bay). Cartier's comment on the coast has already been quoted. He also said, however, that "if the land were as good as the harbours, it would be a good country."

The results of later voyages may be briefly summarized. In 1577 Martin Frobisher sailed along the coast of northern Labrador. "Foure days coasting along this land," he says, "we found no sign of habitation." "All along this coast yce lieth, as a continuall bulwarke, and so defendeth the country, that those that would land there, incur great danger." In 1586 Davis spent a month on the Labrador coast, searching for a northwest passage. Besides the openings already known, Cumberland Strait, Frobisher's Strait, and Hudson's Strait, Davis rediscovered Davis Inlet in 56° and Hamilton Inlet in 54° 30′. It is to him that we owe the most exact knowledge of the coast until modern times. In 1606 John Knight arrived on the Labrador coast in latitude 56° 25′. He and his men were attacked by the Eskimos, and only with great difficulty were able to beat them off. Eight years later a

Captain Gibbons was ice-bound for twenty weeks in "a Bay called by his company Gibbons his Hole"; it is supposed to have been what is now Nain Bay. In 1610 Henry Hudson passed through Hudson's Straits to Hudson's Bay, and so demonstrated the true nature of the Labrador peninsula.

In the seventeenth century the French Canadians began to explore the Labrador coast. In 1657 Jean Bourdon of Quebec tried to reach Hudson's Bay by sea. He sailed up the Atlantic seaboard until he reached 55° north latitude; there he was compelled to turn back on account of the icebergs. Twenty-five years later Jolliet, the discoverer of the Mississippi, also sailed on a voyage of exploration up the Labrador coast. The chart which he made of Hudson's Bay and Labrador is still preserved in the Archives of the Marine at Paris.

It is, however, only within recent times that anything like an exact cartographical knowledge of the coast of Labrador has been arrived at. This has been due, on the one hand, to the British admiralty surveys, the first of which was carried out by the great Captain Cook, and on the other hand to the excellent charts of the Moravian missionaries. The interior of Labrador is still to a large extent unexplored.

The great industry of the coast has always been its fisheries. In the middle ages fish played a much more important part in the economic life of Europe than it does to-day. The number of fast days in the year, and the way in which they were observed all over Europe, made fish one of the great staples of existence. Until the sixteenth century Iceland was the scene of the most extensive fisheries. In 1497, however, John Cabot came back from "the new-found isle" with glowing accounts of the codfish which abounded there. Sebastian Cabot, who had a vivid imagination, vowed that the shoals of codfish were so numerous "they sumtymes stayed his shippes." Enterprising fishermen almost immediately set out for the new fishing-grounds. They appear in the records for the first time in 1504, the year after the last voyage of the Corte-Reals. At first they seem to have come mainly from Breton and Norman ports. When Queen Joanna of Spain, in 1511, wanted pilots for the Bacallaos (Newfoundland), she went to Brittany for them. And in 1534, when Jacques Cartier was passing through the Strait of Belle Isle, he met a fishing vessel from La Rochelle looking for the harbour of "Brest." This was a harbour near the mouth of the Eskimo River, which had obviously been named by Breton fishermen; it was already, apparently, a rendezvous.

Contemporaneously with the French fishermen, came the Basque whalers from the Bay of Biscay. The assertion has even been made that, in their whaling voyages in the north Atlantic, the Basques discovered and fished at Labrador as early as 1470; but this story may be safely discounted. What is certain is that from 1525 to about 1700 they frequented the Strait of Belle Isle and the Gulf of St. Lawrence in considerable numbers. As they soon discovered, the whales followed down the cold Labrador current and passed through the Strait into the Gulf in great abundance.

Portuguese fishermen followed in the track of the Corte-

Reals; and the voyage of Estevan Gomez conducted the Spaniards also to the northwest fisheries. What is now Bradore Bay was long known as Baie des Espagnols; and in 1704 there were still to be seen there the ruins of a Spanish fishing establishment.

The English were slower in recognizing the value of the new fisheries than the French or Spanish. They did not realize at first that Cabot had opened to them a source of revenue more valuable than the fabled wealth of Cathay. But gradually they too awoke to the possibilities of the new fisheries. They threw themselves into competition with the French, and appropriated to themselves a large part of the fishing-grounds. The French were driven back to the west coast of Newfoundland, along what is known as "the French shore." A study of the names on the map of Newfoundland will show the limit of their fishing operations; from Bonne Esperance to Cape Charles, the names are almost wholly French. It was not until about 1763 that the English entered upon the Labrador fisheries at all.

A part of the history of Labrador which still remains to be worked up is the story of the French Canadian settlements along the so-called Quebec Labrador. No full account of these settlements has yet been published; the facts lie buried in the archives at Paris and Ottawa. Most of what has found its way into print has been of the most unreliable and mythical character. Nothing more instructive could be found, for instance, of the way in which history is sometimes manufactured than the legend of the town of Brest. In 1608 there was published in Lyons, France, a little book, the only surviving copy of which is in the Lenox Library, New York. It was entitled *Copy of a Letter sent from New France, or Canada, by the Sieur de Combes, a Gentleman of Poitou, to a Friend, in which are described briefly the Marvels, Excellence and Wealth of the Country, together with the Appearance and Manners of the Inhabitants, the Glory of the French, and the Hope there is of Christianizing America.* This letter gives the following account of Brest:—

"We desired first to go and see the Sieur de Dongeon, who is governor, and resides ordinarily at Brest, the principal town of the whole country, well provisioned, large and strongly fortified, peopled by about fifty thousand men, and furnished with all that is necessary to enrich a good-sized town."

When it is remembered that this letter was written in the year in which Champlain founded Quebec, it will be seen immediately that it is a fairy tale of the wildest sort. Brest was never anything at this time but a convenient harbour for fishermen; and the Sieur de Combes and the Sieur de Dongeon are probably people who never existed. Somebody, however, must have taken the account *au grand sérieux;* for in 1638 the following account of Labrador appeared in Lewes Roberts' *Merchants' Map of Commerce* printed at London:—

"The seventh is Terra Corterialis; on the South whereof runs that famous river of Caneda, rising out of the hill Hombuedo, running nine hundred miles, and found navigable for eight hundred thereof. . . . The chiefe Towne thereof is Brest, Cabomarso, and others of little note."

Cabomarso is obviously a cape named by the Portuguese; but Brest is the "principal town" of the Sieur de Combes. The finishing touches were put on the myth by a Mr. Samuel Robertson, who lived on the Labrador coast in the first half of the nineteenth century. In a paper read before the Geographical and Historical Society of Quebec in 1843, he gave a graphic picture of Brest in its palmy days. "I estimate," he said, "that at one time it contained two hundred houses, besides stores, etc., and perhaps 1000 inhabitants in the winter, which would be trebled during the summer. Brest was at the height of its prosperity about the year 1600, and about thirty years later the whole tribe of the Eskimos were totally extirpated or expelled from that region. After this the town began to decay, and towards the close of the century the name was changed to Bradore." In 1630, he goes on to relate, a grant *en seigneurie* of four leagues of the coast embracing the town was made to the Count de Courtemanche, who was married to a daughter of King Henry IV of France.

Et voilà justement comme on écrit l'histoire. The whole story is a myth and a fairy tale. There was, it is true, a De Courtemanche on the Labrador coast from 1704–1716, but he was not a count, nor did he hold any land *en seigneurie*, and he was married to the daughter of a tanner named Charest at Lévis. Moreover, we have De Courtemanche's account of the coast when he came there in 1704. He does not mention the town of Brest; apparently he had never heard of it. But in the harbour he found an establishment of Frenchmen and a blockhouse, about half a league from the mouth of the Eskimo River. This was just a century after the time when "Brest was at the height of its prosperity." It is indeed probable that Mr. Robertson did not know where Brest was; he confuses it with Bradore Bay, which is eight or ten leagues farther along the coast. And yet the story has died hard; it is to be found in some of the latest books, in Professor Packard's *Labrador Coast* (1891), and in Judge Prowse's *History of Newfoundland* (1896).

The exploitation of Labrador by the French Canadians really began in 1661. In that year the *Compagnie des Indes* granted to François Bissot the Isle aux Œufs *en seigneurie*, together with fishing rights over nearly the whole of the Quebec Labrador, from the Seven Isles to Bradore Bay. This was what was known afterwards as the *Seigneurie* of Mingan. François Bissot was a Norman immigrant who had come out to Canada some time between 1641–1647. He was a man of enterprise and ideas. He was the first Canadian to enter upon the tanning of leather, an industry which is to-day perhaps the most important in Quebec. He was also one of the very first Canadians who attempted to establish sedentary fisheries in the Gulf. At the Isle aux Œufs, and later at Mingan on the mainland, he founded posts at which he carried on fishing, sealing, and trading with great success. Between his farm and his tannery at Lévis and his fishing-posts on the Labrador it was not long before he made his fortune. He was himself of *bourgeois* extraction; but he married his daughters to members of the colony's ruling class. The noblesse and the bourgeoisie joined hands.

One of Bissot's daughters married Louis Jolliet, the discoverer of the Mississippi. His marriage into the Bissot family drew Jolliet's energies eastward. His exploration of the coasts of Labrador has already been referred to. As a reward for his discoveries he was granted the island of Anticosti, a barren fief, of which he was the first seigneur. When Bissot died, Jolliet was one of his heirs. He became engaged in a dispute with the other heirs which was the precursor of a long line of disputes about the Bissot *seigneurie,* litigation over which was only ended in 1892 by the decision of the Judicial Committee of the Privy Council in the case of the Labrador Company *vs.* the Queen. Jolliet's last years were tragic. He endured great losses from the English invasion of 1690, and afterwards was actually suffering from poverty. He died about 1700, neglected and forgotten, on some island of the Labrador coast.

Jolliet's example without doubt induced others to go and spy out the land of Labrador. It was about 1702 that De Courtemanche obtained his concession near the Strait of Belle Isle. Augustin Legardeur, Sieur de Courtemanche, was a lieutenant in the troops of the marine. He spent the early years of his life in the west in the Indian wars, and acquired there a reputation as a leader. In 1697, however, he married the widow of Pierre Gratien Martel de Brouague; she was the granddaughter of old François Bissot, and family ties drew De Courtemanche, as they had drawn Jolliet, to the east of Canada. It has been usual to describe De Courtemanche's concession as a *seigneurie;* but such language is inaccurate. It was merely a grant of fishing and trading rights for a number of years. The policy of the government was evidently to leave its hands free for the future with regard to the Labrador coast. The only true *seigneurie* east of the Mingan Islands was "the fief

St. Paul in the country of the Eskimos"; and about this *seigneurie* not much is known. It was granted in 1706 to Amador Godefroy de St. Paul. In 1725 Godefroy de St. Paul sent one of his wife's relatives to render *foi et hommage* for him at the castle of St. Louis in Quebec. But after Godefroy's death it is probable that the family ceased to occupy the fief; certainly the fief never arrived at any degree of importance.[1]

During the years 1700–1760 it rained concessions on the *Côte du Nord*. Grants of fishing and trading rights were made to the Sieurs Riverin, De la Chesnaye, Constantin, De la Valtrie (who had married a daughter of François Bissot), De Leigne, Boucault and Foucault, De la Fontaine, De Lanouilles, Marsal, Hocquart, Taché, Pommereau, Vincent, De Beaujeu, and Estébe, as well as to Mme. de Boishébert and the widow Férnel.[2] Hamilton Inlet (*Baie des Esquimaux*) was granted at different times to traders and merchants, on condition of its being explored; but none of the grantees seem to have complied with the condition. It is noteworthy, however, that in 1779 Major Cartwright reports the discovery near Hamilton Inlet of "the ruins of three French settlements." And we know from Jeffrey's *Northwest Passage* that in 1752 the French traded with the Eskimos at Hamilton Inlet for whalebone and oil. Perhaps the French Canadians went north of the Strait of Belle Isle oftener than we hear about.

Inside the Strait, however, there is no question about

[1] I have to acknowledge here the kind assistance of Professor W. B. Munro, of Harvard University.

[2] This list does not pretend to be perfect.

the number of fishing-posts which existed. Not only were there cod fisheries and seal fisheries, there were even salmon and porpoise fisheries. The seal fishery was especially important. It supplied the oil which was used for giving light in Canada and for dressing hides in Europe. In 1744, we learn from an old table of products, several thousand barrels of oil were exported from Labrador to France. In the industrial life of New France Labrador played a much larger part than has been usually realized.

The Jesuits did not reach Labrador. In 1730 Father Pierre Laure, serving at Chekoutimi on the Saguenay, wrote to his superior: "I think it would be a good thing if your Reverence would permit me to go to Labrador, where I know that great results can be obtained." But his petition was not granted. The only priest, so far as we know, who worked on the Labrador coast, was the Abbé Martin, who petitioned in 1727 to be allowed to set up a seal fishery there. The memorandum of the Governor and Intendant on the subject throws light on the conditions of the coast in 1727; they write:—

"We cannot answer immediately in the matter of the Sieur Martin's request to set up an establishment of the Labrador.

"This region scarcely seems suitable for a man of his cloth, there being only rocks in this place. The dissipation which a trading-post brings about scarcely suits a missionary.

"These proposals show good intentions. We believe there is nothing behind them. But the matters which he proposes are too delicate not to require time for consideration."

Whether the Abbé Martin's request was granted, we do not know. He is to us merely a *nominis umbra*. We know nothing more about him than that he was "serving on the Labrador."

Order was kept on the coast by the Sieur de Courtemanche, who bore the official title of commandant. At Baie des Phélypeaux (now Bradore Bay) he had a fort called Fort Ponchartrain. He exercised magisterial powers, and sent in an annual report to the president of the Navy Board at Paris. His chief difficulty was with the Eskimos, who persisted in destroying the boats and stages of the fishermen, and in murdering an occasional white man. De Courtemanche's conciliatory policy toward the natives is deserving of notice, especially as it stands in sharp contrast with the treatment of the Indians by the English across the Strait in Newfoundland. There it was considered good sport to shoot an Indian like a deer. This is not the only case in which the French proved themselves superior to the English in their relations with the natives.

De Courtemanche died in 1716, and his place as commandant of the coast was taken by his step-son, François Martel de Brouague. De Brouague held the post until the conquest, though in 1759 he was so old and worn out that the minister proposed to replace him by another. He too had difficulty with the Eskimos, and he seems not to have been so successful as his step-father in his measures. He was, however, a person of importance in New France; he married in 1732 Louise-Madeleine Mariauchau-d'Esglis, sister of the eighth bishop of Quebec, and his daughter was that beauty of whom Garneau tells, who, when presented at the French court, filled with admiration the young king, Louis XVI.

The conquest of Canada in 1763 by the English worked a revolution on the Labrador coast. Shortly after the conquest many of the French-Canadian gentry went back to France; we know, for instance, that in 1767 Captain Croizille de Courtemanche, half-brother of M. de Brouague, went back. At the same time there flocked into the country a number of English and Scotch adventurers — "four hundred and fifty contemptible sutlers and traders," as Governor Murray called them. Some of these men bought up the concessions along the Labrador coast which the French Canadians were leaving. Between 1759 and 1808 they acquired nearly the whole coast from the Mingan Islands to Bradore Bay, and formed what was known as the Labrador Company, the leading spirit in which was Mathew Lymburner, the Quebec merchant who spoke so ably at the bar of the House of Commons in Westminster against the Constitutional Act of 1791.

From 1763 also dates the first authentic account of a settled English fishery between the Strait of Belle Isle and Hamilton Inlet. Under the French régime Canada had included all Labrador; but by the proclamation of 1763 its eastern boundary became the River St. John. Labrador and Anticosti were annexed to Newfoundland. Adventurers immediately began to establish themselves in the new territory. Captain Nicholas Darby, of Bristol, set up near Cape Charles, and the firm of Noble and Pinson, long well known on the coast, began to do business at Temple Bay.

This, however, was not at all the object which the English government had wished to accomplish. It had been their intention to put the Labrador fishery under the same regulations as the Newfoundland fishery. It was to be preserved as an "open and free fishery" for the Dorset and Devon fishing fleets, and was to be governed by fishing admiral rules. The establishment of sedentary fisheries immediately caused trouble. It was the old story, so familiar in the case of Newfoundland itself, of a struggle between the settlers on the shore, who claimed the right of exclusive fishing, and the fishermen who came over the Atlantic from English ports, and who wanted the fisheries and landing-places reserved for themselves. Sir Hugh Palliser, the governor of Newfoundland, strove energetically to carry out the new regulations. He applied to the home government for naval reënforcements, "for the purpose of enforcing the fishery laws and preserving peace and some degree of order amongst the fisheries, especially amongst the mixed multitudes now resorting to the new northern banks about the Strait of Belle Isle, composed of about 5000 of the very scum of the most disorderly people from the different colonies." He built a blockhouse in Château Bay, and garrisoned it with an officer and twenty men. But his measures were in vain. He had to encounter, not only the opposition of the few English and French-Canadian settlers on the coast, the latter armed with their title-deeds acquired under the French governors, but also the hostility of the Canadian and New England fishermen, who were excluded from the fisheries. The feeling among the New England fishermen was especially strong; their exclusion from the Labrador fisheries was one of the lesser causes which helped to bring about the American war, and it explains some episodes in the naval history of the war. In 1774 Labrador was given back to Canada. It was not until 1809 that it was finally reannexed to Newfoundland.

A trader who came to Labrador in 1770 was Major George Cartwright. He had been aide-de-camp to the Marquis of Granby in the Seven Years' War; but failing to obtain promotion, he resigned his commission, and went into business on the coast of Labrador. He has left us his journals, in three large folio volumes. The great majority of the entries are trivial. "I went out a-shooting," he says on September 29, 1772, "but saw nothing." Yet the diary as a whole gives a vivid and minute account of the life at a post on the Labrador in 1770. The drunkenness, the brutality, the license, are all depicted without reticence. Cartwright, who was a man of magnificent courage, treated the Irishmen and Indians under him like slaves. "I gave MacCarthy," he says, "twenty-seven lashes with a small dog-whip on his bare back, and intended to have made up the number thirty-nine; but as he then fainted, I stopped and released him; when he thanked me on his knees for my lenity." "I broke the stock of my Hanoverian rifle," he says at another time, "by striking a dog with it." So far as women were concerned, Cartwright's principles were frankly immoral. Yet he was religious after the fashion of his day. On Easter Sunday, he says, "I read prayers to my family both in the forenoon and afternoon." And after a providential escape from danger he writes: "We could attribute all these things to nothing but the effect of the immediate interposition of the DIVINITY, who had been graciously pleased to hear our prayers, and grant our petitions; and I hope I shall never be of a contrary way of thinking." He was a man of strict honour; and when he failed in business, he refused to go into bankruptcy, and preferred to carry the burden of his debt in the hope of paying it off.

He had several trading-posts at intervals along the coast from Cape Charles to Sandwich Bay. Under him he seems to have had at times as many as seventy-five or eighty men, mostly Irishmen of the lowest description. He did not limit himself to sealing, and fishing for cod and salmon, but he tried by all means possible to cultivate trade with the Indians and Eskimos. His policy in this regard is one of the most laudable things about him. Three years before his arrival on the coast the Eskimos, with whom murder was a pastime, killed three of Captain Darby's men at Charles River. The relations between the English and the Eskimos after this threatened to degenerate into the guerilla warfare which ended in Newfoundland in the extinction of the Beothuks. Cartwright saw that this policy was a wrong one, and by his firm and kindly attitude toward the Eskimos he gradually gained their confidence. Twice he took Eskimos back with him to England, and tried to train them up as go-betweens, but they almost all died from the smallpox. Their death was to Cartwright one of his greatest disappointments. Through ill luck his policy was not so successful as he hoped it would be, but it must be said that he was working along the right lines.

Cartwright was not a good business man, and his adventure was not a success. He suffered from the hostility of Noble and Pinson, "who have been my inveterate enemies ever since I came to the coast," and his buildings were several times destroyed by fire. But the great calamity which overtook him was the visit of the American privateer *Minerva* in August, 1778. At one o'clock on the morning of August 27, he was alarmed by a loud rapping at his door; he opened it, and a body of armed men rushed in; they were, they said, from the *Minerva* privateer, of Boston, in New England, commanded by John Grimes. They made Cartwright their prisoner, and took possession of everything. At nine o'clock Cartwright was taken on board, and received by Captain Grimes, who was "the son of a superannuated boatswain of Portsmouth." Cartwright was not favourably impressed by the first lieutenant and the surgeon, whom he describes as "two of as great villains as any unhanged." He found that his possessions at Charles Harbour and Ranger Lodge had already been plundered. An expedition had been sent off to Caribou Castle to plunder there; and it was only by talking about a British frigate which he expected that he frightened them from sending to Paradise and White Bear River. They robbed him of everything except a small quantity of provisions and a chest of baggage, which Grimes returned ("but many things were pillaged out of it"). Cartwright lost also about one-half of his men. The *Minerva* was short-handed, and Grimes offered a share of the booty to any who would enter with him. Nearly thirty-five men, mostly Irish and Dutch, accepted his offer. It is needless to say, none of them ever saw any prize-money; when they reached Boston, they were all thrown into prison, where they languished for several months.

Cartwright computed his losses at about £14,000. Fortunately, however, his brig, with all the salt and most of the other goods which the Americans had carried away in her, was retaken on her passage to Boston, and his losses proved not so great as he had imagined they would be. Others suffered more severely than he did. Noble and Pinson at Temple Bay lost three vessels and all their stores; and two merchants named Slade and Seydes lost a vessel each at Charles Harbour. The next year a small American privateer of four guns entered Battle Harbour, and captured a sloop there with about twenty-two tuns of seal oil on board. The stores on the shore, belonging to Slade of Twillingate, were destroyed. The result was that "everybody on this side of Trinity was in the utmost distress for provisions from the depredations of the privateers, as no vessels had arrived from England." Cartwright himself had to cut his men down to short rations during the winter.

In 1786 Cartwright returned to England, and his diary closes. In the last entries are some interesting notes on the Strait of Belle Isle. At both Forteau Bay and Blanc Sablon Cartwright founded establishments of fishing companies from Jersey. Behind the Isle de Bois he saw several American whalers lying at anchor. "Not having had any success with whales, they were catching codfish. As they dare not carry their fish to the European markets, for fear of the Barbary rovers, they are sent up to their own back settlements, where they fetch good prices." The journal ends with a poetical epistle to Labrador.

Ten years after Cartwright left the coast Labrador was again the victim of a hostile visitation. In August, 1796, Admiral Richery, one of the ablest of the admirals of the French republic, made a flying visit from Cadiz to the Banks of Newfoundland. After having wrought cruel havoc among the fishermen on the Banks, he despatched three of his ships, the *Duquesne*, the *Censeur*, and the *Friponne*, under Commodore Allemand, to visit the coast of Labrador. Allemand was delayed by wind and fog, and when he arrived at Château Bay, most of the fishing vessels had left for Europe. Several ships, however, still remained, among them part of the rich convoy of peltries returning from Hudson's Bay. These Allemand captured. He then sent a summons to the commandant of Fort York, the blockhouse which Governor Palliser had built at Château Bay, demanding his surrender. When the commandant refused to surrender, Allemand opened fire on the fort, and soon silenced its fourteen guns. The English thereupon took to the woods, but not before they had set fire to all the buildings and stores at the post. The French landed, but found "nothing but ashes"; after a vain attempt to pursue the English garrison in the woods, they put to sea again, taking with them those prizes which they had not sunk or burned. They had done as much damage as it was possible for them to do. The people of Labrador have small reason to love the warships of revolutionary states.

In 1809 Labrador was given back to Newfoundland. The arrangement was once more, however, found to be unsatisfactory. The *Côte du Nord* was really a part of Lower Canada, and it did not fit in, either legally or socially, with the system of government in Newfoundland. The result was that in 1825 that part of Labrador which is now known as the Quebec Labrador, stretching from the River St. John to Blanc Sablon, was reannexed to Lower Canada. This is the arrangement which governs the present condition. Unfortunately, however, the boundaries of Labrador have never been clearly defined. The jurisdiction of the governor of Newfoundland, as defined in the letters patent regularly issued up to 1876, includes "all the coast of Labrador, from the entrance of Hudson's Straits to a line to be drawn due north and south from Anse Sablon [sic] on the said coast to the fifty-second degree of north latitude." The only conclusion which may be drawn from this document is that the advisers of the British crown, when they drew it up, were, as usual, not looking at the map. Anse Sablon is a place which does not exist, though Blanc Sablon does; and just where the entrance to Hudson's Strait is, might well, as Sir John Haselrig said, be the subject for a month's debate. It might be anywhere from Cape Chudleigh to Fort Chimo.

The result of the ambiguity in the terms by which the boundary of Labrador is defined, has been a dispute between Quebec and Newfoundland which is still pending. Canada has issued a map coloured red right to the Atlantic seaboard; and Newfoundland has retorted by colouring nearly the whole of the Labrador peninsula green. The question will probably be decided by the Judicial Committee of the Privy Council.

In 1811 an act of Parliament was passed authorizing the holding of surrogate courts in Labrador. Nothing was done to give effect to this act until 1827, when Sir Thomas Cochrane, the governor, issued a proclamation setting up a court of civil jurisdiction. A sheriff was appointed for the coast, and a vessel was chartered to take the judge on his circuit; but it was soon found that the undertaking was more expensive than advantageous. In 1833 the court was abolished.

Meanwhile a change had been taking place in the fisheries. In 1818 a convention was made between the United States and Great Britain, by which the inhabitants of the United States gained, among other things, the right of taking fish of any kind "on the coasts, bays, harbours, and creeks" of the Labrador. American fishermen took advantage of this convention in great numbers. In 1820 Captain Robinson, of H.M.S. *Favourite*, reported "530 sail of them this year." The English fishermen began to suffer from their competition. Both the American and French fishermen received bounties from their governments: the first in the shape of a drawback on the salt used; and the second in the shape of premiums which were so regulated as to make 20 francs per quintal the minimum price received. The American fisherman also fished "in his own vessel, built by himself, with timber grown on his own land, and with provisions supplied by his own farm." There was great irritation against the government because of their admission of the Americans into what was considered the richest part of the fisheries. It was felt that England was being generous to the prodigal son at the expense of the son who stayed at home. Such a feeling has not died out in Newfoundland yet, as recent events have shown.

Population has never increased by leaps and bounds on the Labrador coast. In 1841, however, Samuel Robertson said that on his part of the coast there were over two hundred and fifty settlers. In 1848 the bishop of Newfoundland visited Labrador. "No bishop or clergyman of our Church," he said, "has ever been along this coast before, and yet the inhabitants are almost all professed members of our Church and of English descent." The good man found plenty of work to do. He consecrated several graveyards. At one settlement "great numbers were married, and both here and elsewhere an offering [of four dollars] was very cheerfully paid." At Battle Harbour fifty-seven children were admitted into the Church.

The statement is made in some of the books that when the Acadians were driven from their homes in 1753, a number of them took refuge on the Labrador coast, and erected a fort at Château Bay. For this statement there is no authority whatever. The only invasion of the shores of Labrador by Acadians took place in the years 1857–1861. During these years a number of Acadians came from the Magdalen Islands, whither their ancestors had fled a century before. Some of them, braving the threats of seigneurs, settled at Pointe Saint-Paul, not far from the ancient harbour of "Brest," and others squatted near Natishquan, ninety miles east of Mingan. In all, they numbered about eighty families. Their children still live on the *Côte du Nord*, scarcely distinguishable from the French Canadians about them.

Something must be said about the Hudson's Bay Company. It is probable that until 1870 the Hudson's Bay Company was at law the proprietor of a large part of the Labrador peninsûla. Under their charter they claimed "all rights to trade and commerce of those seas, etc., within the entrance of Hudson's Strait, and all lands on the coasts and confines thereof." Their claim to Labrador was submitted to the law officers of the British crown in 1752, and pronounced by them to be valid. It was not, however, till 1831 that the company began to exploit Labrador. In that year, having learned from a missionary report that the country about Ungava produced excellent furs, and being desirous also of "ameliorating the condition of the natives," they founded Fort Chimo on Hudson's Strait. A year or so later they established at the other end of Labrador Rigolet Post, near the head of Hamilton Inlet. It was the desire to establish communications between these two posts that led to the wonderful overland journey of John M'Lean, the factor at Fort Chimo, in 1838, a journey which has not been repeated until within the last few years. M'Lean's *Notes of a Twenty-five Years' Service in the Hudson's Bay Territories* is worth reading as an earlier version of the lure of the Labrador wild.

In 1870 the great company surrendered all its rights in British North America to the Dominion of Canada, in return for a substantial *quid pro quo*. All that part of Labrador, therefore, which does not belong to Newfoundland, comes under the jurisdiction of the Dominion.

There remains to be told the story of the Moravian missionaries. No more wonderful story of missionary effort has ever awaited the pen of the reporter; and yet the work of the Moravian Mission in Labrador has been little known. It was in 1752 that the United Society of Brethren first attempted to found a mission there among the Eskimos. It ended in failure. The four missionaries had erected a house, the frame and materials of which they had brought with them, when five or six members of the crew, among them the mate, who was a Brother, were treacherously murdered by the Eskimos. The missionaries were obliged to return with the ship, in order to help man her, and they left their house standing on the bleak and desolate coast. It was seen next year (1753) by Captain Swaine, of Philadelphia, who was exploring the coast in the ship *Argo.*

The attempt to found a mission was not renewed until 1764. In that year Jans Haven, a member of the Brotherhood who had been working among the Eskimos of Greenland, landed at St. John's, Newfoundland. Sir Hugh Palliser, the new governor, was anxious to improve the relations between the white men and the Eskimos, and he did all in his power to further Haven's aims. At last, at Quirpont, Haven met an Eskimo. "I ran to meet him," he says. Great was the surprise of the Eskimo at being addressed in Greenlandic.

The next year three other missionaries came out, one of them an old man whose race was nearly run. They selected the spot which they thought best for their mission, and then asked from the government a grant of 100,000 acres in connection with it. This demand fell on the ears of the government like a thunderbolt. It was excessive; it savoured even of ulterior designs. The missionaries explained that the vicious influence of the European traders and fishermen on the coast made it necessary that the natives should, as far as possible, be preserved from contamination. In 1769, after long delays, the grant was made. Two years later the Brethren began to build their mission house at Nain. "It was as if," wrote one of them, "each with one of his hands wrought in the work and with the other held a weapon." Before winter broke on them they had the house finished.

In 1773 the British government sent out Lieutenant Curtis, R.N., as a commissioner to report on the progress of the mission. Some sentences from his report may be transcribed: —

"They have chosen for their residence a place called by the Indians [Eskimos] Nonynoke, but to which they have given the name of Unity Bay. . . . Their house is called Nain. It is a good situation, and is well contrived. They have a few swivels mounted, although they have no occasion for them, as the Indians [Eskimos] are awed more by their amiable conduct than by arms. There is a sawmill, which is worked by a small stream conducted thither by their industry from the mountains, and they find this engine to be extremely serviceable. . . . They have a small sandy garden, and they raise salads in tolerable perfection. . . . The natives love and respect them, because they have happily adopted and strictly adhere to that conduct which is endearing without being familiar. None of the Indians [Eskimos], a very few excepted, ever presume to come within the palisades without permission, nor is a bolt necessary to prevent their intrusion. . . . The progress which the mission has made in civilizing the Indians [Eskimos] is wonderful."

In 1775 the mission at Okkak was established; and in 1782 that at Hopedale. Everything, however, did not go smoothly at first. About 1787 a mysterious person named Makko, a French Canadian (says the historian of the mission), who combined the character of merchant and

Roman Catholic priest, succeeded in enticing a number of the Eskimos away from the Brethren. And Cartwright says in his journal in 1783: "The Eskimos expressed a great dislike to the Moravians, and assured me they would not live near, or trade with, them more." It was not until 1804, says one of the missionaries, that the fruits of the mission began to appear; but in that year, "a fire from the Lord was kindled among the Eskimos." Since then mission stations have been established at Hebron, at Zoar, at Ramah, and at Makkovik. These names may be seen marked on any good map of northeastern America, "names of another clime and an alien race."

The Eskimos, said Cartwright, "have always been accounted the most savage race of people on the whole continent of America." "They are," said Governor Palliser, "the most savage people in the world." To-day it would be hard to find a more quiet, placid, and peaceable race. The change is due almost entirely to the United Brethren. They have converted a race of primeval savages, with whom murder was a passion and theft a craze, into mild and simple Christians. The great miracle has seldom been wrought on more unpromising materials and with more amazing success.

For their part, the Eskimos are not unmindful of their friends and benefactors. "My dear Brethren and Sisters," writes Simeon of Nain, "I am quite astonished at your love for us, and distressed that I am not able to make you any return. I have requested my teachers to translate my words into your words, that you may understand that I feel great gratitude toward you. I am Simeon."

"I greet the unknown friends in Europe," writes Verona from Hopedale, "as if I knew them, and write these unworthy lines to them. In heaven I shall see them and get to know them, because we shall all be with the Lord, even those who have no money."

CHAPTER II

TRAVELLED ROUTES TO LABRADOR

By W. T. Grenfell

The northeast coast of Labrador can be reached at present only viâ Newfoundland. A passenger steamer runs from each side of the island to Labrador. These steamers belong to the Reid-Newfoundland Company, and receive a subsidy to carry the mails. They are both smart, stout boats, and are in the hands of such old experienced pilot captains that in spite of the badly charted coast, the icebergs, and the absence of most of the aids to navigation in the more beaten tracks, no danger beyond what is incidental to every sea trip need be anticipated. There has never yet been a life lost from accident on these mail boats visiting the Labrador coast.

The tourist must choose whether he wishes to go by the west or east coast of Newfoundland. The east coast boat runs once a fortnight. She calls at many points along the east coast of Labrador as far as Nain, in lat. 56°, and also at several points on the east coast of Newfoundland. The west coast boat makes weekly trips, starting from Bay of Islands. She touches at ports on the island, crosses the Strait, and visits the southern shore of Labrador, from Bonne Esperance to Battle Harbour, at the entrance to the Strait of Belle Isle. Here she connects with the east coast boat, so that visitors can come by the one route and return by the other; the tickets are good on either steamer. St. John's is connected with Bay of Islands by direct railway communication.[1]

The Reid-Newfoundland Company issue an illustrated "Souvenir" of Newfoundland. This contains an excellent map of all the routes of their lines, and also takes in the whole coast of Newfoundland and the Labrador coast as far north as their steamer goes, *i.e.* to Nain. As far as Chateau in the Strait of Belle Isle, the tourist is in telegraphic communication with the outside world and by the Marconi system as far north as Hamilton Inlet.

St. John's is easy of access and can be reached from Liverpool or Glasgow by the Allan line of steamers. The passage takes about eight days. St. John's can also be reached by steamer from Halifax by the Furness line or Red Cross line; from New York direct by the Red Cross line; direct from Philadelphia by the Allan line; and direct from Montreal by the Black Diamond Steamship line. If, however, a shorter sea passage is desired, passengers can go viâ Sydney, Cape Breton, whence a steamer connects with the trans-Newfoundland Railway at Port-aux-Basques, accomplishing the short sea journey in six or seven hours. The railway to St. John's from Port-aux-Basques passes through Bay of Islands, the starting-point of the western boat to Labrador. It also traverses the beautiful valleys of the Humber and Cordroy rivers.

As the east coast Labrador steamer makes about a hun-

[1] The passenger agent at St. John's for the Reid-Newfoundland Company will gladly give all information with regard to means of transit, etc.

dred calls on the round trip, the traveller can learn much without leaving her. But if he wishes really to see Labrador, he must be willing to give more time to it than the mere hurried round trip of the mail steamers can afford him. These steamers remain but a very short time at each place, and do not visit the long and almost unknown fiords which constitute one of the chief attractions of the coast. To go where perhaps the foot of man has never trod, to wind in and out at leisure among the countless turns and twists of these inlets, never knowing what one is likely to meet with next, adds a great charm to a holiday and a freshness which long since has been lost by most summer resorts. The wildest, least known, and by far the grandest fiords are all north of Nain; in order to attain a true appreciation of scenic Labrador, one ought to begin where at present the average visitor is obliged to turn back with the mail steamer.

Thus to enjoy the best that Labrador has to offer, and to study the remarkable features which among all the coasts near to civilization are peculiar to "the Labrador," one must be able to linger at will in the long fiords, push up these still unnamed and almost unknown arms of the sea, and discover for oneself new coves and inlets as he coasts along them. In a few, but only a very few, of the northern bays and fiords one may occasionally find a solitary salmon fisherman. Generally the visitor may enjoy with Robinson Crusoe the joy of being monarch of all he surveys. Not a policeman, nor a warning "not to trespass" will be encountered. No advertising fiend has yet succeeded in defacing these refreshing wilds.

In Labrador there are no hotels in the ordinary meaning of the word. Yet there is not a single place touched by the mail steamer where the visitor will not find a shelter of some sort. The ways of the country are those of the wilds, and every house is glad to offer what accommodation it can to those who come along. The Moravian Brethren, the hospitals of the Royal National Mission to deep-sea fishermen, the larger planters, as well as the settlers, are always glad to help a visitor along. Naturally, however, if one wishes to go exploring, hunting, fishing, or doing any kind of work which involves going far from the mail steamers, it is best to be independent, and to be so one should carry a tent and light camper's outfit.

Very few supplies can be obtained locally. It is best to rely on obtaining nothing beyond flour, sugar, hard bread, salt meats, and one or two of the commoner foods, such as dry peas, etc.; these can be obtained at almost every place where the mail boat stops. Nor must one count on getting canoes or light boats suitable for rivers on the coast. Only a very few such craft exist. It is far better to take one's own boat and sell off at the end of the trip, for craft of this sort would command a ready market.

Guides can be obtained for most of the outer bays if they are arranged for beforehand. Since the summer-time is the only season in which most Labrador men can earn money, arrangements should be made for guides and crews during the preceding winter or spring. The best way to be sure of a reliable guide is to write to the agent of the Hudson's Bay Company, the Moravian Brethren in the north, or the author of this chapter. All are glad enough to assist any one planning a visit to the coast or interior.

The best way of all, though naturally the most expensive, is to hire a schooner or a small steamer, and thus be entirely one's own master. Few yachts have ever visited Labrador. The descriptions given of the welcome afforded by its coast to small vessels, even in such should-be authorities as the Encyclopædia Britannica, are so poetical in their freedom with the actual facts, that they are not calculated to entice any one who is bent on pleasure. As a matter of fact, if the charting were better, there could scarcely be a safer coast for the amateur skipper, for one can get a harbour in every stretch of ten miles along the whole length of the Atlantic coast. It is not necessary to spend a single night at sea the whole way from the Belle Isle Strait to Cape Chidley. Flitting from harbour to harbour, one can easily cover the entire coast.[1]

The days are long in summer in these latitudes, and at night the clear atmosphere, the splendid northern lights, and the absence of strong tidal currents (except in the extreme north), make navigation still more easy. I have cruised the coast both in sailing boat and steamer, year after year, and have never been near losing a life yet. Three parties of friends, who have adopted this method of visiting Labrador in a hired schooner (one party having come two summers in succession), all give the same testimony.[2] The fishermen who visit this coast year after year can give similar evidence; thousands of men, women, and children have for many years been cruising the outside coast

[1] With one man in an open dingey I have, with comparative comfort, traversed the coast from Battle Harbour to Rigolet, a distance of two hundred miles.

[2] The gentlemen referred to are Americans from Boston, Mass., Concord, N.H., and Providence, R.I., respectively.

in summer as far as lat. 56° north and some as far as Hudson Strait. These people come down from both sides of Newfoundland in sailing craft of every conceivable kind, many sailing in vessels under twenty tons, and some in open skiffs. Yet it is very rare to hear of any having been lost from stress of weather. The dangers of the ice have simply been ridiculously exaggerated. The one or two cases where collisions with ice have occurred have been due to the fisherman's hastening along on dark nights in order to reach a fishing station sooner than another vessel. In fact, these accidents are due to the contempt bred of familiarity, and to the consequent boldness which no pleasure party would ever dream of displaying.

The want of charting can be entirely made up for by the knowledge of these fishermen, who can readily be shipped as part of the crew, acting as pilots at the same time. Nor is this knowledge so marvellous after all, when one considers the number of times that they have navigated these same waters, and that they have sounded almost every part of it again and again with their hand-lines as they fish year after year along the coast. Moreover, the cliffs are generally so steep-to that the bowsprit would strike before the keel. Poor anchors and chains are the causes of almost all our losses. Only when it comes to the inside calm waters up the fiords, where, as a rule, the Newfoundlanders do not go after fish, does their local knowledge come to an end, and the pleasure of exploring for oneself begins. But as the water is then necessarily sheltered from any possible swell from the Atlantic, and as an anchor can at a pinch be dropped anywhere, the danger to life becomes almost absolutely nil. In the fiords it is often impossible to strike bottom; if you should wish to do that, your bowsprit will keep you off the land. Even supposing that you were to strike and lose the schooner, you have only to launch the jolly-boat and row ashore.

A forty-ton schooner with a crew of four hands could be obtained for $100 per week, or less — a sum which would include food for the crew, the insurance, and all charges. As such a vessel will easily accommodate a party of four or five, the expenses, considering the nature of the holiday, cannot be considered heavy. The lessor of the schooner would have to be guaranteed probably a ten weeks' minimum hire. It is possible to hire a schooner for a lump sum to include everything.[1]

If time is a great object, the best way would be to send the schooner on to Labrador and meet her there in the mail steamer. This would obviate the only open sea that is more than one could be sure of compassing in a day's run; namely, the journey from St. John's to Battle Harbour. After that it is perfectly easy to harbour every night. As one travels farther north, the number of off-lying islands increases considerably, and for a hundred miles at a time one can pursue his journey along the coast with an "inside" passage. From Cape Harrigan in lat. 55° north to Cape Mugford in lat. 58° north, the voyage can be made almost without seeing the open sea. The last thirty miles to Cape Chidley Island is again all inside, and the vessel can then be sailed on into Ungava Bay through a strait on the south side of the island. It may be noted that the tides, such as they are, set almost uniformly to the south-

[1] Mr. W. H. Peters, St. John's, has arranged such a trip and is prepared to assist any one wishing to make a similar expedition.

ward, so that however hard it may be to beat against head winds to the northward, it is always easy to get back again. Fire-wood for camping purposes can be obtained everywhere south of Cape Mugford; with a little care and foresight the fuel question need offer no difficulty.

After many years' cruising the coast as master of my own vessel, after having visited the coasts of Norway and Iceland, as well as having coasted all round the British Isles, I consider that none of these European shores offers a more fascinating and safer field for pleasure cruising than the coast of Labrador. Everywhere the coast is bold-to, and if disaster overtakes a pleasure vessel in the summer months, it is due to negligence or to bad tackle for holding or running gear.

If the visitor to Labrador desires scenery of a wild and rocky nature, he should certainly aim for the northern half of the northeast coast. At Nain the cliffs are already beginning to rise to heights which cannot fail to delight the eye and to stimulate the imagination. From that point on, the sheer precipices increase in number and impressiveness until, at Port Manvers, they rise two thousand feet out of the sea; at Cape Mugford, three thousand feet; at the Moravian Mission station, Ramah, thirty-five hundred feet; while the mountains rising direct from sea-level in the Nachvak region are over four thousand feet in height. One of the finest of the great mountain-blocks is that at Cape White Handkerchief — so named from a large mass of white rock in the face of this stupendous promontory. At the head of Seven Islands Bay are the highest mountains in Labrador, known as the "Four Peaks." So far as known, no white man has ever climbed any one of these hornlike, rocky piles; their heights have been variously estimated at from six to ten thousand feet. The probable heights seem to be from six thousand to seven thousand feet.

Many of the beautiful inlets in the southern half of this coast may be explored with small, open boats or even with canoes. Some of the inlets can be easily reached by leaving the mail steamer at Fanny's Harbour, Cape Harrigan, or Davis Inlet (the Hudson's Bay Company's name for Ukasiksalik). First, there is Jack Lane's Bay, with a salmon river at its head; then, a few miles farther north, Jem Lane's Bay, beyond which there begin hundreds of miles of winding, interlacing fiords and channels ("tickles"). Such inside passages thread among a long and wide island-breastwork along the coast; many months could be spent in exploring these waters. The wooded sides of the narrow, steep-sided "tickles" not only give their own touch of beauty to the landscapes, but afford cover to animals of various sorts. At Hopedale one has access to several long bays reaching up into the interior; at the head of the nearest bay is a large and beautiful waterfall. Farther south the bays bearing the following names will well repay visits: Kaipokak, Makkovik, Kanairiktok, Stag Bay, Hamilton Inlet, Sandwich Bay, Hawke's Bay, Alexis River Bay, and Lewis Bay. To reach them the visitor should leave the steamer at the respective points: West Turnavik, Makkovik Island, Hopedale, Cape Harrison, Rigolet, Cartwright, Boulter's Rock, Square Island, and Battle Harbour.

But the universal attraction of the coast — the ever changing glory of the atmosphere — cannot be localized or described. Colour is everywhere, with a gamut that few parts of the world can equal. From the hilltops the land is a giant opal, changing, in a million moods, from the tenderest gray or blue, through vivid emerald or most royal purples, to the unsurpassed gold and reds of the long twilights and dawns. In the summer season north of Hamilton Inlet the sky is seldom clouded over completely, and cumulus, stratus, or ocean mist simply enhance the inimitable play of nature's colouring. Thunder-storms are very rare; when one of these storms, coming from the west, does pass out to sea, it may be an event in one's life. I shall never forget one dark night when the huge cliffs of Mugford Tickle through which we steamed, and a group of great icebergs stranded at their feet, leapt out of the blackness as stroke after stroke of lightning blazed from the clouds. It seemed that one could scarcely imagine a sight more thoroughly awe-inspiring. Even the short nights of the summer and early autumn are blest with light and exquisite colour, for the auroral displays are, on this coast, among the most frequent and extensive of all those recorded throughout the world. Very often, beneath this strange sky, the sea is intensely phosphorescent; the traveller by night may find endless entertainment, watching from the bow of his moving vessel the weird lights set flashing by schools of frightened fish.

If the visitor seeks large rivers for exploration by canoe, he can find a good number, and all are well stocked with salmon and trout. Trout are known always to be taken with the fly, but beyond the latitude of 53° 50′ north, little fly-fishing has been attempted, and contrary reports are given as to the measure of success in getting salmon to rise. The noblest of the rivers is, of course, the Hamilton, at the head of Melville Lake (Hamilton Inlet); this river will be specially described in Dr. Low's chapter on "Hamilton River and Grand Falls."

For hunting, the places least disturbed by man are naturally apt to be the best. In the autumn almost all the bays abound in geese and ducks. One may be rather sure of geese at the entrance to Hamilton Inlet, at the head of Lane's Bay, at the entrance of Table Bay, in Goose Bay near Cartwright, and in Byron's Bay. Other likely places are Partridge and Rocky bays, and also at all the flats near the mouths of the big rivers. The autumn deer-hunting is, so far as known to me, most likely to be successful in Davis Inlet, on the hills about Nain, inside Cape Mugford, at the head of Makkovik Bay and on the hills above Stag Bay and False Bay. After Christmas deer are to be found in abundance within reach of the settlers on the southern part of the coast. Black bears are most likely to be encountered where the settlers are fewest in number and where the caplin come to the land-wash near the woods. Many bears are killed every year in Hawke's Bay. They are also found in the fiords between Davis Inlet and Nain. White bears are found in small numbers on the northern parts of the coast, where they remain all summer to feed on the eggs and young of the countless ducks and geese.

Those who wish to study the Eskimo should go to Nain, and then farther north. To see them in anything like their primitive condition one should go as far as Ramah, and, if possible, to Nachvak and Ungava. In the northern fiords are many relics of the stone-age out of which these people are just passing; many articles of ancient make may be found by travelling in the gravel-beaches. To see the

Nascaupee or Montagnais Indians one should seek for them at Northwest River or at Davis Inlet whither they come to trade their furs.

Studies in geology, botany, and mineralogy can, of course, be pursued anywhere. The formations north of Nain seem to offer most prospect of commercial ores. An iron-deposit has been worked near Ramah; gold has been found near Cartwright; mica, at Paradise and at Boulter's Rocks; antimony, near Eagle River; and copper, near Cape Mugford. No lasting mining operations have been begun.

CHAPTER III

THE PHYSIOGRAPHY OF LABRADOR

By W. T. Grenfell

It is probable that the readers of this book are, as a rule, most interested in the drama of human life as, year after year, it is being played out in this strange land of Labrador. For this very reason one may well pause beforehand to review the physical features of the peninsula; in an intimate way and often in spectacular fashion the Labradorman's daily life is controlled by natural conditions. The simplicity and wholesomeness of that life are chiefly due to the fact that the men of the country are always close to nature. These essential traits of fine character are growing every day in the youth of Labrador much as the myriad of exquisite flowers deck its hills during the glory of summer; both man and plant are rooted in the soil or grip the native rocks, their home by the sea. This chapter is intended to furnish a brief outline of the physiography. Since the northeast coast is from many aspects the most interesting part, a following chapter will supply additional details on that region; in that chapter a brief summary of the geological development of the whole peninsula is also included. The scenic importance of the Grand Falls of Hamilton River demands a chapter which incidentally describes many typical features of the interior.

Dr. A. P. Low, now Deputy Minister of Mines in Canada, is the chief authority on the geography of the interior. He alone has published much on that greater part of the peninsula. His truly wonderful trips through the length and breadth of Labrador were signalized as much by the success attained as by the absence of mishaps on his long and hazardous journeys. To see the interior one must understand travelling. Mr. Low's trips show that much good work can be done with little fuss, and that no obstacles to exploration exist which foresight will not overcome. Using his simple but effective and essential rules of outfitting and living on the way, other men will repeat his traverses and add many new ones, until finally Labrador is really and thoroughly known. Meantime, I am glad to be able to supply from Mr. Low's own pen a short account of his findings in the interior. He writes:—

"The peninsula of Labrador has an area of more than five hundred thousand square miles. It is an ancient plateau formed of crystalline rocks which were folded up and elevated above the sea in a very early period in geological history. The plateau rises abruptly from the sea along the Atlantic and the Gulf of St. Lawrence, while the northern and western slopes are much more gentle. The main watershed of southern Labrador is about two hundred miles north of the St. Lawrence, where the general level is about two thousand feet above the sea. As controlled by the southern position of the watershed and by the range of mountains along the Atlantic coast, the greater part of the drainage is to the north and west, into Hudson Bay and Hudson Strait, and the largest rivers flow in those directions.

"The surface of the interior is comparatively level, being broken by low, rounded ridges of crystalline rocks, which seldom rise three hundred feet above the general level, and are usually much lower. These ridges lie roughly parallel; some of them being many miles in length, but as a rule, they die out in less than ten miles, so that the low land between forms a network of connected, shallow valleys. The general surface is further modified by low ridges of glacial drift, whose direction corresponds with the general slope of the country. These ridges have resulted from the transportation and movement of the loose surface material by the glacier, which once covered almost the entire surface of the peninsula. They have largely obliterated the ancient drainage systems of the central area, where the present watercourses are all of recent origin. The valleys separating the ridges are occupied by innumerable irregularly shaped lakes, which vary in size from ponds to lakes hundreds of square miles in extent. The lakes of each valley are connected by a stream, usually with a rapid current and without definite banks, following the lowest levels of the surface between lake and lake. As the streams become larger they are often split into numerous channels by large islands; many of the lakes discharge by two or more outlets flowing into the next lake below. There results a bewildering network of waterways hard to follow or map. These streams are seldom broken by falls; and as an example of the uniformity of the grade, it may be mentioned that the Hamilton River above the Grand Falls can be ascended to the heads of both its main branches without a portage. The rivers as they approach the coast fall into ancient valleys which have been sculptured deep into the hard rocks forming the general surface of the plateau. The Hamilton Valley is the finest example; cut a thousand feet into the plateau, it extends three hundred miles inland, and greatly exceeds the Saguenay Valley in length and grandeur.

"The peninsula, extending northward through ten degrees of latitude, differs greatly in climate, and passes from cold temperate in its southern parts to sub-Arctic on the shores of Hudson Strait. The climate of the interior is Arctic in winter, but during the short summer is much warmer than the coast, with hot days, cool nights, and occasional frosts, so that heavy blankets are always comfortable. The annual rainfall is not heavy, and during the summer heavy rains are rare; light showers fall almost daily, but are not very inconvenient to the traveller. The northern limit of trees extends to the southern shores of Ungava Bay. About the upper waters of Hamilton River, the valleys are thickly wooded with small spruce, fir, aspen, and poplar, while the hills are partly bare. There is a marked absence of underbrush, the ground being carpeted with white lichens on the higher parts and with mosses in the damp lowlands. Blueberries and other small fruits are abundant in the burnt areas and along the banks of streams.

"Owing to the high coastal range along the Atlantic, the only large rivers flowing eastward empty into the head of Hamilton Inlet, which itself is cut through the range. The Hamilton River is by far the largest of these; next in size is Northwest River, the outlet of Lake Michikamou, a very large body of water some three hundred miles inland to the northwest. The Kenamow is the third, and flows from the highlands to the southwest.

"Some knowledge of the interior of Labrador was possessed by the French in 1700, as shown by the map published at Paris, by Delisle, in 1703. This information was probably obtained from Jesuit missionaries and fur traders. By 1733, seven fur-trading posts had been established along the north shore of the Gulf of St. Lawrence and in the southern interior.

"The fight for the fur trade, between the Northwest Company and the Hudson's Bay Company, lasting from shortly after the conquest of Canada until 1820, led to the establishment of many small posts and outposts far in the interior of Labrador. The amalgamation of these rival companies led to the abandonment of many of these small posts, of which all trace is now lost.

"In 1824, the Hudson's Bay Company sent Dr. Mendrys from Moose Factory on Hudson Bay, across the peninsula in canoes, to establish Fort Chimo on Ungava Bay. This trip was the basis of Ballantyne's popular story, *Ungava.*

"At the same time James Clouston was mapping the country between the Nottaway and East Main rivers, which flow into Hudson Bay. The next record of exploration is contained in *Twenty-five Years in the Hudson's Bay Territory* by John McLean. In the period 1838–1840 he made annual trips from Fort Chimo to Hamilton Inlet, and on one trip discovered the Grand Falls of Hamilton River. In 1857 the Hudson's Bay Company had nine posts and outposts established in the country north of the Gulf of St. Lawrence. Owing to changes in the conditions of the Indians, these posts have been gradually abandoned, and but two, Nichicun and Mistassini, remain at the present time. These are situated on the head waters of the Big and Rupert rivers, which flow into Hudson Bay, and are not within the province of this book. The old posts of Nascaupee, Michikamou, and Winokapau on the Hamilton River were abandoned in 1873, and the Indians belonging to them now trade at posts on the Gulf of St. Lawrence.

"With the closing of the trading posts all knowledge of the interior was lost, and it can only be recovered by new explorations. In 1887, R. F. Holmes attempted to reach the Grand Falls of the Hamilton, but being without proper canoes and crew, only reached Lake Winokapau, a little over halfway up the river. Two separate expeditions from the United States ascended to the Grand Falls within a few days of each other in 1891, and accounts of their trips were published in the geographical journals and in the *Century Magazine.*

"Since 1885 the writer has made a number of trips through the interior and along the northern and western coasts, reports of which are published by the Canadian Geological Survey.

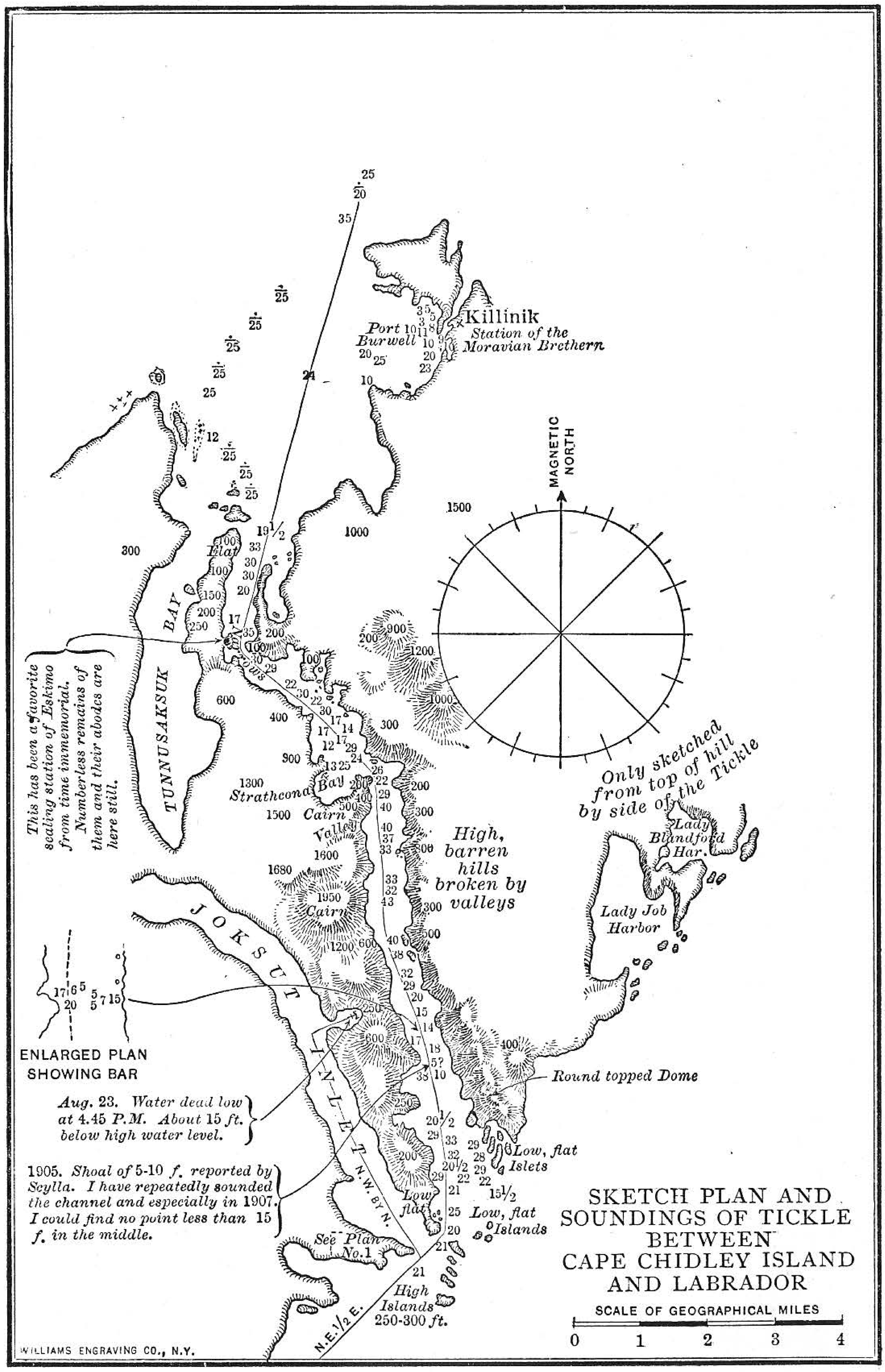
"This in a few words is the available knowledge concerning the history of the vast interior of Labrador; our information has been wholly derived from a few portage routes travelled by the voyageurs of the Hudson's Bay Company to and from the coast and from a few surveyed tracks along the principal watercourses by government explorers and others."

One quarter of the whole surface of Labrador is estimated to be covered with fresh water. Vast lakes are so joined by an intersecting network of rivers that it is possible to canoe over most of the country with astonishingly few portages of length. For example, a voyager can enter the Manikuagan River at the Gulf of St. Lawrence in lat. 49° 15′ north, travel about three hundred miles to Summit Lake in lat. 53° north, cross the lake and on the opposite side enter the Koksoak River, and, proceeding another four hundred miles, come out in Ungava Bay in lat. 58° 5′ north. These distances, it may be noted, are in the air-line; following the turns of the rivers the distances are nearly twice as great as those given. Or, again, one can enter Hamilton Inlet, proceed about one hundred and fifty miles to the mouth of Hamilton River in long. 60° west, follow it to its source some six hundred miles to the westward, cross by a short portage to the head of Big River, and follow that stream about seven hundred miles farther westward, to its mouth in Hudson Bay in long. 79° west. Probably in no country of equal area can exploration by canoe be carried on with so few portages.

The maps showing Mr. Low's traverses are published by the Geological Survey Department at Ottawa, Canada; they are the only reliable maps of any part of the interior.

The distances along the coast-lines of the peninsula are truly "magnificent." The air-line stretch from Battle Harbour to Cape Chidley on the northeast coast is seven hundred miles; following the sinuosities the shore-line is doubtless three to four times as long. From Cape Chidley to Cape Wolstenholme (the north coast) is about five hundred miles as the crow would fly, if he could live up there. From Cape Wolstenholme to the bottom of James Bay is another eight hundred miles, while the south coast is approximately seven hundred miles, also in a straight line. Thousands of miles of additional shore-line are represented in the numerous inlets and in the literally thousands of islands along the southern and northeastern coasts. The relative accessibility of the coasts, coupled with the fact that fisheries will long be the principal industry of the country, makes it expedient to use more space in the description of these parts of the peninsula. Besides the physiography described in the special chapter on the northeast coast, I shall here add some notes derived from my own exploration of the northern fiords.

If one could and should accurately picture the fiords, it would mean that half the interest of the visitors in these northern waters would be lost. The romance of these wonderful cleavages in the mountains largely consists in the feeling one has that, when he turns a corner, no man has told him what will next meet the eye. The study of the fiords has only just begun; all that I can do is to give some indication as to general location, lengths, and con-


Killinik
Station of the Moravian Brethern
Port Burwell
MAGNETIC NORTH
TUNNUSAKSUK
BAY
This has been a favorite sealing station of Eskimo from time immemorial. Numberless remains of them and their abodes are here still.
Strathcona Bay
Cairn Valley
Cairn
High, barren hills broken by valleys
Only sketched from top of hill by side of the Tickle
Lady Blandford Har.
Lady Job Harbor
JOKSUT INLET
ENLARGED PLAN SHOWING BAR
Round topped Dome
Aug. 23. Water dead low at 4.45 P.M. About 15 ft. below high water level.
1905. Shoal of 5-10 f. reported by Scylla. I have repeatedly sounded the channel and especially in 1907. I could find no point less than 15 f. in the middle.
Low, flat Islets
Low flat
Low, flat Islands
N.W. BY N.
See Plan No. 1
High Islands 250-300 ft.
N.E. 1/2 E.
SKETCH PLAN AND SOUNDINGS OF TICKLE BETWEEN CAPE CHIDLEY ISLAND AND LABRADOR
SCALE OF GEOGRAPHICAL MILES
0 1 2 3 4
WILLIAMS ENGRAVING CO., N.Y.

tours of a few of them. Of the thirty or more larger fiords a few will be noted, beginning at the most northerly one on the Atlantic coast. Some stress will be laid on the landmarks which may be of service to future explorers in the far north.

South of Cape Chidley Island is the channel connecting Ungava Bay with the Atlantic. Separated from that

FIG. 1. CAPE CHIDLEY

1. 1950 ft. — Mt. Sir Donald on south side of Grenfell Tickle; 2. The cape; 3. Position of Killinik; 4. East coast of Labrador; 5. Gray Straits.

channel for some ten miles only by a narrow, rocky ridge, is a long inlet which I explored in the small steamer *Sir Donald* during the year 1897. We entered this inlet while searching for the channel above mentioned. We steamed up about ten miles, the water being, as usual, deep on both sides. Finding at that distance a good circular harbour on the north side, we dropped anchor in good mud at six fathoms. We thence scaled the highest hill on the north side, finding the summit too precipitous to ascend until we reached its southwest shoulder. The summit was found to be only about nineteen hundred and fifty feet above sea, but it commanded a glorious view. We could see Ungava Bay in the west, the Button Islands in the north; to the east, the Atlantic beset with numerous islands; to the south, a great array of the rugged peaks stretching away indefinitely into the mainland. We built a cairn on this peak and named it "Mount Sir Donald." Running another ten miles, toward the north-northwest, we reached a point in the inlet, where it is separated from a similar inlet from Ungava Bay only by a low neck of land. The main bay continues to the southwestward — how far, I am

FIG. 2. THE CURVE IN GRENFELL TICKLE
1. Chidley Island; 2. Mt. Sir Donald; 3. Cairn.

unable to say. On a second visit to this fiord we found three families of Eskimo camped on its shore; there are remains of ancient Eskimo encampments on the flats. This is an excellent ground on which to search for stone relics.

Threading the islands for a distance of ten miles from the mouth of this fiord, another inlet opens. It is marked on the Admiralty chart under the name "Ekortiarsuk." I have never entered it, nor have I record of its exploration by a single white man; the inlet is reported, however, to wind away among the mountains for thirty miles.

Fifteen miles to the south-southwest is Mount Bache

Grenfell Strait

and the northern end of the fiord-like Eclipse Channel, which lies between the mainland and the large island "Aulatzevik." Halfway through, this channel is blocked by ledges of rock, so that only small boats can pass. The Eskimo, in order to avoid the journey in the open ocean outside Aulatzevik, regularly use the channel for their skin boats. The mountains on each side of the channel

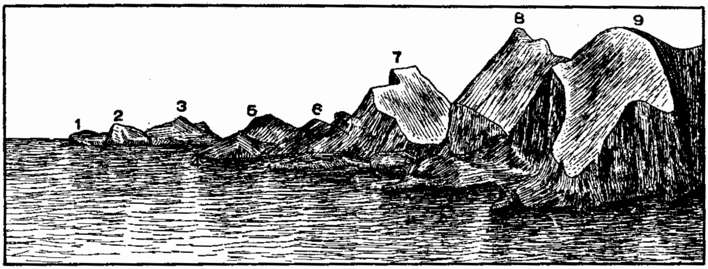


FIG. 3. REGION OF ECLIPSE COAST

1. Cape Naksarektok; 2. Cape Nullataktok; 3. Islands off Komaktorvik; 4. Cape north of Seven Islands; 5. South end of Strand; 6. South side Ryan's Bay; 7. Cape Territok; 8. North cape of False Bay; 9. Mt. Bache.

vary from two to three thousand feet in height. Aulatzevik is divided by a through-going valley, occupied in part by a long bay and, for the rest, by a string of small lakes. The bay offers excellent anchorage. The American eclipse expedition of 1860 has published a chart of the island and "tickle" (channel), but it does not show this harbour on the southern end of the island. Just west of the entrance to the harbour there is a remarkable natural landmark, a sketch of which is given in Figure 4. The landmark may be useful to any one making the land here, for the peak is plainly visible from the sea; I have called the peak "Castle Mountain," since it greatly resembles an old baronial castle perched high on a semi-isolated spur of the general range facing the sea. Care must be taken in approaching the northern entrance, for there are, besides several very small islands, some "nasty" shoals lying between east and northeast of Mount Bache. Beyond these shoals there are some larger islands, one of which has an

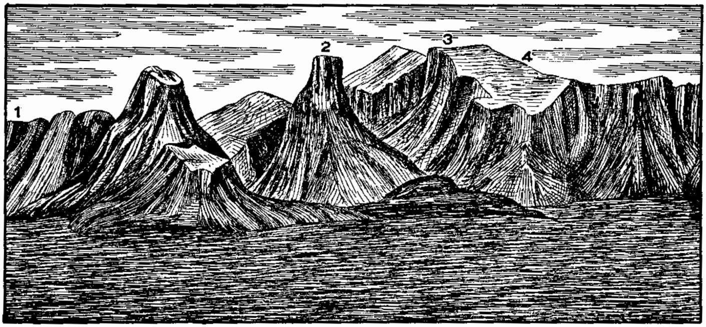


Fig. 4. View from Sea off Southern Side of Big Bay

1. Eclipse—North entrance; 2. Castle Mountain; 3. A green grassy point; 4. By waterfall.

excellent harbour on the western side. These we have called the Mettek Islands, *i.e.* Eider-duck Islands. In 1903 Mr. George Ford of Nachvak, with two Eskimo, visited the islands during the breeding season. The birds were so thick on the ground that Mr. Ford had difficulty in finding enough space free of nests or eggs on which to place his sleeping-bag. The men took away twenty-five hundred eggs, but when they left the eggs were as abundant as ever; the eider-duck is a most industrious bird. I have found the cod abundant among the shoals hereabouts in late August.

About five miles to the south of the southern entrance, and beyond the mouth of the bay called "Komiadluarsuk," a remarkable headland rises from the water. This is a ridge some two miles long and persistently about three hundred feet high. The sky-line is serrate, and the fishermen call the ridge "Razorback." The rocks of the lower cliffs (specially steep at the east end) are red; those higher

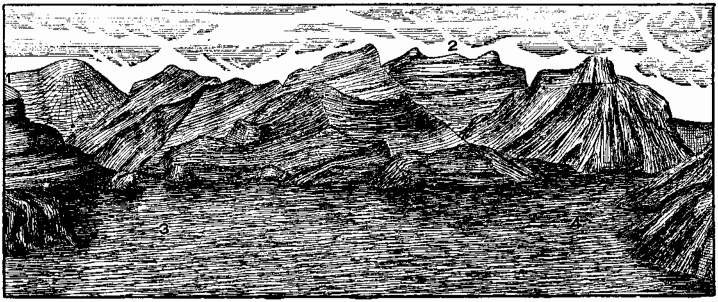


FIG. 5. WESTERN ENTRANCE TO GRENFELL TICKLE

1. Chidley Island; 2. Mt. Sir Donald; 3. Western entrance to Grenfell Tickle; 4. Tunusaksak Bay.

up grow darker until, at the top, the ridge is almost black. Its various peculiarities make the ridge a fine landmark.

"Razorback" lies just north of the entrance to the next fiord, that called Ryan's Bay. This one has not been explored by schooners. There is good anchorage on the north side, just beyond a great rampart of dark rock which runs southerly, at right angles to the ridge just described. On this side of the fiord there is a notable beach of sand, one of the very few sand beaches on the coast. It is a compound beach, being made up of successive terraces of sand, each terrace marking an old level of the sea; the whole forms the clearest evidence of the recent emergence of the coast border from beneath the sea. There are numerous remains of old Eskimo "earth" houses, sunk into these raised beaches. The roofs have long since fallen in, but the walls, built of boulders and banked with sand, were still standing. The bay is said to run far inland, and receives at its head a good-sized river plenteously supplied with trout, a former food supply for the Eskimo.

The mountains both to north and to south of Ryan's

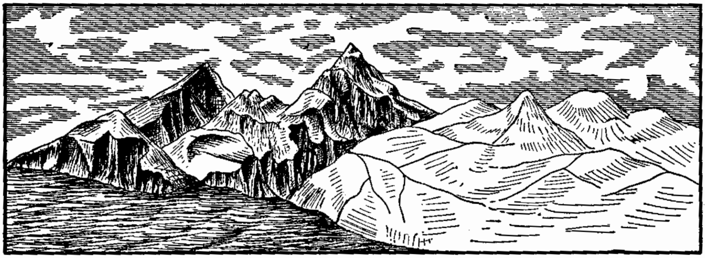


Fig. 6. Mountains to West-southwest looking over Ryan's Bay

Bay are alpine in character. The peaks are bare and sheer; one, rising to the southwest, reminded me strongly of the Matterhorn, though, of course, on a smaller scale (Figure 6). Fifteen miles to the southward, or halfway between Ryan's Bay and Cape White Handkerchief, another large, double fiord opens. Owing to the large islands facing this inlet, the fishermen have named it Seven Islands Bay. The two divisions of the bay are called by the Eskimo "Komaktorvik" and "Kangalaksiorvik." The entrance may be safely made by keeping the north side aboard; there is abundant good anchorage almost anywhere inside. The large, high island bearing to port is called "Avagalik," or Whale Island. The entrance to the south of the islands is partly blocked by shoals occurring near the islands.

These shoals are dangerous, especially as they are covered with black kelp; the average depth upon them is about two fathoms. To enter safely, one should keep the shore side aboard. Running out directly seawards for nearly twenty miles is a barrier reef of low black rocks surmounted by tiny islands; the whole simulating a coral reef in form, though, of course, not in origin. The fishermen call the whole the Hog's Back, from the likeness of the islets and rocky points to a hog's bristles. There is an interesting problem as to just how all these innumerable rocks were cut off so near the water-line. To approach the entrance of the double fiord from the south, the skipper should keep all the islands, including the Hog's Back, to the north; standing in for the land about five miles north of Cape White Handkerchief; with the cliffs aboard, pass in south of a ridged island about three hundred feet high and a mile long. This island is of a red colour, and is called by the Eskimo "Nenoraktualuk," or "Big White Bearskin"; it is the only really large island on the outside. Four miles west of the end of the island is the spring sealing station of many Eskimo, and is called "Inuksulik," or Beacon Island.

How far the double fiord extends into the land is not known, though it is certainly many miles. The Eskimo catch trout in Komaktorvik, and used to carry their catch to Nachvak, the Hudson's Bay station until 1906.

Since this region north of Nachvak Inlet is the least known part of the Atlantic coast, I have laid special emphasis upon it, with the express purpose of pointing to the need of its further exploration. The more southerly fiords have been more visited by white men. One of the very finest of all is that at Nachvak; it is illustrated in Dr.

Daly's chapter on the geology and scenery of the northeast coast — a chapter which also contains a brief description

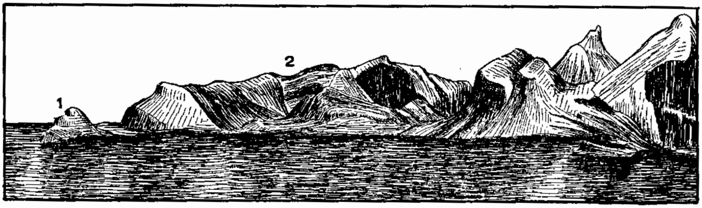


Fig. 7. Region of Iron Strand

1. Point at entrance to Seven Island Bay; 2. The Iron Strand (Sagliarvtsek), shoal water close in (black sand and rocks).

of the very different, though likewise imposing, fiords and channels about Cape Mugford. In order to avoid a tedious verbal account, while giving some idea of the curiously varied scenery of the coast as I have seen it, a considerable

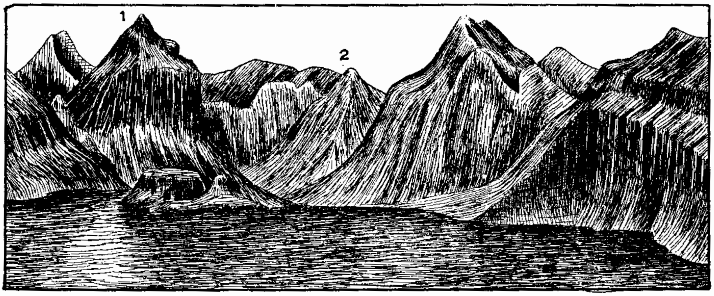


Fig. 8. Region of Iron Strand

1. Promontory off north end Iron Strand; 2. Long fresh water pond.

number of sketches have been introduced (Figures 7 to 12).

The configuration of the sea bottom off the coast is, of course, of the utmost importance to the fisheries. Imperfect as they are, the Admiralty charts yet give us our best information on this subject; to them the reader is referred, as a useful written description of the many irregularities of the inshore bottom is quite impossible. In

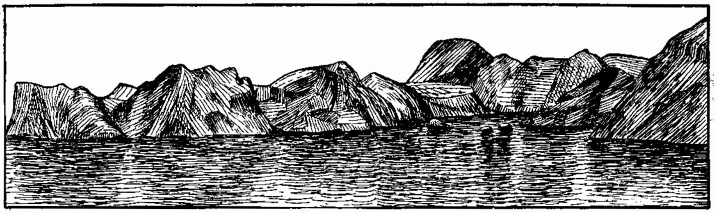


FIG. 9. CAPE NULLATAKTOK
Cape White Handkerchief just around corner.

general, it may, however, be said that the whole coast is fringed with a shelf covered with relatively shallow water, the depth averaging well under one hundred fathoms.

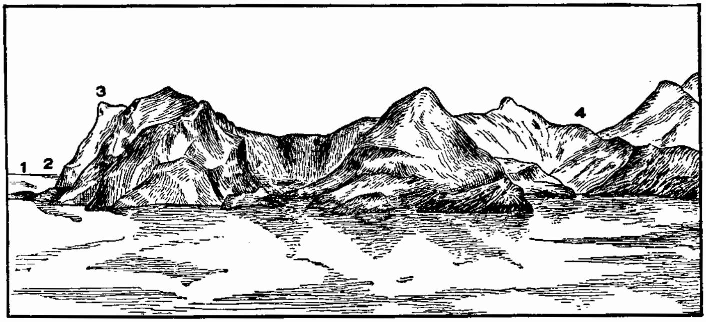


FIG. 10. REGION OF RAMAH
1. Ramah Bay; 2. The Look-out; 3. Mountain above Mission Strait, 3500 ft.; 4. Reddick's Bight.

The beltlike archipelago of islands along the northeast coast simply represents the emerged portions of the shelf. Beyond the islands the depth may increase to more than one hundred fathoms, but, farther out to sea, the bottom often rises again, forming shoals which many claim to be the winter home of the cod. The famous Grand Banks

FIG. 11. VIEW OF SAEGLEK BAY

1. Bluebell; 2. East Uivuk; 3. St. John's Harbour; 4. Southwest Point; 5. Saeglek Bay; 6. Point bearing N. 290° W.

off Newfoundland represent a great enlargement of the

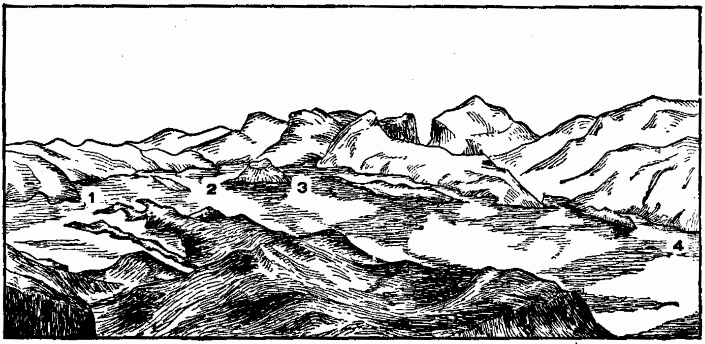
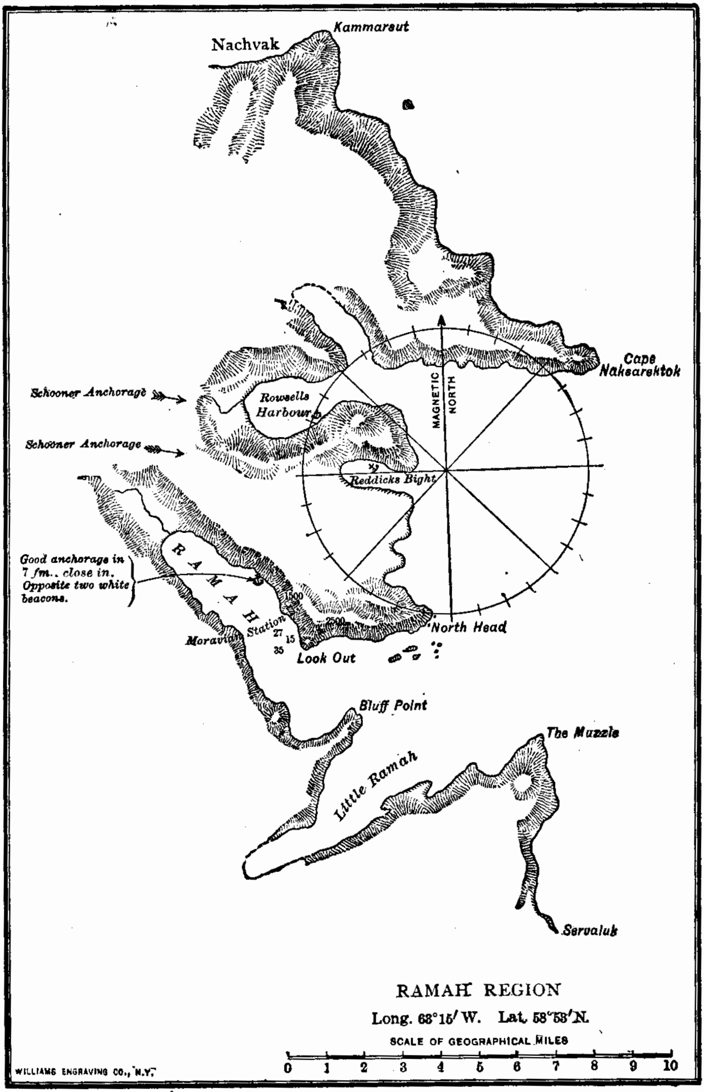


FIG. 12. VIEW LOOKING WEST UP SAEGLEK BAY

1. St. John's Harbour; 2. Southern division of bay; 3. North division of bay; 4. Island bore N. 325° W.

shelf. The summer fisheries are carried on along the "inner banks" which, between Cape Harrison and Cape



RAMAH REGION

Long. 63°15′ W. Lat. 58°53′ N.

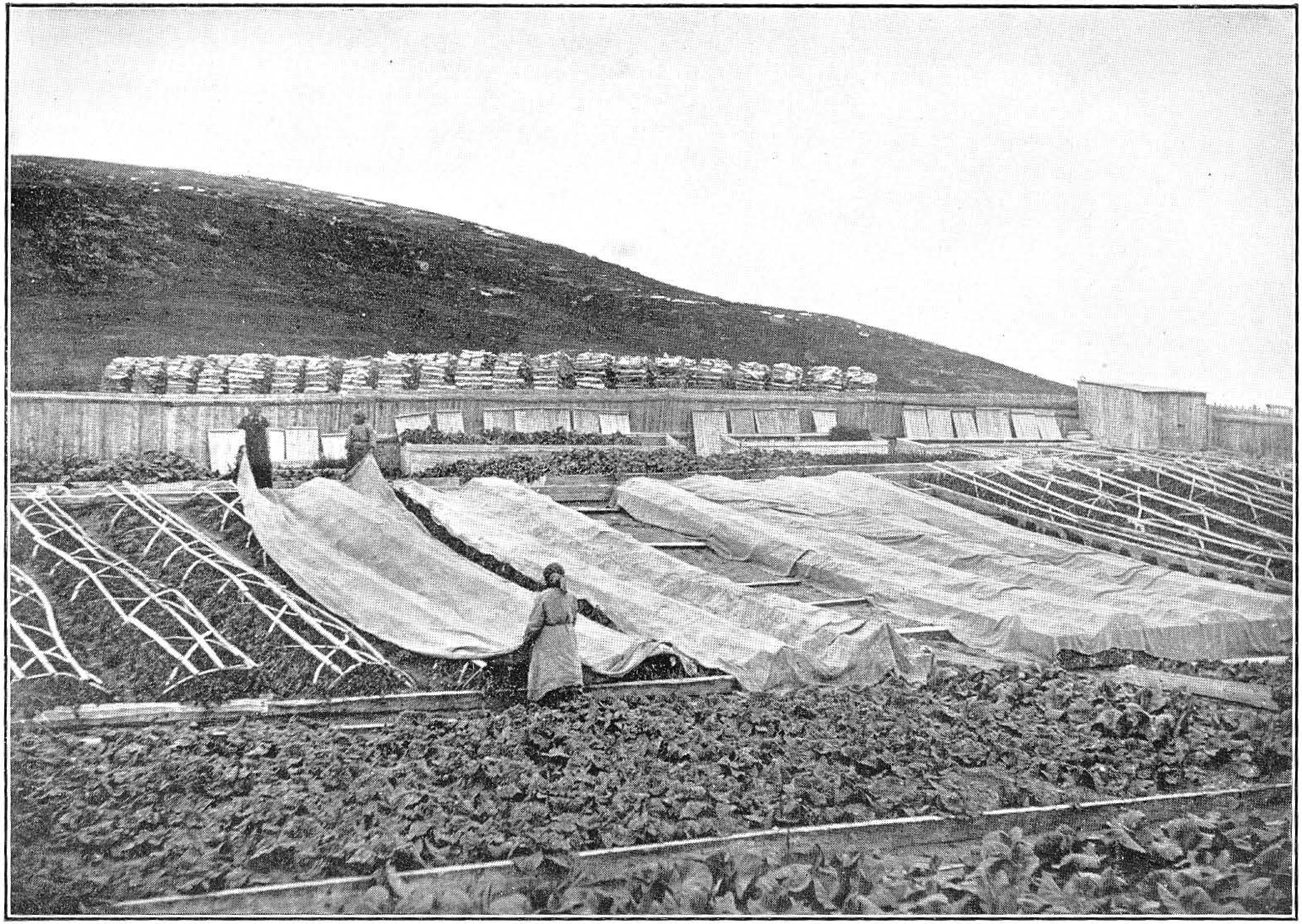
Mugford, Hind has estimated to cover fifty-two hundred square miles. Beyond the outer banks the bottom drops off into water hundreds of fathoms deep — at the real edge of the continental plateau.

As a rule, the tides are practically unimportant in the navigation of the Atlantic coast of the peninsula. They are to be reckoned with in the narrow parts of Belle Isle Strait and in the region about Cape Chidley. The only overfalls likely to affect a small boat are to be expected off Forteau, off Point Amour, in the narrow tickles near Cape Chidley, and in Belle Isle Strait. In the strait the current runs about three knots an hour both to the east and to the west. On the northeast coast the current generally runs slowly to the southward. Strong winds will affect these velocities about a knot an hour either way.[1]

The tides of the far north are, on the other hand, quite remarkable. On one occasion I attempted to force the nine-knot steamer *Strathcona* against a full ebb tide in the tickle south of Cape Chidley Island. At the narrowest place, where the defile is only a hundred yards in width, the water was a boiling torrent, filled with whirlpools. The steamer, though at full speed ahead, was carried astern. We were forced to run back and await the turn of the tide. We reckoned the current at fully ten knots an hour.

The range of tide on the Atlantic coast varies from five to eight feet; at Cape Chidley it is thirty-five feet, while

[1] Fuller information may be obtained in the monograph on the tides of this coast by Dr. W. Bell Dawson, Engineer in charge of tidal surveys for Canada, Department of Marine and Fisheries, Ottawa, Canada.



Gardens at Nain, showing Potatoes being covered at Night from the Summer Frost the range in Ungava Bay is said to be as much as fifty feet. In any case the range in this bay is one of the greatest recorded in the world.

Since the magnetic pole lies to the north-northwest of Hudson Bay, the magnetic variation is very high on the Labrador coast. At Battle Harbour it is 40° west; thence it increases until it is more than 53° to the west at Cape Chidley. The visitor cannot fail to be struck by the fact that, during auroral displays, the middle of the illuminated arc, which flames over the magnetic pole, lies to the north-west, far from the north star.

It should be emphasized that the charts of the region north of Hamilton Inlet are of little or no practical value to the navigator. They are only of value in giving general directions and in furnishing a crude pictorial idea of the coast.

The climate of Labrador is not excelled anywhere in the world for its bracing and invigorating effect. Testimony gathered from hundreds of workmen, prospectors, visitors, sailors, fishermen, officials, lumbermen, and scientific men have shown that, without exception, their general health has improved, and they have been able to sleep quite a material proportion of the twenty-four hours longer than at their own homes. Of this in my own experience of seventeen years, I have had many remarkable instances.

Labrador has no endemic disease, and though, like all subarctic countries, it is the home of many mosquitoes, there is no malaria. Notwithstanding the great number of Eskimo dogs bred and kept in the country, I have never known nor heard of a single case of either hydrophobia or of the *Tænia echinococcus*, or fatal tapeworm, that dogs transmit to man.

The restorative influence of a holiday in Labrador on a jaded and overwrought system is often truly wonderful, and I feel sure that, under proper conditions, a constitution will be toned up much faster than in the summer resorts. Commander Peary has recently added his testimony to the great value of the Arctic air to consumptives.

There has somehow got abroad an idea that Labrador is continually wrapped in fog. This is an entirely erroneous idea, and has arisen from the fact that at the line of junction of the Gulf and polar currents, in the regions of the Banks of Newfoundland and England, more or less fog is prevalent. As a matter of fact, fog is almost left behind at the Strait of Belle Isle. Many times as we have steamed out of the strait in thick fog, and passed the southeast corner of Labrador, we emerged from what, on looking back, resembled a dark wall, to bask suddenly in the clearest of sunshine. As master of my own vessel for fifteen years on the coast, I can say that the delays that I have experienced in the summer from fog between Battle Harbour and Cape Chidley have been quite immaterial. Thus, during last year's cruise, commenced on May 7, and ended November 13, we were delayed by fog only one day. On the average, a more or less foggy day once a fortnight may be expected.

The rainfall again is exceptionally small, and the small amount of snow that falls in the eight winter months, which is at that time the rain of the country, is not sufficient to leave a permanent ice-cap even on the highest peaks. There are no accurate statistics to show exactly what the rainfall is, but the experience of visitors is that a whole day's rain is exceptional. A land surveyor who, with a party, spent four months on the Grand River and not far from the very centre of the country, experienced only one-half day during which rain prevented his party from working. On the other hand, the amount of sunshine is well up to the average. One might say that in summer one day in three is altogether sunny; one day in three is partly sunny; one day in three, dull. As these deductions are not the result of accurate, scientific records, I can only offer them as the results of my own general notes from year to year. They appear, however, to agree with those of observers who have more accurately chronicled the amount of sunshine during their visits to Labrador.

The summer temperature of both air and water varies greatly as one leaves the coast and goes up the bays. This remarkable feature of the coast is due to the combination of two influences — that of the southerly latitude within which Labrador lies, and that of the polar current which sweeps right home to its Atlantic shore. When one considers that the southern point of Labrador is on the same parallel of latitude as London, and its most northern point only the same as the north of Scotland, one can understand how in summer the sun's rays are very effective in warming the atmosphere in localities untouched by the polar current. The summer temperature of the outside water averages, at the surface, from 40° to 45° F., while ten fathoms down it sinks to nearly 35° F., and at thirty fathoms is from 30° to 35° F. When, however, one gets near the head of a bay, say twenty miles in from the coast, the temperature at the surface may be as high as 50° F. and at the heads of the big bays, especially above Rigolet

TABLE (1) OF MEAN AVERAGE MONTHLY TEMPERATURES AT VARIOUS LATITUDES IN LABRADOR DURING MANY DIFFERENT YEARS (DEGREES FAHRENHEIT)

Month	Ramah '84–'88	Hebron '84–'91	Okak '84–'88	Nain '84–'88–'90	Zoar '84–'88–'90	Hopedale '84–'88–'90	Mean of Means	Hebron 1906–'07	Michael's Bay 1907	Cartwright				Caribou Castle		
										1770	1773	1774	1777	1777	1775	1786
Jan.	−7.9	−9.7	−9.9	−11.7	−12.8	−7.9	−10.03	−10.9	−8.7				−3.5			34° to −15° Mean +9°
Feb.	−7.8	−9.4	−8.1	−7.8	−8.5	−5.8	−7.91	−9.9						6.5		31° to −17° +4°
March	2.5	2.5	2.3	3.4	2.6	6.4	3.29	−8.8						9.0 0° to 26°		37° to 10° 22°
April	20.1	17.0	18.5	18.3	19.0	21.2	19.04	9.6						23° to 66°		46° to 10° 25°
May	34.5	32.3	32.5	32.0	32.3	33.2	32.85	26.5						41° to 70°		72° −21°
June	42.1	40.1	42.1	41.5	42.4	42.9	41.87	35.6						41° to 82°		78° −26°
July	49.3	46.6	47.3	47.1	49.8	50.9	48.51	34.8								Max. 79°
Aug.	46.9	46.4	47.6	48.7	50.5	50.7	48.51	44.5								
Sept.	38.6	38.6	40.1	40.8	41.7	42.1	40.34	35.9								
Oct.	30.7	29.5	31.8	31.1	32.3	32.9	31.4	29.7								
Nov.	19.7	18.3	17.9	18.1	17.6	19.6	18.62	25.6		43° to −28°	Nov. 14 46° to −2°	After 16th steady frost	23° to 40° steadily			
Dec.	2.5	2.1	.8	.7	−.6	3.0	1.43	4.2	9.0			Above 0° once	7.2		32° to −16° Mean 11°	
Mean Annual Temp.	22.6	21.2	21.9	21.9	22.3	24.1	22.3	18.0								

in Hamilton Inlet, even higher. The diurnal range of the summer air temperature in the bays is not great.

This systematic relation of temperatures produces the result that, though on the coast one can grow, as vegetables, only stringy cabbages and leaves of turnips, at the bay heads, carrots, potatoes, cabbages, turnips, currants, raspberries, and gooseberries grow with readiness. The average temperature in summer for southern Labrador is about 50° F. On the coast the diurnal range may be from 30° to 80° and in the bays from 45° to 90° F.

The lists (on this and the opposite page) of average monthly temperatures are taken from the records of the *Deutsche Seewarte*, as copied here from the report of His Excellency, Sir William MacGregor: —

Table (2) of Mean, Maximum, and Minimum Temperatures for Entire Years (Degrees Fahrenheit)

Place	Lat. N.	Years	Mean	Max.	Min.	Range.
Ramah	58° 53′	'84–'88	22.64			
Hebron	58° 12′	'84–'91	21.2			
Hebron	58° 12′	'86	26.8		− 33.8	
Hebron	58° 12′	'87	26.5	76.1	− 38.0	114.1
Hebron	58° 12′	'88	27.8	79.8	− 36.4	116.2
Hebron	58° 12′	'90	25.5	86.2	− 38.0	124.2
Hebron	58° 12′	'91	23.3	83.3	− 40.5	123.8
Hebron	58° 12′	'94–'95		72.5	− 19.1	91.1
Okak	57° 34′	'84–'88	21.9			
Nain	56° 33′	'84–'90	21.92			
Zoar	56° 07′	'84–'90	22.28			
Hopedale	55° 27′	'84–'90	24.08			

In a country like Labrador the seasons are so marked, and bring with them such great changes, that one must know exactly at what time to come in order to enjoy any favourite pastime to the best advantage, or pursue any particular object. One visitor landed on the coast, and we drove him over a frozen harbour in the end of May. He had been enjoying fresh strawberries at home before he left, and expected to find summer here, and not our last month of winter. I may therefore give a brief description of the seasons so that one can tell at a glance what is likely to be going on at any particular portion of the year.

January. The second coldest of the winter months; only occasional temperatures above freezing, and then only for a short spell. The whole country everywhere is under ice and snow. The first winter mail arrives from Quebec by dog train. Natural bridges make it possible to cross all the rivers, bays, and arms of the sea. Thus, travelling is usually begun in this month, though in the green woods snow is not yet hard packed, and consequently one has to go round the "drogues," as we call them. The dogs are able to go fifty to sixty miles in a day. The shortness of the days is the chief drawback. The settlers are all in their homes in the woods at the heads of the bays. They are trapping fur, hunting deer, and lumbering. The great herds of deer are in the low marshes and woods near the land-wash, and are often obtainable in great plenty. Willow grouse and rabbits are plentiful at times in the woods. Harp seals are being netted as they pass south along the Labrador coast. The sea is impossible to navigation, except now and again in the Strait of Belle Isle.

February. The coldest month with seldom any "let up"

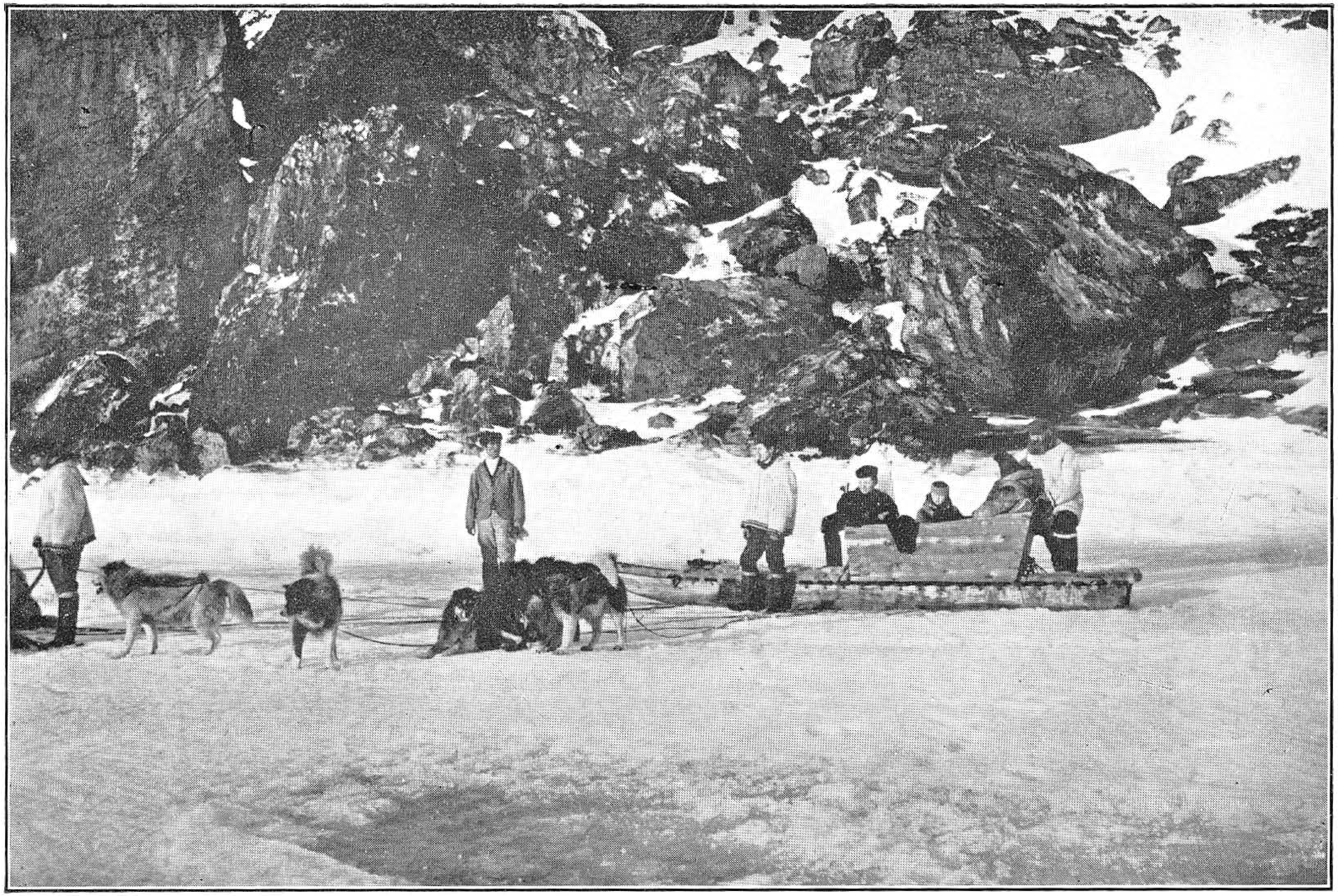
— temperature in the north even falling on rare occasions to 45–50° below zero F. Travelling is improved by the heavier falls of snow, which fill the dangerous hollows and smooth off the rough, rocky points. The Arctic ice blocks the coast and keeps the swell from breaking up the ice in the bays. The Strait of Belle Isle is choked. The hood and harp seals are working southwards in the sea off Newfoundland and in the Gulf, to whelp on the loose floes around which they find the fish. Fox-trapping with hunting for marten or sables, minks, musquash, and other species is in full swing on the land.

March. A splendid, bright, bracing, cold month. The reflection of the sun from the snow makes it imperative to protect the eyes with coloured spectacles, since a single day's exposure will blind a man. The skin gets so tanned that the whites begin to resemble Indians in colour. The settler never loses the tawny colour. This constant sun bath, in spite of the low temperatures, has an excellent tonic effect on weakly people. The snow is now hard, and it is as easy to travel through thick woods as in the open. Much longer distances can be covered by the dogs in a day; they can be given their heads to choose their own paths. Furs are in their prime. The annual seal hunt from Newfoundland takes place, and all along the southern seaboard the settlers are on the watch for baby seals on the ice. Some of the birds are breeding, *e.g.* the Canada jay. Settlers are cutting logs and hauling them out for summer fire-wood. Some traps are now taken up, as certain furs cease to be in prime condition.

April. The bright, hot sun in the middle of the day begins to thaw the snow, which freezes hard again at night.

Travelling is done mostly in the early morning. The ice at times clears off enough to leave a narrow strip of open water along the exposed coast. Ducks and geese, with other smaller birds, such as the snow-bunting and the northern shrike, begin to arrive from the south. Some men are now netting seals if the season is early; others are still working at twine for summer use. Shooting sea-birds from the headlands offers good sport. Fur shows clear loss in value. Many settlers return to summer fishing stations, using dogs and komatiks to transport all their summer necessities out to the islands. Others who take care of and repair the stations of our summer visitors are hard at work on houses and stagings. On fine days these men, while at their outside work, venture off on the running ice. Most years, however, the ice is too hard near the shore, and to go off far from shore, hauling small boats on runners, is restricted to the hardier and more venturesome. Through the ice of the ponds in southern Labrador, good trout fishing can be obtained.

May. Navigation as far as the south part of the east coast is practicable, though onshore winds will bring the floe-ice in at any time and block all the harbours and bays. Still, one or two venturesome vessels come down with safety to southern Labrador, seldom taking any harm from the ice beyond what they are liable to at any time of year. American bankers are baiting in the straits, and French fishermen from Newfoundland arrive on the Treaty Shore opposite. The first mail steamer visits as far as Cape Charles. The rivers and bays break up. The last of the people move out to their summer homes for the fishery. Good trout fishing is to be had in the rivers or in the lakes



"Woman Box" for Winter Sledge Travel

through the ice. Sea-birds are nesting all along the coast on the islands and rocks, and foxes have their young. Many people gather the eggs and store them for eating. Traps are all taken in by the first day, as the fur is now losing colour and the long "king" hairs fall. Seals are beating north; swatching or shooting them from the ice pans as they come up to take breath forms a very favourite pastime. Old harps and bedlamer seals are caught on southern Labrador in great frame nets. Farther north the Eskimo are hunting the walrus. The deer are all going north and taking to the hills. The native bears leave their caves; any white bears that have gone south on the floes begin to work north again.

June. Most of the snow has gone, though in places it remains to the water-level. Ground is still hard frozen, with occasional frosts at night. Arctic ice still besets the coast. Fishing vessels work down along the straits and the southern part of the east coast. Some years the mail boat gets as far as Hamilton Inlet; other years ice inside the islands is as hard as at any time in the winter. In the straits the cod-fishery is in full swing, while on the east coast the southerners in their schooners are up the bays getting wood for firing, for stages, etc. Americans, Canadians, and West Coast Newfoundlanders are trawling in the straits and Gulf. The sea is very calm, owing to the ice outside. The brilliancy of the sun, the innumerable icebergs, the return of the whales, and the fleets of fishing vessels make the scenic effects some of the best in the year. In the inlets the salmon and trout fisheries are being prosecuted. Deer seek the hills to avoid the mosquitoes. The does are with their fawns in the woods. Black bear seek the fish along the land-wash. Most of the small bird visitors from the south have arrived. Lean dogs wander about everywhere, searching for meat, for they are no longer fed, and as yet there are no fish heads and offal for them.

July. Most of the ice and snow gone from the land. The ground at the heads of the bays thaws out enough to sow seed. The mail steamer now usually reaches her northern limit at Nain, visiting all along as she goes. The caplin are working into the land farther north and attracting the codfish. Salmon in the river begin to take the fly. The young ducks and other sea-birds are hatched out. Pleasure schooners can get down among the Eskimo who are now out at their summer fishing stations in skin tents. The salmon fishing with nets in the inlets is going on, and the cod-fishery begins with the caplin school. Mosquitoes hatch out and are troublesome.

August. Southern cod-fishers reach their extreme northern limit, and fish are taken as far as Cape Chidley. Caplin begin to die or leave the shore, cod following them out of the bays. The salmon-fishery in the sea is at an end. The salmon and trout in the rivers rise to the fly well. The best fiords and least-known northern bays are accessible to pleasure yachts. Icebergs in greatest abundance are now to be seen. They are continually driving south with the Arctic current. The flappers of water-fowl are big enough to shoot. Old ducks and divers are moulting, and, being unable to fly, escape pursuit only by diving. The first foreign vessels with dried fish leave the coast. Cloudberries and other berries, *e.g.* bilberries, currants, raspberries, begin to ripen. Formerly large flocks of curlew came down to feed on these. The young geese in the bays are beginning to fly.

September. Hooks and lines replace the large trap nets, as the cod are now only to be taken in deep water. Northern schooners begin to come south with cargoes of green fish. The first snow falls about Cape Chidley, and frosts set in occasionally at nights. Deer are to be had in the country. Geese and black duck are seeking the salt water in the day-time, and may be shot flighting. The mosquitoes are no longer troublesome. Grouse are to be shot on the hills, and afford excellent sport. Small migratory birds begin to leave. Berries are plentiful and add materially to a camper's menu. Caribou leave the hills for the marshes. All together, this is the best month for sportsmen to visit Labrador, except for salmon-fishing.

October. The southern fishermen mostly leave. Pleasure schooners must do the same. Fish are still to be taken in deep water with long lines. Frosts at night are often severe, and many harbours begin to "catch over" with ice.

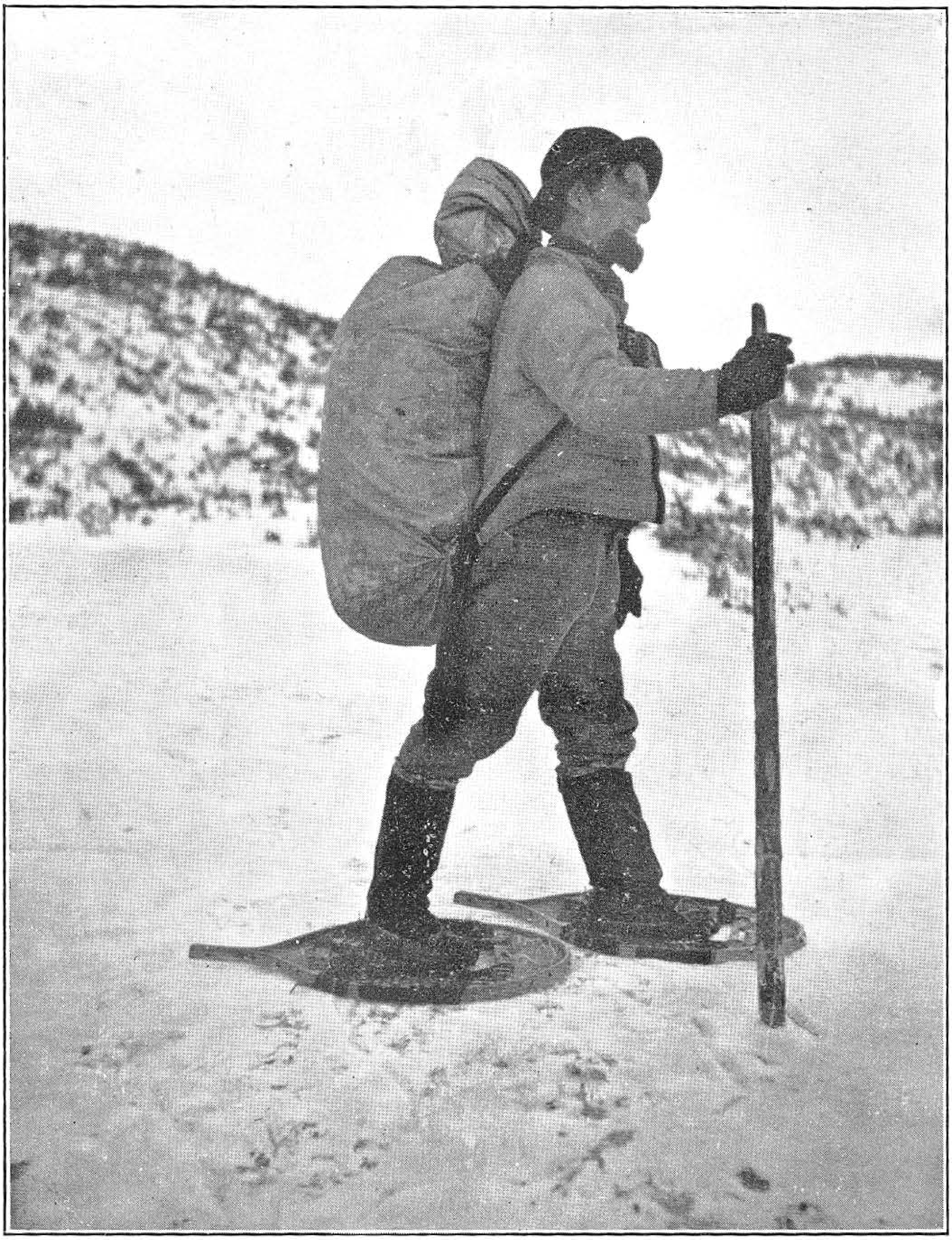
Ducks and geese leave the coast. Deer are rutting, but are now nearer the seaboard in the leads and marshes. The winds are high and cold, but they are nearly all westerly and off the land; thus the sea is often smooth alongshore. The most disastrous storms, however, have occurred in this month. All the trappers are busy taking supplies into the country and preparing their traps. Otters, foxes, mink, beaver, etc., come in season. They are, however, not really "prime." Large Labrador herring are taken in gill nets. Lesser auks, puffins, murrelets, and other diving sea-birds are very plentiful, passing south. The lakes all freeze over, and the hilltops are all capped with snow.

November. The last of the southerners leave. The mail steamer makes her last visit. Winter has really arrived. Not a craft left afloat on the coast by the end of the month. Trapping is specially now for foxes and mink on the seaboard. Many settlers on the "outside" are engaged with seal nets. The rest have gone to their homes among the trees at the bottom of the long bays.

The last of the ducks and geese leave. Hares, rabbits, grouse, etc., assume their winter colouring. Dogs are now fed up for their winter work. Lumbermen are in the woods cutting logs.

December. The short days tend to make this the most dismal month, but the dog driving begins and the assumption of snow-shoes, or "ski," also helps to enliven matters. For sports we now play football on the snow, sail our ice-boats, or go deer hunting. Any game killed now will remain good till June, being hard frozen as soon as killed. All along northern Labrador many seals are being netted. Even the large rivers are now safe to cross on the ice, but in some of the arms of the sea there is still no ice that will bear, owing to the tide. Some of the best furs are now taken in the country. The first dog mail leaves for Quebec at Christmas.

Such is, approximately, the year's curriculum.



The Well-beloved Mail-man

CHAPTER IV

THE GEOLOGY AND SCENERY OF THE NORTHEAST COAST

By Reginald Aldworth Daly

"The Labrador Peninsula is less known than the interior of Africa or the wastes of Siberia." In these words the noted naturalist, Mr. A. S. Packard, in 1891, summed up existing information on that anciently discovered but long-neglected land. Low's fruitful journeys across Labrador have added much to the store of knowledge, but there is even now but little exaggeration in Packard's statement. It was therefore with great and prolonged interest that the members of the *Brave* expedition of 1900 studied the 700 miles of coast from the Strait of Belle Isle to the Hudson's Bay post in Nachvak Bay. The *Brave* was a tight little schooner of but forty tons, specially fitted up to be the home of the exploring party for the summer. The party consisted of five Harvard men and one man from Brown University. Three seamen and a pilot captain with a miraculous knowledge of the ten thousand islands, shoals, rocks, channels, and landmarks of "the Labrador," sailed the little vessel.

Leaving St. John's, Newfoundland, on June 25, the schooner coasted all the way to Nachvak, which was reached on August 22. This slow passage gave the exploring party numerous opportunities to sample the natural history and geology of the coast. One member of the expedition or "exhibition," as the fishermen with unconscious humour and truth called it, was an amateur botanist, another an ornithologist, a third a prospector, a fourth a geologist, and the others enthusiastic hunters. The writer was busied with the geology of the coast, and most of the observations noted in the following pages refer to results obtained during that season.[1]

To know Labrador is to know its geology. The visitor to the northeast coast, were he to go thither to study thoroughly its climate, its scenery, its botany or zoölogy, its peoples or few industries, must come upon the final question concerning all of these: whence came they? When fully answered, he shall have been told the story of the physical growth of the peninsula. Each bird, beast, or man; each moor, tundra, ragged reef, swelling granite dome or fretted mountain-ridge on all the thousand miles of shore, forms a link in the chain that binds the present with the inconceivably distant past of the earth. And seldom elsewhere is the explorer's mind so forced to the thought of an ancient evolution. The great rocky headlands, looming first out of the fog; the deep, quiet fiord or island-labyrinth receiving the stranger vessel as she runs in from the open sea; the vast, moss-coloured landscapes on the wilderness of hills; the stately train of icebergs or the yet mightier ocean-current that bears them southward, — these first views, startling in their savageness, charming in their mantle of colour, astonishing in their extent, always of enthralling interest as the elements of a new kind of world, can never

[1] A technical report on the geology appears in the Bulletins of the Museum of Comparative Zoölogy at Harvard University, Vol. 38, p. 205, 1902.

fail to rouse a very ardour for exploration. In England, France, or Germany, the peoples, the culture, cities, railroads, institutions, must claim the traveller first, and the primitive, the soil, the ground of Europe, only second. In most of Labrador, Nature, supreme in her loneliness, calls first, last, and always.

Like every science, earth-science is the result of restless, eternal questioning, much of it answered, infinitely more unanswered. He thinks especially in questions who thinks at all in Labrador geology; it forms a mass of problems for the most part unsolved. Yet some of these have such importance that the mere statement of them has value, and when further exploration has given the solutions, it will be found that the scientific study of Labrador will have brought a rich store to man's knowledge of the whole earth. Rather, therefore, to erect finger-posts pointing the way to wide fields of research than to indicate that much is known of the Labrador coast, the pages of this chapter have been written.

So far geologists and geographers have accomplished nothing more than a rapid reconnaissance of the coast. That stage of exploration has a borrowed name, and in some respects explorers are compelled to regard the new land as an enemy — to be conquered at some cost. More or less "roughing it," almost always a degree of hard though repaying toil, the bite of the sun or the bite of the polar wind — all form "part of the game," a kind of war-game. An expedition to the Labrador has assuredly to meet with such troubles and a few special ones besides. In early summer a sailing craft must meet with the wide fields of pan-ice which unite with the "Labrador" ocean-current and prevalent northwest winds to prevent a speedy progress "down" the coast. Ashore, at any point from Belle Isle to Hebron, the "enemy" assumes a new face much more repellent. Many a time has every naturalist ashore on the coast during July or August been driven *from* his work or *through* it by Labrador's greatest plague — the almost incredible mosquito and black fly. In countless swarms of countless individuals they attack hands, face, and neck necessarily unprotected in the collection of specimens or in the manipulation of instruments. It is written that the grasshopper may be a burden, but he is a small angel of light compared to the Labrador "fly."

In Newfoundland the mosquito and gnat have had an apologist who, in all fairness, should be heard. Thus writes Whitbourne, the optimist: "Those Flies seeme to haue a great power and authority upon all loytering people that come to the New-found-land: for they have this property, that when they finde any such lying lazily, or sleeping in the Woods, they will presently bee more nimble to seize on them, than any Sargeant will bee to arrest a man for debt. Neither will they leaue stinging or sucking out the blood of such sluggards, untill, like a Beadle, they bring him to his Master, where hee should labour: in which time of Loytering, those Flies will so brand such idle persons in their faces, that they may be known from others, as the Turkes doe their slaves."

But to the explorer, especially to the geologist, there is another side to the matter — an occasion for keen pleasure in spite of every disability in the way of advance or in comfort. Once beyond the fog-curtain so often let down over the Strait of Belle Isle, he can enjoy a climate made for strenuous outdoor work. If he be interested in bed-rock geology, he finds conditions comparable to those that favour observation in "The Paradise of geologists," the arid or subarid plateaus of the western United States. Here as there the climate forbids the growth of the heavy forest-cap which covers so much of the geological record in arable lands, and in Labrador the intense glaciation of the last Glacial epoch has left remarkably little rock-rubbish or "drift" on the surface of the well-scoured and still relatively unweathered, fresh rock. The geologist leaves the coast, therefore, well content if he has had time to make anything like an extended reconnaissance of the enemy; there remains as well the stimulus to hope for a future campaign.

Labrador is the land of charm, whether it be among the low, moss-covered islands of the south or on the superb mountains of the north. But this charm hitherto described in terms of impressions derived from visits to what is really southern Labrador is a hundred fold greater in the region north of Cape Mugford.

Yet throughout the whole stretch from Belle Isle to Hudson Strait the scenery is to be related, sooner or later, to one great group of geological formations, all rocks of the remotest antiquity; and perhaps no more fitting introduction to the geology and geography of the coast is to be found than to describe the extensive fundamental terrane. It belongs for the most part to the Archean series, offering like the Archean rocks of the world, problems of extreme difficulty. Able and highly trained geologists, specialists in the Archean, during the past thirty years have solved some of these problems, but it is still fair to call this vast group of rocks forming the staple material of the Labrador coast by a name confessing at once some knowledge and much ignorance. The Archean formations compose the foundation on which the Continent of North America has been built. Resting upon its ancient surface are the rock-beds bearing the skeleton remains of the earliest known organisms, and upon those beds have been accumulated in turn the limestones, shales, sandstones, conglomerates, and lavas, which make up most of the continent. That is one of the main facts *known* about the Archean, — it is a basement formation. Another fact, no less certain, no less important, is that the Archean is complex in its composition, in its structure, and in its history. Let us, then, call these old rocks by their time-honoured name, "the Basement Complex."

Here and there on the earth the younger, covering rocks have been swept away by age-long weathering and wasting, and the ancient foundation has been exposed to the air. Nowhere on the earth is so great a continuous area of the Archean to be found as in eastern Canada. From Lake Winnipeg to the Atlantic, and from the St. Lawrence and Ottawa rivers northward to the Arctic, the Basement Complex, still locally bearing on its back patches of the younger rocks, forms a rolling, timber-covered plateau, which amazes every explorer who compares the simplicity of its present-day relief with the infinite turmoil through which its constituent rocks have passed. These rocks are almost entirely crystalline — gneisses, schists, marbles, coarser crystalline limestones, and granitic rocks of endless variety — agreeing, however, in the telling of a common story, that the Complex is the remnant of enormous mountain-systems long battered by the weather of ancient days, and so long and successfully attacked and lowered by streams, that already very early in the earth's history these mountains had been flattened to a relief probably as tamed as that of the great Canadian plateau to-day. It was *this* old-mountain plain, or almost-plain, which formed the nucleus of North America. No one can say as yet, even approximately, how much the old plateau has been affected by the destruction of the millions of years since it was reëlevated from beneath the sea, with its mantling load of Cambrian, Silurian, Devonian, and later sediments. Again and again the Basement has been, wholly or in part, alternately above and below sea-level. With each emergence it has lost substance, and with each loss a new physical geography has been developed upon it.

When a mountain-system is young, its summits are ranged more or less systematically in straight or slightly curved lines joining the crests of the various ranges. When the system is very old, that is, worn down flat by age-long wasting, these same trends may still be recognized in the structure of the mountain-roots. A normal range owes its existence, not so much to simple uplift of the earth's crust as to an intense folding and crumpling together of its rock-strata by powerful forces acting tangentially with reference to the curve of the earth and transverse to the axis of the range. If, therefore, the Basement Complex forms the root of an old mountain-system, the natural inquiry arises as to the trend of the rock-bands now visible to the geologist; for these, even in the absence of the long-vanished mountainous relief, will tell the direction of the old ranges and, by implication, the direction of the great compressive forces which set the earth's crust writhing so long ago, and so built one of earth's earliest mountain-systems.

Rather, then, to raise the question than to declare an

FIG. 13.

Sketch map showing mountain trends in eastern North America.

answer to it, the writer has prepared the diagram of Figure 13, embodying a tentative conclusion, the result of observations at some twenty-five localities on "the Labrador."

The little map is intended to show that there is definite trend to the rocks of the Basement Complex, and that this trend has a remarkable parallelism with the present northeast coast of the peninsula. That is, the edges of the worn-down, folded schists and other rocks, like the axes of the folds, run parallel to the general shore-line. It looks as if this part of the Basement Complex were originally built up by mighty earth-forces acting in a northeast-southwest direction and raising a distinct and lofty mountain-chain on the line of the present coast. Further exploration is necessary before the conclusion can be considered as final, but Dr. Bell's discovery in the Baffin Land Archean of what would appear to be the continuation of the same "Labrador trend" (thus extending more than 1300 miles) lends force to the idea.

In Figure 13, heavy black lines diagrammatically represent the "Labrador trend," and others represent the various elements in both relief and rock-structure which belong to the great Appalachian mountain-system. The two trends meet at the Strait of Belle Isle. The "Labrador trend" locates one of the most ancient (Pre-Cambrian) mountain-ranges of America; the Appalachian trend characterizes the much younger (Post-Carboniferous) system that includes the Alleghanies, the Blue Ridge, the White Mountains, the Green Mountains, and the lower ranges of New Brunswick, Nova Scotia, and Newfoundland. Where so little has been done in the field, one must hold but loosely to the idea of a definite law of structure in Canada's most difficult terrane, but it is believed to be a fair and just, perhaps helpful, working hypothesis to govern further exploration.

It would be tedious and not very profitable to the general reader to describe all the different types of rock found in the Basement Complex; yet a few principal considerations will serve to indicate the kind of material which goes to form the bed-rock of the coast, and serve, also, to outline the grand march of events that gave us modern Labrador.

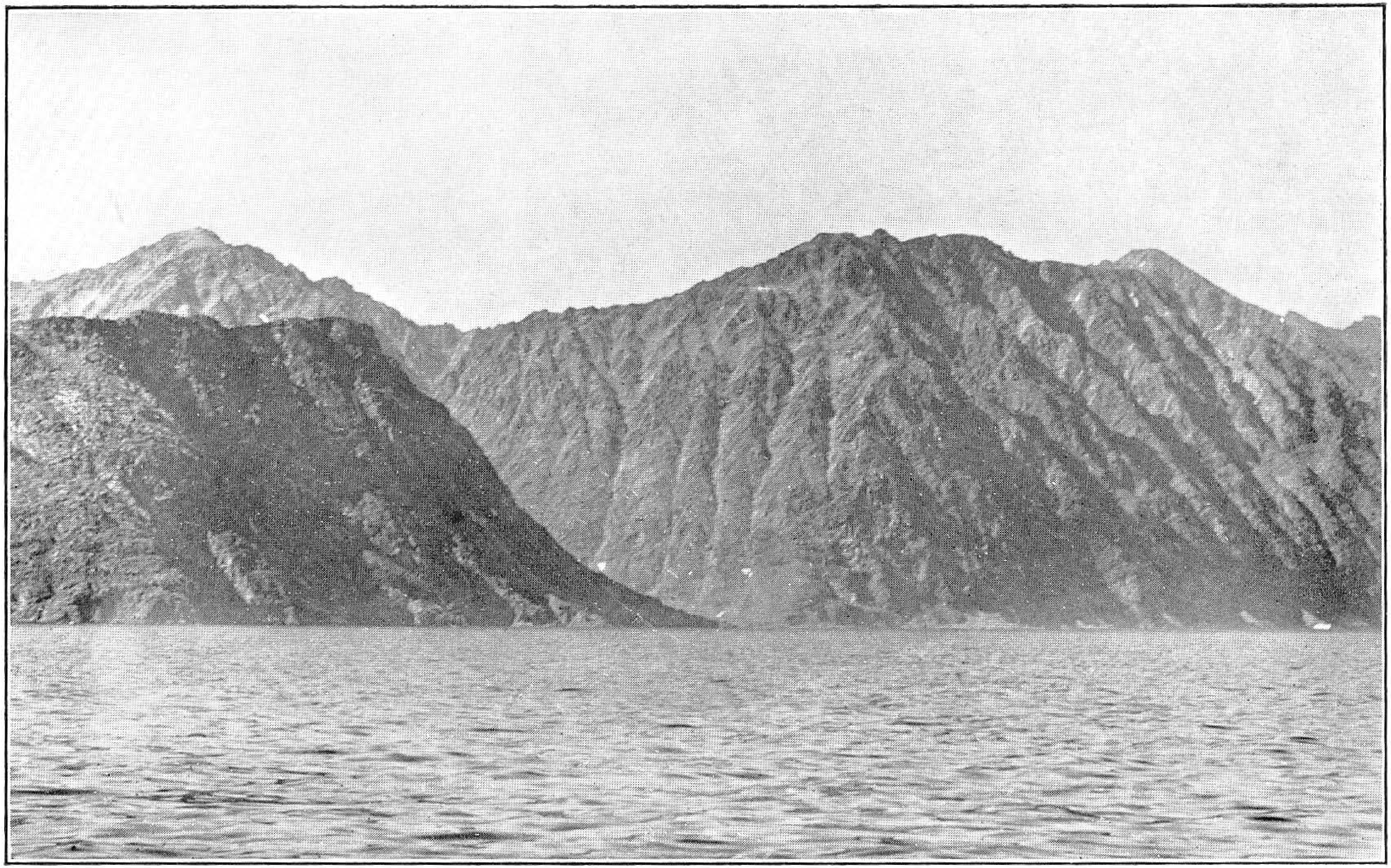
With but rare exceptions the rocks of the Basement Complex are allied to that most familiar rock, granite. Like granite they are aggregates of common minerals like quartz, feldspar, mica, hornblende, augite, magnetite, etc. These are always crystalline, though rarely does any mineral show crystal facets to the eye. The minerals interlock in the intimate way characteristic of granite. Furthermore, these rocks bear witness to one common fact of origin with granite. They formed, crystallized, under the pressure of overlying rock which has long since been swept away — eaten away by the weathering and decay of ages, eroded by the "tooth of Time." Many of the individual rock-masses are known to have resulted from the crystallization of once molten rock-material, cooled slowly as its heat was conducted through the heavy cover of rock above. Such is believed to have been the origin of all granites. Others of the Labrador rocks seem to have crystallized at a temperature high enough to allow of the rearrangement of their ultimate particles from former quite different associations, yet at a temperature too low for actual fusion of the rocks. Such are the conditions within the heart of a mountain-range as it grows, its rocks crumpling together, piling up, fracturing, and making way before great bodies of the molten matter erupted from the interior of the earth; such were unquestionably the conditions under which the old Archean chain of Labrador was upheaved.

As we have seen, enormous lateral pressure, pressure too great to be comprehended by the human mind, ridged up the rocks to alpine heights. During that process much of the crystallization and recrystallization of the Archean rocks took place. It was, therefore, natural that the minerals of the rocks should be arranged with reference to the pressure. They might be expected to lie in the rock with their longer axes perpendicular to the lines of force, assuming thus the position offering greatest resistance to that force. This is the case for probably much the largest area of rock in the coastal belt. Many granites and allied rocks which had been "intruded," in the molten state, into the base of the range, were squeezed by the continued application of the same mountain-building forces, and their minerals, too, have been crushed and driven into alignment at right angles to the direction of pressure. So it has come about that the commonest rocks found on the coast are what are called "crystalline schists": gneisses, which are like granite in composition but show on the broken surface the parallelism of the minerals; mica schists, with the same (schistose) structure, yet lacking the white or pink feldspar crystals of gneiss; hornblende schists, in which the familiar mica is replaced by the less familiar but likewise important mineral, hornblende; and a large number of other rock-species of similar structure.

The nature of the original material from which the crystalline schists have been made, that is, the composition of the earth's crust in a mountainous region before the mountain-building began, is one of the most interesting problems before geologists to-day. It has been proved in certain favourable localities that such schists are the result of the alteration of more ancient slates, sandstones, conglomerates, volcanic ash, and lava-flows, under the same conditions as once obtained within the Archean range of northeastern Labrador. Here again is a wide field open to further exploration. The geologist who seriously studies these coastal rocks of Labrador, wonderfully exposed as they are, may some day establish new principles of interpretation, or confirm those now forming the basis of modern earth-science.

During the paroxysmal though extremely slow growth of a lofty, alpine mountain-range, other changes of great moment occur in the deep, highly heated core of the range. The foundations of the huge pile are unloosed, and enormous blocks of the solid rocks are displaced by molten or thoroughly plastic matter, thrust up into the range by titanic subterranean force. There cooling, this material crystallizes into solid rocks of the granite type. As it crystallizes, the whole mass may be pulled out in the wrenching shear of mountain-building, much as soft pitch may be drawn out in the hands. In such a case the minerals composing the new rock are arranged in lines, and not in planes, as in ordinary schists. An unusually fine example is exhibited on a large scale at Pottle's Cove, West Bay, halfway between Belle Isle and Hamilton Inlet. The rock is there a common light pinkish gray granite possessing this curious arrangement of its constituents — a witness to the "storm and stress" period of Archean mountain growth.

Late in the mountain-building period there occurred one of the most important underground events yet chronicled



Mt. Razor-back from the South, Five Miles Distant in Labrador. For at least fifty miles along the coast from Ford Harbour northward, and for many miles inland, the older formations of the range were in some manner displaced by a huge body of molten rock. This enormous mass crystallized into a solid rock precisely analogous to common granite in having solidified under a cover of older, overlying schists or strata. The latter have since been worn away, and to-day the once deeply buried "intrusive" body is visible in mountain stubs covering hundreds of square miles. The rock is called "gabbro"; in composition it is often similar to basalt, the commonest of lavas, *i.e.* such rocks as have been erupted at the earth's surface from volcanic vents. Like basalt, the gabbro has a specially dark colour, that which dominates the island-cliffs and mainland-mountains of the region about Nain. These highlands are bare of both soil and vegetation, and the black slopes impress the eye with a sense of sombre, almost terrible, majesty even greater than is given by their mere altitude and savage sculpturing. Aulatsivik Island ("The Ruler") and Paul's Island, lying in a whole archipelago of smaller, rounded, hummocky islands or ragged skerries, offer numerous landing-places where the formation can be studied.

As in other occurrences within the Canadian Archean, the gabbro is chiefly made up of a wonderfully beautiful mineral, a feldspar, first recognized as a distinct species during the examination of hand-specimens brought many years ago to Europe from Paul's Island. The species was called "labradorite" in its first description, and the name is still employed to signify one of the main constituents of the earth's crust. It is predominant not only in gabbro and gabbro-like rocks, but as well in the bulk of the world's volcanic rock. Labradorite early attracted the attention of mineralogists and of the much larger class of persons interested in gems and in the beauty of colour in inorganic nature. Owing to the peculiar internal structure of the mineral, white light penetrating its glassy surfaces is broken up into its coloured components. Some of these are absorbed in the mineral and do not affect the eye; the remainder are reflected from myriads of microscopic particles within the feldspar and afford tinted light-rays of exquisite beauty. Purples, violets, and blues, flashing like flame out of the iridescent crystals, are the prevailing colours, but bronze, yellow, green, orange, and red are not uncommon. The individual feldspars vary greatly in size, the diameters ranging from a quarter of an inch or less to six or eight inches. As rocks go, the gabbro is always coarse-grained, but the finest labradorite is found in the numerous veins of specially coarse rock which crop out irregularly on the ledges.

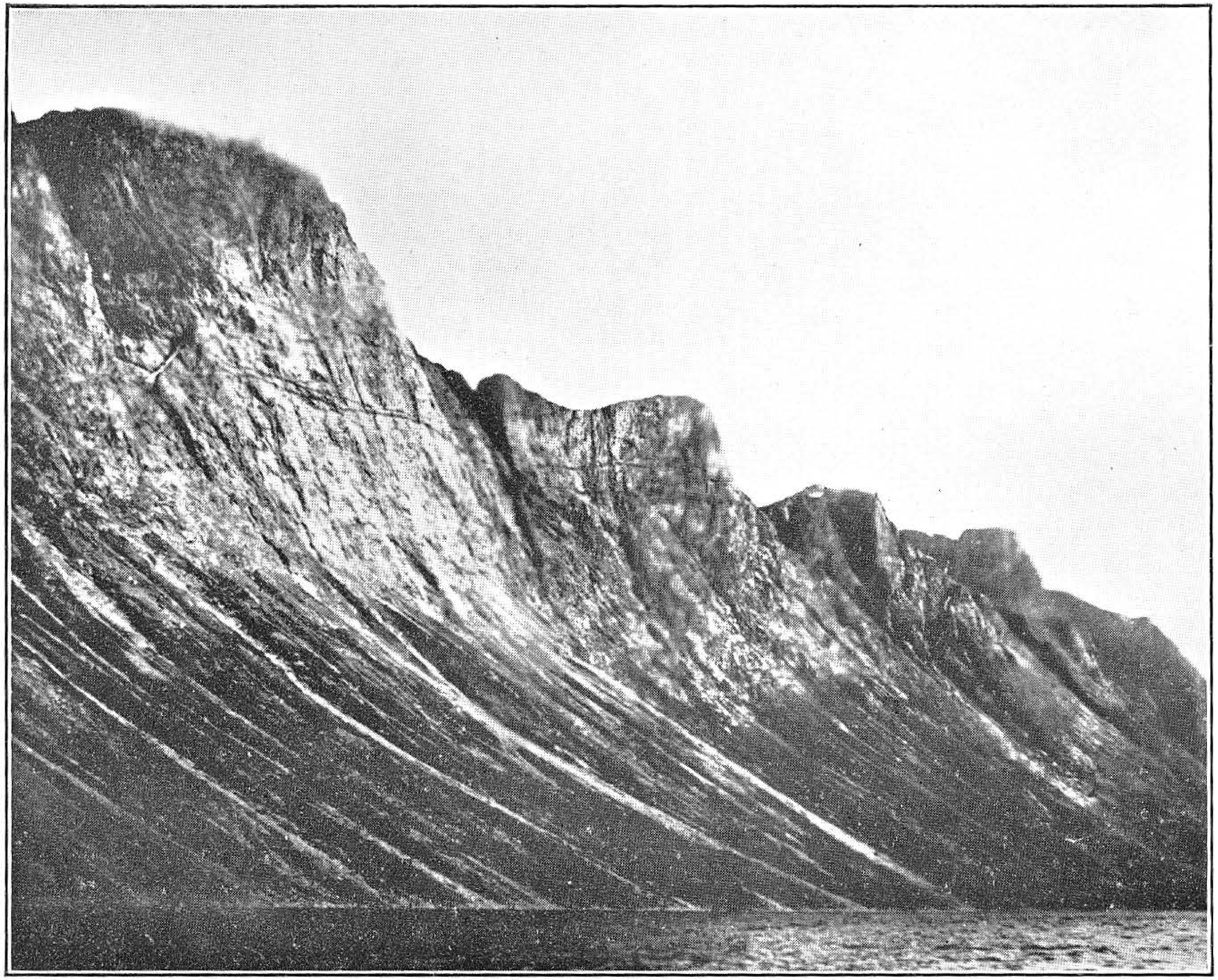
An enterprising American has attempted to market the labradorite as a semi-precious decorative stone. He opened a quarry on a small island (Napoktulagatsuk) situated some twelve miles south of Nain. Dr. Grenfell had the kindness to place the steamer *Strathcona* for a day at the disposal of the members of the *Brave* expedition, and the writer was thus enabled to visit the quarry. It was found that sufficient blasting had been done to remove the weathered rock at the surface. Notwithstanding the fact that the more beautiful material had been shipped away, the fresh surfaces of the rock presented a unique and striking appearance. The iridescence could be discerned in almost every part, but a perfect glory of colour flashed from the coarse, vein-like patches in the rock. With each changing angle of vision a new splendour of gorgeously tinted rays shot out of the finely contrasted dark gray of the general rock-surface. It is no wonder that every effort should have been made to market the stone. Yet, with all their resources, Tiffany and Company have had to decide against the success of the material as a gem. One of the chief difficulties in working the stone lies in its extremely brittle and cleavable nature, forbidding the production of a well-polished surface. The conditions of nature do not, however, prevent the collection of many uncut specimens of exceeding beauty. The finest material yet seen in the bed-rock occurs on or near Napoktulagatsuk. The settlers on the coast report abundant iridescent labradorite also on Mt. Pikey, southwest of Ford Harbour.

A complete account of this interesting formation would necessarily involve a description of the other minerals composing the gabbro, but that would carry the reader far into the domain of the rock-specialist.

The relative ages, areal distribution, and exact composition of the hundreds of igneous rock-bodies between Belle Isle and Cape Chidley must be left almost entirely to future discovery. From the magnificent exposure of these terranes a splendid harvest can be promised to all geological expeditions to the coast.

The Nain gabbro seems to have been "intruded" into the older rocks after the mountain-building, with its folding and crumpling, was nearly completed. This at least appears to be the testimony of the rock-ledges themselves. If the gabbro had already been crystallized out before any considerable amount of the lateral crumpling still remained to be applied, the minerals of the existing rock should show the crushing and granulation due to the strain of the later mountain-building. Such has been the fate of great masses of this gabbro in other parts of Labrador and in Quebec, but, so far as known, the coast gabbros have escaped extensive crushing.

The same remark applies to a quite different class of intrusive rocks which leap to the eye of every observer on the coast. Toward the close of the epoch of mountain-growth in the Basement Complex, perhaps at or near the date of the great gabbro intrusion, the base of the entire range from Belle Isle to Chidley was fissured and, in a sense, shattered. To that event there contributed the irregular contraction of the granites and highly heated schists as they cooled, and doubtless, also, a general settling down of the ridged-up crust after the earth's paroxysm was over. Countless cracks and fissures were thus formed far down below the lofty, rugged surface of the range. The fissures were seldom, if ever, left gaping. So soon as formed and in the very act of forming, they were filled with highly molten basaltic rock which then froze or crystallized. Thus the range was strongly knitted together again. So firm was the new cementation of the shattered formations that the rocks filling the ancient fissures now form so many ribs strengthening the mountain-chain against the attack of the weather. All up and down the coast the gray sea-cliffs and mountain-slopes are seamed with these thousands of basaltic fissure-fillings, the so-called "dikes" of "trap." Wonderfully fine examples occur on the north side of the entrance to Hamilton Inlet. From the anchorage in Ice Tickle one should mount any one of the higher hills on either



The East Wall of the Southern Arm of Nachvak Bay

Ice Tickle Island or Rodney Mundy Island and cast his eye over the singularly varied landscape. Under his feet the observer will find the black ledges of trap. He speedily notes that all the rounded ridges or knob-like hills of the region have the same dark hue, and rightly concludes that they are composed of the same rock. Between the hills are short, broadly flaring valleys floored with light gray schistose rock peeping out through the moss or from beneath the curlewberry bushes and willows. Each of the two large islands, for about three-quarters of its surface, is underlain by the coarse-grained schists with some common granite. The remaining fourth of the surface is underlain by the trap. Many of the ancient fissures have parallel walls which are from ten to a hundred feet or more apart; others have doubly convex walls converging at the two ends of gigantic pods of trap up to a thousand feet in breadth and perhaps of twice that length. The trap being more resistant to the weather than the rocks it cuts, the hills have assumed the varying outlines of palisade, ridge, or dome, according to the shape of their respective bodies of intrusive rock. Such a landscape most tellingly declares the fact that in mountains generally, but especially in old mountains, the expression of the actual relief is really more controlled by the age-long sculpturing of the elements than by the original upheaval of the earth's crust. The uplift and folding together of strata but furnished the raw material; the carving out of valleys by the weather, and particularly the destruction of the softer rock-belts, leaving the more slowly wasting, harder ones projecting, have evolved the finished product, the mountain topography of the present day.

These dikes of trap often occur in nests, as at Ice Tickle, but, large or small, they are never wanting in any extended view of the shore. They form striking features in the frowning cliffs of the north; perhaps nowhere better displayed than in a score of huge, black, vertical seams of trap parting the schists of Mt. Blow-me-down. Another score of

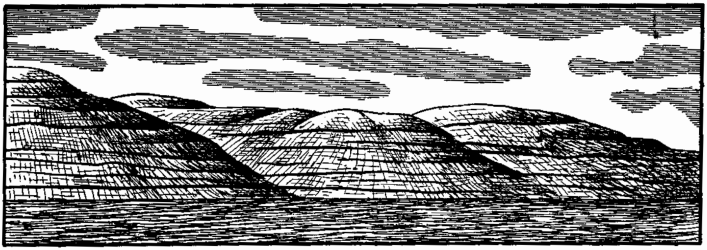


FIG. 14. *From a photograph*

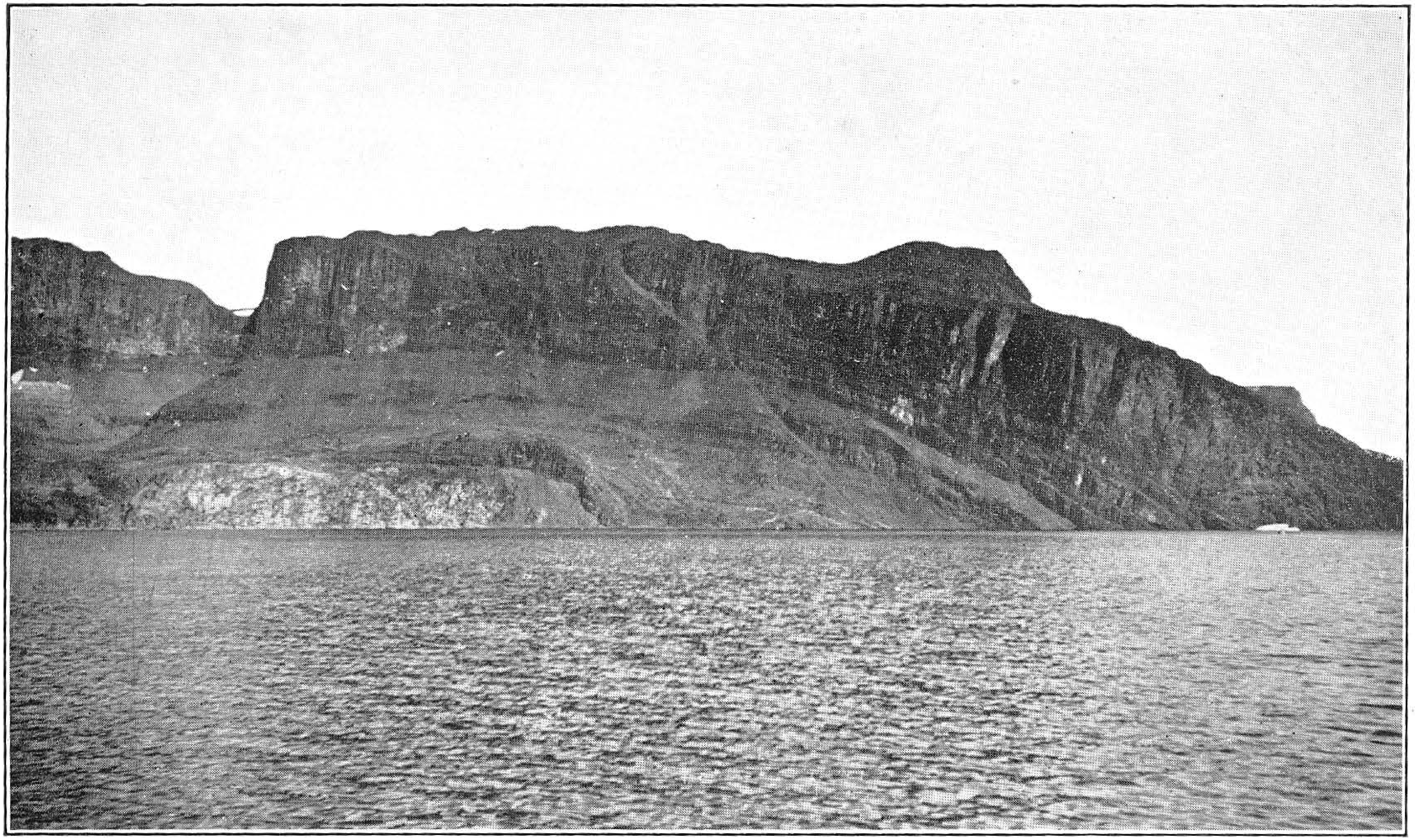
View of Striped Island, looking east. The highest point is about 200 feet above the sea. The black bands represent horizontal sheets of trap, cutting the gneiss.

parallel dikes cut through Webeck Island. On account of their great size — on Mt. Blow-me-down, ranging from one hundred to four hundred feet in width and exposed for thousands of feet along their walls — these dikes are conspicuous even many miles offshore, compelling in the mind of every voyager wonder at the stupendous force that so cleaved the mountains to their mysterious depths. Such dikes appear in the view of Bear Island (opp. p. 130). They are small examples, but serve to show the essential characteristics and that contrast of colour which makes the dikes scenically important on the coast. Before the mountains were wasted away to their present low relief, these dikes extended upwards hundreds, if not many thousands, of feet. It is, indeed, possible that their fissures reached quite to the surface and built volcanic cones and lava plains long since destroyed. That inference is supported by the discovery on the Labrador of just such volcanic accumulations, although these have not yet been sufficiently studied to show actual connection between the lavas and the dikes of trap. That the latter were thrust into the fissures of the mountain-core with enough energy to force the molten rock to the surface is implied in the conditions of Figure 14.

Striped Island gets its name from a remarkable group of thin, nearly horizontal sheets of black trap cutting common gray gneiss. The causes of the intrusion here may have differed from what they were in the case of the vertical dikes, which, as we have seen, entered the base of the mountain-range by a kind of permission; great mountain blocks moved apart and *permitted* the plastic trap to enter the opening fissure. But the sheets of Striped Island, as they forced their way into place, had apparently to lift a rock-cover weighing countless millions of tons. Their intrusion began along so-called "joints"; that is, microscopic though continuous cracks previously developed in the gneiss. The imagination may well be staggered in the attempt to grasp the magnitude of a force which could so thrust fluid rock into almost infinitesimal cracks, wedging up a whole mountain in the process as if a Titan had worked with an omnipotent jack-screw; yet there seems to be no escape from the conclusion that such a wonderful display of power in the molten under-earth has taken place.

In summary, then, the different formations composing the Basement Complex of Labrador, though understood only in the light of rapid and incomplete exploration, are to be viewed as those belonging to old-mountain stubs. The facts show with certainty that an enormous volume of rock has been carried away to the depths of the Atlantic, where the débris is accumulating to this day. Observations in structure, too technical to be described in these pages, seem to show as clearly that the staple rocks of the Labrador were, in Archean times, built up into a gnarled and knotted mountain-system extensive in area and lofty in an Alpine, or even Himalayan, sense.

But the imagination is not left entirely unaided in its attempt to reconstruct the Archean mountains. In comparatively recent geologic time a portion of the Basement Complex on the Labrador has been warped up, *i.e.* bodily uplifted, so high that the streams of the country have been enabled to cut many thousands of feet down into the old rocks. As a result, the 150 miles of the coastal belt southeastward from Cape Chidley presents to-day a rugged relief, rivalling in grandeur many famous Alps of Switzerland and the Selkirks of the Canadian West. Here the strong topography has a distinct coastal trend, and its boldness forcibly suggests that there has been a veritable resurrection of the Archean mountain-chain. This long mountain-belt has been called the "Torngat" Range, from the Eskimo word for "bad spirits." A single view of the bare, forbidding, riven, and jagged cliffs of the saw-tooth ridges and alpine horns, whether seen in the interior or springing their thousands of feet from salt water in the fiords, leaves no wonder at the name. The absence of trees, the eerie loneliness of the whole land, and, in the countless gorges and ravines, the depth of shadow



The Cliffs on the North Side of Mugford Tickle made startling by the brilliance of the high lights under a northern sun, might well cause the savage mind to people these mountains with sinister devils.

A noble introduction to the Torngats is to be found as the vessel bound for Nachvak Bay rounds the long finger-like promontory of Gulch Cape, ten miles south of the Bay entrance. All along the shore cliffs of gray, naked rock, streaked with great black seams (dikes) of trap, rise 2000 to 2500 feet directly out of the sea, and terminate in sharp peaks and ridges. One of the latter has been appropriately named "Mt. Razor-back." Imagine four miles of a saw-toothed pile of rock, nearly 3500 feet high and furrowed on the seaward face by a score of deep gulches which cleave the mass from top to bottom, and each of the lateral ridges in like manner broken by a dozen ravines on each slope, and you have a picture of mountain-land without a parallel on all the American coast of the Atlantic to the southward. Between the great ridges open long, flat-floored valleys that have been moulded into their present forms by the glaciers of the Ice Age. During a memorable day the *Brave* beat up the Inlet, her crew and passengers enjoying an ever changing panorama recalling in its grandeur the cliffs and fiords of Norway.

Nachvak Bay forms a trough running transverse to the range and heading some 30 miles from the Atlantic, at a point more than halfway across the mountain-belt. It is, therefore, fortunately situated for the exploration of the Torngats. For a half-dozen miles together its walls present steep, or even nearly vertical, precipices, their heads often covered with clouds a half-mile above the sea. At one salient angle formed by the meeting of two branches of the fiord, is such a cliff, 3400 feet high — twice the height of the famous Cape Eternity of the Saguenay fiord — the culminating point of a notched and bastioned wall extending seven miles to the southward. Often the vivid and varied colouring of the rocks or the threads and broad ribbons of numerous waterfalls cascading over the cliffs enliven these scenes. How rarely the Inlet is visited appears in the fact that our schooner was the first sailing vessel in eight years to cast anchor at the Hudson's Bay Company Post of Nachvak.

Both to south and to north of the Bay the mountains are truly Alpine in form, their summits measuring more than 6000 feet in altitude. Indeed, some 50 miles to the northward, at least one of the "Four Peaks" is believed to be over 7000 feet in height. In any case, it is not too much to say that the Torngats afford the most lofty land immediately adjacent to the coast in all the long stretch from Baffin Land to Cape Horn. When it is remembered that these mountains rise out of the sea itself, not from an elevated plateau as in the case of the Green Mountains and the White Mountains (Mt. Washington about 6300 feet in altitude), one may well be prepared to understand the fact that in all eastern America there is no scenery that even approaches in scale and ruggedness the Torngats of the Labrador.

At its southern end the range gradually assumes the tamer profiles of a broken plateau. About fifty miles southeast of Hebron, the Moravian mission station, the scenery once more becomes specially impressive, but a wholly new element appears in the landscape forms. Again we meet with a boldness of relief extraordinary for eastern America, with heights above sea-level of from 2500 to 3500 feet for mountains starting up out of the depths of the Atlantic. This second mountain-group covers about 300 square miles. It is called by the Eskimo the "Kaumajet" or Shining Mountain, a name forming the exact equivalent of the Hindoo "Himalaya," and recalling the considerable list of names of peaks, as Mt. Blanc, the White Mountains, Mauna Kea, etc., covered with perennial or evanescent snow-fields.

So far as known the Kaumajets have a unique history in the topography of the coast, and it is of special interest not only in the discussion of the wonderful mountain-forms of the present day, but because of an ancient record,—a geographic fossil long preserved beneath rocky leaves but now visible, for the book is open and may be read. It will be remembered that the Basement Complex was worn down to an almost-plain before the earliest known fossil-bearing rocks of eastern America (the Cambrian formations) were formed. Let us imagine this old mountain-root land-surface sinking deeply beneath the sea; then imagine piled upon it a thickness of 3000 feet or more of mud, sand, and gravel, along with the lavas, flows, and ash, of sea-coast or marine volcanoes. Such material, since hardened to form well-bedded slates, sandstones, conglomerates, tuffs, and trap-rock, was the raw stuff from which the Kaumajets have been made. The whole mass, including the well-buried Basement Complex, was long ago hoisted above the sea, warped and slightly folded into great shallow troughs and low arches (Fig. 15). For countless millenniums the new surface was given over to the patient but powerful attack of frost and other weathering agents and the still more destructive water-streams new born on that surface. The result has been to wear away all but a comparatively small patch of the ancient sea-bottom sediments. Steep-walled gorges and canyons have thus been sunk, leaving massive tables, mesas, and terraced plateaus that reach down to the

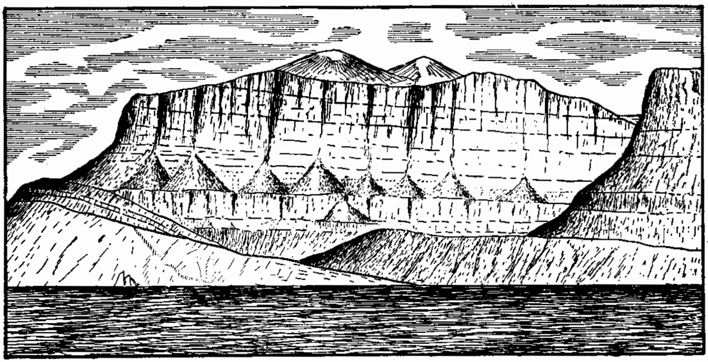


FIG. 15. *From a photograph*

The Kaumajet Mountains, looking north from Mugford Tickle.

valley-bottoms in gigantic steps like those in the much younger strata of the Colorado Canyon. The result has been to fashion a type of mountain scenery truly wild and imposing and of unusual interest in possessing an architectural element quite lacking in the other high mountains of the Atlantic coast. This special quality is best brought out when a fresh fall of snow lying on the narrow ledges of the even-coursed cliffs makes evident the nearly horizontal structure.

Examples of the Kaumajets are represented in Figures 15 and 16, drawn from photographs. In Figure 16 the old buried surface of the Basement Complex, revealed once more after its millions of years, probably tens of millions of years, of burial, appears above the broad unstratified band at the base of the Bishop's Mitre.

A brief note from the revised log of the schooner *Brave* suggests how little exploration of the Kaumajets has been accomplished:—

"As indicated by its position, composition, and topographic character, the island of Ogua'lik really forms the southern extremity of the Kaumajets. Mugford Tickle separates it from the mainland. It was in this narrow channel that our anchorage was chosen. Again we had occasion to mourn the slowness of our northward progress, for it would have been of the highest interest to devote a fortnight at least to the exploration of this region; in order to be certain of reaching Nachvak, however, we allowed but two days in which to secure information concerning the nature of the massifs immediately surrounding the vessel.

"The nine-hundred foot scarps of Ogua'lik would have been impressive among the tamer landscapes of southern Labrador, but they were dwarfed beside the superb walls of the opposing mountains only a mile or two distant. We had entered the tickle late at night, and in the brilliant starlight had discerned the huge piles looming up in solemn and formless grandeur. Their mystery became in part dispelled as a bright sun disclosed a scene in its way unrivalled in Labrador. Due north in the centre of the view two gracefully rounded knobs, estimated by the aid of barometric readings halfway to their summits to be 2500 feet in height, lay close to the verge of an almost vertical precipice from 1000 to 1200 feet high. Below this a series of lesser cliffs, separated by steeply sloping screes of rock-waste stepped downward to the uneven floor of a deep NE.-SW. valley. On the southeast the valley is bounded by a similar arrangement of cliffs and taluses. It ends as a great cul-de-sac, two miles in length, in a thousand-foot head-wall over which there cascades a large brook.

"On landing, I found that the first and natural impression, that this systematic array of scarps and taluses signified a stratified structure for the massif, was justified."

At the foot of the great cliff the light-colored gneisses and other crystalline schists of the Basement form broad ledges well scoured by the ice of the Glacial Period. Their gently rolling surface is considerably more uneven than the old "fossil" land-surface on these same crumpled, gnarled, and twisted rocks. The overlying, veneering strata of the plateaus include black slates, quartzites, and sandstones, apparently all sea-bottom deposits; but probably more than 1500 feet of the half-mile of thickness in these bedded rocks belongs to a volcanic formation. For unknown centuries this part of the Labrador must have been the home of one or more, perhaps many, volcanoes of large size. Millions of years ago they erupted enormous volumes of "ash" and other débris of lava. Most of the lava was shattered into angular fragments, coarse and fine, by the violence of explosion. In the resulting deposits one can find abundant and very perfect "bombs" with the rounded shapes and cracked surfaces of lava masses freezing as they spun through the air from the mouth of Nature's cannon. Other thick sheets of solid lava represent the quiet flows that signify yet greater power in the eruptive force.

So far only the most cursory examination has been given this important rock-section. No organic fossils have been found in any part of the series of beds. Geologists cannot say, therefore, just what is the age of these rocks relatively to the other formations of the world. It is only known that here, as in similar rock-groups in western and southwestern Labrador, the stratified beds are extremely old in a geological sense, dating in all probability from a time near the beginning of the so-called Paleozoic Period. An inconceivable time has elapsed since these lost volcanoes were active; inconceivable time had elapsed between the building of the Archean mountains and the bursting forth of the lavas. Though the exact number of millenniums engaged in those events cannot be told, the discovery of organic remains in the sea-bottom sediments can yet give science an idea as to the *relative* place of the events in the earth's history. Such a search for fossils, the closer description of the rock-formations, the mapping of the region, and the contemplation and explanation of the marvellous scenery of the Kaumajets offer an exploring party enjoyable work for more than one busy season. It is doubtful if a more promising region for research in Nature's wonders can be found elsewhere on the Labrador.

In the northward journey from Mugford Tickle, the vessel will pass close under the sheer two-thousand foot cliff of Cape Mugford. Nowhere is the "geographic fossil" of the Kaumajets better displayed. Even in the photograph one can see the exceeding contrast of colour and composition in the Basement Complex and in the bedded rocks above. It is hard to imagine a more spectacular exposure of such a surface as that limiting the Complex. Let the visitor to the Kaumajets remember that the "almost-plain" has an antiquity so vast that, in comparison with it, the Alps of Europe, the Andes of South America, our own Rocky Mountains, the Colorado Canyon, the boundless plain of the Mississippi Valley, are all but creatures of a day. He will then not only enjoy the wild picturesqueness of these masterpieces of Nature's masonry, but hold in special reverence their hoary record of an ancient world.

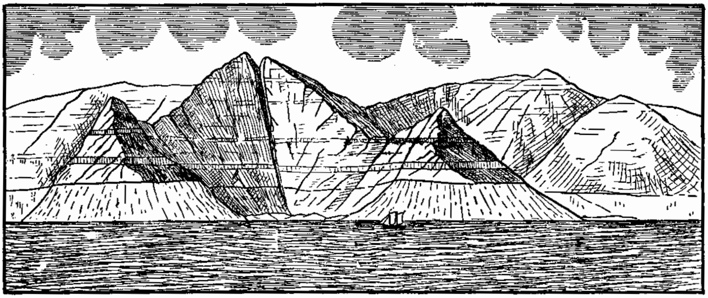
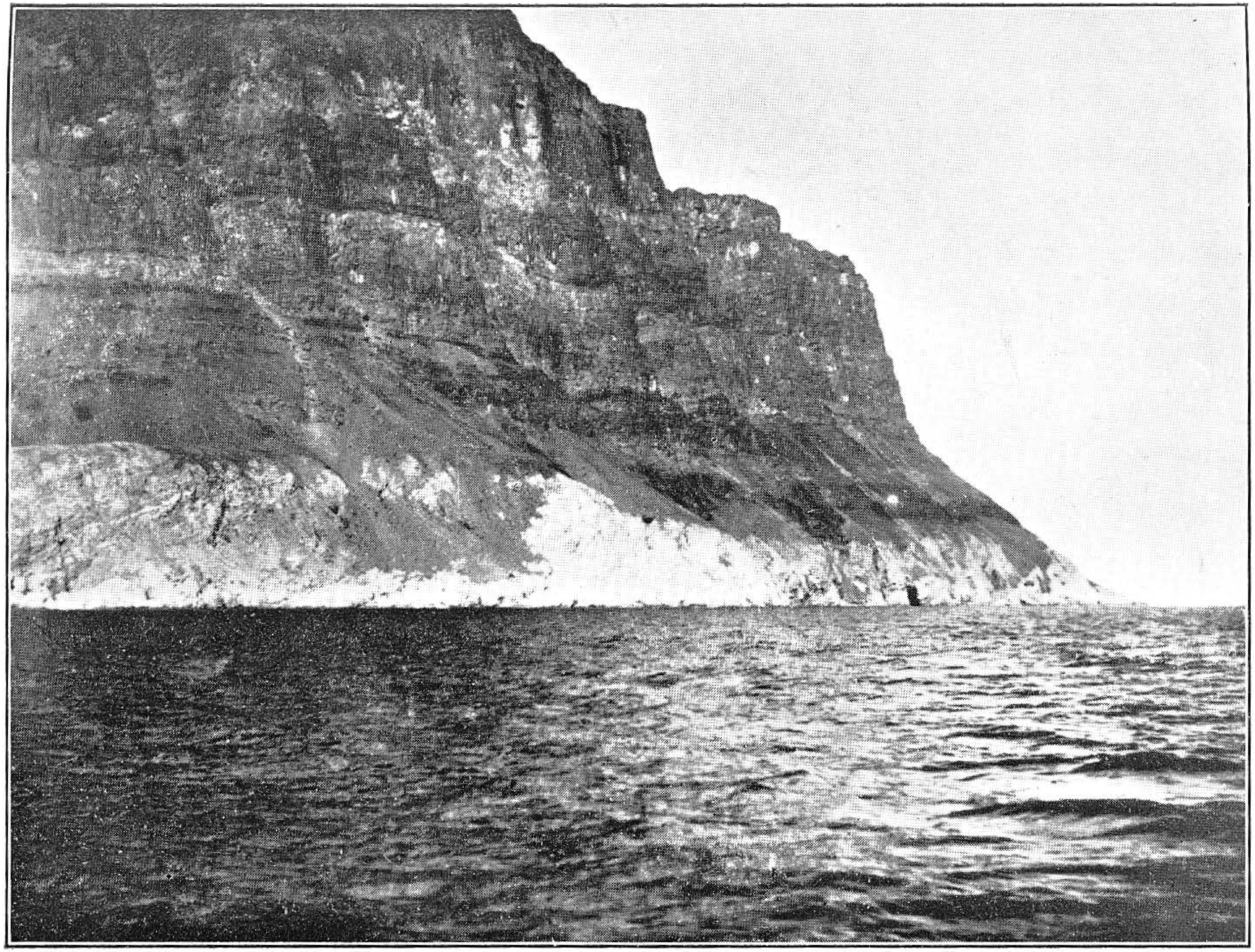


FIG. 16. *From a photograph*

Sea-coast view of the "Bishop's Mitre" (left) and "Brave Mountain" (right).

Again the scene changes. "Numerous waterfalls and extensive banks of snow lent welcome relief to the dark cliffs, the black recesses of the great sea-chasms, and the savage gorge-like inlets that opened one after another as our schooner slowly forged through the 'tide' around the cape. Fine as this scenery was, still greater magnificence awaited us as we came face to face with the Bishop's Mitre (Fig. 16). Seen from the northeast, the Mitre, estimated to be about 3500 feet in height, exhibits a symmetry which is most remarkable in view of the fact that the existing profiles are everywhere the result of weathering and wasting. The two peaked summits are separated by a sharp notch about 500 feet in depth — the uppermost part of a long ravine



Cape Mugford, looking North

cleaving the mountain to its base at the shore two miles from the notch. Occupying the bottom of the ravine an uninterrupted snowbank still marked, in the month of August, the line of symmetry of the whole mountain. From either peak of the Mitre a rugged razor-back ridge descends, each gradually diverging from the other across the widening intervening trench. With essentially similar profiles, the two spurs further match as each terminates at an elevation of about a thousand feet in a bold rock-tower. Each sentinel tower rises some 800 feet above the ridge-crest, from which there is a sudden slope of the full 1800 feet into the sea. The light gray colour of the Basement, in contrast with the black of the cyclopean masonry above, adds to the impression won from the beautiful symmetry that the whole structure is the work of giants with the brains of men. No more interesting mountain occurs on the whole coast."

Our knowledge concerning the Torngat Range or the Kaumajets is imperfect; still less is known of the third of the high places on the Labrador — the Kiglapait. Fifteen miles north of Port Manvers and some fifty miles south of the southern limit of the Kaumajet group, the Kiglapait lifts its rocky head and giant vertebræ out of the sea like the massive skeleton of some monster reptile left stranded on the shore. Practically all the information to be had on the real nature of the range is embodied in two paragraphs of the report of the *Brave* expedition: "The name of this mountain-group is an Eskimo word meaning 'The Great Sierra' and refers to the very ragged sky-line and general outlines. The axis of the range runs due east and west parallel to the coast-line, which here has an exceptional trend. The sierra is not more than thirty miles in length, but, on account of its conspicuous position on the shore, is strikingly picturesque. Ten different summits from 2500 to 4000 feet in height could be counted from the schooner. No one of these, so far as the writer has been able to determine from missionaries, fishermen, or from the literature, has as yet received a name. Here, as in the higher mountains of the north, there is abundant opportunity for systematic field-work on the part of such an organization as the Appalachian Club.

"We had hoped to spend some days, if not weeks, in the study of these interesting mountains, but the lateness of the season forbade our dropping anchor within reach of the noble range. Judging again simply from the peculiarly dark colour of the bare rock-surfaces, it seems probable that the gabbro seen at Port Manvers makes up most of the Kiglapait, which will thus represent the Coolin type of gabbro mountains in Scotland."

The 2700-foot Mt. Thoresby at Port Manvers is another dark-coloured mass of the gabbro, which continues to a point at least twelve miles south of Nain.

Thence southward the rugged, island-girt plateau of the Basement Complex extends all the 350 miles to Belle Isle Strait. Throughout that distance the hills and islands on the shore range from 200 to 1200 feet in height, with an average altitude above sea of about 500 feet. A typical view epitomizing the topography may be had from the summits near Hopedale. One's first impression from the view is that of an extremely broken character in the relief. The endless succession of hills and valleys, islands and bays, would seem to proclaim that on no account must this land be called a plateau. And yet no designation more helpful in giving one an accurate and significant idea of the landscape can be applied. From the deck of schooner or steamer coursing several miles offshore, the hundred visible hills of the coast-belt are seen to accord so closely in elevation that the general sky-line is notably flat. The flatness would scarcely be more pronounced if some miraculous shovel were to fill in the valleys. Such magic filling would give a land-surface quite similar to that which explorers have found sweeping westward over the wide interior of Labrador and beyond to Lake Winnipeg. It is the last "almost-plain" to which the Archean mountain-system has been reduced by the wasting of the ages. Since the plain was formed, it has been bodily elevated some hundreds of feet, and especially on its edges, as on this southern half of the Labrador, new valleys have been etched out by weather and running water. So numerous are these valleys that the relief along the coast is wonderfully diversified, but it belongs none the less to an old-mountain plateau cut in intaglio.

Before we take the next step in declaring the development of scenery on the Labrador, it is well to review the ground over which we have come. The limited exploration of the Labrador has led to the recognition of several distinct units in its topography, all to be related directly or indirectly to an ancient mountain-system represented to-day in the much-worn Basement Complex. The southern half of the coast represents a part of the greatest single element in the relief of British North America — the Archean plateau. The Torngat Range of the extreme north forms the "Alps" of eastern America, — true mountains, as shown not only in the folded and crumpled structure of their rock-bands, but as well in the conspicuous heights of the individual peaks. The strength of this mountainous relief is principally due to the deep incision of stream-made valleys in a portion of the Basement Complex locally, and in a geological sense recently, uplifted far above the general level of the Archean plain. So far as known, the Torngats thus owe their origin to the selfsame processes that have shaped the low but much broken plateau of the south.

A third element in the scenery is found in the high gabbro ranges of Nain, Port Manvers, and the Kiglapait. These fine mountains may similarly have undergone recent uplift; or, on the other hand, they may be still high because the gabbro is tougher than the surrounding rocks and from the Archean time to the present has been more stubborn than they in resisting the destructive activity of the weather. It must be left to future investigation to decide as to which alternative is to be preferred. Both may be true.

Finally, the Kaumajet mountain-group, built on the gently undulating floor of the Complex, and showing a special composition and history, makes the fourth member in our scenic divisions. The stratified rocks forming the terraced slopes of the Kaumajets are the youngest solid-rock formations yet discovered on the northeast coast of the peninsula. No solid formation, with certainty representing any of the lifetime of the earth from the earliest Paleozoic time to the present, has been found.

In Labrador the net result of the geological activities of this incomprehensible æon appears to have been to demolish rather than to construct, to wear away old rock-terranes rather than to build new ones into the framework of this part of the continent. During that time, to the westward and southward, the sea-bottoms of geological epochs accumulated muds, sands, and gravels aggregating many miles in thickness — the rock-materials that now compose the bulk of the emerged continent of North America. During that time, many volcanoes near the Atlantic, many others on the Pacific seaboard, were born, lived active days, and died, to leave more than a hundred thousand cubic miles of lava on plains and broken mountain-land. During that time, the Appalachian mountain-system, stretching from Newfoundland to Alabama, was hoisted to lofty heights again and again; each great uplift was followed by secular wasting that reduced the ranges to flat or rolling plains broken only by remnant hills or low peaks. During that time the Rocky Mountain region of the west was the scene of repeated mountain-building with a similar wastage of its ranges. During that time, the visible rocks underlying the five million square miles of plain country between the Rockies and the Appalachians and extending from the Arctic to the Gulf of Mexico, were deposited on the bottom of America's Interior Sea at a rate doubtless no more rapid than is now accomplished on the bed of the Atlantic. And yet, for all that immense interval in geological history, no bed-rocks have yet been discovered on the Labrador to tell us of the earth's constructive activities in the region. Such formations may be found in the future, but it is already known that they cannot occupy large areas in the coastal belt. The layered rocks of the Kaumajets once covered much more territory than now; it may well be believed that, formerly, other extended mantles of bedded rock in like manner veneered the Basement Complex. But in no case can any one of these mantles furnish other than small patches on the old Basement. For millions of years the Labrador has been above the sea and has suffered the steady, patient onslaught of frost and rain and the delving of brooks and rivers — forces that, with the cumulative power of the ages, have laid bare, throughout the Labrador, the foundation of the world.

Thus it has come about that the most ancient of formations now lies in contact with the youngest that go to make up the geological record, the loose deposits of the geological "yesterday" and "to-day." The "yesterday" is the Glacial Period; the "to-day" is the post-Glacial "Recent" Period. What remains of our brief account of Labrador's scenic evolution has to do with these short but exceedingly important epochs.

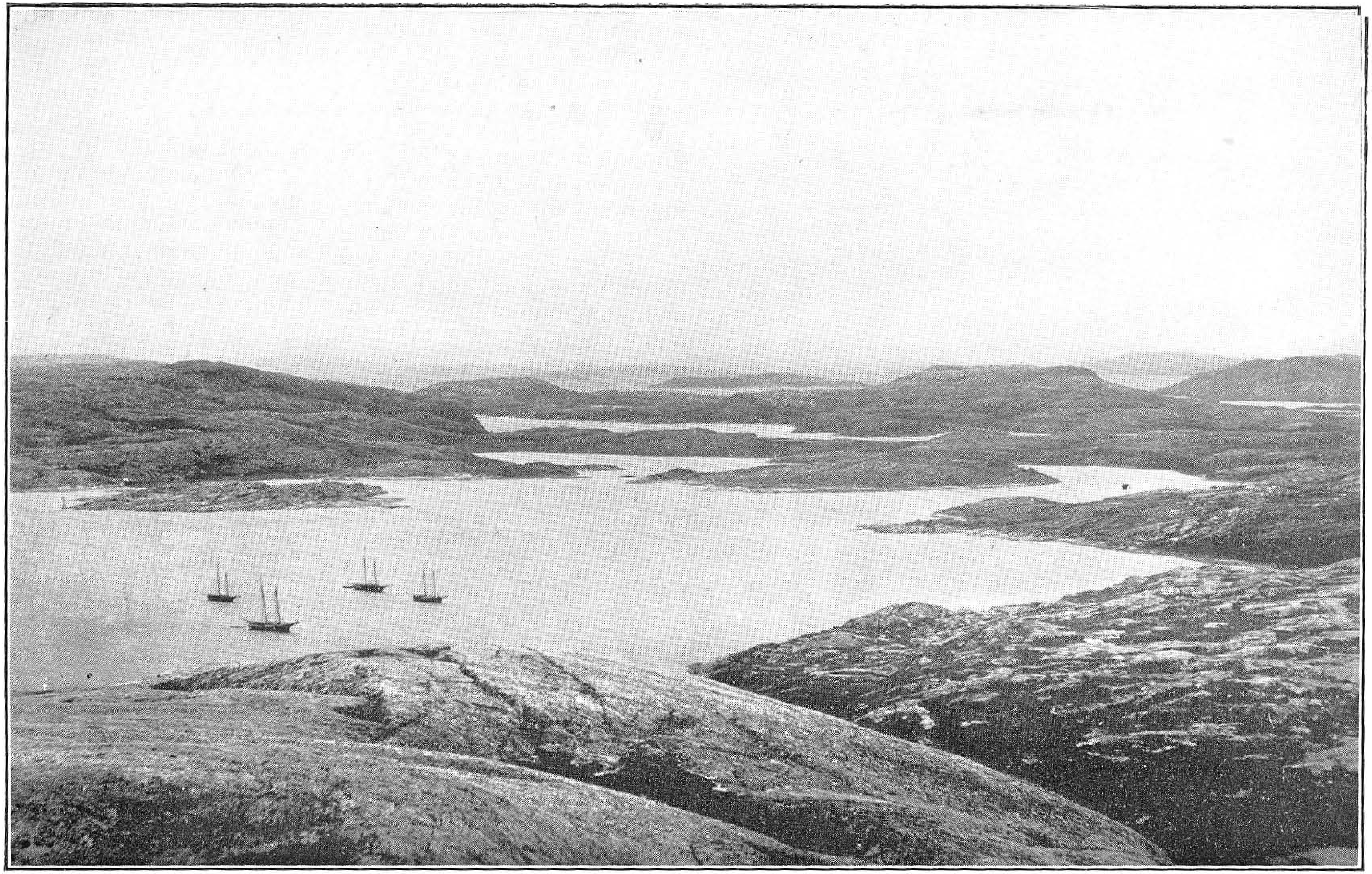
At the beginning of the Glacial Period the Labrador Peninsula had essentially the main topographic features of the present time. Through the working of climatic causes whose relative efficiency is in lively discussion among geologists, a regional ice-cap many times greater than the well-known ice-field of Greenland gradually accumulated in northeastern America. What seems to have been the region of greatest thickening in the ice-sheet was located on the height of land between James Bay and the St. Lawrence River. Thence the ice slowly flowed in all directions — to north, east, south, and west — outward into the Atlantic off the Labrador, the maritime provinces and New England, ploughing the sea-floor as it moved; outward into Hudson Strait and across Hudson Bay, apparently filling that broad basin completely; outward across the Great Lakes, as far as the belt of moraines stretching from New York City across New Jersey, Pennsylvania, Ohio, Indiana, and so on to the plains of the Upper Mississippi Valley and Northwest Territories of Canada. The total area of this "Labrador" or "Laurentian" ice-cap was over two millions of square miles. In the central part its thickness grew to be at least six thousand feet. There is evidence to show that even Mt. Washington (6288 feet in altitude), together with all other peaks of New England, was covered by the flooding ice.

Investigation much less thorough than has been given to the Labrador glacier has suggested that similar, independent ice-caps were formed on the heights of Newfoundland and on the plateau northwest of Hudson Bay (the "Keewatin" Glacier), each having centrifugal flow.

The causes for the disappearance of the ice-sheets are as stimulating to debate among glacialists as the conditions that led to the growth of the glaciers. Fortunately for a scenographic account of the Labrador, these intricate theoretical questions need not detain us; suffice it only to note the *fact* that, after a period of prolonged activity, the ice gradually melted away. Not an acre of the old ice has been found on the mainland of North America. It is possible that the Grinnell Glacier, the relatively diminutive ice-cap of southern Baffin Land (Meta Incognita), represents a still lingering portion of the mightier glacial flood, but so little is known of the Grinnell that a former connection of the existing and the vanished ice-sheet cannot be asserted. On the contrary, it may be that the reported twelve hundred square miles of ice on the Meta Incognita belong to another independent centre of ice-accumulation. The solution to this problem and the interest which always attaches to a regional glacier will surely and amply repay the explorer who heads his steamer for Frobisher Bay. The Grinnell Glacier lies only a long half-day's journey by steamer from Cape Chidley; in a sense it is at the very door of civilization, yet it is far less known than the ice of northern Greenland or the distant glaciers of Alaska.

Whether or not the north land bears any remnant of the ice which once overwhelmed Labrador, the recency of the glacial retreat from the peninsula is most strikingly evident. This is especially true on the northeast coast, where the glacialist, no less than the worker in bed-rock, is blessed with that negative virtue of the earth's surface, the absence of a forest-cover. He who runs may read the glacial records from one end of the coastal belt to the other.

To gain a vital idea of ice-work even on the Greenland scale or the Antarctic scale, one needs not the training of a professional glacialist. A first approach to the understanding of glaciers may be profitably made in the recognition of their analogy with rivers. Upstream, a river scours its channel, batters, grooves, and wears away the solid rock, so deepening its bed and in time excavating a valley of a size appropriate to the stream. In its lower course on flood-plain or delta, the river lays down the rock-fragments worn out of the rocky channel. Throughout the length of the river, increasingly, this débris, in the form of gravel, sand, or mud, is moving deltawards. A water-stream has thus three main functions — to scour, to carry the scoured rubbish down the valley, and then to deposit that same rubbish in lake or sea or other basin, where the stream's velocity is finally checked. In like manner the gliding ice-stream, whether flanked by valley-walls or blanketing



View from a Hill near Hopedale Mission House

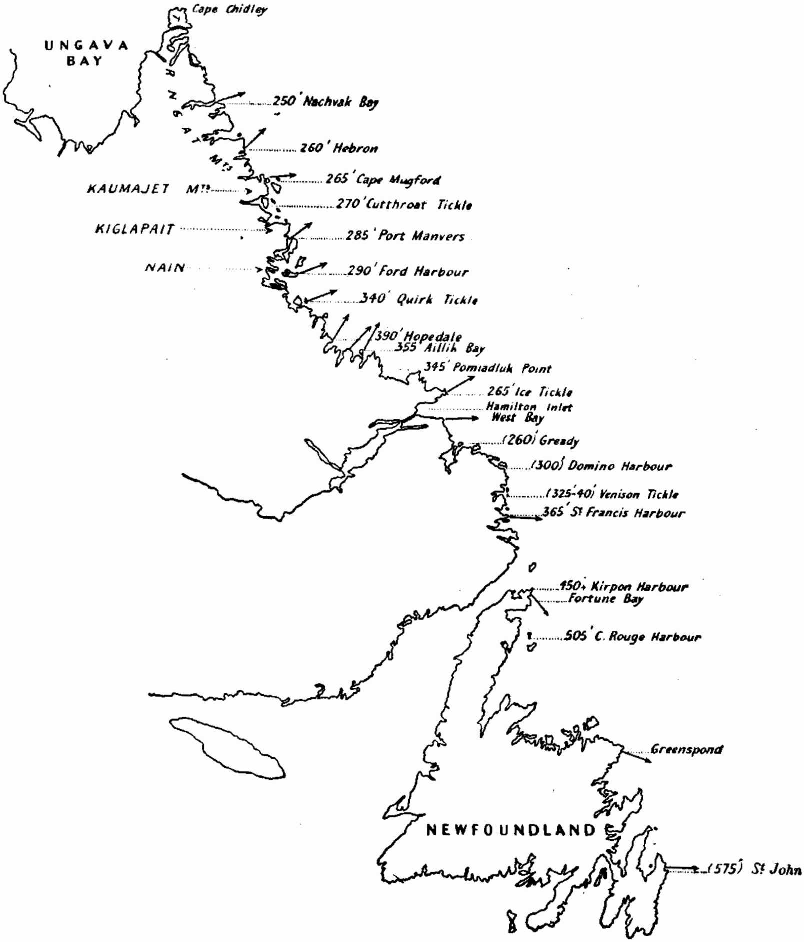


FIG. 17.

Map showing by arrows the directions in which the ice of the Glacial Period moved. Numbers indicate in feet the amount of uplift since Glacial times. Scale, 200 miles to 1 inch.

half a continent, scours and grooves its rock-floor, removes loose rubbish, and attacks the solid rock, which slowly yet surely wastes under the heavy, creeping stream. In like manner, too, a moving ice-stream is freighted with "drift," the débris of the wearing floor, and, finally, that débris is deposited downstream where the glacier current comes to an end. Alluvium is the "drift" material of the river's load; glacial "drift" is the alluvium of an ice-stream. The alluvial deposits of the river in terrace, flood-plain, or delta are the "moraines" of the glacier.

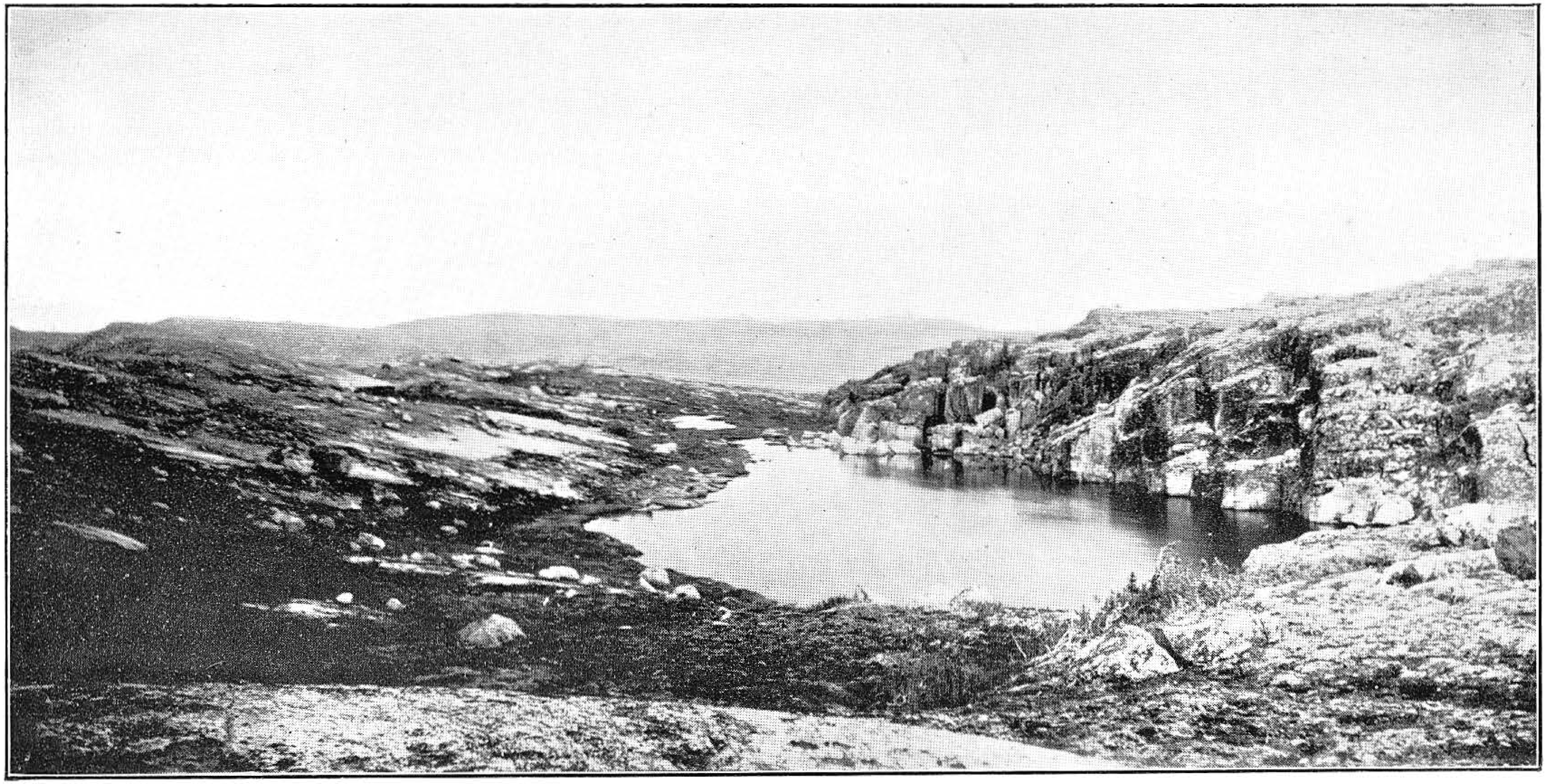
If a well-established, mature river should, through a change of climate, become dried up or greatly shrunken in volume, its scoured, boulder-strewn gorge, its terrace sands and clays and its delta would remain to tell the story of that river's former activity as clearly as if the rushing waters had never ceased to flow. Such climatic changes have actually occurred in various parts of the world, so that, even in that respect, water-streams and ice-streams hold their analogy.

All of these three principal activities of glaciers are memorialized with wonderful clearness on the Labrador. However, as might be expected from the fact that the peninsula was the central region of dispersal for the ice-cap, the main effect of glaciation on the coast has been to abrade the bed-rock and to carry away the loose product of the grinding to the ice-margin which lay far out on the bed of the Atlantic. The scenery, no less than the conditions ruling plant, animal, and human life on the coast, has been powerfully affected by this erosive work of the vanished glacier. To that phase of the glacial geology of Labrador the explorer's attention is inevitably turned.

Among the first evidences to convince the observer of the extent, power, and recency of the glacial invasion is the character of the rock-ledges on all the coastal belt from Belle Isle to Cape Mugford. In pre-Glacial times there must have existed a deep soil and a heavy layer of weathered and decomposed rock over this entire area. The word "must" is none too strong if the Labrador mountains had wasted down after the manner of other old ranges, and there is every ground for believing that such was the case. In other words, we can find an analogy to the pre-Glacial range of the Labrador in, for example, the unglaciated southern Appalachian Mountains in which the granites and schists are so altered by secular weathering that the rock is friable and rotten for depths of hundreds of feet below the present surface.

In Georgia or northern Alabama it can be proved that some of the rock-bands are weathering more rapidly than others; over the former the blanket of disintegrated rock is deeper than elsewhere. So it doubtless was in Labrador. When the ice-cap became thick and powerful, it slowly scoured and planed away the ancient soil with the underlying layer of rotted rock. Under the enormous weight of the cap a half mile or more in thickness, the ice moulded itself into all the depressions. As the easily removed blanket of decayed rock was carried northeastward out to the Atlantic basin, not only was the general level of the country lowered, but it was lowered faster where the pre-Glacial decay of the rocks had been most pronounced. The energy and duration of the glacial scouring were such, that apparently all of this loose material was removed, leaving smoothed, hummocky hills and ledges of fresh, unbroken rock to form the post-Glacial landscapes. Where the pre-Glacial cover of decayed rock was specially deep, a trough or a rock-basin remained after the ice melted away. In this way the old valleys were irregularly deepened and new depressions were sunk; innumerable lakes and ponds were formed which to-day make the peninsula one of the great lake-districts of the world; and the coastal belt assumed its present aspect of singular raggedness. The diversity of relief in southern Labrador is nowhere more conspicuous than along the shore. When the ice finally disappeared, from mainland and invaded sea-floor, the ocean waters entered the maze of scoured troughs that open seaward. The ponderous flood of ice was replaced by the restless sea, flooding a perfect labyrinth of channels, straits, broad sounds, islands, skerries, and headlands.

There is evidence, too, to show that the solid, fresh rock itself was attacked by the overriding ice. All rock is intersected by more or less abundant cracks or planes of weakness which divide it into blocks that may be rifted away. Just as the quarryman uses these rifting planes to remove slabs of marble, granite, or schist, so the Labrador glacier with the wedge of the frost, with bottom friction and shear, plucked out and carried off great blocks from its firm, unweathered floor. The photograph of the "ice-worn surface near Aillik Bay" illustrates a single example of this process which had an important share in the glacial remodelling of the topography. In the view, the smooth slope on the left represents the heavily scoured bed of the ice-sheet as it moved seaward from right to left. The pond fills a small rock-



Ice-worn Surface near Aillik Bay

basin produced by the glacial plucking away of many blocks of the fresh rock (gneiss) frozen into the ice, and so lifted and freighted off by the moving glacier. In the face of the low cliff can be discerned the planes of rifting and the outlines of several blocks that were in the very act of being plucked away as the ice disappeared from the country. It is an instructive case of natural quarrying. Ten thousand other examples on the coast would show quite as clearly that a glacier works with crowbar and crane as well as with gouge and chisel. Using all its powers, the ice-cap strongly modified the *details* of relief on the plateau of southern Labrador.

In so reaching a principal conclusion from the glacial studies, let it not be forgotten that normal stream-cutting in pre-Glacial times produced the grand features of the sculpture.

The energy of glacial attack is manifested not alone in the remodelling of plateau and valley; its power leaves enduring records on the single ledge of rock. Observations on the living glaciers of the world show that they scour their beds not so much by the direct friction of ice against ledge as by the dragging of frozen-in boulders over the bed-rock. The pressure so applied is truly enormous. Deep grooves or shallower "striæ" running in the direction of ice-flow are cut in the solid rock by such "graving-tools." Limestone, slate, trap, granite, or schist may be thus marked by scratches, furrows, or channels from a fraction of an inch to a foot or more in depth. They are not continuous markings, but occur only where the wearing boulder has been pressed with irresistible might against the bare rock. Shallow and deep striations of the sort are to be found on all the length of the Labrador; as elsewhere, they may be used to determine the directions in which the massive ice-cap flowed. Until the year 1900 striæ were reported from not more than five localities on the coast. In that year the list was so far enlarged that it became possible to prove a seaward flow for the ice throughout the 750 miles of the shore. In Figure 17 arrows have been drawn to show the directions of this movement of the ice.

Besides the scouring and quarrying, the Labrador ice-cap, like all other glaciers, carried out a programme of constructive work. In southern and north-central Canada and in the northern United States, this activity furnishes for the glacial story a second chapter of even more positive importance than the chapter so briefly sketched for the Labrador. In northeastern Canada, as we have seen, the ice-sheet spent its energies chiefly in transporting to outlying regions the abundant rock-rubbish won from the plateau in its polishing and latest sculpturing. That same drift was laid down in a broad zone of moraines and water-washed deposits of sand, gravel, and clay not far from the edge of the ice-cap. The rich farms of southern Ontario, southern Michigan, of Illinois, Indiana, Ohio, and other northern States of the Union are underlain by the broken and pulverized material that once composed the pre-Glacial cover of decayed rock in the region to the north and northeast. Through the glacial invasion those southern tracts have gained in the raw material of good soils at the expense of northern Michigan and Ontario, of Quebec and southeastern Labrador.

With seemingly greater thoroughness the mantle of soil and disintegrated rock has been removed from the coastal belt of northeastern Labrador. The resulting moraines and other loose deposits cannot be seen in anything like their full volume, for they are almost entirely buried beneath the waters of the North Atlantic. Only here and there within the coastal belt itself did some lingering, local ice-tongue build a small moraine to represent the immense accumulations that must have resulted from the strong glaciation of the coast. One such moraine has been described as a unique discovery during the voyage of the *Brave*. It was noted on the mainland opposite Copper Island near Seal Island Harbour.

For the rest of the coast, so far as known, the glacial deposits consist either of very small patches of clay carrying boulders or of single boulders scattered over the bed-rock surface. All told, they form but a comparatively insignificant mass of loose material left irregularly distributed over the glacier-floor when the ice finally melted away. As the ice-sheet shrunk, the boulders gradually and quietly sank to their present resting-places. Many of the larger ones were delicately poised on their corners and now form "rocking-stones" which may be easily set swinging from side to side with the hand.

But a picture of the Labrador in glacial times would be far from complete unless the imagination reconstruct the physical geography of the lofty northern mountain-ranges during that period. As far back as 1860 an American geologist named Lieber noted on the mainland south of Cape Chidley "wild volcanic-looking mountains, . . . whose craggy peaks have evidently never been ground down by land-ice into domes and rounded tops." Dr. Robert Bell, after a brief visit to the Torngats, said of them:

"The mountains around Nachvak are steep, rough-sided, peaked, and serrated, and have no appearance of having been glaciated, excepting close to the sea-level. The rocks are softened, eroded, and deeply decayed. . . . Throughout the drift period, the top of the coast-range of the Labrador stood above the ice and was not glaciated, especially in the high northern part." An exploration more prolonged than any permitted to either of the two geologists mentioned was carried on by the writer in 1900, and his observations entirely corroborate their conclusion.

In the northern Torngat Mountains, all signs of general glaciation cease at the level of about 2000 feet above the sea. Above that level, the ledges are thoroughly shattered into angular fragments by the frost, and weathered to a deep brown colour strikingly different from the gray tints of the rounded ledges and boulders which have been scoured by the ice lower down the slope. The decomposition of the rock is doubtless something like that which affected all the ledges of the Labrador in pre-Glacial time. The 2000-foot contour also marks the upper limit at which "erratic" boulders, namely, those which have been surely carried from their parent ledges by ice, can be found.

Thus in the Nachvak region the ice-sheet at its maximum during the Glacial Period was not more than one-third as thick as in southeastern Labrador, and filled these northern valleys to a height of about 2000 feet above the present level of the sea, but no higher. The ice of the local Nachvak Glacier was in largest part derived from the main interior ice-cap which flowed through a deep transverse cleft in the Torngat Range. Branch glaciers growing in the moun-

Looking South into the Tallek, the Southern Arm of Nachvak Bay tains themselves swelled the volume of that trunk stream of ice. For fifty miles the latter glacier, like a broad, deep river, wound its way beneath the grand cliffs of the Torngats until it debouched in the open Atlantic. So it was with many other cross-valleys of the range; the Torngats stood like a lofty, turreted wall which the ice-

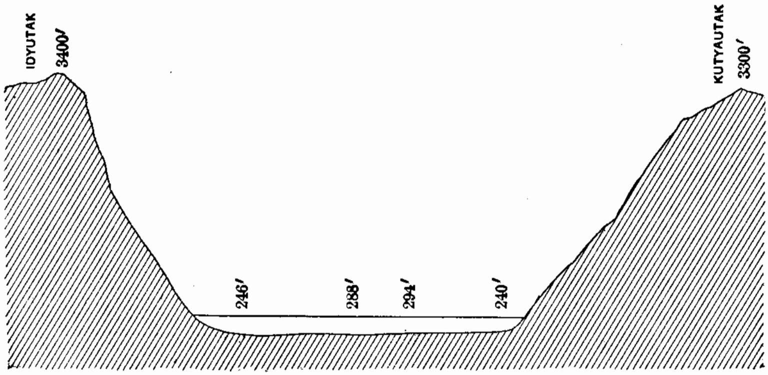


FIG. 18.

Section across the south arm of Nachvak Fiord. Height (above sea-level) and depths (below sea-level) in feet.

cap, thick as it was, could not surmount, but could only partially conquer by the easy routes of the passes. In all probability the tops of the Kaumajets and of the Kiglapait Mountains likewise stood well above the surface of the ice which must perforce flow round them in its journey to the sea.

The glacial occupation of the Torngat valleys led to exceptionally important changes in their pre-Glacial form, and to that modification we owe some principal elements in the impressive landscapes of the long inlets. These

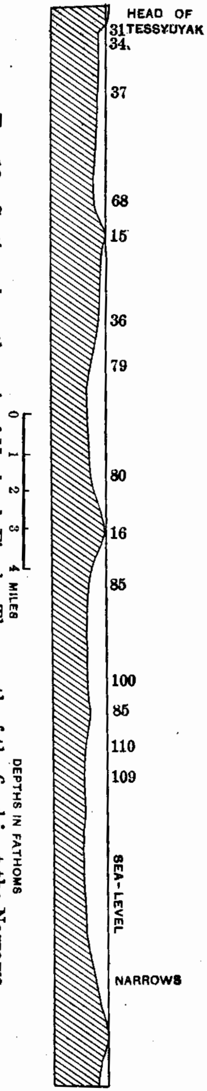


Fig. 19. Section along the axis of Nachvak Fiord. The mouth of the fiord is at the Narrows.

huge tongues of ice, even more noticeably than the main ice-cap, have scoured and quarried away the bed-rock. One result has been to widen and flatten the valley-floors, thereby steepening up the side slopes that belonged to the normal river-cut canyons of pre-Glacial days. Over the cliffs many fine waterfalls are tumbling from side-valleys mouthing many hundreds of feet above the sea-water of the inlets. As usual, too, the rocks of the glacier-beds showed different powers of resistance to the pluck-and-scour of the ice and long, deep rock-basins were ploughed out in the bottoms that once possessed the uniform, smooth seaward slope of river-made valleys. (See Figs. 18 and 19.) Thus, excavation by the great local glaciers has been chiefly responsible for the peculiar and impressive scenic quality of the fiords occurring between Cape Mugford and Cape Chidley.

A short but interesting chapter remains to complete the scenic history of the Labrador. Ice-cap and valley glaciers melted away and left the land sculptured into essentially its present form; left hill and valley, scoured rock, hollowed basins, ponded waters, and countless rushing rapids and quiet reaches in the streams which were new-born on the old glacial floors. At the close of the Ice Period, however, the whole of the Labrador stood some hundreds of feet lower than it now stands with respect to the level of the sea. During the thousands of years which have since elapsed, the land has been slowly upheaved to that amount. All along the existing shore an irregular belt of land so emerged, and now bears with marvellous distinctness the traces of wave-action far above the present level of the Atlantic. Probably nowhere in the world are there more beautifully preserved relics of ancient shores. The absence of forest that might cover the records and the recency of the uplift contribute to the perfection of the display. We must add thereto the fact that it is precisely in just such a coastal region, exposed, as it was, to the full force of the ocean's swell and the gales of a North Atlantic, that we should expect old shore-lines to be well marked. With truly dramatic force Nature has fulfilled the expectation and so afforded every observer on the Labrador a never failing source of interest and instruction.

Again let it be called to mind that the study of any geological fact in Labrador has a twofold significance. Many a stage in the physical evolution of the peninsula, or many a striking element in the landscape or underground structure, is worthy of wonder and interpretation for its own sake — yet still more worthy if it be viewed as a sample of the structure, scenery, or stage of development that belongs to the earth's crust as a whole. Much of the rugged beauty and charm of colour of the Labrador shore are due to the thorough washing, wearing, and fretting of the rocky hills as they emerged from beneath Atlantic waters in recent times. The beauty and charm gain in meaning and power if the truth be recognized that all about the North Atlantic the same upward movement of the land has taken place. The shores of Maine, Quebec, Scotland, Scandinavia, and Finland are regions favoured by those who love the form and colour contrasts of the many-tinted sea with the massive, bold, or savage rocks still bearing marks of a late submergence. On a larger scale and, in general, with much greater vividness than elsewhere in North America at least, the explanation of this peculiar scenery can be told and illustrated on the Labrador, where, therefore, the beauty of such a shore, becoming a type of all, can be at once best appreciated and *understood.*

A visit to the newest dry land of Labrador has yet greater value in giving one faith in the reality of the giant geological forces. Throughout a human lifetime the earth seems stable; the human records of a thousand years seem to establish the same belief. It needs some such object-lesson as the emerged coastal zone of Labrador to show us finally that those "first impressions" are wrong, — that the Greek philosophers were right, though they knew not the name of geology, in claiming for the world an "eternal flux of things." The lesson speaks tellingly of the real instability of the sea-level, of massive, regional uplifts of the land, and of the growth of continents. On other grounds, for example, it is believed that the long coastal plain underlying the Atlantic States from New Jersey to Florida was once part of the bed of the ocean, but the belief founded on local discoveries at last reaches its full strength and overlaps actual knowledge when it can be shown beyond doubt or cavil that the sea-bottom elsewhere has been warped up to form new land. With unmistakable directness and with lavish proofs this ground principle of geology is illustrated on the Labrador.

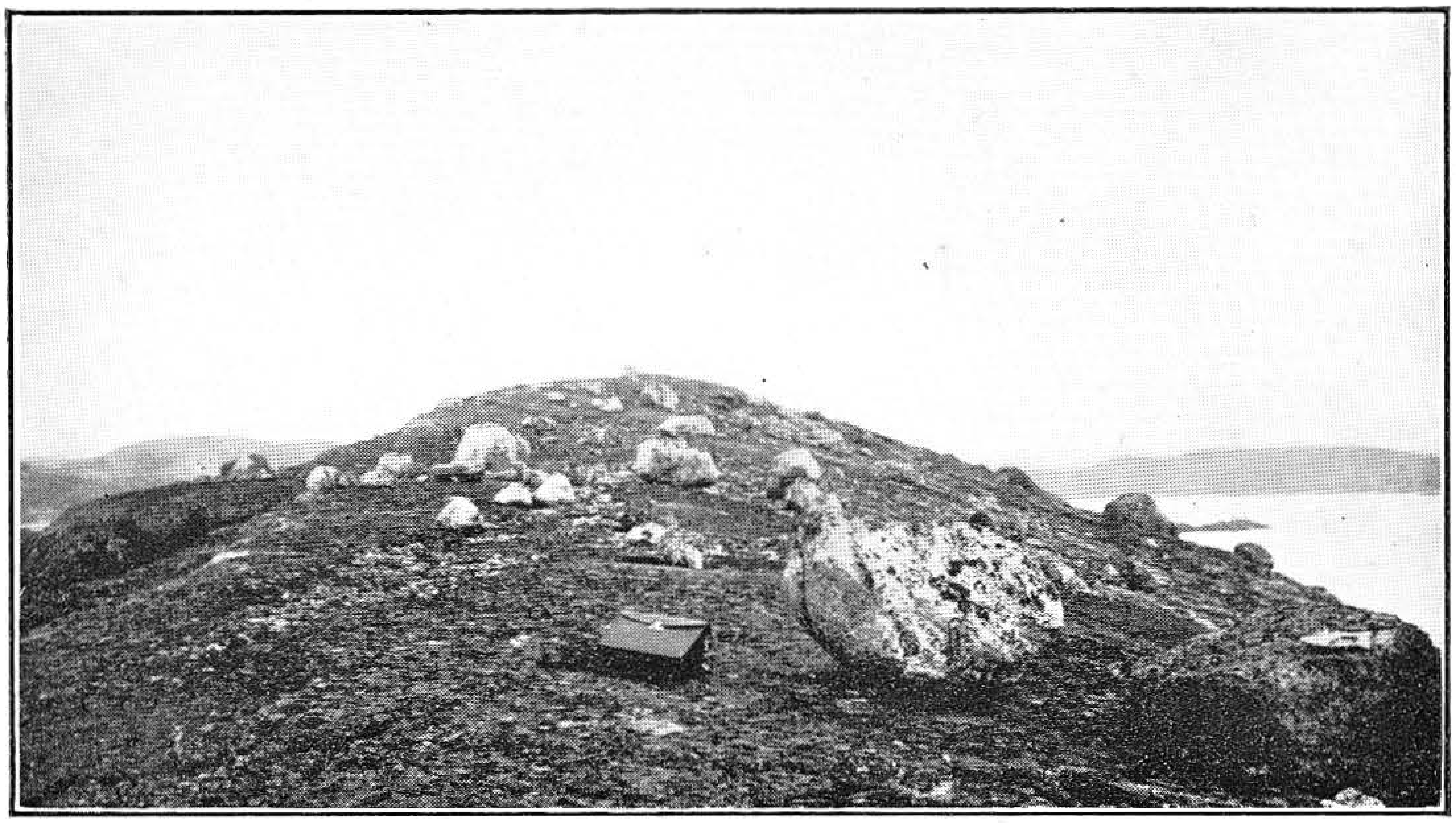
The memorials of post-Glacial uplift are as diverse as the kinds of shore-line form which the waves of to-day are impressing on the hard rocks of the coast. Boulder beaches, gravel beaches and terraces, plains and pointed spits of wave-laid sand, sea-cliffs, splendid sea-caves and long chasms, even the dunes of sand blown up on these prehistoric shores, remain to tell us of just such activities as wind and wave display on the present shore, the lowest of all those which the Atlantic has stormed and battered since the Glacial Period.

Ocean waves are like rivers and glaciers in their ways of working. They destroy or erode bed-rock; they transport the eroded débris; they deposit their freight of rubbish where the force of wave- and wind-driven current is lowered. Thus, in a sense, the gnawed and riven sea-cliffs correspond to the scoured glacier-bed or washed, abraded floor of the river-canyon; the beaches and spits, the bedded sand and mud of the sea-bottom correspond to moraines and to the deltas and alluvial plains of rivers. As the outer coastal belt of the Labrador slowly, with the deliberation of millenniums, and urged by the mysterious, colossal, internal energy of a planet, rose out of the sea, the ocean-billows rolled in upon the changing shores, destroying where they could, constructing where they must. The visible signs of the submergence belong, therefore, to two classes of landscape forms which give a real fascination to this most recent geology on the coast.

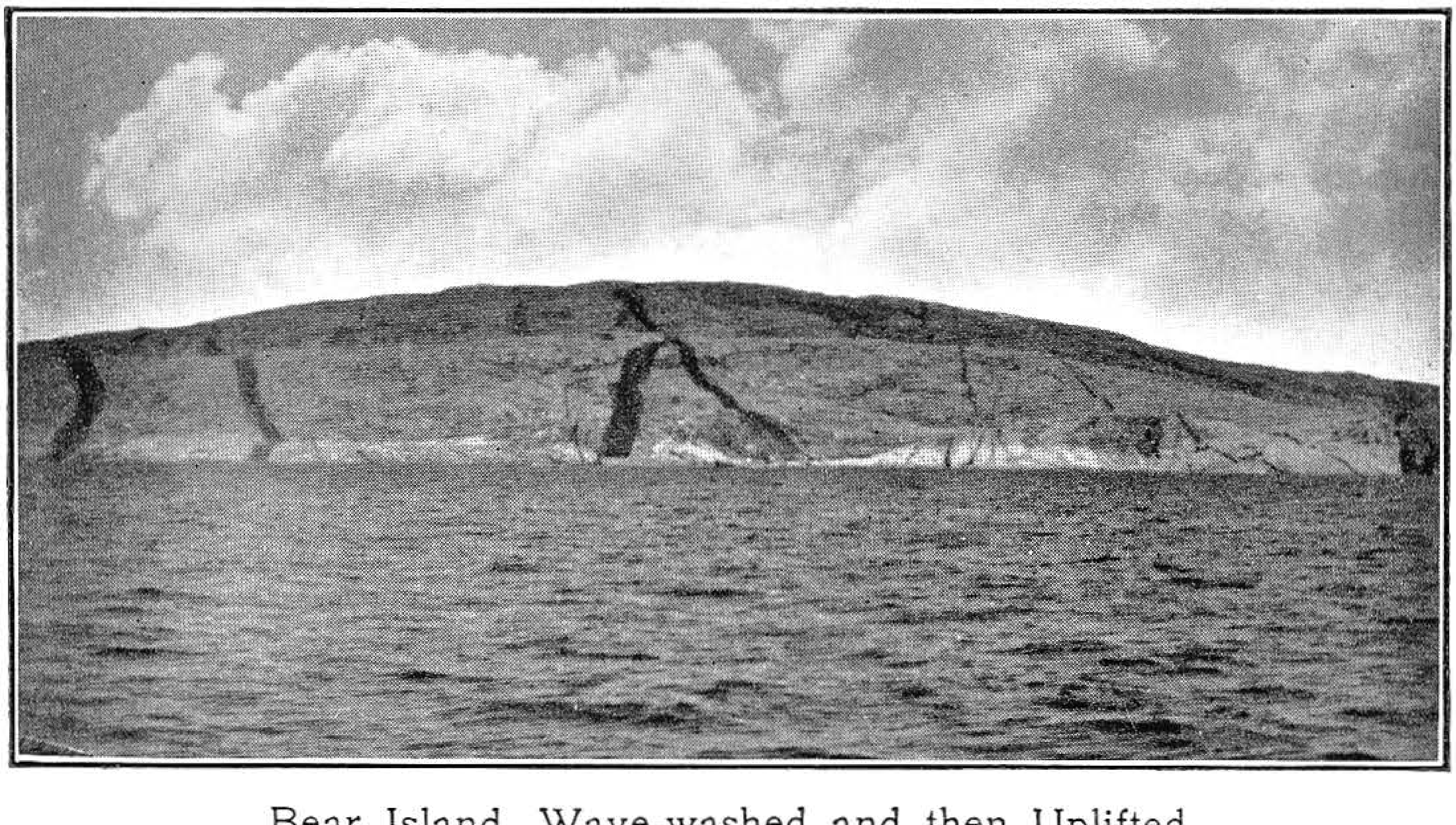
The most widespread evidence of the destruction wrought by the waves on the old shore-lines can be found at almost any landing-place between St. John's and Cape Chidley.

It has been said that the ice-cap left but little of its drift on the surface of the Labrador plateau. The same statement is true of the contemporaneous glacial action on Newfoundland. Yet in both lands enough "drifted" boulders were dropped on the smoothed and scoured bed-rock so that the whole floor of the glacier was pretty thickly peppered over with these products of ice-erosion. Nothing can be more evident on the low, bare, treeless hillsides facing the open Atlantic on Newfoundland or the Labrador than the absence of such boulders. Below the level of 500 feet above sea on the eastern shore of the island, and below the 250-foot contour on the Labrador, the vast majority of the boulders have been swept from the slopes where the ice dropped them. Only a few of the very largest, too ponderous to be moved even by the superb onslaught of the North Atlantic "seas," remain in or near their former positions. The rest are gone to the many boulder and gravel beaches left stranded, as it were, in the valleys of the emerging land, or at the present moment are being ground in the mill of the surf whither they have been dragged during the uplift. Hundreds of square miles of ice-worn hills of naked rock have been thus washed clean of glacial débris. Compare the two views of Bear Island.

With special intensity those cleared surfaces are feeling Nature's ceaseless attack. Exposed as they are to the open sky in a rigorous climate, the rocks of the wave-washed zone are being rent and shattered by the frost, which uses the rain-water of the present, has used the rains and the spray fling of former times, to split the rocks. Here and there the surface is clasped in the close embrace of many-hued lichens or covered by thicker growths of almost



Glacial Boulders on a Ridge near Ice Tickle Harbour



Bear Island, Wave-washed and then Uplifted equally hardy mosses, but, in the main, the ledges seem as bare of vegetation as if the sea had retreated from them only yesterday.

The bed-rocks of the Labrador are old-mountain rocks, toughened in the early days when they lay in the heart of the mountain-chain. They are giving pause to the greedy, unending assault of the ocean wave, which is finding on the present shore, as it found on the higher ones, that, while glacial boulders are playthings, the bed-rock offers work, — grim, arduous work that must continue many, many thousands of years before the stubborn headlands will yield to the onset. For this double reason, first, the shortness of the time during which the emergence took place, and, secondly, the sturdy resistance of the solid rock to wave-battering, the newly emerged land bears relatively few strong cliffs or other scenic forms cut by the waves in the living rock.

Nevertheless, where favourably situated weak bands occurred in the formations of the old shores, the waves infallibly sought them out and at many points excavated strange caves and long, deep chasms along such seams of softer material. To-day, hundreds of feet above the sea, there may be seen these trenches floored with the tough boulders with which the breakers used to cannonade the coast. As one explores the silent, dark recesses, they seem haunted by unnumbered ghosts of the seas that once tore through the narrow gates and roared destruction to the walls of the ever deepening chasms.

The finest of these great clefts in the hillsides are generally located on the dikes of trap-rock that transect the schists or granites of the Basement Complex. As a rule, the trap is more resistant to ordinary weathering and decay than the formation it cuts, but is less resistant than they to the more mechanical destruction of the sea-wave; thus a trap-ridge may be seen to terminate in a sea-chasm at the point where the rock has been under the mastering control of the pounding breakers. An easily visited example, one of relative antiquity as it lies close to the highest of the old shore-lines, is situated on a ridge a half mile northwest of Hopedale Mission House, at an elevation of 325 feet above the sea. This chasm, three hundred yards in length, faithfully follows the line of a trap-dike crossing the ridge. Another picturesque example is nearly as long, with an average width of twenty feet and vertical depth of seventy-five feet; it occurs on Long Island at American Tickle. Its excavation has been long under way, beginning when the land stood scores of feet lower than at present. The boiling waves still run nearly to the head of the chasm.

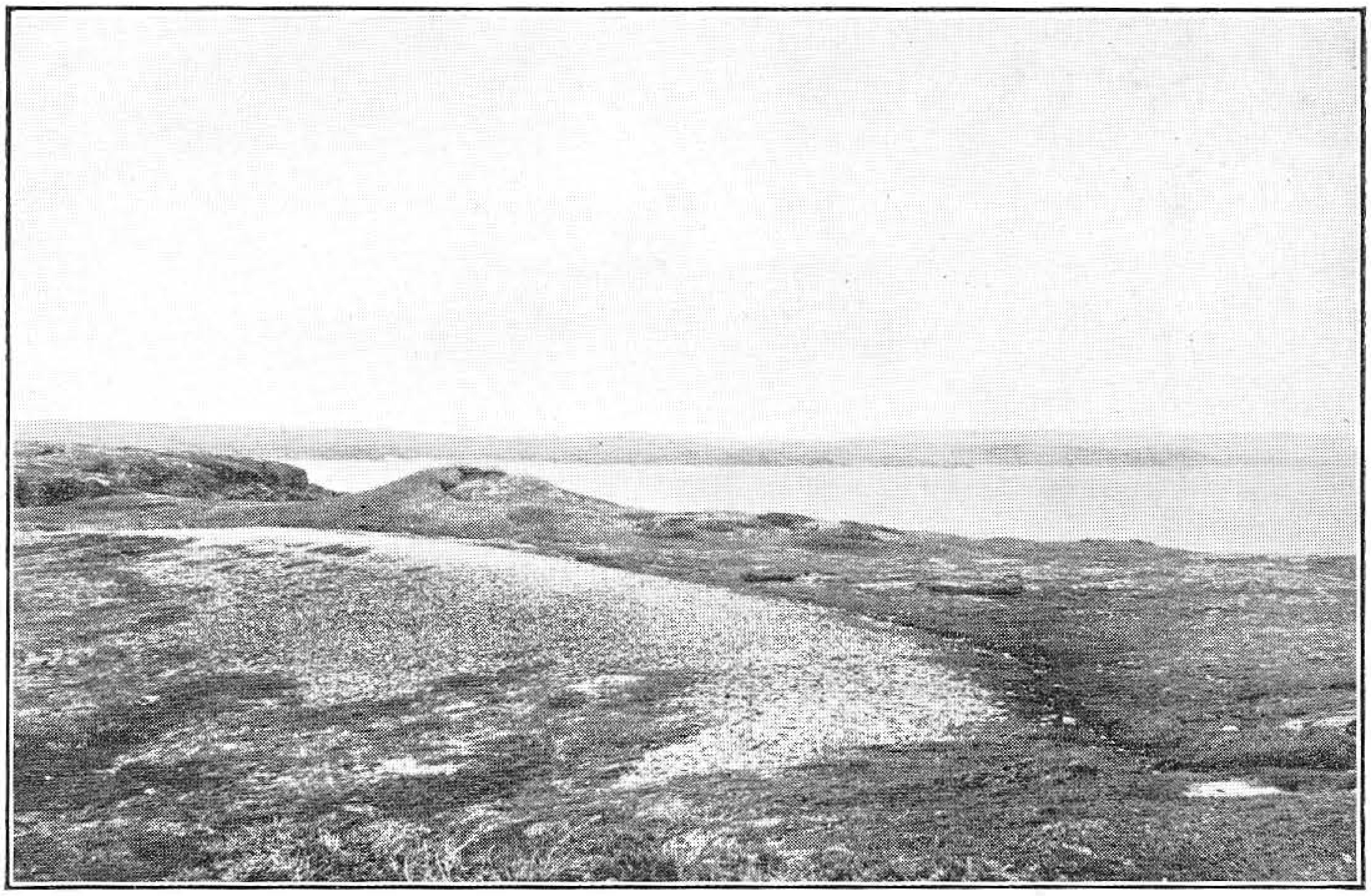
Before the writer lies a photograph which shows the base of a torn and ragged sea-cliff overlooking a fine beach about 200 feet above the present sea-level. The boulders of the beach represent the wave-worn, rounded débris of the cliff. In the background is the old, uneven sea-bottom, now covered with a slight vegetation and with moss-encircled lakelets filling glaciated rock-basins. The scene before the photographer was wild and desolate, yet cheered and made beautiful by the wonderful blues of sea and sky and the no less exquisite purples of the atmosphere. Without the colour, the views might have been depressing; with it, there was much attractiveness in this spectacle of a primitive world restored from the sea.

The fact of the massive crustal upheaval of the Labrador in recent times is still more forcibly emphasized by the thousands of boulder-beaches and other marine accumulations on the emerged land. The glacial drift and the angular fragments of rock torn from cliff and chasm were sorted, grouped, and graded by the waves many centuries ago, yet the resulting beaches very often look as if they had just been formed. Almost the only change that has affected their appearance since the last mad fling of the surf was dried upon them, is the growth of a thin and scattered coat of lichens upon the boulders. Next to a view of the reality no better proof of the remarkable preservation of the beaches or illustration of their perfect exposure can be had than the testimony of the camera. The photographs of the raised beaches are examples, and not exceptional ones at that, of the hundreds of beaches visited by the members of the *Brave* expedition in one season. Some of the most interesting exhibitions of beaches discovered at that time occur at Sloop Harbour (their elevations above sea being 115, 140, 160, and 215 feet), at Aillik Bay, Hopedale, Pomiadluk Point (here measured elevations of 55, 65, 230, 250, 315, 320, and 335 feet), and at Port Manvers.

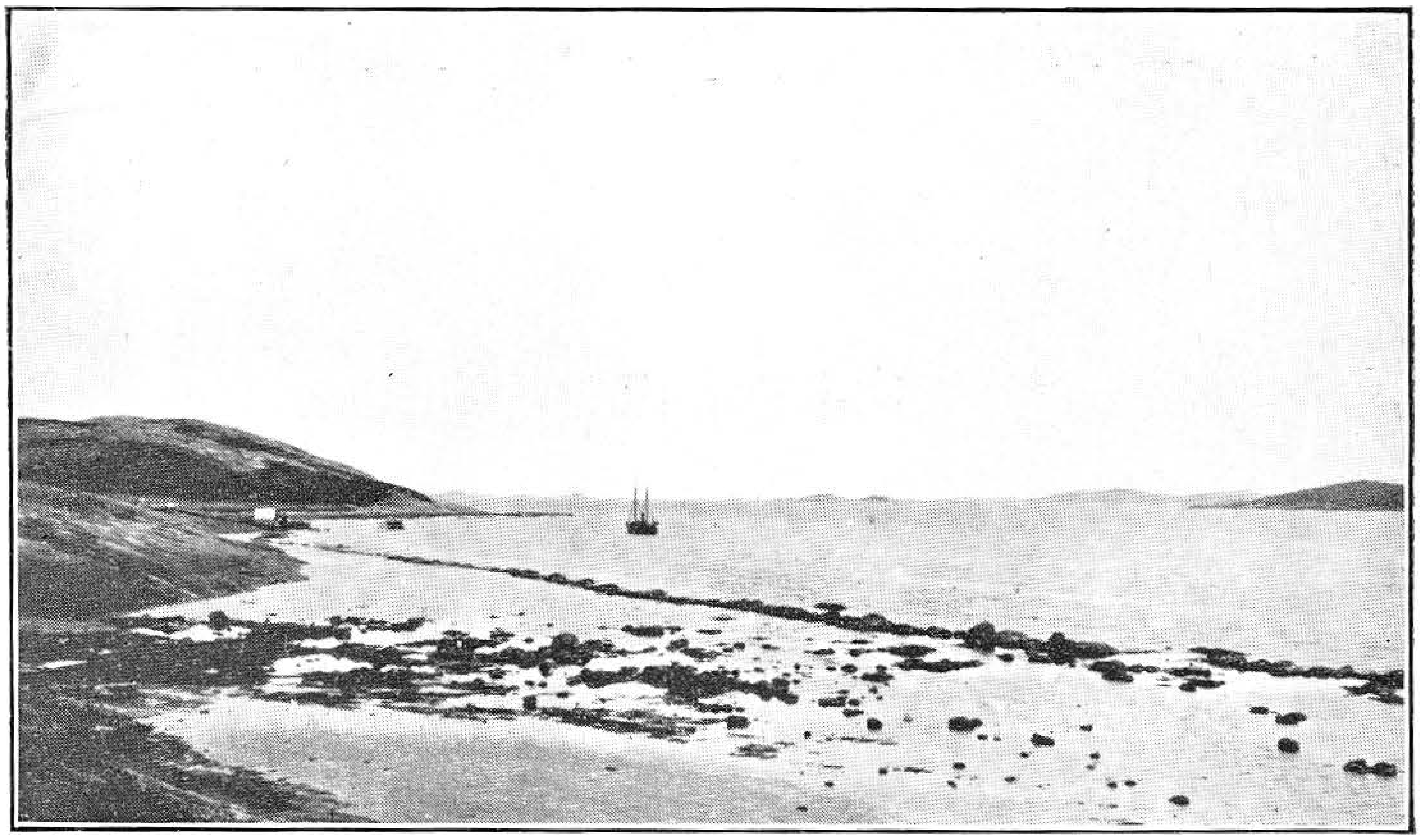
In some of the beaches Packard has found the shells and skeletons of the animals which thronged the sea as the beaches formed. He records the discovery of a whale's skeleton in marine clay fifty feet above the present high-water mark. The captain of the *Brave* reported, too, that he had found whalebones in a beach estimated to be one hundred feet above the same level. Packard states that these fossil remains are identical in character with the hard parts of species now living in the Arctic and North Atlantic.

Where the glacial deposits had been unusually thick, still bulkier accumulations of sand and gravel were built by the waves in sheltered places. In the lee of many an island between Ford Harbour and Nain is an elevated spit which tails off from the island in beautifully even slopes from a few hundred feet to more than a mile in length. Often such a spit forms a continuous bar from one island to another. Other plateau-like sand deposits, as at Port Manvers, tie large islands to the mainland, or, in a unique case, underlie a true coastal plain of large size, as north of Cape Porcupine. The loose sands and clay of this plain have given foothold to a relatively extensive growth of scrub timber which, elsewhere, on the well-washed hills, finds little encouragement. Indeed, there is generally not enough soil on the outer shore to permit of the cultivation of vegetables; at some of the small ports in eastern Newfoundland, soil for the purpose has actually been imported in the form of ballast from England. So scarce is either soil or loose material of any kind that a settlement on the Labrador has almost invariably had to seek a raised beach, often composed simply of large boulders, as the only available site for the graveyard.

As an accurate, scientific description of scenery is necessarily founded on geology, so geological principles have often been evolved or at least brought into clearer light by the impressionistic influence of landscape. The extraordinary proofs of the recent upheaval of the Labrador cannot but force upon the visitor to the coast the question as to whether the elevating process still continues. The answer seems to be in the affirmative. "The almost universal belief of the old settlers on these shores is that in no other way can the changes in depth at familiar localities be ex-



Raised Gravel Beach at West Bay, South Side of Entrance to Hamilton Inlet



Half-tide View of the Shore at Ford Harbour plained. With no theory to support or refute, many reputable observers among the fishing population state that they have time and again noted, during periods of from thirty to sixty years, cases where rock-ledges have come perceptibly nearer the sea-surface, where new channels have had to be sought among the shoals for the passage of their fishing-boats, and where the stages must be again and again lengthened over their bed-rock foundations in order to secure a depth of water sufficient to float their small craft. A gentleman of St. John's has made a study of the question for forty years, and has come to the conclusion that elevation is still in progress along the whole coast. He believes that the rate of uplift is about twice as rapid in northern Labrador as in Newfoundland. He has found among the older settlements of the island some where the inhabitants are in a very unfavourable position for plying their industry on account of the rim of just submerged rock-ledges that obstruct the harbours. He has asked the older men why they chose such locations for settlement. The reply was that they or their fathers had made these harbours when the conditions were very different from the present; namely, when the harbours were deeper. Such qualitative evidence, however great in amount, must yield in value to the testimony of even a few bench-marks carefully distributed along the coast." Here, again, a most welcome contribution to observational geology can be made by an expedition which, by so placing bench-marks, can give the geologists of the future a standard for the measurement of the rate of crustal movement. On quantitative observations, in geology no less than in all other physical sciences, hang all the law and the prophets.

The sea-coast phenomena apparently show that the epoch of emergence is not yet closed; with greater certainty they tell us of the extent of maximum submergence. With very close accuracy the highest, and presumably the oldest, of the shore-lines can be located along the prehistoric headlands and intervening bays. In the summer of 1900 the highest shore-line was approximately fixed at some thirty points on the 1100-mile journey from St. John's to Nachvak. Its position gives a sort of measure as to how much of the Labrador scenery was given final form and colour by the wash and wear and beach accumulation in the shifting zone of the breakers. The discovery of the maximum uplift has also a strong theoretical interest in adding to the observations that some day may suffice to solve the great problem of the cause of such broad upheavals of the earth's crust.

The principle by which the highest shore-line was determined is a simple one. It was only necessary to seek out at the various landing-places the seaward facing hill-slopes which must have suffered strong wave attack in case they had slowly emerged from the sea in post-Glacial time. These slopes, when high enough, always show at once a vigorous contrast between the washed and unwashed zones. Above the highest shore-line, the glacial boulders dotting the treeless hillsides still lie in practically their original positions. Below that line they have been swept away. The highest shore-line is, therefore, just below the boulder-limit, which, of course, has been driven by storm-waves a little higher than the high-water mark of the level sea. At this line the "fossil" beaches, cliffs, and chasms cease, and the smooth, boulder-dotted slopes begin.

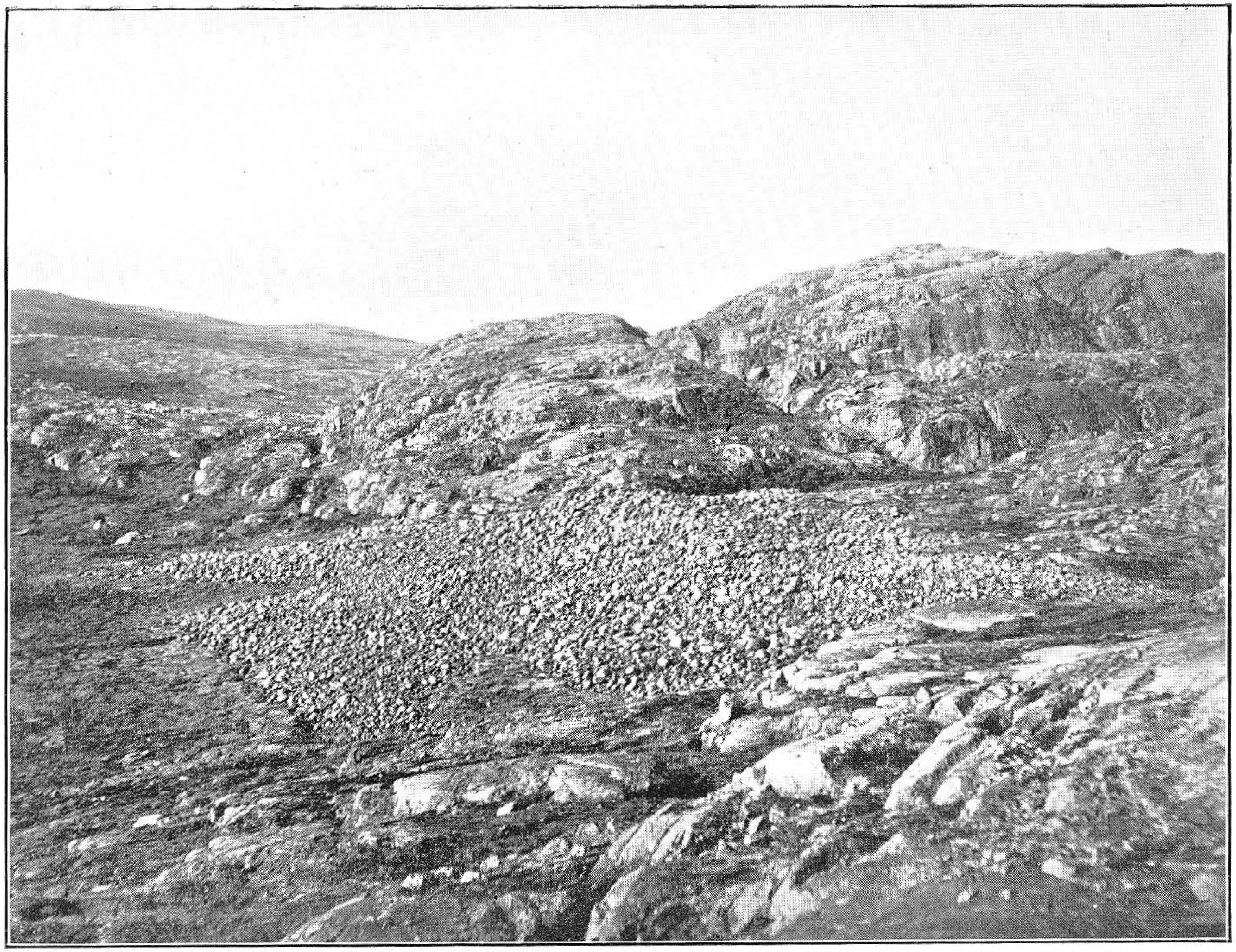
The map of Figure 17 gives a synopsis of the observations so far made on the present altitudes of the highest shore-line. The figures represent the number of feet through which the coastal belt at individual points has risen since the Ice Period. The illustration indicates "that the uplift on the Labrador has been greatest near Hopedale. Hamilton Inlet owes in part its depth, and indeed its very existence as an inlet (it is but 10 fathoms deep at the Narrows), to the fact that the part of the plateau in which it lies has not been elevated as much as the land to north and to south. The line rapidly rises as it crosses the Strait of Belle Isle, and seems to be about 500 feet in height along the whole eastern shore of Newfoundland."

It is further clear that the uplift is a real and independent upward movement of the land and not a mere withdrawal of the sea-water, lowered, it may be, in the filling of distant troughs or basins formed by the recent subsidence of other parts of the ocean-floor. On the contrary, the evidence is unmistakable that "there has been unequal positive uplift of the earth's crust. The force responsible for this great piece of work has been applied locally and in varying degree. The result is that to-day the actual distance from the centre of the earth of every point on the highest shore-line is greater than it was at the close of the Glacial Period."

Why has the earth's crust been thus hoisted? Some geologists believe that the crust is elastic and sensitive, even to the load of an ice-cap, and that the upheaval of the Labrador is due to the lightening of the load on the crust when the massive glacier disappeared. It is certainly true that the recent uplift of the northern half of the continent has been most pronounced where the ice-load was presumably heaviest. The crust underlying northwestern Europe has behaved in a similarly suggestive way since the melting away of the thick Scandinavian ice-cap. The theory of crustal sensitiveness is strengthened by this repeated occurrence of the phenomenon, but as yet other explanations cannot be excluded. The final unravelling of the mystery will be of prime importance in geological investigations as to the raising of mountain-chains and the increase of the continents.

We cross the Strait of Belle Isle once more, homeward bound. Large questions are left to us. From Archean time as from the latest grand event in Labrador's history, they rise to claim the attention of future generations of Nature's students. That attention they will surely have, for the coast shares with other wild lands one greater value "than the best arable we have." Old Jacques Cartier, searching for an Eldorado, found Labrador, and in disgust called it "the land of Cain." A century and a half afterward Lieutenant Roger Curtis wrote of it as "a country formed of frightful mountains, and unfruitful vallies, a prodigious heap of barren rock"; and George Cartwright, in his gossipy journal, summed up his impressions after five and twenty years on the coast. He said: "God created that country last of all, and threw together there the refuse of his materials as of no use to mankind."

In our own day the artist and scientific explorer give us wiser counsels. We have at last learned the vital fact that Nature has set apart her own picture-galleries where men may resort if for a time they would forget human contrivances. It is good for man to be alone, good for him to



Raised Beach, overlooking Emily Harbour, Sloop Island leave his fellows, very good to forget how to make or spend money. That man is unhuman who thinks of his income or his outgo above the snow-line or in the depths of a Colorado canyon. It is as if the pageant of earth's history has left to the waste places some of its choicest settings. The great playgrounds of the world, — the high Alps, the Yosemite, the Selkirks, a Saguenay, — they are in large part desert, most providentially useless. And such a wilderness is Labrador, a kind of mental and moral sanitarium. The keen air of its midsummer is no more bracing to the nerves and sinews of the body than its quiet beauty and savage grandeur are stimulating to the powers of thought and appreciation. The beautiful is but the visible splendour of the true. The enjoyment of a visit to the coast may consist not alone in the impressions of the scenery; there may be added the deeper pleasure of reading out the history of the noble landscapes, the sculptured monuments of elemental strife and of revolutions in distant ages.

CHAPTER V

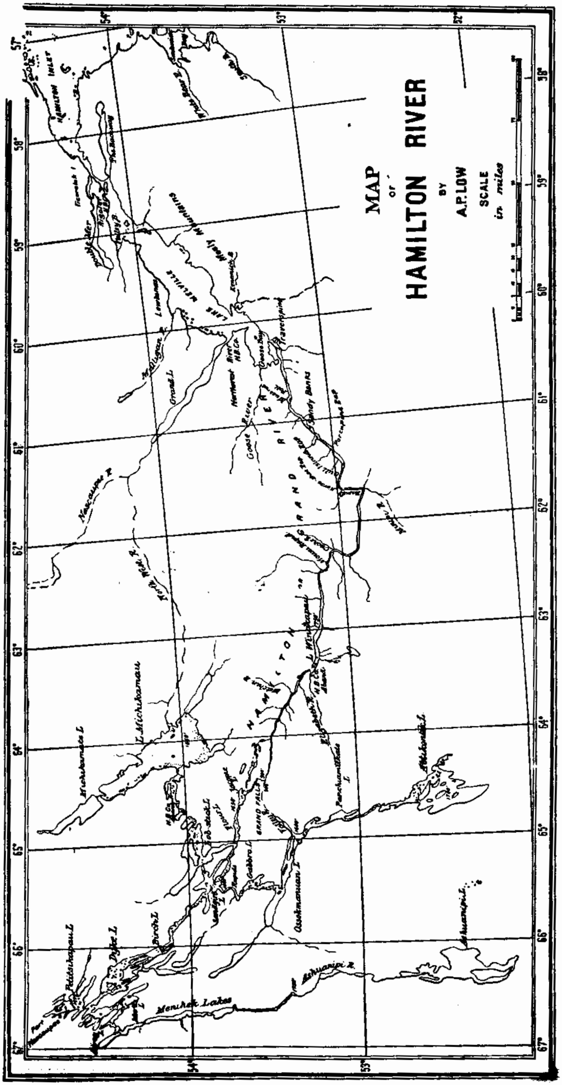
THE HAMILTON RIVER AND THE GRAND FALLS

BY A. P. LOW

HAMILTON INLET is the largest of the many long fiords which indent the Atlantic coast. Like the others, it is very deep, and is surrounded by high hills, often rising a thousand feet sheer from the water, while its surface is frequently broken by large, bold, rocky islands. The lower slope and islands are wooded with dark spruce mingled with the lighter-coloured birch and aspen, forming a pleasing contrast with the bare rocks of the summits. The distance, from the hospital station of Indian Harbour at its mouth, in a southwest direction to the head of the inlet, is slightly over one hundred and fifty miles, while its average breadth is fourteen miles. Forty-five miles above the entrance, the inlet narrows and is only about a mile wide for upwards of five miles. During each change of tide a strong current with rapids occurs at this point.

Rigolet, the headquarters of the Hudson's Bay Company for the Atlantic coast, is situated on the north side of the lower part of the narrows.

A village of Eskimo, made up of a cluster of small log houses, occupies the shore of a small cove at the upper end; its chief interest lies in the fact that it is the most southerly community of these people. The inhabitants have been long in contact with the white men, and have acquired many of the virtues and vices of civilization.


MAP
OF
HAMILTON RIVER
BY
A.P. LOW
SCALE
in miles

The inlet gradually widens above the narrows into Lake Melville, which is fifteen miles across in its widest part. The eastern third is full of wild, rocky islands. The Mealy Mountains rise directly from its southern shores. The northern side is also high, but there is often a wide margin of low land between the water and the rocky wall of the fiord. Northwest River enters on the north side, about eighty miles beyond the narrows. The stream is only about one hundred yards wide at its mouth, but averages fifteen feet in depth. Half a mile upstream it expands into a small lake, which, three miles farther up, again contracts for four hundred yards to form the outlet of Grand Lake, a large body of fresh water extending westward some forty miles, in a deep valley between high, rocky walls.

A Hudson's Bay post is situated at the mouth of Northwest River. It consists of some half a dozen small log buildings. Early in the last century this was an important place, the residence of the chief factor in charge of Labrador. It then had a large farm attached, where oats and vegetables were easily grown. Its importance was greatly diminished by the abandonment of the inland posts in the seventies, and later the Indians trading there were induced by missionaries to take the proceeds of their winter's hunt to the posts on the north side of the St. Lawrence, so that at present the trade of the post is exclusively with the whites living about the inlet. Here also is a fur-trading station of Revillon Frères of Paris.

Almost opposite the mouth of the Northwest River on the south side of Lake Melville is Carter's Basin, a small bay into which empty the Kenamou and Kenamich rivers.

The former is much the larger, and drains an extensive area of the highlands to the southwest. It is very rapid and practically unnavigable. Above Northwest River the inlet has been silted up by sand brought down and deposited there by the Hamilton River, which flows into the head of the inlet. A long, narrow point stretching out from the north shore just above the Northwest River divides the shallows from the deeper portion of the inlet; the upper part is called Goose Bay, and extends twenty miles to its head, which receives a small river, famous for the large brook trout taken about its mouth in the autumn months.

There is here a large lumber mill belonging to the Grand River Lumber Company. Their "loggers" penetrate far into the country along the river valley. Besides their buildings, small log houses are scattered along the shores of the inlet, wherever the ground is sufficiently level for a small garden; these are the winter houses of the white people who reside permanently on the Atlantic coast. They are called "planters" or "livyeres," to distinguish them from the summer fishing population from Newfoundland. The planters are largely descendants of settlers brought out from England for the salmon-fisheries. Some of their ancestors were among the original settlers who came to Sandwich Bay with Cartwright in 1770; others are descended from servants of the Hudson's Bay Company. They are all poor and hopelessly in debt, either to the Hudson's Bay Company or to Newfoundland fishing firms, so that these people have little hope or ambition to better their condition. Their life is fairly happy and close to nature. The sea supplies fish freely; their gardens, potatoes. From the proceeds of their summer's cod-fishery and winter's fur hunt, they obtain food and clothing, together with a few "luxuries." Early in the summer they leave their houses on the inlet for the outer coast, where they engage in the cod-fishing, usually with nets and gear provided by some Newfoundland fishing firm. As a rule, the amount of fish caught does not pay for the advances of provisions and clothing at the prices charged by the merchants, so they get deeper and deeper in debt year by year. At the close of the cod-fishery they return to their houses on the inlet, stopping on the way at the Hudson's Bay posts, where they receive other advances of provisions and clothing to be charged against their coming winter's hunt. Arriving home, they dig their potatoes and catch and freeze trout, which swarm in the mouths of all the streams at this season. As soon as sufficient snow falls, they set their traps for marten, fox, otter, lynx, and other fur-bearing animals. Each hunter has a "path" or line of traps fifty miles or more in length. A single winter visit to all the traps on the line may involve a week's journey. Small "shacks" or shelters, where the hunters may pass the night, are built at convenient distances along the path.

With the advent of spring, the skins get out of condition, and the fur path is abandoned for the seal hunt. These animals are killed by shooting them on the ice, where they come up through cracks and holes to bask in the sun. Later, when the ice leaves, they are caught in heavy nets. By the time the seal hunt is over, the garden dug, and potatoes planted, it is time to go to the outer coast for the cod-fishery.

This is the yearly round of the planter. It applies all along the Labrador, except that nowhere else can vegetables be grown, owing to the settlements being nearer to the Arctic current on the outside coast. Although it may not appeal to many, it is a much better and freer life than is the lot of the poor in civilization, with its monotonous daily grind for a mere subsistence.

As regards the chances of sport about Hamilton Inlet, the summer season is unfavourable, there as well as elsewhere. The big game consists of barren-ground and woodland caribou, black bear, and seals. Caribou are found in small bands on the Mealy Mountains immediately south of Lake Melville, while in the winter large bands of barren-ground caribou come out on the coast to the northward, and have been killed in great numbers within a few miles of the inlet. Bears are found on the burnt areas, where they feed on blueberries in the late summer. The seals, especially the harbour seal, are common in the waters of the inlet, and often afford good sport with the rifle.

Wild fowl and geese are very abundant in the spring and fall, and are killed in great numbers below Rigolet. The curlew, which formerly passed in great flocks on their migration southward, are now nearly extinct; the Canada grouse, or spruce partridge, is abundant about the head of the inlet, and the ruffed grouse is also common. During the winter, great numbers of willow ptarmigan migrate southward and feed in flocks on the willow buds in the valleys.

Hamilton Inlet was once famous for its salmon-fishery, but the use of numerous cod-traps along the coast has practically exterminated the salmon, as far as concerns rod-fishing in the rivers. I have visited the inlet in October, and can vouch for the excellence of the trout-fishing from that time until the ice becomes so thick that it is impossible to cut holes through it. Dr. Grenfell reports that the trout bite freely all summer. The fish appear to be sea-run, although their sojourn in salt water is probably short, for they do not lose their markings as do the trout of the St. Lawrence. Large fish, up to six and seven pounds in weight, are caught in the lower stretches and at the mouths of all the streams flowing into Melville Lake, and take the fly freely until the waters freeze over. My knowledge of the Hamilton River from its mouth to the Grand Falls is confined to the conditions prevailing in late winter and early spring. We left Northwest River early in March and reached the falls on the 1st of May. The great length of time taken on the trip was due to our small party having to draw on sledges the outfit, tents, canoes, and provisions sufficient for the following summer's work in the interior. This amounted to four loads of two hundred pounds for each member, and a consequent sevenfold lengthening of the original distance of two hundred and fifty miles.

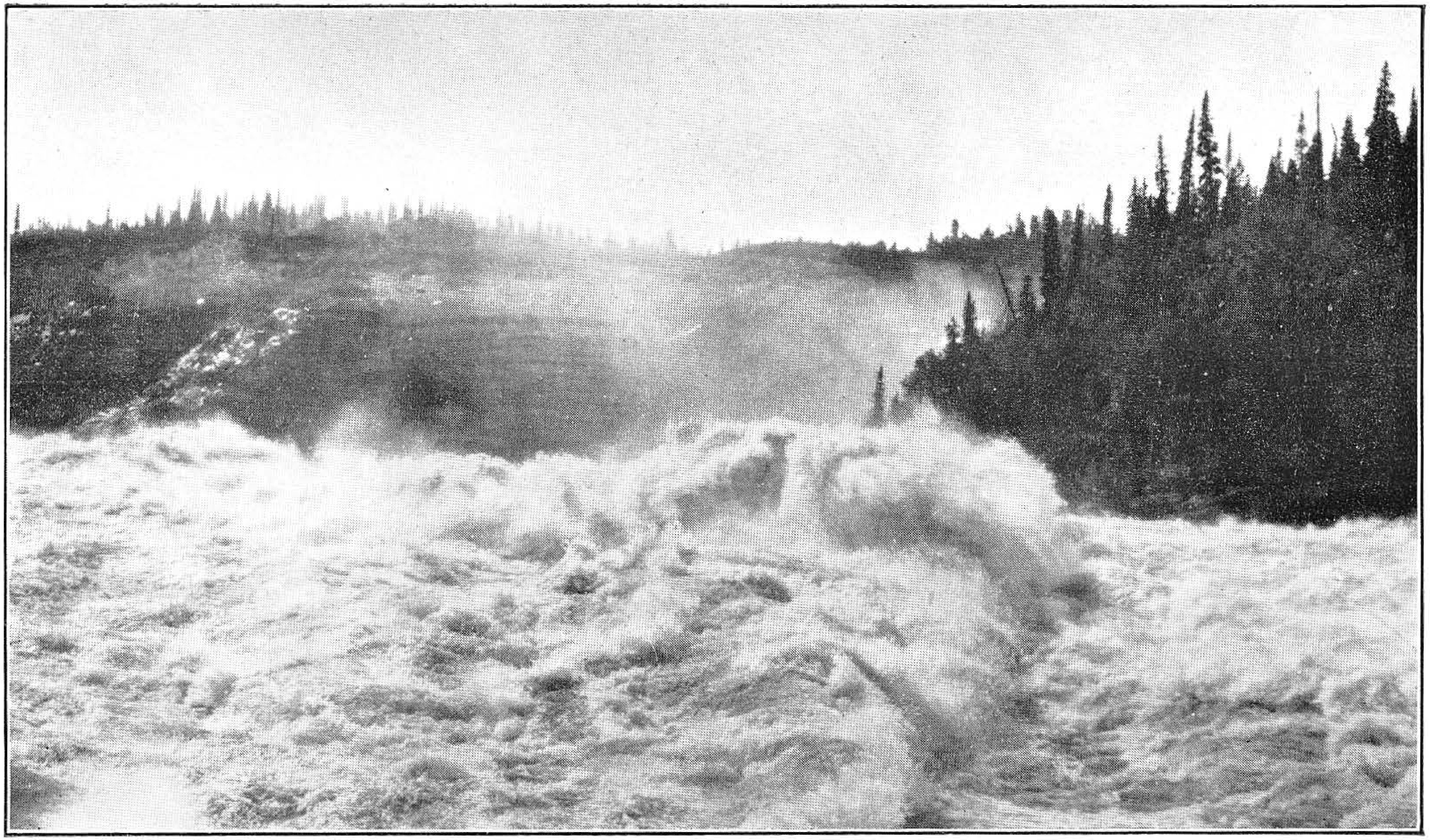
The Hamilton River is the most important stream of the eastern watershed of the peninsula. It is upwards of five hundred miles in length, and extends westward halfway to Hudson Bay. To the north and west its tributaries interlock with those of the Northwest River and with the head waters of the George and Koksoak rivers, both of which flow north into Ungava Bay, while to the south the Hamilton is separated by a low, sinuous watershed from the rivers flowing southward into the Gulf of St. Lawrence.

At the Grand Falls, some two hundred and fifty miles above its mouth, the river is naturally divided into two parts which are quite dissimilar in physical character. The lower part occupies a deep, ancient valley, cut down into the hard, crystalline rocks of the plateau, so that the present level of the river is from five hundred to one thousand feet below the general level of the surrounding country. This deep valley varies in width from one hundred yards to more than two miles between the rocky walls. The river flows with a strong current often broken by rapids, especially along the upper stretches. Only in one place has it a direct fall over a rock obstruction, and that is at the Muskrat Falls, twenty-seven miles above its mouth, where a dam of glacial drift has diverted the stream from its ancient course and has caused it to find a new channel on the south side of a rocky knoll where the river falls seventy feet over ledges in a distance of four hundred yards.

The greater part of the valley below the Grand Falls has been burnt over by frequent fires, which have destroyed much of the original forest of spruce, its place being taken by small second-growth aspen, white birch, and spruce. Where the original forest remains, the trees are fair-sized and of commercial value, in marked contrast to the stunted spruce found partly covering the rolling surface of the plateau above the valley on both sides. The river varies in width, and usually only partly fills the bottom of the valley, being confined between banks of sand or glacial drift forming the soil of the bottom. A reference to the accompanying map shows that the river valley as far as the junction of Minipi River, eighty miles upstream, conforms in its southwesterly direction with that of Hamilton Inlet (Lake Melville). The general direction then changes to west-northwest, and so continues to the Grand Falls. A more detailed account of the various courses and characteristics of the valley than can be given here may be found in my report, and might be consulted by any intending visitor to the falls.[1]

The river flows into the head of Lake Melville on the south side of Goose Bay, and is separated from it by a long, low, sandy point. The mouth of the river is obstructed by wide shoals with numerous narrow channels between them. These continue for about ten miles, where the stream is about a mile wide and gradually narrows to Muskrat Falls. Above the falls there is a steady current for fourteen miles to the foot of Porcupine Rapids, which are nearly three miles long. Good tracking along the banks with deep water makes the ascent easy. An expansion called Gull Island Lake extends six miles from the head of Porcupine Rapids to the foot of the next rapids. In the next twenty miles, to the mouth of the Minipi, the valley gradually narrows, leaving very little bottom-land between the river and its rocky walls. This portion of the river is very rough and almost a continuous rapid. Ascending the stream, Gull Rapids extend for nearly five miles above the lake, with shallow water and great boulders obstructing the channel. The second, or Horseshoe Rapid, is at the sharp bend to the southward; it also is shallow and filled with boulders. The river now contracts to about one hundred yards in width, and deepens, so that although the current is swift, the surface is broken only for a short distance below the junction of the Minipi, where a short portage may be necessary to pass the head of the rapid.

[1] Report on Labrador Peninsula, A. P. Low, *Ann. Rep. Geol. Survey of Canada*, Vol. VIII, Part L, 1895.



Rapids in the Hamilton River

Above the Minipi the valley soon widens, and varies from one to two miles across the bottom. The rocky walls rise from seven hundred feet to nine hundred feet above the water, while the glacial drift in the valley has been cut by the river into terraces, which are seen flanking the walls at heights ranging from twenty feet to two hundred and fifty feet. The navigation is good for the next forty miles, the even current of the river being broken only by a few short rapids not difficult to ascend. A number of very beautiful stretches are seen along this portion, where the channel is divided by islands covered with thick green forest, giving contrast with the bare rocky walls down which a number of small tributaries tumble in feathery cascades. The valley again contracts, and for eighteen miles, to its outlet from Winokapau Lake, the current is swift, and the river broken by a number of rapids, making the ascent difficult, but probably entailing portages only at a few short pitches.

The entrance to the lake is impressive; the walls of the valley are less than a quarter of a mile apart, and tower in sheer cliffs for a thousand feet above the stream. The change from the foaming rapids of the outlet to the quiet surface of the lake is especially pleasing to the somewhat wearied traveller.

Winokapau Lake is thirty miles long and varies from one mile to two miles and a half in width; its waters fill the valley from wall to wall. The lake is remarkably deep, isolated soundings giving over four hundred feet; only a few soundings were made during our passage, as the ice was then four feet nine inches thick, and two hours of hard work were required to put a hole through it. The upper end of the lake is shallow, being filled with sand brought down by the river. The Hudson's Bay post was situated on a sandy plain near the inlet; it was abandoned in 1873, and subsequently destroyed by fire. The old journals of this post show that the first snow fell about September 20th and remained until the following June. The lowest temperature recorded was $-55°$ F. Geese, ducks, and summer birds arrived about the 10th of May and were killed in large numbers in the open water at the head of the lake. In the autumn and winter, ptarmigan were very abundant, while caribou and bears were frequently killed in the valley and on the surrounding plateau. The spring catch of fish was always notable, white fish and trout being taken in large numbers in nets set about the post. In the summer, all the inhabitants used to go in canoes with the winter's fur to the post at Northwest River. Before leaving the place, potatoes and turnips were planted and left to the care of Nature until the return of the traders in September; it is not surprising that the comments on the crops were unfavourable.

The river is easily navigable from the head of Winokapau Lake to the Grand Falls portage, situated on the north side of the river some forty-five miles upstream, at the foot of a continuous rapid, which extends several miles to the mouth of Bowdoin Canyon.

In order to pass the Grand Falls, and reach the upper part of the river, the valley must be left at the foot of the rapids, where a portage, up the bed of a small tributary, rises abruptly seven hundred feet and then, by gradual ascent for two miles, leads to a small lake on the level of the plateau. The route then leads through fourteen small lakes connected by as many portages, and ends in an expansion of the river immediately above the rapids leading to the falls. This route is over twenty miles in length, and more than one-fourth is on portages. To obtain a view of the falls, the river must be crossed at the end of the portages and the far bank descended past the rapids, where an excellent view may be obtained, from the top of the wall enclosing the circular basin, into which the river falls. A descent may here be made into the canyon, with less difficulty and risk than are incurred in descents from the near bank. Our party, from what I can learn, was the only one to view the falls from that side. It must have been a great disappointment to the others, after their long trip, to have seen the falls only from the east side, where no adequate view can be obtained. This warning is intended especially for the visitor who might decide, owing to the difficulty of the portages, to leave his canoes at the lower end of the portages and tramp overland to the falls.

The distance, between the lake expansion at the upper end of the portage route and the mouth of Bowdoin Canyon, is eight miles in a straight line running south-southeast. The river at the upper end of this line has an elevation of sixteen hundred and sixty feet above sea-level, a little below the general level of the surrounding country. Where it issues from the canyon into the main valley, it is nine hundred feet above the sea; there is thus a drop of seven hundred and sixty feet in a distance, by the river, of less than twelve miles. Considering the volume of the stream, estimated at fifty thousand cubic feet per second, this is a phenomenal descent. If the energy developed by the fall could be turned into work, it would produce the enormous amount of upwards of four million three hundred thousand horse-power. Neglecting the rapids above and below the falls and confining the calculation to the power of the falls itself, we find that it would develop energy equal to one million seven hundred thousand horse-power, an amount sufficient to operate a large proportion of all the manufactories and railways of Canada.

For a mile downstream from its lakelike expansion, the river is dotted with small, rocky islands, covered with small evergreens. The great stream is thereby broken into a number of narrow channels with swift current. The river then narrows to less than four hundred yards, and for a mile passes over a number of rocky ledges between low, wooded banks, falling fifty feet in a succession of rapids. It again widens to nearly a mile, and flows swiftly between small islands for two miles; then, turning southeast, it contracts to less than half its previous width and rushes along with heavy rapids in a shallow channel obstructed by huge boulders. In this manner the river continues for two miles, gradually narrowing as it descends. The banks and bottom are solid rock, and the stream in the next mile has cut a narrow and gradually deepening trough, so that, at the lower end of the course, it dashes through a gorge about fifty yards wide with steep walls, one hundred and ten feet below the level of its upper end. In the last three hundred yards the grade is very steep, where the confined waters rush along in a swirling mass, thrown into enormous, long, surging waves, at least twenty feet high, the deafening noise of which completely drowns the heavy boom of the great falls immediately below. With a final great surge the pent-up water is shot down a steep incline for a hundred feet, where it breaks into a silvery mass and plunges into a circular basin two hundred feet below. The momentum acquired during the descent of the slope is sufficient to carry the mass of water far out from the perpendicular rocky wall, leaving at the bottom an almost free passage between the foot of the cliff and the falling water. Owing to the dense column of spray which rises continuously from the basin to a height of nearly a thousand feet, it is impossible to obtain a clear photograph of the cascade.

The trees on the slopes about the falls are largely white spruce upwards of seventy feet in height, while the icicles fringing the foot of the ice-covered walls (on the first of May) were more than fifty feet in length. Owing to the refraction of the ice which flashed the sunlight into all the colours of the spectrum, the spectacle was most gorgeous. The total height of the falls, from the crest of the incline to the basin, is three hundred and two feet; in shape it resembles on a gigantic scale a stream flowing through a V-shaped trough and issuing freely from its lower end. The basin at the bottom is nearly circular, with a diameter of two hundred yards. The rocky walls surrounding it rise perpendicularly five hundred feet, except at a narrow cut at right angles to the falls where the waters pass out into Bowdoin Canyon. The surface of the basin is continuously agitated by the rush of waters and huge, lumpy waves leap high upon its rocky walls. The stunning noise of the fall and the wonderful display of energy are so awe-inspiring that there is a feeling of dread in approaching the brink, and the Indians cannot be induced to visit the neighbourhood.

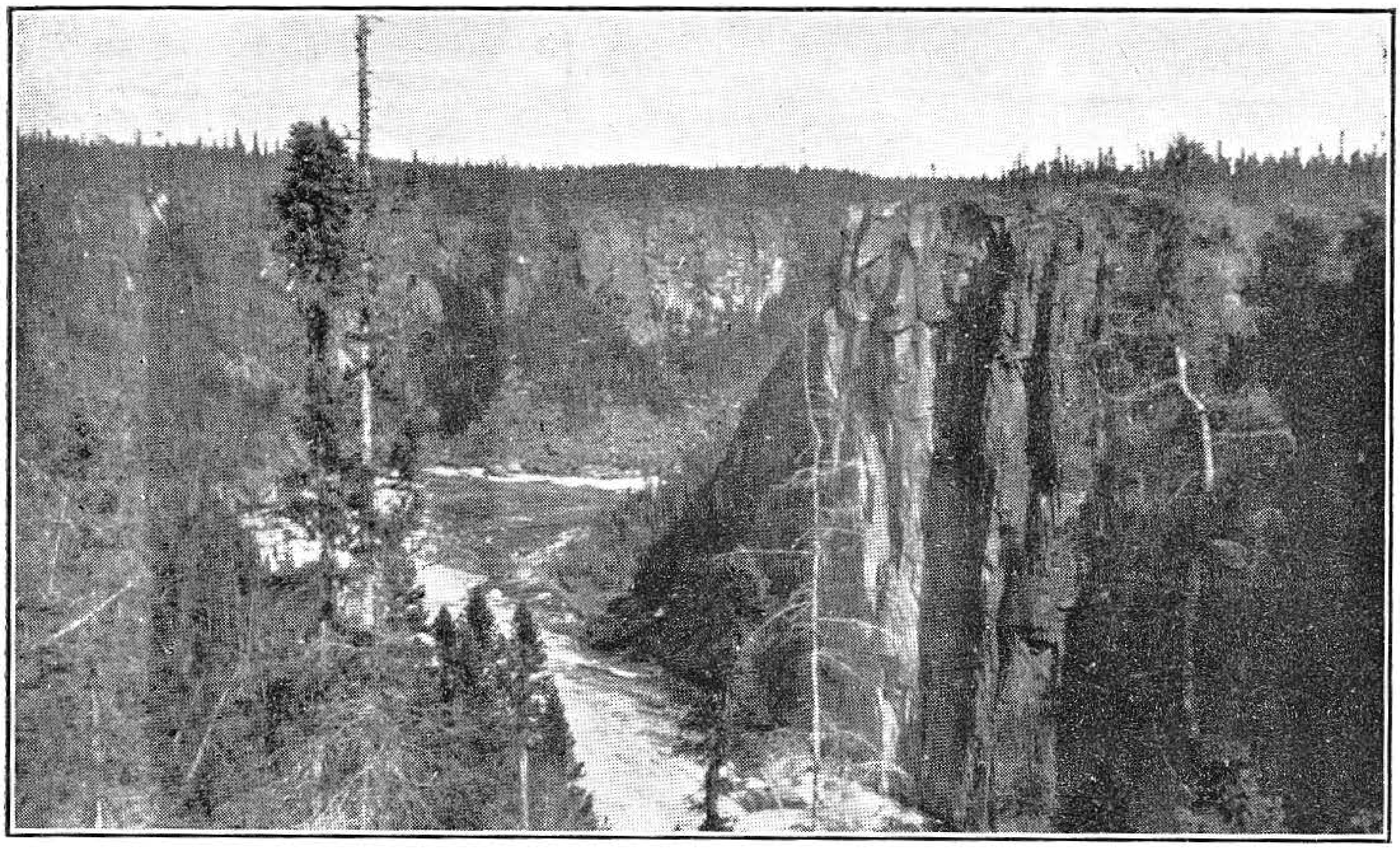
Bowdoin Canyon was so named by Cary and Cole, who discovered it in 1891. Issuing from the basin at the foot of the great cascade, the river zigzags in half-mile courses to the east and southwest until it finally issues into the main valley. The distance from the falls to the mouth of the canyon is eight miles in a straight line, but by the river it is more than twice that distance. The canyon is cut sharply and nearly perpendicularly out of the granites and other crystalline rocks to a depth of over five hundred feet below the general surface of the plateau. The zigzag courses of the gorge conform with the directions of two sets of jointage planes, which split the granites into huge blocks in the area below the falls. The cracks appear to influence the direction of the river courses, and to have greatly assisted the water in clearing out the gorge. The canyon is probably a new valley excavated by the river since the Glacial Period. The ancient river which, in pre-Glacial time, flowed down the main valley seems to have been diverted by dams of glacial drift and perhaps by local changes of level, so that it now flows on the surface of the plateau to the north of the old valley. On reëntering the old valley with such a tremendous fall, the river has cut out the canyon in a comparatively short period of time. The break in the surface of the plateau is so sharp that an approach to within a few yards of the edge may be made without any indication of its presence, the first warning being the hoarse roar of the rapids far below. Across its top the gorge rarely exceeds a hundred yards; at the bottom the river is confined to a width of a hundred feet. The difference in level between the water in the basin and that issuing into the main valley is two hundred and sixty feet, and this descent is in a continuous rapid by the pent-up stream.

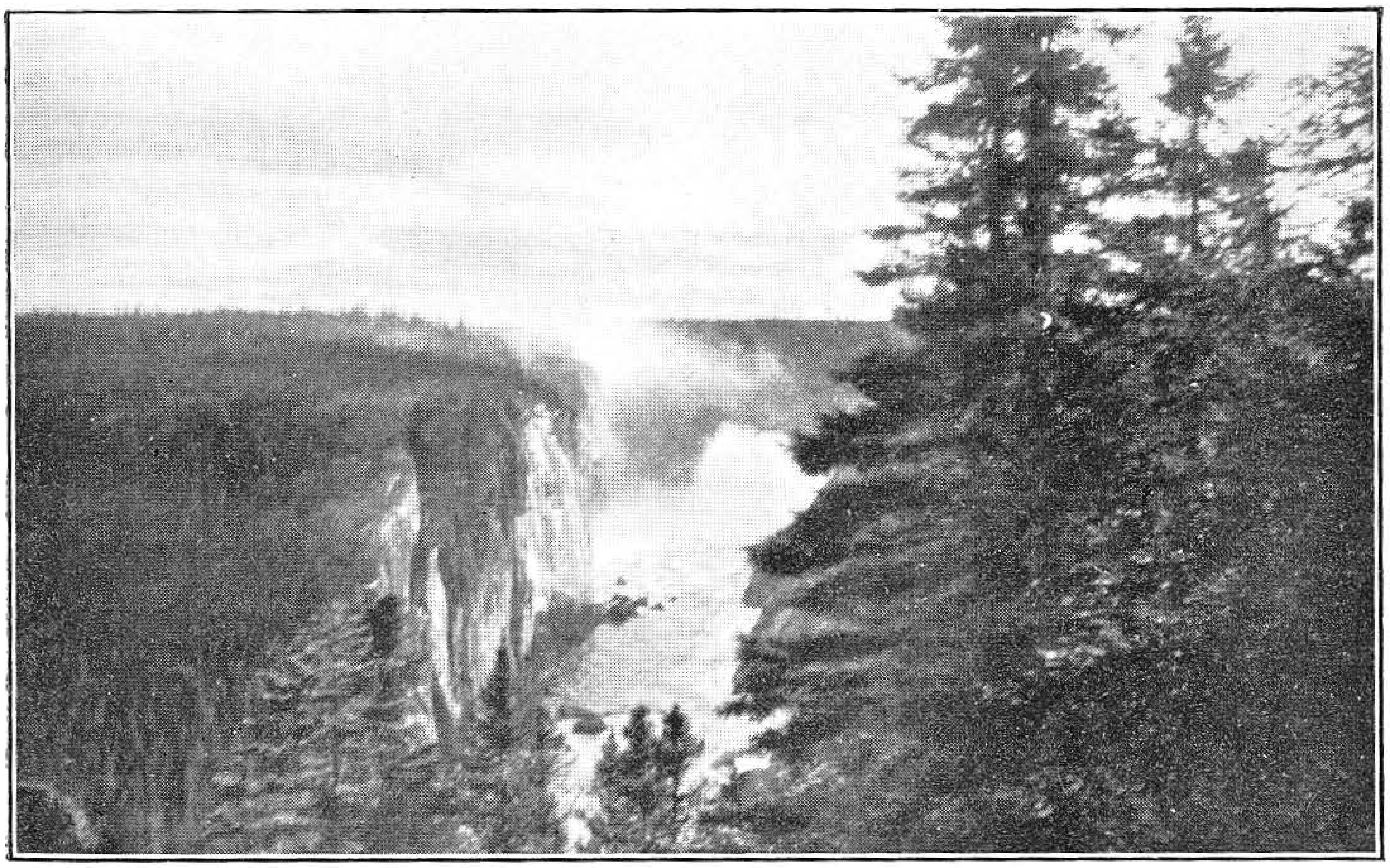
Above the Grand Falls the character of the river changes completely; it now flows nearly on a level with the surface of the plateau, spreading out to fill the valleys between the long, low ridges, arranged *en échelon* over the country. The river in passing around the ridges is often broken into several channels by large islands; in other places where the valleys are wide, it spreads out into long, irregular lakes studded with islands. The current, instead of flowing regularly, alternates between short rapids and long lake stretches. The banks are usually low, and covered with a dense growth of willows, which form a wide fringe between the water and the spruce trees covering the higher ground behind. The general direction of the river is west-north-west from the Grand Falls to Petitsikapau Lake, more than a hundred miles above. Throughout this distance its course is nearly parallel to the direction of the glacial striæ and to that of the ridges of glacial drift. All these features give an aspect of newness to the upper part of the river, and indicate that its present course and condition have been determined by the post-Glacial configuration of the plateau.

The first expansion above the portage is called Jacopie Lake. It is seven miles long by about two miles wide, and is surrounded by low, rocky hills partly burnt over. A stretch of eight miles of swiftly flowing river connects with the island-dotted Flour Lake, which is ten miles long with deep bays leading off on both sides. At its head the river enters by two nearly equal channels, which unite again in Sandgirt Lake, some fifteen miles above. The north channel leads through Lobstick Lake, where a long bay passes northward and connects the spring at high water with Lake Michikamau on the head waters of the Northwest River. The south channel is the ordinary canoe route between Flour and Sandgirt lakes.

Sandgirt Lake is an irregular, shallow body of water, with many islands of drift. It is twelve miles long from the southern outlet to the mouth of the Ashuanipi branch. Owing to the number of canoe routes which centre here, the lake is an important gathering place for the Indians of the interior. The Hamilton River divides into two branches, the larger, or Ashuanipi, flowing from the northwest and the Attikonak from the south. The principal route from Hamilton River to Michikamau Lake and northward also ends here. The Indians who pass the winter hunting in this region congregate at Sandgirt Lake shortly after the ice leaves the river, and thence proceed in company southward to the Hudson's Bay Company posts situated on the north shore of the Gulf of St. Lawrence.

The Attikonak branch of the Hamilton flows into the southern part of Sandgirt Lake, where it has about half the volume of the other branch. It takes its rise in Attikonak Lake, close to the southern watershed; thence a portage leads to the upper waters of the Romaine River flowing into the Gulf of St. Lawrence. From Sandgirt Lake to the south end of Attikonak, the distance by river is about one hundred and fifty miles, and the stream is practically a succession of long, narrow lakes connected by stretches of rapids. The country through which it flows is broken by low hills of rock and ridges of drift, with much low, swampy land between. The lowlands are covered





Two Views of Bowdoin Canyon

with small trees, chiefly black spruce, along with larch and balsam fir. Lake Attikonak is upwards of forty miles long, and is so covered with islands that no idea of its shape or width is obtained by a passage through it. Its water is clear but brownish, and does not appear to be very deep.

The Ashuanipi, or main branch of the Hamilton, enters Sandgirt Lake on its west side. The river flows from the northwest for seventy-five miles in a wide valley, broken by long ridges, which cut the stream into a perfect labyrinth of channels connecting irregularly shaped lake expansions. An intelligent detailed description of the watery maze is almost impossible, and would be too long for the present chapter. A few miles above Sandgirt Lake the granites and gneisses give place to bedded sandstones, limestones, and shales, with which are associated bedded iron ores. These rocks have a remarkably close resemblance to the iron formations of the south and west of Lake Superior, and there is reason to believe that, in the future, important deposits of iron ore will be found along the upper Hamilton River. A change in the physical features follows the change in the rocks; the rocky hills become higher and sharper, while the ridges are longer and much less broken, causing the valley to be walled in between rocky barriers that rise from three hundred feet to five hundred feet above its surface.

With the change of soil there is a surprising change in the trees. These increase in size; and the monotonous forest of small black spruce gives place to a more diversified one of white and black spruce, balsam fir, larch, balsam, aspen, poplar, and white birch, all growing in the valley and on the sides of the hills. This portion of the river is a paradise for fishermen; the swiftly flowing water, in the numerous channels connecting the lake expansions, swarm with large brook trout greedy for any description of lure, from a salmon-fly to a bit of red flannel on a cod-hook. More fish were taken with cod-hooks by the canoemen than I could catch with the regulation rod and tackle. The deep, quiet eddies and the foam-covered spots at the foot of rapids are the resort of lake trout reaching more than twenty pounds in weight. In the rapids the game ouaniniche, or land-locked salmon, may be easily captured with a fly. Whitefish are also seen bobbing about in the thick foam, and take an artificial May-fly; as they jump and fight as fiercely as the ouaniniche, they afford good sport, but, being very tender in the mouth, they are often lost. The willow ptarmigan and Canada goose breed abundantly in this region. The flocks of unmated geese lose their wing-feathers in the summer, and, being unable to fly, may be chased ashore and captured, usually after a most exciting run. Caribou may be secured with little trouble. Bears are not very numerous.

At the head of the long northwest course, a short stream leads into Lake Petitsikapau, a large, irregularly shaped body of water, separated by a rocky ridge from the head waters of the George River, flowing north into Ungava Bay. On its shore is situated the ruins of Fort Nascaupee, established by the Hudson's Bay Company in 1842, and abandoned in 1873. The ruins stand in a small clearing close to the edge of the lake. The houses were built of small, squared logs with sawn-board roofs. The main building is about twelve by eighteen feet, with a low attic. Smaller buildings adjoined the house on both sides, and were probably used as kitchen and shop. The foundation of another small building about twenty yards in the rear is probably the remains of the servants' house, while the powder-magazine, half buried in the ground, stands farther back. Adjoining is a small burying-ground with a large cross in the centre; no marks were found on the graves. In the attic of the main building a fragment of the *Albion* of March 7, 1846, was found. Close to the house are several patches of rhubarb in a flourishing condition. The whole forms the ruined remains of what corresponded to a typical inland post of to-day, as, for example, those of Nichicun and Mistassini. Such a post is in charge of a postmaster, usually graduated from the ranks of the superior servants of the larger posts, and married to an Indian woman. He has generally two or three Indians or half-breeds under him, and these with their families make up the settlement. Owing to the great distances from the coast and the difficulties of transportation, the amount of civilized provisions brought in is small, and the daily ration is very meagre. About one pound of flour per day falls to the share of each family, with tea and sugar in proportion, so that all must look to the country for food. This is largely provided by nets, as the posts are always located conveniently to some good fishing lake. Ptarmigan and other game birds provide most of the flesh, supplemented with caribou, bear, beaver, lynx, muskrat, and rabbits.

At Nichicun potatoes will not grow in the short summer season, and this was probably the case at Nascaupee, so that the farinaceous food was limited to the family share of the daily pound of flour. The life at an inland post is a lonely one. With the departure of the ice in spring, the band of Indians belonging to the post congregate with their furs, which are soon packed in bundles of one hundred pounds and loaded into large bark canoes for the voyage to the coast. All the active males are required as canoemen, leaving behind only the very aged, cripples, and children. Many of the women accompany the brigade in small canoes; the remainder scatter about the lakes to convenient fishing places. The post is practically abandoned until the return of the brigade, late in the summer, with canoes deeply laden with provisions, ammunition, and goods for the next season's trade. A few days after the arrival, each Indian has received his outfit and departs for his winter hunting-grounds, leaving the inhabitants of the post to themselves. The early fall is employed in securing a supply of trout and whitefish for the winter, and nets are set on the spawning-grounds for the fish. This ends the work of the year, and everybody becomes a trapper of fur until Christmas time. With the new year, the cutting of fire-wood for the coming year is commenced; the wood is drawn home with dog-teams. As the spring approaches, the canoes are mended and preparations made for the annual trip to the coast, which is eagerly anticipated, as it means the annual mail and contact with civilization.

The Ashuanipi, at the entrance to Petitsikapau, bends sharply to the south, where it flows out of a large lake of the same name, situated near the southern watershed, close to the head waters of the Moisie River, which flows southward into the Gulf of St. Lawrence. The distance from the bend to the head of the lake is upwards of one hundred and fifty miles, about half of which is unsurveyed.

In closing this brief description of the Hamilton River, a few words of advice may be given to intending visitors. At the present time no facilities exist on Hamilton Inlet for a trip inland. The white men living about the inlet are unaccustomed to canoes, and use heavy sea-boats for their short trips inland. For an extended journey to the interior, canoes are required, and, in my experience for such work, the best are built of cedar; these are nearly as light as the Indian bark canoes, and are much more enduring. They should be built larger and deeper than the ordinary pleasure canoe, which is an abomination on a serious exploratory trip. A good size is nineteen feet long, forty inches wide, and about eighteen inches deep. Such a canoe will take a load of twelve hundred pounds with the crew of three or four persons, without danger, through heavy rapids and across windy lake stretches, where the ordinary canoe could not venture. These canoes weigh about one hundred and twenty-five pounds, and are easily carried by two men. An ordinary camp equipment, including mosquito tent and plenty of good blankets, is all that is required. The provisions should be as simple as possible, consisting chiefly of pork, bacon, flour, and beans, along with tea and sugar. Condensed foods may be good for rations on forced marches, where nothing else is available, but they are highly unsatisfactory to canoemen working hard upstream, who must have a full weight of three pounds of solid food a day. A few tinned luxuries may be taken if the trip does not exceed six weeks in duration, — a good rule to follow is an allowance of three pounds per man, together with the limit of four hundred pounds' weight for each canoeman ascending a river, so that if two men are engaged in propelling the canoe, the load should not greatly exceed eight hundred pounds in weight.

As the whites know nothing about river work, and the Indians are few and unreliable, it is necessary to secure canoemen in Canada, and take them along to Hamilton Inlet. On my trips through the country, I have used Indians and French half-breeds from the Lake St. John district of Quebec, and have found them good, willing, and reliable men. Similar men may be obtained through the officer in charge of any of the Hudson's Bay Company's posts along the frontier. Fish are plentiful in the rivers, especially above the Grand Falls, and a net set nightly affords great assistance in securing the surprising amount of food required by a party of able-bodied men. No reliance should be placed upon the killing of game during the summer months, and if by good luck caribou or bears are met with, it is easy to throw away a corresponding amount of provisions, but a sufficient supply for the entire trip should be taken in case of ill luck; this is an essential matter, as more parties have had to turn back from the northern wilderness owing to lack of food than from other reasons. A good supply of provisions means good-natured canoemen, willing to go anywhere without a thought of danger, whereas the suspicion of starvation will change the same men into a discontented, mutinous crew. Mr. Leonidas Hubbard, subeditor of *Outing*, lost his life in 1903 in this district from starvation. His assistant, Mr. Dillon Wallace, and his half-breed guide only just succeeded in getting out alive. He had relied almost entirely on what game he could capture.

Mrs. Hubbard and Mr. Dillon Wallace have since led

Taking it Easy

separate expeditions through the same country. Travelling inland to Lake Michikamau, thence down the George River to Ungava Bay, Mr. Wallace returned by dog-sleigh in the winter, skirting with his teams the entire Labrador coast. Both expeditions have been described by these travellers in their well-known books.

CHAPTER VI

THE PEOPLE OF THE COAST

BY W. T. GRENFELL

THE fishery as it exists in Labrador at the present day is confined practically to Newfoundlanders, Labrador settlers, or "livyeres," as they are called, Eskimo, Americans from Massachusetts and Maine, and a few Canadians from the Maritime provinces. Of the Basques only a few tiled floors, and the débris of the bones of whales captured by those people, remain. These bones are still fished up at Red Bay in the Strait of Belle Isle and are used for dog-sledge shoes. Biscayans and Bretons are represented by a wild growth of the small leek or hive, which once flourished in their well-cared-for vegetable patches. Jean Jacques and Antoine Perrault still fish on the coast, but speak the homeliest Labrador and are innocent of anything French, even as on the Canadian Labrador Rob Roy McGregor and Angus McNab know nothing but French patois.

The Canadians are represented by their telegraph lines, lighthouses, and steam tenders. An occasional sick French Canadian finds his way to the small hospitals on the coast. Germany has at Nain a consul, a Moravian missionary bishop, whom, in 1907, a man-of-war came in and saluted. Words lacking in the Eskimo language have been supplied from the German. Tosten Andersens and Donald Camp-bells from Norway and Scotland came out with the Hudson's Bay Fur Trading Company, and have left a plentiful progeny to represent them in this generation. One Jersey firm still has a fishing-room. Stone fish-drying bournes, brick chimneys, and occasional panelled doors testify to the excellent scale on which the enterprising men of Jersey once carried on the fishery so far from their own sunny homes. Their influence in doing things must have been very great. But with one or two exceptions there is to-day nothing to compare with the relatively fine style in which all their arrangements were carried out, and their men housed. These businesses have long ago passed into the hands of Newfoundland firms.

The fishery of Blanc Sablon is perhaps the one pursued on the largest scale. It has holdings also at Greenley Island and Forteau. The enterprise of the Honourable Captain Sam Blandford added largely to its fame and efficiency, for he annually hired at great expense two large steamers in which he pushed as far north as Cape Chidley, to add a second chance to each voyage.

Canadian fishing vessels visiting Labrador from the lower provinces are fewer than twenty years ago. Americans from Maine are more numerous. These, the finest fishing vessels by far that come amongst us, are always welcome. Their crews are a generous, open-handed crowd of men, thorough fishermen, and splendidly fitted out. Our own humble vessels look poor and sorry beside them. Only for one thing do we regret their advent, and that is due to their indifference to what we consider the laws of God. They go fishing and working on Sundays among our people, who, though poorer and far more needy of material wealth, are wise enough to know that life does not consist in the abundance of things man possesses. The joy of life on our coast comes of a peace of mind due to a real faith in God's fatherhood and our sonship, and from every high ideal realized on that premise. Without any theories it is the simplest "simple life." There is no room in Labrador for persons affected with the "dementia of owning things." If ever by elimination of their faith or by the introduction of the "habits of civilization" our people are deprived of that faith, life on the coast would be little short of a purgatory to be endured. So strongly do our people feel on this matter of keeping Sunday strictly for rest that one of our laws runs that "no person shall, between the hours of twelve o'clock on Saturday night, and twelve o'clock on Sunday night, take or catch in any manner whatsoever, any herring, caplin, squid, or any other bait fish, or set or put out any contrivance whatsoever for taking them," — just such a law as prevailed one hundred years ago about salmon-catching in Ireland. Oddly enough, the law does not prevent catching the cod themselves, so we cannot prevent the long lines being hauled by our cousins from "civilization." When remonstrated with, however, they have almost always shown enough good feeling to give way to the wishes and customs of our people.

The first of the fleet that leaves for Labrador sets out as early as the end of April. Those from the outports have still, owing to the unfortunate centralization of trade at St. John's, to repair first almost to the very extreme south of Newfoundland for supplies, and thence to leave for the north again. The southern vessels that come out of the winter ice early frequently find time to do some coasting before leaving for Labrador, and will carry loads of lumber, etc., to the capital. But this cannot be done by those who desire to make two cargoes at the fishing-grounds or by those who live in northern ports. Their vessels scarcely get out of the winter ice early enough.

In Canadian waters the trap berths are leased to the same parties year after year by the government, who charge so much per fathom for the "leading" net. There is thus no great incentive to be down on that part of the coast too early.

On the part of the Labrador coast which is under Newfoundland jurisdiction, the first comer takes the best berths. This led to such unnecessarily early starts, with the suffering involved and risks incurred from pushing down among the floe-ice, that laws were made[1] preventing berths being claimed till a certain date, according to the latitude. Any net set before that time is not only taken up, but the owner is fined. Every year, however, numerous disputes and quarrels arise from the eagerness to be sure of the choice of places, and never a season passes without some being brought to the travelling magistrate for settlement.

Some fishermen, without trying for more than one voyage, go direct to the spot of their choice, however long they will have to wait. These men, though living on their vessels, will always be found in the same places. Their schooners at anchor might almost be marked on the chart. These men, such as the Whites of Twillingate, the Milleys, the Lansons, the Barbours, etc., are almost always successful men.

Most of the schooners, however, are obliged to wander about, looking everywhere for "good tucks" of fish, and often so anxious to get the fish quickly that they leave the very places that later turn out to be best, only to find no others and so go home empty or "clean."

These wandering schooners are called "green fish" catchers, and when they have taken their "fare," or when their time is "runned up," they come south, pick up the freighters they left, and carry them to their homes. Of late, however, more "make," or dry, their fish at the harbour, where their freighters are doing the same thing. Though curing seems an easy matter, it involves much work and infinite patience. At home the gardens left in the spring sorely need tending now, and every man is anxious to be getting ready for the winter. Yet often for a week at a time, wet and cold days prevent any work being done. So valuable are fine days that a certain medicine was advertised along the coast as a guarantee to "cure all" and to "give eight fine fish days" to any one buying five dollars' worth.

The actual number of the vessels visiting Labrador I am unable to obtain, — probably one thousand each year. Every year quite a number go down that neither "clear" nor "register" at the customs-houses. About twenty thousand persons, all told, constitute the summer exodus from Newfoundland.

One or two steamers have been used in the Labrador codfishery of recent years, but the people are strongly prejudiced against their introduction. They have seen the steamers supplant the schooners entirely for catching seals. They have seen any chance of large returns pass entirely out of reach of the small fisherman. Moreover, they believe that the seals are being killed out. As yet, however, it has not been possible to get a law prohibiting the use of steam fishing-vessels sanctioned in the Upper House of the Legislature. It should be added that laws relating to the fishery are, all together, very few, and the total number of cases where trouble arises from all causes, when added up, are so small as to be almost negligible. The use of steamers to bring fishermen and their families to the fishery and back again is greatly to be desired.

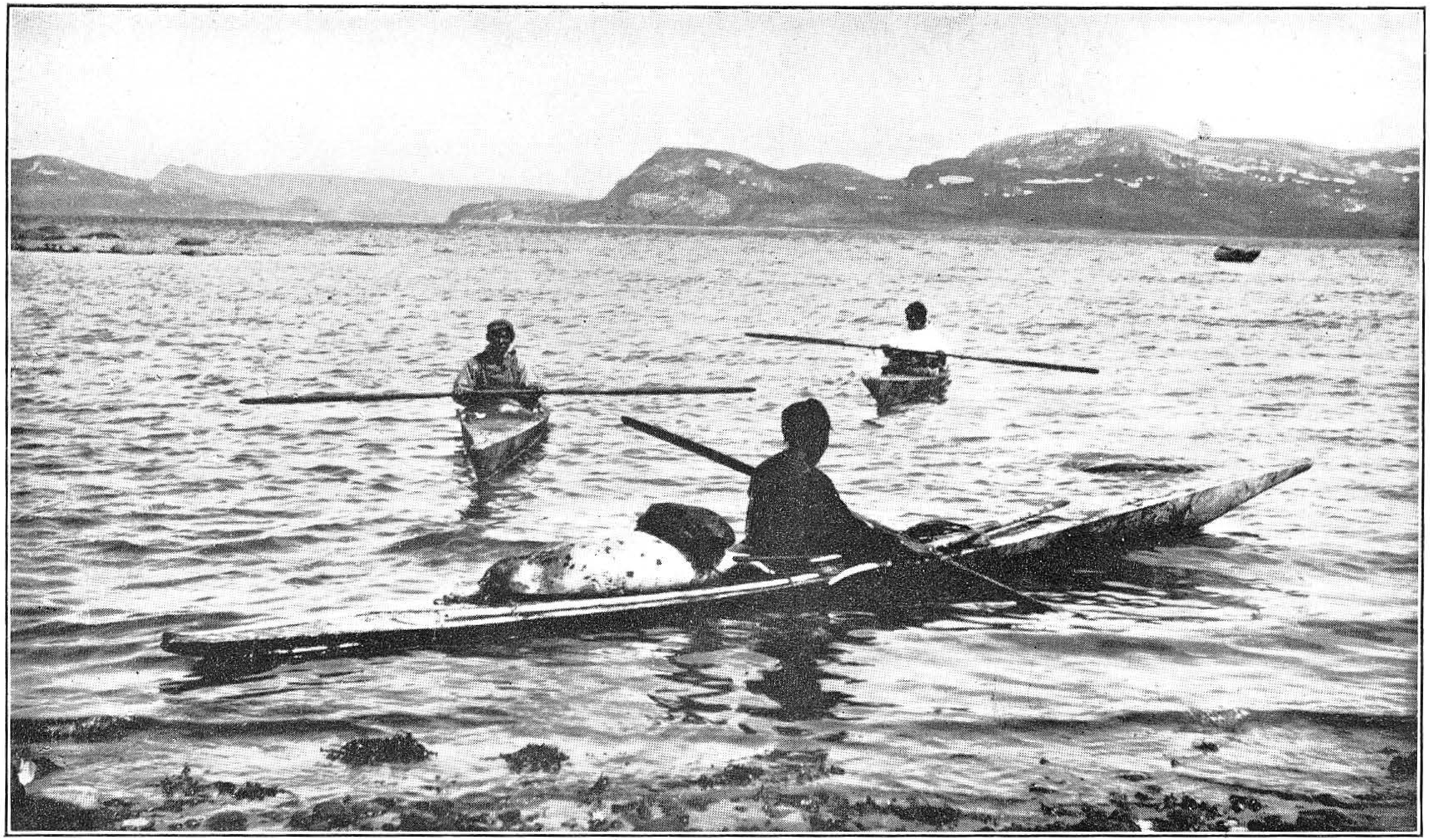
His Excellency, Sir William MacGregor, in the report issued in 1906, after his official visit to the coast, says: "The difference in conduct between the present generation of Labrador fishermen and the banditti, or 'irregular,' crews that formerly frequented it, forms, perhaps, one of the most striking contrasts that could be found in the annals of Justice." He further states that "the administration of justice in Labrador is now so easy as to be, perhaps, without any precedent in any other country." He describes our fishermen as being "phenomenally law-abiding." This is certainly my experience, after acting as magistrate on the coast for the past ten years.

The greatest drawback to the Labrador fishery has been, and still is, the want of proper communication. A small steamer, which is used for seal-hunting in the spring, makes ten trips each year. She is supposed to complete each trip in a fortnight, but as she has ninety ports of call to make, fully fifteen hundred miles to steam, is loaded with freight, and has fog, ice, and bad storms to contend with, she is frequently unable to keep within several days of her schedule time. With a captain second to none for pluck, and acquainted with the coast as probably no other man is, she still loses time. Day and night, when possible, she travels, but the scarcity of lights, the miserable survey, and the absence of artificial assistance to enter harbours, leave no question that she has far more work than she can accomplish.

The passenger traffic alone is far more than she is able properly to undertake. The improved conditions of the fishery enable fishermen to get cash to pay for passages home by steamer so as to save time in the autumn. Thus, so many travel that even the available floor space is at times all too small for those crowding aboard. On some trips the gangway has had to be kept up to prevent more passengers coming aboard. For care, courage, courtesy, and efforts to please, the crew of the Labrador mail vessel cannot be beaten; but they cannot create space. The irregularities thus caused and the uncertainty as to the time of her arrival are also a great source of loss of time and money. Moreover, considering the importance of the fishery to the country, one mail per fortnight is not nearly enough.

Five Marconi stations have been placed on the coast, and these are of very great value. They cover two hundred miles of coast, but do not yet connect with Newfoundland, and only very indirectly with anywhere. When the Canadian station on Belle Isle is working, then Labrador can talk with the outside world viâ Canada. But none of these stations is opened except in the summer months. The government proposes soon to extend and complete this line of communication, which will then be of infinite value to Labrador, its trade, its people, and its visitors.

In the wireless system, the problem of communication



Eskimo in Kayaks at Hebron

in the Arctics and subarctic regions finds a solution. The drifting ice, whether as pan or resistless berg, is almost prohibitive of submarine cables. The immense bays, with their endless indraughts, make land wires out of the question.

With commendable zeal, and with great success, the Canadians have succeeded in running a wire all the way from Quebec along the north shore of the Gulf of St. Lawrence to the Straits. Unfortunately the line ends at Chateau, twenty-eight miles from Battle Harbour, where the terminal Marconi station is situated.

In winter, residence in Labrador is specially discouraged by lack of communication, and the permanent population, except around the newly established mills, is decreasing steadily. The existing arrangement of one or, at most, two mails carried by dogs is not sufficient to meet the needs of a population of English-speaking people during a whole winter.

Labrador could easily carry a large and healthy population if the artificial conditions were improved. The residents on the shore from Red Bay to Quebec show no desire to leave it; yet even for them very little is done to encourage them to remain. The same applies to the whole north coast of Newfoundland. A telegraph line or a chain of wireless stations is badly needed. Such rudimentary adjuncts of modern civilization will no doubt shortly be afforded them.

Exclusive of a school grant of $2000, the total appropriations for Labrador are under $30,000 per annum. Twenty thousand dollars of this is for the summer mail steamer and the Marconi stations; $2000 is for collecting revenue on the coast. All the rest is spent on summer post-offices, and providing for sick fishermen. Five hundred dollars a year appears to be the amount granted to make Labrador habitable in winter.

As the revenue from its inhabitants direct is certainly $150,000 per annum, and the indirect revenue from the fishery so large, this does not seem fair. The Labrador people must purchase every supply from Newfoundland, from a rifle, a trap, a net, to flour, pork, and potatoes. I have seen a cargo of potatoes turned back home from the boundary at Blanc Sablon because they were grown in Prince Edward Island, and the taxation was far too high for the settlers at Forteau and Red Bay to be able to afford them. Yet they could get no potatoes from Newfoundland, could grow none, suffered from hunger for want of vegetables in spring, and some were being fed every year on government flour during the long winter months.

The testimony of hundreds of my friends who live in Labrador, among them men who have lived in the United States, England, Scotland, Canada, Norway, and elsewhere, is that Labrador is by no means a bad country to settle in, but it is handicapped by having too little government encouragement given to people to live there.

The reindeer project, backed only by the Canadian government and by private friends, I shall leave to another chapter.

One other great drawback to settling is the impossibility of either getting grants of land or buying land with good title in Labrador. This partly arises from the unsettled question of ownership. For nobody knows the boundary between Newfoundland and Canada. Grants of timber lands have been made to Canadian firms in Sandwich Bay and Hamilton Inlet, covering about two thousand square miles in all. Grants to fishing firms have apparently been made to Baine, Johnston & Company at Battle, to Isaac Mercer at Long Tickle, to Job Brothers at Blanc Sablon and Indian Harbour, and to a few others at other points.

The policy of the Newfoundland government has always been in theory to leave the land free to any one, so that when one man leaves it another may make use of his former situation. Presumably this is on the assumption that nothing of value will be left behind. But though no legal conveyance has been made, men who fish any particular place, and even move a stone to "spread fish on," will claim that place, though they have not been using it for years, and the courts at home have upheld them. It leaves the land about the harbours in a very anomalous and undesirable condition. There are fishermen anxious to come and settle, there is land unused, and with no marks on it; yet either some one refuses to allow them to settle or they dare not settle for fear some one may arise who will some day eject them. Several of these cases have come before me as magistrate on the coast.

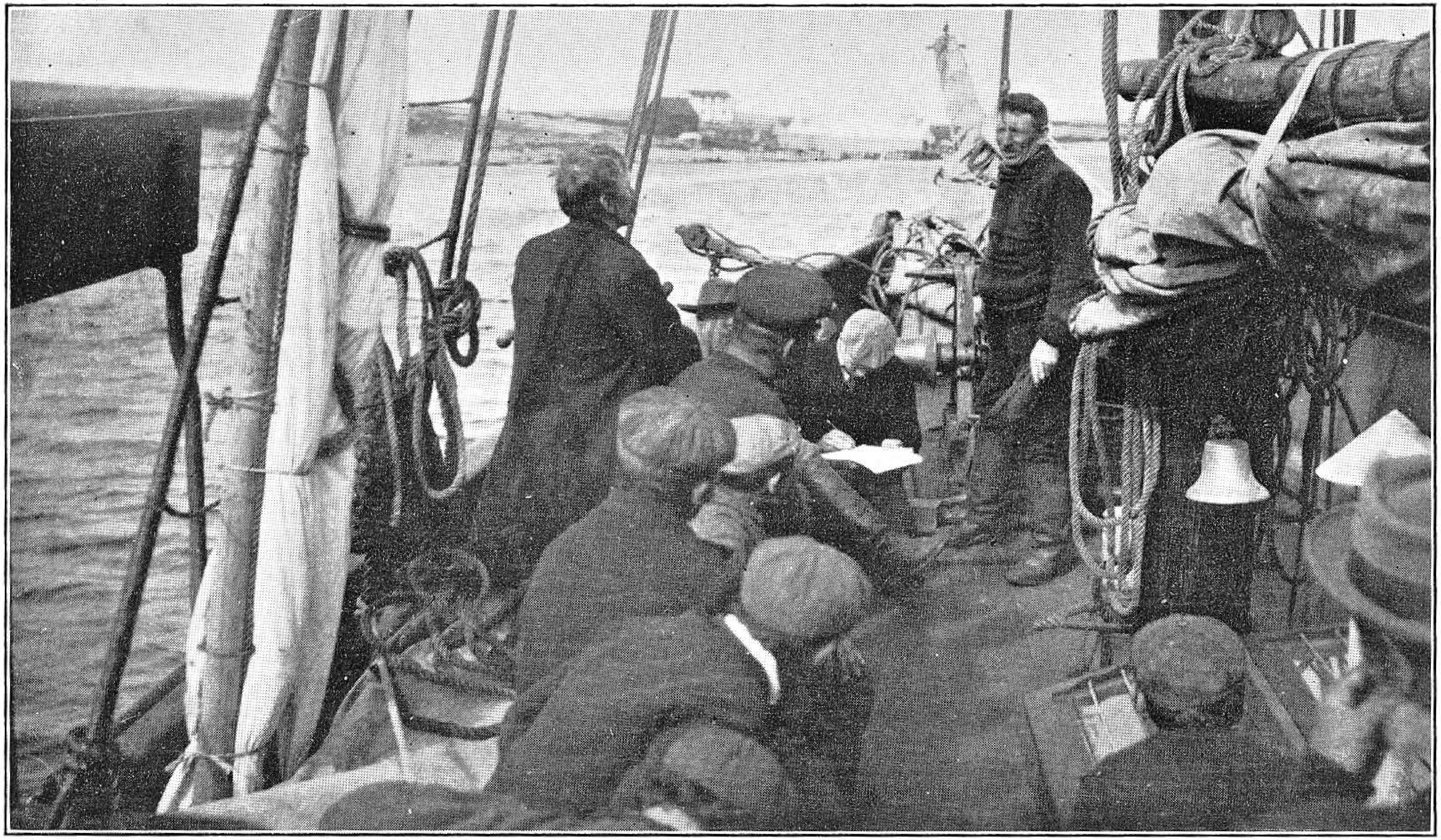
Labrador has no representation, and no one is appointed to look after its interests. The Governor's Report for 1906 does not put the matter one iota too strongly. The following paragraph taken from it is very significant, when the varied experience of its author in other out-of-the-way parts of the world is taken into consideration:—

"If the difficulties of representation are considered to be too great, then there remains the obvious alternative of appointing a minister, or, at least, a secretary for Labrador, whose sole and special executive duty would be to study all the questions in connection with that country. It may be stated here at once that the proper development of the Labrador coast cannot take place unless one or other of the above suggestions is adopted, or some other more or less similar arrangement is provided, such as an annual visit to the coast of a Minister of the Crown."

Only one such has ever visited Labrador, and that one, the Honourable Minister of Fisheries, accompanied Sir William MacGregor on his trip in 1906.

Education in both Newfoundland and Labrador is another very difficult problem. It is rendered almost impossible to solve, owing to the denominational system of schools. A recent visitor, writing in an American paper, expressed himself as follows, and his view I entirely agree with:—

"If any one desires to study the working out of an exclusively denominational education to its logical result, a visit to Newfoundland will supply the materials. The island is a poor and sparsely settled country; yet its education is completely in the hands of the churches, the only uniformity attempted being the preparation of examination papers by a central board. In the smaller settlements there may be a Methodist, an Anglican, a Roman Catholic, and even a Salvation Army separate school, and each denomination, except the Congregationalist, has its own college in St. John's, not one of which has yet got beyond the point of secondary education. This is the logical outcome of the denominational idea. It results in the maintenance of separate camps in every village, and bids fair to postpone forever any real unification and assimilation of the people."



Court of Assize on the "Strathcona"

The best educated people in the country at present are the Eskimo. Almost without exception they can read and write. Many can play musical instruments, share in part singing, and are well able to keep accounts, and know the value of things. These accomplishments, entirely and solely due to the Moravian missionaries, have largely helped them to hold their own in trade, a faculty for want of which almost every aboriginal race is apt to suffer so severely.

I have known an Eskimo called in to read and to write a letter for a Newfoundland fisherman, and I have had more than once to ask one to help me by playing our own harmonium for us at a service, because not one of a large audience could do so. I have heard more than one Eskimo stand up and deliver an excellent impromptu speech. Reading the Newfoundland Blue Books, reporting the numbers able to read and write in Labrador, I acquired an entirely erroneous estimate of the people's accomplishments in those directions. Our white population is still very largely illiterate. Some headway has, however, been made of late years, and literature and loan libraries distributed through the Labrador Mission are now accessible all along the coast, and are creating a love of reading.

There are practically no alcoholic liquors sold in Labrador. Not a licensed house exists. If liquor is sold at all, it is in very small quantities and clandestinely in what we know as "shebeens." To obtain convictions for breaches of the really very stringent liquor laws is not easy. In ten years' cruising the coast, I have only been able to convict five "shebeeners," and I will candidly admit that I lose no opportunities.

Some trouble is caused by the fact that the mail steamer brings down regularly to private individuals liquor which is bought and paid for in St. John's. They can even carry it down for "cash on delivery" and still escape the law.

Naturally, this opens a very wide loophole for the enemy of the fishermen. Foreign vessels are still unfortunately in the habit of giving away rum to those loading them with fish. The total quantity drunk, however, is very small indeed. Thousands of our fishermen are absolute abstainers on principle, and a very strong anti-liquor sentiment prevails almost universally. The results are obvious in the fact that we have not one policeman stationed along the whole coast; not one among twenty-five thousand people. We have no penitentiary, and there has not been, to my knowledge, a conviction for drunkenness. During sixteen years I have personally not seen one fisherman drunk. It is very different among the North Sea fishermen. Alcohol has there been the downfall of some of the best men. It has cost the lives of more than one of my own friends. It has ruined and starved many families I have known and loved.

A careful study of the health conditions of the coast by the doctors of our staff all these years has shown that there is no need for liquor whatever in these subarctic climates; that, on the contrary, the first man to go down in hard physical conditions is almost always the drinking man. Among men on the sea the dangers from its use are enormously enhanced. As a method of making money, I can conceive of few that are so despicable, so inhuman, as this liquor traffic!

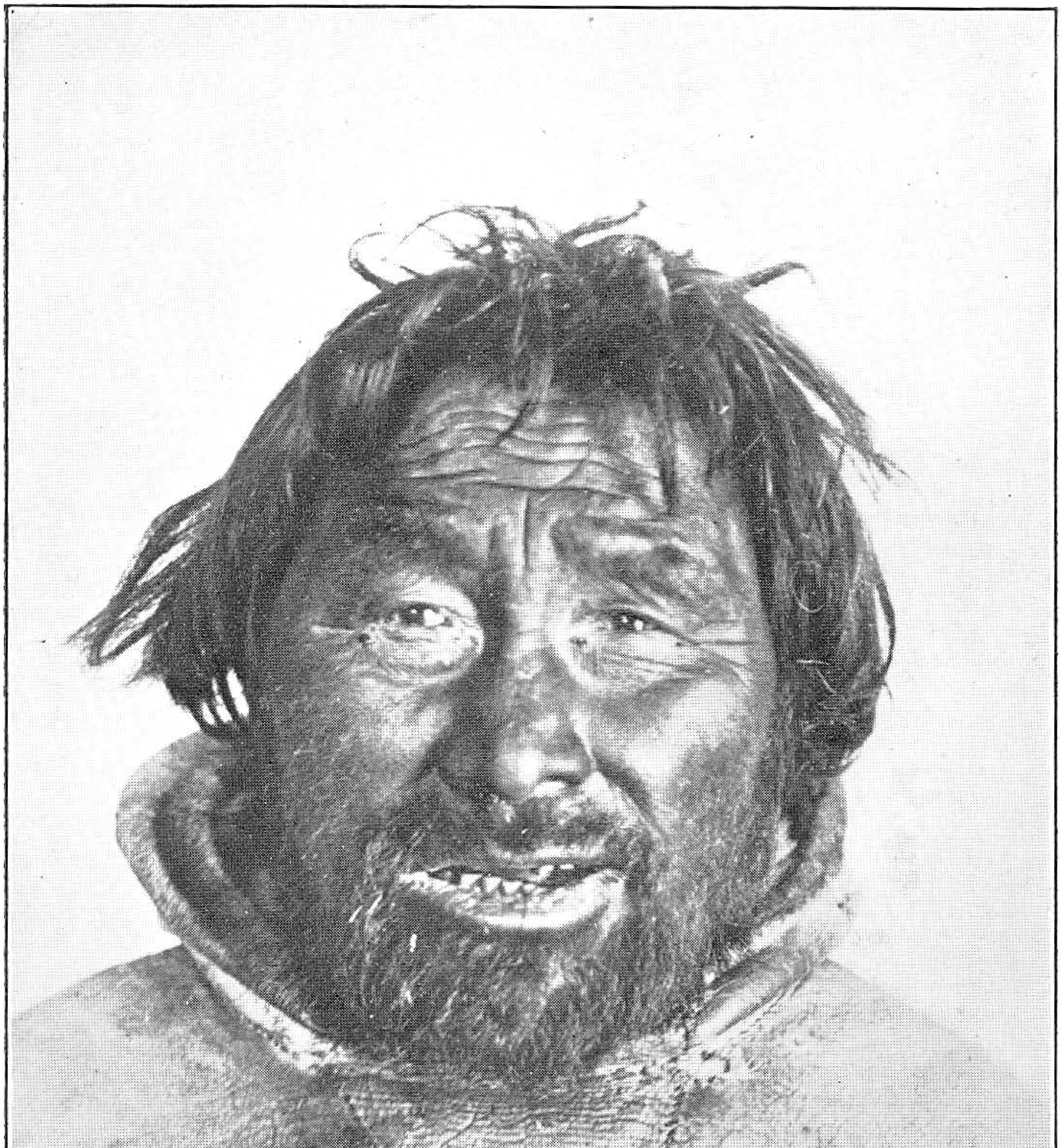
The complete absence of artificial class distinctions on the coast is one of the most refreshing experiences a visitor can have. A man may have fustian instead of broadcloth, sea-boots instead of patent-leather boots, a blue guernsey instead of the latest cut of frock-coat, but a man is a man in Labrador for all that, — independent and free from all self-consciousness, which quite falsely humbles one man in the presence of his fellow-men. Thus I have had guests many times staying with us in our house, waited on at our table, and then quite naturally adjourning to the kitchen and feeling absolutely at home and unembarrassed there with the servants, without any false contempt for others, just as a Ruskin or a Tolstoi, or the Christ would have it.

Yet the Labradorman, on the other hand, has none of that offensive familiarity which would ignore the differences that are the outcome of position and training. He does not so much care who your father and grandfather were, or the quality of your clothes. But he does not try to force that fact on you in the manner said to be the prerogative of "walking delegates."

Those who have visited the Labrador fisherman have, on social grounds, learnt to love him for his simple virtues, his hospitality, his faith, his truthfulness, and his loyalty, — even as Ian Maclaren taught us to love the people of Drumtochty. Nor can you be long in the fisherman's company without feeling this.

The public health of Labrador has practically been a matter of chance. Houses are not drained. Few have even outside closets, much less one in the house. There are no sanitary officers. Very few residents have ever been vaccinated. Until recently they have had no teaching as to the dangers of infectious diseases, and especially how to deal with and avoid tuberculosis. Consumption is the main enemy of these people who live here in one of the purest atmospheres in the world. But it is fostered and propagated in every possible way by the customs of the people and by their poverty. The total number of residents is now about four thousand, inclusive of thirteen hundred Eskimo. In spite of new mills and other new industries recently introduced, the number is not increasing. This is due partly to the fact that some return to Newfoundland to benefit by the schools and other advantages, or to escape starvation or the isolation that arises from no line of communication in the winter. Those residents, who make this journey, invariably tell me they would greatly prefer to remain on the coast in winter if it were possible.

The lack of increase is partly due, also, to the want of care of the young. I have no statistics to show the relative mortality in childhood. I know it to be great. The families are comparatively large. I call to mind one of thirteen, one of fourteen, and several of seven and eight. Most men marry young. Bachelors are very few on the coast. A knowledge of the cheaper food-stuffs and how to use them would be a great help. Thus, corn meal, oatmeal, and rice are seldom used. The average age attained is certainly low. The older English and Scotch settlers live and maintain their vitality much longer than those of the succeeding generations. They also hold their own much better in the battle with their environment. One man proudly told me, "Father is eighty-two and hasn't a kink in him."



Eskimo Hunter

The sicknesses of the coast are not indigenous. In the past seventeen years there have been grippe; a few cases of small-pox, imported by a schooner from the Gulf; scarlet fever brought from Newfoundland in a steamer; one small outbreak of diphtheria in the Straits on the arrival of the summer visitors; and in summer a few sporadic cases of typhoid.

The Eskimo brought back from the Chicago Exposition typhoid of a very virulent type, which killed several hundred of them; and, from the Buffalo Exposition, diphtheria, which is still raging amongst them, and has destroyed many. An epidemic of grippe, complicated with pneumonia and pericarditis, killed about sixty in the neighbourhood of Okkak. The worst enemy of the Eskimo is, again, tuberculosis, and from that in one form or another most of the people die. The disease is entirely due to ignorance, neglect, and poverty. Of late, an active crusade against it has been commenced.

On the other hand, so healthful is the country that I have no hesitation in recommending it for neurotics, or even to persons with disposition for tuberculosis. In winter the dry cold, in spring the low latitude and reflected sunshine, and in summer the clear cold, bracing air, are great recommendations.

When speaking of the people of the coast, one is apt to overlook those who are represented in Labrador only by agents in their various businesses. Were it not for their enterprise and courage, the Labrador fishery would be lost to the human race. Labrador owes them many debts, and the people almost owe their existence to them. To-day the merchants carrying on business in Labrador are mostly residents of St. John's. The largest outfitting firm for Labrador, especially of the greenfish catchers, is, however, that of C. & A. Dawe, of Bay Roberts, and second to them are the Messrs. Ryan, of King's Cove. Nearly all the merchant firms interested in the bank fishing and the shore fishery elsewhere are represented. The largest single establishment at Blanc Sablon belongs to Messrs. Job Brothers & Company, a firm that for a hundred years has carried on the fishery business. The second largest station is Battle Harbour, the property of Messrs. Baine, Johnston & Company. Rorke & Sons of Carbonear own the old-established stations at Venison Tickle and Francis Harbour. Messrs. Harvey & Company are interested in Indian Harbour. Munn Brothers, of Harbour Grace, have built up a fine business at Shoal Bay and Snug Harbour. McCrea & Son, at Gready, carry on a very extensive business. Messrs. Kennedy, Bartlett, Hennesy, Spracklin, Jerrett, and the Anglo-Newfoundland Company and others have all built shore stations and opened up fisheries in which every year they risk considerable sums of money. Labrador owes its developing utility to mankind largely to these enterprising men. They are among the world's producers, adding directly to its supply of necessities in one of the most precarious of businesses. They have met with varying fortune. Some have made successes. None has made a large fortune. Many have experienced great losses. When they come to balance the issues of their enterprise, they should not forget their greatest asset, — that their names are held in honour, and that gratitude to them is cherished in numerous hearts and homes along the ice-girt shore of the "lonely Labrador."

The Hudson's Bay Company has long shared the fur-trade of the northeast coast with the Moravian Mission stations. The older of these two companies has a station in Davis Inlet, one of the most beautiful spots in eastern Labrador. The well-wooded sides of the inlet, the steeply rolling hills, the narrow, deep fiords branching away in many directions, the peace of the seldom ruffled waters, and the number and variety of the sea-birds inhabiting the bays during the summer, all lend Davis Inlet a kind of beauty unrivalled on the outer coast. Here the largest trade with the Montagnais Indians is pursued. Every winter and summer a band comes out with furs, deerskins, and parchment. A trifling reward is given by the company to any settler meeting the band and piloting them in his boat to the station. There they generally stay a few days bartering their "hunt" for ammunition, tobacco, and coloured handkerchiefs and cloths. There is some trade here also with Eskimo and half-breeds in salt trout and salmon. The head post of the Hudson's Bay Company is Rigolet in Hamilton Inlet, and from that place all orders are issued, all goods exported, and to and from that port their annual steamer plies, bringing the goods from London and carrying back the furs in the fall. She arrives generally in mid-July, coming out under sail and steam to economize fuel. She proceeds north to Ungava and to the bottom of Hudson Bay, returning to pick up the summer's catch of salmon with the furs of the preceding winter. The name of her captain, rendered famous in Labrador by his innumerable voyages safely accomplished, will be perpetuated in the channel through which he always passes on his way around Cape Chidley. It has been christened Gray Straits in his honour.

If we steam up ninety miles farther along Hamilton Inlet, we reach the Northwest River station of this same company. From here they supply potatoes, carrots, cabbages, and other vegetables of their own growing to the outside posts. It is beautifully situated at the mouth of a lonely salmon river, with a well-wooded background and a level-grassed, pebbly, and sandy beach in front. Here the Canadian party viewed the eclipse in 1905, and here the present Lord Strathcona, the grand old man of British North America, spent thirteen years of his early life. No place is better worth a visit. The vast quantities of fresh water pouring into the great Lake Melville make it quite warm, and bathing can be indulged in there as well as anywhere in England.

The station at Cartwright, the southernmost of the Hudson's Bay Company stations, is the one, however, best known to visitors, and to the world also, from the famous journals of the founder. The entire people of that bay for long years depended on it for all their supplies, but now they trade also largely with the southerners at their summer stations at Gready and Pax Harbour, and also with the French firm of Revillon Frères, who built a station in the bay in 1907. This firm has been spreading its stations wherever the Hudson's Bay Company carries on operations, and metaphorically have, in each place, put down their trading-post in the latter's back yard. A few years ago this would have originated feuds and strife, as in the famous days of the Northwest Company in Canada. But now-a-days there seems no personal animosity, and the various factors can even meet and smoke together the pipe of peace. Revillon Frères have a station also at Northwest River.

Their advent on the coast has marked a considerable rise in the price paid the people for furs.

In the winter months the fur-traders make long sledge journeys along the coast, buying the skins caught, or laying embargoes on them. The Rigolet dog-teams and the Nachvak dog-teams have for years been famous along the coast. The former, with their well-known owner, James D. Fraser, here probably reach the acme of dog-driving, while the famous Ford family have, between them, carried the mail three hundred and fifty miles each way over these barren, uninhabited shores, winter after winter, where no man lives and no houses shelter them — across mountain fastnesses, over glaciated passes, and the still more dangerous sea-ice, year after year, without serious accident. The mail starts at Fort Chimo in Ungava Bay, then round and along the Labrador coast to Davis Inlet. The mail crosses the land to Nachvak Bay, and so on over a stretch of fifteen hundred miles to Quebec.

The life of a Hudson's Bay factor in Labrador does not offer all the joys of civilization, but it offers a field to develop courage, muscle, resourcefulness, and self-reliance to an eminent degree. It makes men who shoot straight, fear nothing, and live hard. It offers the simple life, with its many advantages, and it breeds a hospitality, a brotherliness to one's kind, a readiness to stand by any one in distress, that, in our complex life in cities and even villages, we rarely find ourselves called on to exercise. Never has a visitor travelled our coast, but his heart has gone out equally to all the brave men of these two great organizations, the Moravian Missions and the Hudson's Bay Company.

CHAPTER VII

THE INDIANS

BY WILLIAM B. CABOT

THE Indians of Labrador are all of the family stock known to ethnology as the Algonquian, which in its day occupied a vast area of the continent. From the Carolinas to the Eskimo shores of Hudson's Strait and from the Atlantic to the Mississippi and far to the northwest, the maps of the present day are dotted with the place-names of one group or another of this vanishing family. These names, one of the chief legacies of the Algic tribes, remain a sign-manual of their occupation of the soil. Their great territory was shared by almost none but the Iroquoian tribes, and these in limited numbers.

Beyond the Mississippi were the various and generally unfriendly races of the plains. Westward from Hudson Bay and to the far north were the Athabascans, different in physiognomy and of another linguistic system. Southward were various tribes, chiefly Muskogean, although names of the Algonquian form are not wholly wanting over most of the southern area to the Gulf.

The northern groups are closely related. The Montagnais, or Mountaineers, of the southern Labrador talk easily with the Nascaupees of the northern and eastern Crees; these latter in turn with others to the west, and so on to the Rocky Mountains. The differences are only of dialect. To the southward it is otherwise; the St. Lawrence marks so distinct a division of language that existing tribes cannot converse in Indian; and as observed by the writer upon the meeting of a Montagnais with an Abnaki acquaintance on the winter trail, conversation must proceed in some foreign language — in this instance in French. The Indians of the Labrador estimate that as many as half of the people speak no language but their own. The presence of white blood is largely evident in the southwest, adjacent to the settlements and the upper gulf; and many who are counted Indians might, but for the saving effect of a hunting life inland, be reckoned as white rather than red.

Low writes: —

"The most northern tribe has a tradition that their people originally lived far to the south, and it is probable that they were driven northward from the country about the St. Lawrence by the Iroquois, about the time of the first settlement of Canada, by the French. There are many traditions about these wars among the northern Indians, and it is surprising to what distances the Iroquois followed them, into the middle of Labrador, and up the east coast of Hudson Bay to the neighbourhood of the mouth of the Big River in north lat. 54°. As the Crees retreated before the Iroquois, they in turn displaced the Eskimo, who at one time occupied the eastern and southern portions of the peninsula as far as Eskimo Bay on the Gulf of St. Lawrence and all the territory about Hudson Bay. These wars terminated when the Eskimo became supplied with firearms, and are now traditions of the distant past; but the memories still live, and the Eskimo and Indians, although never engaging in open hostilities, have a mutual hatred and never intermarry. The northern Indians still regard with fear the descendants of the once fierce Iroquois, and their name is used to frighten children."

In the nearer regions, service at guiding and with surveying or exploring parties as voyageurs is resorted to considerably by men of more or less Indian blood, but the dark Indian accepts such employment rather reluctantly. His light bodily frame, in fact, is not well suited to heavy work. The voyageurs of the north *par excellence* are Scotch or French mixed breeds, men not infrequently of unusual bone and strength. Although Dr. Low regards the modern Montagnais as rather improved in sturdiness by the long infiltration of white blood which began with the days of the *Coureurs des Bois* and early fur trade, the slighter build usual in the northern group is tolerably common.

Occasional association with modern operations along the nearer borders has not much changed the inland life of the people. The interior is still an Indian possession, where no white man makes his home, and the only law is the immemorial code of lodge and hunting-ground. The whole inland, and indeed almost all the coasts, remains given over to the hunting life.

The Indians, always diminishing in numbers, may be reckoned at some three or four thousand at the present time. Of these the Montagnais, who are all tributary to Gulf or Saguenay trading-stations, make up more than half. It is difficult to arrive at a census of such a wandering people, for in one year and another some of them appear successively upon coasts remotely apart. The lists of names at such far-distant trading-stations are rarely compared with each other, while the names of the Indians are somewhat subject to change, and at best are not always easy to identify.

About the great lakes of the central area the people meet as may happen during the hunting season, and exchange their unwritten news; slight, indeed, is the occurrence, from side to side of the country, which escapes those lodge-fire gatherings. Families hidden here and there in remote valleys may wait for their news, perforce, until late in the spring, when at various rendezvous they group together for the down-river voyages; or even until the summer meeting on the reserve, where all subjects have their final review; but on the far lake levels of the high interior, the hunting-place of the strong and skilful, their network of communication is seldom long broken. There, about the central area, gather the rivers which flow to the four coasts, and there the people converge. In the words of John Bastian of Pointe Bleue, "At Kaniapishkau you meet Indians from all shores."

Almost all the Montagnais families leave their hunting-grounds when the fur becomes poor — technically, "common" — in the spring. About the last of the fur-hunting comes with the bear-hunt, late in May, when the snow has settled down and the bears begin to move about after their winter's sleep. By the last of June the people are gathered upon the reserves along the Gulf and on the Saguenay. Sometimes a family remains inland two years for some reason, most often because of a light catch of fur. In such an event some neighbour usually takes down what skins there may be, and brings up purchases accordingly in the fall. There is not much trouble about subsistence in the summer for those who stay in. Fish, taken almost wholly by net and spear, are nearly unfailing, and there are some ducks, geese, and small animals, besides eggs and berries; enough all told to get along on, although the large game fail.

Beaver, bear, and lynx, with the caribou, may be reckoned under the latter description.

The latter days of June — *Nipish Piishum*, the "Leaf Moon" — find the country pretty well vacated by the outgoers. July — *Shetan*, or "Ste. Anne Moon," for Saint Anne is their special saint — is dedicated to church observances and quiet life at the shore. The Oblate Fathers give religious instruction from the missions on the reserves, and the younger Indians are taught to write their own language. Canoes are built; a little near-by fishing is carried on; the season on the whole is one of festivity.

The physical condition of the people is apt to deteriorate in summer, for the elements of the reserve life are largely foreign to the native habit. There is crowding into small houses and cabins; doubtful drainage, water, and food; more whiskey than ought to be, and the ordinary diseases of civilization. At Pointe Bleue, on Lake St. John, rheumatism is prevalent, and the constitutional instability of the mixed race makes for consumption and the minor diseases always present in the large town of Roberval near by.

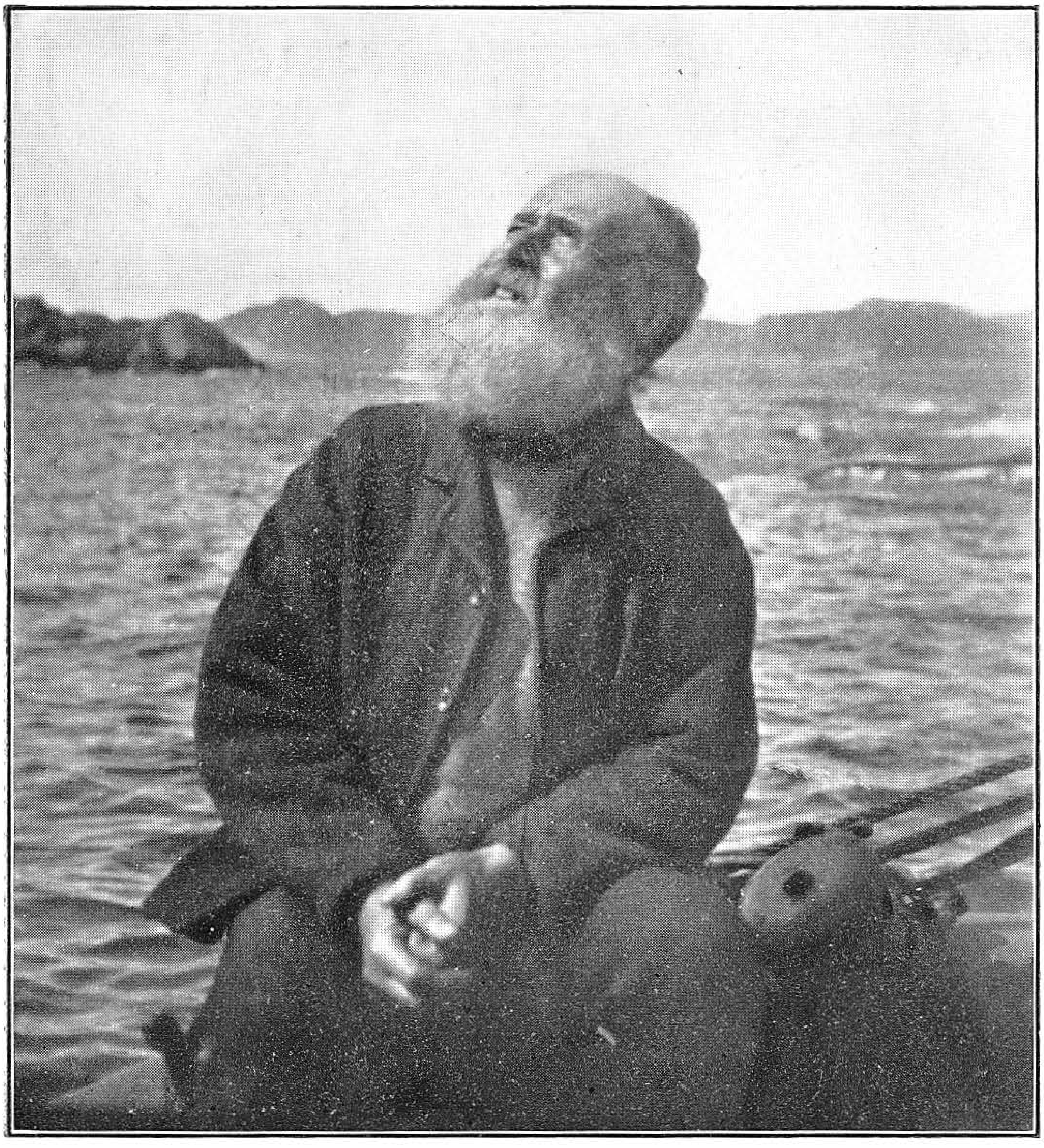
The month of August is known as *O-pó-o Píishum*, "Moon of Flight," for then the young ducks begin to fly. They are welcome for the kettle during the canoe journeys to the hunting-grounds. As the month goes on, a busier air comes over the reserves; trading is completed, and the refitting brought to a close. One by one the families slip away, until at last only those who hunt comparatively near are left. By the last of September, *Ushakau Piishum*, when the "caribou horns harden," most of the cabins are empty, the tents have vanished, and few but the very helpless are left upon the reserve.

Near Bersimis, some two hundred and twenty miles below Quebec, three large rivers converge to the coast, and all receive their customary families in the fall. The Maniquagan is the chief of these, being ascended during recent years by as many as seventy families. Near and parallel with this is the more difficult Outardes River, named by the Indians *Pletipi*, "Partridge-water," from its chief lake. Many of its hunters ascend the Maniquagan some two hundred miles to the lakes, and cross to their own river by a toilsome portage route. A few pass directly up the Outardes. With the burden of provisions now necessary to the hunting of these rivers, the way up such a difficult stream as the Pletipi becomes peculiarly hard. Still, for these people, whatever their age or condition, there is little choice, — inland they must go, to their own lands.

A party on the way up river was camped above the first portage a few years ago when the writer passed down. A bright old withered woman appeared at the landing, her husband, older and blind, standing close with his staff. Two children showed their heads from the bushes near the piled supplies, peering at the strange canoe. A small dog barked not far away, a shot followed, and soon, carrying a partridge, a young man came from that direction and joined the conversation which our Indians had begun. They were going to the large lake Pletipi on the head of the river. It would take a long time, all the fall, and they thought game to live on would be more plenty along the Pletipishtuk than on the other river where so many families travelled. They were cheerful enough, though with virtually only one effective pair of arms to fend for all.

In a country of such scanty resources and physical obstacles, these movements, involving the young and the feeble, could not be undertaken but for the intimate local knowledge of the people. Most of the Indians are actually born upon hunting-lands handed down from their ancestors, and at an early age each knows his own ground as the farmer boy knows his father's farm. He has made the yearly passage of his river, down and back, from infancy. High water or low, he knows its every eddy and turn. As to an inn ahead, he plans his day's travel to some fishing pool or lake; or to the blueberry lands, where will be berries surely, and bears perhaps. He camps in no chance place, but where the beach is clean, the bank not too high or steep, where wood and boughs and water are to hand, and always, when may be, where the view is sightly and wide. Thus he continues his way, every resource of the barren land made his. Illness and death sometimes befall, want and misfortune tax too often the fortitude of this ever disciplined race, but sooner or later the plateau level is gained, the lake region begins, and the portages along the narrowing streams become short and easy. The great falls are behind, their jarring thunder fades in time from the ear; the roar of the long rapids is over; the shut-in river valley has given place to the broad sunshine of the table-land. Well content are they who have safely come. The long toil is over; they are glad to be away from the reserve; above all, they are once more upon the blue lakes of their own hunting-ground.

The journeys inland have become increasingly hard as the game resources have diminished. The carrying in of supplies involves great labour on the long portages. A crew of picked voyageurs moves slowly, even though taking no



The Prayer-leader at the Ragged Islands

time to hunt, and unencumbered by children or old persons. On the Long Portage of the Bersimis, Low's exploring party spent a full week. It appears on his map as the "ten-mile portage," and passes over a mountain more than one thousand feet high.

In the earlier days of the fur trade, these movements were by no means general with the people, partly because the comparatively few articles then required in trade were easily transported, and the trading was done at some distance inland. In the nearer regions, formerly the best hunting districts, fur is now scarce and large game almost wholly wanting. Previous to white occupation of the shores, it is probable that long journeys were not often undertaken for any purpose, while those performed were favoured by a game supply which was usually ample. The seasonal migrations of the recent period bear very heavily upon the young and feeble, and must seriously affect the current mortality figures.

The periods of actual straits and starvation usually occur late in the winter, when reserve supplies are exhausted. It would be hard now to name a district of the peninsula where subsistence upon the country the year through is reasonably dependable.

The prime disaster to the game resources was not due to improved firearms or such access of direct destruction as swept away the buffalo and other western game, but was incidental to a succession of tremendously destructive forest fires. From the Gulf to the barrens, three-fourths of the country has been laid waste within the white period, the thin mat of organic soil being burned wholly away over large areas, leaving only rock and sterile subsoil. The great fire of the Saguenay ran from west of Quebec some seven hundred miles to the Romaine River, sweeping the country from the Gulf to the height of land. Such damp grounds as were spared could sustain little game, and afforded slight protection from the hunters to such as survived. The catastrophe, so far as resources for the Indians are concerned, was nearly complete.

Earlier still the plateau had become largely non-supporting. Hind, writing in the sixties of the country about the Moisie, gives a saddening account of the misfortunes of the Nascaupees. Many were forced to the shores. There food was to be had, but the change to the damp of the Gulf from the activity and sunshine of the high interior brought its natural consequences, and consumption and the unknown diseases of civilization soon brought their end.

Where the soil remains, gradual replacement of the forest goes on, the higher ground most often turning to birch, with quaking asp, and the gravel river levels of the southwest to an open growth of Banksian pine, the *ussíshk* of the Indians, and the *cyprès* of the French *habitants*. In favourable places the original forestation of spruce and fir succeeds, if poorly, in reëstablishing itself.

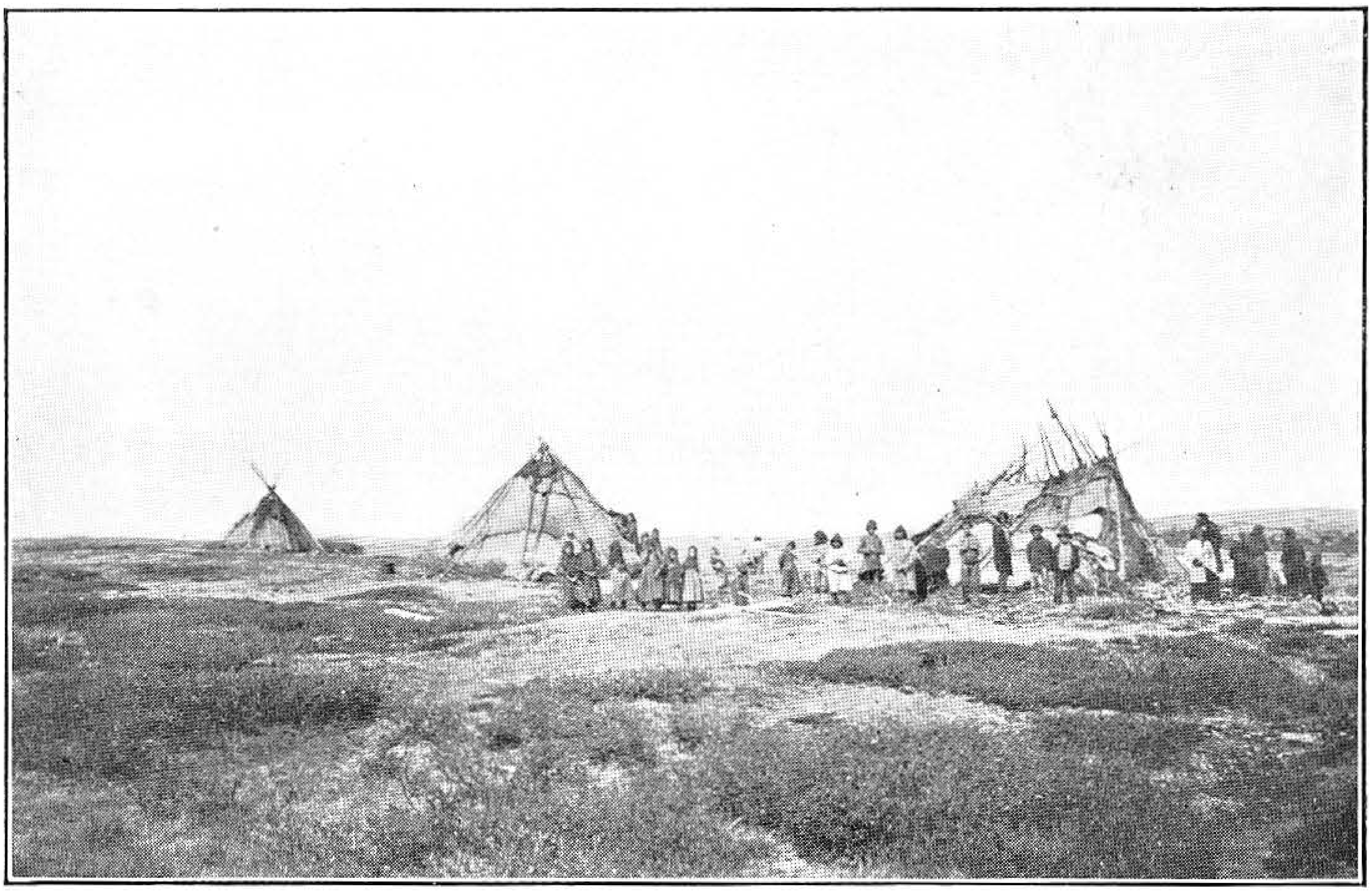
The cause of fires is generally the carelessness of border whites, although Dr. Low's supposition that not a few have begun with "wandering Indians, careful only in their own hunting-grounds," is doubtless true enough. But it is to be remembered that the fire code of the real Indian is very rigid, and the fact that white advent found the country forested to the subarctic barrens tells its own tale. The people were far more numerous then, yet under their law the woods were green. But for the coming of a careless race, they would be so now.

Along the Gulf the principal trading-stations are Bersimis, Seven Islands, Mingan, and St. Augustine. From Seven Islands the Moisie is the main highway to the interior, and several of its families make their hunts within two hundred miles of Ungava on eastern branches of the George. Nearly parallel with the Moisie is the St. Marguerite, or *Tshimanipishtuk*. Its principal western branch interlocks with the Maniquagan. The network of Indian travel about and far beyond the heads of these rivers is interminable.

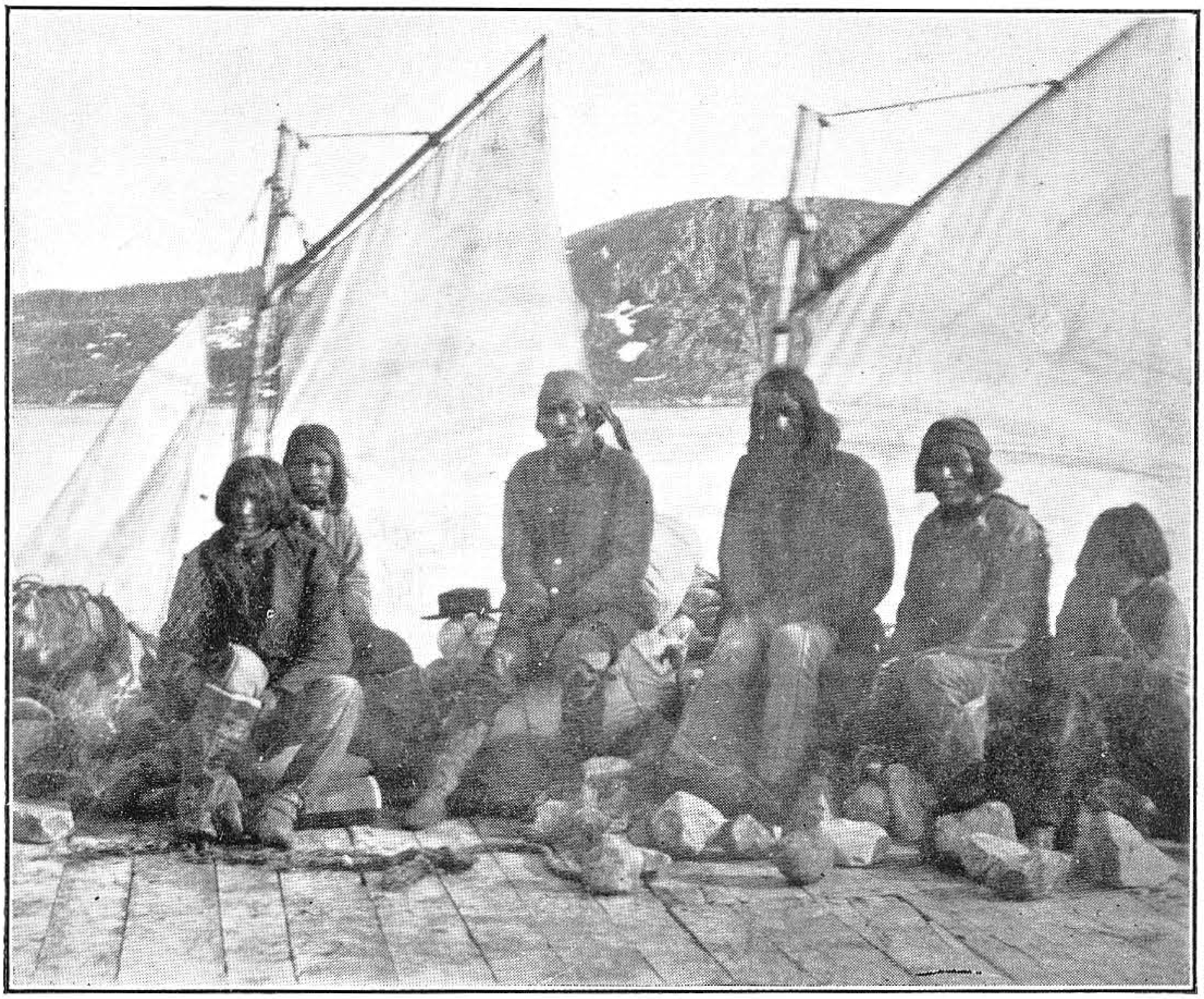
From the Gulf near Mingan, the hunters ascend the St. John, pass a difficult high portage to the Romaine, and proceed toward the Grand Falls region of the Hamilton. They know the lower Hamilton as the *Winikapau Shibu*, or "River of Willows," and the falls as *Pitshetonau*, "It steams," from the column of white vapour which is seen from a distance. Low gives the tradition of two maidens swept over the falls, who spend their time behind the falls dressing skins. The lower part of the Romaine is not navigated, and is perhaps unknown to the Indians of the present day. Its Indian name "Alimun," meaning difficult, has passed through a rearrangement of sounds unusual in the adjusting of Indian names to French organs of speech. From "L'Alimun" to "La Romaine" the transition is easy,—surprisingly so, considering that no less a feat is involved than the introduction of the full rolling *r* into a language which has not the *r*-sound at all.

In general, while the French learn readily enough to make practical use of the Indian dialects, they seem to have much more difficulty in the matter of correct articulation than do persons of English speech. Nevertheless the two races, the French and the Indian, are by temperament rather notably acceptable to each other. It has been remarked that the Highland Scotch, in particular, learn the native dialects well and readily. This peculiarity seems more than an accident of linguistics, for the young Highlanders brought over by the Hudson's Bay Company not only learn the language easily, but marry forthwith, fall into the life, and show in their children as encouraging examples of such combining of extreme elements, the very light and the deep brown, as may well be found. On the other hand, the young Englishmen brought over in the earlier period of the Hudson's Bay Company were a notable failure in adaptability to the conditions, remaining alien to the life and seeking usually a final escape from their surroundings.

Analysis of the deeper affinities of the language must be left to the linguist; superficially it does not appear to have a common origin with any of the European tongues. It must be supposed that articulation, at least, is affected by climate and mode of life, as is physiognomy as well in the case of dwellers upon wind-blown plains. A relation may exist between the mild climate of southern Europe and the prevailing use of the outer organs of speech by the Latin races. The rolling *r* and the mobile face are hardly to be associated with high latitudes. In the north, on the contrary, it might be difficult to find any word in the Algonquian, or in that very different language, the Eskimo, which could not be spoken clearly with the face immovable. These are languages which can be used without



Eskimo and Nascaupee Indians, Hudson Bay



Davis Inlet Montagnais

difficulty when the face is stiff with cold. It may be noted that the Scotch and English, whose relative facility in catching the Indian sounds has been remarked, have also a long inheritance of northern conditions.

Eastward from Mingan the people travel the Natashquan, St. Augustine, and Eskimo rivers. Their lands are chiefly in the region between the Hamilton and the St. Lawrence. Southward from the Mealy Mountains of Hamilton Inlet and the Sandwich Bay coast lies an indefinite, unmapped area of high territory, partly barren, where large lakes supply the rough rivers passing north, east, and south. In winter, white or Eskimo-white hunters penetrate one or two hundred miles into this area. The Hamilton River also is hunted by the shore people. These go up in the fall in boats, returning on snow. The inland life of these shore-dwelling hunters is as little like that of the Indians as well may be. Their winter method is to take what supplies can be hauled on sleds by hand, set traps along their route, the length of which is determined somewhat by snow conditions, and take up the catch of fur on their return march. They are known as "planters"; their occupation is "furring." Cabins are built by some at strategic points, and these "tilts" may be taken as the sign of white blood in the land. The Indian, held to no base, uses the movable lodge only. The shore hunter is bound, his campaign limited, by his large dependence on transported provisions. If half-emancipated from, or better, only half-subjugated by, "the white man's burden," he lacks yet the full inheritance, the ferity, which saves existence to the Indian born. The broad difference between the two, the fur catcher and the Indian, is that between hunting and the hunting life.

The white man goes hunting, his family protected in his absence; the Indian, rarely separated from his family, takes the chances of the open for all.

During late years, few Indians have been regular visitors on the eastern coast of the peninsula. For convenience to themselves, the Oblate Fathers have influenced the hunters who formerly traded at Hamilton Inlet to make the longer journey to Seven Islands. Irregularly a few northern Indians from George River have visited Davis Inlet post, as few as three coming down in one or two recent summers. The northern group turns rather toward Chimo on Ungava Bay. In winter some numbers of the northern group may come to the east coast, but they do not bring their families unless under pressure of starvation, and their stay is brief. The number of lodges on the eastern side of the country depends on the movements of the caribou. These vary rather widely in the course of their migration, the main herd sometimes remaining south a year or two at a time. As already noted, a number of Montagnais families from Seven Islands hunt near the upper George River nearly west from Hopedale. The height of land there is one hundred to one hundred and fifty miles from the coast. All, or nearly all, of these families make the long journey to Seven Islands at intervals, going usually by the upper Hamilton, Ashwanipi Lake, and the Moisie. Rather regularly some of these make a visit to the east coast in winter, and sometimes in summer.

In the northern district, tributary to Fort Chimo, there are some forty or fifty families, according to Peter McKenzie. A certain number of Indians from Whale River also come to Chimo more or less regularly, perhaps more often to Fort George or other posts on Hudson Bay. These probably belong to the division mentioned by Low in his large Labrador report as the coastal Indians of Hudson Bay. Their dialect is not very easy for the other Indians to understand, probably from its Ojibway affinities. Those who come to Chimo are strong, active people, proud of their large hunts and of the long journeys they make to the coast. They look down a little on the Chimo Indians, many of whom hunt comparatively near by. The eastern Nascaupees, in particular, are not very ambitious either in fur hunting or travel. The caribou supply nearly all their wants, so that not much effort is required to get fur enough to pay for what else they require. Indians do not enter the wide peninsula to the west of Ungava, which is Eskimo ground so far as occupied. From Koksoak River to Hudson Bay the respective areas covered by the two races are separated approximately by the line of the Nastapoka and Larch rivers, which constitute a route surveyed by Low, and pursued by Mr. and Mrs. Tasker of Philadelphia in 1906.

The name Nascaupee is a slighting term given to the northern Indians by their more sophisticated neighbours of the south. Originally the word seems to have meant ignorant, unlearned, but is now connected usually with pagan or heathen people who have not had religious instruction. In his very comprehensive report (1885–1886), published by the Bureau of Ethnology, Washington, Lucius M. Turner gives the name Nascaupee as meaning false, unworthy, and as connecting the people with a failure to join in some movement against the Eskimo in the old days; but this rendering seems etymologically doubtful.

Their immediate neighbours call the eastern Nascaupees *Mushauau-eo,* " Barren-ground People," and their principal river, the George, is known to all Indians as *Mushauau Shibo*, or " Barren-ground River."

The Nascaupees' name for themselves is *Nenenot,* "True or Ideal People." Literally this seems to mean "Our Own People," which, after all, in the minds of most races comes to much the same thing. These meanings have been quoted by a recent traveller, Wallace, who gives some of the information gathered during a visit at Chimo. His statement regarding the Indians' extreme fear of the sea seems at least exaggerated. He describes them as afraid to even look upon the sea below Chimo. On the contrary, Mr. Guy, long resident at Chimo, has observed little feeling of the sort. During his time there a young white man while hunting was drowned in a lake on a stream emptying into the bay. Some Indians not only went down to the sea by canoe and around to recover the body, but made the trip a second time to find the rifle. In the recent observation of some Chimo hunters on the Atlantic side, they took very readily to salt water, boating and canoeing under reasonable conditions. If unnecessary canoeing about Ungava with its forty- to sixty-foot tides and notoriously bad navigation has small attraction for them, the circumstance is not to be taken as phenomenal. None who has actually voyaged with these masters of the open canoe is likely to believe them water-timid. Turner says these Indians bear cold as well as the Eskimo do, although under starvation they do not hold their working strength so well. The little children certainly show astonishing indifference to cold.

The lake and river route from the middle George to Chimo leads westerly to Whale River. This is not the Whale River mentioned in connection with the coastal Indians, which is a great stream of the Hudson Bay slope. The present river is smaller, and is known to the Indians as *Manouan,* "Egg-gathering Place." They describe the route as a hard one, and the Manouan as *alinum,* "difficult." The river route eastward to the Atlantic is not difficult for a light party, but as it includes more than twenty lakes with many long portages between, it is hard to follow without a guide, and is at best rather formidable for a loaded party.

Formerly some of the southern Indians came up Northwest River and hunted on its upper waters and those of rivers flowing eastward into the Atlantic. Their country, poor at best, suffered by fire; fish were small, the caribou more and more uncertain. Finding that the deer summered in the unoccupied lake country south of the Nascaupees and west of Hopedale, they adopted that region and gave up the difficult Northwest River route. Having changed their trading-point to Seven Islands, the easier route by the upper Hamilton and Lake Michikamau was very direct. The number of these families varies from half a dozen to as many as fifteen or more. Their summer route finally reaches the east coast by the *Notaquanón* ("Porcupine-hunting-place") River.

In winter, they can traverse the country without much reference to watercourses. The camps are in sheltered places, where there are trees enough to protect from the wind, and are almost always near water. The ice becomes too thick to be cut through easily, but whenever there is much weight of snow, the water comes over the ice in places near shore, and does not freeze when blanketed with ten or twelve inches of light snow. Such water can be cleared of slush by very little warming over the fire. In default of water, chopped ice melts much better than snow, which the people avoid. They prefer to work hard for twenty or thirty minutes chopping a hole, rather than bother to melt down an uncompacting mass of cold, porous snow. They rarely, if ever, drink ice-cold water, but warm it a few degrees, even building a special fire for this purpose when travelling. In this, as in most other race peculiarities, they find their opposite in their Eskimo neighbours, who are said to eat snow and swallow frozen food with only the happiest consequences.

For winter travel, most of the people now use sheet-iron stoves a foot square and about two feet long. The snow is tramped level with the snow-shoes, the tent raised and boughs laid; then the stove is placed on four stakes which are driven some three feet into the snow, and serve as legs. Such a stove will burn almost any small wood, and in a country where good wood is scarce, will save much time and labour in heavy chopping and shovelling snow, besides enabling the traveller to camp almost anywhere and not have to go more than a mile or two out of his course to get good wood.

The Indians at Nichicun are classed by Low as Western Nascaupees. Only thirteen families traded at the post at the time of his visit. Other families in the neighbourhood go to the Gulf with their furs. Living near the geographical centre and apex of the plateau, they naturally hunt not far from Nichicun ("Otter-place") Lake. They live almost wholly on the country. Few deer are taken there, and while fish are generally plenty, the margin of subsistence is uncomfortably narrow. All the able-bodied men go to Rupert House in summer with the brigade, while the women keep the nets out in lakes near the post. The return journey from Rupert takes about sixty days. Sometimes the start downward is made before the ice has left the lakes, but although the stay at Rupert is only a few days, the upper lakes are sometimes frozen again before their arrival at Nichicun.

For some years Nichicun has been the only inland post in the whole peninsula, unless Mistassini, in the extreme southwest, be reckoned. The up voyage of the Mistassini brigade takes about fifty days. The lower part of its route, in common with that to Nichicun, follows Rupert River. There are seventy-five portages between Rupert and Mistassini.

The thirty families who trade at Mistassini are also counted as Nascaupees. All the Indians known by this name are properly Swampy Crees. Those at Chimo say that they came originally from southwest of Hudson Bay to get away from the Iroquois.

The brigade canoes are now of canvas, twenty-eight feet by five and one-half, by two and one-half deep, and carry five thousand pounds each of cargo. In 1898 thirty-five thousand pounds of freight went to Mistassini. The portaging is arduous. Every man takes two "pieces," each of ninety to one hundred pounds' weight. There is competition among the men for the bags of shot, which balance uncommonly well at the top of the load close to the neck. Such a load, of about two hundred pounds, is no trifle over rough and swampy ground; but every man, down to the least, prefers to take his two pieces at once rather than make two trips. The downward trip from Mistassini in a light canoe takes about ten days.

The unit of value here, as formerly in most of the north, is the "Made Beaver." In 1898 a fair-sized actual skin was worth 2 MB. Prices were virtually a nominal matter; the people simply took down their furs and brought back their necessaries, with a share for the post. If for any reason a man did not have much fur to turn in, he was still taken care of, being at least furnished ammunition and other means of getting fur and food.

The Mistassini people hunt chiefly to the north on the east main head water, the "Nichicun side" of the country. Far from outside help, this region has a history of starvation. For a long term of years, the deaths from starvation were more than from all other causes combined. For a time the district was abandoned. The fur game increased remarkably, tempting the people back, and about the year 1906 new cases of starvation occurred. There is not much large game, and in the periodic seventh year, when rabbits fail, and perhaps the uncertain ptarmigan or "white partridge" does not come, the worst may follow.

All the families of the southern slope now take in enough supplies to escape actual starvation. About the year 1904 the large Étienne family, of Ste. Anne, transported about one-third the total amount they would naturally consume; and this may be taken as a fair example of the best half-breed practice. So large an amount can be moved only by stages. The canoe carries a load to the end of the stage of a few miles, and then drops back for another cargo.

The hunting-place of the Étiennes is at Temiscamie, on the very head of Rupert River above Mistassini. Their route follows Peribonka River for nearly three hundred miles.

From Lake St. John the Indians hunt the large rivers northward to the height of land, and to some extent beyond. The great evergreen regions of the East Main are the best hunting-grounds now; there, in the "black growth" forests, the martens are dark and rich, fetching prices of $15 to $30; but the journey is long, and not many hunters from the south go so far. Wherever burnt districts have come up to birch and aspen, fur values are lower. In such districts there may be plenty of martens, but by an interesting observance of the laws of protective colouration, the fur tends to match the general light aspect of the country and is pale and less valuable.

The hunting-lands are held by individual hunters, and are passed down from one generation to another by customs of inheritance similar to our own. The hunting naturally descends upon some man of active age; if a daughter is married, the young husband may succeed to the lands. Surviving parents, or even more distant relatives, have, by common right, their place in the lodge. In fact, all must be taken care of in some way, in one lodge or another; about the hunters group the dependent ones, widows and orphans and incapacitated; none is denied his right.

Infringements upon each other's hunting-grounds are probably no more frequent than the cutting of timber on another's land in civilization. The restraint of Indians in such matters is far beyond that of more advanced races. In passing across another's ground, which may take some days, the traveller has the right to take enough game for subsistence, but not to hunt fur, nor to accumulate a stock of provisions.

The number of animals taken yearly depends on their abundance; enough are always left to renew the supply. Usually the land is divided into three parts, which are hunted in rotation from year to year. On the southern slope the beaver is greatly valued, perhaps more for its wonderfully good meat than its fur. The most sustaining foods are beaver and bear. With bread, of course, all the game is sustaining, — fish, flesh, and fowl, — but the family thrown for weeks or months on rabbits and ptarmigan alone, with perhaps a little fish, weakens in time to the point of danger. The expression "Starve on rabbits" is well understood in the north.

The beaver is taken, not uncommonly, by "staking," a method which involves the driving of long stakes in a sort of grating over the under-water exits of the beaver, and then easily digging out the imprisoned animals. Bears are found even in midwinter, sometimes by aid of the small dogs, but more often by taking advantage of the bear's habit of returning to the same place for successive winters. Their empty nests are noted in summer and visited at convenience during the long period of hibernation.

The keen little dogs referred to are indispensable in the hunting of small game, joining their efforts and senses to those of the family in a marvellous way. In travelling by canoe, they are often put ashore to run the banks, with great effect. An Indian dog, a pole, and a noose are as effective a combination in hunting some of the grouse kind as almost any that can be brought to bear.

The substantial fish of the country, and valued accordingly, is the lake trout — *namaycush,* often called *kokomesh,* "the fish that swallows anything." It sometimes grows to thirty or forty pounds' weight. Although a lake fish, it is found in some of the running rivers in summer, taking flies along with the *fontinalis.* The latter is not as important to the people as the *namaycush,* and is, on the whole, less regarded by both whites and Indians. In fact, when cooked by boiling, which is the method of the country, — perhaps of all countries where the main living is upon fish, — the lake trout may fairly be reckoned the better fish of the two.

The whitefish, when of good size, holds a higher place than either of the trouts. It is a different species from the western one, the *coregonus,* and such fortunate persons as have taken it from the cold rivers of the plateau are likely to regard it as the superior fish. Its specific name is *labradoricus.* The fish is rather insipid, "vealy," when young, but gains in flavour and firmness up to the weight of six or eight pounds. It is caught with the gill net, which in the northern districts becomes useless by midwinter, as the fish go into the deepest water and are considerably dormant. Line-fishing then becomes the only resource. The whitefish is thus unavailable, and the trouts and the pike form the mainstay. In many waters of the south slope the most dependable fish in midwinter is one called among whites by the various names — maria, ling, loche, cusk, and fresh-water cod. This curious combination, to all appearances, of eel and hornpout, comes freely into shallow water under thick ice, and is easily caught by set lines with almost any bait. Its native name is *milákato,* which has been translated by a Montagnais as "Big-wide-head."

Another rendering from a native source carries the meaning of its being a nasty, disagreeable-looking fish, which is certainly accurate. The flesh flakes quite like cod, and is rather good. Its habitat extends at least as far south as the Connecticut Lakes of New Hampshire.

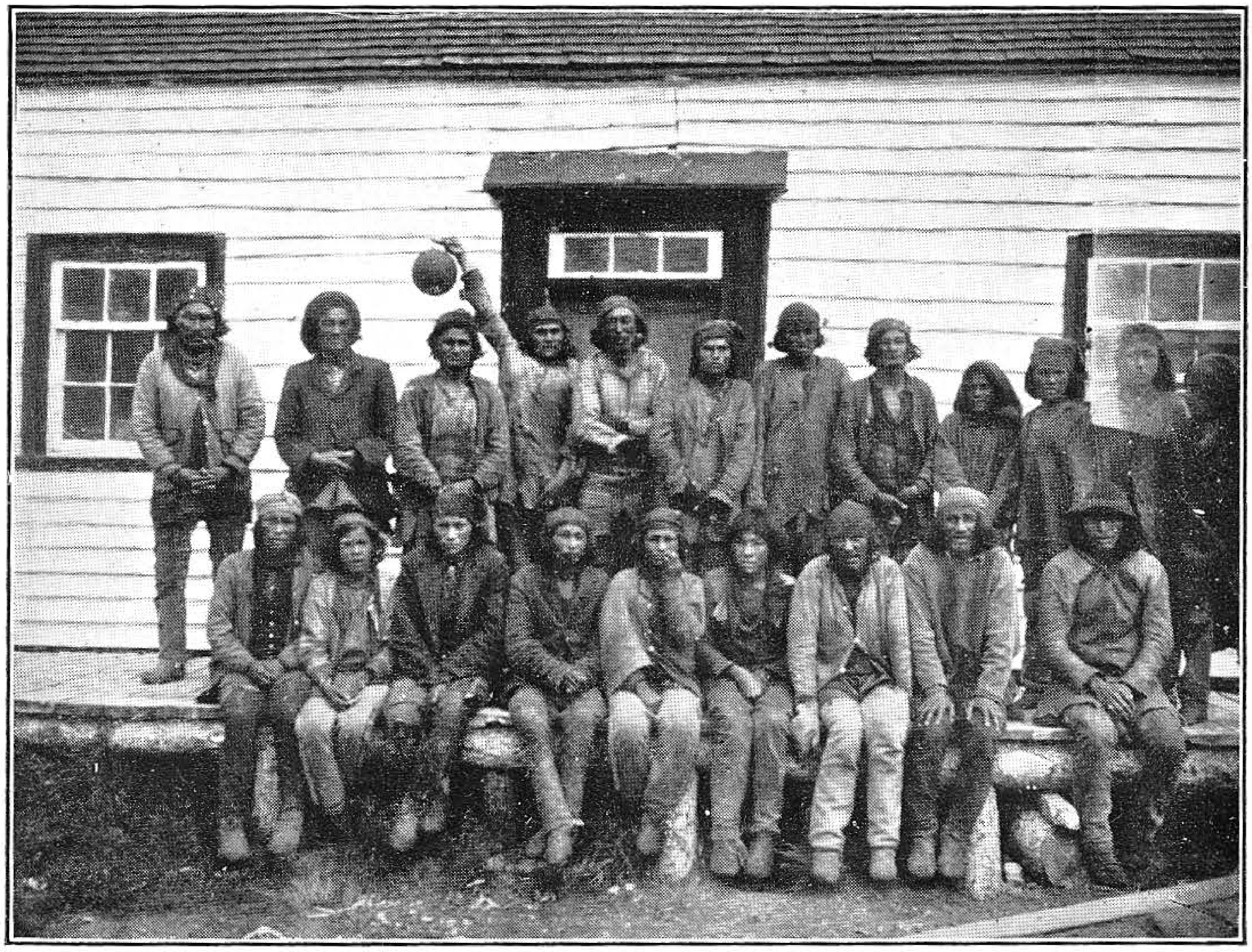
The list of important fishes includes the *ouanániche*, or "land-locked salmon," found rather widely over the southeastern quarter of the country, the red and white suckers, and the pike-perch, or wall-eyed pike; the range of the latter extends as far as the eastern heads of the Maniquagan, where a round lake nine miles across is known as *okauinipi*, "pike perch water." As *kau* means rough, the name of the fish would seem to come from the perch like roughness of its scales.

Last and least of the common southwestern fishes is the river-chub, or dace, which in the cold streams is good throughout the summer. It should be skinned rather than scaled. Its native name is *uitúsh* "stone-carrier," from its well-known habit of piling up pebbles in the shallows.

The wooden spear is used for all kinds of large fish at times, especially for the salmon. To fish with a torch and spear is *waswáno*, hence Waswanipi lake, south of Hudson Bay, and possibly Ashwanipi, the large lake north of the Moisie on Hamilton Water.

According to John Bastian, a young Scotch-Montagnais of Pointe Bleue, who was hunting there between Mistinik and Kaniapishkau, that region has practically no rabbits or beaver, — there being little food for them, — although it is a good district for martens. Other subsistence failing, John and his companion were thrown wholly upon fish, caught with difficulty and boiled without salt, for two or

Indians watching the Caribou at a Crossing



Nascaupee Indians at Davis Inlet

three months. "It was hard work to cut the holes to fish through," for the ice became six or seven feet thick, but they had enough fish to live on. John suffered from cramps while doing without salt, and they both grew weak, although the companion, who was more used to such living, got on somewhat better than he. They "felt well enough, but had no strength." They were gone from the shore more than a year. The experience was rather a commonplace one for the regular hunters of these districts, but it left John a good deal reduced, and it was some time before he recovered his strength.

The people who descend the Moisie in the summer gather at Sandgirt Lake on the Hamilton, apparently for the mere sake of seeing each other, and they keep together as may be until their final separation in the fall for their individual lands. Something of an inland trade used to be done among the people, and doubtless survives still. A Seven Islands hunter would give fur to a Bersimis man at some rendezvous, and each would go his way. Months later, in the fall, one of the fine canoes for which Bersimis is known would be passed in return at some appointed place. A similar trade in canvas canoes goes on between the Gulf Indians and the Nascaupees, whose country furnishes no canoe bark.

Rolls of canoe bark are still sold at some of the northern posts of the Hudson's Bay Company, being imported from more southern districts, along with other merchandise. Nevertheless, the supply has been insufficient for some years and often of poor quality; while by some unnecessary neglect the northern posts have been short even of canvas. With the full supply of the latter laid in recently along the farther coasts, the almost distressing situation of the Indians is at last relieved.

During the period of open water there is practically no foot travel. Some of the hunting-grounds, however, cannot be reached otherwise, and these are unoccupied until late. Mistinik, for instance, is reached by sleds from as far as the lakes of the Maniquagan, only two hundred miles from the Gulf, where the canoes are laid up and a stay made until winter sets in and the foot travel comes on. The tabanask, the sled for light snow, is as narrow as sixteen inches and is one-fourth or five-sixteenths of an inch thick. The thinner and more flexible the bottom, the easier the sled is to haul, but as they wear a little with use, it is better to start a long journey with a little extra stiffness. The material of the sled is usually white birch, sometimes larch. The latter is not likely to ice-up and stick in changing temperatures. This icing-up may occur at zero, or below, and is a very serious hindrance; not much is done to prevent it, but there is no doubt of the good effect to come of such pitch-beeswax-tallow treatment as is given to the Norwegian ski, for the same sort of evil. Thin grease, or still worse, oil, does decided harm. The pulling is done from the head with the hands twisted into the lines behind the back. In midwinter the snow is dry and gritty, and a load of two hundred pounds, taken over a ten-mile stretch, may be a hard day's work for a strong man. As the snow settles in the spring, the loads and mileage increase, runner-sleds are taken into use, and on the lakes and rivers a load of five hundred pounds may move twenty or twenty-five miles a day. All the snow-shoes of the country are of the "round" type, which is doubtless better than any other for light snow in a broken country. The prevailing pattern of the Saguenay district is from twenty to twenty-four inches wide, with an ordinary tail four or five inches long. The rest of the peninsula generally is committed to a rather wider shoe, with a mere loop for a tail. The frame is in two pieces, spliced at the sides. A fine pair in possession of the writer are twenty-six inches wide and twenty-five and three-fourths inches long over all. Although the various patterns of round shoe look awkward or impossible at first sight, they are extremely well regarded by all who have used them. For firm snow or in a level country, a narrower shoe is obviously more suitable. For spring snow-shoeing almost any sort of a makeshift is sufficient; still the round shape prevails, the shoe being smaller than for winter, and roughly made.

For snow-shoe moccasins, caribou hide is largely used in Labrador, in default of moose. Instead of stockings are worn duffel slippers, "nips," which fit one inside another, and are very serviceable. The Indian hunters wear foot wraps — *piuashigan* — which need no repairs, are easily dried, and do not wear thin at heel and toe, like nips. Almost any material serves for these, — blanketing, duffel, rabbit skins, or even old towels.

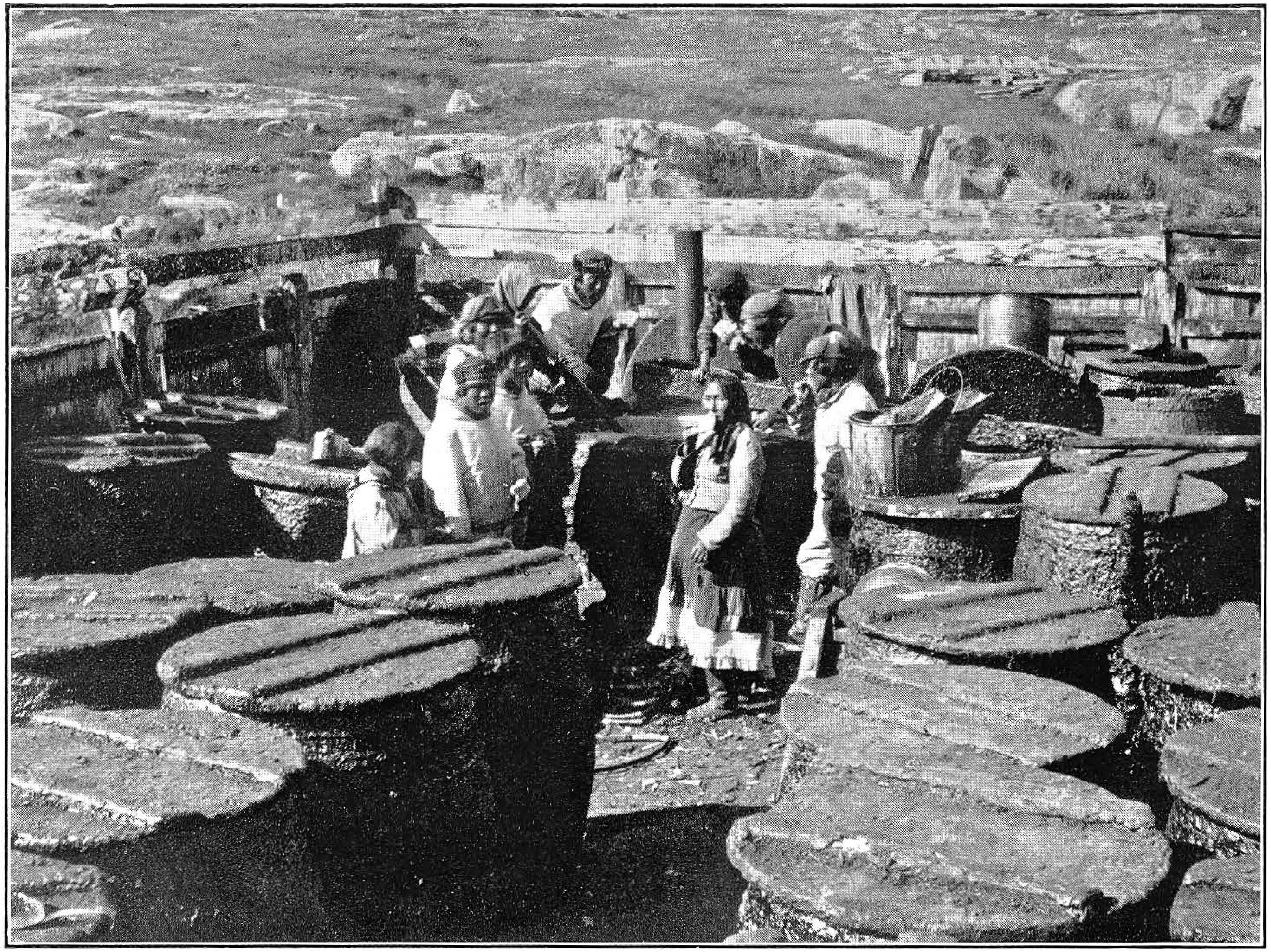
In general, the Montagnais are rather badly clothed in trading-store furnishings. The Nascaupees are still considerably in skins, some, in fact, with no cloth garments at all. The men wear a breech cloth of skin, a sort of thin undershirt of unborn caribou with the slight fleece turned in, leggins of Hudson's Bay Company's "strauds," moccasins, and a skin or cloth frock over. Commonly, when inland, no sort of hat is worn. The hair of the men is cut off square above the shoulders.

In winter the frock has a hood, and the moderate coat of hair which the summer skins bear is allowed to remain on, usually turned inside. For extreme weather this sort of frock is made without a hood, so that a hooded frock with hair outward can be put on over it. Sleeping-bags of caribou skin are commonly used.

Many of the Chimo Indians have lately adopted trousers for winter wear, but the little band of George River people under Chief Ostinitsu still prefer leggins and the bare thigh. No foreign language is yet spoken by this group, nor do they use ordinarily either bread or salt.

Although well off for guns, the chief means of support of this band are those of the prehistoric period. In favourable years the deer-spear alone furnishes the main living. When the great migration is on, hundreds and sometimes thousands of caribou are speared on the lake and river crossings, without the firing of a shot. The smaller game and birds are taken largely in snares and wooden traps. Nets of their own making, either of sinew or twine, are their most dependable means, rarely failing for long of taking food during a large part of the year. Even in the last months of winter, the time of graver straits, they rest their forlorn hope, not on the gun or steel trap or fishing gear of trade, but on the unfailing wooden hook of ancient days.

All in all, the life of these people remains singularly unchanged. It may be doubted whether another such survival of the purely primitive hunter, at the same time of so high a personality as that of the savage of temperate America, is to be found in any part of the world. The caribou are to them what the buffalo were to the Indians of the plains.



Blubber Yard at Hebron

So long as continue the migrations, the old-time ways will prevail.

The cooking of fresh material is done most usually by boiling, the most economical method, and the one which, preserving all the elements of the material in hand, wearies least upon the taste.

In the caribou country, the preferred way of saving meat is by smoking and converting into pemmican. For this the meat is smoked rather brittle, pounded into powder and shreds upon a stone, and put into a bag or bladder. Melted fat is then poured in; when the covering is stripped off, the pemmican looks like a lump of tallow, but an incision with the thumb nail exposes the meat.

In the high, cool barrens, whole carcasses, skinned and cleaned, are left on the gravel-beaches to dry black in the sun and wind. Sometimes many hundreds of carcasses thus exposed may be seen along the beaches at the spearing places.

The art of making pemmican is practised also by certain Africans and other primitive peoples, and the grease is sometimes replaced by honey or some similar preservative.

If it is not surprising that so convenient a means of dealing with the food-supply should be found in various parts of the world, there is nevertheless a deer product in northern use which might more naturally be presumed as of only local use. This is the *uinastikai* of the caribou country; into the paunch of the caribou is put the blood, a little of the partly digested moss is left in, and the whole is cooked and dried, when it may be crumbled into grains like brownish gunpowder. It does not seem to be regarded as a delicacy, being, it would appear, more valued than liked, and used chiefly in times of scarcity. It is also prepared in northern Europe, and quite possibly may be found around the entire reindeer north. When starting for a day's hunt in winter, the Nascaupee takes a cup of water, stirs in a handful of uinastikai, and drinks the mixture. Until through hunting he takes no more food. The same abstinence during the day's hunting is noted of the Blackfeet by Shultz, and is doubtless common to the North American races.

It is probable that the slightly digested moss which enters into the uinastikai appeals to our natural desire, seldom gratified in the northern life, for starchy food. A certain amount of this is contained by *cladonia* moss, although by itself it is hardly digestible. The Ungava Eskimo are said to chop up the caribou moss with seal oil as a sort of salad. If its use among primitive people is anything like coextensive with the range of the reindeer, there must be a practical justification for it.

There are several kinds of berries in the semi-barrens, the service-berry, or mountain cranberry, being the one of principal importance to the Indians. To them it is known as *uishitshimin*, "bitter-berry." The shore people call it simply the redberry. The cloud-berry, or bake-apple, grows here and there in damp places, even to the bleak bogs of the height of land east of the middle George River. Blueberries, delicate of flavour and structure, grow on many of the coast islands and inland hills. They grow so close to the ground in exposed places that often it is not easy to pick one without getting a little grit at the same time. The crowberry, or curlewberry, locally "blackberry," is very common near the coast, but is insipid.

In the southern half of the peninsula the common blueberry grows abundantly in burnt areas, and constitutes an important crop to both bears and Indians. At convenient places the outgoing families burn fresh areas each spring, as the yield falls away after two or three crops. Coming up river in the early fall, the families camp at a suitable distance from their berry farm, and the men make a kind of surround hunt for bears. Sometimes as many as fifteen are taken in a few days. Then the women and children turn in for the berries. A good deal of blueberry cake is made, the berries being stewed in a kettle until they will hold together, and then dried. The name of the cake means "like liver," from its final appearance; it will keep indefinitely. The blueberry is *minish,* the "little-berry."

Formerly the barren-ground bear ranged rather widely in the northern districts. The last one reported was killed near the Barren-groundland Lake of the George about the year 1894. Peter McKenzie, who has bought their skins at Chimo, says the hair was very dark, even black. Both Eskimo and Indian regard it as aggressive and dangerous, though the Eskimo tales at least need not be taken too seriously. They are afraid of the common black bear, being unfamiliar with it. The much more formidable white bear they make little of, attacking him readily with hand weapons. No complete skin of the barren-ground bear of Labrador has been examined; the species is probably extinct now, and while it is not unlikely to have been a variety of grizzly, its identity may never be established.

The caribou range from Hudson Strait to the coast at Belle Isle Strait, where they sometimes mix with the larger woodland species. The migrations do not hold together after leaving the barrens, but scatter into the timbered country of the Hamilton Inlet basin, and from there to the Atlantic. Sometimes the greater herd stays south two or three years, to the great privation, or worse, of the Indians. The families east of the George can generally reach the coast in time to save themselves. At Chimo, in the nineties, nearly half the people starved or died about the post from illnesses due to their enfeebled condition. Actual starvation may happen almost anywhere excepting in the short summer, for subsistence is not altogether secure in any district without the aid of coast provisions. The late Charles Robertson, whose last years were passed at Pointe Bleue, used to speak with feeling of the bad conditions on the "Nichicun side," as an indefinite area north of Rupert River is called. During the long administration at Chimo of Mr. Matheson, lately retired, it was the usual yearly happening that five or six hunters "did not come back." They had fallen somewhere, hunting to the last, — for the less the strength of the hunter, the more urgent the need of finding something before it is too late.

The semi-barrens of the northeast, the home of the Nascaupees, and of the caribou they live on, is in summer an attractive country. Unmapped lakes of large size lie along the height of land east of the George, and smaller ones here and there to the very coast. When the deer are passing north, the best crossing is often at Mistinisi, a fine lake fifteen or twenty miles long discharging into the Barren-ground Lake. The crossing-place is six or eight miles from the east end, and is at least a third of a mile wide. If the leaders of the migration are turned, the whole route is shifted, perhaps a long distance. It is certain that very slight causes must serve to determine their course of migration, for no one can tell just where it will go. From Atlantic to Alaska, throughout the immense territory of the barrens, this is true; no race or tribe can foretell in this absolutely important matter. Some scattering deer are found over the country apart from the main herd; and the latter may break up into smaller bands.

The shore people from Hopedale north formerly depended much on their deer supply. For some years this has failed. The southward movement was never much depended on at the coast, while recent fires have swept so much of the country south of Davis Inlet that the northward movement may be shunted off inland around the burnt district for a long time to come.

So far as the caribou and the Indian are concerned, the loss of the shore people is quite their gain, for the latter are well armed, good shots, and have less restraint in killing than the Indians. An Eskimo family south of Nain told the writer that they ought to get one hundred deer in a good season, for themselves and dogs. North of Nain conditions are less changed. The Eskimo hunters from Nain and Okkak meet near the height of land west of Okkak late in the winter, and often get all the meat their dogs can haul out. Large wolves, varying from gray to black, accompany the herds.

The northern Indians are still polygamous, though the limited number of women tends toward practical monogamy. The work about the lodge is done mainly by the women; what with dressing skins, making pemmican, and the ordinary housework, they are often overworked. In time of scarcity there is little for them to do, while the men, as straits continue, wear down rapidly under the constant hunting. On the hunter, in the end, hangs the fate of all, and this is to be remembered when in times of plenty the men are found merely spearing the deer as they make the crossing and leaving the hard work of meat and skins to the women. In the evil day that is sure to come, it is most often the women and children who survive, husbanding their strength in the lodges until some hunter brings game. There is no question as to the fate of the hunter who does not return, though the spot where he sank to his lonely end may never be known.

These recurring vicissitudes of the hunting life, especially in the farther north, must be taken account of before judgment is passed upon some of the customs and traits of such races. Until recently the old and feeble among the people were at times put out of the way by their relatives. It must be understood not only that the necessary alternative was usually abandonment and death by freezing or starvation, but that the event was brought about by the request of the person concerned.

It might be difficult to find a people more devoted to their own than these. In his well-known *Twenty-five Years of Service* John McLean has an interesting chapter on their traits, his long relations with them standing in as good stead as the imagination which gives colour to Hind's accounts of them as seen at Seven Islands in later years in his *Labrador Peninsula*. To quote a passage: —

"In their intercourse with us the Nascaupees evince a very different disposition from the other branches of the Cree family, being selfish and inhospitable in the extreme; exacting rigid payment for the smallest portion of food.

Yet I do not know that we have a right to blame a practice in them which they have undoubtedly learned from us. What do they obtain from us without payment? Nothing; not a shot of powder, not a ball, not a flint. But whatever may be said of their conduct towards the whites, no people can exercise the laws of hospitality with greater generosity, or show less selfishness toward each other, than the Nascaupees. The only part of an animal a hunter retains for himself is the head; every other part is given up for the common benefit. Fish, flesh, and fowl are distributed in the same liberal and impartial manner; and he who contributes most seems as contented with his share, however small it may be, as if he had no share in procuring it. In fact, a community of goods seems almost established among them. The few articles they purchase from us shift from hand to hand, and seldom remain more than two or three days in the hands of the original purchasers."

The Cree, which is considered the parent language of all the Algic dialects, is believed to have had its early home and centre of development not far from its present place. The Iroquois also are thought to have emerged from the same quarter, — "somewhere north of the St. Lawrence and east of Hudson Bay." The development of either race in such a latitude would seem to be one of numbers rather than of racial type or language, for the last Glacial period there ended only a few thousand years ago, while the physical type of both these peoples appears to have been very long established; and, as well as their accessories of clothing and other belongings, gives a strong impression of development in more moderate latitudes.

The Algonquin group of languages, to which all the dialects of the peninsula belong, are both well developed in method and generally agreeable in sound. Their accept-ability to the Anglo-Saxon ear is evident from the continued use over the country of their innumerable place-names. Once adopted by the white race, these names are rarely displaced; indeed, are brought more into use as time goes on. More than half of the Indian place-names of the northeastern states would be readily understood by the Montagnais or the Nascaupees of Ungava Bay: thus, K'taadn, Monadnock, and Wachusett; Penobscot, Kennebec, and Connecticut; Massachusetts, Narraganset, and Manhattan, are as plain in their meaning to the northernmost Cree of the barrens as they are familiar in sound to the white dwellers of New England.

To the white stranger these are merely well-sounding names, but without significance; to the Indian each brings its image: the "Great Mountain"; the "Mountain-standing-alone"; the "Long-open-water" (Moosehead Lake); "Long-river"; the "Region-about-the-large-hills" (Blue Hills); the "Point-country" (Mount Hope Point); "The Island," — and the list might go on.

Algonquin place-names are rarely fanciful; the method of life required an accurate and serviceable system of geographical description, the function of which was too important to be trifled with. Much of the eastern country was remarkably irregular and made up of features often repeating themselves at different angles. Few regions of the world, perhaps, are as confusing to the traveller as were formerly the vast forested areas of mountains and watercourses throughout the north Atlantic belt.

Of necessity the descriptive method of the people was of almost legal severity, and is in the north to-day. Personal names, however, are often subjects of fancy. The humour of the people lays quick hold of the possibilities of the nickname.

Not infrequently the name of a child is given from some trait or chance occurrence. The name *Mattawayshish*, "Playbear," belonging to an Indian first seen by the writer as a tall old man, dignified though feeble, was doubtless given by the mother to the little boy who played behind the bushes in days long gone.

A short, active man with a peg-top build was nicknamed Mistnouk, from the great triangular fly known in Maine as the moose-fly. A stranger from across some far water was dubbed "Over-sea" or its Indian equivalent.[1] Indian rebaptisms, as to name, are not uncommon, especially in connection with younger men of no especial standing. Many of the Montagnais have French names. Nevertheless, as many as half the people, it may be, speak only the aboriginal tongue; their names, with those of many others, are naturally still of the vernacular.

As regards the language as a whole, it is probable that few but its actual students realize its scope and resources. Notwithstanding the number of names both of places and persons which we have accepted from the race, it would not be far wrong to say that the chance person of cultivation, if told that the Indian language consisted of a few uncouth words of limited import, would assent as a matter of course. It is true that their field of observation as compared with that of modern civilization is limited. The swelling tide of our technical vocabularies, our now half-inanimate burden of metaphysical terms, have scarcely

[1] A northern Indian had a name meaning "Man-in-the-Moon."

a counterpart in the unwritten speech of the lodge and the open.

Yet in the human relation the tongue falls little if anything short; its terms for a thousand features of earth and sky and the endless manifestations of the outdoor world are far beyond our own; our Bible, Old Testament and New, finds its way into the language without loss, and an inheritance of story and song, no ruder than that of our own race at a pitifully near period, is passed by clear minds from old to young as the generations go.

In Lemoine's French-Montagnais Dictionary are some twelve thousand title words, yet the commoner forms are not exhausted. In Watkins' Cree Dictionary are thirteen thousand five hundred Indian title words, and it is probable that Indians of superior mind command a yet greater vocabulary. Without the support of writing, the Indian mind compares in this capacity evenly, or better than evenly, with that of the white races. When it is remembered that, according to Whitney, three thousand to five thousand words "cover the ordinary needs of cultivated intercourse" and that "three thousand is a very large estimate for the number ever used in writing and speaking by a well-educated man," the dimensions of the Algic list of ideas may be somewhat appreciated.

Some peculiar advantages of structure in the Cree have been urged recently by Berloin in a remarkable analysis of more than two hundred pages, entitled *La Parole Humaine.* His conclusions are singularly complimentary to the language; their level may be perceived from a sentence of his last page, — "*Peut-il concevoir meilleur et plus noble langage?*"

Whether his enthusiasm is to be fully shared, or whether such a view must be taken as going obviously too far, if only because the language was conceived by savages, may be left for scholars yet to come.

Superficially, the structure of the language has some resemblances to Latin, mainly in its wonderfully inflected verb. The noun is little inflected, although it has a certain accusative usage. The adjective is put in a verbal form, as *wapau,* "it is white"; hence *wapush,* "little-white-one" (rabbit), and *wapilao,* "white partridge." Adverbs are favoured, and are often placed early in the sentence, as in "Quickly I ran." Pronouns are rather fully inflected. The particles are wanting. Of the verb it may be said that it bears nearly the whole weight of the language. The development of this part of speech is extraordinary. The Dictionary of Father Lemoine gives three hundred and seventy-seven inflections of a single regular verb, and presents no less than fifteen conjugations. The number of inflections in actual use much exceeds this number.

The resemblance to Latin is quite close in some of these verbal inflections, notably such as the imperfect in *-aban* as compared with *-abat* in Latin, and the perfect with the sharp *it,* as in the Latin *amavit.*

The dual form for *we* exists, as in the primitive Greek and German. A special inflection is observed when the subject of the verb is speaking to a person present. The number of inflections is nearly doubled by the use of separate forms for animate and inanimate objects, thus: —

I like the dog — *ni shatshitan atum.*
I like the tent — *ni shatshiau mitshiuap.*

Certain articles of importance are granted the superior form of the verb: among these are *áshamits*, "snow-shoes"; *ashtesh*, "gloves"; *uiash*, "meat"; and the names of the different furs. Curiously, perhaps, for with aboriginal races the flesh is weak in this connection, *ishkut'eu-a'pui*, "whiskey," is not given the higher *genre*, nor *shuliau*, "money" (silver), while *uapamin*, "apple," is.

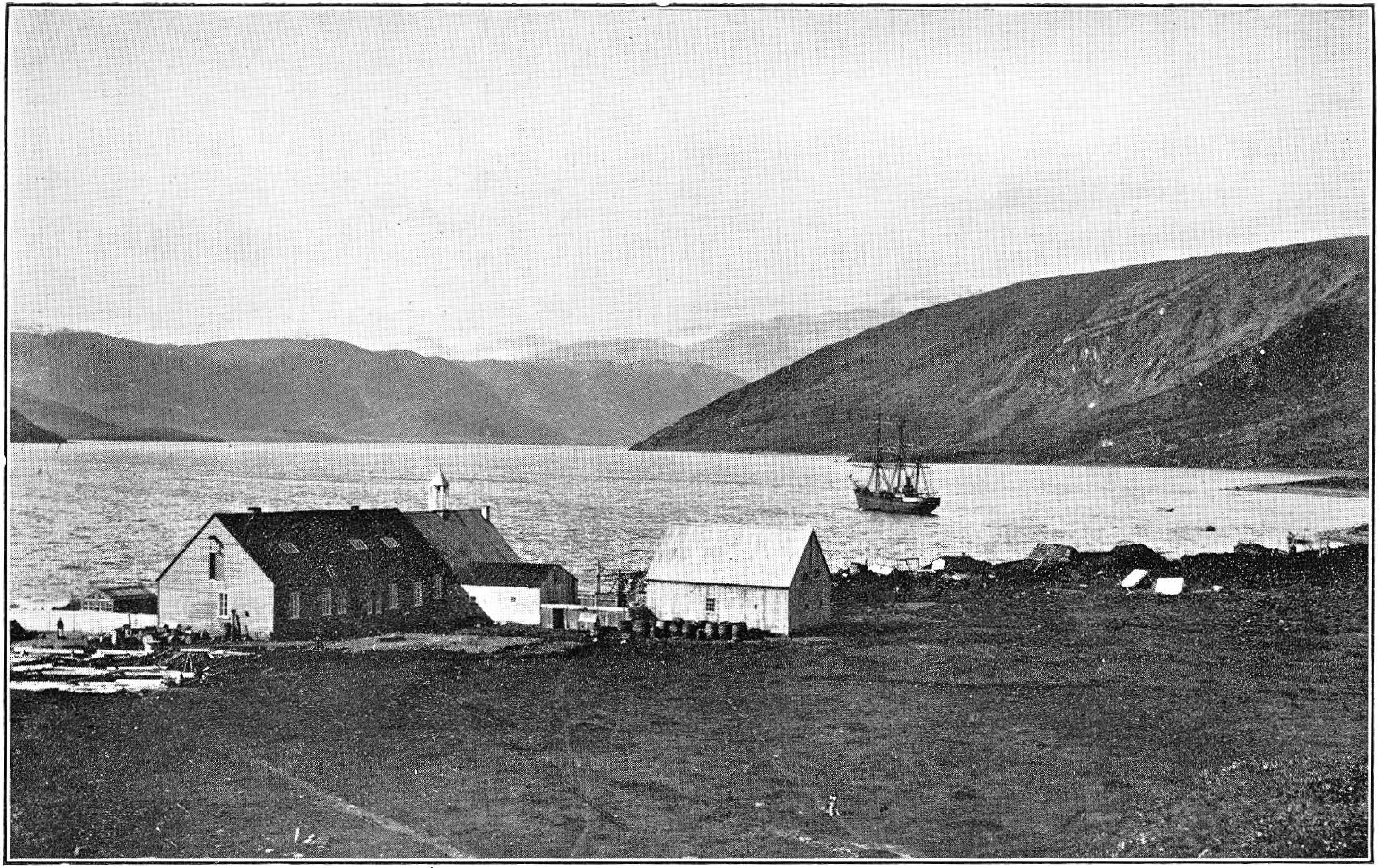
New names have come with the white régime: —

Horse, *Kapílikishúao* — he that has but a single toe.
Cow, *Uishauaútuk* — the yellow deer.
Turkey, *Mishiláo* — great partridge.
Cat, *Miúsh*.
Iron, *Assukumán* — kettle-metal or material.
Tin, *Uapukuman* — white-metal.
Gun, *Passigan* — thunderer.
Soap, *Uapákiigan* — whitener.
Spy-glass, *Tushkápitshigan* — instrument for seeing far.

The ending *s* or *sh*, as in *wapush*, "rabbit," and *miush*, "cat," is a diminutive. Such is *Tshipshas* (lake), "Little Tshipshau," and *Mistassinis*, "Little Mistassini." The latter name signifies "Great Stone," from a large boulder on the shore of that lake, which is regarded as having occult influences. Almost all the names of fish and other creatures are plainly descriptive.

It may be inferred that not much borrowing from other languages has occurred for a long time. Considering how few of our common names, such as horse, dog, cod, trout, not to mention names of inanimate objects, have any descriptive meaning to us, as words, this survival of original meanings in the Indian emphasizes the compositeness, at least, of our English tongue.

Wa- as a prefix means white; *was-* or *wash-*, bright



The S. S. "Harmony" at Ramah

and shining. *Wash* alone means sky; *Washéshkunáu* means blue, sky-colour.

The language is mild in its cadences. Little conversation accompanies serious occupation and travelling. When making camp, the young men toss their japes back and forth, and about the fire the women talk and laugh when by themselves in the world-wide fashion.

The religion of the country is professedly almost wholly Christian. The people trading around Hudson Bay are Protestants, while all the Montagnais are Catholics, cared for spiritually by the various missions of the Gulf and the Saguenay.

It is not to be supposed that the old beliefs are extinct; on the contrary, no reserve or gathering place is so changed in blood or so affected by white neighbourhood as not to have among its members those who are priests of the older theology and can deal with at least some of the overpowers of earth and sky. The influence of these many spirits for or against the laymen is determined largely by the rites of the manitu lodge. The spirits are not malevolent if uninfluenced, although naturally less to be trusted as their form approaches the human; but the power of the priest, literally a *manitsesht*, or "spirit-person," may win over almost any spirit to evil purposes. The one supernatural being of original malice is the frightful *windigo,* described as a cannibal man fifteen or twenty feet high. He lies in wait for the solitary hunter, and rushes out upon him. The mere glimpse of a windigo brings calamity and an early and unfortunate end. The spell may, however, be broken by making the proper observances; these are usually done by the *manitsesht,* who has power in these matters.

"The Great Spirit," the *Tshe Manitu*, is wholly good, but remote and scarcely approachable. The conception seems hardly anthropomorphic at all, certainly not as clearly so as the Biblical one.

What is doubtless an Indianized doctrine of the Trinity has had standing for many years, even in districts west of Hudson Bay.

"The First One" — *Puk-wa-sha-ne-magan* — "gives us that which we must beg for" (what is necessary for mere existence).

"The Second One" — *Wahkt-Kna* — "gives us too much, more than we can use" — (deer, fish, etc., in great numbers).

"The Third One" — *Tshe Manitu* — "is the greatest of all; He gives us the Fur, of which we cannot have too much."

It must be confessed that as to the concerns of the other world the concept is not very comprehensive.

All notable features of the country have their local spirits. As a safe rule, the ordinary person does well to avoid them. Some are always well disposed, but as a spirit of bad intentions may take an attractive form for his own purposes, it is better for the laymen at least to have no dealings with any of them. The people are readily susceptible to missionary instruction, in all earnestness putting on the new faith over the old, which may be supposed to relinquish its ancient hold only about in proportion as the hunting life is given up. This hardly occurs save with persons of much white blood; so long as the wilderness life and the language continue, the old theology will survive.

Under the strict injunctions of the Gulf missionaries, the sound of the *téuehigan*, "the ceremonial drum," is not heard on the summer reserve, but once beyond hearing of the missions some remnant of the old rites is not far to seek. On the other hand, the church calendar is carried everywhere over the Montagnais country; each day a pin is moved forward and pinned through the paper at the succeeding date, and feast-days and Sundays are pretty well observed. Although the Oblates do not require the people to bring their dead to the shore, they do it when possible, for burial in consecrated ground; yet along most of the travelled routes of the south are a few graves, marked sometimes by wooden cross and fence. The burial spots are held in respect by the passers-by; camps are not made very near, nor the peace of the place disturbed.

CHAPTER VIII

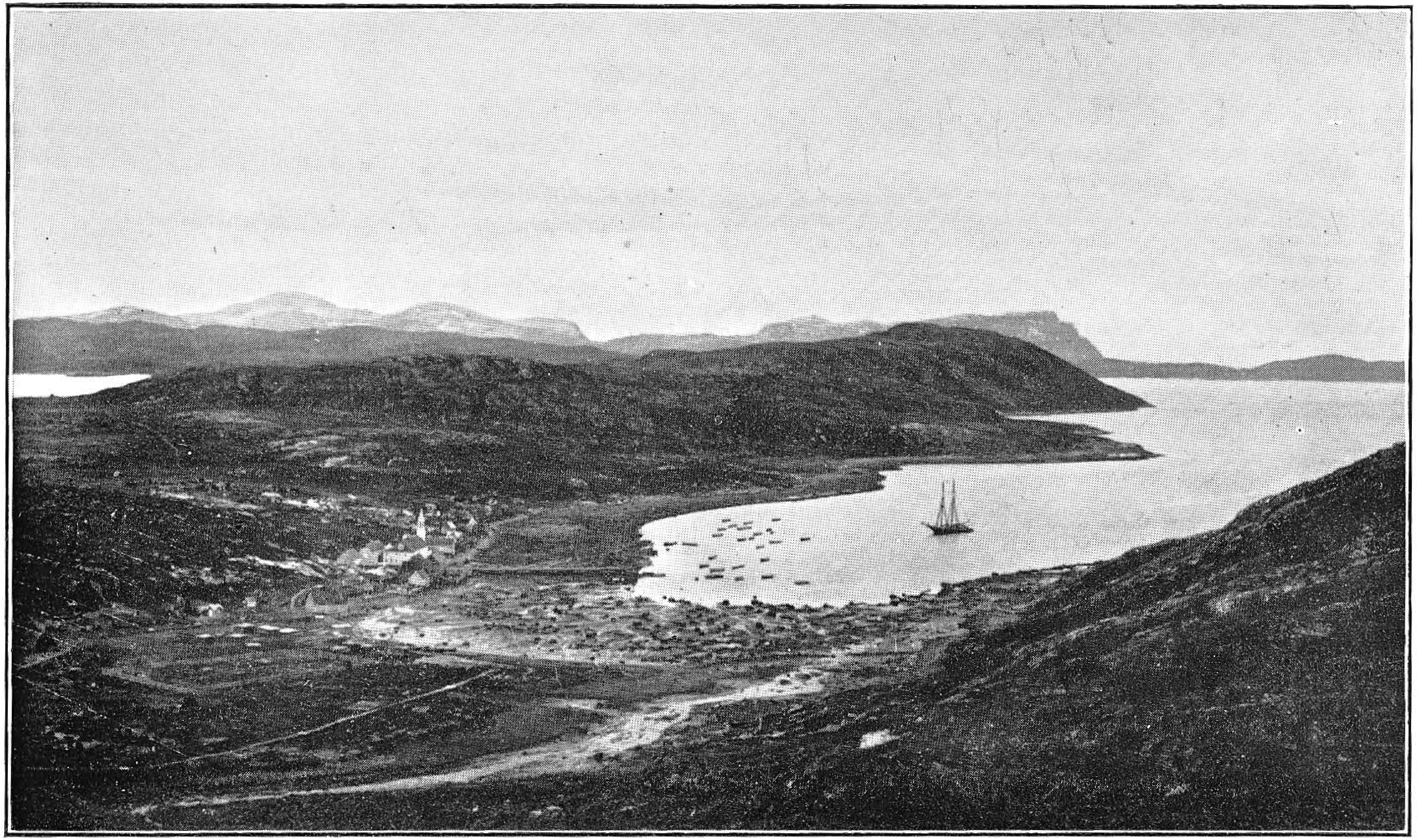
THE MISSIONS

BY W. T. GRENFELL

The Moravian Mission

IF a man in Labrador is not a fisherman, that is, a cod-catcher, he traps fur-bearing animals in winter and catches salmon in summer. The trappers form a class apart from the rest of the shore people. They seldom come out "to the coast," their winter industry keeping them far inland and their summer salmon-catching being convenient in not forcing them to transfer their families very far down the bays. There is, however, every gradation, from the mountaineer Indian, who does nothing all the year but trap and kill deer, through the Eskimo, who once only killed seals, but now even catches furs and "fishes," to the man who lives entirely "out of the water," *i.e.* never outfits for the winter furring.

Until 1905 the trade of all these people was carried on by two great companies, the Hudson's Bay Company and the Moravian Missions. The Hudson's Bay Company originally dealt only with Indians, but the intermarriage and settling of their own imported servants have built up a class which beats the Indians at their own industry, and now does a far larger trade in fur. The Indians are reduced to a mere handful, while the strong Scotch and Norwegian



Okkak

stock is steadily growing and displacing both Indians and Eskimo. Farther north, the Moravians care for the Eskimo. The Hudson's Bay Company have also made a bid for their trade, establishing posts at Nachvak (since abandoned) and at Ungava.

At present the Moravians have six stations. The most northerly station is that at Killinek, or Cape Chidley. Here the Eskimo, attracted by the excellent seal-fishery, walrus, and white-whale fishery to be had at the cape, have gathered from the northeast coast and from Ungava Bay. Though the turbulent currents and whirlpools are dangerous to kayaks, the Eskimo have no fear of venturing out, and, at times, cross to the Button Islands to hunt there. A man with his family will, in the spring, transfer all his belongings to a pan of ice at Fort Chimo, and live by hunting and shooting on the floating ice till he arrives at the cape, one hundred and eighty miles distant. He finds no monotony, feels no cold, and knows no fear of conditions which would whiten the hair of many a bold European.

At the present time one Moravian family dwells at the station. They have themselves built a house, church, and stores. Even the church is admirably constructed to keep out the cold. It is floored under the sills, double floored over them, and filled between with cement. Thick tarred paper in one piece runs up in a similar manner between the layers of the wall. To Europeans the site seems the most villainous dwelling-place possible. The settlement is situated in a deep gulch with a wall of rock opposite, shutting out any view; a terribly dangerous current runs through the defile. The tides rise and fall thirty-five feet. The land is entirely bare of woody growth, even shrubs, and for firing the people must depend on what driftwood is washed up, or else on seal-fat lamps. The average temperature for the year is far below freezing. One mail a year is the most the people can ever expect. They can reach and talk to no Europeans, except possibly by a long and dangerous shore journey taken once in the winter. In sickness or accident there is no skilled help. Yet these patient missionaries have just selected this spot for a station.

The missionary in charge at present is a splendid specimen of humanity, broad and strong far beyond the average man, with merry blue eyes, and the abundant light hair of a Viking. He has a capacity for work, and an accuracy of mind rarely equalled. His hospitality and generous manner toward strangers, along with all his other splendid qualities, make him the ideal man for the environment. One could imagine that he had dropped off an ancient "war swan" and had persisted ever since those days on these seemingly God-forsaken rocks. The man's scorn of physical conditions, the hard things that he has moulded to his will and use, the absolute happiness he always seems to enjoy, have shown to me, each time I have visited the station, how man, as God would have him be, towers above his circumstances. One leaves the station regretting that so few should be there to benefit, humbled and glad that men of such type still live to adorn the human race. Other thoughts, I confess, have risen to my mind in the enervating palaces of some of those "more wealthy."

Few furs are caught there. The white fox and the polar bear alone are not uncommon. The sight and smell of seal and walrus blubber are everywhere. Fat is the measure of wealth. Fat in gallons is the coin of their realm. To the Eskimo of the place, such a man and his mission mean everything, pessimists notwithstanding.

The next station is at Ramah, about a hundred miles to the southeastward. The intermediate station of the Hudson's Bay Company at Nachvak has recently been withdrawn, and the withdrawal of the Ramah station is under consideration. The Eskimo here dwell in holes in the ground with skin bowel-parchment windows that do not open, and with roofs and entrances made of sods. There are no islands near to supply birds and eggs; the decrease in the number of seal and walrus and the low market or local value of sea-trout have seriously impoverished the people. This poverty means that they are poorly equipped for travel; in consequence, they dawdle about the unsavoury village when they should be seeking and finding sustenance, gaining health and strength by migrating from place to place as they always did of yore. Here they are much more dependent upon the missionary, upon his supply of clothing, and upon his *kablenak* or European food, than is good for them. From their physical condition it is perfectly easy to tell a Ramah Eskimo from a Cape Chidley man, though you may never have seen either previously.

A journey to the southward of nearly another hundred miles brings us to the third station at Hebron. This is still a good hunting station. Its Eskimo have been wisely taught by the Brethren to segregate and not congregate. No permanent village has come into being. A few sod houses and one or two better houses exist. This would to-day be probably far the most creditable settlement of Eskimo, had it not been for the carrying of several families to show them to the curious at the exhibitions at Chicago, Buffalo, and elsewhere. Few returned, and they richer only in those heirlooms of civilization, the germs of specific diseases, which most efficiently put a stop to the growth of the community, and left a diseased and miserable people to be a constant danger to every "Innuit" on the coast.

Another forty miles to the south is Okkak, the largest station, with some three hundred and fifty souls. It is within the northern limit of trees, and consequently houses, boats, and firing are more easily acquired. A large number of permanent wooden houses have been erected. At certain seasons of the year considerable social life is possible. The annual census shows that during the fifty years previous to 1902 the congregation was steadily growing in numbers. Some small arts and crafts were established and quite a trade done in ivory carvings, in modern skin dolls, tubiks or tents, kayaks, etc., and in wooden models of native houses, komatiks, and such like. Sickness imported by families returning from the exhibitions, overcrowding and lack of sanitation with its inevitable shadow, consumption, epidemics arising from the increasing contact with the white fishermen who fish in hundreds on what once the Eskimo considered "their grounds," have shorn the settlement of much of its original strength.

The Brethren here now have a little hospital besides their educational and religious work. At first the "Innuits" would not subject themselves to the necessary hospital regulations. We carried thither the first patients in our little hospital steamer. A severe epidemic of grippe (with heart troubles and other complications) was killing many. We had picked up a full load, and dumped them on the new

West Coast Eskimo

doctor. It was a new experience to see an Eskimo trying to accommodate himself to a bed. The warmth of the ward was objectionable. The additional heat of bedclothes was intolerable. Washed to a fine nut-brown, with their jet-black hair and large, dark eyes, they formed a most pleasing contrast to the white sheets on which they lay when we paid our first morning visit. Covering of any kind they had long disposed of, and even then they were perspiring and panting. Nature seems to have taught them what civilization has made us forget, — the value of fresh air.

In a terribly fatal epidemic of typhoid fever in 1896, I had tried to persuade some of my patients to remain in their tents when very feverish. In one case I had endeavoured to enforce my ruling by removing the patient's garments. Such a trifling "impediment" had not daunted him. Why stay under cover when you are hot? Next morning when I returned, I found him stark-naked, huddled up in the cold, waiting for the doctor and the ravished clothes. He eventually recovered, in spite of me.

Nain, the fifth station, is ninety miles farther south, and accessible by mail steamer. It is a perfect harbour, entirely shut in from the sea by countless islands, great and small. Its beautiful bay runs inland over forty miles, and one can travel by steamer for a hundred miles south without once going into the open ocean. Nain is at once the head station of the Brethren, the seat of the Bishop, who is also a German consul, and is of the oldest standing. The well-tended vegetable patches, the tidy paths through the woods so long preserved, and now so lonely looking against the otherwise absolutely naked ground, the prim flower-gardens, and the orthodox tea-houses (with more often than not the appropriate picture of the Kaiser), combine to transport a visitor momentarily to Europe, to the German homes which these good men have left, never to return.

I had the pleasure — a partly melancholy pleasure — of introducing the first gramophone to the attention of a venerable brother who had not visited his home for many years. As he drew near the room in which the machine was playing some musical record, I saw the unbidden tear roll down my dear old friend's cheek, as even that crude music irresistibly called to memory former happy days when the music of the Fatherland was all about him.

Near Nain is a great outcrop of blue labradorite. The hunting and fishing near this station are also excellent at times, and there are many things to attract the visitor. But first amongst these are the hospitable Brethren and the neat congregations at their regular services, where the excellent singing and orchestral playing of the Eskimo men and women is a revelation to the stranger.

This station is the head of the trade, too. For the Mission is an industrial one, and therein, to my mind, lies its immense value. It not only tends to the mind and spirit, but it looks after the "vile body." Had it not been so during the last one hundred and fifty years, there would now be no bodies through which to get at souls. There can be no question the Moravians have so far saved the native population for Labrador. The more numerous Eskimo that once flourished between Hopedale, their southernmost Eskimo station, and Anticosti Island, are gone almost to a single man. Eskimo once were numerous on both sides the Straits of Belle Isle. At Battle and at Cartwright in 1800 they were still numerous. Contact with white men has blotted them out like chalk from a blackboard.

I was intensely surprised to find by reference to their carefully kept registers from 1840 to 1890 that the congregations around all the stations had actually increased in numbers. It is not fair to estimate the numbers that should now exist on the coast by the average increase of Europeans, as some have done. In the wild state, untrammelled by civilization and unmodernized by missionaries, Eskimo can only exist in small numbers and scattered communities, anyhow. The casual reporter visiting Labrador has more than once severely criticised the trade methods of the Brethren, which involve comparative high prices on their goods. They have stigmatized them as robbers and oppressors. Indeed, they have been so misunderstood that their Conference has seriously considered abandoning their trading altogether. Were they to do so, there would, in a very brief time, be no need for their spiritual ministrations.

I do not believe any master of labour could possibly carry on industrial work like fishing and furring, for which the masters have to supply all gear, outfit, and provisions at their own risk, if they employed only Eskimo workmen.

The fact is, they are not able to persevere, and though they are, man for man, far better educated than the men who come from hundreds of miles south and make a good living by fishing right at the Eskimo's own door, yet they cannot compare with the Newfoundland and white fishermen for perseverance and what is known on this coast as "snap." An Eskimo does not get one fish for the other's ten. Thus the Moravians have been again and again saddled with debts sorely crippling their funds, for they assume a responsibility no ordinary master of labour does. They look after the poor, feed the infirm and helpless, tend the sick, educate the children, and, as well, minister to their spiritual needs, which involves up-keep of chapels, and all the attendant duties and expenses. They have recently altered their methods of trade. It is quite possible they might profitably be still further modernized, but no man need fear inquiring into this noble Mission who really is anxious for the extension of Christ's Kingdom.

The magnificent salary of the individual worker, including the Bishop, is £23 per annum, with dinner and tea found at a communal board, the wives taking it in turn each week to cook and superintend meals. The children at seven years of age, the most interesting period of child life, have to leave the parents, probably forever, to be educated at the Society's schools in England or Germany. It is scarcely necessary to say that the missionaries have no personal interest in the trade, and that their small income only clothes and provides absolute necessities for the families. The present trade manager of the whole Mission, for many years past my most beloved friend, has made many long journeys with me all along the coast. He is an excellent photographer, sending the pictures home to help the deputation workers to raise the necessary funds, and he is but the type of all their men with whom I have been acquainted these twenty years past. Soon after my arrival at this station, I asked him if they kept photographic material in the store. After seeing the Eskimo brass band perform, it seemed natural they should perform also the simpler functions of a

A Fishing Fleet welcoming the Mission Boat's Arrival photographer. "No," he replied, "but I have a small private stock." "Would you sell me some printing paper? I have run out." "We may not sell privately," he replied, "but I shall be glad to give you half mine." "But that you cannot afford to do. You must let me at least defray the actual cost." "The Society gives us £23 a year," he said, "and that supplies all our needs. What do I want more money for? We have everything we can possibly need." The whole conversation burnt into my mind. It is worthy of reproduction where it may be read by others, for it is typical of the spirit of all the workers, and shows they have learnt possibly the hardest lesson for the world to learn, namely, the true value of gold, reckoning by the best standard.

Some ninety miles to the south again is Hopedale, the sixth station. It is the southern border of the tribe now, and one cannot visit the station without feeling forcibly that the fringe is ravelling out, and that the race in Labrador is facing its inevitable doom. Mixed with the dying, purer type, are an increasing and stronger element of half-breeds. It is in these that much of the hope for the future population of Labrador at present lies. Here one of the Brethren has had some medical training, and has, single-handed, done some excellent work in emergency cases. The Brethren here, also, have done a considerable amount of scientific work in the past, both in climatology, botany, and ornithology.

The last Moravian station is at Makkovik, fifty miles south. It was only erected in 1900, and was put there in the hope of fostering the scattered half-breeds and settlers who are slowly beginning to populate that section of coast. It is a valuable stand for those travelling the coast in winter.

To no other people on earth does the lonely Labrador owe one-half the debt it does to these devoted servants of the Moravian Mission.

The Methodist church is carrying on work among the settlers, with local headquarters for their mission at Rigolet. The Anglican church has, for many years, supported a mission, with headquarters at Battle Harbour.

The Labrador Deep-sea Mission

In the report of the Newfoundland Chamber of Commerce for 1892, the following item appeared:—

"A new feature worthy of mention in this report, affecting as it does, more or less, the comfort of twenty thousand to thirty thousand of our people, was the appearance on the Labrador coast of the Mission to Deep-sea Fishermen ship *Albert*, outfitted by a philanthropical society in England, unsectarian in its lines, and intended to convey skilled medical aid to our fishermen and provide to some extent for their mental and material wants. This essay has been an unqualified success, and has evoked from the recipients of its bounty expressions of deep gratitude. It is likely to result in well-organized coöperation by the Colony next season upon the lines along which the Mission ship is being worked."

The Mission to Deep-sea Fishermen had, for some twenty years, been working among the great fleets that travel all over the North Sea. The Mission owned a dozen vessels, including one steamer. These were mostly fishing vessels, but in command of men who sought by word and deed to carry the Gospel of Christ to their comrades by the practical messages of love of the "Good Samaritan." Four of the vessels had small hospitals on board, and each carried a doctor. The Mission had driven the liquor traffic off the sea, built homes at the seaports, and provided for religious services, for good reading, and for the care of those in trouble and want. The Mission Council, at the request of Sir Francis Hopwood, one of its members, had sent their medical superintendent to see if similar work were needed among the Bankers and Newfoundland fishermen. The Mission yawl *Albert*, of one hundred and fifty-one tons burden, sailed out, and after a season among the fishermen of the Labrador coast, called into St. John's to report before sailing back to England. The governor of the colony called a meeting at Government House of all the principal men, to receive the report. As a result, on the proposal of the Prime Minister, the following resolution was passed unanimously: —

"That this meeting, representing the principal merchants and traders carrying on the fisheries, especially on the Labrador coast, and others interested in the welfare of this colony, desires to tender its warmest thanks to the directors of the Deep-sea Mission for sending their hospital ship *Albert* to visit the settlement on the Labrador coast.

"Much of our fishing industry is carried on in regions beyond the ordinary reach of medical aid, or of charity, and it is with the deepest sense of gratitude that this meeting learns of the amount of medical and surgical work done. . . .

"This meeting also desires to express the hope that the directors may see their way to continue the work thus begun, and should they do so, they may be assured of the earnest coöperation of all classes of this community."

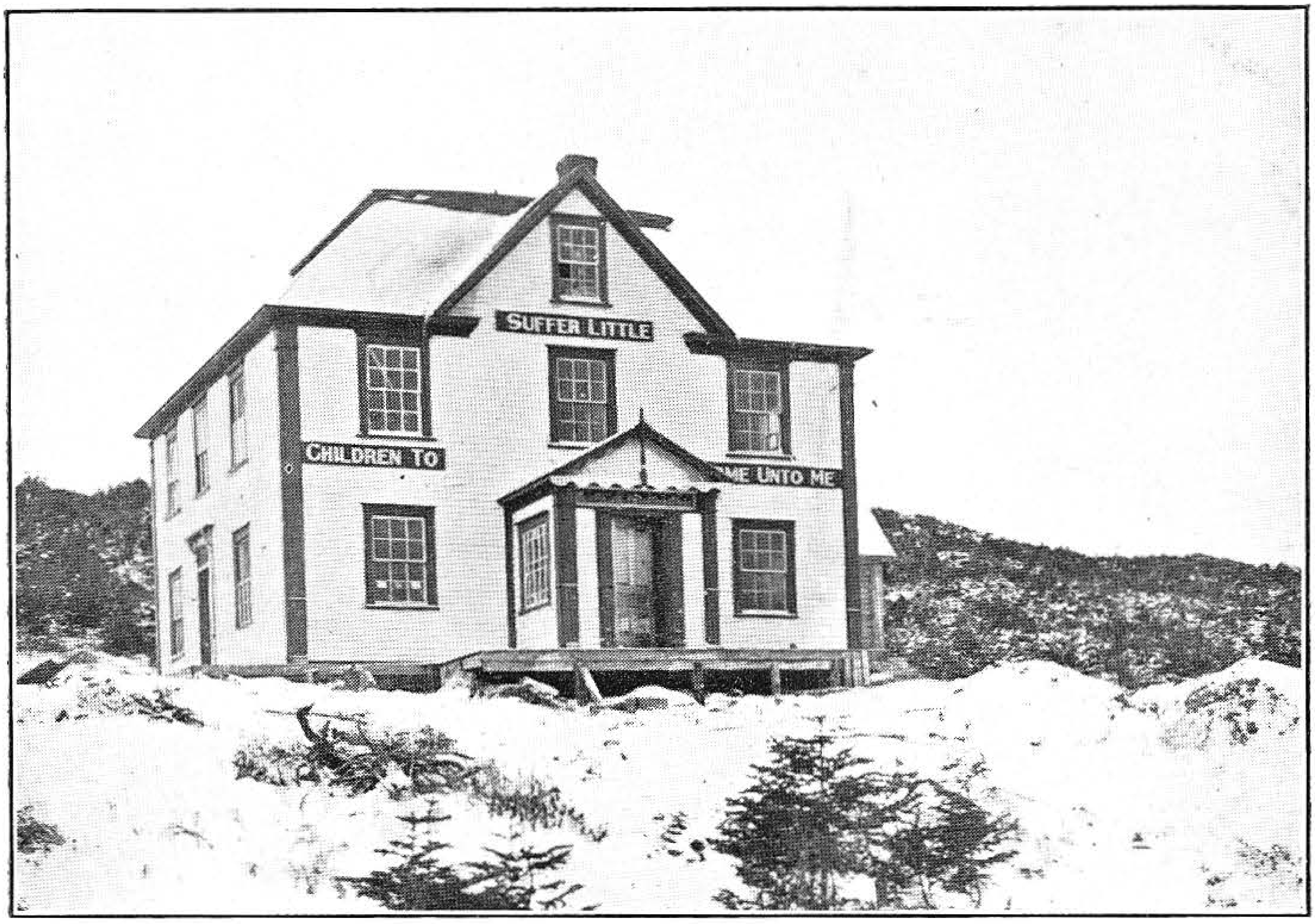
The government of Newfoundland promised to excuse the Mission from paying any duties on bringing in goods, except any for sale.

With open water in spring the *Albert* returned, carrying two additional doctors and nurses, together with fittings and drugs for two small hospitals. One of these was not only presented to the work by Mr. W. B. Grieve, the merchant owner of Battle Harbour, but was got ready by him for immediate occupation. The government of Newfoundland supplied a well-skilled pilot for the ship, and excused all dues of every kind.

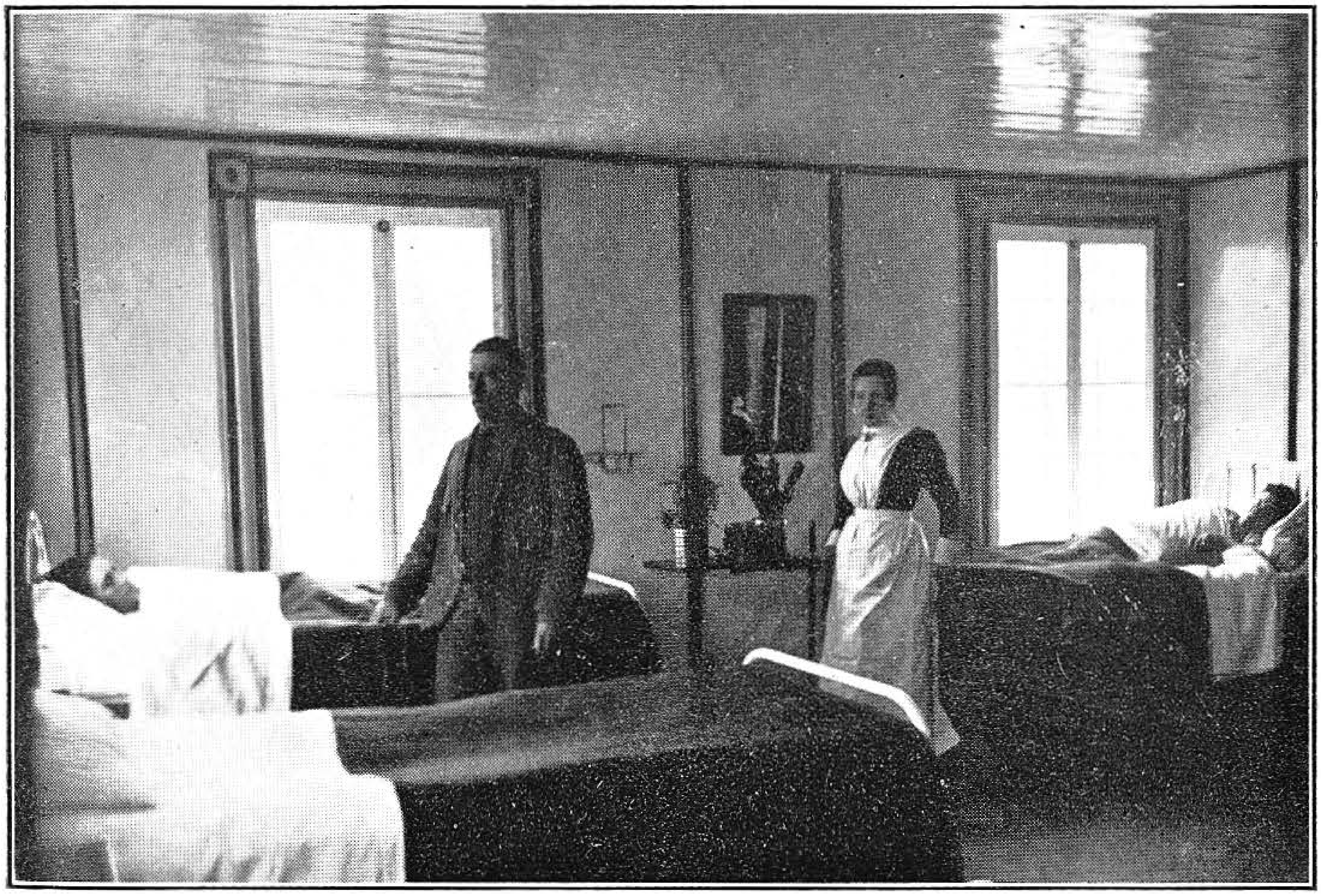
The second hospital, though sent down early in sections, could not be erected and ready for use till the season was nearly over. A smart little steam-launch was sent out to enable the visiting doctor to reach places too far distant in the bays to be served by the large yawl or by her boats.

At the present time, 1908, the Society has four hospitals: one at Harrington on the Canadian Labrador, one at St. Anthony on the northeast coast of Newfoundland, and the original two at Battle Harbour and Indian Harbour. Indian Harbour is situated on an island in the entrance to Hamilton Inlet, two hundred miles north of the Strait of Belle Isle; Battle Harbour, just where the Strait meets the Atlantic Ocean.

An experience of twenty years of work at sea among fishermen has proved for me that the brotherhood of the sea, and possibly the frequent looking of death in the face, can transcend the animosity engendered between man and man by sectarianism on the land. The *raison d'être* of the Mission is to commend to men who daily face the perils and privations of the sea, the Gospel of Christ as the practical rule of life. It labours to form no church. It seeks to inculcate no submission to any theories or shibboleths. It aims at adherence to no intellectual dogma.



St. Anthony Hospital



Interior of St. Anthony Hospital

No continuous presentment of Christ's evangel by human agency can ever hope to be free from deserving criticism. In an environment where sectarianism is still mediæval, opposition to Christian work of an unsectarian nature is inevitable. The staff of this Mission have felt it part of their privilege and duty to endeavour to induce new social conditions, though that involved conflict with previously existing powers. They have also endeavoured to inaugurate enterprises which appeared to them truer forms of charitable work than the easy but ever recurring distribution of clothes and nourishing food to people who only needed saving from a system that was alone responsible for their nakedness and hunger. When the Gospel comes in conflict with what some consider the "real business of life," — that is, money-making, — it should be prepared for hostility. The following brief table illustrates the interpretation which the Mission, with its limited capacities, has considered most likely to commend the Gospel in the circumstances prevailing in Labrador: —

1892. The hospital vessel *Albert* sailed from England with one doctor in charge. He spent three months on the coast holding services, and treating nine hundred sick folk. A large amount of clothing and reading matter was distributed.

1893. Battle Harbour hospital was presented by friends in St. John's, Newfoundland, and opened during the summer under a qualified nurse and doctor. The launch *Princess May* was added to enable the ship to do more work. Work was instituted and help given to the poorest according to their needs; they providing wood fuel for the steamer in return.

1894. Indian Harbour hospital was opened for the summer, and for the first time Battle Harbour hospital was kept open in winter. The doctor, with dogs and sledges, travelled eighteen hundred miles of coast during the winter.

1895. The sailing hospital was replaced by the steamer *Sir Donald,* the gift of Sir Donald A. Smith, who had lived many years in Labrador. Nineteen hundred sick folk received treatment. Dr. Roddick, of Montreal, presented the sailing boat *Urelia McKinnon* to the Mission.

1896. A small coöperative store was started at Red Bay in the Strait of Belle Isle, to help the settlers to escape the "truck system" of trade, and the consequent loss of independence and thrift. Four other coöperative stores have since been opened, with very beneficial results to the poorest. The *Sir Donald* was carried out from her harbour by the winter ice, and found far at sea, still frozen in, by the seal hunters. She had to be sold.

1897. The steam-launch *Julia Sheridan,* given by a Toronto lady, replaced the *Sir Donald.* A large Mission hall was attached to Indian Harbour hospital for the use of the fishermen. Two thousand patients were treated. Some orphan children were taken to America. The doctors were appointed magistrates for Labrador, which enabled them to help in several cases of right against might.

1899. Largely through the munificence of the Mission's staunch friend, Lord Strathcona, the Canadian High Commissioner, the steel hospital steamer *Strathcona* was built at Dartmouth, England, and fitted with every available modern appliance. At the request of the settlers, a doctor wintered in north Newfoundland and travelled all around the north coast. The people cut, hauled out, and erected the frame for a hospital at St. Anthony.

1900. The *Strathcona* steamed out to Labrador. The settlers on the Newfoundland shore of the Strait of Belle Isle completed the hospital at St. Anthony, and the Mission decided to adopt that place as a third station. A coöperative store was started at Braha.

1901. A small coöperative lumber mill was opened with the purpose of helping the settlers of the poorest district, who often faced semi-starvation, to find remunerative work in winter. The schooner *Coöperator* was purchased and rebuilt by the people to assist in the business of the coöperative stores.

1902. A new wing was added to Battle Harbour hospital, with a fine convalescent room and a new operating room. Indian Harbour hospital was also considerably enlarged. Two thousand seven hundred and seventy-four patients received treatment, one hundred and ten of these being in-patients in the little hospitals. The launch *Julia Sheridan* was chartered by the government and was directed by one of the medical officers to suppress an outbreak of smallpox. Some destitute children were taken to Canada.

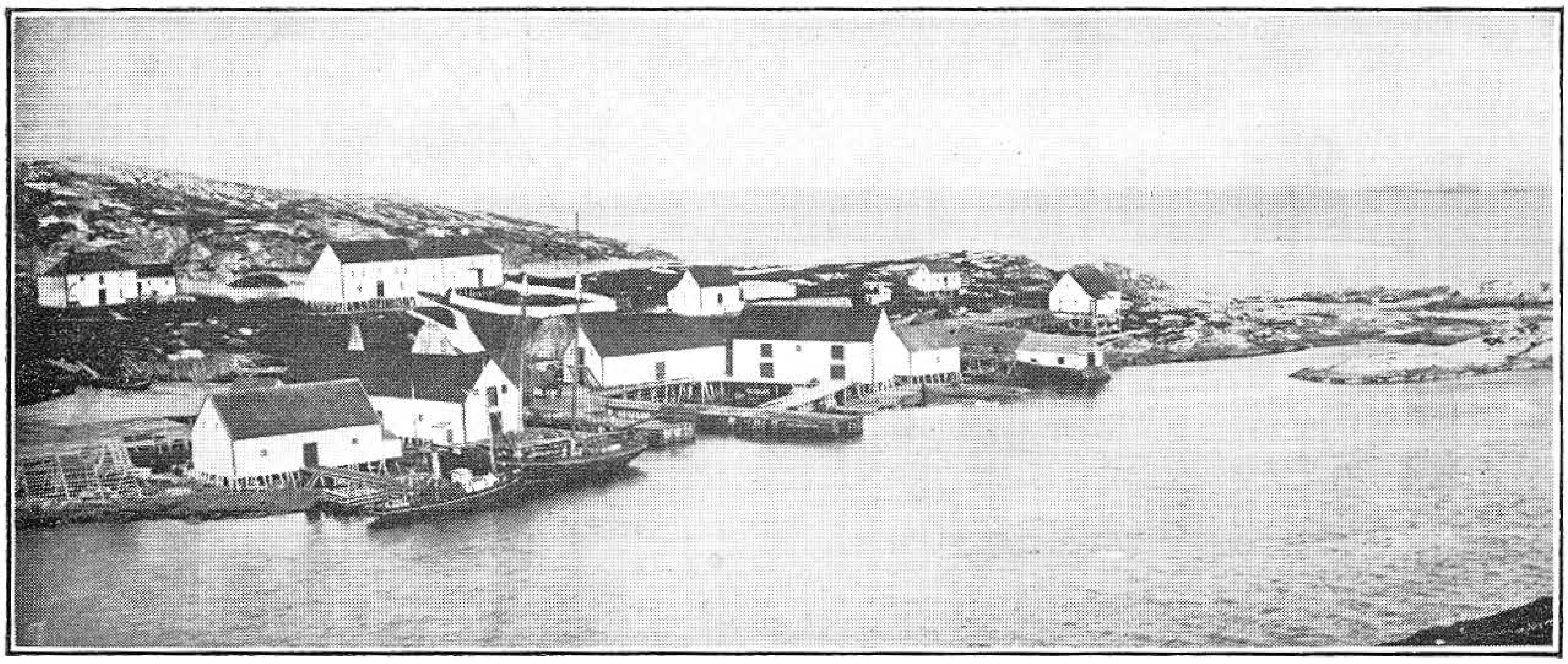
1903. Some new outbuildings were added to the Indian Harbour hospital, and a mortuary and store were built at Battle Harbour hospital. The third and fourth coöperative stores were started at West St. Modiste and at Flower's Cove to encourage cash dealing and thrift.

The *Princess May* went out of commission, and was sold. Some children were taken to Newfoundland. The only licensed house in Labrador was closed, the owner being sent to jail for the crime of barratry. The Mission superintendent accepted the position of agent for Lloyd's.

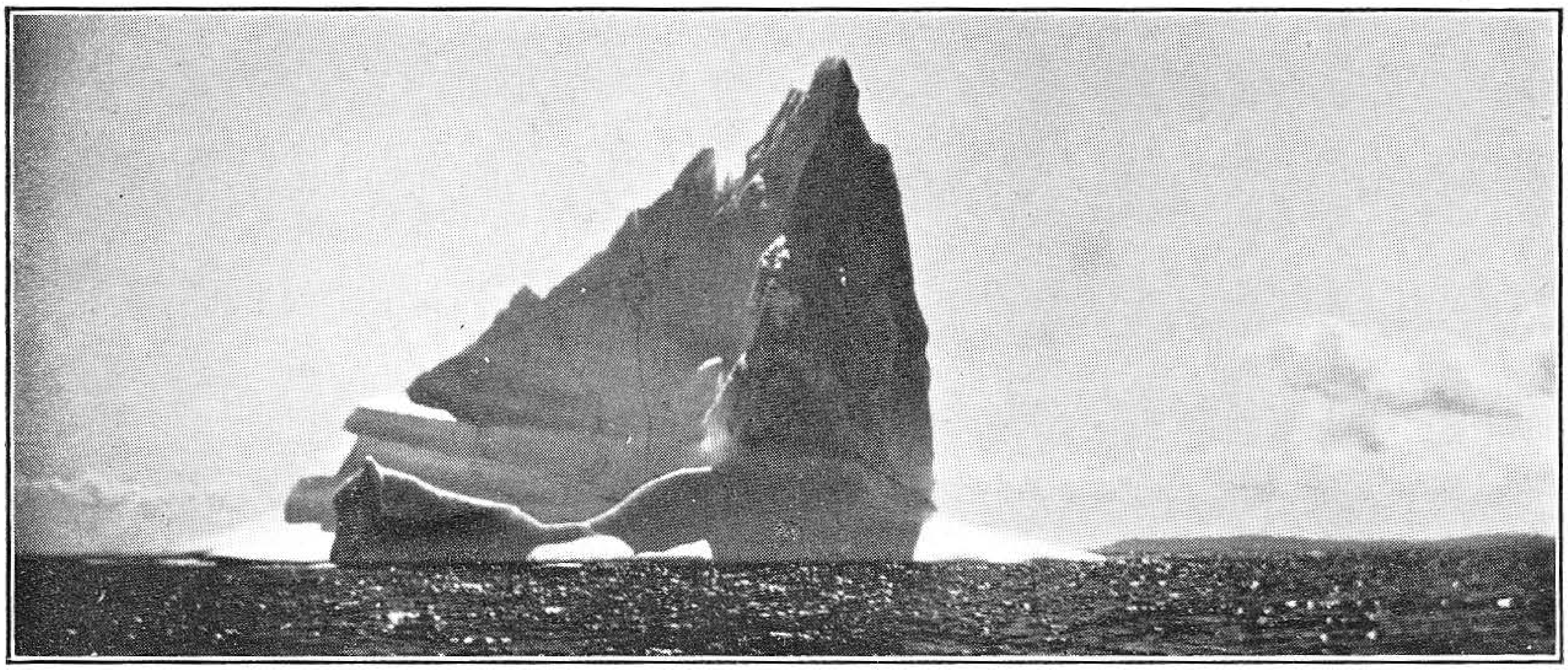
1904. A new doctor's house was built at Battle Harbour. The steam-launch *Julia Sheridan* had to be sold. She was replaced by a ten-horse-power kerosene launch called by the same name. An orphanage was built at St. Anthony hospital to accommodate fifteen children. A building was also added for teaching loom work and general carpentering with lathe work, and a teacher engaged. A society for writing personally to lonely families, and regularly sending them good literature, likely to instruct and help them, was successfully organized.

1905. A doctor was appointed at the request of the people on the Canadian Labrador, with headquarters at Harrington, near Cape Whittle, on the north side of the Gulf of St. Lawrence. The first schooners were built at the lumber mill, which is now flourishing and helping to maintain some one hundred families. During the summer two consulting surgeons from Boston joined the hospital steamer to help in the work. Through the generosity of Mr. Andrew Carnegie, between thirty and forty small portable libraries, each containing from fifty to one hundred books, were distributed along the coast. A fox farm was started in the hope of inducing a profitable industry in the breeding of the more valuable furs.

1906. Through the help of friends in Montreal and Toronto, a new hospital and a doctor's house were built at Harrington; a second kerosene launch, called the *Northern Messenger*, was given for the work there. New dog-sledges and teams were also given by the *Montreal Weekly Witness*. Some new buildings were erected at St. Anthony, including



Battle Harbour — the Hospital on the Left



A Visitor from the North

some small farm out-buildings, and some land taken up from the Newfoundland government with a view to trying to introduce cattle. The orphanage was full for the first time. In connection with the coöperative store at Flower's Cove, an industry of making sealskin boots has sprung up, and fifteen hundred pairs were exported this summer (1906). Around these small industries it is possible to congregate women and children in the winter for the purpose of better education. This year a grant of $500 per annum to each hospital was made by the Newfoundland government.

1907. A new wharf with stores for clothing and for coal, and a large mission room, were added to Battle Harbour. The old executive building had to come down, as the accommodation was altogether inadequate for the work that had to be done. Funds, including a $5000 grant from the Canadian government, were raised, and three hundred reindeer with Lapp attendants were imported, with the hope of starting a regular industry on the lines of that so successful in Alaska. Angora goats were presented by friends in the United States, and were brought to the settlements; it is hoped that these animals will increase and yield the wool for a new weaving industry. Several volunteers joined the staff; in the number were the lady in charge of the orphanage, the electrical engineer in charge of the general mechanical work, and a teacher for night school and library work. The fourth hospital was kept open by a volunteer doctor from Harvard University, and volunteer nurses from England. A highly experienced teacher of "arts and crafts" took charge of the industrial work at St. Anthony this year. The steam-launch *Daryl* was given to the Mission by the Dutch Reformed Union of New York City. A large new schooner was built at the mill, and a Gloucester schooner, the *Lorna Doone,* purchased in Boston. A volunteer doctor was stationed at the large summer fishery at Blanc Sablon. Trained nurses from the Johns Hopkins hospital took charge of districts on each side of the Strait of Belle Isle; nurses teaching sanitation and tending the sick. A skilled teacher was placed at St. Anthony and another at L'Anse Amour. Because of the increasing consulting and operating work, an additional surgeon was added to the staff working either on the hospital ship or at St. Anthony. For this work Dr. J. Mason Little, of Boston, volunteered. Mr. W. G. Lindsay, of Queenstown, Ireland, also volunteer, took charge of the reindeer industry. The growth of the medical work is shown by the following summary of cases treated this year (1907): —

In-patients, 193.
Out-patients, 4720.
Operations under general anæsthetics, 80.

A doctor's house was built at St. Anthony. A new motor-launch was given in Washington for the doctor's use, and navigated down to the coast by volunteers from Yale University. Several additional volunteer nurses and workers gave their aid during the open season. A large coöperative store was started at St. Anthony. Electric power and electrical therapeutic apparatus were there installed. A permanent nursing centre was built at Forteau.

The condition of the fishermen and their families in the far-off places, even of Newfoundland itself, are described in many places by many people. I may quote here from Admiral Sir W. R. Kennedy, well known as an author, and well able to judge, as he spent much time visiting personally from place to place when patrolling with his ships in the western part of the North Atlantic. He writes: —

"On our visit round the island we met with sights enough to sicken one, and we felt ashamed to think that these poor creatures were British subjects like ourselves. On part of Labrador the people were actually starving last winter, owing to a bad fishing season, and many would have starved altogether had it not been for a steamer wrecked on their coast, loaded with bullock and flour."

The same observer, writing in 1881, says: —

"These poor people, ground down as they are by the detestable 'truck system,' live and die hopelessly in debt, living from hand to mouth without a shilling to call their own. Possibly education may in time awaken them to a sense of their degradation, but at present there seems no remedy for this evil. A bad season throws hundreds of these unfortunates upon the government, and no less than $100,000 is paid out annually in pauper relief among a total population of 180,000."

On my own first cruise along the Labrador coast, coming straight from a happier land, I was deeply impressed with the ruling terror of poverty and semi-starvation implied by the conditions then prevailing. The nakedness of the people was an insistent and deplorable feature ever facing the doctor as his calling made him a witness of the mean material, miserable flannelet or cotton, within the reach of a folk living in a subarctic climate. The wretched monotony of their cheap (truly the most expensive) foods; the small, bare, squalid huts; the ignorance and apathy of men and women; the absolute neglect of the crudest sanitation, were all seen to be parts of a great, cruel, vicious circle in which these thousands were living. Nevertheless, from the very first, I was not a pessimist. With vastly more certainty to-day, I hold to the view that the circle can be broken, all these people freed and elevated, and a sterling race of workers happily preserved.

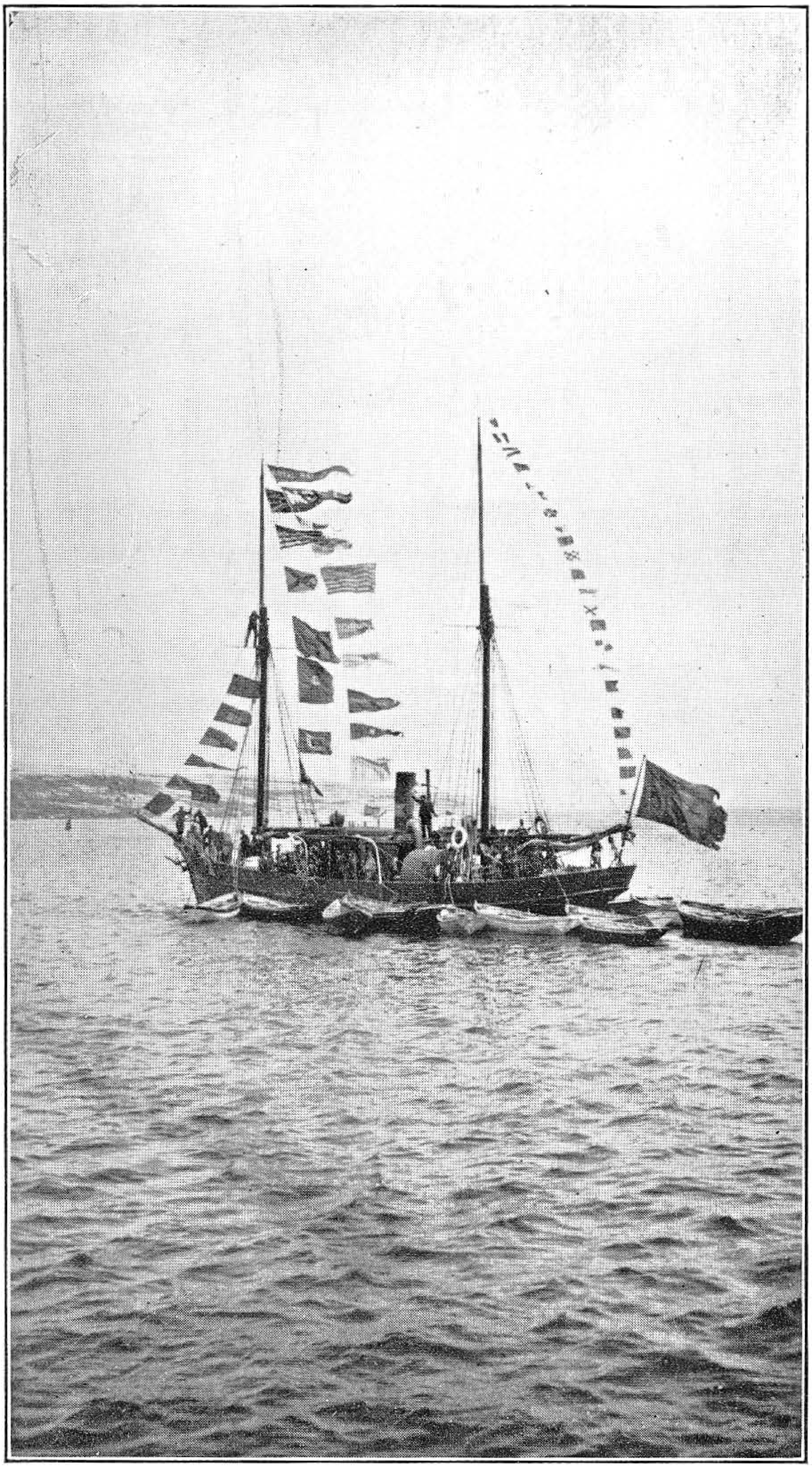
The Deep-sea Mission has set itself to help solve this problem, not merely by telling these men of the tenets of the Christian faith, as new facts of which they have never heard. The solution appears to the Mission to lie rather in example than in precept. The method aimed at is to illustrate in practice the attitude Christ would assume to-day in the varying phases of the fisherman's life.

From the inception of this work no man has, therefore, ever been engaged by the Deep-sea Mission in the capacity of priest or clergyman. Its staff has been always confined to laymen and to women specially trained in the various departments of work allotted to them.

To the sick the message has been, last year: four hospitals, three power-launches carrying medicine-cases, and in winter well-equipped dog-sleighs, stout teams, and many thousands of miles covered in visits from Natasquahan in the Gulf of Nain on the northeast coast, and from Port Sanders on the west to Whooping Harbour on the east coast of Newfoundland.

Within reach of the naked, over $2000 worth of clothing has been placed, their independence being carefully preserved by work demanded in return wherever the recipients were able-bodied.

In relation to equity, complaints have been brought before the medical officer as honorary magistrate, and as far



Mission S. S. "Strathcona"

as possible settled; claims considered and as far as possible adjusted, over the three thousand miles travelled by the hospital steamers, which has had many times to resolve itself into a court of justice. In several cases injustice has been prevented, wrong-doing has been punished, and all along that coast efforts have been made to render it possible for right to be done, and respect for the law to be engendered.

In view of the terrible ignorance of ordinary health precautions that was costing the people so dearly, and in relation to the treatment of young children and methods of sanitation, printed rules and catechisms have not only been distributed, but taught from end to end of the district. The medical officers are encouraged by the steadily increasing observance of sanitary rules.

To aid in destroying the oppressive "truck system" of trade, which keeps its poor victims in a sort of apathetic satisfaction with a hopeless state of slavery, coöperative distributive stores were established, which have paid good dividends, cheapened articles of necessity, and brought also within reach of the people an opportunity to become free of debt and servile dependence on those from whom they obtained supplies. This service has been such an unqualified success that it is bidding fair to outdo even the medical work as a valuable interpretation of the message of love.[1]

[1] Sir Henry McCallum, a recent governor of Newfoundland, in a private letter dated in 1901, says: "One thing you will be rejoiced to hear, the ministry has introduced legislation for bringing into force the Truck Act of 1831. This is one of the most important steps in the history of Newfoundland. By the Truck Act, supplies cannot discharge a debt or balance. Not only is the supplier liable to severe

In relation to ignorance: where once scarcely a single settler could read or write, and where ignorance always meant serious disadvantage in economic relations, travelling loan libraries have been established, small schools helped, and now and again, as it was possible, teachers supplied. Indifference and apathy had to be met with education as the corrective message of affection.

To the absolute helplessness of orphan childhood there can be only one Christian sermon; that was first preached by carrying the child to another country where it could be fed and clothed by an orphanage with a volunteer nurse to mother the children.

Some of the poverty caused by the impossibility of obtaining remunerative work has been relieved through the industry of the lumber mill, through the industries of schooner, barge, and boat building, sealskin boot making, and through other small efforts to use the country's own resources. It is hoped that in digging and drying peat, in working the local clay, and in weaving homespuns, much may yet be done; experiments in all these lines are in progress.

Open hostility to the liquor traffic has always been the attitude of the Mission. In the most populous areas prohibition has been secured. Illicit rumsellers have been ferreted out and fined, or otherwise punished. In St.

punishment, but the debt or balance still holds good in spite of supplies having been given, and can be sued for. Also, if in the absence of shops or passing suppliers necessaries of life have to be given by employees, they must be at cost price for cash, the price for outfits being a definite percentage above St. John's prices to cover cost of freight and charges. The trouble is, however, we have good laws but bad customs, and poor execution of law."

John's itself, where fifty saloons have provided the entertainment for the thousands of our Labrador fishermen who resort there, a large temperance institute on modern lines is in course of erection.

To the "shut-in" folk, to the unusually isolated, to those with no friends outside, the message took the form of a society of volunteer lady correspondents, who try to keep in individual, personal contact with the troubles and needs of the men and women whose names are allotted to them.

In the great need of milk for children, need of meat to ward off scurvy, and need for an additional source of revenue for the people, the best advocate for the message may be the introduction of reindeer; and a herd of three hundred of these animals has been introduced into Labrador and Newfoundland.

The actually starving have been admitted to hospital for feeding pure and simple. On many occasions the homeless and travelling strangers have been entertained. As far as possible, the hospitals have always stood for hotels as well.

That Christ would interpret the love of the Father in Heaven to His children on this coast merely by the erection of churches, the duplication of religious services, the insisting on an orthodox intellectual attitude by doctrinal methods, has not been the premise on which the work has been developed. To say that the results are imperfect is to say the work is human work. To say that visible progress, acknowledged progress, has been made, is a simple statement of fact, — a statement which would meet with the subscription of every member of the present Mission staff on the Labrador. Each one of my noble colleagues in the work sees betterment every year; we believe that, if this work be kept supported, time is on our side, and we are working for the time when no mission need work among these men of Labrador, for they will be self-sustained and powerful in their simple, wholesome life by the sea.

CHAPTER IX

REINDEER FOR LABRADOR

By W. T. Grenfell

It has been shown that almost all species of deer are susceptible to domestication, and that under intelligent management they can be raised for a profit. Venison is chemically almost identical with beef, and when in good condition is fully as nutritious. It is palatable, and fetches a good price in the market, twenty-five to thirty cents per pound being no uncommon price in the larger cities. The horns and hide are also valuable.

The range of many of the most valuable deer was once far wider than at present, and there are vast sections of the earth now lying useless which could with ease support herds of these valuable food-producing animals, if anything approaching the energy and capital expended on the improvements and propagation of vegetable food-supplies were devoted to them.

In the course of ages the upheavals and subsidences of the earth's surface have made new countries with environments suitable for deer; yet these lands are untenanted by deer solely because large tracts of water have isolated the lands and left barriers impassable for the animals. In this way vast areas now lie vacant which could nurture many of these animals for the service of man. Peary's discovery of the white reindeer which are maintaining themselves far north of the Arctic Circle, in spite of the almost Stygian darkness of the long winters and in spite of the minimal food-supply available, shows that even when Nature displays the very least generosity, animals of this family possess a phenomenal fitness to survive. Moreover, it has also been shown by countless experiments with many species of animals, that by careful treatment of those introduced into new environments, traits can in time be developed that will enable the species to flourish in the new home; whereas even had they been able to reach the very same region in the ordinary course of nature, they would, unaided by such development, not have persisted.

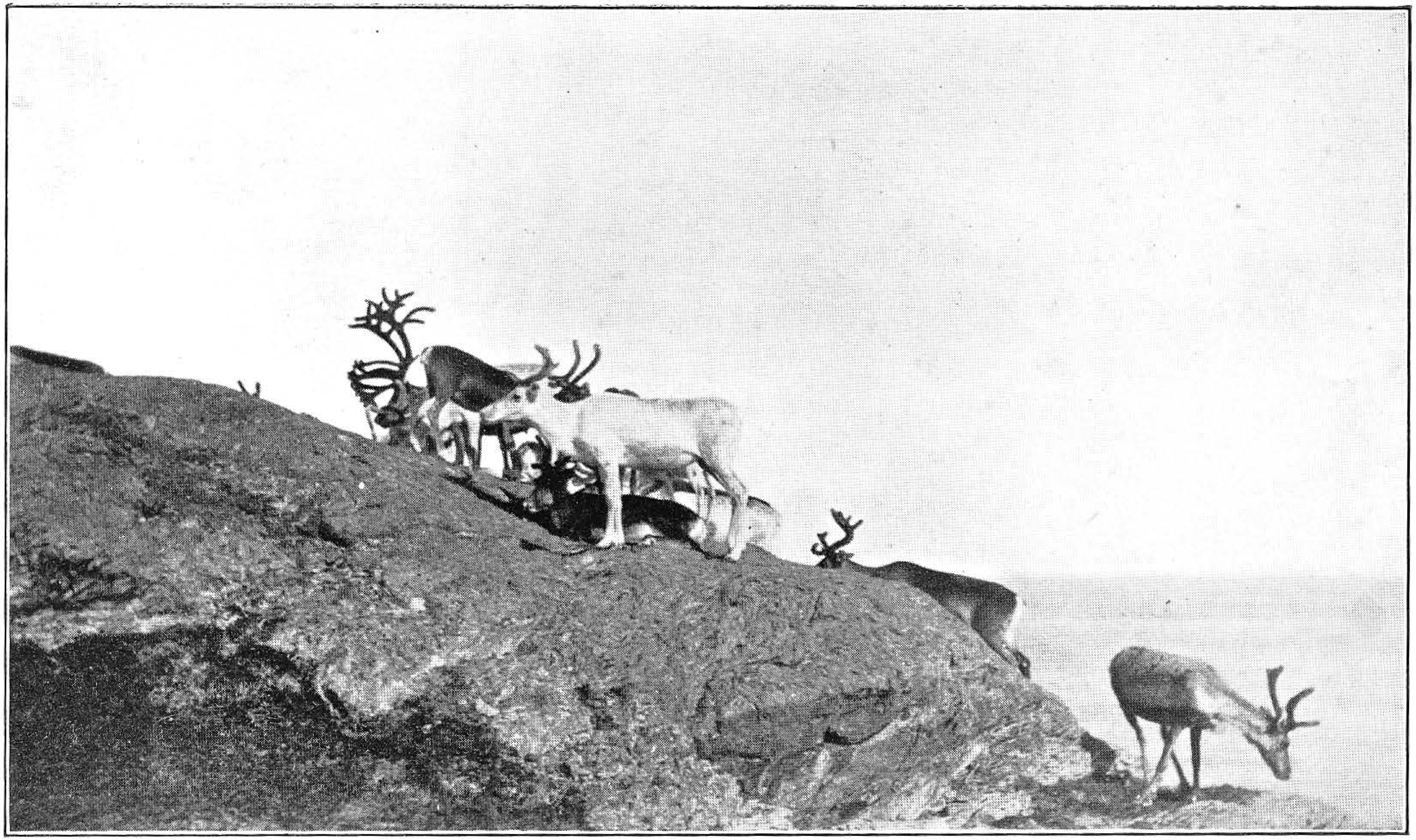
The natural distribution of the reindeer is almost entirely limited to the subarctic regions. Wet and cold offer no terrors to them; the humblest lichen affords them a source of nutriment; only the very deepest snowfalls can prevent their digging down to their food-supply; and they can range and multiply so far north that even their one enemy, the timber-wolf, cannot reach them. The wonderful hoofs of these members of the ungulate family are faced with an ever renewing hard exterior, which, like the beaver's tooth, is only made sharper by being used, and which enables the deer to cut down even through snow protected with an icy covering. At the same time they possess large dew-claws, or hooflets, which increase the spread of their large splay-feet, and enable the deer to travel and escape danger over snow in which any of our common cattle would be hopelessly engulfed and destroyed.

The experiments of introducing domestic reindeer into Alaska were first undertaken by the famous missionary, Dr. Sheldon Jackson, and have been since assumed and prosecuted to a marvellously successful issue by the United States government. These experiments have conclusively proved the adaptability of this particular animal to domestication in the Arctic for the service of mankind. Along the sea-shore, especially, the natives have readily taken to the task of propagating and using them, and already whole settlements are being supplied from these new herds. One Eskimo woman surnamed "Reindeer Mary" has even risen to wealth, owning many hundreds of deer, and, what is more important, shown herself capable in this way of considerable intellectual development. She thus indicates one line at any rate, along which the natives of Alaska may hope to escape extinction through the increasing contact and competition with the advancing white men.

Few other animals on the earth's surface offer as much to man with so little outlay. With scarcely any aid, races of men can subsist on what these beasts alone can provide. For transport they have been shown, under right circumstances, to be able to compete with the Eskimo dog in speed and endurance. On the Alaskan tundra, where the snowfall is much like that of Labrador, they have been an unqualified success. On journeys they can find their own food by the way — an item most important, for the dogs are obliged to carry this additional, and by no means inconsiderable, burden with them. Reindeer are now used not only for packing over open land uncovered with snow in summer-time, when dogs are entirely useless, but they are in regular use for running the United States mail service in the depth of an Arctic winter. Geldings are said to be far more readily trained to harness than stags, and are easier to keep in good physical condition.

At a pinch, one's steeds may be killed and eaten with relish, while the carcass, where meat supplies are scarce, is always of incomparable value. The tongues and kidneys form great delicacies, and the tongues may be smoked for export. A good-sized stag will weigh three hundred pounds, and has for meat alone fetched $50 in the Alaskan markets. The large, thickly haired skin of caribou or of the Lapland reindeer is invaluable for many purposes,—for boots, clothing, sleeping-bags, tents, and blankets. These skins need scarcely any preparatory treatment. Dehaired and dressed, they make most satisfactory clothing for use in cold climates. The sleek, dark-brown hair of the early fall affords a very beautiful material for ladies' jackets or motor coats, and picked skins for such purposes should well repay exportation; two dollars apiece is the present local price for Labrador deer skins. Some of our deer have snow-white skins in winter, and the hair is as thick as a cocoanut fibre mat.

Moccasins manufactured from the thinner deer skins make the warmest foot-gear known. The heavier stag skins furnish admirable light, soft, flexible over-clothes. They are perfectly wind proof, and, when dressed for use, fetch fifty cents to one dollar per pound weight. Stretched, undressed, they are sold by the pound as parchment; this, cut into strips, is rolled up, and sold as babbage, out of which all the fillings for snow-shoes are made. Of this, also, are made the lashings for our sledges and the harness for our dogs. The tough thongs show remarkable elastic strength as they feel the jarring and jolting of the rough trails. The very tendons that are useless as food are amongst our most valuable acquisitions, affording our women all the sewing



Where the Reindeer Graze

material they need for making boots, skin-boats (or kayaks), and clothing. These animal tendons are taken and dried, and fetch from ten to fifty cents for each animal. They strip easily into single fibres, and these separate threads form a strong sewing material, which resists water, and yet, when used in boots intended to be water-tight, swells up as soon as the boots are immersed in moisture. In this way leakage through the needle holes is prevented. The tendons do not rot easily, nor do they tear the skin substances, for they contract and expand with that material. Even the horns and hoofs are valuable, and furnish many of the household essentials of the natives. Some of these various manufactured products can be exported to the European markets. Reindeer may thus largely increase the earning capacity of any region, by converting its unsalable material into valuable products. The fresh rich milk of the does in the summer has also supplied us with what is a vital necessity, and one which was obtainable in Labrador in no other way; while the excellent and easily made cheeses afford a method of storing the nutriment in a palatable and assimilable form without any necessary outlay for a preserving plant.

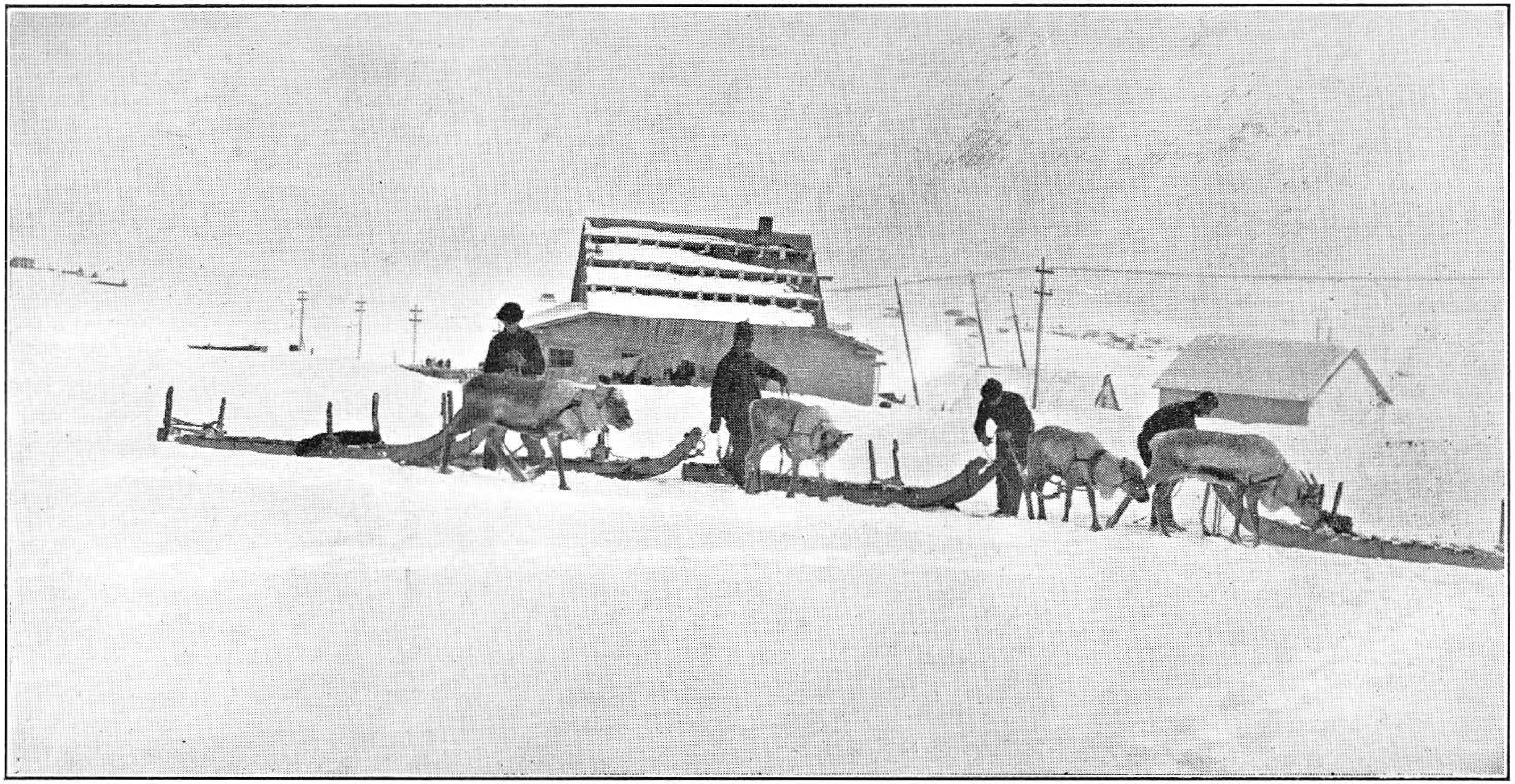
Reindeer have shown themselves to be regular breeders, comparing more than favourably with ordinary cattle stock. Reindeer herds may be expected to at least double themselves in three years. Does will breed the second year, and after that with great regularity bear one fawn as a rule, though occasionally two. Only a comparatively few stags are needed to serve a large number of does. So large were our own Newfoundland fawns at the end of their first season, in this our first year of experiment, that many of the yearlings were covered by the stags. The domesticated herds in Siberia have thus increased to such an extent that it is possible to buy full-grown animals at fifty cents per head, and Mr. Vanderlip, in his *Search for a Siberian Klondike*, states that he could purchase them as low as twenty-five cents a head as food for his dogs. Similarly, George Kennan tells me that he bought many at fifty cents apiece for dog food in Siberia. It has even been stated that the fecundity of reindeer may be liable to become a positive nuisance.

In the bot-fly the deer has an enemy which greatly worries him, but which does not appear seriously to injure him. The fly pierces the outer skin and leaves the egg underneath, where the larva grows and develops through the winter, in probably the only place where it would not freeze. In the spring the fly hatches out and leaves its birthplace. These large bot larvæ projecting under the skin are picked off and eaten by the Alaskans as a choice delicacy. In the ethmoid cells of these deer, at the root of the nose close to the skull, there are also always to be found a number of large maggots in various stages of development. These give rise to a coryza, fortunately not fatal, which leads the animal to sneeze out the larvæ in great quantities. We have otherwise found no disease likely to trouble the recently imported reindeer in Newfoundland.

During fifteen years of medical mission work on the coast of North Newfoundland and Labrador, I have discovered that one out of every three of our deaths on the coast is due to tuberculosis; that one out of every three native babies died before reaching the age of one year. Moreover, rickets, scurvy, multiple neuritis, blindness from corneal ulcerations in marasmic children, and other diseases of insufficient nourishment were rife among a people enjoying a bracing, pure air, undefiled by human or other exhalations, and in a country entirely free of endemic diseases. There were no milk-producing animals on all our coasts except a couple of cows and a handful of goats. The trading system and the people's poverty put even the tinned article out of the question. We were wont to see ill-fed mothers, without milk to suckle their babes, chewing hard bread, and thus after predigesting it in their own mouths, trying to maintain life in their wizened offspring, till they should attain the age at which nature furnishes them with the salivary glands, and enables them to convert "loaf" into the assimilable sugars for themselves.

Milk, milk, milk, seemed to us the great cry from the coast. It seemed impossible to supply it from either sheep or cows or goats on any large scale, since every family is obliged to maintain at least half a dozen dogs for hauling fuel and for travelling, and thus every village had a throng of fifty to one hundred of these hungry, half-fed beasts. The dogs, even at long distances from their own homes, go hunting exactly like wolves in large packs, and have killed the cattle as fast as it has been introduced. Thus it seemed impossible that we could maintain cattle and dogs together, and our medical staff had been compelled to do the best it could with a scanty supply of tinned milk. In any case, cows and goats need feeding in winter, and imported hay cost us $40 a ton. A cow eats two tons, even on a ration diet during our long winter, and it would cost us therefore twice as much as the cow was worth for her winter hay. All our people are forced by the necessity of their poverty to resort to the outer seaboard during the whole of our four warm months. There the Arctic current renders us liable to sudden frosts at night, and so gardening is unremunerative. Only one or two of our salmon-fishers who remain up the inlets all summer can collect the plentiful wild hay that grows there. The experiments of the Grand River Pulp Company in raising green oats or barley for fodder on the shore of Hamilton Inlet have been successful, but do not bear directly on the problem of procuring milk supplies on the outer coast, where most of our people live.

It was in this dilemma that I turned to the Rev. Sheldon Jackson, to learn the results and prospects of his experiments with Siberian and Lapland reindeer in Alaska, which is a somewhat similar coast, and I went to Washington to get our information at first hand. Meanwhile Sir William MacGregor, governor of Newfoundland, collected and sent to Kew Botanical Gardens specimens of all our mosses and lichens, and received from them a completely favourable report as to the suitability of our most abundant forms of vegetation to support these deer. Favouring the conviction that we were plunging into no unwise speculation, we had the evidence of the abundant natural herds of caribou, known to exist in the barren lands west of Hudson Bay, as well as the more direct evidence of the comparatively large herds of caribou on the Labrador plateau, from which our native Indians still draw almost their entire food-supply. Moreover, we are familiar with the large numbers of caribou maintaining themselves against all odds (including the extensive forest fires) in Newfound-



A Deer-team

land. These deer are of the same species as our domestic reindeer (*Cervus tarandus*), though of slightly different varieties, the barren-land caribou and the Canadian woodland caribou being about the same size, but both of rather smaller growth than the Newfoundland woodland variety. This difference might reasonably be accredited to ages of access to a superior food-supply, and this has been one factor to influence us in keeping temporarily our small experimental herd on the south side of the Straits of Belle Isle. The herds in the Canadian barren-land are phenomenally large. The photographs taken by Mr. J. B. Tyrrell show interminable serried ranks on the march, resembling with their long, slight horns a vast army of spearmen. In 1909 a herd of half a million of these barren-land caribou was reported from Dawson City as travelling along the Tanana River beyond Sixty-mile River. The procession was described as twenty miles wide.

It seems to have been shown that deer, freed from the fear of man, have a great predilection for associating with domestic cattle. In New England, once they learn they have nothing to fear from man, deer will come down among the cattle almost into the farm-yard. Thus, the further hope that the young of the wild species might be cut out, corralled, and raised with a domestic herd without any fear of their again returning to the wild, seems to be assured. Also it has been shown that the two varieties can interbreed successfully. On one occasion a Newfoundland caribou joined our herd; it so closely resembled our own deer that an English friend tried to knock up the rifle of the Lapp herder who was shooting it from twenty yards away. Again, two of these same caribou joined a section of the herd sold by us to Mr. Mayson Beeton of Grand Lake and remained with his animals two days, coming in and out of his corral with the rest, while three of his tame ones wandered off for three weeks with their wild cousins and then returned, as if preferring the less strenuous life.

Encouraged by all we had heard, we set to work, and collected a sum of $10,000 by public subscription, chiefly by the help of the *Boston Transcript*, and in addition the Canadian Federal Department of Agriculture voted $5000. The task of purchasing and shipping the deer and of securing their herders was intrusted to Mr. Francis Wood of London, England, who voluntarily proceeded to Norway and Lapland for the purpose. Three hundred deer were eventually purchased. Of these, two hundred and fifty were does of an age to bear fawns in the spring, and fifty were stags; they were to be delivered on the beach at Altenfjord on the north coast of Lapland in lat. 71° north, at a cost of $8.50 apiece.[1] A contract for thirty tons of the moss known as reindeer moss, or Iceland moss (*rangifereria*), was arranged. The moss was to be gathered and stored on the highlands to await transport by the deer themselves, on the pulkas, or native sledges. The contract with the Laplander agent ran as follows: —

"Israel N. Mella acknowledges hereby having sold to Mr. Francis H. Wood, of London, 250 female reindeer, three years old, sound, fresh, prime deer, for a sum of 30 Kr. each delivered on board the ship in Bugten, Altenfjord; also 25 tame four-year-old drawing deer for the sum of

[1] On board the steamer ready for sea, they cost $16.74 per head; landed in Labrador, they cost $51.49 per head.

Kr. 40 each; also 25 three-year-old buck deer (oxen), price 35 Kr. each, all the deer prime, all the deer delivered on the ship at Bugten between November 25th and 30th, 1907. Also 500 loads of reindeer moss, at 150 kilograms per load, at the sum of 12 Kr. per load, delivered on board the ship at Bugten between November 25th and 30th, 1907. Also eight good trained reindeer dogs, 25 Kr. each. I undertake to procure four Lapp families for the expedition on the lowest terms possible; for the work of yarding, taking care of the deer; also food for the deer until the ship comes, between November 25th and 30th, there shall be paid me (Mr. Mella) Kr. 500. In the Kr. 500 is included the engaging of the families. I acknowledge by this having received for 500 loads of reindeer moss, Kr. 6,000; also half the purchase price of the reindeer, Kr. 4,688; also there shall be paid to me (Mr. Mella) the advances made to the families, and the remaining half-price of the purchase money of the reindeer in Bugten on the delivery of the reindeer and the moss on the ship.

"(Signed) ISRAEL N. MELLA.

"*Witness:* DINA AUNE. *July 29th,* 1907."

Unfortunately the winter was very late, and it was impossible to haul until after Christmas, — a fact which made tonnage for sea transport much harder to secure and much more expensive. Indeed, it was only with extreme difficulty a steamer was secured at all to carry the deer so late in the year. She had to be fitted with stalls to prevent the deer being thrown about and damaged in rough weather. A contract was entered upon to carry the herd of three hundred animals from Lapland to Labrador for $8262. A bonus of fifty cents per head was to be paid the captain for every animal that was landed in good condition.

Following is the essential matter of the charter contract:

LONDON, *6th July,* 1907.

It is hereby agreed between the Owners of the good steamer "Anita," and Francis H. Wood, 181 Queen Victoria St., London, Charterers, that the said Owners will, between 25th November and 30th November, place at the disposal of the said Charterers at a port in NORTH NORWAY in charterers' option, to be declared in good time before steamer's readiness, the above-mentioned steamer for the conveyance of three hundred head of reindeer and fodder, which the steamer shall be fitted to carry under experienced Captain's supervision to the satisfaction of Charterers' reasonable requirements to prevent mortality.

The Reindeer are to be supplied to the steamer as quickly as they can be received by the steamer.

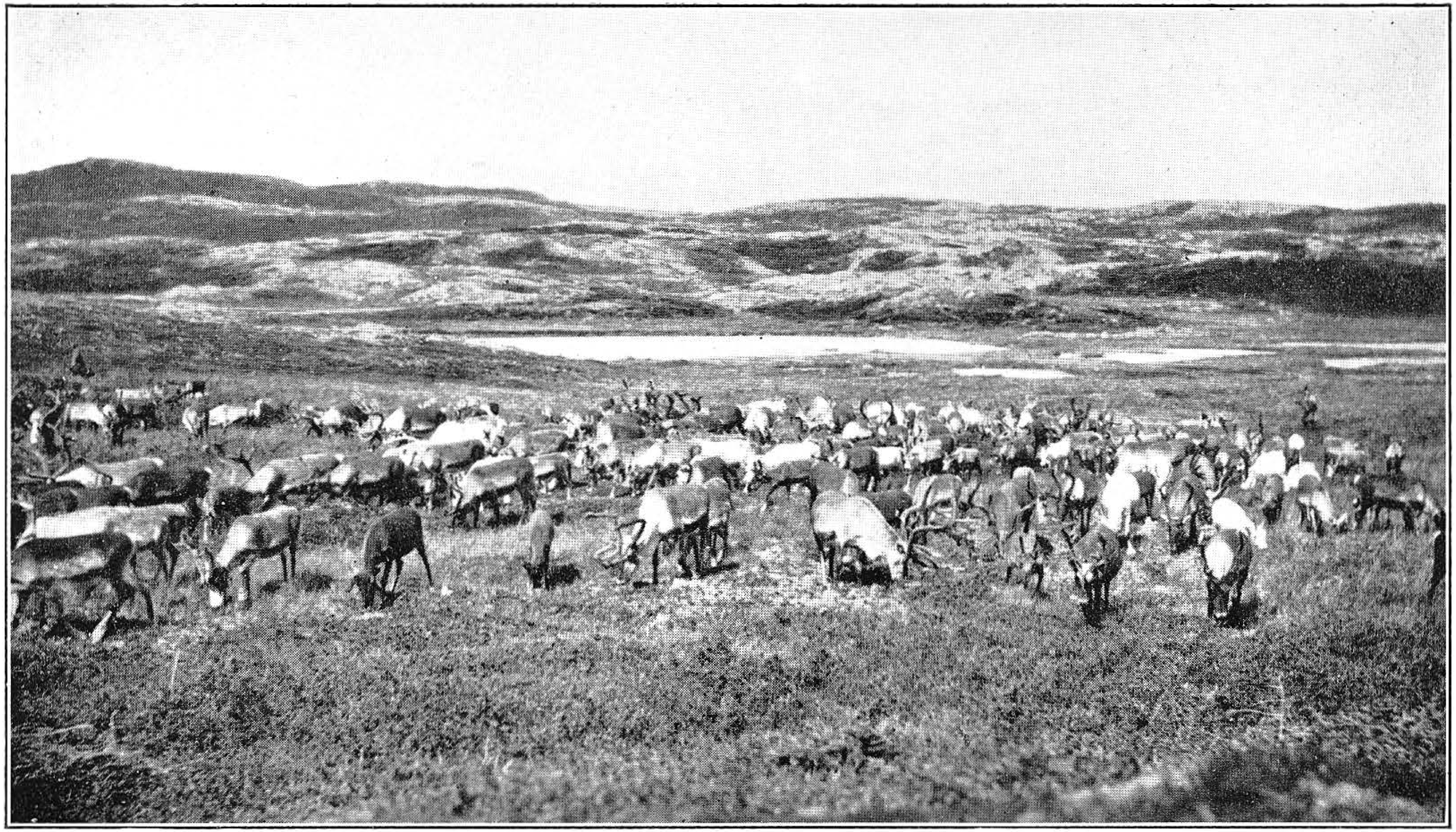
As soon as the reindeer fodder and cattlemen are on board the steamer is to proceed to ST. ANTHONY, Cape Bauld, Newfoundland, to land the reindeer; afterwards proceeding to Lewis port to land 50 deer.

It is understood that the Harbour accommodation at both ST. ANTHONY and Lewis port is good and easy of access.

For the carrying of the reindeer the steamer is to receive a lump sum freight of £1700 *(seventeen hundred pounds) sterling.*

Four cattlemen (Laplanders) are to be provided by the charterers. Owners are to provide sufficient additional cattlemen to assist in looking after the reindeer on the way out.

The steamer is to be fitted under experienced Captain's supervision to the satisfaction of charterers' agents' reasonable requirements to prevent mortality, for the conveyance of the reindeer by Owners at their expense and in their time.



The Herd in Summer

£1300 of the freight to be paid in cash in London on completion of loading in Norway; balance of freight to be paid in cash in London on receipt of cable advices that the reindeer have been landed.

Charterers are to provide sufficient food for the reindeer. The steamer is to supply the requisite fresh water for the reindeer in accordance with charterers' reasonable requirements; also food and sleeping accommodation for the cattle-attendants.

Should ST. ANTHONY or Lewis port be inaccessible by reason of ice on steamer's arrival, the whole of the cargo is to be landed at whichever port is free of ice. If both ports are inaccessible on account of ice, the steamer shall proceed to the nearest safe open port, where the cargo is to be landed and freight to be paid as if the steamer had performed the voyage as above.

Owners not to be responsible for mortality.

The steamer to have liberty to call at any ports in any order, to sail without pilots, and to tow and assist vessels in distress, and to deviate for the purpose of saving life or property.

It is agreed by charterers that the ports of loading and discharge shall be such as steamer can reach, always being afloat, the animals being brought to, and taken from, alongside by charterers, steamer to go alongside any accessible and safe wharf, dock or craft as ordered by charterers.

Owners to give charterers fourteen days' notice of steamer's readiness, also ample notice when and where steamer will be fitted out.

It was further necessary to insure the deer against accident, and the contract was made as follows: owners to pay insurers $38.88 per cent less rebate of $13.50 per cent if no claim was made. No claim did arise.

The herd set sail on December 30, and, after a very rough voyage of twenty-one days, sighted ice off the Labrador coast. She eventually anchored in a bay on the North Newfoundland coast, about eight miles from the harbour that we had chosen as a wintering place for the deer. During the night a heavy onshore wind drove the ice into this bay, and pushed the steamer from her anchors and on the rocks, — a position from which she was only subsequently rescued after considerable damage. The deer were meanwhile landed on the broken slob-ice with the result that they scattered in every direction, some even disappearing over the horizon seaward and many falling into the water between the large pans of ice. The Lapp herders at once led ashore some of the more sedate beasts with bells around their necks, and tethered them at varying distances along the coast, as lures to the others. This ruse proved most successful, and by an accurate count made at a round-up three weeks later, every one of the three hundred was found in the herd. Lieutenant W. G. Lindsay of Cork, Ireland, who had had some experience in Mexico ranching, has been in charge of this experiment from that time.

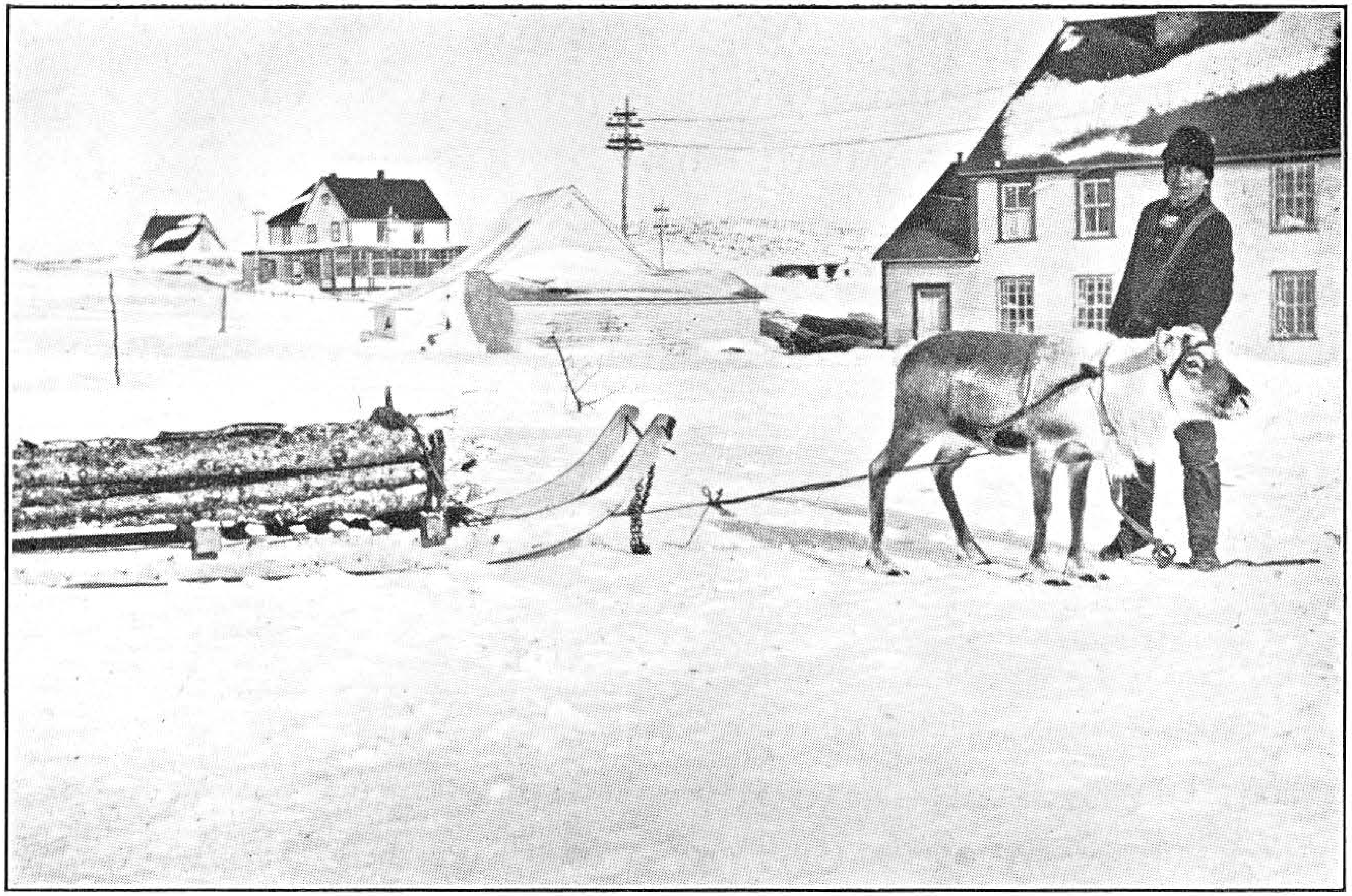
The deer at once took kindly to their new environment, being allowed to run wild all day, though brought in near camp every night. Each day two herders, with dogs, followed the wandering herd and brought them nearly to the same place in the evening. The deer never wandered far; on two or three occasions a single individual was missing and got perhaps as far as twenty miles away, but straying never presented any serious trouble. More serious at first were two successive glitters, or sharp thaws followed by frost, which covered the snow with a hard ice coat and made it difficult for the deer to dig down to their food. In spite, however, of all difficulties and the long voyage, they steadily gained in weight, and so far as we can tell, not one of the pregnant does lost her fawn.

On the following pages is the expense account of the enterprise:—

FRANCIS H. WOOD IN ACCOUNT

Dr.

	£	s.	d.
To Cash per Mr. Peters	£1,570	2	7
" " " Mr. Reed, of Boston	1,312	4	11
" " " Miss Brodribb	20	0	0
" Sundry Contributions per "Toilers of the Deep"	3	11	6
" Interest on Deposit	9	13	9
" Cash Anglo-Newfoundland Development Company, sale of 50 deer	513	19	2
" Cash Anglo-Newfoundland Development Company, sale of 4 dogs	5	10	0
" Cash Anglo-Newfoundland Development Company, repayment advance of wages to Lapp Families	32	17	6
" Rebate on Insurance (*see contra*)	76	19	0
	£3,544	18	5



After a Long Haul

WITH REINDEER FUND

PURCHASE ACCOUNT **Cr.**

		£	s.	d.	
By Cost of 300 Reindeer, as per contract with Israel Mella	Kr. 9,375				
" Cost of moss, as per contract	Kr. 6,000				
" Cost of 8 Lapp dogs for herding deer, as per contract . . .	Kr. 200				
" Allowance for providing yard at Bugten and herding deer between November 25th and 30th, as per contract .	Kr. 500				
" Payment to Agent for assistance in making contract and superintending shipment, etc. .	Kr. 1,800				
	Kr. 17,875 =	£982	2	10	
" F. H. Wood's travelling expenses to Norway to purchase deer, etc. .		50	0	0	= £1032 2 10 = $16.74 per head

SHIPMENT AND EMBARKATION EXPENSES

	£	s.	d.	
By cost of feeding deer from November 30th to December 12th while waiting for ship, extra for fittings, and sundry expenses connected with embarkation, telegrams, and postages .	206	11	1	
" Payment to owners of *Anita* for freight	1,700	0	0	
" Present of 2/- a head to Captain for each deer landed alive	30	0	0	
" Cost of insuring deer against all risks at £8 per cent less rebate of 54/- per cent if no claim arose (*see contra*)	206	16	6	= £2143 7 7 = $34.75 per head

DISBURSEMENTS ON ACCOUNT OF MAINTENANCE

	£	s.	d.	
By Advances made to 4 Lapland Families on account of wages	82	3	11	
" Stores and provisions for re-sale to Lapps, including Port Dues (£3 1s. 2d.) in London	26	14	2	
" Balance in hand for maintenance expenses forwarded to Newfoundland .	260	9	11	
Grand total .	£3,544	18	5	= $51.49, total per head landed St. Anthony

Our attempt to use the stags for rapid transit has not been altogether successful. At hauling logs and other weights on the boat-like "pulkas," or on our more adaptable "catamarans," at a walking pace they succeeded admirably, each deer pulling as much as four or five dogs. But when pace was the criterion of success they failed at the first. For though they could go like the wind when they wished, they did not often go fast when we wished, and we had to be contented with the Lapps' assurance that they only needed experience. In this respect the deer have certainly improved this second winter very considerably; but still we have not been able to consider them as rivals in speed to our dogs. Their timid natures seemed to make them flurried when an excess of speed is demanded on a down grade, and their habit of suddenly stopping ceased to be amusing, when it would cause you, with your loaded sled, to roll over and over with your team to the bottom of a steep incline. I am assured, however, that this is only a difficulty to be overcome, and my Alaskan informant, who for many years has driven a mail train with reindeer, assures me that it takes a reindeer stag three seasons' work really to find himself. If, however, for any reason we are unable to entirely replace our dogs with deer for rapid transit, we shall proceed as we have locally, by killing off all the worst dogs and enforcing the existing laws, which compel all dogs roaming at large to wear a heavy clog or carry one paw through a ring round the neck. I have repeatedly driven my own dog-team through the herd this winter without trouble.

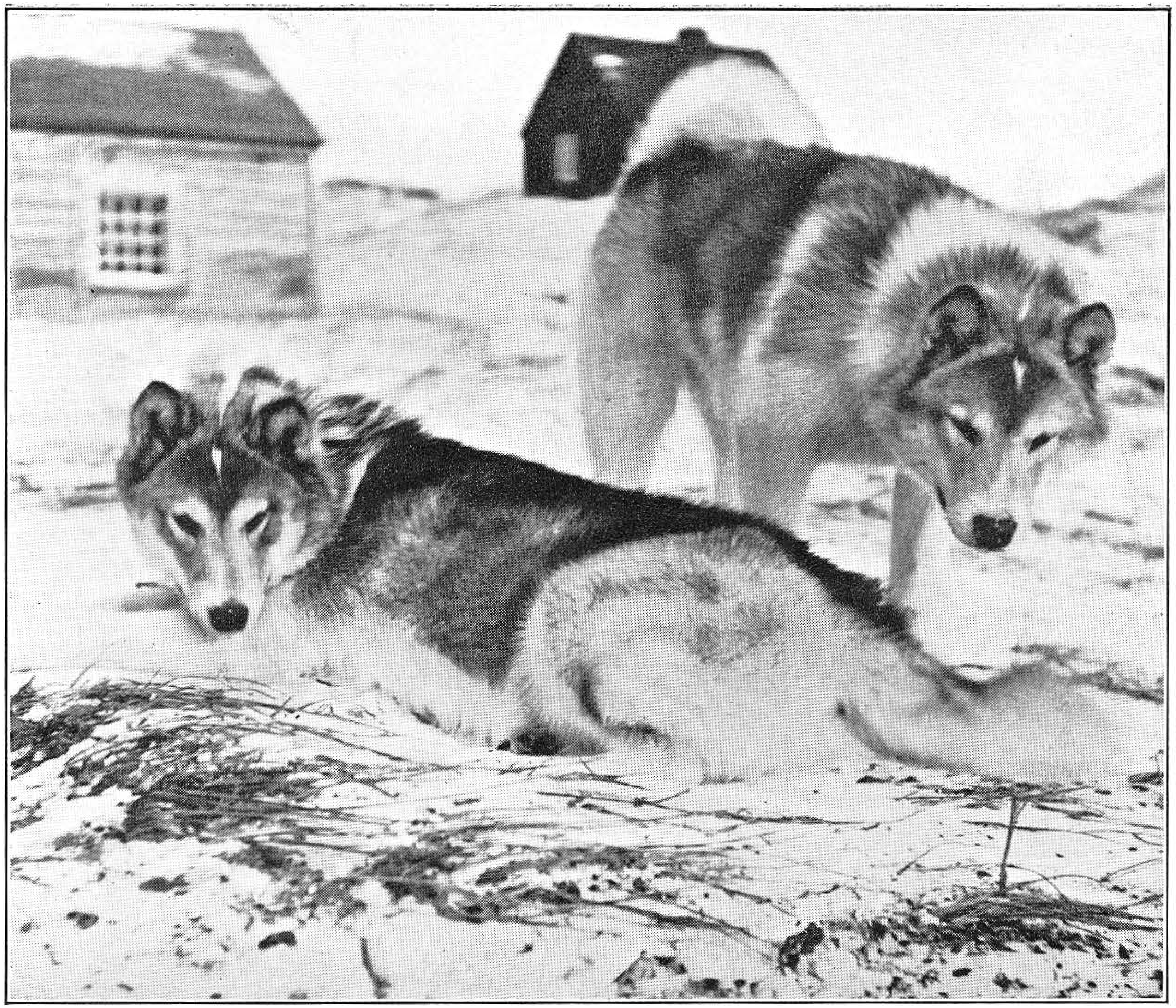
On several occasions when we have tethered our beasts at night they have either pulled adrift, or chewed through the skin line that held them, and so escaped. But as a rule they have at once found the herd and returned to it, even though it may have been feeding many miles away at the time. At other times, certain deer have shown a propensity to select certain particular spots for grazing, and have repeatedly left the main herd and returned to the ground of their own selection. The main herd, as a rule, get up and feed from daylight to about 11 A.M., then lie down and rest until about 4 P.M., about which hour a stag would get up and walk round restlessly. If he came too near another, the latter would strike viciously at him with his head, as if deploring the fact that the time had arrived for renewed activity. He would, however, soon arise as if under protest, and join the moving group till all the herd was afoot. Then, without apparently any reason, it would seem to occur to a stag that to migrate ten miles northwest or southeast would be advantageous, and off he would go at a staid walk, the whole herd falling in and following him like a funeral procession.

The time for fawning came with May, and Mr. Lindsay took the deer to highlands as free as possible of the then treacherous brooks and lakes, which were opening beneath the spring sun. Our herd was now reduced to two hundred does and fifty stags, for we had sent south the fifty deer sold to a large lumber concern, three hundred miles to the south. These latter had all reached their destination safely after their long march, only one stag dying after arrival. They were to be used for carrying supplies over snow to far-off logging camps.

As far as we could count, the does threw one hundred and sixty-eight fawns, and of these only eight were born dead or perished in the brooks and thickets. We also lost two deer by dogs during the year, and found one doe shot with buckshot, so that exactly one year after arrival, our two hundred and fifty numbered four hundred and five. Among these deer the fawns were so large by October, when the rutting season came on, that some, at least, were covered by the stags; but with what result we are yet unable to tell.

All summer long the deer had chosen the high green-covered hills close to the sea, greatly enjoying and rapidly fattening on the salty food. They ate mostly the young grass and new green leaves, apparently making little discrimination, except that as they did not seem to use the moss on which they must rely in winter, one might have suggested (probably untruthfully) that they were specially saving that for consumption when nothing else would be available.

The magnificent antlers on the older stags proved a danger to others, and after one had been killed by a bad wound in the side, we dehorned the rest, with the exception of their brow antlers, which we considered sufficient to enable the deer to keep up their courage and spirit of play. After the fawns had run six full weeks with their mothers, that is, by the beginning of August, the herd was driven by the dogs every day into a large corral built for the purpose, and sixty does were milked each time. While suckling their fawns, we could not expect to get very much milk at best from each. They gave us, however, a pint of a very rich, creamy milk per head. This tasted more like cow's milk than anything I know of, and had none of the flavour familiar to that of the goat. I have unfortunately no analysis of its component parts with me, but would judge it



Whole-bred Eskimo Dogs

would take at least one-quarter part of water to reduce it to the standard of cow's milk. This being an experimental year, beyond now and again sending a supply round to our nearest hospital and to neighbours, we made no attempt at a systematic distribution of it. That will naturally be a difficult matter until we can either divide our herd or get sufficient quantities of milk to make it worth while to distribute it widely. The milk was, however, readily made by our Lapp herders into a very delectable and easily digestible cream cheese,—a commodity which we found it easy to carry on our sledge trips during the winter. It did not freeze, and formed an excellent addition to our diet.

Our next effort will be to capture and rear with our domesticated animals a number of the young of the woodland caribou, which roam in great numbers near us, and also to obtain some of the barren-land variety, if we possibly can, for a similar purpose. In view of the immense area of land that surrounds us, many thousand square miles of moss-covered Newfoundland and Labrador which are well able to support reindeer, we are still exceedingly optimistic as to the outcome of this venture. For stock raising alone it should certainly prove remunerative. The experience in Alaska entirely justifies this conclusion, where now the government has twenty thousand of these beasts in its herds.

A report direct from the herd, dated March, 1909, states that the herd is in splendid condition: the stags fat and sleek, the does all well, and no losses. Even those returned in bad condition by schooner (from the lumber camp mentioned) have picked up during a hard winter, and appear to promise well for fawning in the spring.

CHAPTER X

THE DOGS

By W. T. Grenfell

Human life in Labrador has been so largely dependent on dogs that a brief chapter devoted to them is almost essential.

The real Labrador dog is a very slightly modified wolf. A good specimen stands two feet six inches, or even two feet eight inches high at the shoulder, measures over six feet six inches from the tip of the nose to the tip of the tail, and will scale a hundred pounds. The hair is thick and straight; on the neck it may be six inches in length. The ears are pointed and stand directly up. The appearance generally is that of a magnified Pomeranian. The legs look short, compared with the massive body. The eyes are Japanese, and give the animal a foxy look about the face. The large, bushy tail curves completely over on to the back, and is always carried erect. The colour is generally tawny, like that of a gray wolf, with no distinctive markings, but a beautiful black and white breed has grown up, and furnishes the handsomest dogs. The general resemblance to wolves is so great that at Davis Inlet, where wolves come out frequently in winter, the factor has seen his team mixed with a pack of wolves on the beach in front of the door, and yet could not shoot, being unable to distinguish one from the other. Settlers have succeeded in getting good skins by pegging out a female dog in heat, and shooting the wolves that come down after her.

The wolves themselves are larger than the dogs. They may measure in length as much as seven feet eight inches, from nose to tail. They are very bold; on one occasion wolves lurked around a solitary house in Big Bay till they had carried off the four dogs, one by one, and left only after capturing the cat. The dogs retain these same ancestral habits. Some summer settlers at Batteau have goats at their small shacks. About ten miles away at Red Point lived a hungry team of dogs. One night a goat was missing. The crime was traced to the dogs. Men with guns waited their return, with no result except much loss of time. The dogs never came near the settlement by day. Yet, before the people left, the dogs had successfully carried off every goat without suffering any losses.

On another occasion my own leading dog, a black bitch from Cape Chidley, ran away from the hospital in early spring. She was seen near a neighbouring village, killing sheep. Three had been slaughtered by her on land, and she had driven two more out on to a rocky island, where she swam off and slew them. With a long shot the sheep-owner wounded her, and she fled into the woods, but still did not return home. He hauled the carcass near the edge of the woods, and sat up for her. True to her wolfish instinct, she returned to her quarry by night, and so met her fate.

Our dogs know little or no fear, and, unlike the wolves, will unhesitatingly attack even the largest polar bear. On one occasion a man's dogs, travelling along smooth sea ice, scented a white bear and started off like the wind.

They suddenly turned a point and ran right into him, so that the traces tangled round the bear before the astonished driver had time to unlash his gun. As soon as he could, he cut the traces, but even in harness the dogs kept Bruin at bay. Though the bear stood up to fight on his hind legs, the dogs managed to get in some good bites without being hurt. On another occasion a man brought me a specially valued dog that a bear had squeezed. The bear had been sighted some distance off on the ice-floe, and the dogs were slipped to hold him up for the hunter. By the time he arrived on the spot, they had the bear practically killed. But two had been damaged by him, one clawed and one squeezed.

The Labrador wolf has never been known to kill a man. Yet on several occasions single men have fallen in with them. One man told me that a pack followed him almost to his own door, that they stopped when he stopped, and came as close as ten yards. He had no gun and no means of defence, yet they never touched him. The Labrador dog has much the same respect for man. He is, moreover, affectionate and playful. You can easily make a pet of him, if you treat him well. He is generally harmless to children when he is decently looked after, but a team of dogs together, however quiet, are never safe to strangers. Even a single dog, if kicked about, badly fed, and left to be worried by the neighbouring dogs every day of his life, cannot be trusted.

The wolf will track a deer day after day till he captures it. Again and again our trappers have seen evidence of the indefatigable zeal and indomitable resolution of a single wolf in following a caribou herd; and observers all agree that each time the track spells the shadow of death. A settler told me the story of a doe caribou which, in the early summer of 1906, he saw brought to bay on the middle of a pond by a single wolf. The ice had thawed out, and it was necessary for the wolf to swim off to get at the deer. The wolf, after long hesitation in taking to the water, which it apparently hates, swam off, fought the caribou, and though repeatedly knocked down by her fore hoofs, at last pulled her down.

Our dogs, taking the scent of a caribou trail, even when in harness, will forget all discipline, and they will almost tear a komatik and driver to pieces in their eagerness to give chase. I have known of a team that thus ran away, and some of them never came back. In all probability they had been killed, for an Eskimo dog never loses his way.

The dogs very seldom perish for want of food, and then only under circumstances of an extraordinary nature, such as being adrift on the floe-ice. The Eskimo dog takes kindly to the water in summer. He will go in fearlessly after fish. When the caplin run ashore, the dogs, half starved after the winter (like most of the other animals), almost live in the water, eating their fill till they are like ambulatory barrels. I have watched them patiently hunting flatfish in shallow water. They dive their heads under water when they feel the fish wriggle under their feet. Twice I have had half-breed dogs who would dive to the bottom in two to two and a half fathoms of water, and bring up stones wrapped in white paper. This accomplishment served me well on one occasion. From the edge of the shore ice I had shot a seal swimming in the open water alongside. My leading dog, which I unharnessed, dived to the bottom, and brought the seal to the surface by the flipper.

I am inclined to think the half-breed dogs are the cleverest also in memorizing. In 1907 I was driving a distance of seventy miles across country. The path was untravelled for the winter, and was only a direction, not being cut and blazed. The leading dog had been once across the previous year with the doctor. The "going" had then been very bad; with snow and fog, the journey had taken three days. A large part of the journey lay across wide lakes, and then through woods. As neither I nor my friends on the other komatiks had been that way before, we had to leave it to the dog. He went so quickly and so confidently that it grew almost weird to sit behind him. Several times I called a halt to examine the direction and leads. Without a single fault, as far as we knew, he took us across, and we accomplished the whole journey in twelve hours, including one and a half hours for rest and lunch.

No amount of dry cold seems to affect the dogs. They sleep out on the coldest nights, frequently choosing the most exposed places, and apparently disdaining any shelter. I have almost had to dig them out from new snow in the mornings. They will stay in the water any length of time in summer when the water is from 40 to 43° F. I have seen a dog mistake the buoy on a net for a stick thrown by his master. He swam out, seized it, and tried to pull it ashore. We went in and had tea, and when we came out again, the dog was still pulling at the buoy. Yet, in winter, the dogs dread the water, and it is very difficult to drive them through it. They seem also to have an instinct telling them when ice cannot be depended on, and it is rare that they fall through, unless being urged on by a driver.

The Mainstay of the Team

In training a leader, a female is generally chosen as less likely to be damaged by the others fighting with her, — an accident which, at certain times, would cost a man his life. The ideal team is a clever mother followed by a dozen of her own pups. Mixed teams, however powerful, are never so good. The dogs soon learn to turn at the word of command. The whole team will sometimes learn to "turn" without waiting for the leader; but that is rare. The dogs get to know their own places in a team, and, if allowed to run loose for any cause, such as an accident or sickness, will nearly always come and run in their places. I have had so much trouble with a dog doing that and getting repeatedly run over for his pains, that I have had to lash him on the komatik to save his life.

There can be no question that the dogs love to be driven. They go perfectly wild with excitement when they are in harness. The komatik must be lashed to a stump or stone, and the line cut only when the driver is ready to go. The team then shoots off like an arrow from a bow.

They are, of course, flesh eaters, and, by nature, purely carnivorous, only touching meal and farinaceous foods when compelled by dire hunger. During my years in Labrador they have killed two children and one man, and eaten another. In the case of the second man the evidence went to show that he was not killed by the dogs, though his dead body was devoured by them. In that case (winter of 1906), a man, his wife, and son got lost. Their bodies were found only when the snow melted away during the following summer. Of the owner of the dogs only the bones were discovered. As the dogs returned in good condition after a fortnight's absence, all of them were shot. The other man killed (also in 1906) was driving home, and had badly fed, savage dogs. He was apparently beating them, when they fell on him and nearly tore him to pieces. Each of the two children fell down in the midst of a pack that had begun fighting.

The dogs will kill almost any kind of domestic animal quite naturally. I was passing a house one day into which an elderly lady was driving a goat. I heard a shout and noticed my leading dog was calmly proceeding on the way, dragging the unfortunate goat in his mouth by the hind leg. Our traces, harness, and all fastenings are made of sealskin, and these the dogs love to eat, but most will readily learn not to do so. I have had dogs which would not eat their skin shoes that we put on them to save their feet against the cutting of the ice crust. At the same time my sealskin whip has often been eaten, a deed which one scarcely knew whether to attribute to bad taste or to great sagacity.

There is nothing an Eskimo dog likes more than a fight. The moment the noise of a fight breaks the silence, every dog in hearing will fly off at full speed to the spot and "chip in." Members of one team will, as a rule, stick together; a whole team will saunter out, and try to lure passers-by into a mêlée. As a rule, however, all dogs will bite the first to fall, and if one has the misfortune to be thrown on his back, it is nearly certain his fate is sealed. It is marvellous how soon they can kill the enemy. I have known it done in two minutes, a great fang finding a billet in the carotid artery. I had purchased a fine dog for a leader one year, and on the first trip left him tied with the team in harness while I went to pay a visit. He was dead and partly eaten when I returned.

The natives always use great whips with a lash as long as thirty feet. With that the driver can strike any dog he wishes, even at full gallop. The length of the handle is immaterial. Indeed, I have known an Eskimo kill many partridges (or spruce grouse) by flicking them with a whip which had no handle at all. Any good hand with a whip will drive nails into a post with it, and will cut a hole almost through a door-panel.

For endurance, few animals can equal our dogs. As I have said before, cold seems absolutely immaterial. At 50° F. below zero, a dog will lie out on the ice and sleep without danger of frost-bite. He may climb out of the sea with ice forming all over his fur, but he seems not to mind one iota. I have seen his breath freeze so over his face that he had to rub the coating off his eyes with his paws to enable him to see the track. I have driven him from daylight to dark on bright spring days when a couple of hours of such exposure would blind the unprotected eyes of most men. I have never yet known a dog's eyes to suffer at all.

No dog is fed more than once a day, and one might almost say no dog is ever given all he wants to eat. Yet a team will, when unavoidable, go two and three days without food on a journey, and yet show scarcely a sign of fatigue. To feed its puppies, a dog will vomit the food it has eaten itself.

For speed and endurance it is difficult to surpass these wonderful animals. An old friend, a Hudson's Bay factor at Moose Factory, in a letter describing a journey he recently made with ten dogs, and nearly a thousand pounds' weight on the komatik, says: "We covered the one hundred and eighty miles of distance in two and a half days, and the dogs showed no signs of slacking when we drew up." With a half-breed team of only seven dogs, I have myself travelled seventy miles a day over a hilly country, but there were only two hundred and fifty pounds on the komatik. On this journey there was time allowed for midday rest for lunch and the boiling of the kettle.

The Eskimo dog never barks. But he howls exactly like a wolf, in sitting posture with the head upturned. One dog will start every dog in ear-shot. This keeps a traveller awake, and so the people have invented many charms, one of which consists in seizing the band of your shirt in your teeth and chewing it till the noise stops.

During twenty years we have known of no cases of hydatid cysts due to the dangerous form of tapeworm such as is transmitted by dogs in Greenland. Indeed, even distemper and mange are very rare among Eskimo dogs. Though every family keeps half a dozen at least, not a single case of hydrophobia has been known.

The great beauty of a dog-team is that it seems to banish all conventionalities. You can go anywhere and everywhere with no roads, no hedges, no walls, no restrictions but your own will; and that will, without rein or bridle, you make your dog's will. Dogs can carry you up almost the steepest snow slope and down again in safety. They do not slip or sink in, and if they fall over even a high cliff in the winter, they are very rarely hurt. They seem to understand what you say, and so form a far better companion than a horse. They are automobiles which need no handling of their machinery. They enjoy travelling almost more than their masters enjoy it. They learn to love you as only a dog will, and if it were not for their occasional out-breaks of wickedness, they would make the best of companions. As it is, I know of no greater pleasure possible than a large, strong team, a good leader, a brisk, bright spring day, and a really long journey to go.

CHAPTER XI

THE COD AND COD-FISHERY

By W. T. Grenfell

Labrador is as yet a land of specialized industries. The endless problem of food and clothing has made the native Eskimo a hunter of seals; the native Indian has preferred the deer; the incoming whites, while importing their flour and woven cloths, have found their good genius in the cod. Nearly three hundred years ago it was known that this fish was plentiful on the southern coast of the peninsula, and ever since the cod-fishery has been more or less vigorously pursued on the Labrador. In former times the herring, and always the salmon, has furnished minor parts in the harvest from the coastal waters, but it is remarkable that, in Newfoundland and Labrador, "fish" is a synonym merely for cod; a local law has stated that salmon is not fish. Other members of the Gadidæ family, as the hake, tusk, haddock, whiting, coalfish, pollack, ling, and whiting-pout, are absent or present in negligible quantities. A flounder is the only noteworthy representative of the flat-fish family. The halibut is found only in deep water, far from shore.

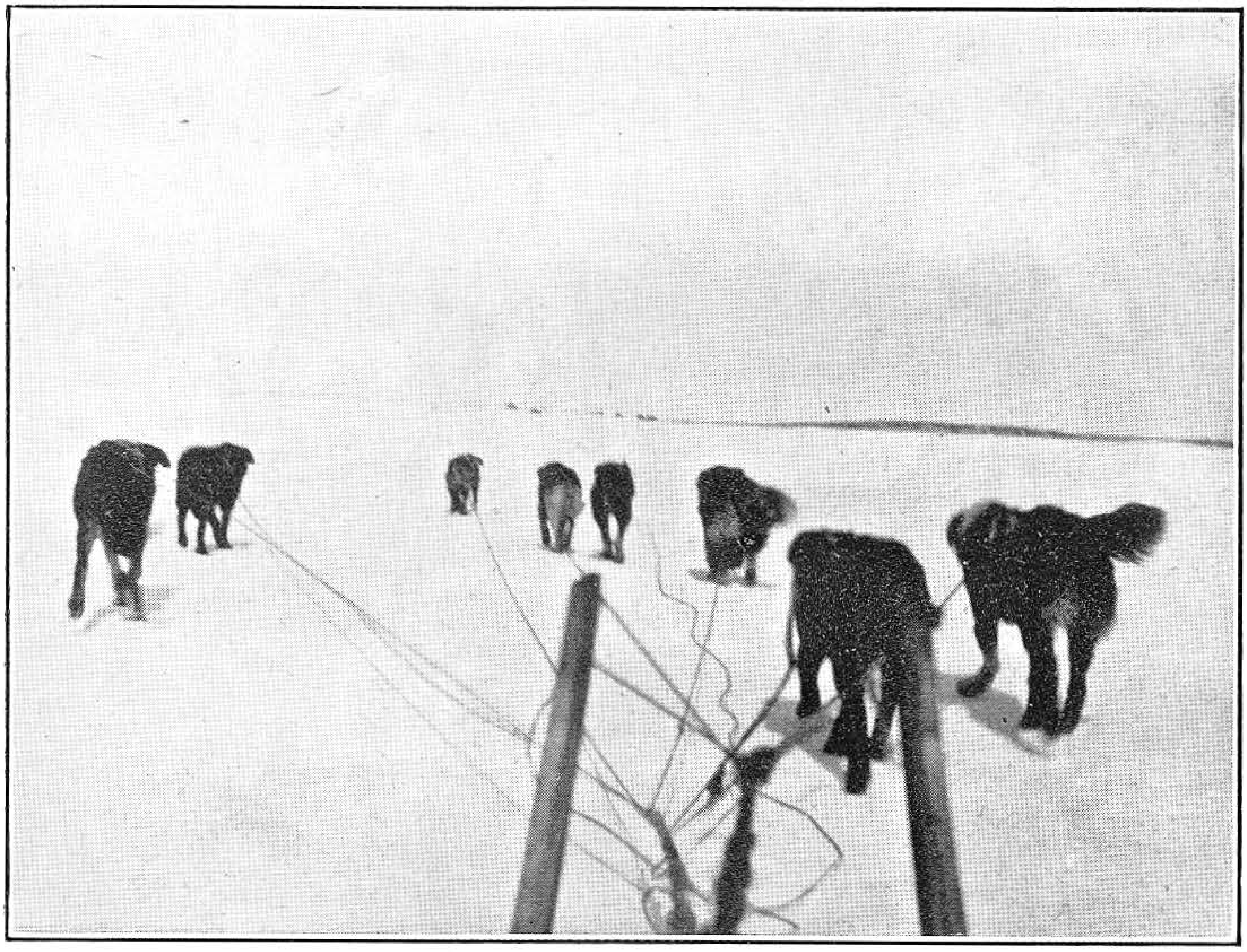
For many reasons the humble cod has a just claim to preëminence among the food-fishes. As food for man, cod is the bread of the sea. He may be called the bread and butter, for more surely than any other marine species does he supply a food of which the white man's palate does not tire. His flesh is rich and gelatinous, without being fatty. Every particle of his body is useful to man. The skin and bones make excellent glue. The tongue and swim-bladder are rare delicacies when well cooked, and have also been used as raw material in the manufacture of isinglass. The refined cod-liver oil is among the most sterling remedies yet devised for man's bodily weakness, which so often leads to deadly phthisis.[1] The refuse oil may be employed for tanning purposes; the offal is very valuable manure. In Norway and Iceland, the dried heads have been largely used as food for cattle. The roe is an excellent bait, and forms a notable part of the Norwegian annual export. On Arctic shores the well-dried bones, for lack of other material, have been used for fuel. For curing purposes, the cod is unsurpassed. Belonging to the Anacanthini, or spineless fish, he can be rapidly deprived of bone and entrails without danger to the fisherman's hands.

A fresh codfish weighing 6.6 pounds contains as much as 5.4 pounds of water. When well cured, it will weigh 2.2 pounds, of which 16.5 ounces is nutritive matter, 4.5 ounces is salt, and 12.5 ounces is water. Compared with fresh beef, the nutritive value of the dried cod is as 9 to 10, and the cost is less than one-half that of beef at average prices. It is said that a Newfoundland fish contains more nutriment

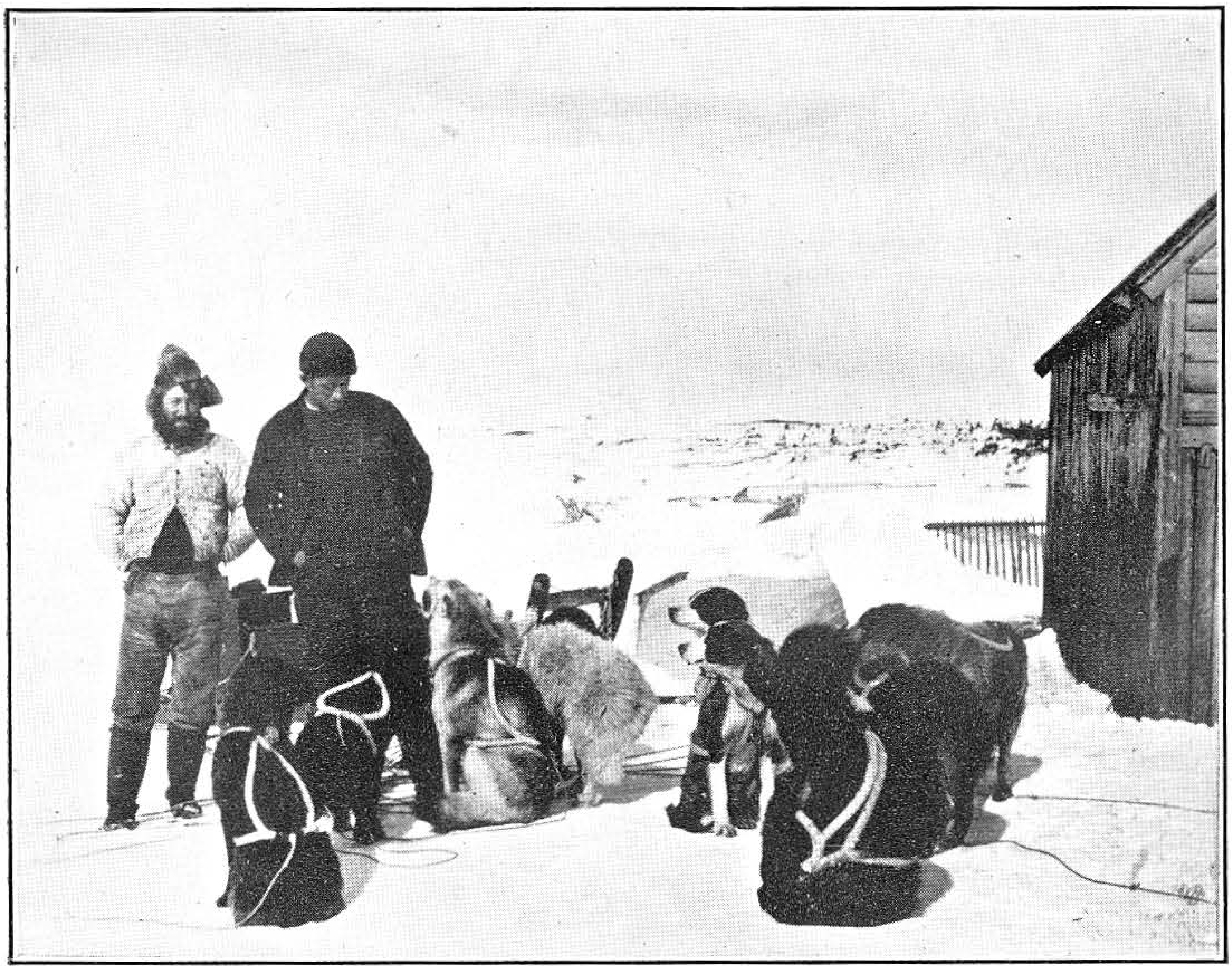
[1] Four hundred Lofoten cod give a barrel of oil, but it takes twice as many to give a barrel of the refined, medicinal oil. The product rotted out is called cod oil; that for drinking, cod-liver oil. About thirty-six hundred livers of Labrador cod go to the barrel of twenty-five gallons.

than an equally heavy fish from the French banks. In Europe, fresh cod is regarded as best for table use when caught in the coldest months, December to February. The relatively high nutritive value of the Newfoundland-Labrador fish is probably to be explained in large part by the fact that all the year round the sea temperatures are at least as low as those which bring the European cod into best condition.

The fish can be preserved in wet bulk all winter by putting enough salt between adjacent layers to prevent them from touching one another. It may also be preserved as dry bulk in piles covered over and well pressed down. But the fish may be cured by no other means whatever than by splitting open the carcass and hanging it up in the sun to dry. Many of the ancient, foreign names for the animal have apparently been derived from the fact that from times immemorial the flesh of the drying split fish has been made tenderer by beating the carcass with clubs. The Norwegians call the animal the "stock" (stick) fish; in Spanish it is "baccalhao" (from Lat. *baculum*, a staff, rod, or small stick); in Italian, "mazza" (a club); in Gaelic, "gad" (rod). The Greeks called the fish "bacchi" (rods). In English the name "stock-fish" covers the haddock, ling, and hake, as well as the cod. The Labrador Eskimo always preserve cod by hard drying without salt. The white man, of course, has devised his own methods of curing the cod by smoking it like the salmon, or of turning it as steaks or in boneless rolls, ready for immediate use, but the commonest method is still that by dry salting, as it has been for so many centuries. Since these many virtues as a food-fish must be multiplied by the inconceivable numbers of



On the March



Waiting for Their Master

individuals, the title "King of the food-fishes" is justified, even against the herring.

Each female lays from three to nine million eggs each year, generally in the months from February to May, inclusive. The fish spawns rapidly. As the females are "ripening," the roe or ovaries are so large that they fill the mother's body and actually tend to prevent her feeding. So far as it goes, this is a fortunate protection for the species, since, during this important period in her life, the female is thereby less liable to be caught on a bait. The males seem to outnumber the females considerably, but the balance is maintained for reproduction by the fact that the roe of the average female is two or three times as heavy as the milt of the average male.

Though the eggs contain no oil globule, they float in the water. The milt also floats, and as its units are present in inestimable quantities, the fertilization of the eggs, which takes place in the open water, is insured. It is made yet more certain by the fact that during the spawning season the cod aggregate into immense shoals in shallow water. This free floating is a great protection to the eggs, as they cannot be browsed up in bulk off the bottom, like the spawn of herring, which adheres in masses to the rocks and gravels. The young cod grows rapidly, and in twelve months is about sixteen inches long, and in twenty-four months is a mature fish about twenty-four inches long. As a rule, however, it will not breed until it is three years old. Its youth is largely spent in eating its own brothers and sisters and cousins, and also in escaping being eaten. The career of any individual is apt to be a checkered one, and it is only one out of many that succeeds "in realizing any aspirations he may have to a humble corner on a fishmonger's slab." During his life he seems singularly free from diseases, but blindness and rickets (unaccompanied by fever) have been found not infrequently. The blindness may be due to mechanical injuries or to exposure to too much light during the long days of the north. Rickety fish often have humped backs.

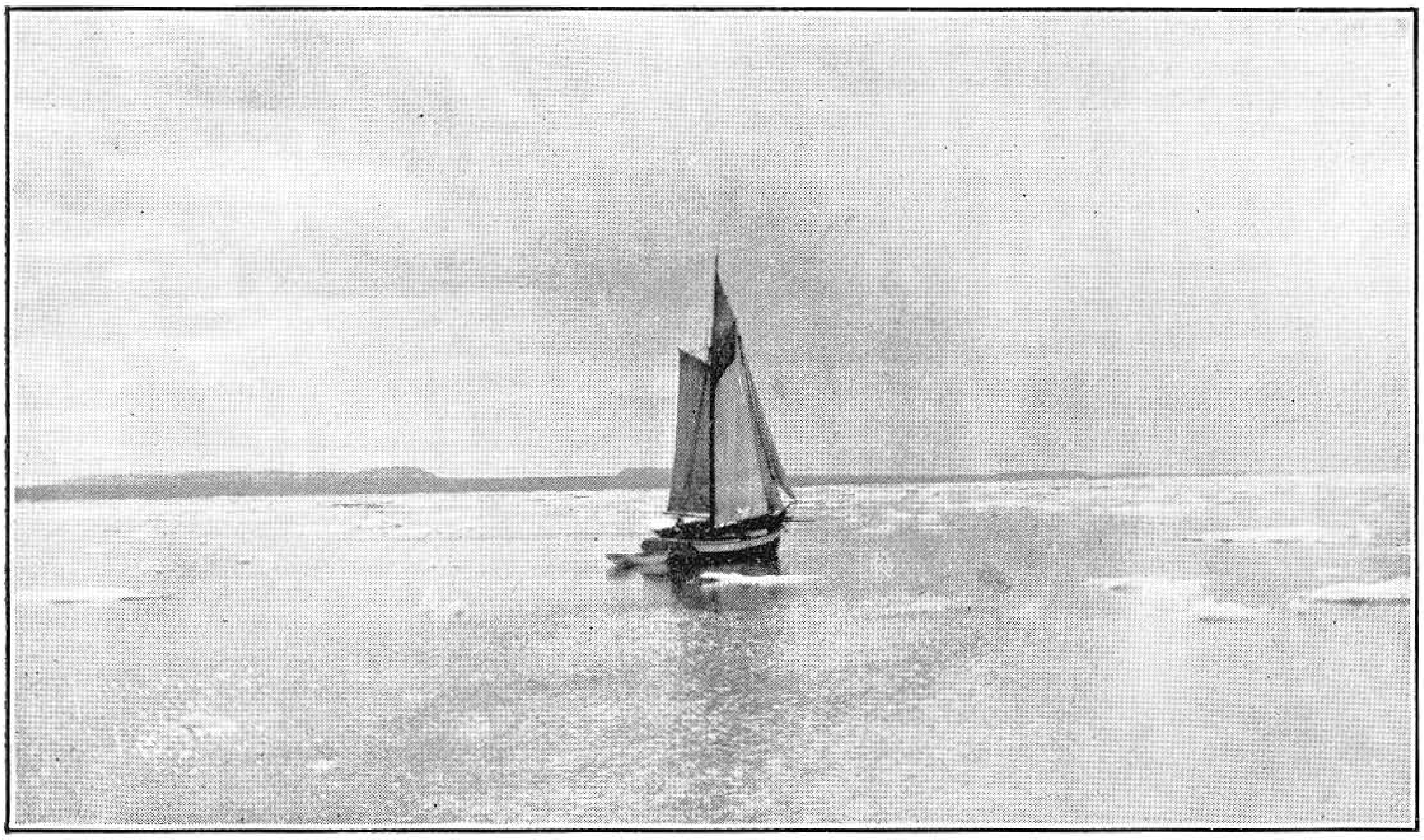
The largest codfish of which I have record on this coast scaled one hundred and two pounds, and was five feet six inches long. The record on the English coast is seventy-eight pounds, with length of five feet eight inches; this fish was caught in 1755, and was sold for the sum of one shilling. The largest recorded cod on the Newfoundland Banks was caught by Captain Stephen May in 1838; the weight, after the fish was gutted, was one hundred and thirty-six pounds! Another cod holds the record on the American coast; he was caught by Captain Atwood, who found him to scale one hundred and sixty pounds. In the Gulf of St. Lawrence and on the east coast of Labrador, the fish are of smaller average size than on the banks off Newfoundland and the United States. The fish from the far north, near Cape Chidley, are both shorter and thinner than those taken at the Strait of Belle Isle. The average Labrador cod taken in the trap-net is about twenty inches long, and weighs between three and four pounds. Those caught on hook and line in the autumn are much larger and heavier.

The monster cod once caught off Rockall and the Hebrides in the early days of those fisheries have disappeared. Presumably they held a kind of monopoly of all food that came along, and thus assumed the first chances in swallowing baited hooks. It may be noted that the cod is never large enough to be completely free from the danger of being eaten alive, for seals are quite indifferent on that point. The cod must rarely die of old age.

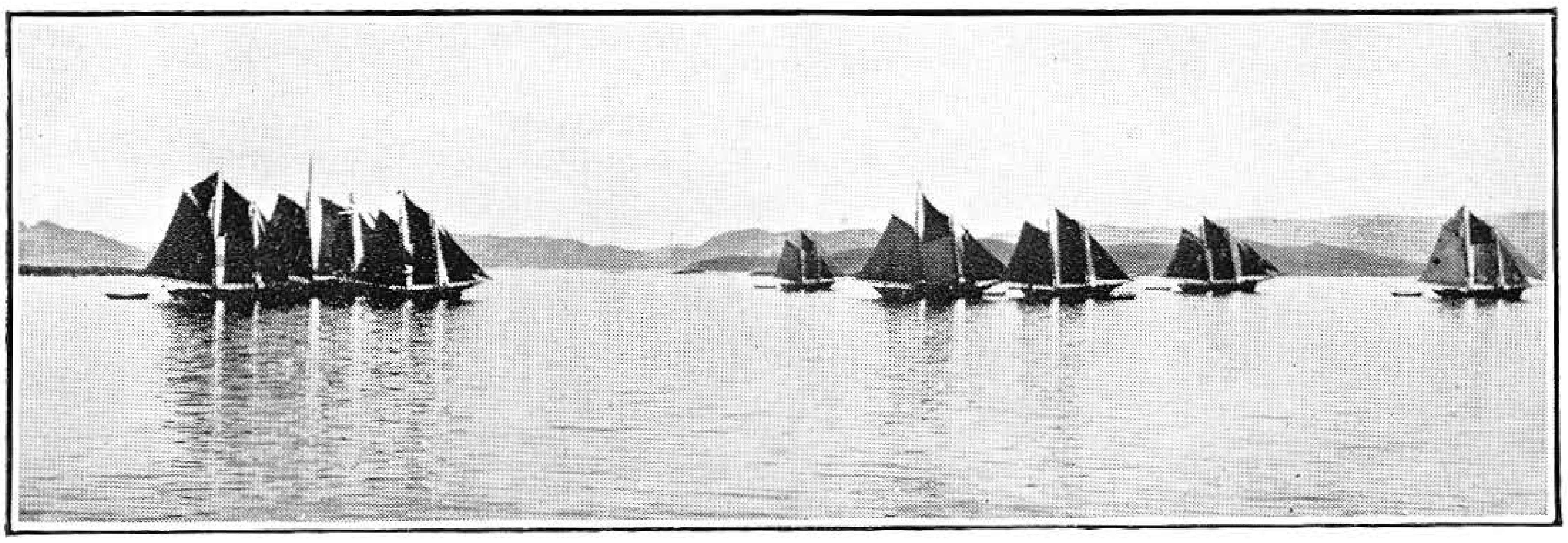
The actual company enjoyed by these gregarious creatures may be observed any season on the Labrador, when the great schools of cod are feeding on the living caplin, as the latter, themselves in countless hosts, run inshore to feed. The water is then often literally black with cod, and so eager are they after their food that the air over the school is alive with fish jumping after their prey. Additional excitement in the water is furnished by the dogfish, sharks, seals, or herring-hogs, which follow the cod from interested motives. Cartwright, in 1776, gives the following description of such a school : "Observing many codfish to come close inshore, where the water was deep, I laid myself flat on the rock, took a caplin by the tail, and held it in the water in expectation that a cod would take it out of my fingers. Nor was I disappointed, for almost immediately a fish struck at it and seized it. And no sooner had one snatched away the caplin than another sprang out of the water, and actually caught a slight hold of my finger and thumb. Had I dipped my hand in the water, I am convinced they would soon have made me repent of my folly, for they are a very greedy, bold fish." A similar sight was presented at one point on the coast last year (1908), good sizable fish jumping out of the water after bait and landing on the rocks, so that they were actually taken without any trouble beyond that of picking them up.

Fortunately for themselves and for the world, they are gifted with the most extraordinary digestive powers; they certainly do their honest best to convert everything that comes into their way into that which will ultimately benefit mankind. I have myself taken three small cod and twenty-seven caplin from the stomach of one postprandial fish and have seen an excellent gold ring taken from the stomach of another. A book in three volumes was taken from the stomach of a codfish off Lynn, England, and presented to the vice-chancellor of Cambridge University. Scissors, oil-cans, old boots, testify to the catholicity of the cod's appetite. Captain Hill, who lost his keys over the side in the North Sea, had them returned to him from the inside of a codfish. Two full-grown ducks have been found in a cod's stomach; the birds were quite fresh, and had apparently been swallowed alive. An entire partridge, a whole hare, six (small) dogfish, an entire turnip, a guillemot (beak, claws, and all), a tallow candle, have all betrayed the omnivorous leanings of some of our friends. But perhaps their devotion to business is best shown by the number of stones taken from their interiors and merely swallowed for the sake of the corallines which had grown on the stones. Lobsters, crabs, whelk shells, and the like, swallowed *au naturelle* do not seem to require any special digestive precautions. A Newfoundland fisherman had the melancholy duty of forwarding a wedding-ring found in a cod's stomach to the family of a lady who was lost off the Newfoundland coast in the steamship *Anglo-Saxon*.

The question whether there is any diminution in the supply of the cod on the Labrador is an interesting and important one. If it be granted that there is such diminution, it is still an open question whether man has been responsible for the change. All the millions of fish taken annually out of these waters must represent but an extremely minute fraction of the total "run" along the



The Sea of Ice



Newfoundland Schooners working North

thousand miles of coast. It is conceivable that the codfish host is so evenly balanced against the host of its natural sea-water enemies that even the small human inroad on the numbers, especially on the numbers of females, may in time produce a sensible thinning out of the shoals. But we have as yet no good proof that this is the case. The fish are protected from man by the long winter months; from November to June, or even July, they are safe from that enemy at least, for the ice shuts man out from the sea. Those places where the largest catches were made years ago are still usually the best berths, *e.g.* Griffin's Harbour. That fact seems significant, for, in some measure like the salmon, the cod is a local fish and tends to return, year after year, to the section of the coast where he was born. It follows, therefore, that, if man were causing a diminution in the numbers of the cod, the best berths of former times would be less likely to be the best berths now. Though the herring and mackerel have largely disappeared from the Labrador coast during the last half century, they have certainly not been exterminated by fishermen. The quantities taken of these two fish have been far too small to effect that result. The ancient fishery off Yarmouth, England, has taken ten thousand times more herring than have ever been captured on the Labrador, yet the annual taking off the English coast is still remarkable.

However, the majority of Labrador fishermen think that the cod are diminishing in numbers along the whole coast. They refer to the partial or complete abandonment of the northern summer stations at Windsor Harbour, Fanny's Harbour, Aillik, Long Tickle, etc., where the industry once flourished. Other arguments run to the effect that the

Jersey and American firms who, years ago, conducted large operations on the coast, had to give them up, owing to the scarcity of fish; that well-off families have fallen into poverty and want, and that many have left the coast; that floating craft have to keep going farther and farther afield; that large bays, which attracted settlers on account of the local abundance of cod, are now deserted; that some places along the Labrador fail every year nowadays; that, notwithstanding the large mesh now compelled by government, the fish taken are now of smaller average size than formerly; that the catch is not proportionate to the increased outfit; and that the bank fisheries have been depleted both absolutely and relatively. The pessimists argue further that the cod-fishery runs risk of approaching the failures recorded for the lobster, salmon, seal, and even the trout, all of which have been signally depleted by man; the whales and whalers are steadily diminishing. Walrus has been banished from the Labrador. All along the Labrador there are bullies and fishing-boats, once in regular use, now lying up and rotting on the shore.

That the government once leaned to this view was shown by the establishment of a codfish hatchery in Newfoundland, not for biological experiment, but for hatching young fish for restocking the bays. Subsequently, under Sir William Whiteway, the hatchery was closed down. Some fishermen thought the plan a success; others thought it a failure.

In judging the case, the obvious precaution must be taken that too much reliance be not placed on the testimony of a few individual captains; as the number of men and amount of capital engaged in the industry increase, the chances of failure of cargo for the single schooner are increased. There are simply not enough "best berths" to go round when the list of schooners increases beyond a certain point. Quite independently of man's interference, the harvests of the sea, like those on the land, may naturally swing in cycles. So long ago as 1775 there was a complete failure of the cod-fishery along the north side of Belle Isle Strait; yet this latest year (1908) the "crop" has been unusually good. It may well be that the inshore fishing is now in a period of relatively lean years, to be followed by a period of fat years, — the whole swing of the industrial pendulum being utterly uncontrolled by the relatively insignificant takings of the summer fleet on the Labrador. Neither science nor the practical industry has yet obtained sufficient knowledge of the sea to declare the whole law which governs the annual, much less the age-to-age, swelling or recession of the finny flood.

In any event the cod seem to be as plentiful as ever in deep water. The use of long lines by banking vessels along the Labrador is growing steadily in importance. The failure of many a schooner to find cargo may be due to the fact that the trap-net is the only method of capture employed. The deepest water in which I have seen traps set is eighteen fathoms. If for any reason the fish, though as plentiful as ever, do not come right home to the rocks, the captain outfitted with trap-net only might wrongly report on this question of a possible diminution in the numbers of the cod in Labrador seas.

One important cause governing the nearness of the approach of the cod in any year to the actual coast-line is undoubtedly the temperature of the water. This may affect the fish directly, or may control the distribution of the other animals on which he feeds, thus affecting the cod himself indirectly. The cod will not feed in water under 34° F. He prefers temperatures ranging between 35° F. and 42° F. On the cod-bearing Norwegian waters the hottest month is August, when the surface of the sea averages 43.5° F. (12.8° C.); ten fathoms down it averages 41.9° F. (11° C.), and twenty fathoms from the surface, 37° F. (5.6° C.). The coldest month is February, when the averages are: surface, 32° F. (0° C.); at ten fathoms, 33.8° F. (1.25° C.); at twenty fathoms, 36.5° F. (2.5° C.). From the few observations I have taken of the Labrador, the average surface temperature in summer varies from 40° to 45 ° F. In the summer of 1900, Mr. R. A. Daly of the Brown-Harvard expedition made some serial readings of the temperatures in the coastal waters on days when abundant cod could be taken from the schooner on which the temperatures were determined. Two carefully calibrated thermometers gave accordant results. A few examples of the serial readings may be of interest as showing how very cold may be the water in which the cod appears to thrive. The tables also indicate the density of the water as collected in a "Mill" bottle at various depths. The rapid changes of temperature and of salinity in a few fathoms are noteworthy.

First Series

At anchor, three and one-half miles west of Cape Pomiadluk, Labrador; 8 P.M., July 31. Air temperature, 11.3° C. (52.3° F.).

Depth in Fathoms	Temperature, t		Specific Gravity at Temperature t
	Cent.	Fahr.	
Surface	7.0°	44.6°	1.01965
1	5.7	42.1	1.02045
2	5.5	41.9	1.02060
3	5.3	41.5	1.02065
4	2.1	35.9	1.02220
5	.4	32.7	1.02355
6.5 (bottom)	.3	32.5	1.02390

Second Series

At anchor in Summer's Cove, Aillik Bay; noon, August 4. Many cod jigged, at all depths from three to ten fathoms.

Depth in Fathoms	Temperature, t		Specific Gravity at Temperature t
	Cent.	Fahr.	
Surface	6.2°	43.1°	1.01980
1	5.7	42.1	1.01980
2	3.5	38.3	1.02070
3	8.2	37.0	1.02125
4	1.2	34.2	1.02285
5	.5	32.9	1.02355
6	.3	32.5	1.02375
7	.1	32.2	1.02385
8	– .2	31.7	1.02420
9	– .2	31.7	1.02450
10	– .3	31.5	1.02485
11	– .3+	31.4	1.02490
12	– .5	31.1	1.02495
13 (bottom)	– .55	31.0	1.02510

Even in late summer the temperature of the water in the (ice-free) northern fiords remains very low. This fact is illustrated in the groups of serial readings taken during a visit of the same party to Nachvak Bay. One such group is represented in a

Third Series

Locality, on rocky bar three miles east of Hudson's Bay Company station in Nachvak Bay and about seventeen miles from the mouth of the fiord; 2 P.M., September 4, 1900. Air temperature, about 12.5° C. (44.5° F.).

Depth in Fathoms	Temperature, t		Specific Gravity at Temperature t
	Cent.	Fahr.	
Surface	3.9°	39.0°	1.02380
1	3.3	37.9	1.02430
3	2.2	36.0	1.02510
5	.5	32.9	1.02595
10	.4	32.7	1.02600
14½	.3	32.5	1.02620

From these (hitherto unpublished) observations obtained in 1900, it appears that the water of the northern fiords, at depths greater than about twenty fathoms, never rises sensibly above the freezing-point of fresh water.

There is little doubt that the cod does not travel far in its annual migration. After spawning, the school simply moves out into deeper water on the slopes of the continental plateau or on the Grand Banks. There in depths of from eighteen to seventy fathoms they browse about.

Though this fish prefers such a range of depth, it may be trapped in water as shallow as two fathoms or as deep as three hundred fathoms. To the most favoured depths the animal retires after the spawning season, which is also that of optimum temperature along the immediate Labrador shore, has been passed. In rhythmic fashion the cod returns each year to its birthplace with the shoal, and haunts the same neighbourhood throughout its short season of inshore life.

North Latitude	Locality	Arrival	Close of Fishery	Duration of Fishery
51° 30′	Cape Bauld	June 20	October 20	122 days
52°	Chateau Bay	June 20	October 1	102 days
53° 24′	Batteau	July 12	October 1	80 days
54° 26′	Indian Harbour	July 15	October 1	78 days
54° 56′	Cape Harrison	July 18	October 1	75 days
55° 27′	Hopedale	July 20	October 1	73 days
55° 52′	Davis Inlet	July 28	October 1	65 days
56° 33′	Nain	July 28	October 1	65 days
57° 30′	Okkak	July 28	October 1	65 days
58° 30′	Hebron	August 15	September 15	32 days

The shoal arrives on the coast about a week later for every degree of latitude farther north. But, as codfish are spread over the whole coast of over a thousand miles simultaneously during August and September, the later arrival in the north cannot be due to a south-to-north movement of the same individual fish in a single shoal. The first fish at St. Anthony (on the Treaty shore of Newfoundland) appear about May 25; those at Cartwright, about July 25. In Europe the advance-guard reach the Norwegian coast in January, host following host in a north-easterly direction. Sometimes they are delayed by the coldness of the season, and may then not run in until March. Professor Hind has prepared the preceding table of arrival and departure in average years at different latitudes on the Labrador. It may be noted that the cod of the western Atlantic coast ranges from Cape Hatteras to the Gulf of Boothnia in lat. 75° north.

The smaller fish leave the shore first; the larger ones remain on the near banks till well into November, when they withdraw into deeper water. Buffon said they retired to the polar seas, but it seems impossible that they go very far. Some Labrador cod are known to winter on the Grand Banks, as some with Frenchmen's banking hooks sticking in their mouths have been captured by the Labrador crews.

As cod began to show real or apparent failure on the Newfoundland coast, and then on the Grand Banks, the great fleet of fishing vessels began to turn its bows northward. First, a few venturesome fishermen crossed the Strait of Belle Isle without having wetted a line or net, and risked their summer's catch off the Labrador coast. These early pioneers were richly rewarded, and others soon followed in their wake. As it became imperative for more and more families to seek a living from Labrador, many, who had no means of obtaining schooners of their own, managed to find their way north as "freighters," with their more fortunate brethren. Arrived on the Labrador, a family of "freighters" builds a rude summer "tilt" at some spot suggested by their previous experience, and then fish from the land in small boats, returning in the same way in the autumn. Thus commenced the great exodus of men,

A Batch of Prisoners

women, and children that every year starts for Labrador from Newfoundland as soon as the ice of winter breaks up and the journey becomes possible. At length these so-called summer settlers pushed as far north as Cape Harrigan, and the floaters as far as Cape Chidley. Of late years, however, an ebb tide has set in, and more fish is taken in the Straits and along the southern shore than in the north, and many of the northern summer settlements have been abandoned.

On first consideration the Labrador voyage does not sound particularly enterprising. But there are features about it which are not immediately apparent. The entire living of these pioneers depends on the fishery, for the fur catching in Newfoundland is almost a negligible quantity as far as most of the men are concerned. Only of late years has enough work at the Sydney (Nova Scotia) mines or steel works, or at the iron mines on Bell Island, Newfoundland, been available, in case a family is left with nothing for the winter. Even that is not open to all. Labradormen have only one string to their bows, so that the daily increasing anxiety from not finding fish as the summer wears away tells heavily on the skipper. I remember one poor fellow tying an anchor round his neck and jumping over the side of the schooner in the night. He came up with the cable in the morning.

The mainstay of many of these men to-day, especially the southern men, is the little plot of land at home, which is attended by the aged or by those incapacitated and able to be spared from the long Labrador voyage. On this home patch they grow enough potatoes, cabbages, and turnips to "put them through the winter," if only a handful or two of flour is available. Most of the homesteads also have a few sheep, and possibly a cow as well. Most of the fishermen spin their own wool, and make their own boots from the skins of their cattle and of seals which they tan in their net barking pots. They have thus no fear of utter destitution.

Still, I have seen many of these people showing in the spring all the signs of meagre diet through the long winter months. Unfortunately, to keep a cow or garden is practically impossible in the north, owing to the numbers of dogs used on the coast. Moreover, when the whole family has to leave for Labrador and the home must be closed, unless a neighbour can be found to look after things, the supplies from the tiny "farm" are necessarily cut off.

The schooners in the financial reach of most of the men are home-made products of soft wood, *i.e.* spruce and fir cut from their own bays, and mostly only iron-fastened. The vessels are often very small and also cheaply found in the most necessary of all their outfit, the holding gear. They have to carry such quantities of fishing gear that they are very crowded on deck, as well as below. The crew need so many boats that throughout most of the long voyage the small schooner will have to tow one or two behind. This necessity very considerably impairs the sea-going quality of the schooner. The salt nets and puncheons for oil are bulky; spare canvas and gear, if the crew is fortunate enough to be able to afford any, fill much of the remaining space. When, therefore, the time comes to take in "freighters," men, women, and children, with all their personal and fishery outfit as well, it is little wonder that the dangers and discomforts are greatly increased.

Many times I have seen these vessels with the space below decks divided only by chalk marks on the inner lining of the hold, to indicate the few feet allotted to each crew and family. The separation of sexes and privacy for women is inadequate at best, and frequently to all intents and purposes absent. I have attended confinements and almost every kind of sickness in these vessels where one could scarcely stand up. I have seen suffering aboard them that I trust none of my own kith and kin will ever have to experience. The natural, simple kindness of the fishermen surely stands them in good stead. The fact that crowds of women and children are battened down in the holds of these vessels in rough weather is too suggestive to need detailed description. The carrying of single girls on these vessels has led to many troubles also, and I have never ceased to deplore the carrying of females as part of the crews of fishing vessels that are months away from home and civilization. It is a matter of profound gratitude that the opening up of other work is lessening the necessity for it, but it should long ago have been made illegal.

The freighters are often so close to the decks and beams that it is impossible even to sit up without care. When the weather is rough, the hatches must be closed, and then no daylight can get below. Meanwhile the "lumber" makes it impossible to get about on deck in a breeze to handle the vessel. Such schooners, therefore, have to pick their way along the shore, "keep inside all the runs," and always, if possible, get an anchorage at night. This becomes doubly essential on the return voyage in the autumn, when the sudden storms sweep down off the high land and the proverbial gales of the "roaring forties" make it hard for even well-found craft of that tonnage to live through them.

Owing to the method of fishing, it is of paramount importance to secure a good place for the trap-net. A fisherman may have built a summer house and stage, have left boats and gear and salt on the coast, and yet if he comes down a day after another man, he may find his trap-net berths already seized by the crew of some schooner anchored near. The late comer may, therefore, after all, have little chance of getting a cargo or "voyage." He has usually no chance of going elsewhere to look for one. Fish "sets in shore" as soon as the ice opens, possibly even before. "Snapper" men will be able, by going early, to run home with a "voyage" from the southernmost section of the coast, and get down in time for another in the far north, before it is too late for fish. The result is that the rush north commences long before the ice is gone, and craft are everywhere pushing north through lanes and leads in the ice, taking incalculable risks which occasionally end in disaster. The admirable skill and magnificent handling of their vessels succeed in averting accidents to a degree which surprises one the more he is familiar with the incidents of such a journey.

As if these were not sufficient troubles, the heavy fogs which do prevail at times off the Labrador coast are most common in the spring of the year, and not a single precaution in the way of a warning bell or fog-horn has yet been placed to help the schooners from one end of Labrador to the other, except the Canadian station at Point Amour, sixty miles up the Strait of Belle Isle, where there is a steam fog-horn. Until two years ago, not a single light of any kind whatever existed along this same area, and now only two small lighthouses on dark, wintry nights serve to guide these fisherfolk along more than one thousand miles of coast. This fact becomes more significant when one remembers that most of the craft are, as has been stated, obliged to run along the reefs and islands, and are not able to keep to the open sea and run home "on the outside." The average mariner would consider that at least a good chart of the journey on which the vessels were bound was a prime essential, without which no one would be likely to venture. But regretfully we must add that no such thing exists. The present survey is so imperfect that in many places only dotted outlines indicate the actual shore-line, while many shoals and hidden dangers are either inaccurately placed or not marked at all.

Fortunately, the tides of the southern part of Labrador are, as far as navigation goes, practically unimportant, though they are often, and more especially with northwest to northeast winds, too strong for the big nets.

The rise and fall of the tide is about six feet as far as Cape Harrigan. But as Cape Chidley is neared, the tides grow stronger and rise higher, till in Hudson Strait they rise thirty-five to forty feet, and run six to eight knots an hour. Boiling whirlpools and eddies seethe in the current of Gray Straits, and navigation in a schooner is, even at best, both difficult and dangerous.

In view of all the dangers, one must feel proud of this crowd of emigrant fisherfolk, — proud of their physical courage, their self-reliant resourcefulness, of that big heart which makes them willing to "venture out" early each summer.

Progress in methods of catching the fish more quickly and safely, and with less personal exposure, has also marked the lapse of the years, though the primeval hand-line and hook is still the only gear to which many of the poorer men can attain. A hook-and-line man with work and tolerable fortune should catch an average of fifty quintals a year. As he has practically no expense but the purchase of salt, his average catch, along with his other possible sources of revenue, will afford a living. He has less anxiety as he has no valuable nets to lose, — for which many mortgage all they possess and then lose the nets. He is certain never to make an absolute blank, and he has considerably more time for other work. But he can never nowadays get "rich" in worldly possessions, and therefore nearly all aspire to "get twine," if they can.

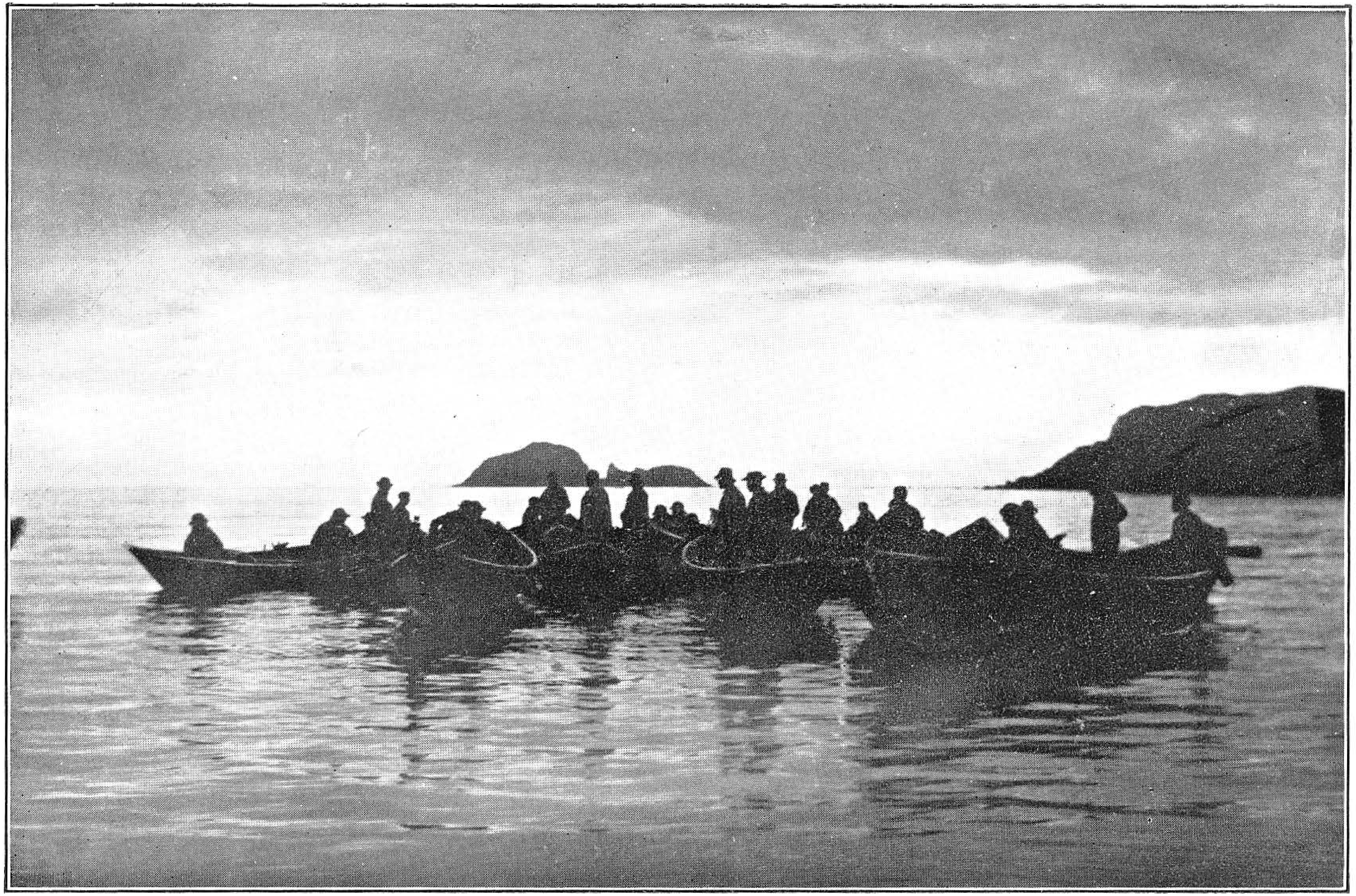
The main difficulty with hook-and-line fishing is the difficulty of obtaining bait. Caplin are excellent bait, but when they are plentiful, cod can feed on live ones, and, being glutted, do not take the hook well. When cod are plentiful still on the banks, the caplin have left the fishing grounds. Lance, a fish like a small eel, have to be hauled at the bottoms of inlets far from the fishing grounds, and even then are not always obtainable. Crews of men have to spend all day rowing to get enough to supply the combined crews that have spared a man apiece to send them. Most bait, to be of service, must be quite fresh. The enterprising Captain Bartlett of Turnavik, Mr. Croucher at Battle, Mr. Grant at Blanc Sablon, now use small steamers for no other purpose than to get bait and carry fish and salt. Squids are seldom obtainable in Labrador. But some men have barrels of salt squids sent down. They are useful, but not the best, and cost the fishermen fifteen to fifty cents per hundred. They are tough, and hold well on a hook. Mussels would be used if they would hold on the hooks. Bits of sea-gulls that the men shoot for the purpose are also employed. Even artificial bait has been tried with modified success, — rubber fish with hooks attached. Little net bags enclosing baits of mussels and gelatine — an invention of Mr. John Hayward — have been used with some success.

But the bait question is ever the hook-and-liner's worst difficulty. The tendency is to give up the puzzle and use what is known as a jigger, a piece of lead the shape of a fish, with two enormous hooks projecting from the bottom. This is "jigged" up and down about a fathom from the bottom, and sometimes hooks fish very quickly. It naturally sticks into the fish anywhere it strikes him, and the result is that many fish get away with bellies ripped open, eyes pulled out, etc. The shoals seem to follow these injured fish off the ground, though rather for the purpose of eating them than from fear of a similar fate. In some districts the use of the jigger is forbidden, as it is believed to be detrimental to the fishery.

The first advance in methods seems to have been putting more than one hook on a line, till the present system of long lines, called "bultows" or "trawls," with as many as three thousand hooks on a line, was developed. Lines up to seven miles in length have been used. This is still a very favourite method, and is practically within reach of the poorest. Many large cargoes are now "made" on the inshore grounds in this way, as they have been made for many years on the Grand Banks far out at sea. But even this method has its drawbacks. It involves both great risks and great personal exposure. It allows so many wounded fish to escape that it is prohibited altogether along many sections of the coast. This prohibition is accomplished by getting local laws sanctioned by the Legislature and included in the annual "Fishery Laws." In one place it was enforced by the residents at the end of their long guns; as they say, "As well be hung as starve." Oddly enough, at the opposite side of the sandy beach where they live, hand-lining has been ruined by west-coast boats with bultows, and the people who live there have, in consequence, fallen on very evil times.

For this purpose the bottom beam and other trawls of the old country were found useless. Quite recently the enterprising firm of Bowring Brothers purchased a modern steam trawler, and tried all around the coast and islands, but met with so little success that the attempt has been abandoned. Gill-nets, which came next, are but little used for cod. Cod seem ordinarily too lazy in disposition even to put their heads hard enough into a mesh to be caught. This is, of course, very unlike the more agile salmon and trout. The large-mesh cod net, however, anchored on the bottom, still has its advocates, and at times many cod become entangled in the leaders of the trap-nets.

The advent of the large seine-nets marked a very material advance in the rapidity with which the fish could be taken, and it is still at certain times and places the most successful method known. The net itself is an expensive affair. It is on an average eighty feet deep and over seven hundred feet in length. It has corks on the top to keep its upper end on the surface and leads on the bottom to keep the



Fishing Crews catching Bait

foot down. It needs a great deal of rope to work it, and, as a rule, a large crew of men. On an average, such a net contains five hundred pounds of twine, and costs, ready to go into the water, about $500. The crew of the long, specially constructed boat numbers seven men, one of whom is the "seine master"; he directs the oarsmen, himself standing up forward on the lookout for shoals of fish. This net can be used only in more or less shallow water, where tides are slack and where the bottom is smooth and perfectly sandy. The purse-seine, a variety which can be pulled together into a bag below, and so fished far from land in deep water, is not used on our coast. To enable the master to see fish in ten fathoms of water, he uses a "fish glass," a metal funnel with a plain glass bottom, which he pushes down below the ruffled surface of the sea. An advantage of the purse-seine net is that the fisherman pursues the fish with it, instead of waiting for them to come to him. It satisfies also the mind restless to be hunting and working, rather than, like the lazy spider, merely sitting down and taking the chance of the prey coming voluntarily along.

The latest contrivance, however, and the one now generally used, is called a cod trap. It is practically nothing but a large room with walls and floor of twine, and the surface of the sea for a roof. It has a door on the landward, into the middle of which passes an upright net partition, called a leader. The leader is made to the land or rocks along which the fish are wont to swim and feed in their great shoals. When the room or trap is seen by the crew in the boat overhead to contain fish, the doors are pulled up, and then the floor is passed over the boat till all the fish can be baled out with large dippers. In this way as many as one hundred quintals of fish have on many occasions been caught at one haul, so that a whole year's wages can be easily earned if there is one fortnight's good trapping in the year. Nevertheless, as fish do not go to every point every year, some fishermen who rely entirely on their traps will sometimes make an absolute blank of it. The trap is, moreover, exceedingly expensive, with its strong ropes, heavy anchors, and immense weight of twine. A good one costs between $300 and $400, containing three hundred and fifty to five hundred pounds of twine. It is about three hundred and fifty feet in circumference, eighty feet deep, and may need a leader from fifty to sixty fathoms long. In shallow waters, as in the Straits of Belle Isle, the trap may be only thirty feet deep. Being very heavy and unwieldy, it is often an impossible task to take it up in time to avoid bad weather, or quickly enough to save it from driving ice. The result is that in the sudden storms to which the coast is liable, great losses occur. Honest men are suddenly thrown into hopeless debt, as they have had to raise the net on credit, and perhaps their sole method of getting a voyage is lost in a moment.

The old two-handed jacks, or bully boats, which, in the autumn months, used to venture far off from the land with hand-lines, now lie rotting on the rocks at all the harbours on the coast. The fishery is developing into a great gamble. A man casts all he has and all he can borrow on a single issue. At times it renders him a magnificent and rapid return. If the fish come to his trap he obtains a sudden wealth, whereas if the fish do not come he goes home a broken man.

In many cases the merchants and traders own traps, and the crew operating the trap take, as their share, one-half or three-quarters of the first caught. Some traders give even four-fifths of the catch to the planter who works the trap for them. But the latter is expected to turn in all the fish he catches to the man who supplies the net, and to purchase all his stores from him also. That is, he will be really paid in kind, and a balance due him will be carried over on the books more often than paid in cash. This, however, has changed for the better in late years, and the payment of cash balances is becoming more common year by year.

When the fish is actually landed on the stages, it is still far from becoming cash, and it runs all sorts of risks and dangers before it gets to market. Originally all Labrador fish went to St. John's for exportation; to-day much of it is exported direct. We have as yet no cold-storage traffic.

The fish is cured systematically. A table with notches in suitable places is fixed in a covered stage running out over the sea. To this a removable front with supports is added each spring after the ice goes, and taken in during the autumn. A shoot on the right hand of the splitter through this temporary part of the stage carries the offal, consisting of the head and entrails, into the water below. The boat ties to the front of the stage, and the fish are picked up with "pews" and thrown upon the pounds built up on the top. One person, usually a woman or child, picks up the fish and puts them on the table to the right of the "header" and the "throater," who stands on the side of the table near the sea. The throat is cut with one hand, while the other hand passes the carcass to the header, who tears off the head, scoops out the entrails, and rapidly passes on the body to the splitter. The splitter sits or leans standing on the opposite side, and keeps the stream of fish running on in the same way, the good portion falling into a large tub of water, the bones falling out through the shoot. Meanwhile, a washer stirs the tub and removes the washed bodies. These he wheels off and piles up in rows, the salter following along with a barrow of salt. With a wooden shovel the salter shakes over the rows the amount of salt appropriate to the market for which the fish is destined. To save salt, men sometimes throw the fish bodies into tubs of pickle, making the pickle strong enough for a raw potato to float in it. It takes about one pound of salt to salt a pound and a half of cod. Washing out again takes one minute per fish. Salt wastes in bulk when stored, and there is a constant anxiety lest too much salt should be stored, or, far worse, there should not be enough salt to meet a sudden big catch of fish. This has often been the case, and I have seen many a quintal spoil and nets full of fish not being hauled because no salt was obtainable.

To dry, fish needs sun and a proper set of the wind. The actual work of catching is not over till late in the year, and at that time the right combination of a westerly wind and a bright, not too hot sun does not come very often. The least rain, fog, or frost makes both drying and shipping impossible. While awaiting a clear day, the fish may be quickly stacked under shelter, or at least turned face down in small "yaffles," or bundles. The fish's own thick skin is a fair waterproof cover. Birch rinds, and even canvas bags, are used by some of the more enterprising men. Fish that gets wet once or twice never dries really white, especially around the edges. Hot sun also spoils fish very quickly; sunburnt fish turns black and slimy. This, however, is not so likely to happen in the bracing climate which, in that respect at least, is adapted to the fisherman's needs. The most interesting and skilled part of the curing process is the splitting of the fish, the removal of the backbone. Women may cut off the head and take out the entrails. They also wash out and even salt the bulks, but a really smart splitter is always the best man on a "room" or a vessel. Good men have been said each to split a hundred quintal between morning and evening; that is, have cut out the spine, from head to tail, of ten thousand cod in one day. Moreover, the bone must be all neatly removed, and the flesh must not be injured. I have timed a good splitter who finished fourteen fish in a minute, whereas I myself took nearly a minute to a fish, and then did it poorly.

The method of paying fishermen in Labrador has been, as in Newfoundland, almost entirely a barter system. The merchant fits out all "planters," who really carry on the fishery. In return, he expects all the fish caught. He then gives him a "winter's diet" out of the proceeds, if they are large enough; if not, the planters expect the diet on credit. They do not expect to turn in money earned in other ways towards this debt, and the law prohibits money earned at the seal-fishery being stopped for cod-fishery debts. In the spring a new outfit on credit is called for, and thus large debts pile up, which the merchants know they can never expect to collect in full, and which the planter soon begins to consider he does not really owe. They have been called red-letter debts.

An example may be given. In 1896 one firm of merchants trading in Labrador assigned. Their creditors found on their books as "assets" the debts of four hundred and eleven souls, including women and children, people who are among the very poorest; these people owed the firm over $64,000. The value of these "assets" was returned as "nil."

Thus the system was wofully bad for both parties. The fisherman, generally illiterate, was at the absolute mercy of the merchant, and lived and died a slave and in debt. The merchant was often ruined by bad debts. For not only did some fisherman, imitating Ananias, only turn in part of the catch and represent it as the whole, but often he became hopeless and apathetic, and lost all stimulus to do his best. Again, some men would temporarily give to friends who had good credit the bulk of their catch, in order to prevent its being absorbed in payment of their own debt. The fish thus held back might be bartered or sold to outside traders for goods such as tinned milk, sugar, and such "luxuries" which they could not hope to obtain on credit from their own merchant. To prevent such frauds, a kind of espionage had to be exerted, and the catches of a suspected planter were watched as the season progressed. Convicted planters were turned off from their merchants and no one would take them on. Thus resulted in the end the worst cases of poverty, — cases, to my mind, not caused by the bad fishery, but by the bad system.

Of late years, things have been improving, and a more general cash basis has come into vogue, though still there is room for improvement.

The planter himself must have men to help him, and these he can either ship for wages, or engage on shares paid out of the "voyage." The pay of the shipped man has risen to $100, and even to $130, with food for the season. For that sum he must do everything the master tells him that will benefit the voyage, and may be called on to work all hours of the night and day from the first of May to the first of November. It increases the "gamble" considerably to have all shipped men. If you "miss the fish" and earn nothing, you are still liable for all wages, but if you strike the fish, you will make very large profits. For a man is well worth $300 in a good year. Little as their wage seems, most of the men prefer employment under this system. They at least will have flour and molasses for their families, whatever happens, these wages, less advances for oil-skins, boots, etc., being always paid in cash.

The shareman in this country usually agrees for "half his hand." That is, the catch is divided by the number of men, including the owner or planter, and each shareman gets half a share. He has no expenses except clothing. Often the planter cannot, however, obtain men on these terms, and is obliged to take a full-share man. These men feed and clothe themselves and provide their own salt, but take a full share of fish. The more men a planter engages, the more fish he can handle and expect to catch, but the more numerous are the shares into which the catch must be divided. On an average, the shareman gets every eighth fish out of the trap for himself. It has often puzzled me how the hired man with $100, less expenses, could live, much less feed his family; at best he can scarcely do more than merely exist.

The following statements taken at random will illustrate how pitiful is the living of a hook-and-line man in a poor year. Both men, A. B. and C. D., are well known to me as capable and industrious. One cannot wonder that they may be in perpetual debt to the merchant.

A. B. is a "handy man"; his wife is dead and he has eight children, most of whom are young. His financial year may be described in informal bookkeeping thus:—

Income		Expenses	
Caught on hook and line, 30 qtl. of fish at $3.20	$96.00	Nails, oakum, paint, rope, etc.	$4.00
Salmon, none; easterly seas destroyed nets		Hooks and line . . .	2.50
Oil from codfish, balanced against salt for fish		16 bbls. flour (cheapest possible)	80.00
Winter work, logging for mill	44.00	5 bags hard bread . .	19.00
	$140.00	50 gal. molasses . . .	22.50
Balance against A. B.	10.80	12 lb. cheapest tea .	4.80
	$150.80	10 lb. oleomargarine .	2.00
		1 bbl. salt pork . .	16.00
			$150.80

A. B. had no potatoes for seed, no cabbage seed; no money for powder, shot, caps, crockery, kerosene, matches, boots, oilskins, clothing, house repairs, tools, bedclothes, etc.; no luxuries, no doctor's fees, no church expenses.

C. D. has a wife, two small sons, and three small daughters, owns no nets, shared this year in two salmon-nets with another man. His account for the year stands:—

Income		Expenses	
Caught on hook and line 12 qtl. of cod	$38.40	Boat, $5; salt, $6; lines and hooks, $2.50	$13.50
Value of oil from same at 30¢ per gal.	6.00	Fishing boots, $4; oil-skin, $3.50	7.50
Share of salmon, 1½ qtl.	7.50	Flour, 13 bbl. at $5; molasses 45 gal. at 45¢	85.25
Work on roads	3.00	Hard bread, $11.40; tea, $4.00	15.40
Herring, one bbl.	2.00	Oleomargarine, $1; kerosene, $2	3.00
Work on lumber and at mill	55.00	Kettle, $1; matches, thread, needles, and soap	2.00
Potatoes sold	14.00		
	$125.90		
Balance against C. D.	.75		
	$126.65		$126.65

It will be observed that C. D. has not nearly enough fats in his food-supply to sustain him properly even in a warm climate. Like A. B. he lacks most of the civilized necessaries and luxuries of every description.

The most important change that has of late years come over our fisheries has been the one most needed of all; that is, the chance of obtaining remunerative work during the long winter, when the fishery is out of the question. Nowadays, a man who fails need not see semi-starvation and scurvy, and even death, overtake his family before he can again find a source of supplies. Such results of starvation I have seen more than once. Pulp and lumber mills, mines, and other industries may now afford work for most of those who return south from Labrador before they "freeze in" for the winter. A somewhat similar improvement has followed in Labrador itself, though trapping fur-bearing animals is there naturally the second string to the settler's bow.

Few fishermen grow rich. Some, however, are able to put by considerable sums, and there are as happy and comfortably provided families among our fisherfolk as can be found among any artisan class in the world. The very nature of the calling begets a healthy body, a simple nature, and an easily contented mind. Unaccustomed to luxuries, the lack of material wealth causes no vain regrets. Inured as they are to privations, the smallest acquisition gives pleasure. They may not aspire to have servants under them; they are their own masters at least throughout their working days. They have an interest in and love for their occupation, the like of which one can scarcely credit to a factory hand, who is always making a piece of a complicated whole, and never finishing a job, or can credit to a clerk on a high stool everlastingly adding up figures. The men love their calling, and with sound reason. For sheer love of it, I know several, who, after trying Canada or the United States, have returned eventually to their old occupation as being "a far better job." In what other calling are poor, working, uneducated men so able to enjoy the luxury of independence, the prize which riches might seem able to purchase for the wealthy only, and yet to which many rich men never in any way attain!

When the French Revolution began, the fishers of cod on the Newfoundland-Labrador shores were already established in their more prosaic industry. In 1812 the catch of fish on the Labrador and French shore combined is said to have been 29,500 hundredweight. The catch in some of the later years may be given:—

In 1814	44,650 hundredweight
1821	49,652 hundredweight
1823	40,399 hundredweight
1824	42,240 hundredweight

In 1845 two hundred vessels from Newfoundland, mostly from Conception Bay, went to Labrador; they are reported to have employed five thousand men. In 1851 it was estimated that seven hundred vessels went to the Labrador from Newfoundland, carrying from ten to fifteen thousand men; their catch was computed to be between one hundred and sixty thousand and one hundred and eighty thousand hundredweight. Harvey states that in 1880 from one thousand to twelve hundred schooners carrying over thirty thousand people went to Labrador; of these about one hundred vessels were from Canada.

Prior to 1860 no accurate account was kept as to the annual takings in Labrador. The trade report issued by His Excellency, Sir William MacGregor, in 1906, states that for the thirty years preceding the average annual export of dry codfish from the whole colony of Newfoundland has been 1,246,664 quintals (hundredweight) at an average value of $4,830,079. The report shows the average annual export direct from Labrador in various periods to have totalled as follows:—

1860–64	192,051 hundredweight
1865–66	197,885 hundredweight
1873–77	300,854 hundredweight
1878–82	371,681 hundredweight
1885–89	216,434 hundredweight

1890–94	257,314 hundredweight
1895–99	220,150 hundredweight
1900–04	219,948 hundredweight
1905–06	296,553 hundredweight

Besides the fish exported directly each year, an average of three hundred and fifty thousand quintals is carried from Labrador to Newfoundland and exported thence. This gives a mean annual output from Labrador of about six hundred thousand quintals. In 1906 and 1907 the figures are: —

Exported Direct	Value	Sent to Newfoundland	Value
1906, 250,857 quintals	$1,030,492	545,000 quintals	$2,180,000
1907, 289,493 quintals	1,013,227	345,000 quintals	1,380,000

Grand Total

		Value
1906	795,857 quintals	$3,210,492
1907	634,493 quintals	2,393,227

In 1905, 342,219 quintals, valued at $1,237,329, were exported direct from the Labrador. In 1907 the entire export of dried codfish from Newfoundland and Labrador amounted to 1,422,445 quintals, valued at $7,873,172. The total product of the fisheries for the colony in that year was valued at $10,058,052.

The average price during these years has varied very considerably, but on the whole has tended to improve, and has reached as high for Labrador fish as $4 and even $4.20 per quintal, that for shore or Newfoundland fish having reached an average of $5.30. This difference in price needs explanation. It arises from the fact that certain markets prefer the fish drier and harder salted than do other markets. In Labrador the fine days for drying fish are rare after the fishery is over; it is, therefore, better to ship the fish damper, or, as people say, "with only a day's sun," rather than wait perhaps weeks to be able to dry the fish hard. There is, however, one other alternative, and that is to take the fish south "green" or unwashed in salt, and finish the cure in Newfoundland. If a man has few fish and plenty of help, he can thus employ himself at a remunerative wage to raise the value of his Labrador catch to that of shore fish. But if he has much fish and work to do on his little farm at home, or perhaps other better "paying work," then he will ship direct from Labrador. It must be remembered that drying the fish entails loss of weight, and after all it may pay better to sell ten quintals at $3.50 a quintal than dry the same fish to eight quintals and sell at $4 or even $5 a quintal. Moreover, some of the schooners have so many "freighters" and their gear to carry to and fro that they are unable to take their fish to Newfoundland whether they would wish it or not, while the merchants who have ordered steamers or schooners to go to Labrador for loads are so anxious for the fish to reach the markets early, that they will give at times considerable bonuses over the price arranged by the Chamber of Commerce. Last year men who refused $3.60 spot cash in Labrador realized only $3 to $3.20 in St. John's.

The rapid loading, and the accepting of all the fish "Tal qual," *i.e.* just as it comes along, greatly encourages bad fish-making, and as the loading often goes on by flares after night, sometimes unsound fish will be slipped in, and a whole cargo injured or even spoiled. Moreover, the fish does not receive so severe a culling on the Labrador as it does in Newfoundland, and, indeed, is generally taken without culling. The merchants run very considerable risk in exporting fish. The hiring of their vessels, small as most of them are, is an expensive business, and the small margin left for profits when there has been a keen competition in prices to "finish a vessel," has left many an enterprising man sorry he ever "touched it." The vessels used are mostly square-rigged schooners, and old-fashioned small brigs and brigantines. Indeed, the industry is serving the useful purpose of helping to perpetuate this very interesting class of vessels, which everywhere else is becoming extinct. These vessels represent a distinct bond with the mother country, for they are mostly Welsh, with some from Devonshire. They are handled by the type of sailor of long ago, men whom one would expect to step off Amyas Lee's vessel on its return from the Indies. These men are possessed of the material which made their prototypes so desirable an asset to their country. They are sailors to the soles of their boots, and amongst them are many of the most simple, God-fearing, contented men I have ever seen. The masters are generally part owners, and often mess with their crews as with a party of friends. Many a helpful hand do they lend our fishermen, for the vessels are bound to be out here by a certain date. Being slow and uncertain, the vessels often arrive two months early, and even have to wait three months for their complement of fish. During all that time their crews are the good geniuses of the little havens in which they are anchored, and the "skipper" and his medicine-chest are in continual demand.

The itinerary of these visitors is somewhat as follows: September, leave Labrador for the Mediterranean; thence in December to their homes; then cargo of slate or ore possibly to Hamburg; in March, to Cadiz for salt; then to Labrador by June, and so on back again. Once home in the year, if all goes well. They make a modest living, and are able to retire before old age incapacitates them. Some are lost in the "roaring forties," the latitudes in which they mostly ply their calling, and many are the stories of heroism and suffering on these vessels that the sea could unfold. On one occasion a skipper, deserted by his crew at Bonne Esperance, sailed his square-rigged schooner across the Atlantic alone to Gibraltar with a cargo of fish. Sometimes they will carry fish to the West Indies or Brazil, and then possibly return with molasses to St. John's before taking a final cargo to the Mediterranean. I have seen a vessel leave in late October with ice on her sides, and every one muffled up. In three days she will run into the warm atmosphere of the Gulf current, the men will be in their shirt-sleeves, and a few days later they will be eating fresh fruit in Spain. A very favourite holiday among these men is to get a lift across as far as Genoa, and perhaps work a passage out from Gibraltar, or come out again by way of England.

Naturally there is considerable rivalry in making quick passages. The westward passages are always longest, the prevailing winds in the North Atlantic being from southwest to northwest. But the following examples show what can be done under favourable circumstances: —

The square-rigged schooner *William* ran from Labrador to Patras, Greece, in twenty-three days. The square-rigged schooner *Red Rose* took only seventeen days to reach Genoa from Labrador. The fore-and-aft vessels can make fast round-trip passages. Captain McCrea's fore-and-aft schooner *Clara* left Harbour Grace, reached Gibraltar in sixteen days; lay there thirteen days; went to Patras, Greece; lay there fourteen days; returned to Cadiz, loaded with salt, and was back in Harbour Grace in ninety-eight days. In my own fore-and-after, the *Albert*, I left St. John's and was anchored in Great Yarmouth, England, in twelve and a half days. No doubt quicker passages have been made than any of these.

Of late years, Norwegian and Danish vessels, being "cheaper," have partly taken the trade from British merchants, but there are still firms patriotic enough to pay more in order to secure British bottoms.

Italy is the best market for Labrador fish to-day, though up to 1904 Spain took most from us. Spain and Greece take quite a large quantity still. Of late years the United Kingdom has not taken so much, the ports to which we export being Liverpool, Exeter, and Bristol. The Portuguese and Brazilians, who are the largest consumers of dry cod, like it very hard, and nearly all their fish goes from Newfoundland. The fish culled out as not suitable for other markets is shipped to the West Indies at a lower price.

The culling of the fish is a most important measure, and though as a rule the men will avoid a "cull" if possible, it is really distinctly to their own interest. In self-defence, every buyer of fish should agree to insist on it. For the fish really varies immensely in value according to the quality, and that depends far more on the making or curing than on the fish, except that big fish are, as a rule, more salable than small ones. Remove the cull and sell the fish "Tal qual," and at once all incentive to spend time on cleanliness disappears. It is almost like putting a premium on laziness and carelessness. As the Newfoundland and Labrador fish must compete in Europe with Norwegian and even French fish, the whole colony suffers with the loss of the good name of its marketed fish. It is an all-important issue to almost every one in the colony, as all are more or less dependent on King Cod.

The printed forms on which receipts for fish are given by a large firm to its dealers or fishermen, show clearly how common it is to accept all Labrador fish as of the same value: —

Received from

	Qtl.	lb.
Large		
Merchantable fish		
Medium		
Small		
Madeira		
West Indies		
Tal qual		
Inferior		
Damp		
Dun		
Slimy		
Labrador		

and also casks of gallons of oil.

To cure and dry a single quintal of fish uses salt and time, and costs money, but it often pays to cure the catch when it is not too large, for the price per quintal then rises so much that the net profit is actually greater. Five and one-quarter barrels of Cadiz salt or six and one-half barrels of Liverpool salt (29.7 gallons to barrel) will cure 2205 pounds of cod, — that is, 1435–1462 pounds of salt to 2205 pounds of dry cured fish. Salt comes to from twenty-five to thirty cents per quintal of dried fish.

The markets are subject to very rapid fluctuations. A cargo scheduled for a certain port may arrive just too late, find the port glutted with other arrivals, and have to proceed farther, which means fresh port dues and expenses. There is thus a veritable race both in loading and in making the transatlantic journey. This has led to the employment of steamers to carry the fish; then the merchant finds the new difficulty that steamers large enough to pay expenses are likely to flood any local market to which they are consigned.

Again, the consignee has at times thrown the cargo back on the merchant's hands, the condition of the fish not equalling that which he desires and to which he feels entitled. Sometimes the whole cargo will be actually returned to Newfoundland. This, however, is so ruinous to the merchant that he generally arranges for an arbitration to be held, and lower prices may be agreed upon. The result is some incentive to protest against accepting the agreed price. In addition, there is always the element of risk, unavoidable by the merchant, that the quality of the fish may have deteriorated on the passage. Very large losses have been made in this way by individuals, who are in turn compelled to bring losses on the fish-catchers when it is imperative for the merchant to compound with his creditors. The element of chance, that a bad voyage may, after all, turn out a good one, adds another attraction to fishing, however monotonous it may appear. The love of a gamble is innate in man. Of late years there has been a considerably larger quantity of fish exported by smaller men, but the tendency is to confine the actual export process to the larger firms.

Naturally the Norwegian catch influences the total supply very materially, and a failure there means better prices here. The French can scarcely afford to export fish, for they are paid such high bounties for taking it to France.

Happily for the fish-catcher, the markets for salt fish are not only opening up wonderfully, but the price obtainable has also been steadily increasing, and has risen from 2.22 cents per pound to 4.74 cents in the last six years. This, more than anything else, explains the general prosperity of our people. For the rise in the market price is out of all proportion to any increase in the amount of fish taken. There is good reason to suppose that this rise in price will be maintained as long as the article exported is properly cured. The wealth and numbers of the peoples requiring this produce are steadily increasing, and other proteid foods are rising in price synchronously. It seems, therefore, that in this respect our future is still in our own hands, and that there are yet halcyon days in store for our folk that "go sailing out into the deep."

The import duties imposed by our customers vary greatly. France prohibits foreign cod altogether, with a tariff of $4.68 per quintal, besides giving bounties to her own men. Spain charges $2.34 per quintal, Italy 40 cents only, Greece 38 cents, Portugal $2.14, Brazil $1.39, United States 84 cents; Persia, of all countries, free import, and the United Kingdom, free as usual! France pays 50 francs to each member of a crew drying fish away from France; 30 francs to each member of a crew drying the fish in France; approximately 10 francs on every quintal of salt fish shipped to transatlantic countries; 16 francs per quintal on shipments to cisatlantic countries; a bounty of 20 francs on cod roe brought back to France. So that besides the prohibitive duty on the fish of other countries, grants to foster French fisheries amount to approximately one and one-quarter million dollars per annum. That means that, if our fishermen were accorded similar privileges, they could almost afford to catch fish, get the bounty, and give the fish away.

These important duties and bounties show that some countries do not value the codfish much, or they would welcome it in freely as a cheap food-stuff. Yet they strive all they can to make their own men go and catch it. Great are the mysteries of statesmanship!

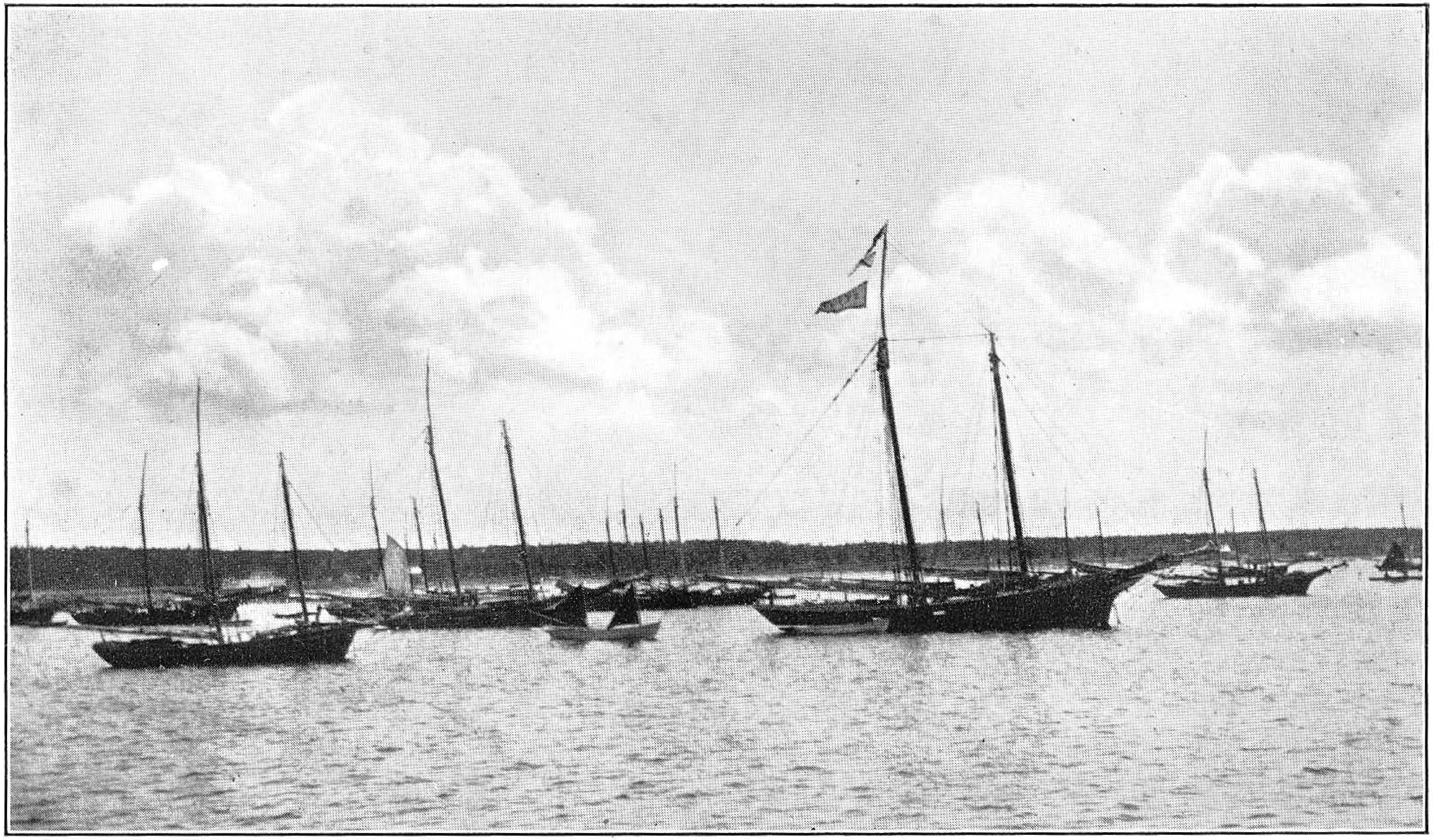
Now the value to the human race, or any section of it, of a particular calling or industry or commodity cannot be measured altogether by the dollars each brings the government or the number of people it employs, though we are apt to apply these standards. If we did so, the liquor traffic would be classed among the most valuable to the race. Yet while the fishery is productive and constructive, the liquor trade is destructive, both of human capacity and of material. Probably of all industries the one of first importance to the British race is that which involves the following of the sea. For in the art of man-making no environment can surpass it, and sea-power means world-power.

Few landsmen have ever given a thought to the influence exerted on mankind by the humble codfish. Nations have jealously watched these dreary wastes of icy, fog-bound waters, and spent human lives by the thousands in the years that are gone in the endeavour to turn the food and money that these finny hosts spell into their own treasuries, and to gain also the environment involved and its evolutionary advantages. As early as 1368 kings were granting rights to fish for cod in the North Sea. Henry the Fifth paid compensation to the king of Denmark for damage done by the English cod-fishermen to his. The Cabots' discovery of this north land opened up a great source of human food-supply which has been, and will be, of greater value than the diamonds of Golconda or the gold mines of the Rand. It was landlubbers ignorant of the value of these northern seas that made Canada in 1813 lightly give back to Newfoundland the coast from Blanc Sablon to Cape Chidley; made England lightly give back to France the islands of Miquelon and St. Pierre, and the rights of fishing on the Treaty coast; and permitted the American fishermen the privileges of the treaty of 1818. Our debt to this small denizen of the deep is far greater than those consider it who only view the fishery from a gastronomical or economical standpoint. Strange as it may seem, the codfish has been an invaluable factor in preserving and evolving that genius of the British race, which in God's providence at the time of the Invincible Armada alone allowed us to persist still free among the great powers. That genius, which four hundred years ago preserved us from national crippling or from absolute deletion from the roll of great nations, is in danger of being lost by the general increase of wealth and luxury.

I shall here only suggest the debt that the Catholics of Europe owe the codfish. The vast amount they consume is the best proof of the value at which they estimate him. But I can suppose that the family circle on many a Friday night would sit around the table with blank faces if it were not for this additional virtue of our friend, viz. his gratifying faculty for passing muster as eligible for dinner before an ecclesiastical inquisition which has placed all our staple articles under the ban. And for this discernment the world in return owes the authorities of the Church a very real debt, inasmuch as they so directly encourage in this way a calling so invaluable to mankind.

Thus it cannot be said that, in praising the codfish, we have exaggerated his virtues. Not only has he bred a healthy race; he has invigorated a weak one. His oil has enabled us to battle successfully with the subtlest enemy of our race, the tubercle bacillus, even in the face of all the wonderful discoveries of modern science and the hoards of money lavished on other methods. A couple of years ago, when the supply of cod-liver oil was short, the crude article rose in value in a couple of months from forty cents a gallon to $4 a gallon direct from the barrel.

May the men of Labrador never need the emasculating paternal legislation of our neighbours in Europe, or the bounty system of "presents for good boys that venture out to sea"! When the world beholds the spectacle of the English, as a race that will not venture forth on the mighty waters without being stimulated by such adventitious aid,



The Fishing Fleet

taxing those who have to stay home, then indeed may we pray again for our good genius in the form of a codfish. If ever that day comes, may our friend be put on the national flag, and let him rank three codfish with three lions.

CHAPTER XII

THE SALMON-FISHERY

BY W. T. GRENFELL

OF the four varieties of salmon in Labrador, — *Salmo salar*, *Salmo trutta*, *Salmo immaculatus*, and *Salmo hudsonicus*, — only the first two are of commercial importance.

Salmo salar is a noble fish. In strength, beauty, and spirit he is certainly superior to any others in the Labrador waters. He is found from end to end of the coast, but less abundantly in the north, where he remains a shorter time than in the south. He arrives during the period between the latter part of June and the end of July; and, after browsing about on the coast for a month or so, proceeds up the rivers to breed. It appears that for some time he runs in and out of the river mouth, as if to accustom himself to the change to fresh water.

The salmon is really a river dweller, a luxurious fellow with a winter home in the sea, but in most countries two-thirds of his life is spent in the rivers. So strong a homing instinct does he possess, that he can hardly be kept back from returning to his own particular river, the place of his birth and the abode of his first year. This has been shown by marking live salmon taken at the head of a river, carrying them around to another river, the source of which was quite close to their own, but whose mouth was the opposite side of a great stretch of land. Three weeks later some of the marked fish were caught in their own pool again. In

Alaska a barrier of sand and gravel was once formed across the mouth of a river by a phenomenal storm. The river was, however, able to percolate through. When the salmon returned to their river, so determined were they to get up, they threw themselves out of the water on to the pebbly beach, and some at least succeeded in wriggling and jumping till they reached the other side. The natives profited by the experience, though the devotion of the salmon deserved a better fate. Only three things will apparently keep salmon from their own home, — pollution of the river, insuperable natural barriers, and man's persecutions. All these three are one, and that one is Death. If the summer is early and the water warm, well and good; they return to their river early. If it is late, they are content to "bide." If it becomes too cold after they arrive, they will return to the sea and go up again later. In these adventurous journeys the larger fish are the leaders. Obstacles are only things to be overcome. They will leap ten feet out of the water up a cataract. With successive leaps they will climb a fall of thirty feet. They will go on jumping till they are dashed to pieces and, bruised and dying, are borne down on the bosom of the river they loved, back to a tomb in the great deep out of which they came. The zeal of Kim and his old Lama in search of the river of the arrow was no greater than that of this kingly-spirited fish. The fact that he can no longer people our rivers is no fault of his.[1]

This very persistence of the salmon is his own undoing.

[1] A most interesting fact noticed about salmon by Mr. W. G. Gosling is the existence in certain rivers below the falls of pot-holes scooped out by the water in the solid rock. While watching salmon leap up

I have lain on a high perpendicular rock, watching the gill-net stretched across the pool of clear, transparent water. I have seen the approach of the victim and his friends on the journey, the courage with which he charged the net. If only he would give way, he might yet go free. But he knows no yielding, and is not satisfied till the tough twine has passed over his head, caught behind his gills, and then it is too late to save himself.

But we will follow the more successful fish that reach the home of a former year. Once in their pool, the mother fish finds a suitable sandy or fine gravelly spot in shallow water, where the ground is soft and deep, and the current not too boisterous. Often enough it is the nest of a sea-trout before her, but of that she takes little account. Throwing herself on her side, she scoops out a "redd," or nest, by flapping her tail, and in this she deposits a number of eggs. She then returns into deeper water, coming to and fro to her nest to lay more eggs for several days, till she has laid as many as five hundred for every pound she weighs. Each time, her male partner accompanies her, depositing the milt required to fertilize the eggs. Since they entered the river, they have avoided one source of danger by taking no food, and they subsist on the fat accumulated on the rich pastures outside the river. Indeed, the beautiful pink of their flesh depends on the crustaceans they have there devoured.

the falls, he noticed first one and then another, that failed to clear the fall, totally disappear. A careful search revealed the fish head down and only their tails out of deep little pot-holes. He caught the fish for food, but was surprised to find the hole full at the bottom of bones of salmon that had no doubt perished miserably in the same way. It shows that salmon at times come head first down into the water when diving, like an expert human being.

One result of their abstinence is a peculiar pinched and hungry look on the male fish's face. His jaws grow hard and hooked, and he is thus able to fight the many battles that lie before him, with far better chance of damaging his enemy.

The "spent" salmon are called "kelts." They are so weakened that they fall an easy prey to any strong enemy they may meet. Like eels, many, if not most, salmon die after spawning. With scanty gratitude men have advised giving the poor salmon no protection at that time on the theory that the spent adults will, in order to recover, if they ever do recover, destroy in the process more young fish than they are worth. On the other hand, as the kelts are not worth eating at that time, and are thought by some observers to be poisonous, it is poor policy to capture them. A fisherman who had taken a number was once asked by a "protective" enthusiast, if it was not true they were not good to eat in that state. The fisherman replied "That's true," but with a wink added, "Them's not bad kippered."

The eggs of the salmon are remarkable. They are round and about one-quarter inch in diameter, of a pink colour, elastic, so that they bounce like a ball off a board. They will hatch out in a month, but if it is too cold, and circumstances are not right, like a caterpillar in a chrysalis, they just wait till the conditions are more to their liking. They can be carried in ice for thousands of miles; stored in this way, they have been carried and successfully propagated in India, Australia, and New Zealand.

The adult fish also can stand great ranges of temperature; he may be caught as far south as lat. 37° north and as far north as lat. 70° north. The salmon so fill some rivers that when the waters subside with the advance of summer, the odour of rotting fish on the banks and in the branches of trees is said to be positively poisonous. On Kadiak Island in the North Pacific they are so abundant in certain rivers that the fish "interfere with the progress of canoes." The variety found in Cook's Inlet averages four feet in length, and weighs fifty pounds. The natives here kill in their primitive way some twenty-five thousand fish per year, which provides for each person the moderate allowance of four hundred and thirty pounds, or about four pounds a day the year round.

Once hatched out, the little salmon, or parr, is handicapped for three weeks by the large umbilical sac on which he subsists. He is fain, therefore, to hide away closely among the stones, for many creatures are fond of him. Insect larvæ, beetles, crustaceans, large fish, rats, and even diving birds, are all anxious to take him in. If he survives, he remains in the river for one or two full years. During this time he has grown to a sizable fish of a couple of pounds' weight, but his full glory does not appear until, in his third spring, he assumes his glittering silver armour. He is then known as a "smolt," and attains the dignity of venturing into the unknown immensity of the ocean, with his fellows of his own age, as they go forth in the wake of the great salmon.

In the river the samlet, or parr, is not troubled with the scruple of his parents, and feeds voraciously. But it is not until he reaches the great sea that he begins to grow at all rapidly. It has been said that he will grow from a few ounces to as many pounds in three months. He may return to winter a second time in the pools and lakes, a full-grown grilse. This pleasure is, however, generally deferred till the fourth spring, when the fish arrives in all the pride of silver and with all the well-known energy of a three- to six-pound grilse. Those who have felt the rush and jump of these exquisite creatures on the end of a light line in rapid water know the marvel of their agility. The males are at this time mature, but, as a rule, do not spawn. They seem simply to have a good time in the upper reaches and, not until the fifth year, when they have grown to the weight of ten pounds at least, do they feel called upon to assume the duties of the head of a family.

The grilse, from their agility or smaller size, are fairly successful in escaping the cod-trap leaders. They even pass through the salmon-nets in the rivers, and the rod-and-line fishing for these is still excellent in many Labrador rivers. Eagle River still gives good sport for salmon, and an enterprising Hudson's Bay factor is trying to arrange a summer hotel for visitors near the large pools. Sandhill Bay River also gives good fishing. The late General Dashwood came two years in succession from England to fish in this river.

Many of the other rivers would doubtless afford sufficient attraction if only they were given a fair trial. But as yet little is known about them. A party in a steam-yacht, visiting Byron Bay in 1907, claim to have had good sport there, but we had no accurate details of their actual catch. Landlocked salmon are very common in the lakes and upper reaches of the Hamilton Inlet. One feature that tells most in favour of the rivers on the Labrador coast belonging to Newfoundland, is that no rivers are reserved for clubs or private owners, and visitors may visit or fish any or all at their own will. No fishing tackle can be obtained on the coast. Silver Doctors, Jock Scotts, Soldier Palmers, Durham Rangers, and Fairies are all good flies on the Labrador rivers.

Why salmon leap at a fly at all, is much debated. The need for food does not alone seem to explain the habit, which has persisted from the smolt days of their youth. A much greater puzzle is, Why are salmon timid to-day, voracious to-morrow? Why will every salmon refuse to look at a fly at nine o'clock, but at nine fifteen o'clock every salmon in the pool will leap at any fly one likes to try?

The salmon that return to the rivers in the winter lose their bright colour. The males become dark in the back, and have a dark red colour developed on the sides and belly. The females are a dark, dusty gray, somewhat resembling coalfish. Their flesh becomes white, and they are useless for eating. Early in the fifteenth century, it was a capital offence to kill salmon out of season.

The Labrador salmon are said to be the best in the world for eating. The cold waters seem to produce a specially vigorous, well-fleshed fish. The salmon-fishery in Labrador preceded the cod-fishery by many years. The former was much the more valuable then. With salmon catch and fur trade the resident white population grew up and flourished; with the destruction of the salmon those people have fallen into poverty, and even into starvation.

In the history of the Labrador settlers we may read the pitiable story of the blotting out of these valuable fish. The increasing quantity of twine used on the outside for codfish offers no prospect that the salmon will assume their former abundance.

As long ago as 1774, at any rate, the Alexis River, and soon after the Eagle and other grand rivers of Sandwich Bay, were completely net-barred. Of late years the "baymen," or livyeres, have been slowly obliged, owing to the increasing scarcity of the salmon and to the declining price of salt salmon in the market, to abandon this fishery and try for cod.

The transition stage is a time of great misery for the poor settlers. Their nets, small boats, outfit, and habits are all calculated for the peaceful fishery in the bays; for the rougher fishery outside they have neither gear, education, or inclination. Many try to do both. But the cod arrive on the coast before the salmon take to the rivers, and these men are very apt to make a blank year, entailing great privations on their own and other families.

Whether man can decrease the number of cod or herring in the deep sea is uncertain, but that by netting rivers you can empty them of salmon, is a well-ascertained fact. The former great abundance of this fish on the Labrador is well emphasized in the following few extracts from the journals of the inimitable Major Cartwright in 1775–1785. In July, 1775, he writes of the Eagle River: "We have 140 tierce (casks) ashore, but have had to take up two nets, as fish get in too fast." "The big pool is so full of salmon, you could not fire a ball into it without injuring some." Even the animals seemed to know the wonders of this river, which must have been almost as well stocked as the Fraser River in British Columbia. Cartwright describes "remains of thousands of salmon killed by white bears round the pool." His famous description of some fourteen white and black bears that he saw fishing in the pool is quite unique. In 1776, August 7 to 11, Cartwright took 1230 salmon from the pool in one week. "At Paradise we have 214 tierce ashore. Few escape there." In his "artless" poem he writes:—

> ". . . salmon up fresh rivers take their way,
> For them the stream is carefully beset; few fish escape."

That is not to be wondered at, for he says, "My ten nets, each forty fathoms long, fastened end to end, stretch right across the stream."

On July 17, 1779,

> "In Eagle River we are killing 750 salmon a day, or 35 tierce, and we would have killed more had we had more nets. Three hundred and fifty tierce ashore already at Paradise. If I had more nets, I could have killed a thousand tierce alone at this post, the fish averaging from 15 to 32 pounds apiece. At Sandhill Cove two men have 240 tierce ashore, and would have had more, but we had no more salt."

From June 23 to July 20, in Eagle River, he killed 12,396 fish, or 300 tierce. In 1782 he writes: "Little or no salmon at Cartwright, only 80 tierce." In 1786 he writes: "We have 490 tierce in White Bear River, and Paradise R. and 165 tierce at Charles Hr." Naturally enough the archaic story of the clause in the apprentice's indentures, that he was "not to be forced to eat salmon more than thrice a week" is told of Labrador in these days.

In 1818 Mr. Pinson was getting two hundred tierce of salmon at Cartwright. He received a bounty of three shillings per quintal for this shipment to England.

In 1864 Mr. Stone's average catch at Henley was sixty tierce for a season. The entire catch, as given in the Government Blue Book for 1906, was eight hundred and twenty tierce, valued at $16,437. The catch in 1907 was seven hundred and fifteen tierce, valued at $16,057.

This catch cannot, however, represent much more than half the amount caught, for nearly every trap-net used in the cod-fishery catches salmon in its leaders, and these are salted, smoked, and carried to Newfoundland. I have known three hundred salmon taken in one day in a cod-trap.

The trap leaders specially used for salmon are set out from points exactly as cod-trap leaders are, and being four inches instead of six inches in mesh, stop much smaller fish. In this way a very large number of small salmon are taken every year, and in the opinion of many people, the traps do more damage to the salmon than the river nets.

Rivers in Labrador are, as a rule, not now barred, but practically all that are of any value are illegally netted. It seems that a prescriptive right has grown up with some residents to fish rivers in defiance of the law, and the only one on which a fish warden is appointed is regularly netted at least three miles above its mouth. If, however, these rivers received the protection the laws of the country nominally afford them, there is no reason why they should not again become as attractive to visitors and sportsmen as those of the Canadian Labrador.

The regular method used to catch salmon in Labrador is to set the gill-net from the land. These nets are fastened by a mooring to a "shore fast" and run straight off to sea. The salmon seldom swim more than a few feet below the surface, so the nets are fastened to a line of corks on a "head rope," and hang down perpendicularly. The legal mesh is not less than six inches in diagonal measure. At the outer end, the line of nets, called a "fleet," is held by heavy anchors, and then a pound is formed by turning back with another net at an angle of forty-five degrees in the direction from which the salmon are expected to strike. At times yet another net is added, so that the triangular pound is closed, leaving merely a door. The salmon do not strike a net in daytime so readily as do sea-trout. They seem, however, to get confused in the pound, and in this most are taken.

The Hudson's Bay Company, who are by far the largest salmon buyers on the coast, own many nets. They also own houses, or "posts," as they are called, at all the best points of land in the long inlets, and the planters use these and turn in half their fish as rent. For the balance they get goods from the company's store.

Most of the salmon catchers are fur trappers, although those who live on the outside land do little or no "furring." Indeed, many have fallen into poverty and have neither traps, safe guns, ammunition, nor even clothing and food to enable them to get out and face the Arctic cold of winter. This is now the poorest class of men in Labrador.

Formerly the Hudson's Bay Company had a large salmon cannery in Eagle River. The building is still standing, but the trade has been abandoned for want of sufficient fish to maintain a scale of business large enough to enable them to compete with British Columbia and other places. The salmon industry is generally in a bad way, as the price of the salted article has steadily declined, till this year instead of $6 and even $8, only $3 a hundredweight was paid. The

Hudson's Bay Company gave far the highest prices on the coast these last two years. Were it not for them, the fishery would be practically abandoned.

Last year, 1908, a new method was tried. Mr. E. Gibb of Aberdeen, Scotland, brought over a large tank steamer, in which to carry home to England live fish. He is fishing in a way new to Labrador, pursuing the fish with a floating trap-net. What will be the outcome of the venture, it is impossible to foretell. He has brought houses, men, and tackle. Three trips in a year would fully satisfy him.

CHAPTER XIII

THE HERRING AND OTHER FISH

BY W. T. GRENFELL

THE immense value of the herring to the world has been known for centuries. One thousand years ago our ancestors in England knew its virtues. To-day it is of no less, but rather of greater, importance. With the increasing population of the earth's surface, with the ever growing need for food-supplies, we can ill afford to neglect any precaution that might tend to the development and maintenance of so immensely valuable an industry as that of catching herring. In this Labrador once had its share. Alas, to-day the glory of the Labrador herring-fishery has departed, and only a few paltry barrels find their way to the markets.

So important has this industry been, that Professor Huxley calculated that at least three billion herrings were, in an average year, killed for food of man in the North Sea and the open Atlantic. As these herring average eight ounces at a minimum, the immense weight of food, one billion five hundred million pounds, speaks for itself of its importance to the human race. For herring is a fat fish. Lying in Lerwick Harbour, among nine hundred herring boats, I have seen the oil set free in the splitting of captured herring cover the surface of that immense harbour so thickly that, though the vessels would be sailing in and out with a stiff breeze, not a ripple of any sort would be visible. It left a most marked impression on the mind. One of those fat herring, taken straight from the water, then split and grilled on a gridiron over an open fire, will actually catch fire from his own fat.

But in Labrador our herring have won a well-earned reputation for being *facile princeps* among the world's herring; only those from the Icelandic and Shetland waters can compare with them. The Labrador fish run to seventeen, or even more inches in length and weigh nearly one pound apiece.

Kings and queens have worshipped at the shrine of the herring. William Berkelzon of Flanders, in about 1300, discovered how to cure red herring, and generally how to preserve them better for food. After his death, Charles the Fifth erected a monument to his memory, visited his grave, and there prayed for his soul. Mary of Hungary, in a somewhat appropriate way, paid tribute to our benefactor by sitting on his tomb and eating a red herring. In North Scotland there is an old saying, "No herrings, no weddings." The "common" herring is not taken in the Pacific or Mediterranean, but, nevertheless, has a great range, — from Cape Hatteras to Spitzbergen and the White Sea.

The one failing of the herring, and the one thing that still keeps hope up that he may return to Labrador, is his inconstancy. He seems to disappear according to some subtle law of nature which has baffled all the skill of scientists, and has eluded all the speculations of fishermen. History records that European herring were to be found in vast quantities in the year 1020 A.D., and during the following periods: the twelfth century, 1260–1341, the fifteenth century, 1550–1590, 1660–1680, 1747-1808, 1857–1878, and also of recent years. Such large quantities have been taken in the North Sea these past two years that all previous records have been eclipsed. They disappeared from the Norwegian coast from 1655–1699, and again from 1784–1808. In 1871 they almost entirely disappeared again.

The old theory that all the herring lived in one vast race in the polar seas and made a circular tour of the waters they are found in, was eloquently described by Buffon, but is now abandoned. There is little doubt that many separate shoals exist, and that they do not retire into ocean abysses, or mid-ocean, where they cannot be taken. When they leave the shore, they probably feed on the slopes in moderate depths near the coast they frequent. They have been captured in one hundred fathoms of water off the Newfoundland coast. They are easily affected by temperature, preferring a temperature of 55° F. But they are caught in water as cold as 37° F., and the Scottish fishery is mostly in water at 41–42° F.

The eggs (thirty-one thousand, on the average, to each fish) which sink and stick to the bottom are eaten in vast quantities by many species of animals in the waters. It is, obviously, of great importance that the egg stage should be as brief as possible. Nature seems to furnish the instinct, therefore, to seek water at 55° F., the optimum temperature for rapid hatching. In any case it is probable that in the Labrador polar current which carries the temperature of 30° F. in subsurface layers, the herring is not likely to breed at all. This view coincides with the actual observations that herring do not spawn north of the Magdalene Islands and the west coast of Newfoundland.

It is impossible to believe that man has had any hand whatever in driving herring from the Labrador. The herring-fishery on this coast has, at best, been on a very small scale. Professor Huxley states that even in the North Sea man cannot be responsible for as much as five per cent of the herring killed. From the time of the egg to the full-grown fish this huge family of the herring is preyed upon by larva, crustacean, and sea-worm. "All that men take would not compromise one school of twelve square miles area, and there must be scores of such in the North Sea." If every herring lays thirty-one thousand fertilized eggs, and all but two of the family are killed every year by their enemies, the herring would still maintain their vast numbers. "Man," says Professor Huxley, "is only one of a great coöperative society of herring catchers, and the larger share he takes, the less there is for the rest of the company."

The herring seems specially adapted for man's use. Like the cod, he has no poisonous nor pain-wreaking spines; he herds together so as to be caught quickly in vast quantities; and he can be easily preserved. He is a deep-sea fish, and is thus not dependent on refuse food in shallow water. Young herring fetch a high price as "white bait." "A large proportion," says Professor Goode, "pass under the name of 'French sardine.'" Some are canned in spices and sold under the still more imaginative name of "brook trout." If, however, they have been feeding on crustaceans with hard shells, these, being undigested, putrefy very rapidly and spoil the herring. Herring barred inside a seine are, therefore, as a rule, safer to cure if left for two or three days in the net while digestion is finished.

Though the herring have small teeth on their tongues and the roofs of their mouths, they feed by sieving the water through gill-rakers armed with teeth and fine spines, which catch the small copepods, etc., and gently guide them down their throats.

They spawn in spring and autumn, but the same herring only spawns once a year, and they do not spawn till eighteen months old. The danger to the herring increases immensely when they come into the shallower waters for this or any purpose. It seems, therefore, another provision of nature that they should be a swift-swimming fish and, after spawning, leave rapidly for deep water.

Dr. Moses Harvey, the historian, writing in 1880, says the average export of herring from Labrador was 50,000 to 70,000 barrels for the years immediately preceding. In 1880, 20,000 barrels were exported; in 1881, 33,330 barrels; in 1908, only 180 barrels. As many as 500 barrels have been taken in one haul at Snug Harbour. Captain Hennesy described to me how, thirty years ago, he sailed through millions of herring north of Cape Mugford; their vast bulk made the surface of the sea oily.

There are many superstitions about herring, and the reasons advanced for their not "coming in" have been of every conceivable kind. To change this luck, some amusing ceremonial "charms" have been invented, such as dressing a fisherman in a striped shirt and riding him around the town in a wheelbarrow. Another valuable recipe was to pick out herring with red fins without letting them touch wood, and then pass them round and round the scudding pole as many times as the number of lasts of herring you hoped to capture next autumn. A "last" means 1320 herrings. Less amusing was the burning alive, two centuries ago, of men and women supposed to be bringing evil luck in the fishery. Laws have existed in England forbidding the taking of herring between sunrise and sunset, under the idea that the nets turned the fish. An Irish law forbade nets to be out between sundown on Saturday and sunrise on Monday. Probably the best laws, however, are no laws at all, until more definite knowledge is possessed as to the real causes of the movement of the herring.

A great deal of the value of the cured article depends upon the methods of cure, and much skill is needed to be really successful. In Europe the fish is pickled round, not being split at all; in America they are split and cured; in Holland the belly is clipped off with scissors. The variety of barrel is also an important point. The wood once used with us was hard, clear spruce. But the Labrador barrel industry has died with the departure of the herring. For more reasons than one many have been left sorrowing for a friend of whom we are all fond in every way and whose loss we deeply deplore.

Mackerel are not taken in Labrador, except occasionally on the shores of the Gulf of St.Lawrence. The range of this fish is from Belle Isle Strait to Cape Hatteras. In general the lack of variety of round fish on the Labrador is compensated only by the abundance and quality of the cod and salmon.

None of the marketable flatfish of Europe and America frequents our waters. Absent is the succulent sole, the delectable plaice, the toothsome turbot and brill. The witch sole, deep-water denizen though he is, pays us no visits. Of all these prime fish, only a stray halibut wandering in from the enormous schools that frequent the great banks one hundred and fifty miles from our shores, pays tribute to our Vikings of Peace, the acknowledged masters of the mighty Atlantic, even among the rocks of Labrador.

His name, halibut, probably means "holy plaice," — "holy" because a favourite food on holy days. He is often found in water as deep as two hundred and fifty fathoms. He prefers to live in water approaching the temperature of 32° F., or that where fresh water would freeze, and he ranges from the fortieth parallel of north latitude to the Arctic Ocean. The larger specimens attain lengths of eight or nine feet and weights of four hundred pounds; sometimes these giants have lived to so great age that large barnacles may be found growing on the skin, much as barnacles grown on an old whale. It takes a hand winch to haul up a big fish, and four or five men to get him over the side. Where only two men operate the dory, the usual plan is to list the gunwale over level with the water and then rush the fish and water in together. The halibut has sometimes had his revenge by capsizing the little craft. On one occasion a Gloucester vessel had brought a sick man of their crew to our hospital, and, wishing to express gratitude, offered us a fresh halibut. We gladly accepted, the change of diet being very welcome. We were a little surprised, however, to see later four stalwart men coming up the platform with a fish swung on poles — the fish the size of a porpoise! The fish smokes most excellently, the pieces then much resembling good Wiltshire hams in appearance.

Halibut are eminently fitted to survive. They are very swift and powerful, have large mouths with fearful, sharp teeth. They have a most catholic appetite that readily embraces a few dozen younger brothers or sisters if these get in the way. Half a barrel of flatfish was taken out of the stomach of a single halibut.

This fish, though commanding good prices, does not form a Labrador export, the banking fishery being carried on by our American cousins. These come to us as early as April, sail round the south end of the ice-floe, and so reach the banks; or, if leaving in February, make straight for the south coast of Greenland and try to get north by keeping outside the two currents of drifting coast-ice. On one occasion the skipper of a Boston vessel came to a hospital before our harbour ice had all gone, and we gave him a drive round on the ice with our dog-sleigh, as he had never seen dogs travelling. The main impression on his mind seemed to be "To think we had ripe strawberries before I left home a fortnight ago!"

In Europe and America the dab (*Hippoglossoides limandoides*) flourishes in both cold and warm waters. In his youth he is a free-swimming, upright fish, but takes to lying on one side on the bottom. He shows his adaptability by causing the under eye to travel round over his nose, as this eye would be useless looking down on the ground. He has fine, shiny scales. In Dublin he is called the smeareen, and is much eaten by the poorer classes. On the New England coast he passes as the "mud dab," but on his arrival in New York he further shows his adaptability by assuming the name of the "American sole." In Labrador he is classed with the "offal" and contemptuously thrown away. The dogs, however, appreciate his qualities better, and one often in the spring sees a dog wading about looking or feeling for the dab in the mud, and then quickly diving down and bringing the struggling, squirming fish ashore, there to be swallowed alive. The dab's hope of safety lies in escaping notice, and this he does whenever he is at rest. He flaps about till he settles in the mud; the mud which he has stirred up falls again, and covers all but his eyes and nose. At largest, the fish reaches twenty inches in length, and weighs up to two pounds. He remains all winter. As he is the first fish to be taken when our ice goes, he is speared by the boys, and, when food is short, cooked and eaten. But herring so soon follow the departure of the ice that even in this season the dab is seldom used. Visitors, however, esteem him highly whenever the native cook will condescend to prepare him for table. Probably it is the ugly face with huddled-up eyes and distorted mouth that tells here against his popularity.

The cause of his ugliness is explained elsewhere by a strange legend. It is said that when the fish were summoned to settle who should be king, the plaice was late, delaying to paint on some of his beautiful red spots. When he heard the election was already over, his mouth so twisted in disdain it never came straight again. A still older legend accounts for his being coloured only on one side. It runs that Moses, having caught one, proceeded to cook it over an oil lamp, but when one side was broiled and grilled, threw the fish into the sea.

The winter fluke (*Pseudo-pleuronectes Americanus*), the cousin of the dab, closely resembles him in size and appearance, and is found here, as he is all along the North America coast, south to Cape Cod.

The lump-fish (*Cyclopterus lumpus*) is very common with us, but is practically useless. We have been too stupid to find a use for him, except as a fertilizer. He has developed a sucker on his belly, with which, being a lazy fish, he fastens himself upside down on any moving thing, and will then drift about without the trouble of swimming.

The common sculpin, or scavenger, exists all along the coast. There are two varieties, *Cottus scorpioides* and *C. Grœnlandicus*. He really consists of a large mouth, an indefinitely distensible belly, a voracious and omnivorous appetite, and an outside coat of sharp spikes. One can scarcely credit him with feelings, for when fishing with the sharp jigger for cod, the same sculpin will run for the hook again and again, though the barb may in the earlier capture have been in almost any part of the anatomy. Sometimes a fisherman has had to oblige him by leaving him on deck in order to avoid the worry of repeatedly hauling in the line with the useless fish adhering. Our dogs, however, make nothing of his horny and thorny exterior, and eat him with great gusto, always commencing by biting off his tail. At a pinch, the sculpin would be very useful in sustaining human life.

Another fish that stands by us all the winter is the rock cod. He is much like a small cod in appearance, but darker, with partly iridescent sides. He remains about the harbours. As a matter of fact, he is "not at all bad eating," but is considered by the fishermen very inferior to the true cod, and is always rejected from those they export. He is, however, dried up with the smaller cod, which are not split, but simply salt-sprinkled. They are kept for winter use under the name of "rounders." He is also taken through the ice in winter, and has frequently shared with the lowly clam and mussel the honour of preserving the life of those in one of these scattered communities.

Hake or haddock are rarely seen in Labrador. The former fish is easily distinguishable by his silvery armoured coat, and the latter by the black marks on his shoulders, irreverently attributed to the fingers of St. Peter, who is said to have pulled him out of the water to pay taxes, with the money in the fish's mouth. Why the spots are black, tradition does not say.

It seems to surprise most people that the shark is found in Labrador, as he is always associated with tropical waters. The variety we have is the sleeper, *Somniosus microcephalus*, the little-headed, sleepy shark. He has a large body up to fifteen feet long, and fully lives up to his name. He feeds on offal thrown overside, earning the name of gurry shark; he is the most despised of our ocean fauna. He frequently gets caught in the sunken nets for seals, though not nearly as often as he deserves, for he browses along the nets, eating out the seals. In most cases his energy is not sufficient to make him push into the net. A ten-foot shark has a mouth contour of two feet, and a gullet proportional. It is said that he eats live whales, biting huge pieces out of the abdominal blubber; but I cannot believe him smart enough to do this. So sharp are his teeth that he will sculp all the fat and skin off a dead seal, without taking two bites at one piece. I have taken from his stomach nearly every bit of a seal's skin and fat in one long string the width of the shark's mouth, almost as one takes off the peel from an orange or an apple. On one occasion we found in a shark the carcass of a red dog, which we had left on a pan of ice to drift out to sea a week previously. The sleeper shark seems to have little capacity for pain. Captain Atwood reports that after driving a scythe right through one's stomach, it came placidly back and went on feeding off the same dead whale in the same place. In large numbers these sharks haunt the ice-fields, where the sealers have left the mutilated carcasses of the young seals. I have driven a boat-hook into one bigger than myself, as it lay basking on the surface of the water, and hauled it easily out on the ice without its making any notable resistance. On one occasion, with the help of a couple of men, I hauled out five from one hole through the ice in this same way.

The only commercially important part of the sleeper is the liver, which yields fifteen to thirty gallons of very excellent oil; for the purpose of securing this oil a shark-fishery grew up on the coasts of Norway and Iceland. Our fishermen sometimes use a lump of its skin-covered flesh for scrubbing the floor. The flesh is white and nauseous, and even our dogs, voracious as they are, will scarcely eat it. This shark seems quite indifferent to man's presence, and is not a man-eater. It is almost impossible to conceive that the shark's stomach should still, by some races of human beings, be considered the gate of heaven; and that living children be offered by mothers to its rapacity that the children may enter paradise through that probably most repulsive of all forms of death.

CHAPTER XIV

THE OCEAN MAMMALS

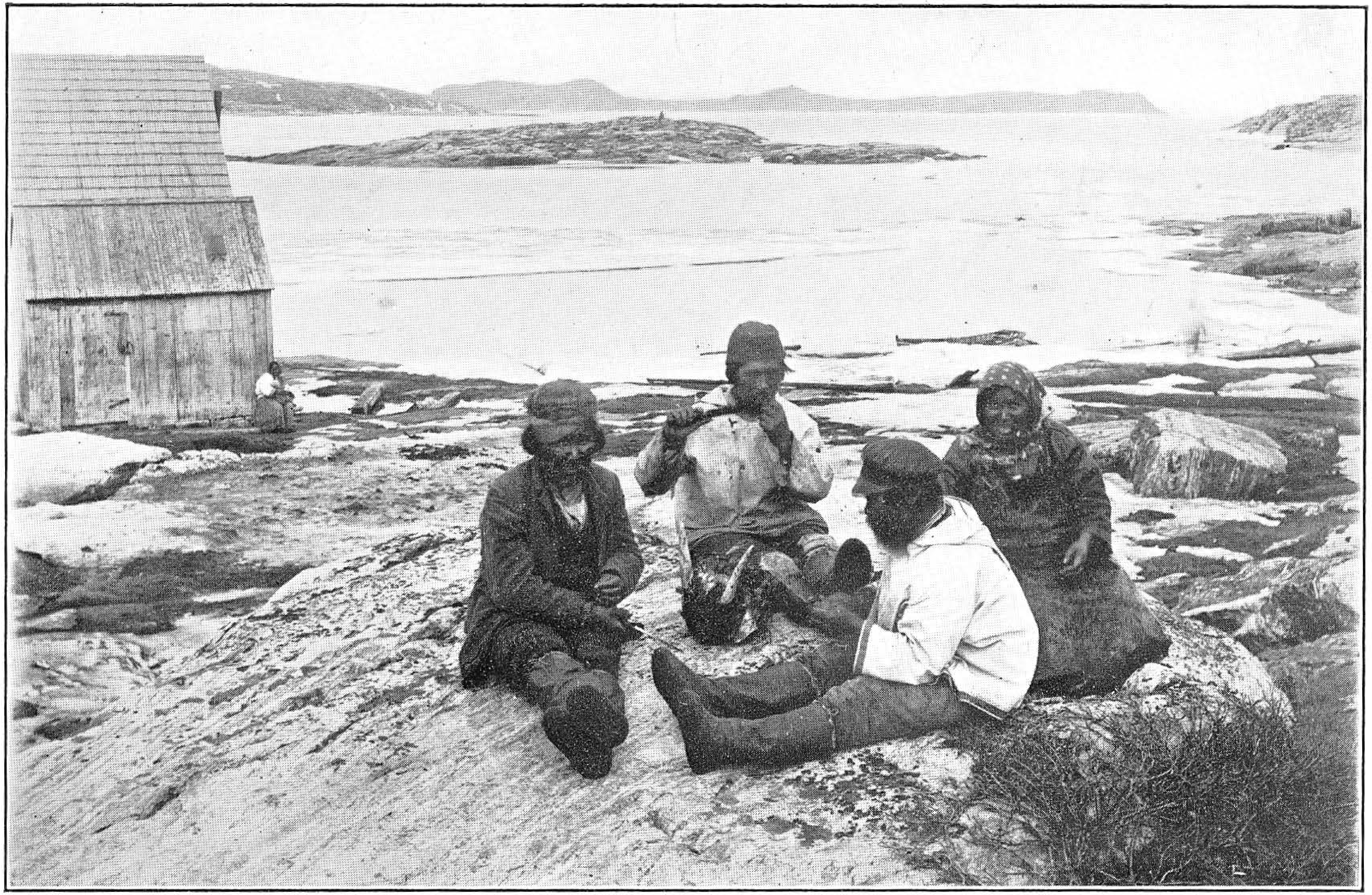
BY W. T. GRENFELL

To compensate the Labradormen in some small degree for the loss of herring and the depreciation of salmon, a whale-fishery has sprung up. The great success made in killing sulphur-bottom, finback, and humpback whales, in North Newfoundland, led to a hope of great things from them for Labrador. But the numbers killed have been very limited.[1] The whales themselves are, however, so intensely interesting, it is worth while referring to the various sorts one is liable to see in Labrador.

The whale is, of course, really a land animal, but he has left his native element, and taken to a roving, nautical life. Now his legs are not necessary for locomotion; hence they have become rudimentary and are enclosed in his thick, rubbery, oily skin. The arms are not used in swimming, but simply for preserving the animal's balance or for grasping the baby whale when it is in danger.

Of all the adaptations of these strange beasts to their environment, perhaps none is more remarkable than the arrangement for hearing. The whale has no need of the sense of smell, but he does need to hear the approach of an

[1] In reading the records of the Moravian Missions for the years 1780 to 1850, one is greatly struck by the number of dead whales mentioned as having been discovered, from time to time, on the coast.



King "Attanek" and His Friends, eating Walrus Head enemy. Because of the enormous pressures which must be endured by the animal, the external opening of the ear is reduced to the diameter of a crow-quill, whereas the opening of the ear into the nose — the Eustachian tube — is very large. Deafness, following the closing of this tube by adenoid growths in children, has made most of us know of the existence of this second "ear-hole." The whale actually hears through his nose, in a way similar to that by which a person listens "open-mouthed." The eyes are very small; this is not a disadvantage, fixed as the eyes are in such positions that the animal can see well neither ahead nor astern. Sight can hardly be much used as a feeding sense; think of looking for your food when you have to catch millions of tiny creatures, like copepods, to satisfy your appetite! It has been said that a whale brought to land does not die of asphyxiation, for he can breathe an hour or two at least; that, on the other hand, he does die of starvation. He must eat incessantly or die.

On a fine morning on the Labrador coast, I have counted a dozen whales in a single school. Now and again a huge tail would emerge from the water and lash the surface with its full breadth, making a sound like the firing of a cannon, while the silence of the stillness was otherwise broken only by the noise of their blowing, as they rolled lazily along on the surface. I have seen the thresher whales making their huge prey hurl his whole immense body clear out of the water, only to fall back with the splash of a waterfall, and the noise of a thunderclap, to be stabbed by the swordfish below, or eaten alive by the fearful jaws of his enemy.

In order to remain below water so long as they do (a full-grown male can stay down one hour), whales have a huge reservoir of blood in vessels situated in the front of the chest, like the pipes of a water-cooler. This blood he overoxygenates by repeated spoutings. A whaler can tell by the number of blows exactly how long the animal will remain below on his sounding. To aërate the blood thoroughly, a male sperm whale blows about sixty times, once every ten seconds. The females blow for about four minutes, and do not remain down so long as the males. The elastic, compressible skin is equally compressed by the water at great depths; in a marvellous manner the vital organs are relieved of dangerous pressure, while an automatic water-bag valve fills and closes the nostrils so that no water is forced in.

Six species frequent the Labrador coast, though only four kinds are still common, — the finback, humpback, sulphur-bottom, and white whale. A specimen of the largest, the sulphur-bottom, so called from the colour of his body, has been taken with a length of ninety-five feet and a circumference of thirty-nine feet. The weight of this animal was estimated to be two hundred and ninety-four thousand pounds. Think of the awful power of the tail that can not only propel this mass at fifteen knots an hour, but can actually hurl it clean out of water into the air!

In this animal the baleen, or whalebone, hanging from the roof of his mouth, weighed eight hundred pounds and reached four feet in length, or somewhat less than half the length of the "bone" in an adult right whale. There were no fewer than three hundred plates on each side. He gave one hundred and ten barrels of oil. So large is the mouth of a sulphur-bottom that a boat can row into it.

The jaw-bone may be sixteen to eighteen feet long. It took four of us a whole afternoon, with axes and swords mounted on pike handles, to cut out one bone and carry it to our steamer. One had to walk almost in the footsteps of Jonah to get at the articulation, so far back is it in the body. Yet the gullet of this whale, where full-grown, is only a few inches in diameter. In reality, his mouth is a vast trap for food, the more of which is caught the larger the mouth is developed. Their food is very simple, being almost entirely small crustaceans of the shrimp variety which they sieve out of the deep water as they swim along. Occasionally they swallow a caplin or herring, which gets in the way. No whale is ever killed in a starved condition, not even a blind one, of which several have been captured.

The finback is the commonest whale on the coast. He runs only to about sixty-five feet in length, and in proportion gives less oil than the sulphur-bottom. The humpback is, at times, scarcely worth catching, giving very little oil. He may be seventy to seventy-five feet long, and has bone up to three feet in length. When freshly killed, the young humpback affords excellent food for man. Indeed, were it not for the prejudice against them, these "mountains of meat" would be considered a most desirable food-supply. A few of us on the coast have used it, fresh, salted, and tinned. It is too hard in salt, but, tinned, is really good meat, with not enough characteristic qualities for the ordinary man to tell it from tinned beef. The tinning, as an industry, seems to be abandoned, but in a country where vegetables are absent, cattle impossible, and our wild meat supplies diminishing with the years, the immense amount of nourishing material would seem a most desirable adjunct to the diet of all. The poor people especially welcome this meat, for it is scarcely more expensive than the can it is put into. Preserved frozen for winter, whalefish would help to prevent the scurvy, which often affects the people in spring after the long winter of isolation.

The white whale is a slender, graceful animal about twenty feet long. His skin forms excellent leather, called "porpoise hide"; it is very impervious to water. The adult is as big as two dozen calves. He weighs about twenty-five hundred pounds, and gives one hundred gallons of oil. These whales were very common in the Gulf of St. Lawrence, and are still found there. They play in schools, jumping out of the water, enjoying life much like porpoises. They have been caught in cod-trap nets, getting tangled up in the twine, and in 1907 some sixty were caught in the big seal-nets set at Cape Chidley by the Moravian missionaries. They are voracious beasts, eating alive almost every kind of fish in the sea. They even kill and eat our seals. But the white whale is paid back in his own coin by the much more powerful threshers, who are very partial to his flesh.

The thresher, or killer whale (*Orca gladiator*), is himself only twenty feet in length, but he is the fiercest of all our sea animals, and is a perfect buccaneer and pirate. He has a back fin about six feet long which reveals his presence as he swims along near the surface. With it he is said by some to beat his prey. Many are the battles that have been described between this beast and his larger kindred. Captain Atwood tells of three attacking an enormous cow sperm whale and her huge offspring in shallow water. They killed the calf and drove off the mother, badly wounded, after which they came back and ate the baby.

The grampus, thirty feet long, and the porpoises, or herring hogs (eight to ten feet long), are allowed to pursue their way untroubled by the fishermen. Both animals have large teeth, and consume large quantities of fish. The teeth interlock so that their slippery, scaly prey cannot escape. The fish often run into nets and shallows to escape them. Porpoise and grampus are not only hard to catch, but are of very little value when taken. Like all the larger whales, they are mammals, and suckle their young swimming along on their side. The nipple is retractile, and may be drawn back into a slit or fold in the breast, so that it is scarcely visible as the animal lies on deck. Having shot a suckling mother on one occasion, we tried the milk. It was very rich, and had a somewhat fishy taste. Porpoise meat is exceedingly good for eating.

The sperm whale, or cachalot, is not now a denizen of our coast, where, however, he makes occasional visits. In 1892 a monster, some eighty feet long, ran into the rocks near Battle Harbour, and, I presume, finding them hard as his own adamantine skull, got somewhat confused; for he continued to battle with the rocks till he stranded and perished. He was towed into the harbour and flensed in an amateur way. The head was one-third as long as his body. The head contained two large tanks, called the case, and out of this the oil was pumped. One hundred and forty gallons were taken. The oil helps to float the huge jaw-bones. The lower jaw had fifty large, conical teeth of solid ivory, several inches apart. The teeth of the cachalot were at one time almost venerated in Fiji and other sea islands, and disastrous wars and many murders have resulted from disputes as to their possession. The food of the sperm is fish, and any flesh it can catch, especially large cephalopods. It is said that out of the stomach of one cachalot, thirteen porpoises and fourteen seals were cut.

The usual food of the whale is the octopus, or giant squid, which flourishes in deep water off the Labrador. An octopus arm no less than twenty-seven leet long was reported as taken from the mouth of a captured cachalot. Even the white whale falls victim to this most masterful animal in the sea. The sperm whales travel in schools, the boys and girls in separate companies, and each in charge of one or two old folk. The big bulls maintain an absolute proprietary right to the harem until deposed by some able and aspiring youngster.

The narwhale, like all the others, is retiring steadily before the advent of the white man, and is now seldom taken on our shores, though in the north it is still occasionally killed. Its front left canine tooth grows directly forward out of its mouth, and is twisted round and round itself or its fellow-tooth, making a solid ivory tusk ten feet long. The fish itself is only twelve to fifteen feet long. It is said to use the tusk for digging food, such as shell-fish, from the mud.

There are now two whale factories in Labrador. One at L'Anse au Loup was closed for want of whales. One situated at Cape Charles has been running for four years. Another at Hawke's Harbour, forty miles to the north of the Strait of Belle Isle, has run for two years, and kills most fish. The whales apparently come from the northward during the season.

Hunting the whales is certainly a most exciting industry, and I can imagine no more thrilling moment than when the big fish rises for the last time right under the bow, and the harpooner makes his shot. The small, fast steamers, with the harpoon gun mounted on a swivel on the fore poop deck, are still handled by Norwegians trained to the work. In rough and fine weather one sees them darting here and there and everywhere. The first puzzle to the visitor is as to how these tiny craft ever managed to steam across the great Atlantic. Two at least have been lost, — one on a reef; one disappeared on the passage. They steam about fifteen knots per hour, which is far faster than any whale swims, unless he is badly frightened. As the monster, which is as large as the steamer, blows alongside, and one holds one's breath involuntarily, the harpooner quite silently indicates with one hand to the helmsman which way to put the helm, keeping his other hand on the gun-stock. Then there is a commotion right ahead, a sensation as if the vessel were running to destruction on a huge rock, a bang, and then, — nothing but the whirr of the line as it flies out through the pulleys. It is indeed a trying time. Either there is $1500 on the end of the line or, perhaps, another tedious and fruitless search for days or weeks. No wonder that on one occasion when I witnessed what scarcely ever happens, a real old expert harpooner make a clean miss, his language burst as if from a safety-valve, and was "frequent and painful and free." By a careful and merciful arrangement, when the harpoon goes home, the start of the whale pulls a trigger which is one of the flukes of the barbed iron. This fires an explosive charge in the fish, and will more often than not kill him immediately. If, however, the harpoon strikes him in the tail, or again, if it goes through a thin portion and does not explode, there is likely to be trouble. With the powerful engine going full speed astern, the whale will tow the steamer ahead, they say, at several knots an hour. It seems never to face the enemy voluntarily; and though one, after sounding, came up through the engine-room floor and sank the vessel, it probably did so by chance in its dying agony or "flurry."

A sunken whale can only be raised by steam power, and once it is dead, it will otherwise remain down till putrefaction sets in. Then after eight or nine days the retained gases bring it to the surface. In Iceland where the fishery, after fifty years' prosecution, has destroyed the supply of inshore whales, a sunk whale is sometimes buoyed and left for another steamer to haul home. But the smell is then so dreadful, and the oil so brown and so inferior in value, that this delay in cutting up is avoided as often as possible. Here on the Labrador the dying whale is hauled alongside and given the *coup de grace* with a long lance, or possibly a second bomb may be fired into him. A long, hollow rod is then driven in, a force-pump is attached, and the great leviathan is inflated like a foot-ball. His tail is now triced up to the rigging, the flukes, as a rule, being cut off for convenience. Thus he is carried in triumph home to the factory, or anchored off while another victim is sought for. Till late years the carcass was a waste product and was allowed to float away or rot in the neighbouring coves. There it fouled the air and water and made the very rocks greasy and offensive. Now with the excellent machinery the meat is cut up and treated with heat and acid. Almost one-third as much good oil is thus extracted as is pumped from the "case" in the head. The flesh is then passed along from the vats to be dry heated with the crushed bones, and converted into a valuable fertilizer, which is put into sacks for exportation. Little or nothing of the carcass is wasted; the blood itself goes into fertilizer.

Even during the few years the industry has been prosecuted, it would seem as if the whales had decreased in number.

In 1904 two companies fished and killed 153 whales, valued at $73,440.

In 1905 three companies fished and killed 149 whales, valued at $42,318.

In 1906 two companies fished and killed 85 whales.

In 1907 two companies fished and killed 94 whales.

Of the 149 whales killed in 1905 there were five sulphur-bottoms, 101 finbacks, 43 humpbacks. A fall in the price of oil and the inferior quality of the catch accounted for the great drop in value from the previous year.

If codfish and salmon are essential to the white inhabitants, seals and walrus are none the less the mainstay of the aboriginal coast dwellers — the Eskimo. Alas for these people, the increasingly vigorous prosecution of the seal-fishery from Newfoundland with larger and larger steamers has already begun to tell on the numbers of the seals, and especially on the commonest and most valued, the harp seal (*Phoca Grœnlandica*). The Eskimo of Labrador are slowly being driven back and dying out before the tide of white population, and there can be no question that improved rifles, improved seal-nets, and the steam sealers have been potent factors in their downfall.[1] No one

[1] Fortunately one of the Eskimo's favourite seals, the "netsek," does not come south at all, but whelps in holes excavated by it in the solid body of the great ice pans.

more clearly recognizes this or more deeply deplores it than one of the best authorities, Dr. Fridjof Nansen. The hood-seal fishery of East Greenland, once a great industry, has long ago ceased to exist. It began in 1761, and by 1884 it was already failing, yet only one million seals had been killed. Every year the white communities in Labrador are finding it less worth while to prosecute the seal-fishery. And now the land being also denuded of its once plentiful game, many settlements have disappeared. In 1795 it was considered a poor seal year when eleven hundred were killed at Battle Harbour; one hundred and fifty seals would be a good year's catch there now. Professor Hornaday of New York declares that "every large terrestrial mammal species is being killed off faster than it breeds." The same may be said of most of the aquatic mammals.

I am safe in saying that along the whole coast of Labrador not more than fifty walrus are now killed in the year. One was killed near Cape Mekattina in the Gulf, last year (1908). I have not heard of any other having been seen in the Gulf during the sixteen years I have known it. Most are killed by the Eskimo at Okkak, Hebron, and Ramah. They are more numerous around Cape Chidley, but there are fewer people there to kill them. Great herds were said to have once existed on the Magdalene Islands. In 1641 a vessel hunting as far south as Sable Island secured as many as four hundred pair of walrus tusks. In 1750 they were very plentiful in the Gulf of St. Lawrence. Yet in 1841 so rare had they become, one was reported killed "as far south as the Gulf of St. Lawrence." It may be noted that the walrus are not migratory in habit. Even in the polar seas it would seem they are getting scarcer, and the huge herds once so common are now seldom seen. The extinction of the walrus in Hudson Bay will mean death to many of the only class of human beings able to flourish in that environment. Nevertheless, the increasingly fatal weapons of modern civilization are being directed against the walrus for the paltry return they give the white man or for "pure sport."

Surely the time has come to extend some protection to the northern people by preserving almost their sole food-supply. Professor Henry Elliot describes the absolute destitution of two villages of three hundred Eskimo, whom he knew personally and regarded as a superior race of Eskimo; their starvation, in this case, resulted from the fact that a special movement of the ice that year deprived them of walrus. A. P. Low records the death of every single soul in a Hudson Bay community from starvation because the whalers had supplied modern weapons to neighbouring Eskimo, who were then employed in destroying the only walrus (for export of the skins) available to the fated settlement. Were it in my power, I would most certainly close for "civilized" walrus hunting all the water to the west of Labrador and Baffin's Bay, and thus prevent the intentional or the unintentional robbing of another people's means of existence.

After all, the walrus catch is of no great value to the white man. The dense skin from a half inch to three inches in thickness is useful only for a few special purposes. The ivory of the tusks keeps its colour well, but is very faulty, and not large enough for the manufacture of billiard balls. It is of comparatively little value. I once bought from a trader here a whole boxful of tusks at thirty cents a pound. The largest tusks I have had from a Labrador walrus weighed, when cleaned and dried, six and one-quarter pounds. Possibly a very extraordinary pair might weigh ten pounds.

The old male walrus would scale twenty-five hundred pounds, be about fifteen feet long, and has measured as much around the waist. They are clumsy, lethargic beasts, gregarious and monogamous. They are slow in the water, and dead slow on the land, advancing by hauling painfully along by their fore flippers, or if hurrying into the water "rolling over anyhow." Amusing accounts have been written as to how they wait for succeeding waves to heave them out on sandy beaches, rather than scramble up themselves; when thousands are together, the last comers lie on top of the earlier arrivals, simply because they are too apathetic to move on. They appear to have a fair sense of smell, but not to rely on sight or sound for protection from their enemies, among whom is the polar bear.

Professor Elliot describes how he watched a herd basking on an Alaskan beach, and before one dodged off to sleep, it poked the next one and woke it up. This grape-vine telegraph seemed to be for the purpose of having one always somewhat on the alert. They are shy and harmless, digging up clams with their tusks for food, and also browsing on some of the seaweeds. They have been known to attack a kayak, or boat, but only when wounded or when defending their young. They use their tusks for helping themselves out on an ice edge.

Though to Europeans of so little value, to an Eskimo the walrus may mean everything, — meat, clothing, light, housing, boats, weapons, nets (from plaited bowel); everything necessary can be got from a good walrus. However, the skin of the ring seal or the bay seal is the Eskimo's usual clothing. Only the blown and dried gut, which is sewn with sinew and makes an excellent oilskin jumper, and is mostly used in kayaking, is obtained from the walrus.

The meat is black, and to us offensive. We were walking along the beach one day, and, while crossing a pebbly ridge, felt it move up and down as if it were on soft rubber. We moved a few top layers of stones, and found an immense cache of raw walrus meat left against next winter. Another cache we saw barred into the end of a sea-worn cave. This was, however, so odoriferous, we could only suppose it was in reserve for the dogs. A sick Eskimo boy that we had for twelve months as a patient would at first eat no "kablenak" food. We had to keep a supply of dried walrus meat that looked like tarred leather. This he would tear in strips with his teeth and eat raw, somewhat as men chew plug tobacco. The tusks are the greatest prize, however, for on these the Eskimo depend for their harpoon tops, the bone being heavy and curved exactly as they like it. We brought out one year a few iron harpoon tops for some northern friends. But I found they did not use them, greatly preferring the native tusk tops. These are most skilfully made; they are purposely divided into three pieces so that when the harpooned walrus puts a heavy strain on the line, the pieces come apart, leaving the barbed head inside the animal. Thus the weapon itself does not break.

The harp seal (*Phoca Grœnlandica*) is far the most abundant seal on the Labrador. In the late autumn he comes south from Melville Sound and from even more northern waters during November to February; at this season the East Coast men set gill-nets for them. About the first of March they bring forth their young on the ice-floes off the coast, and also in the Gulf of St. Lawrence, as far as the Magdalene Islands, and even Nova Scotia. For this they herd together in tens of thousands on the floating ice, which under ordinary circumstances should afford them safety. But at this time when they are absolutely unable to escape, the Newfoundlanders hunt them in large steamers, and kill immense numbers of the babies by clubbing them. From two hundred and fifty thousand to five hundred thousand is the average number thus destroyed annually. The babies are quite white, called "white-coats," and are almost all born on the same day, and also take to the water on the same day, three weeks later. The baby fur comes off at this time. He is then called a "ragged-coat." The fur of still-born babes does not come off, and the skins are therefore more valuable and are called "cats."

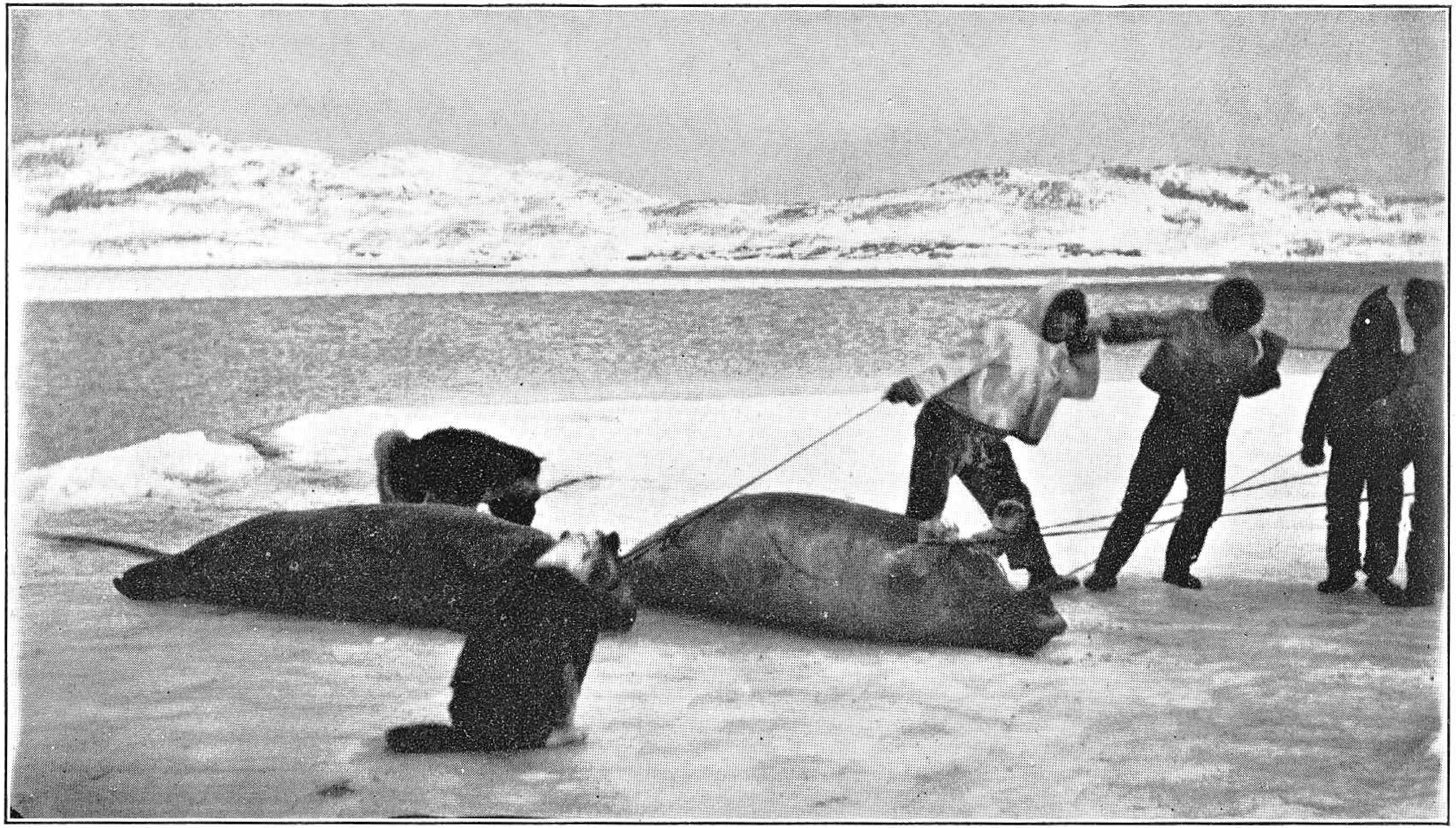
During these (generally three) weeks, the ice has been drifting rapidly to the south. The mother seal has kept a blow-hole open up through the ice near where she left the baby, and through this she has been away fishing every day. She gives such rich milk that her offspring can be almost seen to grow. They are so fat that I have seen them looking, in their ice cradles, like bladders full of lard, as they lay on their backs in the hot sun, fanning themselves with their flippers. The mother at last forces the pup to take to the water, and a mysterious instinct at once teaches him to "go north, young man." This he does in leisurely fashion, and by the end of May these "beating seals," as they are called, have mostly passed along the Labrador coast.

When these poor creatures are killed, the waste is terrible. I have seen three or four thousand bodies of young seals, freshly stripped of their furry jackets, left to rot, or be a prey for sharks, as the case may be. The sealing industry is a very popular one, however, in Newfoundland. The sealing masters are the great men of the fishery, and there can be no question that from the sealer's point of view, the adventure, the call for pluck and hardihood, and the gamble of it, beyond the few dollars each man may make, are great attractions. It is not true, so far as I have seen, that brutalities, such as flaying alive, are ever practised. Nor can any one, knowing the men as intimately as I do, ever believe them capable of any such abominable atrocities.

The "beater seal" returns as a "bedlamer" with his fellow-beaters left from the previous year, when the old seals come south next winter. He plays about among the floes, and returns again north in the spring, to come back a "young harp" the third winter, ready to do his share in maintaining the race. Often, however, he does not breed till the fourth year, when he assumes the dignity and name of an "old harp." The saddle, or harp, is a large, bilateral, black, wing-shaped patch across his back showing well on the lighter, drab-coloured skin of the rest of his body.

Even when the dangers of the ice-floes are over, where many old seals, as well as the young, are slaughtered, the harp is still not safe on his northern journey. In May and June, along the shores of Labrador huge frame nets are put out from a capstan on the land. The great room of net has a doorway which, once the seals have entered the room, is raised by winding up the capstan on the land. As the seals trim the shores, and even follow round the bays on their long journey, many are caught in this way. I have known one settler's family to take nine hundred seals, while three hundred to four hundred forms a catch by no means unusual. Not nearly so many seals, however, are taken nowadays, spring or autumn, and one can see many abandoned capstans standing on rocky points. At one little Labrador settlement a trapper of the name of Jones became so rich through regular large catches of seals that he actually had a carriage and horses sent from Quebec, and a road made to drive them on; while he had a private musician hired from Canada for the whole winter to perform at his continuous feastings. I was called on awhile ago to help to supply clothing to cover the nakedness of this man's grandchildren.

Yet another mode of welcome the poor harp gets from southerners, when it leaves its northern home to visit us. That is given with buck-shot and musket, ball and rifle. The process is called swatching, and is carried on by two men in a light rodney, or punt, which is sometimes provided with runners. The seals are bound to rise in the "ponds," or fissures, between the great pans of the Arctic floe, to take breath. The plan is to "get by a likely lead of water," build a "gaze," or shelter, out of ice blocks, and "bide your time." You must be absolutely alert to get any seals. I have myself chosen a small lead and watched, lying down with rifle ready loaded, cocked, and pointed, and yet many times a great harp has noiselessly put up his head and shoulders and gone down, leaving only a ripple on the sur-



Catching Seals near Hebron

face, before I could draw a bead on him. Then for a short time he floats at this time of the year, and you must rush off your boat, or throw your many-hooked jigger over him, and haul him quickly up on to the ice, if you are strong enough to do so.

If the seals are basking on the ice as the boat approaches, the men shout and wave, and even fire under the seal, which seems to so frighten him that he remains staring into space, till they land and club him with the rifle. As the slain animal does not move, the others think there can be no danger, and will at times allow a man to land and shoot or club them every one.

Our next most important seal is the bay seal. He is a small seal, weighing only about one hundred pounds and looking rather dingy in a drab coat with faded black markings. Nor are they very numerous, never being seen in herds. Yet they will probably outlast all the others, being the most adaptable to their varied environment. They are found in the Pacific and Atlantic, in Europe, Asia, and America, and in the south seas. They can bear heat or cold. I have shot them when driving my komatik over a frozen arm of the sea, tolling them into range by lying flat down and waving my feet to represent a seal; I have also secured them in the hot summer when the mosquitoes and the heat have made the period of waiting almost unbearable. Bay seals are equally at home in salt water or fresh. Some of our rivers are almost ruined for ordinary fishing by the number of bay seals that infest their pools. This "robber of the river," to use the name of the salmon fisherman, is there shown no mercy by the fishermen, and cannot possibly escape. The seals will watch the salmon nets so carefully, and eat the struggling captives so rapidly, that there is little wonder most fishermen are "agin them." I have known a seal haunt a net so persistently that to get any fish the owner had to watch all the while at one end of it, and even then the seal was so "well adapted to his environment" that he would almost snap off the fisherman's hand as he raced to be first to disentangle the salmon. The bay seals are captured by our people in nets anchored to the bottom. When diving, the seals become "meshed" and are soon drowned, as they cannot rise to breathe.

The seals can travel a considerable distance over land and can remain for long periods out of water. The harbour seal (*Phoca vitulina*) breeds and lives in Seal Lake, one hundred miles inland from Richmond Gulf and eight hundred feet above the sea. In winter this seal leaves for islands in the open where the sea does not freeze. The bay seals of the coast breed on the land in caves, rocks, or beaches. I have seen them many times with their young. When the baby is born, he is a dusky white, but he soon assumes a most beautiful silvery coat mottled with black, which he wears for a year. During this time he is called a "ranger," and his skin makes the most attractive clothing, sleeping-bags, pouches, etc.

At three years the ranger becomes a "doter" and is a breeding seal. The young are born in April and May in southern Labrador, and later on as one gets farther north. The young seal is able to take to the water at once. It is said that the "baby-hair" is cast inside the mother before his birth.

Clever as the modern circus "feature" shows seals to be, they are easily decoyed in the manner above described. Once, however, the biter got bitten. For one of our Eskimo, who had hidden himself in a sealskin bag and was lying on a favourite basking rock flapping his legs, was mistaken for a seal by a passer-by on the shore, who promptly sent a bullet through him.

The large, gentle eye makes the seal's appearance exceedingly attractive, and those inclined to be sentimental have found in him a great scope for their effusions. As a matter of fact, he eats his prey alive. He will take a bit out of a fish, and leave the rest to struggle away and die slowly. They are fierce fighters, and will catch and eat birds swimming on the surface of the water. One was seen devouring a salmon alive. The seal swallowed him by inches, swimming a mile while the struggle lasted. It seemed an open question whether he would succeed or not. Another seal was seen to capture a gull on the water, but the persistent harrying he got from the rest of the birds persuaded him to let the wounded victim go.

The ringed seal, *Phoca hispida,* so dearly loved of Greenlanders, and so prized by their people for clothing, is rare in Labrador, only a few specimens being taken, and those in the extreme north.

Nor does the hooded (or hood) seal (*Cystophora cristata*) come much to the shore. Indeed, the ringed seal is a glacial seal, and the hood a pelagic and glacial seal. The hoods breed in the ice off our shores in March, a little later than the harps, and their baby, dark on the back, is called a "blue-coat." The old ones are slightly larger than the harps, and the skin is covered with black patches. The strange bag on the head, which is inflated from the nose, is probably only an ornament like a crest. Some think it is specially provided to protect its nose from seal bats or clubs, — of course an impossible theory, for sufficient time has not yet elapsed for Nature to have evolved armour against the sealers in the ice-field, any more than she has yet provided for the ideal requirements of twentieth century foot-ball man. The hood seal has been so far exterminated in its favourite resort between Greenland and Iceland, that the fishery has had to be abandoned.

This seal displays great strength, courage, and affection in defending its young, and I have seen a whole family die together on a pan of ice not twelve yards square. Four men with wooden seal bats did the killing, but not before the male had caught one club in his mouth and cleared his enemies off the pan by swinging it from side to side. The old seal, which must have weighed fully two thousand pounds, was hoisted on board whole (or unsculped), so as not to delay the steamer. He was apparently quite dead. As, however, he came over the rail, the strap broke, and he fell back into the sea. The cold water must have revived him, for I saw him return to the same pan of ice, distinguishable by the blood stains left by the recent battle, and now some little distance astern. The edge of the pan was almost six feet above water, but he leaped clear over the edge, and landed almost in the spot where his family had met their tragic fate. The men immediately ran back and killed him with bullets. He was this time sculped, and so brought aboard.

The strength of the hood seal is also well illustrated by the fact that he can descend for food to a depth of sixty or even ninety fathoms. This is shown by the fact that a deep-sea fish called "bergylt," which only lives between those depths, has been found in his stomach.

The last and largest of our seals is the gray seal (*Halichœrus grypus*). We measured one eleven feet long, with a girth of eight feet. No doubt, however, larger ones have been killed. These seals are practically devoid of hair, make the best possible material for covering kayaks, and for the manufacture of water-tight feet for boots. The skin of the harp seal is used for the legs and for the bottoms as well, when the boots are to be used in the coldest weather, because this skin is so much softer, and allows freer movement; but the gray sealskin is much more resistant to water. The gray seal is generally shot as he plays along the ice edges, but is occasionally meshed in sunken nets.

CHAPTER XV

THE BIRDS

BY CHARLES WENDELL TOWNSEND, M.D.

FROM an ornithological point of view, Labrador has an interesting past as well as present. The great Audubon testified to the wonderful interest of Labrador to the ornithologist, by visiting this country in 1833. His writings contain frequent reference to the observations he made at that time, and he states in his Labrador Journal that he executed or partly executed seventeen plates of birds during his brief sojourn of two months on these shores.

Since Audubon's times there have been sad changes in the bird life of this country. Two species have become extinct; namely, the great auk and the Labrador, or pied, duck. The former bred in great numbers on Funk Island off the near-by coast of Newfoundland, but was slaughtered mercilessly during the latter part of the eighteenth and the beginning of the nineteenth centuries. Cartwright describes the capture of one of these flightless birds, not far from the southern coast of Labrador. He says, calling the bird by its common name of "penguin": "We were about four leagues from Groais Island at sunset [Monday, August 5, 1771] when he saw a snow [sailing-vessel] standing in for Croque. During a calm in the afternoon, Shuglawina went off in his kyack in pursuit of a penguin;

he presently came within a proper distance of the bird, and struck his dart into it; but, as the weapon did not enter a mortal part, the penguin swam and dived so well, that he would have lost both the bird and the dart, had he not driven it near enough the vessel for me to shoot it." The last auk seen alive was in 1852.

The Labrador duck doubtless occurred in abundance in past times along the Labrador coast. Audubon was shown nests supposed to belong to this species, but he saw none of the birds, and there is much doubt as to the identity of the nests. Cartwright speaks in his Journal several times of shooting *pied ducks*, and there are reasons to believe that these were Labrador ducks, although the evidence is of course not absolute. That this duck is now extinct, there seems no doubt, as none has been seen or shot since about 1874.

Another bird which seems to be going the same way towards extinction, a bird which has been in times past perhaps the most characteristic bird of Labrador, is the Eskimo curlew. This bird visited the coast regions in countless multitudes every autumn on its southward migration. Professor Packard, writing of the Eskimo curlew in 1860 in Labrador, says: —

"On the 10th of August the curlews appeared in great numbers. On that day we saw a flock which may have been a mile long and nearly as broad; there must have been in that flock four or five thousand! The sum total of their notes sounded at times like the wind whistling through the ropes of a thousand-ton vessel; at others the sound seemed like the jingling of multitudes of sleigh-bells."

The birds were delicious eating. They fattened almost to bursting on the Empetrum, or curlewberry, so abundant along the coast. The fishermen kept their guns loaded, and shot into the great flocks as they wheeled by, bringing down many a fat bird. About 1888 or 1890 the curlew rapidly diminished in numbers, and at the present day perhaps a dozen or two, or possibly none at all, are seen in a season.

The rocky islands which line the Labrador coast have always been favourite breeding places for various water-birds, chief among which may be mentioned the puffin, black guillemot, the common and Brünnich's murres, razor-billed auk, great black-backed gull, glaucous gull, herring gull, Arctic tern, common and double-crested cormorants, and American and Greenland eider-ducks. These formerly bred abundantly all along the coast, and before the arrival of the white man paid a comparatively small and unimportant tribute to the greed of polar bears, Eskimos, and Indians. This natural pruning, as it might be called, had little or no influence on the numbers of the birds. White men, however, with their insatiable greed and their more systematic methods, have created havoc in the ranks of these interesting water-fowl. In Audubon's time the vile business of "egging," as it was called, was at its height, and the horrors of the business are graphically pictured by the great ornithologist. He describes a shallop with a crew of eight men: —

"There rides the filthy thing! The afternoon is half over. Her crew have thrown their boat overboard, they enter and seat themselves, each with a rusty gun. One of them sculls the skiff towards an island, for a century past the breeding place of myriads of guillemots, which are now to be laid under contribution. At the approach of the vile thieves, clouds of birds rise from the rock and fill the air around, wheeling and screaming over their enemies. Yet thousands remain in an erect posture, each covering its single egg, the hope of both parents. The reports of several muskets loaded with heavy shot are now heard, while several dead and wounded birds fall heavily on the rock or into the water. Instantly all the sitting birds rise and fly off affrighted to their companions above, and hover in dismay over their assassins, who walk forward exultingly, with their shouts mingling oaths and execrations. Look at them! See how they crush the chick within its shell, how they trample on every egg in their way with their huge and clumsy boots. Onward they go, and when they leave the isle, not an egg that they can find is left entire. . . . The light breeze enables them to reach another harbour a few miles distant, one which like the last lies concealed from the ocean by some rocky isle. Arrived there, they react the scene of yesterday, crushing every egg they can find. For a week each night is passed in drunkenness and brawls, until, having reached the last breeding place on the coast, they return, touch at every isle in succession, shoot as many birds as they need, collect the fresh eggs, and lay in a cargo."

The days of commercial egging have long since passed and the laws against egging and shooting the nesting birds are now fairly enforced in Canadian Labrador. In Newfoundland Labrador, however, there seems to be no pretence of bird or egg protection. The inhabitants and the summer fishermen appear to consider the eggs and the breeding parents as godsends to eke out their scanty larder. Knowing every rock on the coast as these men do, they can easily keep in touch with the birds and rob them of their treasures. When I was in Labrador in the summer of 1906, the fishermen made no concealment of the fact that they took all the eggs and killed all the birds they could. They often carried their guns with them when they visited their fish-traps. In the spring and fall great numbers of migrating ducks, and even gulls, are shot as they stream through the narrow tickles.

The Eskimo dogs are not fed in summer, and, foraging for themselves, they ransack the coast and undoubtedly destroy many eggs and young, not only of the larger water-birds, but also of other ground nesting birds, such as pipits and horned larks.

It is sincerely to be hoped that the wonderful nursery for water-birds in Labrador will not be entirely depopulated, but that sufficient protection for the breeding birds will be given, and that speedily, lest it be soon too late.

Notwithstanding these inroads on the birds, Labrador is still of great interest to the ornithologist, and it may be well to take up in turn some of the characteristic birds [1] to be found at the present day in the three faunal zones into which the Labrador peninsula may be divided, — the Arctic Zone, the Hudsonian Zone, and the Canadian Zone.

The Arctic Zone includes the barren grounds above the limit of tree growth on all the larger hills and mountains in the interior, the whole northern portion as far south as about lat. 58°, and the entire coastal strip of varying

[1] In a recent study of the birds of Labrador by Dr. Glover M. Allen and myself, we have recorded two hundred and thirteen species and subspecies of birds for the Labrador peninsula, as shown in the list in the Appendix.

width from Natashquan on the southern coast along the shore of the Straits of Belle Isle, the entire eastern coast, and the Hudson Bay coast south to about the region of the mouth of the Great Whale River.

Two characteristic Arctic birds, which the visitor along the southern and eastern coast will be most likely to see, are the American pipit and the horned lark. These are common everywhere along the coast, building their nests in the deep moss of the barren hills. Both birds are graceful walkers along the ground, and the pipit distinguishes itself by its habit of constantly wagging its tail up and down. Both birds are interesting singers, and both indulge in flight songs, each in its own peculiar manner. The pipit suddenly springs up into the air, mounting nearly vertically, but circling slightly. Up, up it goes, singing repeatedly a simple refrain, *che whée*, *che whée*, with a vibratory resonance on the *whée*. Attaining an eminence of perhaps two hundred feet, it checks itself and at once begins its descent. Down it goes, faster and faster, repeating its song at the same time faster and faster. Long before it reaches the ground, it sets its wings and tips from side to side to break its descent. During the performance it may emit its refrain eighty times.

The horned lark, on the other hand, mounts silently into the air in irregular circles, until it becomes a mere speck in the sky. Here it alternately flaps its wing and sails, emitting a jingling, squeaking, but not unpleasing, song. This performance continues for several minutes, during which the bird repeats its song many times. Then the song ceases, and the bird dives to the earth as silently as it rose. Occasionally the song is given from the ground. The song resembles in kind but not in quality the famous song of the English skylark.

Another common bird in this coastal strip is one that is also a dweller farther south, an inhabitant of the eastern United States; namely, the savanna sparrow, and strangely out of place does it seem here.

In the more northern parts of the Arctic Zone of Labrador are to be found the Lapland longspur, the wheatear, possibly the white wagtail, the snow-bunting, snowy owl, rock ptarmigan, Reinhardt's ptarmigan, the white, gray, and black gyrfalcons, and the American rough-legged hawk, although these four last-named birds may be found even on the southern coast.

The American rough-legged hawk is a splendid broad-winged bird almost black in colour. It may sometimes be seen poised motionless for several minutes at a time over the brow of a hill, sustaining itself like a kite by the air currents. The gyrfalcons have more pointed wings, and the whiteness of the plumage of the white, or Iceland, species makes it very conspicuous among the dark crags where it nests.

The two ptarmigans already mentioned, as well as the willow ptarmigan, which is found in the region of tree growth of the Hudsonian Zone, resemble their compatriot, the Arctic hare, not only in becoming white in winter, but also in possessing shaggy feet at this season, — feet densely tufted with hair in one case, with feathers in the other. This tufting probably acts in the manner of snow-shoes to prevent sinking into the deep snow, and not merely to keep the feet warm. The generic name of the ptarmigan is *Lagopus*, which means rabbit-footed. In the same way the snowy owl's feet are well padded and tufted with feathers.

The change of colour in the ptarmigan from the brown and mottled plumage of summer to the snowy white of winter is due not to any mysterious change in the feathers themselves, but to the moulting of the brown feathers and to their replacement by others of a different colour. Both plumages are wonderfully protective, and it is as difficult to see the brown bird amid its barren surroundings in summer as it is to see the white bird amid the snow and ice in winter.

While the coastal strip is under consideration, it will be well to speak of the water-birds that breed along the shore. Of the small wading birds one of the most interesting is the northern phalarope, not much larger than a "peep," that bears the name of "gale bird" on the Labrador coast, "sea-goose" on the New England coast. It has a habit of riding the water both of the sea and of the reedy pools like a miniature goose or duck. On the shores of these reedy pools along the coast, the females lay the eggs, but confide to the males, smaller and less brightly plumaged birds, the duties of incubation and caring for the young, while they go gadding in companies off at sea. Least and spotted sandpipers and semipalmated plover also breed on the Labrador coast, but most of this group go farther north to raise their young.

Of the divers, the loon and red-throated loon breed commonly near fresh-water ponds, and are to be met with in considerable numbers along the coast. The black-throated loon is occasionally found in the northern portions.

The puffin, or parroquet, as it is universally called in

Labrador, breeds at favourable spots all along the coast, but it is to be seen in greatest abundance in the Straits of Belle Isle near Bradore. Here it breeds in great numbers at Parroquet Island, a small island of crumbling red sandstone in which it burrows and lays its single egg. The puffin is a good bird to watch from a steamer, for it allows of close approach before it attempts to get out of the way. After nervously dabbing with its bill at the water a few times, it either dives or flies away. In both cases it may be said to *fly* away, for in diving it flops out its wings as it goes down, and continues to use them under water in flight. Whether swimming on the surface, or in aërial flight, the shape and appearance of puffins are characteristic. They are short and apoplectic in form, being devoid of a neck. Their large red bills and gray eye-rings, which suggest spectacles, and the dark band about the neck, give them a comical appearance.

The black guillemot, or sea pigeon, is perhaps the most ubiquitous bird along the coast. It breeds securely in deep fissures among the rocks. Its black plumage, relieved by the large white patches on its wings, makes it very conspicuous. Both the common and Brünnich's murres breed along the coast, although in sadly diminished ranks as compared with their former abundance. Each species lays a single egg on the rocky ledges. The egg varies greatly from a delicate blue or bluish green to a buffy white, and is wonderfully spotted or streaked with various shades of brown. It is pyriform in shape, so that it is less liable to roll off its precarious perch.

The razor-billed auk, or tinker, is also to be found breeding on the rocky islands, except where the greed of man has exterminated it. Its broad, sharp bill in summer at once distinguishes it from the murre, as well as its habit of cocking up its tail as it swims. In its short neck it resembles the puffin, but it is a larger bird, and as it flies away, it shows a black line in the middle of its back between white sides, while the puffin looks black from the same point of view. The dovekie, or little auk, breeds farther north, but is found along the coast during the migrations and in winter.

Of the gull family it is possible to mention only a few here. Perhaps the most beautiful in flight are the hunters of the sea, the jaegers, who rob the other gulls and terns of their prey. A pomarine jaeger in the black phase twisting and turning in pursuit of a white kittiwake is indeed a beautiful sight. The kittiwakes breed on the high cliffs of the northern Labrador coast, but may be seen in great flocks anywhere along the shore. An assembly of several thousand of these beautiful white birds settling on the water and rising to whirl about like gusts of snow driven by the wind, is a wonderful sight. Their cries suggest the syllables *kittiwake*.

The great black-gulled gull and herring gull are such familiar birds in winter farther south that they need not be mentioned here, but one must not omit to speak of the glorious glaucous, or burgomaster, gull. This bird, as large as a great black-backed gull, breeds on the eastern coast in moderate numbers. The purity of its plumage vies with that of the Arctic ice that often surrounds it. The long feathers of the wings are spotless white, instead of being marked as in the herring gull. The adults have a gray-blue mantle on the back, while the immature birds lack this mantle and are of a universal whiteness slightly tinged with buff.

Among the tube-nosed swimmers, the greater and sooty shearwaters may sometimes be found in summer in flocks of several thousand along this rugged coast. These birds, however, do not breed here. In fact, they are spending their winter in the neighbourhood, for they breed in the Antarctic regions in their summer, our winter. Wilson's petrel also wanders here in the same way, while the stormy petrel wanders from its breeding grounds along the coast of the British Isles. Leache's petrel, however, is a true inhabitant, and breeds on the Labrador coast. Both the common and the double-crested cormorant, weird-looking birds, commonly called "shags," breed on the southern shore. A small colony of gannets also are still to be found there.

Many species of ducks migrate along the Labrador coast, seeking and returning from their breeding places farther north. Others breed on the coast or in the interior on the shores of rivers or ponds. Perhaps the most conspicuous bird in this group, one that still attempts to hide its nest from devastating man or Eskimo dog, along the shores of the sea-coast, is the American eider. In its nest it lays from five to eight large, pale greenish eggs slightly tinged with olive. These eggs it protects and keeps warm with the eider-down which it plucks from its breast. They are large birds, and generally fly in single file low over the water. The strikingly marked males, with the black bellies and white breasts, necks, and backs, are easily recognized. The female is a great brownish bird, looking very dark in some lights, and entirely lacks distinctive markings. Both sexes have, however, a characteristic way of holding the bill pointing obliquely downward at an angle, instead of straight out before them like most ducks. The king eider, a wonderfully marked bird, breeds in scanty numbers along the coast, and the Greenland eider is a breeder in the northern parts of the country.

The three species of scoters, or sea-coots, as they are called, breed in the interior, but numbers of each species are always to be found in summer along the sea-coast. A small duck that is diminishing in numbers still breeds in the interior of Labrador along the course of streams. This is the harlequin duck, as curiously variegated in colours as is the individual for which it is named. After the breeding season, this bird resorts to the salt water.

Of the geese, the Canada goose alone breeds commonly in the interior of Labrador, and is often caught by the natives during its helpless moulting period.

The heron and rail family are represented in Labrador by but few species, and those mostly stragglers.

The upper limit of the Hudsonian Zone coincides with the upper limit of the tree growth. The lower limit cannot be accurately placed, for it glides imperceptibly into the Canadian Zone. There are frequently offshoots and islands of the Canadian Zone in favourable localities in the Hudsonian Zone, just as there are offshoots and islands of the Hudsonian Zone in the Arctic Zone. The most characteristic Hudsonian bird and one that clings closely to the outskirts of the Arctic Zone, often indeed invading its territory, is the white-crowned sparrow, well called the aristocrat of its family. A most distinguished-looking individual he is, with his snow-white crown and white bars over the eyes. The area of the white crown is enlarged when he erects it in pride or passion, or when the wind blows it up. This is the familiar dooryard bird of the bleak Labrador coast. He sings from the roof of the turf-covered tilt, or from the cross-stays of the fishing schooner in the narrow tickle. He contentedly picks up crumbs and insects about the houses and makes his nest in the thickets of spruces or firs that are unable to struggle more than two or three feet above the earth. His call note is characteristic and easily recognized, a metallic *chink*. He also has a sharp, chipping alarm note. His song is pleasing, although it has not the familiar charm of his cousin, the Peabody bird, or the power and brilliancy of that of the fox sparrow. It sounds something like *more wet-wetter-wet-chezee.* There is a long and somewhat mournful stress laid on the first note, and a buzz not easily expressed in words comes near the end.

Another Hudsonian bird that frequents the stunted trees and bushes on the borders of the Arctic Zone is the tree sparrow. The chestnut crown and large black spot on the otherwise spotless breast make it easily recognized. His song is simple and easily memorized, *seet-seet, — sit-iter — sweet-sweet.*

Two other sparrows are common and characteristic of this zone. The Lincoln's sparrow, discovered by Audubon in Labrador and named by him after his young friend Tom Lincoln, resembles closely the song sparrow of more southern regions. Its disposition, however, is very different, for it is a most retiring bird, skulking out of sight in the bushes if it but suspects that it is an object of interest. Instead of mounting to a conspicuous post to sing like its cousin, the song sparrow, it is apt to select the interior of a fir bush for this performance, and the listener often looks in vain for the songster. The song is varied, but partakes at times of the warbling character of the song of the purple finch and of the wren. It is wild and mournful, and well fits its surroundings.

Of a different type is the fox sparrow. A large, handsome, rather showily dressed bird is he, one that does not hide his light under a bushel. As a musician he takes first rank. He is a performer of high merit. His clear and flutelike notes ring out with great purity, yet his song has not the charm of some simpler bird melodies.

The redpoll belongs also in this zone, although it hardly appears to have a local habitation, such a restlessly wandering bird is it. Its *chug chug* as it flies recalls the white-winged crossbill's call note, and its sweet *dee-ar* resembles closely the similar note of its cousin goldfinch. Frequently in the breeding season it waxes melodious in its own way, and flies about in irregular circles, alternately *chug chugging*, and emitting a finely drawn rattle or trill.

The Tennessee warbler and the Wilson's warbler are both found in this zone, the former a very plain, inconspicuous bird, the latter bright yellow with a glossy black cap. The Tennessee warbler is as inconspicuous in its habits as in its plumage, and retires to the depths of thickets when the observer endeavours to learn its secrets. The Wilson's warbler, on the other hand, does not hesitate to display its charms at close range, and sings its simple little song.

Two other birds, both fine singers, may be mentioned here, for they belong in this Hudsonian Zone; namely, the ruby-crowned kinglet and Alice's thrush. That the diminutive kinglet can produce such a loud and wonderfully clear and varied song is always a surprise and delight. The Alice's thrush is a common bird in the scrubby woods on the edge of the Arctic Zone. Its call note resembles at times the call of the night-hawk, at times the call of the veery. Its song, which may be heard in the long summer twilight of Labrador even after nine o'clock, is interesting and beautiful. It begins with a single or double note, followed by a long veery-like vibration, sweet yet mournful.

The Canadian Zone includes the wooded region of southern Labrador. Its limits cannot be accurately defined, and the birds of this and the Hudsonian Zone intermingle. Sheltered valleys often enable the Canadian birds to extend far north into the region of the Hudsonian class.

It is impossible in the space of this chapter to do more than mention a few of the characteristic birds. The spruce grouse and the Canadian ruffed grouse here take the place of the willow ptarmigan of the Hudsonian Zone and the rock ptarmigan of the Arctic Zone. The spruce grouse is so tame or so stupid that it is often caught by a noose on a short stick. The Labrador jay is a subspecies of the Canada jay, and resembles its cousin closely in its pilfering habits and in the variety and weirdness of its call or conversational notes. The young of the year are dark plumbeous in colour, and resemble large cat-birds. Pine grosbeaks, white-winged and American crossbills, and pine siskins are all to be found here on the borders of the Hudsonian and Canadian zones. They are all dependent for their food-supply on the cone crop of the spruces and firs. When the crop fails, they wander widely in winter and visit more southern localities. The common warbler, whose range extends throughout the wooded area even to the edge of the Arctic Zone, is the black-poll warbler, whose simple song can often be heard in little islands of struggling spruces among the barren rocks. The Hudsonian chickadee is also found here.

Still more southern and more Canadian in their distribution are the olive-sided and yellow-bellied flycatchers, the white-throated sparrow, and purple finch. The well-known Peabody song of the white-throated sparrow recalls the pastures of Maine. This song has a charm and beauty unsurpassed even by the songs of more power and complexity. The magnolia, myrtle, bay-breasted, yellow-palm, black-throated green, and Canadian warblers, and northern water-thrush are also found in these more southern regions. The winter wren, golden-crowned kinglet, black-capped chickadee, olive-backed thrush, and hermit thrush also occur here. The divine song of the hermit thrush heard in the wilds of Labrador is indeed an inspiration.

There remain to be added a few wide-ranging birds that have not been included in these classes. The northern raven may be mentioned first. While the American crow is rarely found in Labrador, and then only in the southern part, the raven takes its place throughout the country, especially on the sea-coast. Here they build their nests in inaccessible recesses in the rocky cliffs. No need have they when snow covers the ground of a change like the ptarmigan to white plumage for protective purposes. Their wits alone are sufficient. Their harsh *cra-ak* or *cru-uk* at once distinguishes them from the crow with its familiar *caw*. Their larger size cannot be depended upon as a distinguishing mark, for in vast surroundings one can with difficulty judge of size. The rounded tail of the raven is a good field mark, for the tail of the crow is nearly even.

Of the four species of swallows found in northern New

England, all but the eave-swallow have been observed in Labrador. The strong flying robin abounds in various parts of Labrador, pushing its way even to the very edge of the Arctic Zone. It is a strange experience to hear the familiar morning chorus of the robin in bleak Labrador, and to find it building its nest on an Eskimo hut.

CHAPTER XVI

THE FLORA

BY E. B. DELABARRE

THE writer of this chapter is unwilling to allow it a place in this book, unless his readers will be truly indulgent and permit him to preface it with a brief note of personal apology. It must be read only with the clear understanding that it is written not by an expert in botany, but by one who, with the limited skill of an amateur, studied the plants of Labrador during a long summer's visit, and since then has read with eager interest all that he could find bearing on the subject. Such a person naturally lacks the technical knowledge and trained judgment of a botanist by profession, especially in matters of nomenclature, of important but not easily observed detail, of good insight into real causes and conditions. So the present writer would gladly have persuaded a more competent person to take his place. Some day the real experts will correct a large number of inadequacies in this description. But until they are ready, it seems inevitable that a chapter like this must be contributed by one who is merely a general observer and ardent lover of nature, and who happens to have been on the field, even though he lack an equipment sufficient to guard him from making many errors.[1] There is need, then, of indul-

[1] In a previous chapter on this subject, in a "Report of an Expedition to Labrador in 1900," published as a Bulletin of the Philadelphia Geographical Society, I unfortunately allowed a number of errors to occur, especially in exact nomenclature. I welcome this opportunity to atone for them as well as is now possible. I stated there that I had myself attempted only the more easy identifications, lying well within the capacity of the amateur; that, aside from a few special kinds, I had submitted my collection to Professor Bailey of Brown University for the correct naming of specimens; and that he had submitted all doubtful cases to Professors Robinson and Fernald of Harvard University for approval or revision. In making these statements, I seemed to involve all these eminent authorities in responsibility for the errors that were included. But, through no fault of others, I received a mistaken impression as to the finality of many of Professor Bailey's identifications, failing sometimes to distinguish between his confident namings and his mere suggestions, and as to the extent to which they had received verification from the professors at Harvard. I now feel it a pleasure and a duty to apologize to these three men, who cannot be held accountable in any degree for mistakes that were due wholly to my own misunderstandings. This case is an illustration of the difficulty met with by an amateur who wishes to describe strange and interesting places that he has seen, in guarding himself against error, and especially in attaching correct names to the objects he has observed.

Since then Professor Fernald has kindly revised my collection, and tells me: "The plants are now correctly named, I think, with the exception of a few upon which I dare not venture a determination." Space is lacking here to indicate all the changes that are necessary in my published list. Some new names are secured, some individual numbers of plants must be credited elsewhere than as given. But mistaken conclusions in using the list may be largely guarded against by realizing that the following names are apparently all that need to be omitted entirely, or altered to another variety or species, or given a more modern nomenclature: *Dicentra Canadensis, Draba nivalis, Lychnis apetala, Sagina procumbens, Dryas octopetala, Saxifraga Hirculus, Epilobium alpinum,* var. *majus, Archangelica, Aster radula, Taraxacum dens-leonis, Andromeda polifolia, Ledum latifolium, Pyrola rotundifolia* et var., *Vaccinium Canadense, V. Vitis-Idaea, Primula* gence from the readers of this account. But if this be generously extended, the writer permits himself to hope that, however inadequate his description may be and however subject to later correction, it may serve largely to increase the enjoyment of visitors to this fascinating country, by enabling them to understand more fully the great interest and attractiveness of its plant life.

Some few visitors to Labrador return with an impression that it is a bleak and forbidding country, rude, cruel, unattractive, bare of vegetation. But to many others it seems full of beauty, of attractiveness, and even of a rich and appealing fertility. The latter is the truer view, for it is the one gained by those who observe with more seeing eyes. Really, the wealth and variety and brilliancy of the Labrador growths and flowers are very striking to one who can see them at all understandingly. Very little knowledge of botany and love of plants are needed to realize this fact. An added ability to recognize and name the more common forms naturally increases enormously one's appreciation and satisfaction, and is not difficult to acquire. It is as important for real enjoyment and profit as to possess a similar outline knowledge of the geological forms of the land and of the causes that have moulded its scenic features. It will not cost a great amount of additional labour to gain an even more intimate understanding of the plants, — of

Misstassinica, Gentiana propinqua, Pedicularis flammea, Polyganum littorale, Betula nana, Luzula arcuata, L. hyperborea, Eriophorum alpinum, Poa laxa, Lycopodium lucidulum; omit also, but leave the synonym given with it: *Comarum palustre, Potentilla rubens.* In a majority of cases these corrections do not imply that the plants thus called in this and earlier lists do not exist in Labrador, but that it is now possible to give them more accurate names.

some of their special means of adaptation to their environment, of causes of the particular kinds and particular structures that occur, of their relation to food-supply, soil and climate, and to insect life. If the observer start with some ability to make analyses of flowers, and with a simple equipment of books[1] to aid in the identification of specimens, he will soon gain acquaintance with all the more commonly occurring plants. If, in addition to this, he be expert in botany, or will make a carefully selected and annotated collection and submit it to some capable botanist at home for identification, he may possibly be rewarded by the discovery of species and varieties hitherto unknown in

[1] Of books, among the most useful will be:—

1. As aids to analysis:—

Britton, Manual of the Flora of the Northern States and Canada.

Britton and Brown, Illustrated Flora of the Northern States and Canada.

Gray: Synoptical Flora of North America (incomplete).

Gray: New Manual of Botany, 7th ed., rearranged and revised by B. L. Robinson and M. L. Fernald, 1908.

2. For an understanding of forms and distribution:—

Schimper: Plant Geography upon a Physiological Basis. Oxford, 1904.

Dawson: The Geological History of Plants.

Hooker: Distribution of Arctic Plants.

3. For lists of plants already reported from Labrador:—

See lists of books in Delabarre's Report of Expedition to Labrador (Philadelphia Geographical Society, 1902), pp. 172, 194, 197. But for their inadequacy, see previous footnote.

Professor Fernald, our most expert authority on far northern plants, informs me that nearly all the published lists of Labrador plants contain many errors. Recent studies have given a much more intimate acquaintance with the northern flora, and thus all the old lists need critical revision. It is impossible, therefore, to give an accurate list of all plants thus far observed as occurring in Labrador, under their correct names. The whole matter must be decided finally by competent authorities that region, which still offers large opportunities for botanical as well as for other kinds of exploration.

Few localities will better repay the amateur or even the professional botanist than this, either in æsthetic gratification or in opportunity for scientific research. Labrador is one of the most southerly of all countries that have a predominantly Arctic vegetation. It is sufficiently far to the south to show transitional belts between the temperate and Arctic zones, as well as those more strictly Arctic. Like all far northern lands, it presents an amazing wealth of strikingly coloured flowers, so thickly sown as in many places to resemble a cultivated garden. Add to this the exceedingly great picturesqueness of its scenery, its unexplored lofty mountains, higher perhaps than any others on the Atlantic side of the Americas, its fairly easy accessibility, and the decidedly tolerable nature of its brief summers; then its attractiveness and charm to those who know it will be easy of comprehension.

Botanically, Labrador may be considered best by dividing it into two regions of markedly different aspect, — the interior and the coast. Of the former but little is known, except that it is covered with trees of good growth, extending almost to the northern extreme of the country. These interior portions possess essentially a cold temperate, not an Arctic, type of flora. Our knowledge of their plants is derived mainly from journeys across it in several directions by Dr. Low of the Canadian Geological Survey, and from the visit of Mr. Bryant to the Grand Falls.[1] Its

[1] For these descriptions, see *Ann. Rep. Geol. Survey of Canada*, Part L, Vol. VIII, 1896; and Bulletin of *Philadelphia Geographical Club*, March, 1904. Other earlier expeditions through the interior,

wealth in accessible timber is considerable, and already large mills have been established near the head of Hamilton Inlet.

The coastal region, with which all the rest of this chapter will be concerned, presents a vegetation of a decidedly Arctic type. A cold ocean current from the north bathes its shores, bringing with it ice-floes until the last of July, and icebergs throughout the rest of the summer. Innumerable snow-drifts linger from winter back again to winter in favourable places on the land. Yet for two months of summer, at least, the days are long, and the temperature does not fall to the freezing-point even at night. Picturesque hills in the south, and in the north towering, untrodden mountains rise directly out of the sea and expose their flanks and summits to the unbroken force of the winds. The soil is thin, and through it the bare rock frequently protrudes. There is usually no lack of moisture in soil or air, and many places, especially in the relatively lower elevations of the south, are decidedly boggy.

The characteristic features of an Arctic flora are usually attributed to the need it has for struggle and protection against severe cold. Schimper has shown that this factor itself has almost no direct influence. The greatest cold known anywhere is in Siberia, in a region where forests still flourish. No special protective devices against cold are known; if any exist, they consist probably in the internal structure of the protoplasm itself, not in any observable external modifications. The observable peculiarities of

and the more recent ones of Hubbard, Wallace, and Mrs. Hubbard, while adding largely to knowledge of the country, have contributed little to botanical information.

the vegetation are protections not against cold, but against dryness. Even with an abundance of moisture in the soil, it may not be readily available for the plant. The soil is cold, the bogs are rich in humous acids, the water of the shores is full of soluble salts. All these conditions, which are the prevailing ones throughout the northern country, are unfavourable to the ready absorption of water by the plant, and hence lead to physiological dryness. This is further increased by the lack of protection against drying winds, which tend to produce strong transpiration. A plant whose water supply is limited, whether in wet or in dry soil, must guard against too great transpiration, especially under conditions where this tends to be large. It hence assumes a xerophilous structure, or one fitted to contend with physiological dryness. In this respect the flora of Arctic climates, of alpine heights, of bogs, of sea-shore, and of deserts will closely resemble one another, though the particular devices adopted may vary with different conditions.

Except in the rarer situations of sheltered valleys or sunny slopes, with relatively warmer soil, water free from acids, and protection from wind, the flora of Labrador may be considered as universally adopting one form or another of the various means fitted to protect it from too great dryness. It becomes an absorbingly interesting study to observe the different ways in which this object is accomplished. The most evident devices are the following: —

1. A well-developed system of roots for the absorption of nutrient materials and of water.

2. A low and often stunted growth. This characteristic, as a special modification, applies of course to plants that

are usually shrubs or trees rather than to those of a naturally low, herbaceous type. The former are of very few species, mostly willows, alder, and birch, and a few evergreens. The height of these will vary much, and will be determined largely by the degree of their protection from drying winds, whether by the conformation of the land or by a winter covering of snow. In very exposed situations they will be lacking, or will lie close to the ground, or will have become modified into a special low-growing species, such as the interesting and widely spread willow, *Salix herbacea*, each plant of which bears but two or three leaves on a single unbranching stem, attaining only a fraction of an inch in height.[1]

3. Reduction in surface of leaves. These tend to be small and thick (*Empetrum*, *Ericaceæ*) or, if thin, either long and narrow (*Cruciferæ*, *Caryophyllaceæ*, *Salicaceæ*, evergreens, grasses, etc.), or deeply lobed (*Pedicularis*, some *Rosaceæ*), or much wrinkled with strong veins (*Rubus arcticus*, *R. Chamæmorus*), or pinnately divided (*Leguminosæ*, *Filices*). The latter form gives them an increased surface without disadvantage, because of their special mobility,

[1] Townsend (in *Along the Labrador Coast*, 1907) gives a few measured examples of these stunted growths. He found, for example, a larch 9 inches high and $\frac{5}{8}$ inch in diameter, that was 32 years old; in another case, a balsam fir 13 inches high, 2 inches diameter, with 27 inches spread, 54 years old. These remind me of the pasture apple trees of New England, in whose case the stunting agent is not drying winds, but browsing cows. Much the same effect is produced, — a lower, thicker, stockier growth, even at great age. I measured one in western Massachusetts, for instance, that proved to be 40 years old, yet was less than 5 feet in height, with an average diameter of 2 inches a little above a much thickened base, and a total spread of about 7 feet.

whereby the leaflets may open out in moderate illumination and close together under conditions where transpiration tends to be excessive, in strong wind or hot sun. Another device consists in folding back the edges of the leaves underneath (*Cassiope tetragona, Ledum, Pinguicula*); and still another, in crowding them thickly together (*Cassiope, Bryanthus*). All of these many modifications have the one object of securing a reduced or reducible transpiring surface, and almost all the plants of Labrador adopt one or another of these methods of accomplishing it. The examples given are only illustrative, and might be increased many fold under almost every heading.

4. Increase in thickness of the leaf and of its cuticle. Many leaves are tough and leathery (*Ericaceæ, Empetrum*); or have thick, strong cuticle (grasses and sedges); or develop a waxy, resinous, or varnished coating on the under side or on both (*Andromeda, Vaccinium Vitis-Idæa, Pyrola,* some *Salices*, evergreens).

5. Development of water-storing cells in stem or leaves, the latter becoming thick and succulent. This is not of very common occurrence. It is found, however, for example, in saxifrages, *Sedum*, and *Sphagnum*.

6. Protection of the stomata from the influences that tend to cause evaporation through them. This may be secured by (1) turning away the under side of the leaf from sun and wind, as in the pinnately divided leaves mentioned already; (2) sinking the stomata in the leaf-surface (*Andromeda, Empetrum*); (3) covering the under side of the leaf and sometimes also its upper side and the stem with a protecting layer of hairs or tomentum, which may vary greatly in length and thickness, from a mere silvery or

bronzed dust, or a short, thick fuzz, or tomentum, to a felted growth of longer hairs (most *Ericaceæ* and *Salices*, *Draba*, some *Potentillæ*, *Cerastium*, *Dryas*, *Papaver*, *Antennaria*, and many others.

7. Development of a tendency to grow a thick rosette of leaves at the base (*Arabis*, *Draba*, *Antennaria*, *Lychnis*, *Pinguicula*, many saxifrages), or to mass themselves in close, thick clumps or cushions (*Diapensia*, *Silene*, *Sedum*, saxifrages). These tendencies are similar to the one already mentioned of crowding the leaves closely together on the stem. They may develop in species which in more favourable locations grow apart from one another, and have their leaves more evenly distributed along the stem.

8. An occasional tendency, in case of difficulty in absorbing nutriment from the soil, to develop devices for trapping and absorbing insects. Insects are not numerous in Labrador, with the exception of mosquitoes and flies, but a few plants there are partially carnivorous (*Drosera*, *Pinguicula*, *Sarracenia*). They appear to be confined almost wholly to the marshes of the more southerly part of the country.

9. While physiological dryness is extremely unfavourable to vegetable growth, and necessitates special devices for the absorption and conservation of moisture, it is, on the other hand, very favourable to the reproductive functions. Accordingly, the number of flowers is large, and appears the larger on account of the crowding of all varieties into one short season, and by contrast with the lack of luxuriance in vegetative shoots and foliage. Many of the flowers are large and brilliant in colouring, and nowhere is there any lack of them in abundance, unless in situations most severely open to the winds or destitute of soil.

Such are the main characteristics of xerophytes. They constitute the great bulk of the flora of Labrador, since almost all its physical conditions — bog, sea-shore, thin soil, cold ground, drying winds — are such as to exert a xerophilous influence. Hygrophytes (reaching their extreme in Aquatics), adapted to conditions of easily available moisture, and Tropophytes, adapted to alternating seasons of moisture and of dryness, are of much rarer occurrence. The former are characterized by weakly developed roots, more luxuriant vegetal growth, great expansion of the transpiring surfaces. Tropophytes are hygrophilous during the summer, the season of moisture, and xerophilous during the winter, which is physiologically dry. They secure this change either by shedding their hygrophilous leaves; or by dying down to the ground as a whole; or, as in evergreens, by developing shoots which are hygrophilous only when young, turning xerophilous as they mature.

Thus a relative lack of available moisture is one of the chief features determining the general appearance of the vegetable covering of the Labrador landscape. Other factors, such as cold, wind, and physical nature of the soil, derive their influence mainly from their tendency to limit the supply of available water, or to increase transpiration. Each of them, however, has some direct influence besides. Thus it is said that cold tends to make leaves broader and shorter, with bent margins and loss of irregularity in margin (mosses, *Ericaceæ*), and is favourable to the development of sexual organs; though the real influence even here may be perhaps not cold directly, but dryness and the shortness of the season of growth. Wind not only favours transpiration, but directly increases the tendency to low, shrubby growth, and favours anemophilous adaptations (*i.e.* those using the agency of the wind) for pollination and for dissemination of fruits. Differences in the nature of the soil in Labrador would seem to be not great, and to derive their importance mainly from their ability to conserve moisture, free from admixture with growth-hindering acids and salts.

There are, however, some further direct and important influences. One of them, not often mentioned but very evident, is the scarcity of insects that aid in pollination. The proportion of flowers that are anemophilous, or wind fertilized, as compared with those that solicit insect aid, is considerable, as might be anticipated from the fact that flower-haunting insects are rare. Yet there are many flowers of the latter type, though mainly of species that do not absolutely depend upon insects for the fertility of their seeds.

Another positive influence is the relatively protracted illumination during the period of growth. This, like many other influences operative here, has been shown to have a tendency to diminish herbaceous growth, affecting the size both of the plant and of its leaves; and to favour reproduction. The devices that protect against too great transpiration often serve at the same time to secure protection against excessive and prolonged illumination.

Finally, the shortness of the season of growth is of large importance. It is this which forces a large proportion of the plants that are to survive under the conditions which Labrador supplies, to develop in a previous season the embryonic preparations for the leaves and flowers that are to appear the following summer. Hence is derived the magical rapidity of appearance of vegetation and of flowers, almost coincident with the disappearance of the snows. Hardly does the ground become clear of snow before flowers are there in its place. Not only is there barely any transition between winter and spring, but all kinds of flowers follow upon one another so quickly that spring, summer, and autumn are all rolled into one quickly coming and quickly disappearing, brief, brilliant, and glorious summer season. This is the main factor that introduces a difference into the floral character of different latitudes. In all of them the same conditions are present otherwise, — the exposure to winds, the coldness of the soil, and other influences that conduce to physiological dryness, — but the season grows shorter as one advances farther north, and high latitude will thus conserve more and more the plants of the spring-blooming type, that prepare their blossoms and growths a season beforehand, and tend to exterminate those that come more slowly to maturity. In some places plants relatively unfitted will survive, but will lose some of their characteristics as the season of growth becomes shorter. Thus, *Rubus Chamæmorus* and *Rubus arcticus*, which are abundant and fertile in Newfoundland, the writer found to be much more rarely fertile in Labrador and to increase in rarity toward its northern extreme; and it is said that *R. Chamæmorus* survives, but is without flowers, at its most northern station. In some cases the length of the season suffices for flowers, but not for fruits and seeds. In such cases it would seem to be, not the temperature itself, as Schimper puts it, but the length of time during which the warmer temperatures persist, that determines the surviving species and their reproductiveness.

All of these influences together, the most important of which are evidently the amount of available moisture and the length of the season of temperatures favourable to growth, determine the characteristics of vegetation on the coast of Labrador. The prominent features that result have most of them been already described. A few others, however, still remain to be considered. One of them is the great variability of the flowers. I observed it myself markedly in several species. In *Rubus Chamæmorus* and *R. arcticus*, the petals and calyx lobes ranged in number almost indiscriminately between four and six; and in the former the ends of the calyx lobes were sometimes single-pointed and sometimes toothed, the number of teeth varying, and its leaves were often spotted or even entirely coloured with deep purple. In *Ledum palustre*, var. *dilatatum*, flowers of the same cluster showed no constancy in the number of their stamens, any number from five to eleven being present. *Sedum Rhodiola* is very variable. In flowers of the same plant I found petals ranging in number from three to seven, sepals from three to five, scales from two to four, stamens from five to thirteen, and pistils from two to nine. In *Cornus Canadensis*, I noticed one variety with six upper leaves arranged in a whorl, with each side of the four-sided stem grooved, and with greenish white flowers; another with three pairs of opposite leaves, only two of the sides grooved, and flowers dark purple or maroon, both calyx and corolla; and a third with characteristics between these two. *Pedicularis* also, to my inexpert botanical eye, seemed to present a greater variability than could be accounted for by the number of already reported species.

Of fruits, the most common are such as depend on dissemination by wind or by birds and other animals. A few species depend on other methods mainly, as in case of the large easily floating bladders or pods of *Oxytropis* and other legumes, or of large seeds that rarely find their way far from the parent plant. But the families best represented in individuals, and largely also in species, are such as bear small berries (*Ericaceæ*, *Empetrum*) attractive to animals, or numerous small light seeds, or spores, easily spread abroad by the wind (mosses, grasses, *Cruciferæ*, *Caryophyllaceæ*, *Compositæ*).

The regions of Arctic vegetation possess relatively fewer species and varieties than more favoured localities, and most of these are the same as those growing in the colder temperate zones. As Hooker[1] points out, uniformity in physical characters and absence of those changing conditions which we assume to be stimulants to variation (different combinations of conditions of heat, light, moisture, and mineral characters) give uniformity in vegetation. Hooker gives the total number of flowering species in Arctic Europe as 616, in Arctic East America as 379, in Greenland as 207. On the other hand, he estimates that 5800 species exist in temperate Australia. Gray's *New Manual of Botany* (7th ed., 1908) enumerates about 4000 species of flowering plants and ferns, belonging to over 150 families, from the central and northeastern United States and Canada. But in Greenland, according to Schimper, there are only 386 species of vascular plants, belonging to 53 families. Labrador shows similarly a

[1] Joseph D. Hooker, *Distribution of Arctic Plants.* Trans. Linnean Society, 1862, Vol. XXIII, p. 251.

relatively low number of species and families. It is impossible to give exact figures. We have already noticed both that all these northern lands are still insufficiently explored, and that the nomenclature of their known plants needs careful revision. The figures quoted from Hooker and Schimper cannot be regarded as accurate. Yet with all the revision to which they may be subject, the large difference existing between Arctic and temperate regions remains strikingly true, and its degree is probably fairly well indicated by the figures given. The writer has attempted a calculation for Labrador, based on all the reports, reliable or otherwise, known to him in January, 1905; but its results, for the foregoing reasons, must not be regarded as very exact. According to it, there occur in Labrador not far from 425 species of vascular plants, belonging to 50 families. In addition to these there are about 300 species of bryophytes and fungi so far discovered. The number of species in the orders best represented is as follows: *Compositæ* 36, *Ericaceæ* 31, *Cruciferæ* 30, *Roseaceæ* 29, *Cyperaceæ* 28, *Gramineæ* 27, *Caryophyllaceæ* 26, *Salicaceæ* 19, *Saxifragaceæ* 19, *Ranunculaceæ* 19, *Scrophulariaceæ* 14. The number of species in the genera best represented is: *Carex* 21, *Salix* 17, *Potentilla* 11, *Saxifraga* 11, *Draba* 11, *Ranunculus* 10, *Arenaria* 9, *Epilobium* 9, *Vaccinium* 7, *Pedicularis* 7, *Lycopodium* 7, *Stellaria* 6, *Poa* 6.

Having now studied the main influences affecting the flora of Labrador, and the characteristic features of its plants resulting therefrom, we are in a position to consider the general appearance of the Labrador landscape near the coast, so far as it is determined by vegetable life. It will be necessary to distinguish several different regions or typical situations, each with its own peculiar aspect. We may conveniently divide these into the areas of forest, of sea-shore, and of the tundra, and the latter again into several subdivisions.

1. The forest region is best described by Low.[1] He says:

"The southern half of the Labrador Peninsula is included in the subarctic forest belt, as described by Professor Macoun. Nine species of trees may be said to constitute the whole arborescent flora of this region. These species are: *Betula papyrifera* Michx., *Populus tremuloides* Michx., *Populus balsamifera* Linn., *Thuya occidentalis* Linn., *Pinus banksiana* Lam., *Picea alba* Link., *Picea nigra* Link., *Abies balsamea* Marsh, and *Larix Americana* Michx. The distribution of the forest areas and the range of the various trees depend on several factors, among which may be mentioned, position as regards latitude, height above sea-level, distance from sea-coast, and character of the soil, all of which are important. The forest is continuous over the southern part of the peninsula to between latitudes 52° and 54°, the only exceptions being the summits of rocky hills and the outer islands of the Atlantic coast. To the northward of latitude 53°, the higher hills are treeless and the size and number of the barren areas rapidly increase. In latitude 55°, more than half the country is treeless, woods being only found about the margins of small lakes and in the valleys of the rivers. Trees also decrease in size, until, on the southern shores of Ungava Bay, they disappear altogether. . . . The tree line skirts the southern shore of Ungava Bay and comes close to the mouth of the George River, from which it turns south-southeast, skirting the western foot-hills of the Atlantic coast range, which is quite treeless, southward to the neighbourhood of Hebron, in latitude 58°, where trees

[1] A. P. Low, Report on Explorations in the Labrador Peninsula, *Ann. Rep. Geol. Survey of Canada,* 1896, Part L, Vol. VIII, pp. 30 ff.

are again found in protected valleys at the heads of the inner bays of the coast. At Davis Inlet, in latitude 56°, trees grow on the coast and high up on the hills, the barren grounds being confined to the islands and headlands, which remain treeless to the southward of the mouth of Hamilton Inlet. These barren islands and bare headlands of the outer coast, along with the small size of the trees on the lowlands, have caused a false impression to be held regarding much of the Atlantic coast, which from Hamilton Inlet southward is well timbered about the heads of the larger bays and on lowlands of the small river-valleys. . . . *Picea nigra* is the most abundant tree of Labrador and probably constitutes over ninety per cent of the forest. . . . *Larix Americana* is probably the hardiest tree of the subarctic forest belt; it grows everywhere throughout the Labrador Peninsula, and is probably next in abundance to the black spruce. . . . Throughout the forest belt, the lowlands fringing the streams and lakes are covered with thickets of willows and alders. As the semi-barrens are approached, the areas covered by these shrubs become more extensive, and they not only form wide margins along the rivers and shores of the lakes, but with dwarf birches occupy much of the open glades. The willows and birches grow on the sides of the hills, above the tree line, where they form low thickets exceedingly difficult to pass through. Beyond the limits of the true forest, similar thickets of Arctic willows and birches are found on the low grounds, but on the more elevated lands they grow only a few inches above the surface. In the southern region, the undergrowth in the wooded areas is chiefly Labrador tea (*Ledum latifolium*) and laurel (*Kalmia glauca*), which grow in tangled masses, from two to four feet high, and are very difficult to travel through. In the semi-barrens this undergrowth dies out, and travel across country is much easier in consequence. In the southern regions the ground is usually covered to a considerable depth with sphagnum, which northward of 51° is gradually replaced by the white lichens or reindeer mosses (*Cladonia*), which grow freely everywhere throughout the sèmi-barren and barren regions."

The traveller along the coast, who penetrates but a short distance into the interior, will find little evidence of this forest area, except in sheltered places at the heads of bays. Of the trees and shrubs mentioned by Low, I found only *Abies* (no farther north than Hamilton Inlet), *Larix*, *Picea*, — and none of these evergreens were seen north of Hebron, — and, mainly in dwarf forms, *Alnus*, *Betula*, and *Salix*. Nowhere did I find thickets of undergrowth that offered any obstacle to travel.

2. The most common plants characteristic of the seashore are seaside sandwort (*Arenaria peploides*), sea-lungwort or ice-plant (*Mertensia maritima*), *Potentilla anserina* and *tridentata*, a few large *Umbelliferæ* (*Cœlopleurum actæifolium*, *Conioselinum Canadense*, *Ligusticum Scoticum*), and one or two species of *Plantago*. *Iris* and *Lathyrus maritimus* also are not unusual in the more southerly regions. Besides these, almost all of the more common plants of the tundra may occur close to the sea-shore. On sandy places, which are rather rare in Labrador, and which are exposed preëminently to the effect of high winds and scanty water, the number is more limited. For example, on one low sand-dune which I studied at Pottle's Cove, close by the entrance to Hamilton Inlet, in latitude 54°, I found only the plants enumerated below, though many others grew on the rocky heights in the near vicinity. The more abundant are italicized, the rest were rarer.

a. In the more exposed situations exclusively: *Arctos-*

taphylos alpina, Betula glandulosa, *Empetrum nigrum*, Abies balsamea, *Juniperus communis*, *Picea nigra*, Boletus.

b. In the more sunny and protected situations exclusively: *Rubus arcticus*, Potentilla tridentata, Taraxacum, Polyganum viviparum.

c. In both, but mainly in the more exposed: Cerastium alpinum, *Vaccinium Vitis-Idæa*, var. *minus*, Rhinanthus Crista-galli, *Salix Brownii*.

d. In both, but mainly in the more protected: *Draba incana*, Cœlopleurum actæifolium, *Cornus Canadensis*, Achillea millefolium, *Solidago macrophylla*, a fine thin unknown grass.

e. In both about equally: Stellaria longipes, Lathyrus maritimus, Sedum Rhodiola, Elymus arenaria, Poa pratensis, var. domestica, Barbula ruralis, *Brachythecium*, Hylocomium splendens.

At Ford Harbour, a little farther north (56°), the following additional species (some but not all of the above being present also) were found in a similar situation: *Arenaria Grœnlandica*, *Silene acaulis*, *Astragalus alpinus*, *Oxytropis*, *Saxifraga Grœnlandica*, *Epilobium latifolium*, *E. spicatum*, *Antennaria*, *Solidago multiradiata*, var. *scopularum*, *Taraxacum officinale*, var. *palustre*, *Pyrola grandiflora*, *Vaccinium uliginosum*, *Polyganum Islandicum*, *Salix herbacea*, *S. Uva-ursi*, *Polytricum commune*, *Lycoperdon*, *Festuca rubra*, *Hierochloe alpina*, *Carex rigida*.

3. The open country uncovered by forest, whose highest growths are low shrubs or shrubby, stunted forms of trees, and which are more or less continuously carpeted with Arctic plants of many kinds, is called the *tundra*. It is the formation that will be most often met with by the voy-

ager along the coast; and since Labrador, as at present geographically limited, and as it must always be known to the great majority of visitors, is but little more than a coast-line, the tundra is the characteristic Labrador formation. "Beyond the last stunted trees," says Schimper,[1] "so far as ice does not cover the ground, the frigid desert, or *tundra*, almost alone dominates Arctic mainlands and islands. Only in the less cold and therefore chiefly southern tracts in the Arctic zone, in more favourable localities a few less insignificant formations exist; for instance, willow-bushes and small meadows on river-banks and in fiords, or even formations of dwarf shrubs, which consist of a denser growth of the same evergreen, small-leaved, shrubby species as appear singly in the tundra between mosses and lichens. Dwarfed growth, a distinctly xerophilous character, the predominance of mosses and lichens, the incomplete covering of the ground, — these features are everywhere characteristic of the tundra. . . . In the less cold tundra districts, more soil is occupied by vegetation than unoccupied; even wide tracts can have a continuous carpet of lichens. Where the climate is most rigorous, the vegetation forms only widely separated patches on the bare, usually stony soil."

Conditions in Labrador are such as to make possible the close continuous growth almost everywhere. It is interrupted only by the occasional intrusion of unfavourable or improved surroundings. These are of four types: the summits of the higher mountains; protruding areas of sparsely covered rocks and gravels; collections of water in

[1] A. F. W. Schimper, *Plant Geography upon a Physiological Basis*, p. 685. Oxford, 1904.

low depressions, forming moors; and well-watered, sunny slopes. The first three of these are emphasized forms of the tundra; the last departs from the tundra type, forming oases in it.

(*a*) The alpine conditions of the higher mountains, which are confined almost wholly to the northern half of the country, are unfavourable to any form of life. The summits consist of broken masses of rock, a *Felsenmeer* of rough and continuous boulders of various size. Among these, only scattered clumps of struggling plants can find footing and the essential conditions for living. The number of individuals, even among the mosses and lichens, is small, and the species are few. On one summit (Mt. Faunce, 4400 feet, latitude 59°) I found above 3300 feet only the following: *Cerastium alpinum, Draba fladnitzensis, Saxifraga cæspitosa, S. rivularis, S. nivalis, Papaver nudicaule, Sedum ?, Luzula confusa*, mosses (*Andreæa petrophila, Bryum ?, Pogonatum alpinum* or *urnigerum, P. capillare, Racomitrium lanuginosum*), and lichens (*Alectoria divergens, A. nigricans, Cetraria arctica, C. cuculata, Sphærophoron coralloides, Stereocaulon denudatum, S. tomentosum, Theloschistes polycarpus, Umbilicaria proboscidea*).

(*b*) On protruding rocks but few plants grow, in low, flat, spreading cushions. Areas of gravel are also but little hospitable to plants, and their covering is consequently scanty. The plants that find it possible to survive there are to some extent identical with those already described as growing well in sand. They are pioneers among plants, such as can take root and nourish themselves on the bare rock-grains and moisture; and their decay makes richer soil for others to grow in. The species of most common occurrence which I found in such situations are: *Oxytropis campestris* (rare), *Arctostaphylos alpina*, *Loiseleuria procumbens* (rare), *Vaccinium uliginosum*, *V. Vitis-Idæa*, var. *minus*, *Diapensia Lapponica* (growing in little rounded mounds on its own previous growth, very branchy, showing yearly additions outward and upward, — one specimen I examined was three inches in diameter and one and a half inches high in the centre); willows, *Empetrum nigrum*, *Carex rigida* (rare), *Festuca brevifolia* (rare); three mosses (*Dicranum*, *Polytricum strictum*, *Racomitrium lanuginosum*), and a lichen (*Umbilicaria*). Dead roots and branches, especially of the willows and *Ericaceæ*, were frequent, and on them grew other varieties of moss. Labrador tea and grasses flourished on the edges of these bare patches, where some soil had already been formed.

(*c*) "Shallow depressions of the tundra, where the water of melted snow and ice accumulates in the soil, become swamps in the form of *tundra-moor*, and there a scanty peat bears a thin layer of *sphagnum* with a few small phanerogams. Such places correspond physically but not physiologically to the oases of the dry desert" (Schimper). The moor presents many features that are unfavourable to the life of plants. Humous acids are abundant and prevent the easy absorption of moisture; mineral substances are hard to obtain, "owing to the great distance of the vegetation from the mineral substratum and to the absorptive influence of humus, rendering it difficult for the plants to obtain soluble salts"; nitrogen is abundant, but in such form that the moor is among the poorest of soils in easily assimilable nitrogenous substances. Sphagnum is the characteristic and most abundant plant in such situations.

"Its spongy, water-absorbing cushions," which "keep even the highest parts of the moor permanently saturated with water, . . . gradually grow in height, while the lower parts pass over into sphagnum peat" (Schimper). The following list of other plants growing in moors is that given by Schimper, with those of known occurrence in Labrador italicized. Some are characteristic of high-moor: Viola palustris, *Vaccinium oxycoccus, Andromeda polifolia,* Betula nana. Others are preëminently meadow-moor species: *Epilobium palustre,* E. tetragonum, Senecio aquaticus, S. paludosus, Gentiana pneumonanthe, several species of *Carex.* Many others that are essentially moor plants occur also in dry stations without peat: *Vaccinium Vitis-Idæa;* or on meadow moors: *Drosera rotundifolia, Comarum palustre,* Pedicularis palustris, Salix repens, species of *Eriophorum,* many species of *Carex.* Many moor plants compensate for their disadvantages by becoming carnivorous: *Drosera, Pinguicula vulgaris, Sarracenia purpurea.*

(*d*) By far the most favourable and fertile situations in the whole country are the sunny slopes, exposed to the south, which are abundantly fed by water from melting snow-drifts, on which the water, not becoming stagnant, has no opportunity to accumulate humous acids. Schimper describes them thus: —

"The physiological analogues in the tundras of the desert oasis are *Heat-oases* — sunny slopes protected from the drying winds — upon which the sunbeams fall almost perpendicularly, and thus warm the water in the soil so that plants can obtain it in actual abundance. Such stations frequently resemble the flower-beds of a garden. According to Nathorst: —

"'The plants of the slopes are in many respects the most interesting. The majority of them occur as strongly developed individuals, which here appear to thrive perfectly, and apparently can ripen their seeds annually. This naturally is true of the good localities, namely, of the slopes that soon become free from snow. Here one has an opportunity of being able to observe the remarkable influence of the sun's rays. Slopes, that a short time before were covered with snow, a few days later are adorned with several flowers; the development of these can proceed so rapidly that one soon finds fruit as well, as in the case of *Draba*. Here one sees sometimes quite blue mats of *Polemonium pulchellum*, or red ones of *Saxifraga oppositifolia*, with a varied mixture of other tints, yellow, white, green. . . . When the plants of the slopes occur in the plains, they are not usually so well developed as on the slopes, but the difference in this respect is much greater in some plants than in others.'"

The plants growing on these slopes are for the most part more flourishing individuals of the same species that are found on the surrounding tundra. I myself noticed only a few that seemed confined to these or similar situations: *Ranunculus pygmæus, R. hyperboreus, Linnæa borealis, Gentiana nivalis*. Many others might probably yet be discovered by careful attention to the influence of this particular situation.

Such aspects of the vegetable growths of Labrador as have thus far been described may be considered as exceptional. The predominant form of vegetation on or near the coast is that of the true tundra itself. Its appearance as it occurs throughout Labrador I cannot better describe than in words which I have already used: [1]—

[1] Report of the Brown-Harvard Expedition to Labrador, Geographical Society, Philadelphia, 1902, pp. 129 ff., 168 ff.

"The interior is said to be well wooded and far from barren, even almost to the northern extremity. But near the coast one rarely sees trees of any notable size. At Hopedale and Nain there are small groves near the mission stations; but elsewhere we met them only deep in the bays and in sheltered valleys a considerable distance — five or ten miles at least — inland. Thus, when not entirely lacking, they form an unobtrusive feature in the usual landscape. The low vegetation that predominates clothes the country with a close green mantle, but leaves its shape and natural outline unconcealed. Inorganic nature reveals herself in her own primeval character, leaving all the strength and charm and variety that she can assume naked to observation. There is little of softness, little of the attraction that vigorous organic life can add; though the green of the low plants, the grays, reds, and browns of mosses and lichens, the blues and whites and pinks and yellows of the flowers, add a suggestion of this, yet in a way that never interferes with the stern grandeur of the lifeless masses.

"The more northern landscapes differ from those thus far described mainly in the facts that the greater heights attained lead to grander impressions of massiveness and strength, and involve greater ruggedness and variety of form; and that the softening influences of soil, water, and vegetation are present to a far less degree. . . . Plant life is still abundant on the lower levels, but finds little hospitality on the bleak higher slopes. . . .

"The great mass of the vegetation of Labrador consists of low forms. It grows so thickly and vigorously in the thin soil, however, that the country never gives the impression of being lifeless and barren. In the far south, especially on moist lowlands, sphagnum is often a prevailing growth. But aside from its rather rare supremacy, almost everywhere we went we found the curlewberry (*Empetrum nigrum*) and the so-called caribou-moss (*Cladonia*, really a white lichen) together forming an almost continuous green and gray sward, touched with red in the autumn. The berries of the curlew are exceedingly numerous, and those of the previous season still cling thickly to the vine among the green new ones, and even until the latter begin to ripen in the middle of August. In the midst of this continuous curlew and moss grow occasional clumps of grasses of many kinds, and a great variety of flowering plants. Perhaps the most common of the latter are the *Ericaceæ*. Some of them are berry-bearing, with inconspicuous flowers, particularly the blueberry (*Vaccinium Pennsylvanicum* and *V. uliginosum*), the mountain cranberry (*V. Vitis-Idæa*), and the bearberry (*Arctostaphylos alpina*). Others have more prominent flowers, such as the omnipresent Labrador tea (*Ledum*), together with the somewhat less universal *Loiseleuria* and *Bryanthus*. These are all exceedingly abundant in the southern half of the peninsula, but extend variously far to the north. The white clusters of the *Ledum* and the purple umbels of the *Bryanthus* are very conspicuous. In the autumn, the red-turning leaves of the *Arctostaphylos* are the most attractive of the season's colourings. There is also a large number of other plants that are constantly met with, though few of them are so nearly omnipresent and continuous as are most of those already mentioned. The bake-apple, or cloudberry (*Rubus Chamæmorus*) grows thickly as far north as Hebron, but very thinly beyond. We could find but very few of its ripe berries in Labrador, though in Newfoundland they seem to be common. Associated with its single white flowers are frequently seen the showy, rose-coloured ones of the Arctic raspberry (*Rubus arcticus*). This also, so far as our experience could determine, had about the same limits and was equally rare in fruit. Bunch-berry (*Cornus Canadensis*) is likewise very common, especially in the south, and grows in thick groups. Dense tufts of the white-flowered *Diapensia Lapponica* and of the beautiful mosslike pink

Silene acaulis greet the eye continually. *Astragalus* and *Oxytropis*, *Dryas*, a great variety of saxifrages, *Sedum*, *Pedicularis*, the violetlike *Pinguicula*, and many inconspicuous *Cruciferæ* and *Caryophyllaceæ* complete the list of forms more universally present in the early part of the season.

"After the beginning of August, when we had reached a higher latitude, the character of the vegetation changed considerably. Caribou-moss, curlewberry, blueberry, and *Arctostaphylos* still remained the most continuous growths. But the flowers began to change to more autumnal forms. The Arctic goldenrod (*Solidago Virga-aurea* and *S. macrophylla*) appeared abundantly. The large showy pink flowers of the *Epilobium* and the thick pink heads of *Lychnis* were very prominent. Yellow *Arnica alpina* and delicate blue harebells (*Campanula*) were common. A yellow poppy (*Papaver nudicaule*), with early deciduous petals, was not infrequent on the hilltops. A strikingly beautiful flower, though a rare one, was the small twinflower (*Linnæa borealis*). Fungi, including *Boleti*, *Russulæ*, and various agarics, also became very abundant toward the close of the summer; they were fairly numerous in the north, and the moist woods about Nain and Hopedale were full of them."

Thus far we have considered what are the main types and characteristics of the plant forms that occur in Labrador and the causes that make these predominant; and what are the main features and less frequent varieties of its landscape, in so far as they are supplied by its floral covering. If now we consider the affinities of the plants of this region with those in other parts of the world, a number of curious and unexpected facts present themselves. Who, for instance, would anticipate that the northern parts of America possess many more plants like those of Arctic

Europe than Greenland does? Or that there are many plants here identical with those growing on the southern slopes of the Alps, which are altogether lacking in northern Europe? Or, still more strangely, that one must seek in the Arctic regions of America, and not in Europe, for the closest resemblances to the plants that flourished in the far distant Miocene age in central Europe? Yet so we are assured by competent authorities. To these facts we may add the following statements from Hooker:—

The polar regions have relatively fewer species and varieties than have other regions. The flora of all its parts is largely identical or closely similar, but is unequally distributed. Of all Arctic regions, Greenland exhibits the greatest poverty in number of species. Many Scandinavian plants have found their way westward to Greenland, but have stopped short on its west coast, without crossing to America; many American types terminate as abruptly on the west coast of Baffin's Bay, not crossing to Greenland and Europe; Greenland contains actually much fewer species of European plants than have found their way eastwards from Lapland by Asia into Western and Eastern Arctic America; the Scandinavian vegetation has in every longitude migrated across the tropics of Asia and America, while plants typical of these continents which have found their way into the Arctic regions have remained restricted to their own meridians.

These facts, at first seemingly inexplicable, and actually so under existing conditions of sea, land, and temperature, naturally have their explanation in the evolutionary and geological history of our globe. Most of them will be understood clearly from the following account given by

Hooker,[1] which in all essential points agrees with the theories advanced in the latest edition (10th) of the Encyclopædia Britannica:—

"It appears to me difficult to account for these facts, unless we admit Mr. Darwin's hypotheses, first, that the existing Scandinavian flora is of great antiquity, and that previous to the glacial epoch it was more uniformly distributed over the polar zone than it is now; secondly, that during the advent of the glacial period this Scandinavian vegetation was driven southward in every longitude, and even across the tropics into the south temperate zone; and that on the succeeding warmth of the present epoch, those species that survived both ascended the mountains of the warmer zones, and also returned northward, accompanied by aborigines of the countries they had invaded during their southern migration. . . . If it be granted that the polar area was once occupied by the Scandinavian flora, and that the cold of the glacial epoch did drive this vegetation southwards, it is evident that the Greenland individuals, from being confined to a peninsula, would be exposed to very different conditions to those of the great continents. In Greenland many species would, as it were, be driven into the sea, that is, exterminated; and the survivors would be confined to the southern portion of the peninsula, and not being there brought into competition with other types, there could be no struggle for life amongst their progeny, and consequently no selection of better-adapted varieties. On the return of heat, these survivors would simply travel northwards, unaccompanied by the plants of any other country. In Arctic America and Asia, on the other hand, where there was a free southern extension and dilatation of land for the same Scandinavian plants to occupy, these would multiply enormously in individuals, branching off into varieties and

[1] *Distribution of Arctic Plants*, pp. 253 f.

subspecies, and occupy a larger area the farther south they were driven. . . . Hence, on the return of warmth, many more Scandinavian species would return to Arctic America and Asia than survived in Greenland; some would be changed in form, because only the favoured varieties could have survived the struggle."

The summer visitor to Labrador, whether scientist or pleasure-seeker, may naturally be expected to have an interest not only in the scientific aspects of its flora, but also in the possibilities it presents of making additions to his food-supplies. These are meagre, but, so far as they go, of a very satisfactory nature. Garden vegetables, berry-bearing plants, and fungi nearly exhaust the list of commonly known plants that is available for this purpose. The former are raised sparingly in the fishing villages of the southern portion of the coast, and by the missionaries at the Moravian stations as far north as Nain. Edible berries are exceedingly abundant, especially blueberries, Arctic cranberries, and curlewberries. The last two kinds require cooking to make them palatable, but then are delicious. The cloudberry, or bake-apple (*Rubus Chamæmorus*) is abundant in some few parts of the country, and is much esteemed by the natives. Raspberries also are found in some localities.

The fungi of Labrador have as yet received but little study. The most common kinds, both of which are easily identified by any one with a very slight knowledge of fungi, are apparently various species of Boletus and of Russula. These grow in considerable numbers almost everywhere. Several other kinds of fungi are obtainable in smaller quantities. They need much further investigation, and their study offers a problem for further research, attractive for both economic and scientific reasons.

Mention may also well be made of certain growths which, while not ordinarily attractive as foods, may yet serve in emergency to sustain life for an indefinite period. A list and description of a number of such "emergency foods," easily available at any season of the year, has recently been given by Ernest Thompson-Seton (*Country Life in America,* September, 1904, Vol. VI, p. 438). After enumerating several small forms of animal life that may serve in this way, he describes and pictures the plants. Among them are several abundant lichens (*Cetraria* or Iceland moss, *Cladonia* or reindeer moss, *Umbilicaria* or rock-tripe), the outer and inner (but not the middle) bark and the buds of aspen (*Populus tremuloides*), the shoots of spruce and tamarack, the inner bark of willows and birch. Most of these need to be well dried at first, and then either roasted or boiled for a long time. It is evident that a knowledge of these plants and of their nutritious qualities might on occasion prove of the utmost value to the traveller in these regions. The party of Sir John Franklin lived almost exclusively on such diet for over three months. "Lowly in the scale of diet as they are in the scale of organic nature," says Mr. Seton, "the rock-tripes are yet reliable friends of man, and no one should travel in these vast inhospitable regions without a knowledge of their appearance, their qualities, and the best methods of preparing them for human food." [1]

[1] Some of the edible plants here mentioned are of very common occurrence in all these northern lands. The list here mentioned could doubtless be largely extended.

A great deal of work is yet to be done by careful observers before the full nature of the Labrador flora can be satisfactorily known. As yet only its more superficial aspects have been reported. Hardly any attempt has been made to determine the influence of different types of situations, and to enumerate the plants that flourish in each. It is but a rough preliminary survey that has thus far been accomplished. There must, moreover, still remain many species of plants undiscovered. Every new visit to the country results in fresh finds. A large number of species has been found in near-by regions as yet unknown in Labrador, but probably occurring there. A striking instance of this probability seems to be presented by the *Cyperaceæ*. According to methods of calculation already explained, which cannot be very exact, forty-seven of them seem to have been reported from adjacent localities, and only twenty-eight from Labrador. Other instances of similar importance will probably be found. Especially large rewards may probably be expected from further investigations of the mosses, lichens, hepatics, and fungi. A considerable number of those brought back by the writer in 1900 seemed to be new for that locality, so far as previous records showed.

Labrador is no longer the inaccessible land of mystery it was a few years ago. Its marvellous scenery and varied charm are sure to attract more and more visitors year by year. Many will go for technical study, and will find a rich field for its pursuit. Most will be drawn by the love of an outdoor life, by the desire for adventure or for serviceableness in the Mission, by the opportunity for seeing and enjoying a strange and fascinating country. It is for these latter mainly that this chapter has been written. The more they can understand and observe of the great wild garden that, if really seen and intimately known, makes impossible any thought of barrenness, the larger will be their pleasure. However small the knowledge with which he starts, no one need be deterred from attempting to gain a larger comprehension of these matters, so significant for the correct interpretation of the true nature of a country. If these be its features in which he is most interested, he will at least add enormously to his own satisfaction and insight. By making a carefully selected and well-annotated collection of plants, he may also, on submitting it to reliable experts, make some extension to the list of recorded varieties and species that occur there. If he will prepare himself as well as possible beforehand and then make some special study of still unsettled points, such as the edibility of various plants, the particular features of certain especially variable species and of the conditions under which they occur, the influence of particular situations, soils, and conditions, he may well hope to make contributions to new knowledge. Plenty of such opportunities are still open to the amateur. In spite of his own unfortunate experience in admitting errors into his published description, the writer still does not hesitate to encourage amateurs in endeavouring to make really new additions to knowledge in this far from fully explored field. The mistakes of an amateur may well be forgiven and gradually corrected, if he does not pretend to be anything more; and confession of the difficulties met with by one of them may help to eliminate similar troubles in the future, and to render only real discoveries liable to publication. To make this more certain, the amateur must always know the authorities to whom he may surely appeal for final verification, and must leave to the professional and expert botanist all the more delicate questions of identification and the critical settlement of problems concerning structure, influence, and conditions.

APPENDICES

I

INSECTS OF LABRADOR

The Insects, excluding the Beetles

BY CHARLES W. JOHNSON

OUR knowledge of the insects of Labrador is based largely on the various papers by Alpheus S. Packard. The lists of the species recorded in these papers were later brought together and published in his work, *The Labrador Coast.* In this work about two hundred and twenty species are mentioned. A few additional species from the interior are listed in A. P. Low's *Report on Explorations in the Labrador Peninsula.*[1] These, with a few scattered species, make the total number about two hundred and fifty. This is a small number if we consider the whole Labrador peninsula, but a large number when we take into account the limited amount of entomological work which has been done and the small area covered.

A. P. Low defines the southern boundary of the Labrador peninsula as a straight line extending nearly east from the south end of James Bay, near lat. 51°, to the Gulf of St. Lawrence near Seven Islands, in lat. 50°. This gives a clearly defined geographical area, which, bordered by Arctic seas, and a more elevated interior, gives quite uniform climatic conditions, and would make it possible to study the insect fauna to better advantage than if it were limited by political boundaries.

The section from which nearly all the insects have been collected (the immediate coast-line) is in that portion of the boreal region which has been designated as Arctic, the flora and fauna of which are largely governed by the effect of the winds from the cold Arctic seas. On the other hand, a short distance inland, we enter the subarctic forest belt, or Hudsonian Zone, with a much richer insect fauna than could exist on the bleak, storm-swept coast.

[1] *Am. Rep. Geol. Survey of Canada,* Vol. VIII, 1895.

The close proximity of the wooded section in the more southern portion and the narrowness of the so-called Arctic Zone causes it to be inhabited during the summer by many species from the strictly Hudsonian area to the west and south, even though conditions are not favourable for their permanent existence. Botanically the two zones are quite clearly defined, but from an entomological standpoint it would be difficult to draw the line.

Taking the country as a whole, the two hundred and forty recorded species probably represent less than thirty-five per cent of the insects which will be found to inhabit this region. It is somewhat difficult to make an estimate of the number of species in the more northern latitudes, where the tendency is toward vast numbers of individuals and few species, and where the insects with incomplete metamorphosis are poorly represented. There are, however, many reasons for considering that our knowledge of the insects of Labrador is very imperfect. The country with its comparatively rich flora (over five hundred species) presents quite favourable conditions for insect life, a fact which is shown by the large number of species recorded from the so-called Hudson Bay region, and the tendency of species in northern latitudes to extend entirely across the continent. There has been an almost total neglect of the Diptera, or flies, the order most prevalent in boreal regions, only fifteen species being recorded, while from Alaska, for example, two hundred and seventy-six species representing one hundred and thirty-eight genera and thirty-six families were obtained by Professor Trevor Kincaid of the Harriman expedition during the summer of 1899.

Under each order will be given a brief account of our present knowledge of the insects of this region, with notes on their habits, distribution, and other features of general interest.

I am indebted to Mr. H. H. Newcomb for the loan of some butterflies, to Mr. J. A. Cushman for photographs, and to Miss L. R. Martin for drawings illustrating this article.

The Diptera, or two-winged insects, comprise what are popularly known as flies, midges, gnats, and mosquitoes. I have stated that this is a very much neglected order, but I am told that they never neglect the visitor; in fact we would probably know more about the flies of Labrador if they were not quite so attentive. They constitute the most annoying, and at times an almost unbearable, feature of the short summer, nature seeming to strive to make up in individuals what it lacks in species. It seems remarkable that insects can increase in such numbers in so short a time, and under conditions apparently so unfavourable, but cold does not seem to hinder the development of certain species. Professor John B. Smith, in his work on the mosquitoes of New

Jersey, has positively proved that during the early days of February, in water just above the freezing temperature, the larva of *Culex canadensis* hatches from the egg. A wingless snow gnat (*Chionea valga*) is found only during the winter in the northern United States and Canada, crawling on the snow with the thermometer as low as 15° above zero. There are many other insects which seem to thrive under similar conditions.

Another feature which enables Diptera to withstand most unfavourable climatic conditions is their diversity of habit; aquatic, parasitic, herbivorous, and carnivorous, they feed upon almost everything from living tissue to the most putrid and decayed animal and vegetable matter, and are thus liable to be widely distributed through commerce. Many of the blood-thirsty species breed in water, the larva of the mosquito living in swamps and stagnant pools, while those of the black-fly frequent the rapidly running streams. These conditions, existing to so great an extent throughout the interior, present very favourable breeding places for these insects, and render some districts practically uninhabitable by man.

A great similarity prevails throughout the whole dipterous fauna of the more northern regions. Many are circumpolar in their distribution, others differ so slightly that it is almost impossible to determine them from descriptions, and comparison with European specimens is necessary. That they have not become more differentiated is probably due to the uniform climatic conditions under which they have existed. In numbers the Diptera extend farther into the Arctic region than any other order of insects, therefore presenting one of the best groups for tracing boreal distribution.

The flies include most of the many species of insects which infest mammals and birds. Of these parasites some may be external, others internal. Their generally small size and the indifference of trappers and most collectors of animals and birds to their existence, is one of the principal reasons for our lack of knowledge of these forms, especially from more northern latitudes. It is doubtful if there is an animal or bird which is entirely free from a parasite. While these are probably less numerous in the colder region, the conditions are quite favourable, and they are undoubtedly more abundant than is generally supposed.

There are two species of flies of which we know but little, but which we do know infest the caribou. They belong to the family Œstridæ, popularly known as bot-flies. The habits of one of the species are apparently similar to those of the sheep bot-fly. A description, therefore, of what is known of the latter species may aid in studying the life history of the one infesting the caribou.

The fly of the sheep-bot is about one-half of an inch in length, very rapid in its actions, and consequently not readily seen when flying. Its small size and obscure colouring would also prevent its detection when at rest in protected places during cold, wet days, for it only flies during the dry, warmer days, at which time the female attempts to deposit its young larvæ in the nostrils of the sheep. The eggs of the sheep bot-fly are retained until hatched in the oviduct, and emerge as young larvæ or maggots. The appearance of one of these flies among a flock of sheep causes considerable alarm, and they try various ways to prevent it from depositing its young larvæ. They huddle together, lie down and bury their noses in the dirt, and even raise a cloud of dust to deceive their enemy. When deposited in the nose of the sheep, the young maggot, by means of small hooks and spines, begins its migrations upward through the nostrils to the frontal sinuses. The movement of the larva, as it increases in size, greatly irritates the poor victim, and it makes many attempts, by sneezing and snorting, to rid itself of the parasite. This is rarely accomplished, however, until the larva reaches maturity, when it detaches itself from the mucous membrane, reaches the nose, and is expelled by the violent snorting of its host.

The grub remains about ten months in the nasal cavity of the sheep. After leaving the sheep it pupates and remains in that state from four to six weeks, when the adult fly makes its appearance.

Dr. Grenfell informs me that in all of the heads of the caribou that he has examined, he has found parasitic larvæ, usually just below the ethmoid. The injury done the caribou by this parasite is not known, nor do we know the species, as neither the larva nor fly has been secured. It probably belongs to the genus Cephalomyia. To work out its life history and determine the species would prove an interesting subject for investigation.

The second species infesting the caribou is a subcutaneous parasite, which may prove to be the same as the reindeer bot-fly (*Œdemagena tarandi*). If not, it is a closely related species, with a life history probably similar to that of the ox bot-fly, or warble (*Hypoderma*). The eggs are deposited on and fastened to the hairs in a similar manner to those of the horse bot-fly, and always in a position within reach of the animal's mouth, as on the fore legs and sides. In licking itself the animal transfers these eggs to the mouth, the saliva rapidly dissolves the hard egg cases, and the young larvæ already formed within are liberated. These young spiny larvæ pass by way of the œsophagus through the tissues of the animal to the subcutaneous tissue along the back, forming large tumours or swellings before reaching maturity. When the larva has attained its full size, it bores its way out and drops to the ground, into which it enters and pupates. It remains in this dormant stage about four weeks, when the fly emerges, soon to lay another lot of eggs. The larval period lasts about ten months, the presence of the larvæ causing inflammation, loss of flesh, and injury to the skin. Dr. Grenfell says that he has seen a skin so perforated that it was practically impossible to cut from it a pair of moccasins. Mr. Owen Bryant informs me that the caribou of Newfoundland are infested by what is apparently the same fly. The reindeer bot-fly is found in Alaska.

The birds and mammals of Labrador would indicate the presence of other families of insects. In the Diptera should be found members of the family Hipposcidæ, popularly called the louse-fly, from their habits of living parasitically upon birds and animals. They have flattened bodies adapted for moving readily between the feathers and hairs. Some species have wings, while in others the wings are obsolete or wanting. The term Pupipara is applied to this group on account of its remarkable mode of reproduction. The eggs hatch within the body of the parent, the larva being retained and nourished until full grown and ready to change to the pupa. These flies are most commonly observed on the hawks and owls, although many other birds are infested. The owl-fly (*Olfersia americana*) lives upon the great-horned owl. The *Pseudolfersia maculata* Coq. (= *fumipennis*) infests the osprey and loon, while on blackbirds and other small birds are frequently found the more common bird-fly, *Ornithomyia pallida*. Many species of the Mallophaga, or bird-lice, are probably present on various species of birds.

The horse-flies, or gad-flies, are represented by the two most prominent genera — Chrysops, or deer-flies, and Tabanus, or true horse-flies. Both are at times very annoying, especially in the woods, swarming about in great numbers and frequently giving sharp bites. Packard, in referring to these flies, says: "Half a dozen frightful horse-flies of gigantic stature hovered about. Now and then, when we are not watching, they will settle down on our hands and bite terribly, making a wound which does not heal for days." I am told the natives call them "waps," probably a corruption of "wasps." They are not as active on a cloudy day, and a strong breeze will usually disperse them.

FIG. 4.
Larva of the Horse-fly.

The three species of Chrysops are all black forms with the usual broad black band on the centre of the wing. *Chrysops excitans* (Pl., Fig. 1) has two of the basal segments of the abdomen yellowish on the sides with a large gray triangle on the second segment. *Chrysops mitis* has the abdomen entirely black, with faint triangles of grayish hairs. *Chrysops sordidus* is distinguished by having the first and second segments of the abdomen marked with yellow on the sides, and the posterior margins of all the segments narrowly bordered with gray, and a dorsal row of small triangles. The species are all of about the same size, a little less than a half inch in length, *C. excitans* as a rule being a little larger than the other two.

The larger horse-flies are represented by at least six species, all belonging to the group with hairy eyes. These were formerly separated from the genus Tabanus and placed in the genus Therioplectes, but they are now united, the character used in separating them being probably only of subgeneric value. The two most prominent species are *Tabanus flavipes*, or the yellow-footed horse-fly, and *Tabanus zonalis*, or banded horse-fly (Pl., Fig. 2). They are nearly three-quarters of an inch in length, with wings spreading an inch and a quarter; black, with the posterior margins of the abdominal segments bordered with a band of golden-yellow hair; the wings are brownish, tinged with yellow toward the base. The two species closely resemble each other, but can be readily separated by the latter's having the tubercle in front of the base of the wing reddish, and the yellow bands of the abdomen broader, with slight anterior projections on the second and third segments. The *Tabanus auripilus* of northern Europe is closely related to *flavipes*. Another species of about the same size is *Tabanus affinis* (Pl., Fig. 3); it is a dark brownish black, with the sides of the abdomen red. The little-headed horse-fly, *Tabanus microcephalus*, is about one-half inch in length; the head is comparatively small, not exceeding the width of the thorax; the abdomen is marked with three rows of conspicuous grayish triangles. The northern horse-fly, *Tabanus septentrionalis*, is similar in general appearance, but with a larger head and less prominent abdominal markings. The sixth species, *Tabanus illotus*, is distinguished from the preceding one by the broad, distinctly excised, third antennal joint, and faint brown clouding on the cross-veins.

The larvæ of the horse-flies (Fig. 4) are aquatic or subaquatic, living either in the mud in streams and swamps, or in wet earth adjacent to springs. The eggs are placed on plants overhanging the water or in very wet situations. The eggs hatch in about a week, and the young larvæ drop into the water or mud. The larvæ are carnivorous, feeding upon other insects and snails, and probably repaying to some extent their annoyance when adult. They are cylindrical, tapering gradually toward the end, and usually translucent, whitish, and in some of the larger species

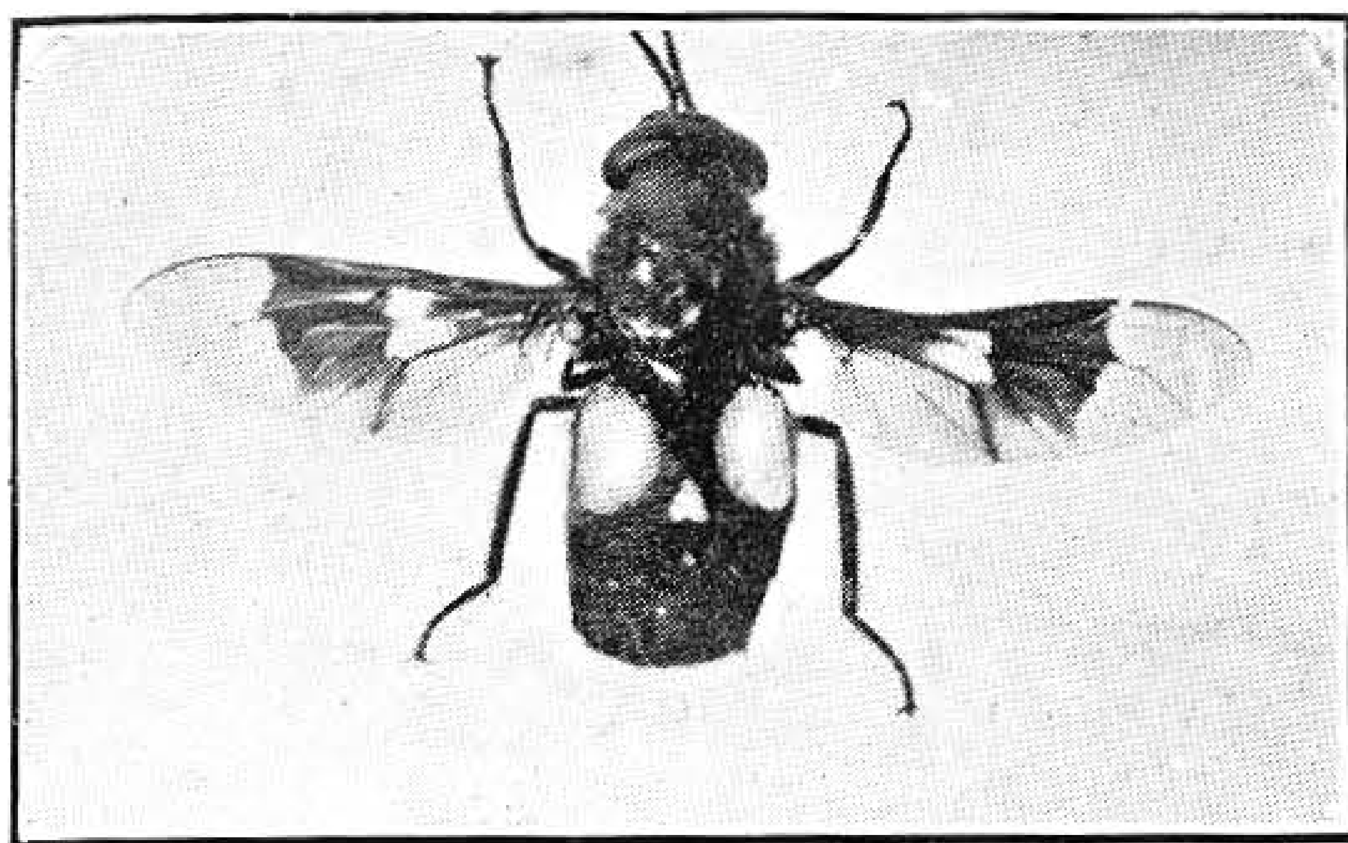


FIG. 1. Chrysops excitans (enlarged)

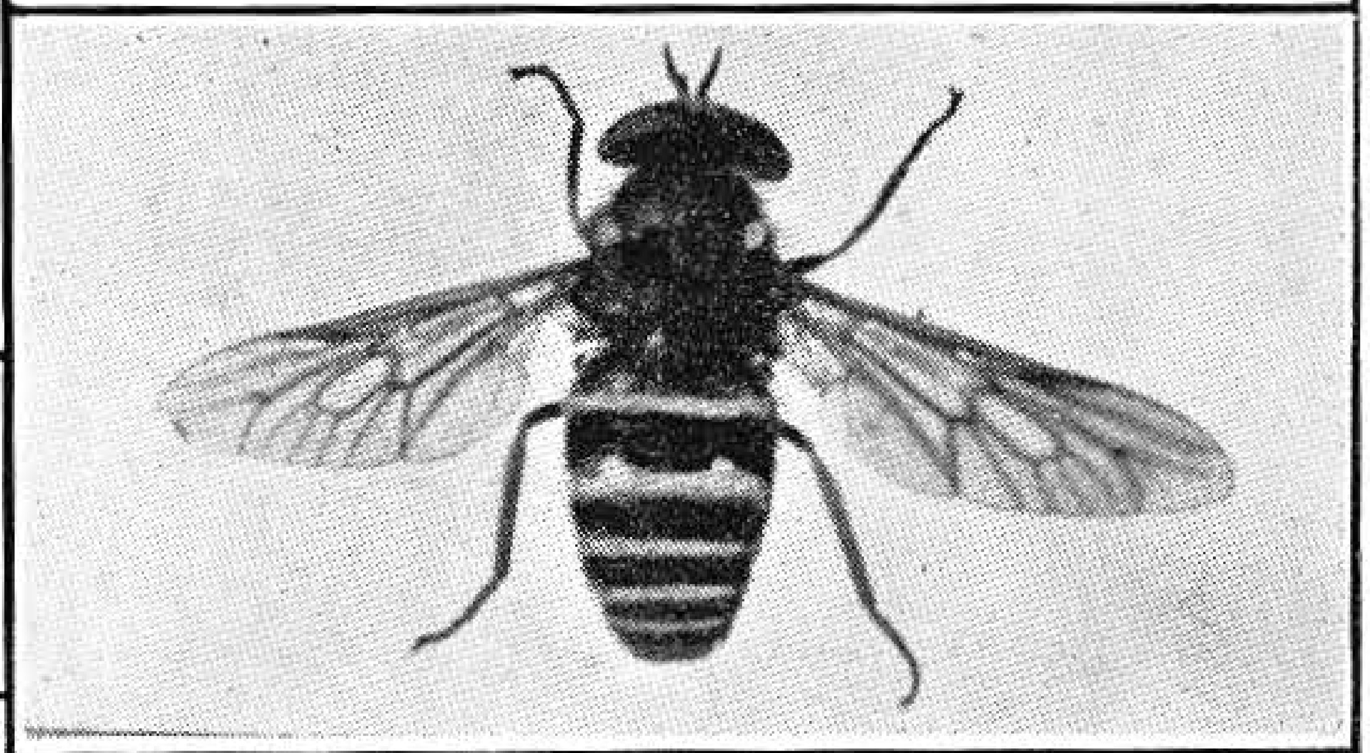


FIG. 2. Tabanus zonalis

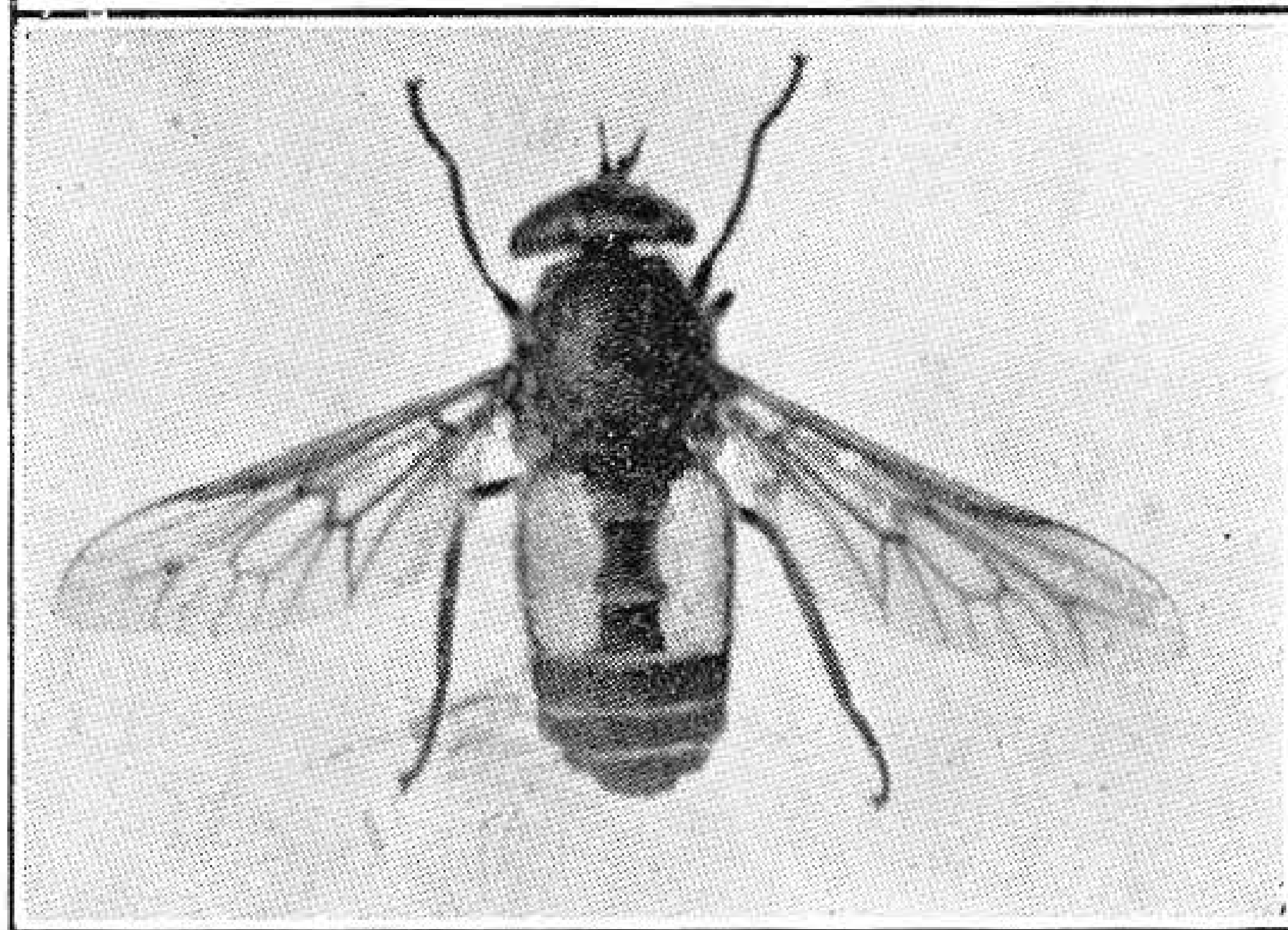


FIG. 3. Tabanus affinis

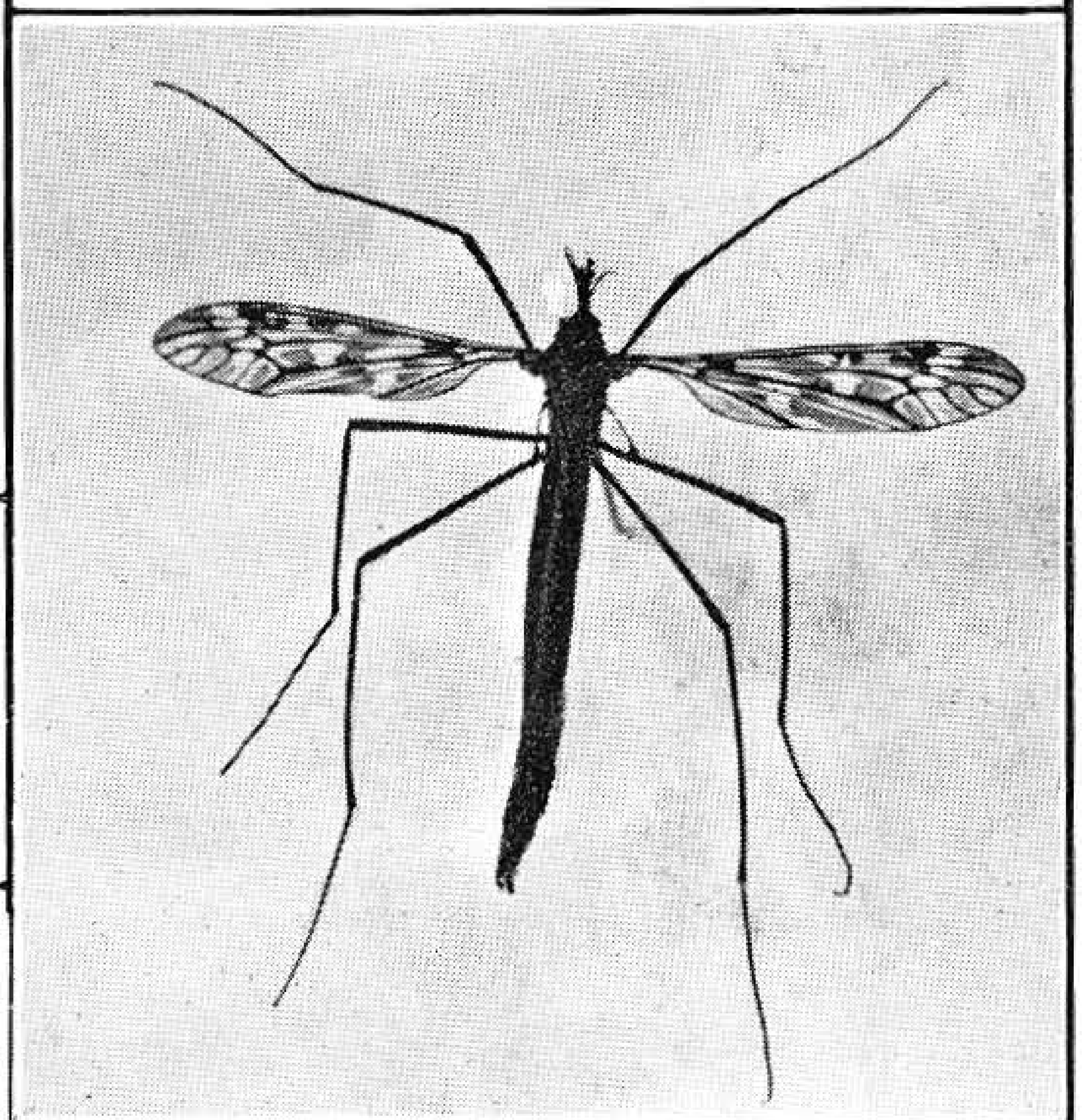


FIG. 5. Tipula tesselata

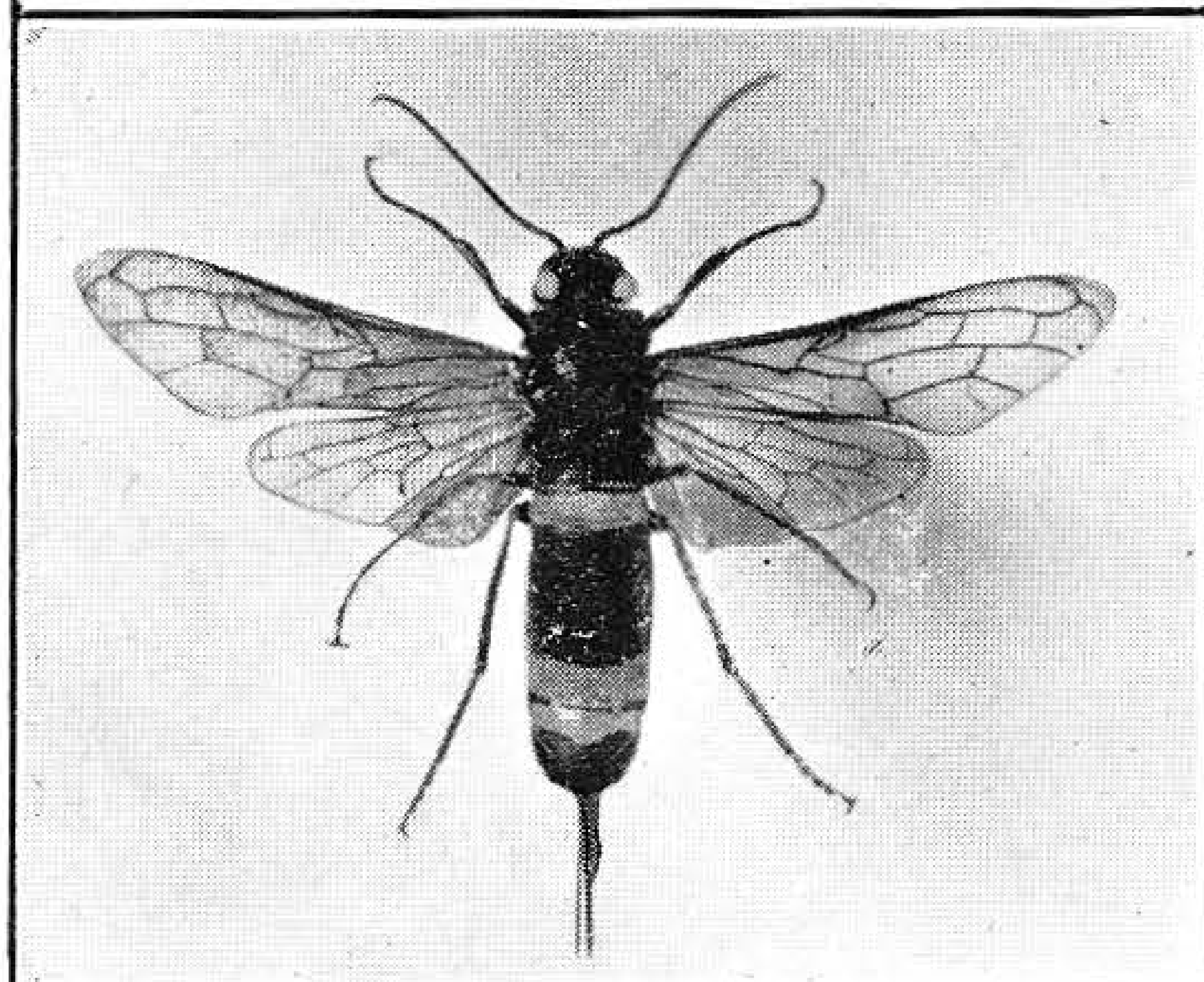


FIG. 8. Sirex flavicornis

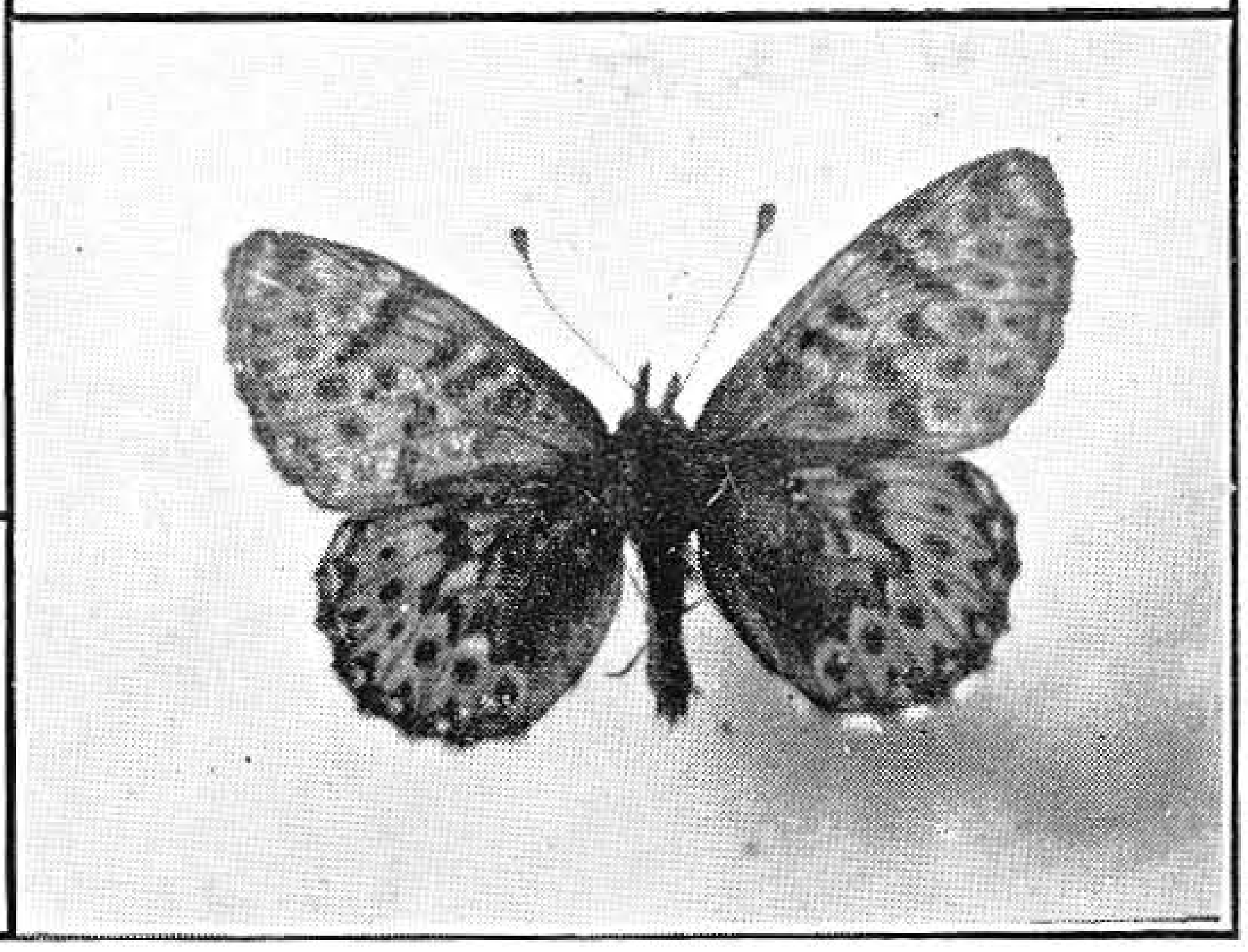


FIG. 9. Brenthus frigga

frequently banded with brown or black. They possess great extensile and retractile powers, which enable them to move quite rapidly through the mud and decaying vegetable matter. When captured they are restless and active; if held carelessly in the closed hand they use their mandibles freely, puncturing the skin and causing severe pain.

The family Tipulidæ, or the crane-flies, as they are popularly called in reference to their long, slender legs, constitute a very conspicuous group of flies which extends well into the Arctic region. Six species have been recorded from Labrador, but there are probably four or five times this number. The large tessellated crane-fly, *Tipula tessellata* (Pl., Fig. 5), is over an inch in length, with spotted wings and dark body covered with a grayish pollen. The northern crane-fly, *Tipula septentrionalis*, is a smaller species, with darker wings marked with white and black. The larvæ of this group live either in damp, decaying vegetation, or in wet earth and water.

Of the mosquitoes of Labrador we only know that they are abundant and constitute a very annoying feature, but from a systematic standpoint we know very little. Specimens collected by Dr. C. W. Townsend and Dr. G. M. Allen were submitted to Dr. H. G. Dyer, who says: "I have looked over your specimens, and find that they unfortunately belong to that group of Ædes which cannot be determined with any certainty without the larvæ. I have been able to separate most of the species from regions collected over, but as these come from Labrador, it is possible that they represent new species, which would have differential larvæ, but be very close as adults. These are some of the early spring species, which in Labrador are doubtless the dominant, if not the only occurring, species."

Closely related to the Culicidæ, or mosquitoes, are the Chironomidæ, or midges. Four or five species of this family have been collected, but among them are no representatives of the biting forms. To the genus Ceratopogon belong the "punkies," or "biting gnats," which the Indians call the "no-see-um." These very minute but annoying insects are sometimes abundant in northern Maine, and especially noticeable just after sunset when there is no wind. They may possibly extend into southern Labrador.

The black-fly, *Simulium* (Fig. 6), is an even more formidable pest than the mosquito, for, unlike the latter, it makes its appearance only on the bright sunny days and disappears during the cloudy weather. In describing their attacks, Packard says: "The armies of black-flies were supported by light brigades of mosquitoes. They fly into our faces; they do not bite hard, like the mosquitoes, but the vampires suck long and deep, leaving great clots of blood.

No wonder that these entomological pests are a perfect barrier to inland travel, and that few people live during the summer away from the sweep of the high winds and dwell on the exposed shores of the coast to escape these torments." The larva of the black-fly (Fig. 7) lives in the swiftly flowing streams, while those of the mosquito are found in stagnant water, and as "one-third of the area is given up to ponds and streams," conditions are very favourable for their increase.

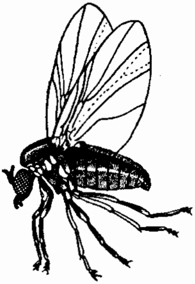


FIG. 6.
The Black-fly.

There are many other species of flies, fully as interesting as the biters. The little Dolichopodidæ and Empididæ are each represented by four or five species; the bright-coloured Syrphidæ, by about twelve species, including such forms as *Syrphus contumax*, *S. diversipes*, *Melanosto mamellinum*, *Eristalis bastardi*, and *Helophilus glacialis;* the Tachinidæ, or parasitic flies, by the large *Echinomyia florum;* the Muscidæ, or house-flies, by the "blow-fly" (*Calliphora vomitoria*), the blue flesh-fly (*Cynomyia cadaverina*), the common green carrion-fly (*Lucilia cæsar*), and the dark blue (*Phormia terræ novæ*). Hosts of Anthomyidæ are yet to be determined, while the Scatophagidæ are represented by the widely distributed *Scatophaga stercoria*, *furcata*, and *islandica*.

The order Hymenoptera includes the bees, wasps, ants, saw-flies, etc. Notwithstanding their diversity of habit, it is one of the orders which diminishes greatly in numbers as we approach the more Arctic regions. Only twenty-six species have been recorded from Labrador. Further research will, however, increase this number, especially in the Ichneumonidæ, or parasitic species.

The large percentage of Phyllophaga, or leaf-eaters, is very marked, eleven of the above numbers representing this group. They belong to the family Tenthridinidæ, popularly known as saw-flies, a term derived from a peculiar structure on the under side of the last abdominal segment of the female, consisting of a pair of chitinous, sawlike pieces with which she cuts little pockets in the leaves in which to deposit her eggs.

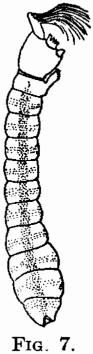


FIG. 7.
Larva of the Black-fly.

Many of the saw-flies are injurious to the spruce, larch, willow, birch, and other trees and plants, often completely defoliating them. The larvæ resemble some of those of the butterflies and moths, but can be quite readily distinguished by having from twelve to sixteen prolegs, or abdominal feet, while the true caterpillars have as a rule only ten. Various species of the genus Nematus infest the spruce, willow, and birch. *Euura orbitalis* makes a gall on the willow.

Closely allied to the saw-flies are the Xylophaga, or wood-eating Hymenoptera, comprising the family Siricidæ, or horntails, the females being provided with a long, hornlike ovipositor adapted for boring, as the eggs are laid in solid wood on which the larvæ feed. Two species are recorded from Labrador. The large and beautiful *Sirex flavicornis* (Pl., Fig. 8), with its handsome livery of deep black and orange-yellow, seems to be quite common. The male is smaller and darker than the female, the yellow being confined to the four middle segments of the abdomen, at the end of which there is only a short triangular projection. It differs so much from the female that for a long time it masqueraded under the name of *Sirex abdominalis*. In more southern localities this insect infests the white pine, but in this region it probably lives in the spruce. *Sirex cyaneus*, a dark blue species, has been recorded from Hopedale. We should naturally expect to find one of the large ichneumon flies (Thalessa or Rhyssa) with very long ovipositors, which parasitizes the horntails farther south.

There are a large number of parasitic species belonging to the family Ichneumonidæ. Packard collected about twenty-five species, only five of which have been determined. He also records two or three species of Chalcidæ. Both of these groups are probably mostly parasitic, as the various species of moth.

Two species of ants are recorded, — the large *Campanotus herculeanus*, or black carpenter ant, which builds extensive nests in logs and stumps and even living trees, and *Formica sanguinea*, or the "slave makers." It would be interesting to note the habits of this species in the more northern latitudes. The white-faced hornet, or paper-making wasp (*Vespa maculata*), has been recorded from the more southern portions of the peninsula, and *Vespa norvègica* from Caribou Island. Five species of bumblebees (Bombus) have been collected, some of which have a wide band of dark orange-red pile on the abdomen. There are probably a number of the smaller bees, such as *Andrena* and *Halictus*, several species of which often appear very early in the spring in more southern latitudes.

The order Lepidoptera, or the butterflies and moths, is not only very well represented, but includes many rare and interesting species. Upwards of one hundred and fifteen have been recorded, of which number eighteen are butterflies. Among the latter are four species of the smaller Fritillaries, — *Brenthus frigga* (Pl., Fig. 9), *B. polaris*, *B. triclaris*, and *B. chariclea*. They are similar in appearance, the upper surface of the wings being reddish, marked with black, while the under side of the hind wings bears a series of whitish spots or markings. A larger species, *Argynnis atlantis*, the "mountain silver-spot," has been recorded from the interior of the peninsula. It may prove to be only an accidental visitor, although two species of violets, the food plant of the Fritillaries, are recorded as far north as Hopedale. *Papilio turnus*, the yellow swallow-tail, has also been recorded from the interior.

The northern white butterfly (*Pontia napi*, variety *frigida*) varies greatly in different localities, and consequently has received many varietal names. The wings are white, with the veins on the under side more or less broadly marked with gray, with the tip of the fore wings and the hind wings pale yellow. The larvæ feed on various species of the Cruciferous plants, especially turnip and mustard.

The smaller yellow, or sulphur, butterflies are represented by three or four species, — *Eurymus palæno*, *nastes*, and *pelidne* or *labradorensis*. The large "white-j butterfly," *Eugonia j-album* (Pl., Fig. 10), is marked with dull yellow and reddish brown, irregularly maculated with black, with a spot of white near the tip of the wing, and the outer margin with a double crenulated line; the hind wing is reddish brown, black along the anterior margin, with a central patch of white; the under side consists of various shades of grayish brown, giving a woody or mossy effect, and when the insect is at rest presenting an interesting example of protective coloration. The larvæ feed on birch. It has been taken as far north as Okkak.

The barren-ground butterfly, or Arctic satyr, *Œneis jutta* (Pl., Fig. 11), is circumpolar, being found in the more northern parts of both the eastern and western continents. The colour of the fore wings is a dark brown, with six yellowish spots of varying sizes near the outer margin and somewhat blending into the brown, spots with or without central points of black; the hind wing has four yellowish patches, the anal one with a small black spot; the under side is brownish, the hind wings being mottled with gray and closely resembling the moss-covered ground and rocks. A closely related species, the "White Mountain butterfly" (*Œneis norma*, variety *semidea*), is very similar in colour, and its habits have been so nicely described by Mr. A. H. Scudder that I quote the following: —

"As soon as one alights it tumbles upon one side with a sudden fall, but not quite to the surface, exposing the under side of the wings with their marbled markings next the gray rocks mottled with brown and yellow lichens, so that the ordinary passer-by would look at them without observing their presence: it is an obvious case of protective resemblance. The surface is generally exposed so as to receive the fullest rays of the sun, or else the creature falls so as to let the wind sweep over it, its base to the windward."

The larva of the Arctic satyr feeds on carax. It has been found at Nain, Hopedale, and Square Island Harbour during the months of June and July. *Œneis norma*, varieties *semidea* (*œno*) and *bore*, are recorded from Strawberry Harbour and Hopedale, collected August 3.

The little "Arctic bluet," *Agriades aquilo* (*Polyommatus franklinii* Curtis), which Packard refers to as "half skipping and half flying over the lichened boulders," has been taken at Sloop Harbour, Henley Harbour, and Hopedale, July 19 to August 15. In the interior of the peninsula, one of the varieties of the "Spring Azure" — *Lycæna* (*Cyaniris*) *ladon*, variety *lucia* — has been collected. Its colour is a pale violet, the wings having a broad blackish border in the female; under side of the wings is light gray, flecked with brownish black. The wings expand about one inch. It feeds on a great variety of plants, especially *Cornus*.

Two species of the Hesperidæ, or skippers, are recorded. The *Pamphila comma*, representing the variety "*catena* Stand.," is also found in northern Scandinavia and Lapland. The other species is *Hesperia centaureæ* Ramb.

The family Arctiidæ is represented by only four species. One of the tiger-moths (*Apantesis quenseli*), a small black species with the fore wings tessellated with white, is also found throughout Arctic America, Europe, and Asia, and on Mount Washington, New Hampshire, and the Swiss Alps. The great tiger-moth, *Arctia caia*, has dark brown fore wings marked with white, and bright red hind wings spotted with black. It is also circumpolar in its distribution. The large and beautiful "St. Lawrence tiger-moth," *Hyphoraia parthenos* (Pl., Fig. 12), with its bright reddish brown fore wings spotted with yellow, and bright yellow hind wings banded with black, is recorded from the Moravian stations.

The Noctuidæ, or owlet-moths, number about forty species, and form a very interesting group worthy of a great deal of study. Professor Packard refers to those boreal forms as follows: —

"The moths were all Arctic species, and when at rest so harmonized in colour with the lichens and other vegetation in which they nestled as to entirely deceive me. And yet what was the use of practising, even unconsciously to themselves, this deception? The answer was not far off — there was a shore lark, or some such bird, flitting about and running over the rocks, busily searching for just such moths as these, and the only hope of safety for the insects from their sharp eyes was in their resemblance to the lichens."

The forty species are divided among some fourteen genera according to the more modern classification, the more prominent of these being *Mamestra*, *Pachnobia*, *Hadena*, *Semiophora*, *Anarta*

(Pl., Fig. 13), *Noctua*, and *Syngrapha*. To this family belong the cutworms and many other injurious species. The larvæ vary considerably in appearance, and feed upon a great variety of plants.

The Geometridæ, or measuring-worms, are so named from the peculiar looping gait of the larvæ, as if measuring the surface over which they move. There have been recorded about twenty species. The family Lipariidæ is represented by *Gynœphora rossii;* and the Hepialidæ, or ghost-moths, by *Hepialus hyperboreus* and *mustelinus*.

The family Pyralidæ, numbering about eight species; the Crambidæ, or "close wings," some six species; the Tortricidæ, or leaf-rollers, — a term derived from the habit of many of the larvæ, — with about twenty species; and the Tineidæ, which contains the clothes-moths and a number of the leaf-miners, and represented by some ten species, comprise the smaller species, and constitute in part what are commonly classed as the Microlepidoptera.

The caddis-flies constitute one of the most interesting groups of aquatic insects. They belong to the order Trichoptera, or hairy-winged insects. At first sight many of these resemble a moth, but with a closer acquaintance no one need confuse the two. The peculiar habits of the larvæ of the various species form one of the most interesting studies of insect life. A bundle of little sticks, or a tube made of coarse grains of sand, moving mysteriously about the bottom of a stream or spring is apt to attract the attention of the most casual observer, but how few know what these are. They are the cases of the caddis-worms, the larvæ of the caddis-flies, built to protect their soft bodies from their enemies. What adds so much to their interest is that each species has a very different method of house building, some preferring wood, others stone, but the caddis carpenters and masons do not always build in the same manner. Some place the sticks crosswise, while others arrange them longitudinally; some have the curious habit of decorating by fastening shells, etc., to the outside of their houses; others make a case largely composed of pieces of leaves. The numerous masons seem to be very particular about the size of the stones and the shape and position of their domiciles. One will make a beautiful tube of sand, unattached, in which it wanders to all parts of the stream; another will make a spiral tube so closely resembling a snail-shell as to lead a conchologist to describe it as a mollusk. One, commonly observed in running streams, is made of a few small pebbles attached to a large stone. Some of the dwellers in these rude homes are also fishermen and construct a funnel-shaped net at their doors, with the opening upstream. Their nets are made of silken threads, such as are used in fastening

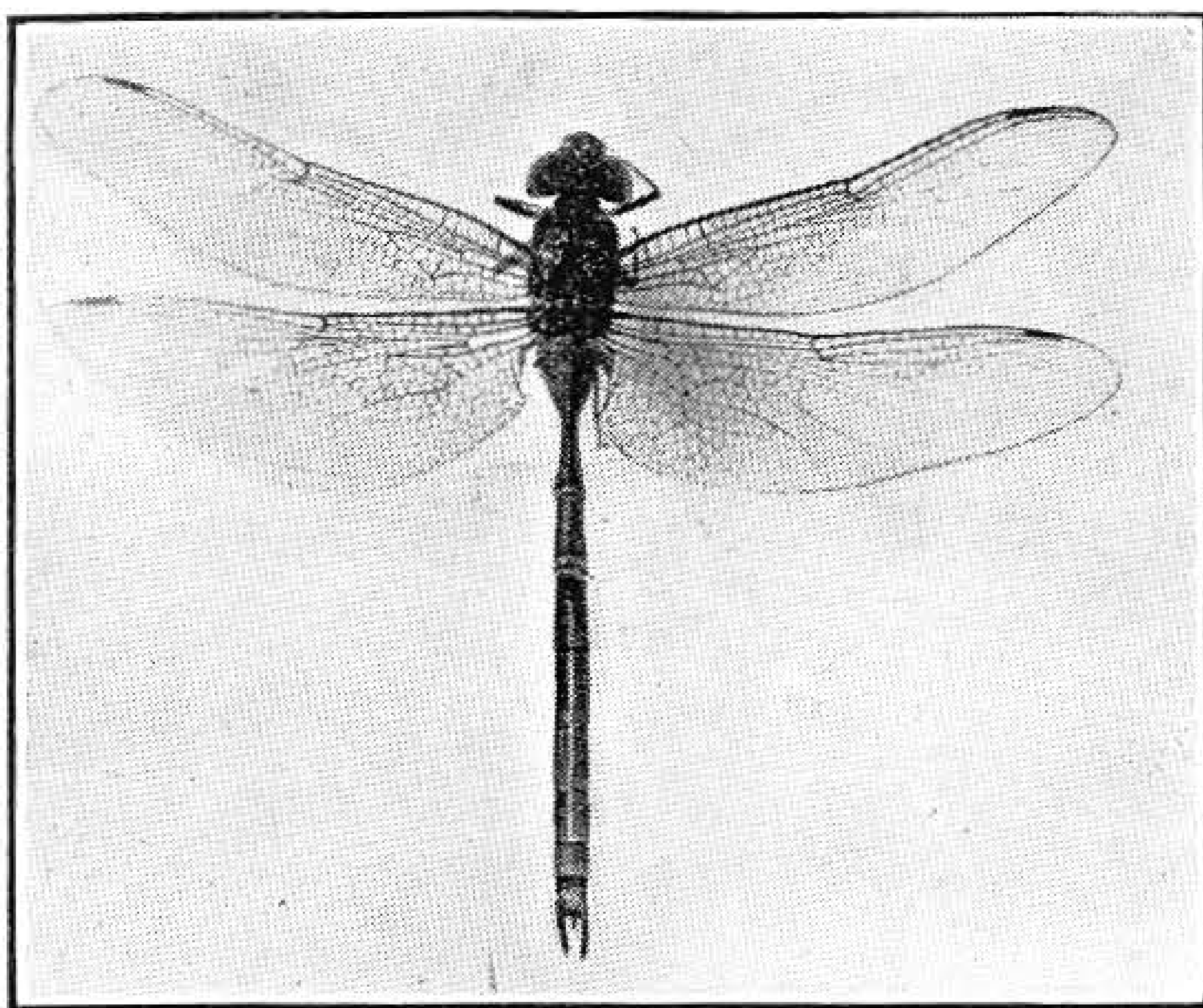


FIG. 15. Æshna constricta

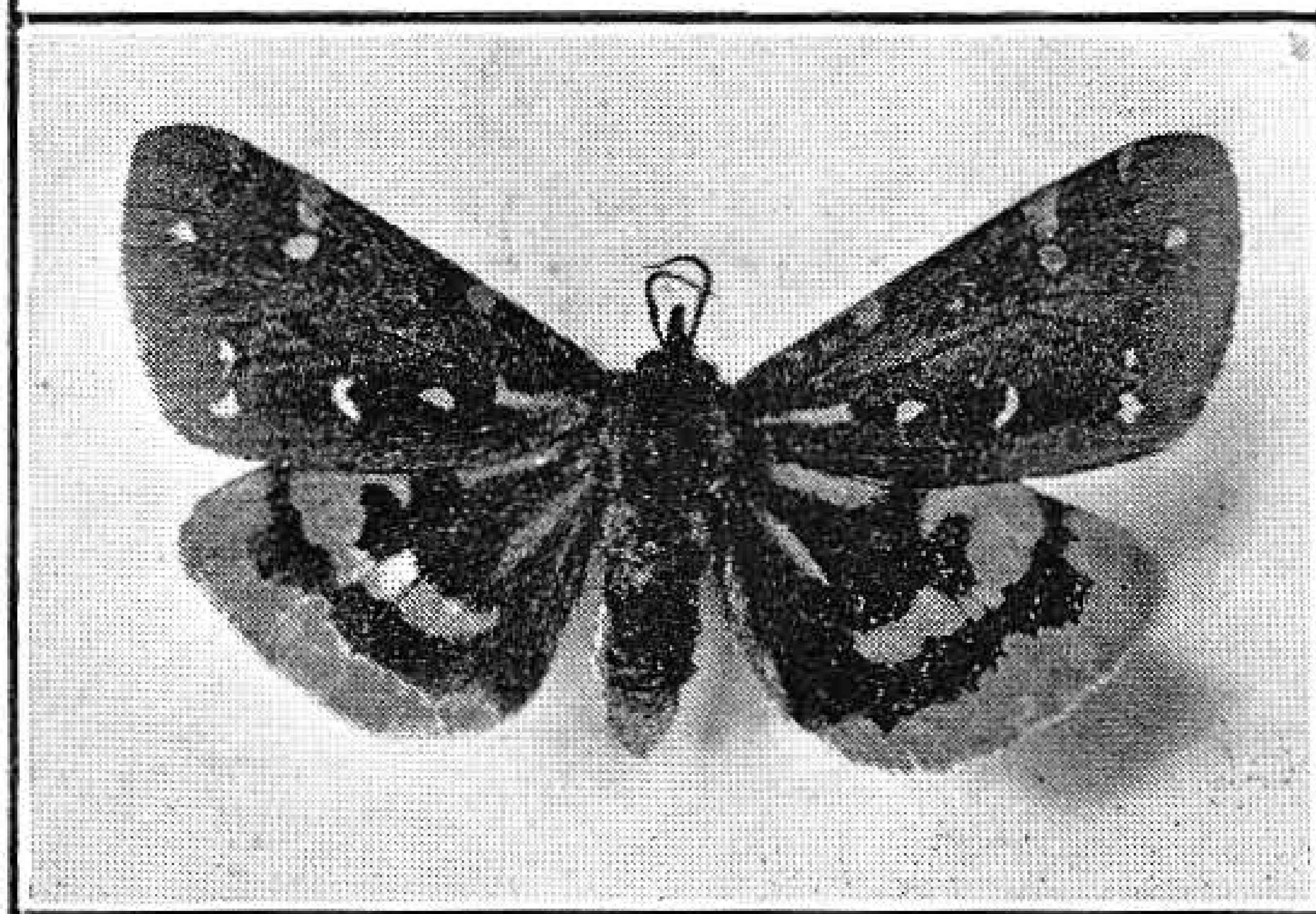


FIG. 12. Hyphoraia parthenos

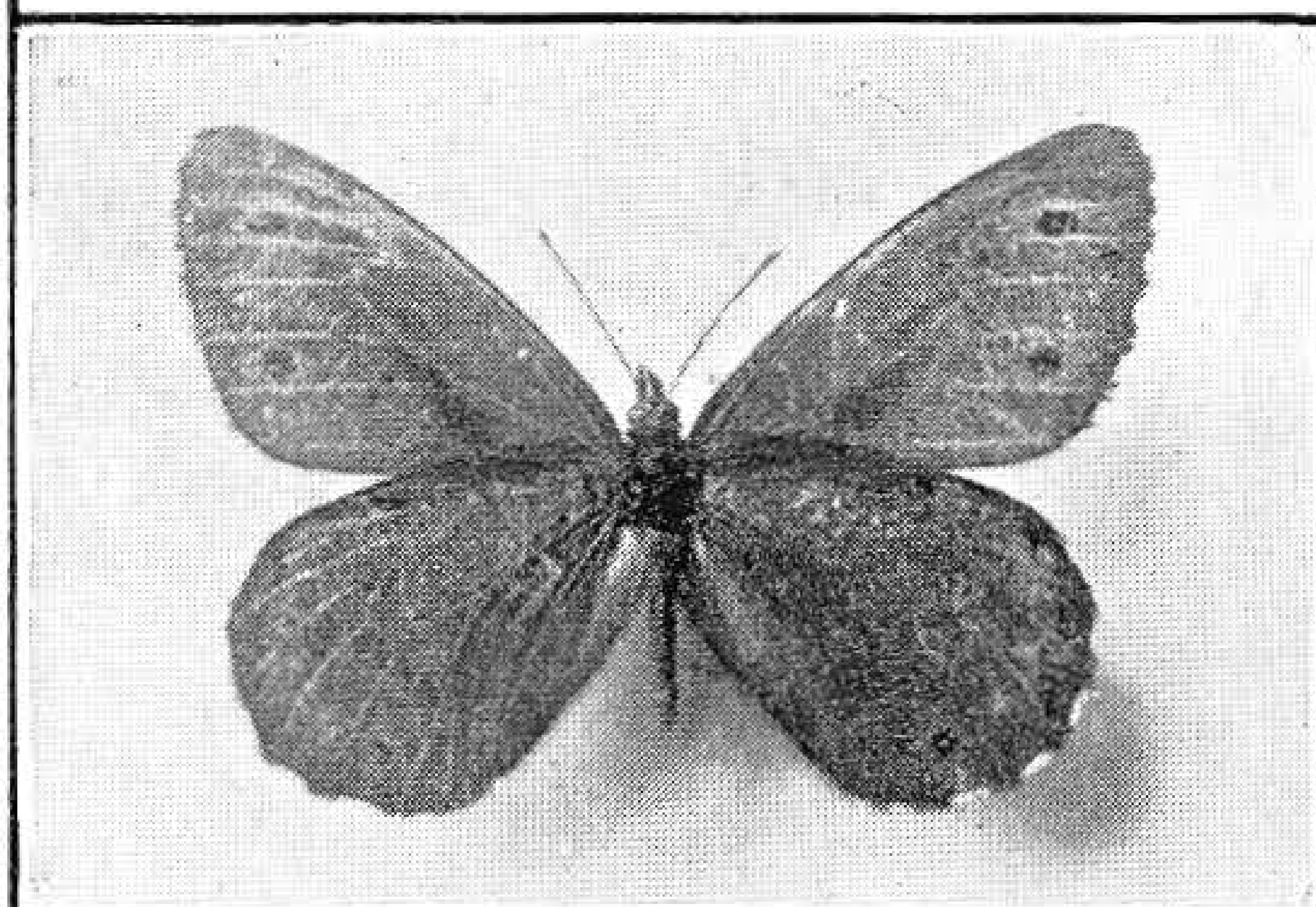


FIG. 11. Œneis jutta

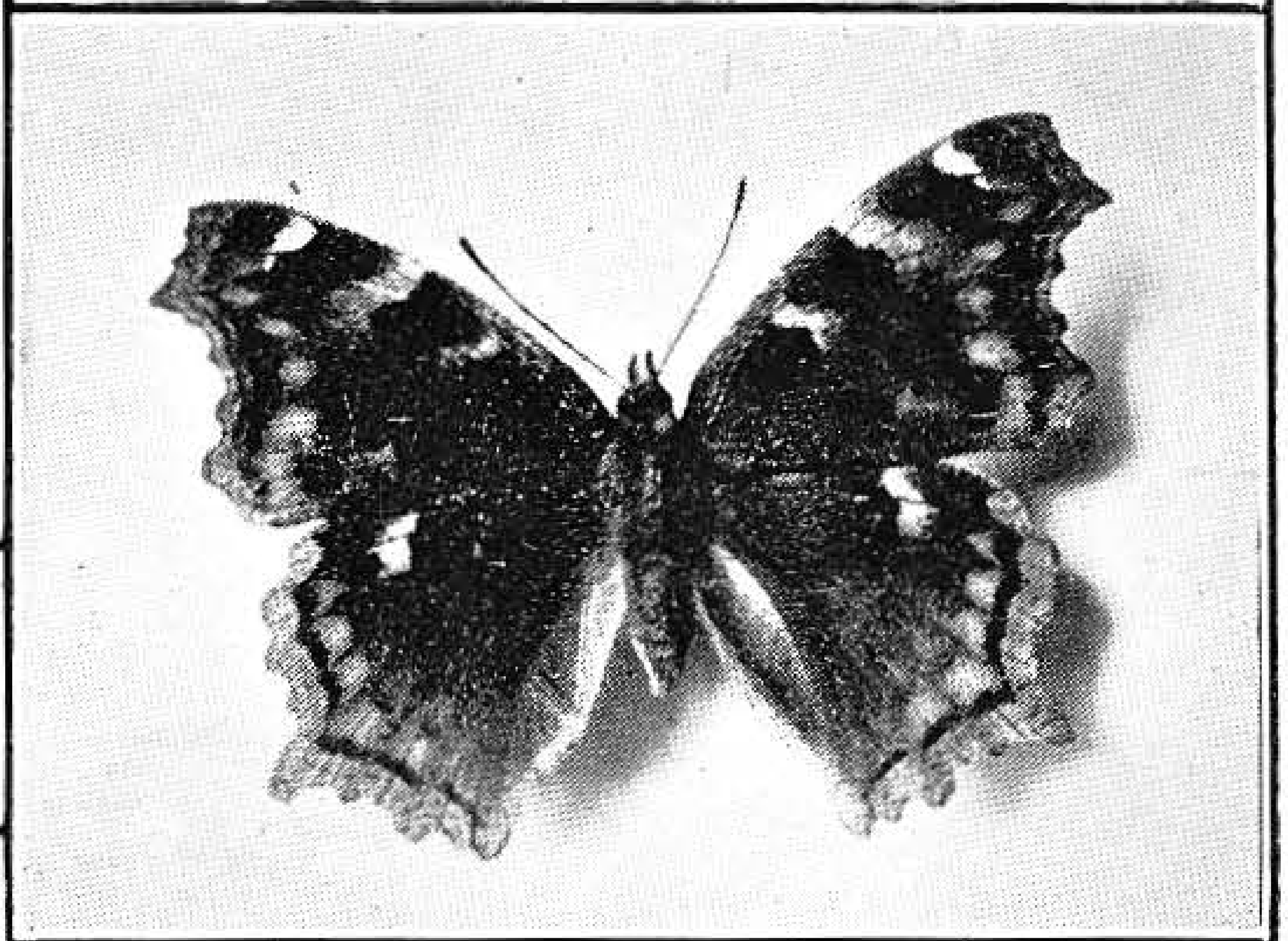


FIG. 10. Eugonia j-album

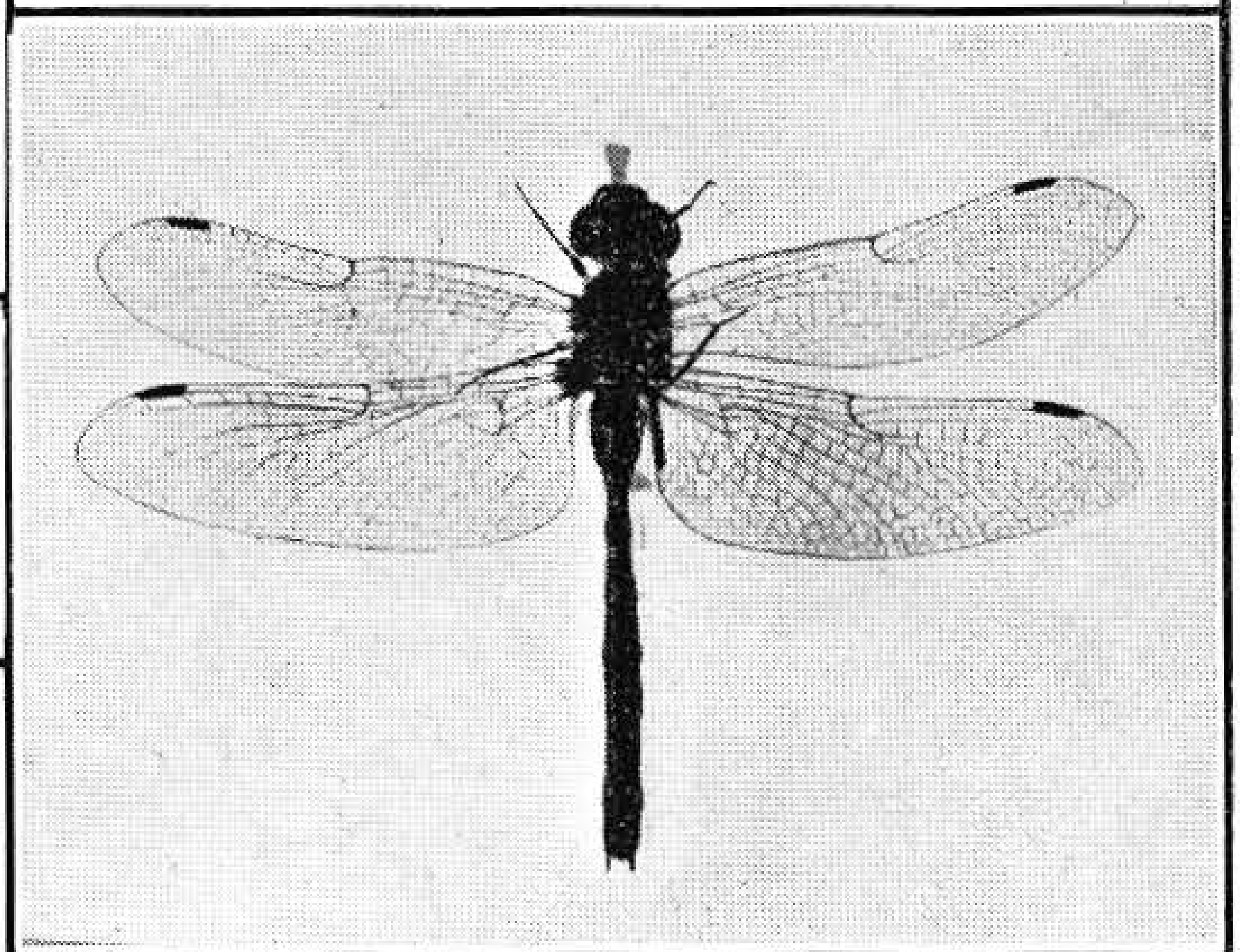


FIG. 16. Leucorhina hudsonica

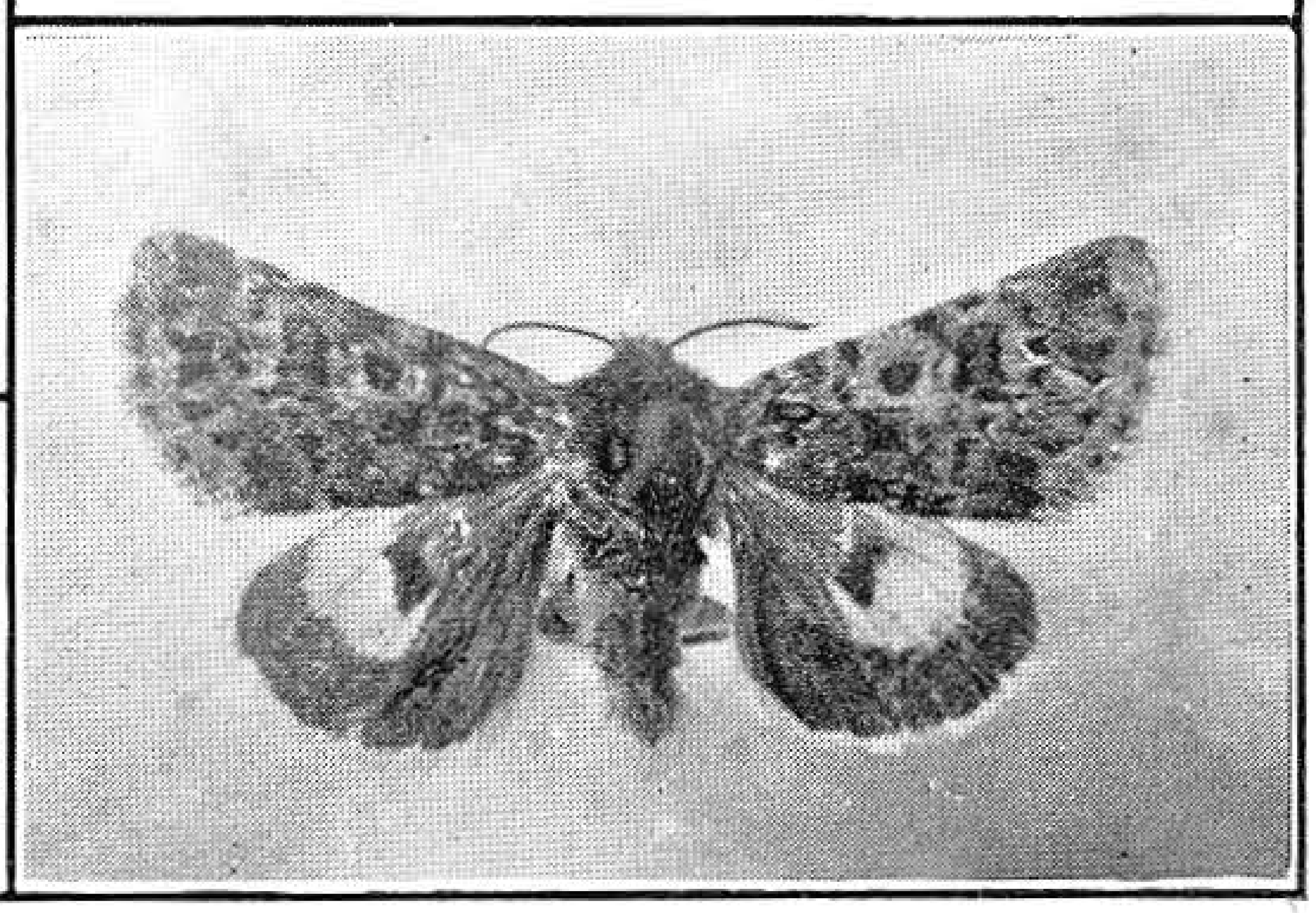


FIG. 13. Anarta

together the stones and sticks. In some species the entire case is made of silk. Some five or six species have been recorded from Labrador. *Limnophilus subpunctatus* is a common species which is also found in Lapland. *Desmataulius planifrons* is recorded by Professor Packard from Okkak.

The Hemiptera, or true bugs, are poorly represented, — two leaf-hoppers, including *Deltocephalus debilis;* a small bug, *Trigonotylus ruficornis;* and one of the "water-boat-man," *Corisa*, are all that have been discovered. Equally scarce are the Orthoptera, only one species of grasshopper, *Melanoplus*, having been recorded.

The Odonata, or dragon-flies, are among the most active and swift-flying of insects, darting back and forth over the ponds and streams and turning suddenly as they seize any unfortunate midge that comes within their reach; or alighting on the tip of a dead stick or reed from which vantage-point they can swoop like hawks upon their prey. Thus they are in many sections of the country known by the popular name of mosquito hawks.

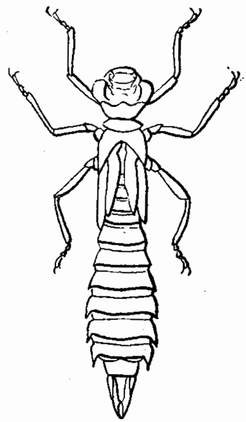


Fig. 14.
Nymph of the Dragon-fly.

The dragon-fly lays her eggs in the water, where the young or nymphal stages are passed. The nymph (Fig. 14) is a clumsy, awkward creature, crawling over the mud and among decaying vegetation, where it will lie partly concealed until its unsuspecting victim comes within reach of its extensible lower lip, which is armed with a pair of jawlike hooks. They are voracious feeders and not at all particular, for young fish are frequent victims. They are, however, to be classed among the beneficial insects, for they undoubtedly destroy great numbers of the pestiferous gnats, mosquitoes, and flies.

After moulting several times, the nymph, when it attains its full size, crawls out upon some stick or plant, the skin splits longitudinally along the back, and the adult dragon-fly emerges. The life of the adult is from twenty to forty days, depending on climatic conditions, the more northern latitudes being unfavourable. About three hundred species are known from the whole of North America, of which only eight have thus far been collected in Labrador, including such large and widely distributed species as *Æshna constricta* (Pl., Fig. 15), *Æ. crenata*, *Æ. septentrionalis*, the type of which was from Labrador, four species of the genus *Somato-*

chlora, two of which were originally described from this region, and *Leucorhina hudsonica* (Pl., Fig. 16).

The May-flies, or day-flies, belong to the order Ephemerida, an application which refers to the short lives of the imagoes. They represent one of the more primitive groups, with mouth-parts rudimentary or almost wanting in the adult, as they do not feed during their few hours of existence as winged insects. The wings are delicate, with a fine network of veins; the hind wings are much smaller than the fore wings, or sometimes wanting; the abdomen bears two or three long, many-jointed, bristlelike appendages, while the antennæ are very short. In the nymph or the wingless aquatic stage their life is a long one, in some species often extending to two or three years. The nymphs are interesting objects of the streams and lakes, clinging to the under sides of stones and sticks and feeding on the smaller animal and plant life. They are readily recognized by having their sides fringed with tracheal gills, two or three caudal appendages, and feet with single claws. When the nymph attains its full size, it rises to the surface, the cuticle along the back suddenly splits, and a frail-winged creature appears, but this is not the true imago; it is what is known as the subimago stage. In a short time another moulting takes place, and we have the adult day-fly. This subimago stage is unknown in any other order of insects. *Potamanthus marginatus*, the only species recorded from Labrador, also occurs in northern Europe.

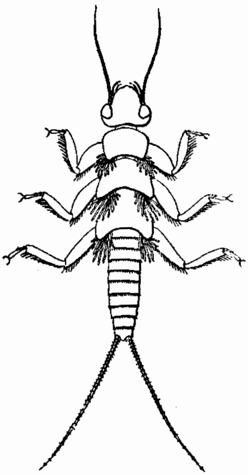


FIG. 17.
Nymph of the Stone-fly.

Somewhat resembling the nymphs of the day-flies are those of the stone-flies, belonging to the order Plecoptera, or plaited-winged insects. These can, however, be easily separated, the gills being in the form of tufts of short hairs on the thorax and behind each leg, and not on the sides of the abdomen. The feet have two claws, the legs being usually fringed with hairs, and there are two caudal processes. They are found in streams which are quite rapid, as they require more aërated water than the nymphs of the day-flies. Reaching its full size, the nymph (Fig. 17) crawls out upon the rocks or trees, the skin splits along the back, and the adult appears.

The full-grown stone-fly (Fig. 18) is, however, very different in appearance from the day-fly. The body is flattened, the antennæ are quite long, the fore wings narrow, and noticeably smaller than the hind wings. Some of the smaller species appear very early in the spring, long before the snow has melted. Three species have been recorded from this region, — the large *Pteronarcys regalis*, *Perla* sp., and one of the small green *Chloroperla*.

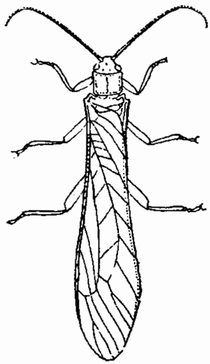


FIG. 18.
The Stone-fly.

The Thysanura, popularly known as the bristle-tails or spring-tails, constitute the most primitive group of insects. Although not recorded from Labrador, there is little doubt that the order is represented, for they seem to thrive under very unfavourable conditions. The snow-flea (*Achorutes nivicola*), a minute, blue-black insect, is exceedingly abundant in the snow in New England and Canada, and undoubtedly extends northward. A closely allied species, *Podura humicola*, is found in Greenland.

While the spiders do not belong to the true insects, but constitute a separate class known as Arachnida, they are very frequently referred to in connection with insects. Spiders are distinguished by having four pairs of legs, the head and thorax united, forming the cephalothorax and an unsegmented abdomen. Eleven species have been recorded, including several of the genus Lycosa, or running spiders, two of the "orb-weavers" (*Epiera*), and a "tube-weaver" (*Clubiona*). A Myriopoda (*Millepede*) is recorded from Square Island.

The Beetles

BY JOHN D. SHERMAN, JR.

A LIST of the beetles and other insects of Labrador was published as long ago as the summer of 1888 by the late A. S. Packard of Brown University, and reprinted in his book, *The Labrador Coast*. This list included about sixty different kinds of beetles collected at various places along the coast, many of them gathered by himself in 1860 when he made his first trip to Labrador, and most of the others by Dr. Robert Bell. Even before Packard's visit to Labrador, several insects from the Hudson Bay region had been mentioned and described by the well-known British entomologist, Kirby. This was in 1837.

During the last two or three years the writer, through the kind assistance of Dr. Grenfell, has had the good fortune to receive a large number of Labrador beetles from correspondents living at the following points: West St. Modest (Ernest Doane), Red Bay (W. Y. Pike), Cape Charles (Albert Pye), Nain (Chesley Ford), Nachvak (George Ford), and Fort Chimo (Duncan Matheson).

These men, without any previous experience in insect collecting, succeeded in finding seven or eight thousand beetles representing over eighty distinct species, some of them less than one-sixteenth of an inch long. Their success in this occupation of hunting beetles — an unusual one to say the least — seems truly remarkable, and the men selected by Dr. Grenfell certainly lived up to his opinion of their cleverness and very much more than fulfilled my own expectations.

A very large percentage of the beetles sent to me from Labrador have been feebly developed, and I have noticed the same condition in collecting beetles, particularly water-beetles, above the tree line in the White Mountains. So it would seem that insect life in these cold countries does not attain the average and normal full development found in our warmer climates.

Beetles are at once separated from all other insects by their hard shell and elytra, two horny wing covers meeting on the back in a straight line and covering the real wings, which, like those of flies and wasps, are formed of delicate membranes. In some beetles these real wings are only feebly developed, being but little used, and a few species have no true wings at all, but only the hard wing covers.

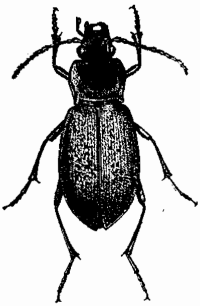


FIG. 19.
Carabus chamissonis.

More than one-third of all the known Labrador beetles belong to one family (Carabidæ). The species of this family are carnivorous, feeding on other forms of animal life, and are commonly called ground beetles, as they are usually found upon the surface of the ground, under stones, logs, or dead leaves, or around the roots of plants, in moss, and in similar places. The Labrador forms are all of dark colours, though a few have a metallic lustre, and nearly all are of graceful form.

A typical Labrador beetle of this family is shown in Figure 19. It is an opaque black insect a little over half an inch long, and it is known to scientists as *Carabus chamissonis* Fisch. This beetle, like a great many others of the Labrador species, is found in Alaska, and above the tree line on Mount Washington. It occurs also in Greenland.

A large number of the beetles of Labrador are generally distributed throughout the northern part of America, occurring throughout Canada, on the shores of Lake Superior, and on our high mountains, both the White Mountains and the Rockies. Several of them are found in the Arctic regions of Europe and Asia as well. It is not strange that forms of life sufficiently hardy and sturdy to live in these far northern countries have been vigorous enough to spread over such a large territory.

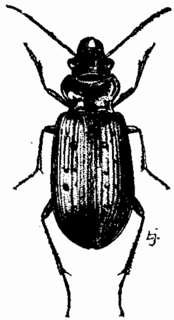


Fig. 20.

Pelophila ulkei.

The insect represented in Figure 20 (*Pelophila ulkei* Horn), on the other hand, is, so far as known, peculiar to the Labrador country and the Hudson Bay region, though a closely allied form is found in Alaska. The Labrador species is about three-eighths of an inch long, and, though entirely black, is of peculiarly graceful form. It is quite flat, and slender and very shining, and has several distinct punctures and tubercles upon the wing covers. Another beetle of the same genus (*Pelophila rudis* Lec.) is also found in Labrador, though it is very rare. It is about the same size as the former species, but the outer border of the wing cases is dark red. The mere difference of colour does not, of course, make it a different species, but these two beetles can easily be separated in this way, without recourse to more scientific distinctions.

Several of the Labrador Carabidæ belong to the genera Pterostichus and Amara, and are proportionately more elongate and narrower than the two beetles illustrated. Most of these species are of blackish colours, but there is one kind (*Amara similis* Kirby) which is often metallic green or purple on the upper side of the body, with reddish legs. *Amara similis* is another one of the Labrador forms found in Mount Washington, and it has recently been found in the Green Mountains of Vermont.

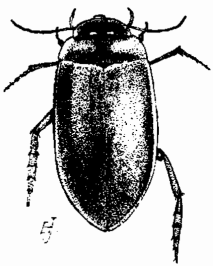


Fig. 21.

Agabus arcticus.

In a region where there are so many pools and ponds and so much water, we find that water-beetles are very common indeed. These belong mostly to the family Dytiscidæ, and are, like the ground-beetles, carnivorous, feeding on tadpoles, aquatic insects, and small fish. My desire to obtain two particular members of this family was what first interested me in Labrador insects.

One of these beetles (*Agabus arcticus* Payk) is shown in Figure 21.

It was first described from Lapland, and is very common in Labrador, but occurs nowhere else in America. It is a narrow, slender insect one-quarter of an inch long, yellowish brown, with the head and a band across the thorax (or middle portion of the body) black. The wing cases are quite rough and uneven.

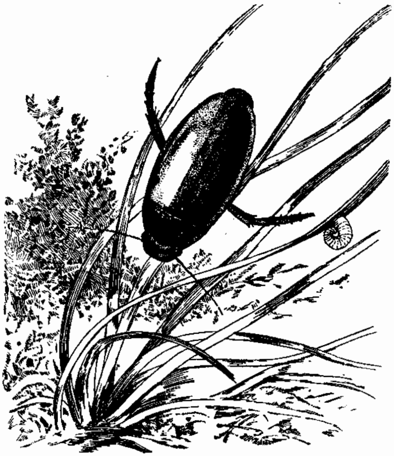


FIG. 22.
Dytiscus dauricus.

The other beetle which I sought in the beginning from my Labrador friends (*Agabus infuscatus* Aube) is apparently even more common there than the one in the illustration. It has been recorded from Mount Washington and Lake Superior, but it is certainly not common at either of these points. It is shorter and more robust than *Agabus arcticus;* the wing covers are brown, the head and thorax black.

The large water-beetle shown in the next figure (No. 22 *Dytiscus dauricus* Gebl) is one of the largest of the Labrador beetles, being an inch and a quarter long. It is greenish black, with the borders of the thorax and of the wing covers yellow. The under side of the body is yellow, with several black lines and markings. The beetles of the genus Dytiscus are probably the most highly developed of all beetles. The males have the three basal joints of the front tarsi (the last segment of the leg) enormously dilated and enlarged into a large circular disk, the under side of which is covered with a large number of palettes, some large, some small. The middle legs are similarly modified, but to a less degree. These disks are of use in enabling the beetle to cling to objects, and are probably also very sensitive organs. The females do not have these disks at all, but, on the other hand, they often have deep grooves or furrows extending longitudinally halfway or more along the wing covers.

While speaking of water-beetles, it is interesting to note that they all possess real wings and are capable of flying great distances. In countries where there are artificial lights, the beetles are often attracted to them and are sometimes found many miles away from any water.

The next beetle which is shown (*Silpha lapponica* Hbst., Fig. 23) belongs to a family whose members are scavengers feeding on decaying animal matter. This beetle is very common in Labrador, living, no doubt, on dead fish. As seen in the illustration, it is rather a square-shaped beetle, black, covered with a yellowish pubescence. It is about five-eighths of an inch long. The wing cases are covered with very prominent small tubercles arranged in rows; the antennæ, or feelers, are thickened at the end as in other allied forms. *Silpha lapponica* occurs nearly everywhere in North America except in the southeastern states. It is an inhabitant of Europe also, but there it is confined to the Arctic regions.

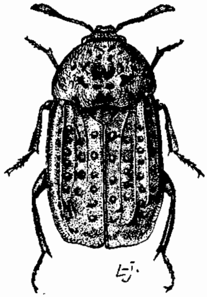


FIG. 23.
Silpha lapponica.

In general the Arctic species are more inclined to extend toward the temperate climates to the south, here in America, than in Europe. The northerly and southerly direction of our American mountain ranges enables the insect forms of the two climates to maintain a geographical connection and specific identity. In Europe, the mountains running from east to west have tended to form a definite boundary for both Arctic and southern species, so that there the allied forms of the two regions have either remained distinct or become so, through separation from one another. This interesting fact was pointed out by Mr. Schwarz some years ago.

Another Labrador beetle quite generally distributed in Europe, Asia, and America, through commerce, is the "bacon beetle" (*Dermestes lardarius* Linn., Fig. 24). The beetle is about one-third of an inch long and brownish black, with a yellow band extending across the front of the wing cases. Its larva lives on preserved animal food products, such as hams, bacon, old cheese, and in dried skins, hair, etc.

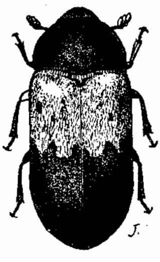


FIG. 24.
Dermestes lardarius.

The last two of Mr. Joutel's figures represent two members of the family Cerambycidæ. Both of these beetles are quite large, and have very long antennæ, or feelers, like the other species of this family.

Criocephalus agrestis Kirby (Fig. 25) is a long, narrow, brownish beetle varying considerably in size, with two or three curious depressions in the thorax, and two longitudinal ridges extending along each wing case. The species is found generally in the northern parts of our continent from the Atlantic to the Pacific. Its larva feeds on the wood of living pine trees, boring its way out to the surface.

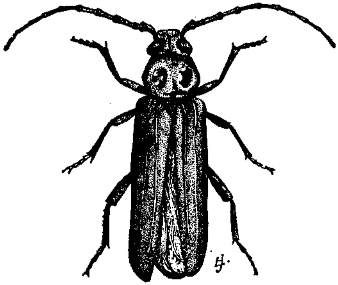


FIG. 25.

Criocephalus agrestis.

Pachyta liturata Kirby (Fig. 26) is not so common as the preceding, but is found over practically the same wide territory. It is much shorter, being only three-quarters of an inch long, and the sides of the body are not parallel, as in that species. The wing cases are light yellow, faintly marked with black, and when folded the insect is very much wider and thicker at the middle of the body than at either extremity. On each side margin of the thorax is a small spine.

Beetles belonging to several other families besides those I have mentioned are found in Labrador. *Byrrhus Americanus* Lec., a small, convex, silky, greenish black beetle was taken by Professor Packard on the stems of the "Labrador tea," and several specimens of this and another smaller, closely allied kind have been sent to me. The beetles of the family Byrrhidæ are common in northern climates, living in mossy places, around the roots of plants, etc.

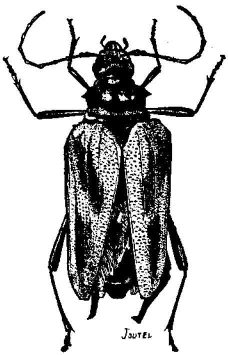


FIG. 26.

Pachyta liturata.

Then there are some small snapping beetles of the family Elateridæ, and some Buprestidæ (whose larvæ are wood-borers). Also some species of weevils which are bark-borers, and a few beetles which we might expect to find upon the blossoms of plants. The regular leaf and plant beetles, however, are conspicuous by their absence, though very likely some of them may be found in Labrador. None were found by Dr. Packard, and I have not received any.

There is no doubt that there are many species of Labrador beetles besides those already known. The additions made to former records by Dr. Grenfell's friends show this clearly enough, and if these men continue the search, we can probably look for many more important captures from this very interesting region.

II

THE MARINE CRUSTACEA

BY MARY J. RATHBUN

CRUSTACEA are the most conspicuous invertebrate animals on the coast of Labrador by reason of their vast numbers, brilliant colours, swift movements, and diversity of form. The shallow water fauna is most abundant on the northern and southern shores, especially in Ungava Bay and from Hamilton Inlet southward and westward, where the harbours are enriched by the silt of numerous rivers and the land slopes gradually into the sea. Various kinds of Amphipods and other small forms swarm under the rocks and in masses of algæ or in pools of water. Along most of the Atlantic coast, however, the bays are barren and rocky, with little seaweed, and there are few large streams carrying down sediment to form muddy and sandy bottoms; the rocks at the water's edge are precipitous, supporting a narrow line of *Fucus*, which gives shelter only to the common sand-flea. In quiet eddies in the passages between the islands which fringe the coast, conditions are more favourable for the development of life. Here the dredge rewards the collector with spidery crabs and darting shrimps.[1]

The species found in Labrador are not numerous, nor are they peculiar to the peninsula, but in general range from Cape Cod to Greenland, while many extend to Europe or are Arctic in distribution, in not a few cases reaching into Bering Sea and the North Pacific Ocean.

The common shore-crab, or rock-crab (*Cancer irroratus*), of the New England coast is also the shore-crab of Labrador, but has not been found north of Hamilton Inlet. It occurs frequently under stones in the Strait of Belle Isle. Occasionally it is caught and eaten by the natives. The shell is broadly oval, with nine saw-teeth on each side, and is speckled with fine red or brown dots; the claws are stout and similar in size and shape, and there are four pairs of smooth, flattened walking feet.

Three other crabs inhabit the coasts of Labrador, but live offshore in depths varying from a few fathoms to fifty or more. They belong to the group popularly known as spider-crabs, on account of their relatively long and slender legs, but differ widely from the

[1] Cf. Packard, *The Labrador Coast.*

common round-bodied spider-crabs of the eastern coast of the United States. The largest (*Chionœcetes opilio*) has a rough, flattened back, semicircular behind and narrowed in front, with a short bifid beak and very long, flat legs armed with small spines. This crab attains a large size, sometimes having a span of over two and a half feet, with the shell itself five inches in width. The smaller species are much alike, and are known as toad-crabs, from a fancied resemblance to that batrachian; their shells are two or three inches long, shield-shaped, one having lateral wings on the forward half (*Hyas coarctatus*), while the other has not (*Hyas araneus*); the beak is short and broad, and split through the middle. Like most of the family to which they belong, they have the habit of attaching to their backs foreign substances, like seaweed, bryozoans, and sponges, which are held in place by hooked hairs on the surface of the crab. In this way the carapace, and the legs also, may become entirely hidden by a miniature forest which serves to protect the crab from its enemies. Nevertheless, many individuals find their way into the stomachs of fishes. This is true not only of crabs and shrimps, but of smaller crustaceans, such as schizopods and amphipods, which are consumed in great quantities by cod and other large fish as well as by whales and shore-birds.

Only two hermit-crabs are known on the coast, but in favourable spots they are abundant from low-water mark to perhaps fifty fathoms. They are quite different in appearance and behaviour from true crabs. The eyes are not incased in sockets or orbits, the antennæ are long, the claws are very unequal in size, — the right (in these species) always the larger, — and the walking legs are four in number. The hinder part of the body is soft, tapering, and asymmetrical, as it has to accommodate itself to the shape of the gasteropod shell which forms the crab's dwelling. Each individual appropriates a dead shell, and is never seen without it except when the increasing size of the inmate compels it to seek a larger tenement. The transfer from one shell to another is made with striking rapidity, the little creature being very active and wary and on the lookout for its stronger enemies. Although it crawls about with the body covered by the shell, and the limbs extruded, yet it is capable of retreating entirely into its domicile and closing the aperture with its claws. The two Labrador species are very similar; one (*Pagurus pubescens*) has claws covered with stout spines and with hairs which retain particles of mud and sand, while the claws of the other (*Pagurus krøyeri*) are rough, with finer and more numerous spines, and are almost devoid of hair; there is a difference, too, in the shape of the left or smaller claw: the outer surface of the prismatic hand-joint is narrow and lanceolate in

P. pubescens, and about four times as long as wide, while in *P. krøyeri* it is obliquely triangular, between two and three times as long as wide. The eyes of *P. pubescens* are longer than those of *P. krøyeri*, so that the slender scale at the base of the outer antennæ does not reach the end of the eye in the former but does in the latter. By far the easiest way to distinguish these two forms is by the colour pattern; in *P. pubescens* the bands of red on the walking feet are disposed across the middle of each segment, while in *P. krøyeri* they run across the articulations between the segments.

The common lobster of New England extends to southern Labrador and occurs in abundance on the coasts of the Gulf of St. Lawrence. It has been found as far north as Henley Harbour (52° north lat.), and extends perhaps a few miles farther. Its absence along the Atlantic coast of Labrador is explained by the lower temperature produced by the Arctic current, which flows southward close to the shore. While many lobsters are trapped in the shallow bays of the southern coast, the catch is not sufficient to supply a cannery. The lobsters appear to be all fished out when the traps are first set, and various attempts to operate canneries have had to be abandoned.[1]

There are fourteen species of shrimps known on the Labrador coast, varying in length from a half inch to four or five inches. They agree in having the abdomen or posterior part of large size, and generally extended to the full length, though sometimes bent at a right angle instead of being folded up under the thorax, as in the crabs. The shrimps are further marked by a spreading tail fan composed of the terminal segment, or tail, and the two pairs of appendages attached to the preceding segment. In one of the most abundant species (*Sclerocrangon boreas*), of a pale brownish red colour with a chestnut stripe along the sides, the skin is hard and rough, the body is stout in front, tapering posteriorly, the tiny claws which arm the first pair of trunk legs are of curious shape peculiar to the family Cragonidæ, the palmar portion being oblong and bearing a small spine in place of the well-known thumb or immovable finger of the lobster and most shrimps, while a slender movable finger lies transversely or across the end of the palm.

One of the largest shrimps is *Pandalus montagui*, which is abundant especially in weeds on a clear, pebbly bottom; it is compressed laterally and armed with a long, slender, swordlike rostrum or beak, with a row of sharp spines on its middle line; the antennæ may be as long as the rest of the animal, and the legs are all slender without conspicuous claws. The red colour which plays a promi-

[1] *Cf.* Herrick, *The American Lobster,* in Bull. U. S. Fish Comm. for 1895, pp. 14–15.

nent part in all these shrimps is here arranged in obliquely transverse lines or bars on the body, and in specks, blotches, or rings on the legs.

In the numerous species of *Spirontocaris*, the body is shaped as in the preceding, but the beak is much shorter and variously shaped and toothed, but always thin and compressed. The first pair of legs have small but well-defined claws; those of the second pair are notable in being very slender and in having the wrist or antepenultimate segment divided into many small pieces jointed together and tipped with a minute claw.

Besides the true shrimps there swarm at the surface numbers of transparent schizopods, or cleft-footed shrimps, known as *Mysis*, which swim in immense shoals, and form the main food of the sea-trout. These shrimps are of small size, an inch or less in length, with large, dark eyes, and have seven instead of five pairs of trunk-legs, devoid of claws, but each provided with an appendage adapted for swimming. The eggs are carried by the female in a marsupial pouch beneath, which has suggested the name of "opossum-shrimp."

The Cumacea are still smaller crustaceans, half an inch or less in length, distinguished by having the anterior half very robust, the posterior half slender, the eyes sessile, not stalked as in the crabs and shrimps, the carapace leaving five segments of the trunk exposed, the antepenultimate segment of the body the longest, the tail fan composed of three branches. They are abundant in sand at the depth of a few fathoms.

The Phyllocarida, or leaf-shrimps, so called on account of the laminar or leaflike expansions with which their legs are provided, are represented by *Nebalia bipes*, which was dredged by Dr. Packard at the mouth of Henley Harbour in four to twenty fathoms. This little creature, less than an inch in length, is most remarkable for the great size of its ancestors, whose paleozoic remains measure nearly two feet.

The Amphipods, or sand-fleas, are by far the most abundant of the Crustacea, both in species and individuals. They are found on the sand near high-water mark, in seaweed, and among rocks in shallow water, and may be dredged at any depth. None is of large size; individuals range from about one-eighth of an inch to an inch. Many of them hop like fleas. Others move rapidly while lying flat. They act as scavengers, often nearly consuming a dead fish before it can be hauled in. They are sessile-eyed, laterally compressed, somewhat crescent-shaped, with rounded backs, and usually of stout build. An exception is the slim skeleton-shrimp, *Caprella*, which clings to finely branched seaweed and is so flexible that it can bend itself into a ring. Another slender form (*Ericthonius difformis*) inhabits the delicate tubes of a hydroid, while a third (*Hyperia medusarum*), as its name signifies, lives in the stomach cavity of a jellyfish. The *Euthemisto* is a surface-swimming amphipod, and in sufficient numbers forms an acceptable meal for hungry fishes, as examination of their stomachs has proven. *Gammarus locusta,* the common amphipod, or scud, is the most noticeable species of the shore, being very abundant between tide-marks. These creatures are of an olive brown or light chestnut-brown colour, much like that of the *Fucus* they inhabit. They skip about on their sides, and on entering the water swim rapidly with the back downward or sideways.

The isopods, unlike the amphipods, are flattened above, and are usually of a uniform width throughout their length; in many cases all their legs are about the same size, whence the name "isopod." They also have sessile eyes and are usually of small size, the largest ones in the Labrador fauna being the two *Mesidotea,* which are about three inches long and taper at the posterior end to a sharp point. The most slender form is *Arcturus baffini,* which may attain a length of nearly two inches, with antennæ even longer. Several species are parasitic, as the fish-louse, *Æga psora,* which lives on the skin of the cod and halibut; the shrimp parasite, *Phryxus abdominalis,* a hemispherical, distorted little lump of an isopod occurring under the abdomen of various species of *Spirontocaris* and *Pandalus;* and a similar but smaller form which attaches itself to the schizopod, *Mysis oculata.* The last two isopods exhibit great sexual dimorphism, the females being vastly larger than the males and of wholly different appearance. Other parasites belong to different orders of Crustacea.

The copepods live mostly on the external surface or in the gill cavity of fishes, to which they cling by means of claws and sucking disks. They are represented by *Lepeophtheirus salmonis,* parasitic on salmon and sea-trout. This species is distinguished in the female by a metallic lustre and by long, slender egg strings. Another species is *Lernæa branchialis,* variety *sigmoidea,* in which the female is fixed in one position for life, having lost all trace of appendages save those which fasten her to the host, while the male is reduced to minute size, and, although capable of motion, adheres to some part of the body of the female.

Occasionally a hermit-crab is infested with one of the Rhizocephala (*Peltogaster*), parasites which are allied to the Cirripedia, or barnacles, but are degenerate forms with saclike, unsegmented bodies without limbs; their antennæ are modified into rootlike processes, which bury themselves in the host, from which they derive nourishment.

The barnacles reported from Labrador all belong to the sessile variety known as acorn-shells. They are found here, as everywhere, incrusting stones, wharves, shells, and other objects. The body of the animal is surrounded by a shell, composed of six or more plates, and in the shape of an irregular cone with the top cut off; the base of the cone is attached to the object incrusted, while the small end is closed by a shelly operculum which may be opened at will. The feathery tentacles, which are modified feet, are then extended and kept constantly waving. The smallest species, *Balanus balanoides*, is the commonest, and is known as the rock-barnacle. A large species, *Coronula diadema,* two inches in diameter and with a very thick shell, lives on the surface of whales. *Balanus porcatus* has been found fossil at Hopedale and Caribou Island in beds of sandy clay and coarse gravel which are exposed between tide-marks and extend beneath the water.

It seems not inappropriate to include in our list two forms which live in pools of fresh water close to the sea; one of these is a schizopod, *Mysis relicta,* which also inhabits Lake Superior, Lake Michigan, and the lakes of northern Europe. It is so closely related to a certain marine form as to suggest a common origin. At Indian Tickle abound the "fairy shrimps," or branchiopods, in which the gills or branchiæ are situated on the feet, the eyes are large and stalked, and the tail is long and slender. These shrimps are able to live in pools which are dry for long periods, as the eggs, when dried, preserve their vitality for an indefinite time. They swim with the back downward, and the gills are bright orange.

III

THE MOLLUSKS

By Charles W. Johnson

The summer visitor, or even the native Labradorian, can know little about the mollusks of Labrador unless he be provided with suitable appliances for dredging in moderate depths of water. The great mass of pack-ice which bounds the shore for a large portion of the year is a destructive agency, preventing the possibility of existence of what, in more southern latitudes, is termed the *littoral fauna*. Beyond the area affected by the ice, however, there is a rich and varied fauna, with constant surprises awaiting the collector with suitable facilities for dredging. Not only is the number of species quite large, but these are also, in many cases, individually abundant. Occasionally one of the larger, rare gasteropods finds its way into the dredge, alluring one to further activity, with the prospect of new species in this comparatively neglected region. The fauna is Arctic, the southern boundary of the Arctic province being the limit of floating ice, which on the Atlantic coast of North America extends to southern Newfoundland. Many of the species are circumpolar in their distribution, or represented by closely related forms or local variations, having undoubtedly a common origin.

Several annotated catalogues of the mollusks of Labrador have been published. Professor A. S. Packard, in 1863 (*Canadian Naturalist and Geologist,* Vol. VIII, p. 412), published "a list of the animals dredged near Caribou Island, southern Labrador, during July and August, 1860." The list contains seventy-eight species of mollusks. In 1867, Professor Packard (*Memoirs Boston Soc. Nat. History,* Vol. I, p. 262) published in connection with a paper on the glacial phenomena of Labrador "a view of the recent invertebrate fauna" in which are recorded one hundred and eight species of mollusks. Miss Katherine J. Bush, in 1883 (*Proceedings U. S. Nat. Museum,* Vol. VI, p. 236), recorded seventy-nine species obtained by the expedition under Mr. W. A. Stearns in 1882. The collection was made at various points between Forteau Bay and Dead Island. Again, in 1891, Professor Packard, in his work, *The Labrador Coast,* published a list of one hundred and twenty-nine species, including all those in the previous lists.

There are many other works bearing on the Mollusca of Labrador, including Gould's *Invertebrata of Massachusetts* (2 ed.), 1870; Sars's *Mollusca Regionis Arcticæ Norvegiæ*, 1878; Friele's *Den Norske Nordhavs Expedition, Mollusca;* etc.

The following remarks are based partly on the above papers, and partly on a collection of shells made by Mr. Owen Bryant during the summer of 1908. A partial study of these adds several species to the fauna. Very little is said by writers in regard to the mollusks of this region being used for food. The common clam (*Mya arenaria*) is reported plentiful in the more southern portions, but, living in deeper water, it is no doubt more difficult to obtain than in more southern latitudes, while in the more northern portions of the coast it is probably rare or wanting. The truncated clam (*Mya truncata*), a closely related species, but apparently less abundant, extends farther northward than the common clam. The habit of these two species of burying deep in the mud and sand, with only their long siphons extending to the surface, makes it practically impossible to obtain them by dredging, while flats exposed at low tide and subject to freezing would be too cold for their existence. A smaller shell related to the Mya is the little nestling shell (*Saxicava arctica*), which, living in various-shaped cavities in the rocks, etc., is therefore frequently very irregular in form. They usually measure about an inch, though sometimes reach an inch and a half in length.

There are two scallops which frequent the waters of this region. The great scallop (*Pecten magellanicus*), locally known by the name of "pussel," is found in the Strait of Belle Isle. It is excellent eating, the large adductor muscle being removed and fried in lard or butter. The Iceland scallop (*Pecten islandica*) is found along the entire coast in from ten to fifty fathoms; it is also doubtless good eating, but more difficult to obtain. The edible mussel (*Mytilus edulis*) is reported from the entire coast; it spins numerous silken threads called the byssus, by which it attaches itself to various objects. In some places it is extensively used for food, usually boiled and pickled in spiced vinegar. The horse mussel (*Modiolus modiolus*) is found in the more southern part; it also spins a byssus and nestles in chinks and cavities. The great seaweed, or kelp (*Laminaria digitata*), frequently attaches to this shell and, after attaining its great size, the force of currents and waves tears the shell from its mooring and carries it to other places, or it is ruthlessly cast upon the beach to die. Two other mussels are commonly dredged, the black mussel (*Modiolaria nigra*), and the discordant mussel (*Modiolaria discors*), with part of the valves ribbed and part smooth.

Two species of cockles, or heart-shells, are commonly associated in from ten to fifty fathoms. The Greenland cockle (*Serripes grönlandicus*) is about three inches in length, nearly smooth, with only a few obsolete ribs on the ends; the young is thin, and beautifully mottled with reddish purple. The hairy heart-shell (*Cardium ciliatum*) is about two inches in length, with about thirty-six acute radiating ribs on each valve. The shell is covered with a yellowish epidermis, forming rows of stiff bristles on the edge of the ribs. The common cockle of Europe (*Cardium edule*) is largely used for food. It is probable that both of these are also edible. Perhaps the most common shell of the coast is *Macoma calcarea*, quantities being brought up with each dredge. When on a muddy or sandy bottom, the thin epidermis is usually eroded, giving the shell a chalky appearance. Another characteristic bivalve of the more northern waters is the little brown clam, Astarte, of which four or five species are to be found along the Labrador coast. They are about an inch to an inch and a quarter in length, somewhat triangular in form, thick, with prominent concentric ridges, and a dark brown epidermis. Related to Astarte is *Venericardia borealis*, which has radiating, instead of concentric, ridges.

Other bivalves which are constantly being caught in the dredge are the little, round, glossy brown *Nucula tenuis*, the polished greenish brown *Yoldia myalis*, and the pointed *Leda pernula* with a greenish epidermis and fine concentric lines. This group can be readily recognized by having numerous minute teeth along the hinge. There are a number of other bivalves which are occasionally brought up by the dredge, including a group with thin, pearly shells, represented by *Thracia myopsis*, *Pandora glacialis*, and *Lyonsia arenosa*.

Some of the rivers and streams of the interior contain the fresh-water clam, or pearl mussel (*Margaritana margaritifera*), a species which is also found in northern Europe and Asia. It sometimes yields very handsome pearls, and I have seen a few beautiful ones, which were said to have come from Labrador.

The Gastropoda, or the univalves, as they are often popularly called, slightly exceed the bivalves in the number of species. They seem, however, to be less abundant individually, especially the larger ones. The most prominent of the larger forms belong to the family Buccinidæ, or whelks. The common whelk (*Buccinum undatum*) is found along the entire coast. In northern Europe, where this species is abundant, it forms an extensive article of food. They make an excellent soup; or boiled, until they can be easily removed from the shell, they can be either fried in fat until brown, or eaten with pepper and vinegar. There are six or seven other species of whelks on the Labrador coast, including: *Buccinum cyaneum, B. ciliatum, B. gouldi, B. donovani,* and *B. tottenii,* dredged in from five to thirty fathoms, and associated with *Chrysodomus despectus, Tritonofusus kroyeri,* variety *cretaceus,* and *Tritonofusus spitzbergensis* Reeve (*Sipho lividus* Morch). To these Mr. Bryant has added the true *Tritonofusus islandicus* and the large brown *Beringius largillierti* with its big protoconch. *Trophon clathratus* is a slender, waxy, white shell, with about twelve thin, elevated, longitudinal ribs, while between the ribs are numerous slight spiral lines. In almost every dredge, we find the little hairy-keeled shell, *Trichotropis borealis,* and equally common the small, cancellated *Admete couthouyi,* belonging to the family Cancellariidæ. Another conspicuous group of shells, which may appropriately be called the little "tower-shells," is represented by three species, — *Turritella erosa, T. reticulata,* and *Turritellopsis acicula.* Professor Packard records a dozen species of Bela, little high-spired shells, the most northern representatives of the family Pleurotomidæ. The little pearly Margaritas are quite common in some localities; *Margarita grœnlandica, M. cinerea, M. argentata,* and *M. helicina* are the principal species. The sea-snails are represented by three species. *Natica clausa* is found in almost every haul of the dredge. It is readily distinguished from the others by having a calcareous opercula, and the umbilicus entirely covered by a callus. *Lunatia heros* is recorded from the Strait of Belle Isle, and *L. grœnlandica* from fifteen fathoms in Chateau Bay. A large and interesting shell is the *Aporrhais occidentalis,* allied to the "pelican's foot" (*Aporrhais pes-pelicani*) of Europe, but having the lip entire and not lobed as in that species. It was dredged in numbers, at Gready and Egg harbours, in seven to twenty fathoms. Three species of limpets are also recorded, *Acmæa testudinalis, A. rubella,* and *Lepta cæca,* the latter being the most plentiful.

A remnant of the littoral fauna, of more southern regions, exists in the presence of a few species of the family Litorinidæ. The "periwinkle," *Littorina litorea,* is reported by Stearns as rare; *L. palliata* is recorded from the Strait of Belle Isle, while *L. rudis* is not uncommon along the whole coast. Living in the crevices of the damp, spray-covered rocks, above the direct effects of the ice, they are able to withstand the Arctic conditions.

Shells are frequently covered with a light pink or reddish coloured, stony algæ (*Lithothamnion polymorphum*), frequently referred to as "Nullipores." Clinging to the rocks and shells covered with this reddish growth, we find the little red chitons, *Trachydermon rubrum* and *Tonicella marmorea,* so closely resembling it in colour as to almost escape detection. This was especially noticeable in the collection made by Mr. Bryant at Gready Harbour, in twelve fathoms, where the shells were quite thickly covered with the red algæ. Seventeen specimens of both species of the red chitons were obtained. The chitons are now placed in a separate order, Amphineura, and represent the lowest type of the Mollusca. They have a shell consisting normally of eight plates, hence the name *Polyplacophora,* the many-plate bearer, is applied to the most important of the two suborders.

A group of beautiful creatures when living, but very difficult to preserve, are the Nudibranchs, or the naked-gilled Mollusca. The large and handsome *Dendronotus arborescens,* with a row of tree-like gills on each side of the back, and branching appendages on the head, was obtained by Professor Packard in Henley Harbour, at a depth of four fathoms. A species of Eolis is also reported from the same harbour, and *Coryphella diversa* from L'Anse au Loup. A group of small shells, which are usually present in each haul of the dredge, are known as Tectibranchs. They are related to the Nudibranchs, but have the gills covered, and usually a shell varying considerably in form in the different families. *Cylichna alba, Retusa pertenuis, Philine lima, Scaphander punctostriata,* and *Diaphana hiemalis* are the principal species.

Each haul of the dredge brings in many other forms of animal life besides Mollusca. The large brachiopod, *Hypothyris psittacea,* is frequently obtained in from eight to fifteen fathoms, while attached to the shells are a number of species of the beautiful incrusting Polyzoa, or Bryozoa, and the minute Foraminifera.

Among the interesting objects of the more open Arctic sea are the little *Pteropods,* or wing shells. Packard reports great numbers of the little Arctic pteropod *Limacina helicina* off Cape Webuc, and says they are like winged sweet-peas, the shape of the body and colour suggesting the resemblance. Another species, *Clione limacina,* with long wings and bright red tints, belongs to the shell-less group Gymnosomata. They sometimes appear in such numbers as to actually discolour the surface of the water. They are said to afford food for the Greenland whale. The pteropods usually come to the surface in the greatest numbers during the night, and can be caught by using a towing-net.

The land mollusks of Labrador are few and scarce. The slug *Agriolimax agrestis* is reported by Packard from Strawberry Harbour, together with the little *Pupilla hoppii, Vitrina angelicæ,* and *Euconulus fulva,* variety *fabricii.* They occur under spruce bark and chips in the damp verdure, and represent the few truly Arctic species found also in southern Greenland.

IV

LIST OF THE MAMMALS OF LABRADOR

BY OUTRAM BANGS

AT Dr. Grenfell's request I have prepared the following list of the mammals of the Labrador peninsula. As I had before written a list of the mammals of this region,[1] it was very simple to compile the present one, which is merely the old one corrected and brought up to date.

In this list political divisions of the region are disregarded, and the area considered includes the whole Labrador peninsula lying to the northward of a line joining the mouth of the river St. Lawrence and the foot of James Bay.

I am able to say very little about the habits of the various forms of mammalian life, occurring in the great Labrador peninsula, knowing them myself only from museum specimens, but under each species or subspecies the distribution, so far as it is known, is given, the first reference is cited, and where a form was described from Labrador the type locality is mentioned.

I believe the list to be practically complete; the species are all given by the names in current use by the best systematists. I trust it may prove of some help to those interested in the biota of the great peninsula.

1. BALÆNA GLACIALIS Bonnat.
Balæna glacialis (Right whale) Bonnat. *Tab. Encycl. Cétalogil.*, p. 3. 1789.
Formerly common on east and south coasts, now nearly exterminated.

2. BALÆNA MYSTICETUS Linn. Bow head; Greenland whale.
Balæna mysticetus Linn. *Fauna Suecica*, Vol. II, p. 16. 1761.
Hudson Bay and Hudson Strait, along the edge of the ice.

3. MEGAPTERA NODOSA Bonnat. Humpbacked whale.
Balæna nodosa Bonnat. *Tab. Encycl. Cétalogil.*, p. 5. 1789.
Common on south and east coasts.

[1] *American Naturalist*, Vol. XXXII, No. 379, July, 1898, pp. 489–507.

4. BALÆNOPTERA ACUTO-ROSTRATA Lacép. Little-piked whale.
Balœnoptera acuto-rostrata Lacép. *Hist. Nat. Cét.*, Vol. I, p. 197. 1803–4.
Common close inshore along the east and north coasts.
5. BALÆNOPTERA PHYSALUS Linn. Common finback.
Balœna physalus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 75. 1858.
Common along the coasts.
6. BALÆNOPTERA BOREALIS Lesson. Pollock whale.
Balœnoptera borealis Lesson. *Hist. Nat. Cét.*, p. 342. 1828.
A rare species.
7. BALÆNOPTERA MUSCULUS Linn. Sulphur-bottom.
Balœna musculus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 76. 1758.
Common all along the coast.
8. PHYSETER MACROCEPHALUS Linn. Sperm whale.
Physeter macrocephalus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 76. 1758.
Very rare in Labrador waters, one record by Packard.
9. HYPEROÖDON AMPULLATUM Forster. Bottle-nosed whale.
Balœna ampullatum Forster. *Kalm's Travels in North Am.*, Vol. I, p. 18. 1770.
Common on the northern coast.
10. DELPHINAPTERUS LEUCAS Pallas. White porpoise.
Delphinus leucas Pallas. "*It.* iii, p. 84, t. iv."
Common everywhere along the Labrador coasts.
11. MONODON MONOCERAS Linn. Narwhale.
Monodon monoceras Linn. Ed. X, p. 75. 1758.
Common all along the Labrador coasts.
12. ORCINUS ORCA Linn. Killer.
Delphinus orca Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 77. 1758.
Common on the east coast.
13. GLOBICEPHALA MELAS Traill. Black fish; pilot whale.
Delphinus melas Traill, *Nicholson's Journal*, Vol. XXII, p. 81. 1809.
Recorded from Newfoundland, probably occurring on the south coasts of Labrador, a migratory species.
14. PHOCÆNA PHOCÆNA Linn. Harbour porpoise.
Delphinus phocœna Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 77. 1758.
Found commonly along the south and east coasts.
15. LAGENORHYNCHUS ACUTUS Gray. Striped porpoise.
Delphinus acutus Gray. *Spicil. Zool.*, p. 2. 1828.
Occurs along south and east coasts.
16. DELPHINUS DELPHIS Linn. Common dolphin.
Delphinus delphis Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 77. 1758.
South and east coasts.
17. TURSIOPS TRUNCATUS Montagu. Bottle-nosed dolphin.

Delphinus truncatus Montagu. *Memos. Wernerian Soc.*, Vol. III, p. 75. 1821.

Common on the south and east coasts.

I am under the greatest obligation to Dr. Glover M. Allen for helping me prepare this list of the Labrador cetaceans. Many of the species were observed and identified by him during a cruise along the coast in the summer of 1906.

18. PARALCES AMERICANUS Clinton. Moose.

Cervus americanus Clinton. *Letters on Nat. Hist. and Int. Resources of New York*, p. 193. 1822.

Low is in doubt whether or not the moose enters the south-western limits of Labrador. It is occasionally killed in the region about Lake Edward, Quebec.

19. RANGIFER CARIBOU Gml. Woodland caribou.

Cervus tarandus γ. caribou Gmelin. *Syst. Nat.*, Vol. I, p. 177. 1789.

Reported by Low to now be very rare, — almost exterminated, — though formerly abundant throughout the wooded regions. Low also says that the destruction of the woodland caribou has resulted in the dying off, from actual starvation, of a large proportion of the interior Indians, which, in its turn, has caused a great increase in the numbers of the fur-bearing animals.

Mr. Ernest Doane took specimens at Black Bay in September, 1898, and sent me three fine adult females and a male.

20. RANGIFER ARCTICUS Richardson. Barren-ground caribou.

Cervus tarandus var. a. *arctica* Richardson. *F. B. A.*, Vol. I, p. 241. 1829.

According to Low, the barren-ground caribou still ranges in immense herds over the barrens and semi-barrens, south to the Mealy Mountains, between Hamilton Inlet and Sandwich Bay.

21. SCIURUS HUDSONICUS HUDSONICUS Erxl. Northern pine squirrel; red squirrel.

Sciurus vulgaris ε. hudsonicus Erxl. *Mammalia*, p. 416. 1777.

Type Locality. Hudson Strait.

Common in the wooded regions, and extending into the semi-barrens. Goldthwaite took specimens at Rigolet. Turner took specimens at Fort Chimo and at Forks, Northwest River, and Doane sent me a large series from Black Bay.

22. ARCTOMYS IGNAVUS Bangs. Labrador woodchuck.

Arctomys ignavus Bangs. *Proc. New Eng. Zoöl. Club*, Vol. I, p. 13. 1899.

Type Locality. Black Bay, Labrador.

Common throughout southern Labrador, in the region about Black Bay and L'Anse au Loup.

Low speaks of a woodchuck as common in the country between

Lake St. John and the East Main River; this may possibly be another form, — *Arctomys monax empetra* Pallas.

23. Sciuropterus sabrinus makkovikensis Sornborger. Labrador flying squirrel.
    Sciuropterus sabrinus makkovikensis Sornborger. *Ottawa Naturalist,* Vol. XIX, p. 48. June, 1900.
    Type Locality. Makkovik.

Rather generally distributed throughout the wooded region, though apparently not common anywhere. The Labrador form is a very well-marked subspecies.

24. Castor canadensis canadensis Kuhl. Canadian beaver.
    Castor canadensis Kuhl. *Beiträge zur Zoologie,* p. 64. 1820.

Low says the beaver is common in the wooded regions, and extends into the semi-barrens, where food is found. I have seen no Labrador specimens.

25. Mus norvegicus Erxleben. Brown rat; Norway rat.
    Mus norvegicus Erxleben. *Syst. Reg. Anim.,* Vol. I, p. 381. 1777.

Doane took one Norway rat at Black Bay, November 30, 1899. This is the only specimen I ever saw from Labrador. I have never received specimens of the house mouse, *Mus musculus* Linn., from Labrador, though it must undoubtedly occur there.

26. Peromyscus maniculatus maniculatus Wagner. Labrador deer-mouse.
    Hesperomys maniculatus Wagner. *Weigmann's Archiv.,* Vol. XI, p. 148. 1845.
    Type Locality. "The Moravian settlements in Labrador."

Common throughout the peninsula south at least to Hamilton Inlet. The Labrador deer-mouse, like many of its congeners, is apt to take up its abode in buildings and huts like the house mouse, and in Labrador seems to be much more abundant in such places than in the woods and among rocks. I have examined very large series of this species.

27. Phenacomys latimanus Merriam. Small yellow-faced phenacomys.
    Phenacomys latimanus Merriam. *North Am. Fauna,* No. 2, p. 34. 1889.
    Type Locality. Fort Chimo, Ungava, Labrador.

Probably of general distribution in the drier semi-barrens. Known from Labrador only by the specimens sent to Washington by Turner.

28. Phenacomys celatus celatus Merriam. Large yellow-faced phenacomys.
    Phenacomys celatus Merriam, *North Am. Fauna,* No. 2, p. 33. 1889.

This northern form has, so far as I know, been taken in the Labrador peninsula only at Fort Chimo, Ungava, whence it ranges west at least to Godbout, Quebec.

29. PHENACOMYS CELATUS CRASSUS Bangs. South Labrador phenacomys.

Phenacomys celatus crassus Bangs. *Proc. New Eng. Zoöl. Club,* Vol. II, p. 39. 1900.

Type Locality. Rigolet, Labrador.

This is a southern form occurring in the eastern forest belt from L'Anse au Loup north at least to Hamilton Inlet: it is much larger than true *P. celatus,* being the largest member of the genus yet known.

30. EVOTOMYS UNGAVA Bailey. Ungava red-backed mouse.

Evotomys ungava Bailey. *Proc. Biol. Soc. Wash.,* p. 130. 1897.

Type Locality. Fort Chimo, Labrador.

Probably restricted to the barrens and semi-barrens. Turner reported the species to be abundant at Fort Chimo, but apparently did not send many specimens to Washington.

The differences between this and the next species appear to be as great as between any two members of the genus Evotomys.

31. EVOTOMYS PROTEUS Bangs. Hamilton Inlet red-backed mouse.

Evotomys proteus Bangs. *Proc. Biol. Soc. Wash.,* p. 137. 1897.

Type Locality. Rigolet, Hamilton Inlet, Labrador.

Very abundant at Hamilton Inlet, and probably throughout the wooded regions. Goldthwaite took a large series at Rigolet, and Doane found it very abundant in the woods, in the neighbourhood of Black Bay.

32. MICROTUS PENNSYLVANICUS LABRADORIUS Bailey. Small Labrador vole.

Microtus pennsylvanicus labradorius Bailey. *Proc. Biol. Soc. Wash.,* p. 88. April 30, 1898.

Type Locality. Fort Chimo, Ungava, Labrador.

This little vole probably occurs only in the barrens and semi-barrens. It can be told from *M. enixus* by its smaller size, shorter, more hairy tail, by its smaller, flatter skull, with shorter rostrum and nasals, and smaller, shorter, incisive foramina, differently shaped zygoma, and larger auditory bullæ. There are, probably, colour differences also, but I have seen alcoholic specimens only. Turner took many specimens at Fort Chimo.

33. MICROTUS ENIXUS Bangs. Larger Labrador vole.

Microtus enixus Bangs. *Am. Nat.,* Vol. XXX, p. 105. 1896.

Type Locality. Rigolet, Hamilton Inlet, Labrador.

Probably common throughout all the wooded regions, its range extending north to the semi-barrens and meeting that of *M. pennsylvanicus labradorius.*

Goldthwaite took a large series at the type locality. I have examined three specimens in the collection of the Geological Survey of Canada, from "50 miles north of Fort George." Turner took quite a number at Fort Chimo, and Doane secured a large series at Black Bay.

34. MICROTUS CHROTORRHINUS RARUS Bangs. Labrador rock vole.

Microtus chrotorrhinus rarus Bangs. *Proc. Biol. Soc. Wash.*, Vol. XII, p. 187. 1898.

Type Locality. Black Bay, Labrador.

Known only from Black Bay, where Doane secured a good series.

35. FIBER ZIBETHICUS AQUILONIUS Bangs. Labrador muskrat.

Fiber zibethicus aquilonius Bangs. *Proc. New Eng. Zoöl. Club,* Vol. I, p. 11. 1899.

Type Locality. Rigolet, Hamilton Inlet.

Common throughout the southern wooded region, and found, though probably not in such abundance, north to the barren and to Fort Chimo.

36. SYNAPTOMYS INNUITUS INNUITUS True. True's bog lemming.

Mictomys innuitus True. *Proc. Nat. Mus.,* Vol. XVII, No. 999. Advance sheet. April 26, 1894.

Type Locality. Fort Chimo, Labrador.

Known at present only by the type.

37. SYNAPTOMYS INNUITUS MEDIOXIMUS Bangs. Intermediate bog lemming.

Synaptomys innuitus medioximus Bangs. *Proc. New Eng. Zoöl. Club,* Vol. II, p. 40. 1900.

Type Locality. L'Anse au Loup.

This form, larger than, and otherwise different from, true *S. innuitus* of Fort Chimo, is at present known only by two specimens, —one, the type from L'Anse au Loup, and the other from Hamilton Inlet.

38. DICROSTONYX HUDSONIUS Pallas. Hudson Bay lemming.

Mus hudsonius Pallas. Glir. p. 203. 1778.

Type Locality. Labrador.

Found throughout the barrens and on the treeless hills, south at least, to Hamilton Inlet.

39. ZAPUS HUDSONIUS LADAS Bangs. Labrador jumping mouse.

Zapus hudsonius ladas Bangs. *Proc. New Eng. Zoöl. Club,* Vol. I, p. 10. 1899.

Type Locality. Rigolet, Hamilton Inlet.

Abundant in the southern wooded region, about Black Bay, etc., and extending northward, along the coast, to beyond Hamilton Inlet.

40. NAPÆOZAPUS INSIGNIS ABIETORUM Preble. Northern woodland jumping mouse.

Zapus (*Napæozapus*) *insignis abietorum* Preble. *North Am. Fauna*, No. 15, p. 36. 1899.

I have seen but one Labrador specimen of this species, a mounted example from the Geological Survey of Canada collection, taken by Low at Hamilton River.

41. Erethizon dorsatum picinum Bangs. Labrador porcupine.

Erethizon dorsatus picinus Bangs. *Proc. New Eng. Zoöl. Club*, Vol. II, p. 37. 1900.

Type Locality. L'Anse au Loup, Labrador.

Common and generally distributed from the St. Lawrence, north to the semi-barrens.

42. Lepus labradorius Miller. Labrador polar bear.

Lepus labradorius Miller. *Proc. Biol. Soc. Wash.*, Vol. XIII, p. 39. 1899.

Type Locality. Fort Chimo, Ungava.

Of general distribution in the barrens and semi-barrens of Labrador, occasionally reaching so far south as Hamilton Inlet. Turner took specimens at Fort Chimo and Solomon Island.

43. Lepus americanus americanus Erxl. American varying hare.

Lepus americanus Erxl. *Syst. Reg. Anim.*, p. 330. 1777.

Type Locality. South side of Hudson Strait.

Common throughout the wooded region, and extending into the edge of the barrens. Goldthwaite took fourteen specimens at Hamilton Inlet.

44. Phoca vitulina Linn. Harbour seal.

Phoca vitulina Linn. *Syst. Nat.*, Vol. I, p. 38. 1758.

Common along the whole coast, and in the lower parts of the rivers. It is also, according to Low, found in many of the fresh-water lakes of the interior, and the Indians assert that these fresh-water seals never leave the lakes. This should be carefully looked into, and it is to be hoped that collectors in Labrador may be able to take some of these fresh-water seals.

One skull in Bangs's collection from Okkak, obtained by Sornborger from the Eskimo.

45. Phoca hispida Schreber. Ringed seal.

Phoca hispida Schreber. *Säugt.*, Vol. III, p. 312, Pl. LXXXVI. 1775. (*Vide* Thomas. *Zoölogist*, p. 102. 1898.)

Common along the entire Labrador coast.

46. Phoca grœnlandica Fabricius. Harp seal.

Phoca grœnlandica Fabricius. *Müller's Zoöl. Dan. Prod.*, Vol. VIII. 1776.

Common along the whole Labrador coast.

47. Erignathus Barbatus Fabricius. Bearded seal.

Phoca barbata Fabricius. *Müller's Zool. Dan. Prod.*, Vol. VIII. 1776.

Low reports this seal to be rare in the St. Lawrence and in southern Labrador, but more common northward, — in Hudson Strait, Hudson Bay, and James Bay.

48. Halichœrus grypus Fabricius. Gray seal.
Phoca grypus Fabricius. *Skriv. af. Naturh.-Selsk.*, Vol. I, ii, p. 167, Pl. XIII, Fig. 4. 1791.
Rare along the Labrador coast.

49. Cystophora cristata Erxleben. Hooded seal.
Phoca cristata Erxleben. *Syst. Reg. Anim.*, p. 590. 1777.
Not common along the Labrador coast.

50. Odobenus rosmarus Linn. Atlantic walrus.
Phoca rosmarus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 38. 1758.
Now restricted to northern Labrador, reaching south only to about Nachvak. Formerly abundant along the whole Labrador coast. A fine pair, ♂ and ♀, skulls in Bangs's collection, obtained by Sornborger from the Eskimo at Okkak.

51. Lynx canadensis canadensis Kerr. Canada lynx.
Lynx canadensis Kerr. *Anim. King.*, p. 157. 1792.
Common within the wooded area from the Atlantic coast to Hudson Bay, Low.

52. Vulpes rubricosa bangsi Merriam. Labrador red fox.
Vulpes rubricosa bangsi Merriam. *Proc. Wash. Acad. Sci.*, Vol. II, p. 667. 1900.
Type Locality. L'Anse au Loup, Labrador.
Common throughout the whole of Labrador from the St. Lawrence to Hudson Strait.

53. Vulpes lagopus ungava Merriam. Labrador white fox.
Vulpes lagopus ungava Merriam. *Proc. Biol. Soc. Wash.*, Vol. XV, p. 170. 1902.
Type Locality. Fort Chimo, Ungava.
The Arctic fox is abundant in the barren-grounds and extends south to about Lake Michikamaw and to Nichicum. Along both coasts it pushes rather farther south; on the Atlantic to Hamilton Inlet, and rarely even to the Strait of Belle Isle; on the coast of James Bay to its southern part.
Two skulls in Bangs's collection from Hebron, obtained by Sornborger.

54. Canis occidentalis Richardson. Timber-wolf.
Canis lupus, occidentalis Richardson. *F. B. A. Mamm.*, p. 60. 1829.
According to Low, the timber-wolf is now very rare in the southern wooded region, owing to the extermination of the woodland caribou. It is still common in the barrens and semi-barrens of the north.
One skull in Bangs's collection from Hopedale, collected by Sornborger.

55. Canis albus Joseph Sabine. Arctic wolf.
Canis lupus — albus Joseph Sabine. *Franklin's Narrative.* Appendix, p. 655. 1823.

Occasionally taken in northern barren-grounds, Low.

56. Lutra canadensis canadensis Schreber. Canada otter.
Mustela lutra Canadensis Schreber. Säugthiere, Pl. CXXVI, B.

Low states the otter to be common throughout the wooded region and to range northward into the semi-barrens. One skull in Bangs's collection from Okkak, Sornborger. Turner sent one specimen to Washington from "Forks," Ungava. (Although it appears in the catalogue, it cannot now be found.) Doane took specimens at Black Bay.

57. Mephitis mephitica Shaw. Canada skunk.
Viverra mephitica Shaw. *Museum Leverianum*, p. 172. 1792.

Said by Stearns to be found occasionally on the southern coast of Labrador. I found it common at Lake Edward, Quebec, and it is probable that its range does reach Labrador, though I never have seen a specimen from that region.

58. Gulo luscus Linn. American wolverine.
Ursus luscus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 47. 1758.

Abundant throughout Labrador, especially northward to Hudson Strait.

Two skulls from Okkak in Bangs's collection, obtained by Sornborger. Turner sent one specimen to Washington from Fort Chimo. Doane sent me some beautiful specimens from L'Anse au Loup.

In Labrador the wolverine is usually called "badger."

59. Putorius vison vison Schreber. Little black mink.
Mustela vison Schreber. *Säugt.*, Vol. III, p. 463. 1778.

Low says the mink is found only in the southern part of Labrador, seldom occurring north of East Main and Hamilton rivers. Doane sent me four specimens from Black Bay.

60. Putorius cicognanii cicognanii Bonap. Small brown weasel.
Mustela cicognanii Bonap. *Fauna, Italica, Mamm.*, p. 4. 1838.

Reported by Low to be common everywhere south of tree limit.

Goldthwaite took two specimens, ♂ and ♀, at Rigolet. Turner took one at "Forks," Ungava. Doane sent me a fine series from Black Bay and L'Anse au Loup.

One would expect to find *Putorius cicognanii richardsoni* Bonap. replacing the present form in the western and northern barrens, and very possibly it does, but I have seen no specimens from that region.

61. Mustela americana brumalis Bangs. Labrador marten; sable.
Mustela brumalis Bangs. *Amer. Nat.*, Vol. XXXI, p. 162. February, 1897.

Type Locality. Okkak, Labrador.

Formerly I thought that the marten of southern Labrador would prove to be true *M. americana,* but specimens sent me by Doane from L'Anse au Loup are *M. a. brumalis,* and I now doubt the existence in Labrador of two forms.

The Labrador subspecies is a fine large, dark-coloured marten, and is generally distributed throughout the wooded regions.

62. Mustela pennantii pennantii Erxl. Pennants's marten; fisher.

Mustela pennantii Erxl. *Syst. An.,* p. 479. 1777.

Pennants's marten, according to Low, rarely enters the southwestern limits of Labrador, not occurring east of Mingan nor north of Mistassini.

63. Ursus americanus Pallas. Black bear.

Ursus americanus Pallas. *Spicil. Zool.,* fasc. XIV, p. 5. 1780.

Ursus americanus sornborgeri Bangs. *Amer. Nat.,* Vol. XXXII, p. 500. 1898.

Type Locality. Okkak, Labrador.

Of general distribution throughout Labrador, north to tree limit.

At one time I thought the Labrador black bear was separable as a subspecies and named it *W. a. sornborgeri,* but since then I have examined a large number of additional skulls and find none of the characters on which I based the subspecies to hold good, most of these skulls being indistinguishable in size or in any other way from skulls from Nova Scotia, Maine, New Hampshire, etc., with which I compared them.

In my former list I included *Ursus richardsoni* Swainson — the barren-ground bear — on the strength of reports that Low had of it from the Nascaupee Indians. I am now inclined to discredit these, so far as Labrador is concerned. Indians everywhere have many traditions that persist in a remarkable manner, and often they are borrowed from tribes that live at a distance. I can find no evidence that the barren-ground bear occurs in the barrens of Labrador, and until it is actually known to be there it must be struck from a list of the mammals of Labrador.

64. Thalarctos maritimus Linn. Polar bear; ice bear.

Ursus maritimus Linn. *Syst. Nat.,* Ed. XII, Vol. I, p. 70. 1766.

Low says the polar bear ranges south along the Atlantic coast of Labrador occasionally as far as the Strait of Belle Isle, and in Hudson Bay to Charleton Island. The species seldom goes far inland, except to produce its young. Sornborger told me that the polar bear is very common and resident in northern Labrador.

Four skulls in Bangs's collection, all obtained by Sornborger of the Eskimo at Hebron and Okkak.

65. Sorex personatus miscix Bangs. Labrador shrew.
Sorex personatus miscix Bangs. *Proc. New Eng. Zoöl. Club.*, Vol. I, p. 15. 1899.
Type Locality. Black Bay, Labrador.
Common throughout the Labrador peninsula from Fort Chimo south.

66. Condylura cristata Linn. Star-nosed mole.
Sorex cristatus Linn. *Syst. Nat.*, Ed. X, Vol. I, p. 53. 1758.
Goldthwaite saw and fully identified a star-nosed mole that the dogs had caught at Rigolet.
Doane sent me a female from Black Bay, taken October 20, 1898.

67. Myotis lucifugus lucifugus Le Conte. Little brown bat.
Vespertilio lucifugus Le Conte. *McMurtries' Cuvier*, Appendix, p. 431. 1831.
Low supposed the bats seen by him on Hamilton River and at Lake Mistassini to belong to this species. I took this bat at Lake Edward, Quebec, and Miller (*North Am. Fauna*, No. 13, p. 63) records it from Godbout and Ottawa, Quebec, and from James Bay, Ontario. It is also found in Newfoundland.

68. Myotis subulatus subulatus Say. Say's bat.
Vespertilio subulatus Say. *Long's Exped. to Rocky Mts.*, Vol. II, p. 65, footnote. 1823.
Reported by Stearns from Natashquan. Miller (*North Am. Fauna*, No. 13, p. 76) records specimens from Mount Forest and North Bay, Ontario, and Godbout and Ottawa, Quebec.

V

LIST OF THE BIRDS OF LABRADOR

With brief annotations

By Charles W. Townsend, M.D., and
Glover M. Allen, Ph.D.[1]

1. Colymbus holbœlli. Holbœll's grebe.
Rare transient visitor.
2. Colymbus auritus. Horned grebe.
Rare transient visitor; possibly breeds.
3. Gavia imber. Loon.
Common summer resident.
4. Gavia arcticus. Black-throated loon.
Summer resident, not uncommon in the north; rare in the south.
5. Gavia lumme. Red-throated loon; "whabby."
Common summer resident.
6. Fratercula arctica. Puffin; "paroquet."
Abundant summer resident.
7. Cepphus grylle. Black guillemot; "sea-pigeon."
Abundant summer resident.
8. Cepphus mandtii. Mandt's guillemot.
Summer resident.
9. Uria troile. Murre.
Common summer resident in south; a few winter.
10. Uria lomvia. Brunnich's murre.
Common summer resident; a few winter.
11. Alca torda. Razor-billed auk; "tinker."
Common summer resident; a few winter.
[Plautus impennis. Great auk; "penguin."]
Extinct.
12. Alle alle. Dovekie; "bull-bird."
Abundant transient and winter visitor.
13. Megalestris skua. Skua; "sea-hen."
Accidental visitor.
14. Stercorarius pomarinus. Pomarine jaeger; "bo's'n."
Common summer visitor; probably breeds in north.

[1] Vide *The Birds of Labrador*, Proc. Boston Soc. of Nat. Hist., Vol. 33, No. 7, July, 1907.

15. Stercorarius parasiticus. Parasitic jaeger.
Common summer visitor; perhaps breeds in north.
16. Stercorarius longicaudus. Long-tailed jaeger.
Rare summer resident.
17. Pagophila alba. Ivory gull; "ice partridge."
Common winter visitor.
18. Rissa tridactyla. Kittiwake; "tickler."
Abundant summer resident.
19. Larus glaucus. Glaucous gull.
Common summer resident; a few winter.
20. Larus leucopterus. Iceland gull.
Rare transient or winter visitor.
21. Larus marinus. Great black-backed gull; "saddle-back."
Common summer resident.
22. Larus argentatus. Herring gull.
Common summer resident.
23. Larus delawarensis. Ring-billed gull.
Uncommon summer resident, locally in south.
24. Larus philadelphia. Bonaparte's gull.
Common transient; autumnal visitor in south.
25. Xema sabinii. Sabine's gull.
Rare transient visitor.
26. Sterna caspia. Caspian tern.
Very rare summer resident in south.
27. Sterna hirundo. Common tern.
Common summer resident in south.
28. Sterna paradisæa. Arctic tern.
Common summer resident, locally.
29. Sterna antillarum. Least tern.
Extirpated.
30. Fulmarus glacialis. Fulmar.
Common summer visitor.
31. Puffinus gravis. Greater shearwater.
Abundant summer visitor.
32. Puffinus fuliginosus. Sooty shearwater.
Common summer visitor.
33. Procellaria pelagica. Stormy petrel.
Rare summer visitor.
34. Oceanodroma leucorhoa. Leach's petrel.
Common summer resident in south.
35. Oceanites oceanicus. Wilson's petrel.
Uncommon summer visitor.
36. Sula bassana. Gannet.
Uncommon summer resident, locally.
37. Phalacrocorax carbo. Cormorant.
Common summer resident, locally.

38. PHALACROCORAX DILOPHUS. Double-crested cormorant; shag.
Common summer resident, locally.
39. MERGANSER AMERICANUS. American merganser.
Rare summer resident.
40. MERGANSER SERRATOR. Red-breasted merganser.
Common summer resident.
41. LOPHODYTES CUCULLATUS. Hooded merganser.
Rare summer resident.
42. ANAS BOSCHAS. Mallard.
Rare transient visitor.
43. ANAS OBSCURA. Black duck.
Common summer resident.
44. ANAS OBSCURA RUBRIPES. Red-legged black duck.
Common summer resident.
45. MARECA AMERICANA. Baldpate; American widgeon.
Rare transient visitor.
46. NETTION CRECCA. European teal.
Accidental visitor.
47. NETTION CAROLINENSIS. Green-winged teal.
Rare summer resident.
48. QUERQUEDULA DISCORS. Blue-winged teal.
Very rare summer resident.
49. SPATULA CLYPEATA. Shoveller.
Accidental visitor.
50. DAFILA ACUTA. Pintail.
Very rare transient visitor.
51. AYTHYA AMERICANA. Redhead.
Very rare transient visitor.
52. AYTHYA MARILA. Greater scaup duck.
Rare summer resident in northwest.
53. CLANGULA AMERICANA. American golden-eye; whistler.
Common summer resident.
54. CLANGULA ISLANDICA. Barrow's golden-eye.
Rare transient visitor and summer resident.
55. CHARITONETTA ALBEOLA. Buffle-head; "sleepy diver."
Rare transient visitor.
56. HARELDA HYEMALIS. Old-squaw; "hound."
Common summer resident in northern parts.
57. HISTRIONICUS HISTRIONICUS. Harlequin duck; "lord and lady."
Common summer resident in northern parts.
[CAMPTOLAIMUS LABRADORIUS. Labrador duck. Extinct.]
58. SOMATERIA MOLLISSIMA BOREALIS. Northern eider; Greenland eider.
Abundant summer resident north of Hamilton Inlet.

59. SOMATERIA DRESSERI. American eider; "sea-duck"; "metik."
Common summer resident in southern part.
60. SOMATERIA SPECTABILIS. King eider; "king duck."
Abundant transient visitor; not uncommon summer resident in the north.
61. OIDEMIA AMERICANA. American scoter; "butter-bill coot."
Common transient visitor; rare summer resident.
62. OIDEMIA DEGLANDI. White-winged scoter; "brass-wing diver."
Abundant summer resident.
63. OIDEMIA PERSPICILLATA. Surf scoter; "bottle-nosed diver."
Abundant summer resident.
64. ERISMATURA JAMAICENSIS. Ruddy duck.
Uncommon summer resident on shores of Hudson Bay.
65. CHEN HYPERBOREA NIVALIS. Greater snow goose; "wavey."
Very rare summer resident in northwest; common transient visitor on shores of Hudson Bay.
66. CHEN CÆRULESCIUS. Blue goose; "blue wavey."
Common transient visitor on shores of Hudson Bay.
67. ANSER ALBIFRONS GAMBELI. American white-fronted goose.
Accidental visitor.
68. BRANTA CANADENSIS. Canada goose.
Common summer resident.
69. BRANTA BERNICLA GLAUCOGASTRA. White-bellied brant.
Abundant transient visitor locally.
70. OLOR COLUMBIANUS. Whistling swan.
Very rare summer resident in northwest.
71. BOTAURUS LENTIGINOSUS. American bittern.
Very rare summer resident in southwest.
72. ARDEA HERODIAS. Great blue heron.
Accidental visitor.
73. FLORIDA CŒRRLEA. Little blue heron.
Accidental visitor.
74. NYCTICORAX NYCTICORAX NÆVIUS. Black-crowned night-heron.
Accidental visitor.
75. RALLUS VIRGINIANUS. Virginia rail.
Accidental visitor.
76. PORZANA CAROLINA. Sora.
Accidental visitor.
77. FULICA AMERICANA. American coot.
Accidental visitor.
78. CRYMOPHILUS FULICARIUS. Red phalarope.
Common transient visitor; rare summer resident.
79. PHALAROPUS LOBATUS. Northern phalarope.
Common summer resident.

80. GALLINAGO DELICATA. Wilson's snipe.
Rare summer resident.
81. MACRORHAMPHUS GRISEUS. Dowitcher.
Rare transient visitor.
82. TRINGA CANUTUS. Knot.
Uncommon transient visitor.
83. ARQUATELLA MARITIMA. Purple sandpiper.
Rare transient and winter visitor.
84. ACTODROMAS MACULATA. Pectoral sandpiper.
Common autumnal transient visitor.
85. ACTODROMAS FUSCICOLLIS. White-rumped sandpiper.
Common transient visitor.
86. ACTODROMAS MINUTILLA. Least sandpiper; "peep."
Common summer resident.
87. PELIDNA ALPINA SAKHALINA. Red-backed sandpiper; American dunlin.
Uncommon transient visitor.
88. EREUNETES PUSILLUS. Semipalmated sandpiper; "peep."
Common summer resident, locally.
89. CALIDRIS ARENARIA. Sanderling.
Common transient visitor.
90. LIMOSA NÆMASTICA. Hudsonian godwit.
Very rare transient visitor.
91. TOTANUS MELANOLEUCUS. Greater yellow-legs.
Common summer resident.
92. TOTANUS FLAVIPES. Yellow-legs.
Uncommon transient visitor.
93. HELODROMAS SOLITARIUS. Solitary sandpiper.
Uncommon summer resident.
94. TRYNGITES SUBRUFICOLLIS. Buff-breasted sandpiper.
Very rare transient visitor.
95. ACTITIS MACULARIA. Spotted sandpiper.
Common summer resident.
96. NUMENIUS HUDSONICUS. Hudsonian curlew.
Uncommon autumn transient visitor.
97. NUMENIUS BOREALIS. Eskimo curlew; "the curlew."
Formerly abundant autumn transient visitor; now very rare.
98. SQUATAROLA SQUATAROLA. Black-bellied plover.
Common transient visitor.
99. CHARADRIUS DOMINICUS. American golden plover.
Uncommon autumn transient visitor.
100. ÆGIALITIS SEMIPALMATA. Semipalmated plover; "ring-neck."
Common summer resident.
101. ARENARIA MORINELLA. Ruddy turnstone.
Common transient visitor.

102. HÆMATOPUS PALLIATUS. American oyster-catcher.
Extirpated; formerly summer resident.
103. CANACHITES CANADENSIS. Hudsonian spruce grouse.
Common permanent resident.
104. BONASA UMBELLUS TOGATA. Canadian ruffed grouse.
Not uncommon permanent resident in southern part.
105. LAGOPUS LAGOPUS. Willow ptarmigan.
Common permanent resident in wooded portions.
106. LAGOPUS RUPESTRIS. Rock ptarmigan.
Common permanent resident in treeless portions, except in extreme north.
107. LAGOPUS RUPESTRIS REINHARDTI. Reinhardt's ptarmigan.
Common permanent resident in the extreme north.
108. PEDIOCÆTES PHASIANELLUS. Sharp-tailed grouse.
Uncommon, permanent resident in western Labrador.
109. ECTOPISTES MIGRATORIUS. Passenger-pigeon.
Formerly very rare, now extirpated.
110. ZENAIDURA MACROURA. Mourning dove.
Accidental visitor.
111. CATHARTES AURA. Turkey vulture.
Accidental visitor.
112. CIRCUS HUDSONIUS. Marsh-hawk.
Very rare summer resident in the south.
113. ACCIPITER VELOX. Sharp-shinned hawk.
Very rare summer resident in the south.
114. ACCIPITER COOPERI. Cooper's hawk.
Rare summer resident in the south.
115. ACCIPITER ATRICAPILLUS. American goshawk.
Uncommon permanent resident.
116. BUTEO BOREALIS. Red-tailed hawk.
Very rare summer visitor.
117. ARCHIBUTEO LAGOPUS SANCTI-JOHANNIS. American rough-legged hawk.
Very common summer resident.
118. AQUILA CHRYSÆTOS. Golden eagle.
Very rare permanent resident.
119. HALIAËTUS LEUCOCEPHALUS ALASCANUS. Northern bald eagle.
Rare summer resident.
120. FALCO ISLANDUS. White gyrfalcon.
Common permanent resident.
121. FALCO RUSTICOLUS. Gray gyrfalcon.
Rare winter visitor.
122. FALCO RUSTICOLUS GYRFALCO. Gyrfalcon.
Rare visitor.

123. Falco rusticolus obsoletus. Black gyrfalcon.
Common permanent resident.
124. Falco peregrinus anatum. Duck-hawk.
Common summer resident.
125. Falco columbarius. Pigeon-hawk.
Common summer resident.
126. Falco sparverius. American sparrow-hawk.
Rare summer visitor.
127. Pandion haliaëtus carolinensis. American osprey.
Common summer resident in south.
128. Asio accipitrinus. Short-eared owl.
Common summer resident.
129. Syrnium varium. Barred owl.
Very rare summer visitor in the south.
130. Cryptoglaux tengmalmi richardsoni. Richardson's owl.
Rare permanent resident.
131. Cryptoglaux acadica. Saw-whet owl.
Rare summer resident.
132. Megascops asio. Screech owl.
Very rare summer visitor in southern part.
133. Asio magellanicus heterocnemis. Labrador horned owl.
Common permanent resident.
134. Nyctea nyctea. Snowy owl.
Not common permanent resident.
135. Surnia ulula caparoch. American hawk-owl.
Common permanent resident.
136. Coccyzus erythrophthalmus. Black-billed cuckoo.
Very rare summer visitor in south.
137. Ceryle alcyon. Belted kingfisher.
Common summer resident in southwest.
138. Dryobates villosus leucomelas. Northern hairy woodpecker.
Uncommon summer resident in south.
139. Dryobates pubescens medianus. Northern downy woodpecker.
Common permanent resident in southern half.
140. Picoides arcticus. Arctic three-toed woodpecker.
Common permanent resident north to tree limit.
141. Picoides americanus. American three-toed woodpecker.
Common permanent resident north to tree limit.
142. Colaptes auratus luteus. Northern flicker.
Uncommon summer resident in southern half.
143. Chordeiles virginianus. Night-hawk.
Common summer resident in south.
144. Trochilus colubris. Ruby-throated hummingbird.
Very rare summer resident.

145. TYRANNUS TYRANNUS. Kingbird.
Rare summer resident in south.
146. SAYORNIS PHŒBE. Phœbe.
Very rare summer resident in south.
147. NUTTALLORNIS BOREALIS. Olive-sided flycatcher.
Very rare summer resident in southwest.
148. EMPIDONAX FLAVIVENTRIS. Yellow-bellied flycatcher.
Common summer resident in southwest.
149. EMPIDONAX TRAILLII ALNORUM. Alder flycatcher.
Not uncommon summer resident in southwest.
150. OTOCORIS ALPESTRIS. Horned lark; shore lark.
Abundant summer resident throughout the Arctic Zone, especially on coast.
151. PERISOREUS CANADENSIS NIGRICAPILLUS. Labrador jay.
Abundant permanent resident in forested regions.
152. CORVUS CORAX PRINCIPALIS. Northern raven.
Common permanent resident.
153. CORVUS BRACHYRYNCHOS. American crow.
Uncommon summer resident in the south.
154. XANTHOCEPHALUS XANTHOCEPHALUS. Yellow-headed blackbird.
Accidental visitor.
155. EUPHAGUS CAROLINUS. Rusty blackbird.
Common summer resident.
156. PINICOLA ENUCLEATOR LEUCURA. Pine grosbeak.
Common summer resident; winters in southern portion.
157. CARPODACUS PURPUREUS. Purple finch.
Common summer resident in south.
158. LOXIA CURVIROSTRA MINOR. American crossbill.
Uncommon summer resident; may winter.
159. LOXIA LEUCOPTERA. White-winged crossbill.
Common permanent resident.
160. ACANTHIS HORNEMANNII. Greenland redpoll.
Abundant winter visitor in the north.
161. ACANTHIS HORNEMANNII EXILIPES. Hoary redpoll.
Abundant permanent resident in the north.
162. ACANTHIS LINARIA. Redpoll.
Abundant permanent resident.
163. ACANTHIS LINARIA ROSTRATA. Greater redpoll.
Common winter visitor; rare summer resident in the north.
164. ASTRAGALINUS TRISTIS. American goldfinch.
Accidental visitor.
165. SPINUS PINUS. Pine siskin.
Uncommon summer resident in the south.
166. PASSERINA NIVALIS. Snowflake; snow bunting.

Abundant summer resident in the north; winter visitor in the south.
167. Calcarius lapponicus. Lapland longspur.
Abundant summer resident in the north; winter visitor in the south.
168. Passerculus sandwichensis savanna. Savanna sparrow.
Very common summer resident.
169. Zonotrichia ledcophrys. White-crowned sparrow.
Abundant summer resident.
170. Zonotrichia albicollis. White-throated sparrow.
Common summer resident in south.
171. Spizella monticola. Tree sparrow.
Common summer resident.
172. Junco hyemalis. Slate-coloured junco.
Uncommon summer resident.
173. Melospiza cinerea melodia. Song sparrow.
Uncommon summer resident in southwest.
174. Melospiza lincolni. Lincoln's sparrow.
Common summer resident in south.
175. Melospiza georgiana. Swamp sparrow.
Common summer resident in southwest.
176. Passerella iliaca. Fox sparrow.
Common summer resident in south.
177. Hirundo erythrogaster. Barn swallow.
Very rare summer resident.
178. Iridoprocne bicolor. Tree swallow.
Common summer resident locally.
179. Riparia riparia. Bank swallow.
Common summer resident in a few localities.
180. Ampelis cedrorum. Cedar waxwing.
Rare summer resident.
181. Lanius borealis. Northern shrike.
Not uncommon summer resident.
182. Helminthophila rubricapilla. Nashville warbler.
Very rare summer visitor in the south.
183. Helminthophila peregrina. Tennessee warbler.
Not uncommon summer resident in Hudsonian Zone.
184. Dendroica æstiva. Yellow warbler.
Common summer resident locally in the south.
185. Dendroica cærulescens. Black-throated blue warbler.
Accidental visitor.
186. Dendroica coronata. Myrtle warbler; yellow-rumped warbler.
Common summer resident, chiefly in Canadian Zone.
187. Dendroica maculosa. Magnolia warbler.
Common summer resident in Canadian Zone.

188. DENDROICA CASTANEA. Bay-breasted warbler.
Very rare summer resident.
189. DENDROICA STRIATA. Blackpoll warbler.
Very common summer resident.
190. DENDROICA BLACKBURNIÆ. Blackburnian warbler.
Rare summer resident in the south.
191. DENDROICA VIRENS. Black-throated green warbler.
Common summer resident in the south.
192. DENDROICA VIGORSII. Pine warbler.
Very rare summer resident.
193. DENDROICA PALMARIUM HYPOCHREPEA. Yellow-palm warbler
Rare summer resident in the south.
194. SEIURUS AUROCAPILLUS. Oven-bird.
Rare summer resident in the south.
195. SEIURUS NOVEBORACENCIS. Water-thrush.
Not uncommon summer resident in wooded portions.
196. GEOTHLYPIS TRICHAS BRACHIDACTYLA. Northern yellow throat.
Common summer resident in south.
197. WILSONIA PUSILLA. Wilson's warbler.
Common summer resident in south.
198. WILSONIA CANADENSIS. Canadian warbler.
Rare summer resident in south.
199. SETOPHAGA RUTICILLA. American redstart.
Common summer resident in south.
200. MOTACILLA ALBA. White wagtail.
Accidental visitor.
201. ANTHUS PENSILVANICUS. American pipit.
Abundant summer resident throughout Arctic Zone.
202. OLBIORCHILUS HIEMALIS. Winter wren.
Uncommon summer resident in south.
203. SITTA CANADENSIS. Red-breasted nuthatch.
Uncommon summer resident in south.
204. PARUS ATRICAPILLUS. Chickadee.
Not uncommon summer resident in south.
205. PARUS HUDSONICUS. Hudsonian chickadee.
Abundant permanent resident.
206. REGULUS SATRAPA. Golden-crowned kinglet.
Common summer resident in south.
207. REGULUS CALENDULA. Ruby-crowned kinglet.
Common summer resident in south.
208. HYLOCICHLA FUSCESCENS. Wilson's thrush.
Rare summer resident in south.
209. HYLOCICHLA ALICIÆ. Gray-cheeked thrush; Alice's thrush.
Common summer resident.

210. HYLOCICHLA USTULATA SWAINSONII. Olive-backed thrush.
Common summer resident in southwest.
211. HYLOCICHLA GUTTATA PALLASII. Hermit thrush.
Common summer resident in south.
212. MERULA MIGRATORIA. American robin.
Abundant summer resident.
213. SAXICOLA ŒNANTHE LENCORHOA. Greenland wheatear.
Rare summer resident.

ADDITIONAL SPECIES

Observed by CHARLES W. TOWNSEND, M.D., and
A. C. BENT, in 1909.

214. ÆGIALITIS MELODA. Piping plover.
Rare summer resident in south.
215. CYANOCITTA CRISTATA. Blue jay.
Accidental visitor in south.
216. MNIOTILTA VARIA. Black and white warbler.
Not uncommon summer resident in south.

VI

LIST OF CRUSTACEA ON THE LABRADOR COAST

By Mary J. Rathbun

Compiled from various lists published by Dr. Packard,[1] Professor Smith,[2] and Dr. Ortmann,[3] from collections in the U. S. National Museum,[4] obtained by Mr. Lucien M. Turner,[5] in 1882 and 1883, and by Mr. Owen Bryant,[6] in 1908.

Brachyura

Cancer irroratus Say. Hamilton Inlet [7] (Packard); Caribou Island (Packard).

[1] Packard, A. S., Jr., "A List of Animals dredged near Caribou Island, Southern Labrador, during July and August, 1860," *The Canadian Naturalist and Geologist,* Vol. VIII, pp. 401–429, Pls. I–II, December, 1863.

Packard, A. S., Jr., "Observations on the Glacial Phenomena of Labrador and Maine, with a View of the Recent Invertebrate Fauna of Labrador," *Mem. Boston Soc. Nat. Hist.,* Vol. I, pp. 210–303, Pls. VII–VIII, 1867.

Packard, A. S., "Life and Nature in Southern Labrador," *Amer. Nat.,* Vol. XIX, pp. 269–275, 365–372, 1885.

[2] Smith, Sidney I., "List of the Crustacea dredged on the Coast of Labrador by the Expedition under the Direction of W. A. Stearns, in 1882," *Proc. U. S. Nat. Mus.,* Vol. VI, pp. 218–222, 1883.

Smith, Sidney I., "Review of the Marine Crustacea of Labrador," *Proc. U. S. Nat. Mus.,* Vol. VI, pp. 223–232, 1883.

Smith, S. I., "List of Crustacea from Port Burwell collected by Dr. R. Bell in 1884, in Observations on the Geology, Mineralogy, Zoölogy, and Botany of the Labrador Coast, Hudson's Strait and Bay." By Robert Bell. Appendix IV, pp. 57DD–58DD. *Geol. and Nat. Hist. Survey of Canada,* 1884, Montreal. Pp. 1DD–62DD.

[3] Ortmann, A. E., "Crustacea and Pycnogonida collected during the Princeton Expedition to North Greenland," *Proc. Acad. Nat. Sci. Phila.,* Vol. LIII, 1901, pp. 144–168, 1 text figure.

[4] By permission of the Secretary of the Smithsonian Institution.

[5] Determined by Prof. S. I. Smith.

[6] By permission of Mr. Bryant in advance of his report on the expedition.

[7] On p. 203 of *The Labrador Coast,* Packard says that the shore-crab occurs *south of* Hamilton Inlet.

Chionœcetes opilio O. Fabricius. Off northern Labrador, 10–15 fms. in stomachs of fish (Packard); Henley Harbour (Smith); Chateau Bay, 30–50 fms. (Packard); Strait of Belle Isle, 10–50 fms. (Packard).

Hyas araneus Linn. Outside of Hebron, 60 fms., gravel (Bryant); off Fish Island, 75 fms., mud, and Nain, 7 fms., mud (Bryant); Domino Run, 0–1 fm. (Ortmann); Battle Harbour, 12–14 fms. (Ortmann); Henley Harbour (Smith); near Caribou Island, common (Packard); L'Anse au Loup and Forteau Bay, 15–25 fms., sand, kelp, and dirt (Stearns); abundant along the whole coast, 5–50 fms. (Packard).

Hyas coarctatus Leach. Henley Harbour, shallow water and 8 fms. (Smith), 30 fms. (Packard); Temple Bay (Smith); near Caribou Island, common (Packard).

Anomura

Pagurus pubescens Krøyer. Hopedale, 10 fms. (Packard); Egg Harbour, 7 fms., mud (Bryant); Dead Island, 1–3 fms., rocky (Smith); Fox Harbour, 3 fms., sand (Smith); Battle Harbour, 0–1 fm. (Ortmann); Henley Harbour, shoal water (Smith); Temple Bay, 10 fms. (Smith); Strait of Belle Isle, 50 fms. (Packard); L'Anse au Loup, 10–15 fms., sandy (Smith); abundant on the whole coast from low-water mark to 50 fms. (Packard).

Pagurus kröyeri Stimpson. Port Burwell (Smith); Nachvak, in stomach of cod (Turner); outside of Hebron, 60 fms., gravel (Bryant); off Fish Island, 75 fms., mud (Bryant); halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant); Port Manvers, 30 fms., sticky mud (Bryant); Nain, 7 fms., mud (Bryant); Shoal Tickle near (southeast of) Nain (Bryant); Dead Island, nullipore (Smith); Henley Harbour, 3–15 fms. (Smith); Temple Bay, 10 fms., rocky (Smith); not so abundant as *P. pubescens* (Packard).

Macrura

Homarus americanus Milne Edwards. South of Hamilton Inlet (Packard); Henley Harbour, rare (Packard); near Caribou Island, common (Packard).

Crago septemspinosus Say. Caribou Island, very large and abundant on mud flats (Packard).

Sclerocrangon boreas Phipps. Labrador Reef, Ungava (Turner); Port Burwell (Smith); Komaktorvik Bay, 5 fms., rocky

(Bryant); Nachvak, cod stomach (Turner); Egg Harbour, 7 fms., mud (Bryant); Dead Island, 1–3 fms., rocky (Smith), Square Island, 30 fms. (Packard); Henley Harbour, 4–10 fms., one with a *Pontobdella* an inch long attached to under surface (Packard); Strait of Belle Isle, 10 fms. (Packard); Caribou Island, 8 fms. (Packard); L'Anse au Loup, 8–10 fms. (Smith).

Nectocrangon dentata Rathbun = *N. lar* Smith, not Owen. Nachvak[1] (Turner); outside of Hebron,[1] 60 fms., gravel (Bryant); Nain,[1] 7 fms., mud (Bryant); Shoal Tickle [1] near (southeast of) Nain (Bryant), Egg Harbour,[1] 7 fms., mud (Bryant); Dead Island,[2] nullipore (Smith); Square Island,[2] 30 fms. (Packard); Henley Harbour,[1] 10 fms. (Smith); near Caribou Island,[2] 10 fms.,[3] mud, rare (Packard).

Sabinea septemcarinata Sabine. Halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant); Thomas Bay, 15 fms. (Packard).

Spirontocaris grœnlandica J. C. Fabricius. Port Burwell (Smith); Komaktorvik Bay, 5 fms., rocky (Bryant); Nachvak, in cod stomach (Turner); Egg Harbour, 7 fms., mud (Bryant); Dead Island, 1–4 fms. (Smith); Square Island, 15–30 fms. (Packard); Domino Harbour, 7 fms. (Packard); Fox Harbour, 1 fm. (Smith); Strait of Belle Isle, 10 fms. (Packard); Caribou Island, 14 fms. (Packard); L'Anse au Loup, 10–15 fms. (Smith).

Spirontocaris spina Sowerby. Nachvak (Turner); outside of Hebron, 60 fms., gravel (Bryant); Shoal Tickle near (southeast of) Nain (Bryant); Egg Harbour, 7 fms., mud (Bryant); Square Island, 15–30 fms., not common (Packard); Henley Harbour, shoal water and 10–15 fms. (Smith); Temple Bay, rocky (Smith), near Caribou Island, frequent in 10–50 fms. (Packard).

Spirontocaris phippsii Krøyer. Port Burwell (Smith); Komaktorvik Bay, 5 fms., rocky (Bryant); Nachvak (Turner); outside of Hebron, 60 fms., gravel (Bryant); halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant); Shoal Tickle near (southeast of) Nain (Bryant); Battle Harbour, 12–14 fms. (Ortmann); Domino Harbour, 7 fms. (Packard); off Belles Amours, 10 fms., rocky (Packard, as *turgida*); L'Anse au Loup, 8 fms. (Smith).

Spirontocaris polaris Sabine. Labrador Reef, Ungava, pale flesh

[1] Specimens examined by the present writer.
[2] Probably this species.
[3] In Packard's first list (1863) the depths are erroneously given in feet.

colour, not active (Turner); Port Burwell, 68 mm. long (Smith); Nachvak (Turner); outside of Hebron, 60 fms., gravel (Bryant); Dead Island, 3 fms., seaweed (Smith); Square Island, 15–30 fms. (Packard), Strait of Belle Isle, 10 fms. (Packard).

Spirontocaris fabricii Krøyer. Labrador Reef, Ungava (Turner); Port Burwell (Smith); Nain, 7 fms., mud (Bryant); Shoal Tickle, near (southeast of) Nain (Bryant); Egg Harbour, 7 fms., mud (Bryant); Dead Island, 3 fms. (Smith); Fox Harbour, 1 fm. (Smith); Henley Harbour, 10–15 fms. (Smith); Domino Harbour, 7 fms., not common (Packard); L'Anse au Loup, 15 fms., sand, and on rocky bottom (Smith); Forteau Bay, 20 fms. (Smith).

Spirontocaris gaimardii Milne Edwards. Komaktorvik Bay, 5 fms., rocky (Bryant), varying toward *belcheri;* halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant), varying toward *belcheri;* Nain, 7 fms., mud (Bryant), varying towards *belcheri;* Shoal Tickle near (southeast of) Nain (Bryant); Hopedale, 10 fms., (Packard); Egg Harbour, 7 fms., mud (Bryant); Square Island, 30 fms. (Packard); Henley Harbour and Sloop Harbour, 8 fms. (Packard); Caribou Island, 15 fms. (Packard); common (Packard).

Spirontocaris gaimardii belcheri Bell. Nachvak (Turner); off Fish Island, outside of Hebron, 75 fms., mud (Bryant); Henley Harbour, 10 fms. (Stearns), varying toward typical *gaimardii;* L'Anse au Loup, 8–15 fms. (Stearns).

Spirontocaris stoneyi Rathbun. Shoal Tickle, near (southeast of) Nain (Bryant).

Spirontocaris macilenta Krøyer. Off Fish Island, 75 fms., mud (Bryant); halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant); Shoal Tickle near (southeast of) Nain (Bryant); Square Island, 15–30 fms., rare (Packard).

Pandalus montagui Leach. Port Burwell (Smith); Nain, 7 fms., mud (Bryant); Hopedale, 10 fms. (Packard); Egg Harbour, 7 fms., mud (Bryant); Sloop Harbour, 6 fms. (Packard); Henley Harbour, 20 fms. (Packard); Temple Bay, 10 fms., rocky (Smith); L'Anse au Loup, 8–15 fms. (Smith); Forteau Bay, 20 fms. (Smith).

SCHIZOPODA

Mysis oculata O. Fabricius. Port Burwell (Smith); Komaktorvik Bay, 5 fms., rocky (Bryant); Dead Island (Smith); Caribou Island (Packard); swarms in tidal pools and abundant along the whole coast (Packard).

Mysis mixta Lilljeborg. Ungava in stomach of murre, *Uria columba* (Turner); Rigolet, not common (Turner).
Mysis relicta Lovén. Indian Harbour, fresh water (Bryant).

Phyllocarida

Nebalia bipes Fabricius. Mouth of Henley Harbour, 4–20 fms. (Packard).

Cumacea

Diastylis rathkii Krøyer. Mouth of Koksoak, Ungava (Turner); Fox Harbour, 3 fms., sand, abundant (Smith); Belles Amours, 6 fms., Thomas Bay, 15 fms., mud, Square Island, 15–30 fms., Henley Harbour, 8 fms., Chateau Bay, Long Island, 15 fms. (Packard); common in 10–50 fms. (Packard).
Diastylis quadrispinosus G. O. Sars. Off Belles Amours, 4–6 fms. (Packard, *The Labrador Coast*, p. 113. Not given, however, in his list of Crustacea and perhaps confused with the preceding).

Isopoda [1]

Leptochelia filum Stimpson. Caribou Island, 8 fms., sandy, rare (Packard).
Gnathia cerina Stimpson. Chateau Bay, Long Island, 15 fms., sandy (Packard).
Æga psora Linn. Port Burwell (Smith); Nachvak (Turner); Strait of Belle Isle, on under side of cod (Packard); north shore of Gulf of St. Lawrence (Whiteaves).
Arcturus baffini Sabine. Port Burwell (Smith).
Mesidotea entomon Linn. Nachvak (Turner).
Mesidotea sabini Krøyer. Halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant).
Synidotea marmorata Packard. "Cock Capelin," Gready Harbour (Bryant); Sloop Harbour, Kyuetarbuck Bay, 7 fms., sandy, reddish brown (Packard); Battle Harbour (Ortmann).
Asellus aquaticus Linn. Hopedale and Square Island, common in soil under stones, etc., in company with *Limax* (Packard).
Jæra marina O. Fabricius. Indian Tickle (Packard); Indian Harbour, Sandwich Bay (Packard); Fox Harbour (Smith); Caribou Island, common near high-water mark (Packard); abundant at low water under stones (Packard).

[1] Names revised according to Richardson, "A Monograph on the Isopods of North America," *Bull. U. S. Nat. Mus.*, No. 54, 1905. Isopods in Bryant collection determined by Dr. Harriet Richardson.

Munnopsis typica M. Sars. Halfway from Cape Mugford to Hebron, 60 fms., mud, sand (Bryant); off Beachy Island, between Flint Island and Cape Mugford, 80 fms., soft mud (Bryant).

Phryxus abdominalis (Krøyer). Port Burwell, on *Spirontocaris polaris* (Smith); Nachvak, on *S. polaris* (Turner); off Fish Island, 75 fms., mud, on *S. macilenta* (Bryant); halfway from Cape Mugford to Hebron, 60 fms., mud, sand, on *S. macilenta* (Bryant); Nain, 7 fms., mud on *S. gaimardii* var. (Bryant); Shoal Tickle near (southeast of) Nain, on *S. macilenta* (Bryant); L'Anse au Loup, on *S. gaimardii belcheri* (Stearns).

Dajus misidis Krøyer. Labrador (Packard), probably from *Mysis oculata* (Smith).

AMPHIPODA [1]

Hyperia medusarum (O. F. Müller). Domino Harbour, found with numerous young in the stomach cavity of *Cyanea arctica* (Packard); Dead Island (Smith).

Euthemisto libellula Mandt. Mouth of Koksoak, Ungava (Turner); lat. 56° north, long. 60° west (Turner).

Socarnes vahli Krøyer. Nachvak (Turner).

Orchomenella minuta Krøyer. Henley Harbour, 10–15 fms. (Smith).

Tryphosa höringii Bœck. Labrador (Packard).

Anonyx nugax Phipps. Port Burwell (Smith); Fox Harbour, 3 fms. (Smith); Dumplin Harbour, Sandwich Bay, 4 fms. (Packard); Henley Harbour, 10–15 fms. (Smith); off Henley Harbour, 40 fms., 3 miles from land, pebbly bottom (Packard); Sloop Harbour, 8 fms. (Packard).

Centromedon pumilus Lilljeborg. Labrador, 15 fms., sand (Packard).

Onesimus edwardsii Krøyer. Atlantic coast of Labrador (Smith).

Pontoporeia femorata Krøyer. Fox Harbour, 1–4 fms. (Smith); Belles Amours, 5–8 fms., muddy, abundant (Packard).

Phoxocephalus holbölli (Krøyer). L'Anse au Loup, 15 fms. (Smith).

Ampelisca macrocephala Lilljeborg. L'Anse au Loup, 10 fms. (Smith); Henley Harbour, 10–15 fms. (Smith); Chateau Bay, 30 fms. (Packard); Stag Bay, 10 fms., hard bottom (Packard); Caribou Island, 8 fms., sand (Packard); Long Island, 15 fms., sand (Packard); Strawberry Harbour, 14 fms., hard (Packard).

Ampelisca eschrichtii Krøyer. Mouth of Koksoak, Ungava (Turner); Ungava Bay, 28 fms. in mud, pale yellow (Turner); Nachvak

[1] Names revised according to G. O. Sars, *An Account of the Crustacea of Norway,* Vol. I, 1895.

(Turner); Chateau Bay, presumably (Smith); Caribou Island, 14 fms. (Packard).

Byblis gaimardii Krøyer. Dead Island, 2–4 fms. (Smith); Henley Harbour, 10–15 fms. (Smith); Temple Bay (Smith); Chateau Bay, 30 fms. (Packard); Chateau Harbour, Long Island, 15 fms., sand (Packard).

Haploops tubicola Lilljeborg. Chateau Harbour, Long Island, 15 fms., sand (Packard); Caribou Island, probably (Smith).

Stegocephalus inflatus Krøyer. Nachvak, in cod stomach (Turner).

Parœdiceros lynceus M. Sars. Port Burwell (Smith); Henley Harbour, 10–15 fms. (Smith); Henley Harbour, 4 fms. (Packard); Temple Bay, 10 fms. (Smith); Caribou Island, 8 fms., sand (Packard); L'Anse au Loup, 15 fms. (Smith); Forteau Bay, 20 fms. (Smith).

Pleustes panoplus Krøyer. Port Burwell (Smith); Henley Harbour, 4 fms., among weeds, not uncommon (Packard); L'Anse au Loup, 10 fms. (Smith).

Paramphithoë bicuspis Krøyer. Henley Harbour, probably (Smith).

Acanthozone cuspidata Lepechin. Temple Bay, 10 fms. (Smith).

Acanthonotosoma inflatum Krøyer. L'Anse au Loup, 8 fms., rocky (Smith).

Acanthonotosoma serratum O. Fabricius. Dead Island, shallow water (Smith).

Rhachotropis aculeata Lepechin. Port Burwell (Smith); Nachvak (Turner); Square Island, 30 fms. (Packard); Henley Harbour, 10–15 fms. (Smith); Temple Bay, 10 fms. (Smith).

Halirages fulvocinctus M. Sars. Henley Harbour, 10–20 fms., hard, weedy bottom (Packard).

Apherusa bispinosa Bate. Henley Harbour, 10–20 fms., hard, weedy bottom, rare (Packard).

Calliopius læviusculus Krøyer. Henley Harbour, 4 fms., very abundant (Packard); Stag Bay, 15 fms., on hard, weedy bottom (Packard).

Pontogeneia inermis Krøyer. Square Island, 15 fms. (Packard); Henley Harbour, 4 fms. (Packard); Stag Bay, 15 fms., on hard, weedy bottom (Packard).

Amathilla homari J. C. Fabricius. Labrador Reef, Ungava (Turner); Rigolet (Turner) abundant under stones on beach.

Gammarus locusta Linn. Ungava Bay, amid floating ice (Turner); Labrador Reef, Ungava, abundant under stones among the sand and silt (Turner); mouth of Koksoak, Ungava, common under stones on beach (Turner); Davis Inlet, common (Turner); Port Burwell (Smith); Rigolet (Turner); Fox Harbour, 1–4 fms. (Smith); Gulf coast (Whiteaves); whole coast (Packard).

Melita dentata Krøyer. Square Island, 15–30 fms. (Packard);

Henley Harbour, 10–15 fms. (Smith); Temple Bay, 10 fms. (Smith); Strait of Belle Isle, 15 fms., mud (Packard); Chateau Bay, 20–30 fms. (Packard); near Caribou, 10 feet, mud, sand (Packard).

Amphithoë rubricata Montagu. Henley Harbour, 8 fms. (Packard).

Ericthonius difformis Milne Edwards. Caribou Island, 8 fms., sand (Packard).

Unciola irrorata Say. Henley Harbour (Smith); Caribou Island (Packard).

Dulichia porrecta Bate. Rarely found (Packard).

Caprella linearis Linn. Battle Harbour, 12–14 fms. (Ortmann).

Caprella septentrionalis Krøyer. Henley Harbour (Smith); whole coast, 4–30 fms., among weeds (Packard).

Ostracoda

Cypridina excisa Stimpson. Labrador (Packard).

Copepoda

Lernœa branchialis Linn. var. *sigmoidea* Steenstrup and Lütken. Labrador in Stearns collection (Smith); attached to skin of cod (Packard).

Lepeophtheirus salmonis Krøyer. Ungava Bay, on salmon and sea-trout (Turner); Rigolet, on *Salmo salar* (C. B. Wilson).

Branchiopoda

Branchinecta arctica Verrill. Indian Tickle, north shore of Invuctoke Inlet, abundant in a pool of fresh water (Packard); Indian Harbour (Bryant).

Cirripedia

Balanus porcatus Costa. Whole coast, only in deep water (Packard).

Balanus crenatus Bruguière. L'Anse au Loup, 10 fms. (Smith); whole coast (Packard).

Balanus balanoides Linn. Whole coast (Packard).

Coronula diadema Linn. Taken quite frequently from the skin of whales caught in the Gulf of St. Lawrence (Packard).

Rhizocephala

Peltogaster paguri Rathke. Henley Harbour, on *Pagurus pubescens*, shallow water (Smith).

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