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owing to the warm Irminger current which from Cape Farewell follows the shore as far north as Melville Bay. Along this coast the isotherms run in a north-south rather than east-west direction and the mean for the month of July is only a couple of degrees higher at Ivigtut in latitude 61° 12 N. than at Jakobshavn in latitude 69° 13 N. All Danish meteorological stations in Greenland are situated on or near the open sea coast where the summer temperature is depressed by the proximity of the sea and rain and fog are prevalent. For the period 1880-1925 the mean for the month of July at Ivigtut was just below 50°F. but during the last two decades has increased slightly.

In late years it has been demonstrated that at some distance from the coast, near the head of the Greenland fjords, the climate is decidedly continental, with relatively warm and dry summers and correspondingly colder winters. The early Norse settlers well realized this and their farming communities which thrived in Greenland from the 11th to the 14th Century were all far from the open sea coast. Because the modern Danish colonization of Greenland has been based largely on fishing, sealing and whaling, all Greenland towns and villages have been built on the coast and only lately has there been a return to the fjords where now a rapidly expanding sheep farming industry is developing.

At the time of the Norse settlement the innermost parts of the south Greenland fjords had extensive but low and scrubby birch forest composed of a European species (Betula pubescens) which is also native to Iceland and northern Europe. This sparse early Greenland forest was severely depleted by the Norse settlers who depended largely on it for firewood. In some places the birch forest recovered following the decline and disappearance of the Norse settlements but in modern times Greenlanders and Danes have again made severe inroads causing the forest to disappear in all but the most inaccessible places.

Except for the low and bush-like juniper the flora of Greenland includes no conifers, nor is there any evidence that spruce or other tree-like species grew in Greenland in post-glacial time. This may be due to the insular nature of Greenland for along the Labrador coast white spruce extends north to Nain, and a short distance inland grows to fair size although the climate of the Labrador coast is probably no better than that of the west coast of Greenland.

Several species of plants that in North America are closely associated with the northern coniferous forest are found in southwest Greenland, among them a species of mountain ash (Sorbus decora) and green alder (Alnus crispa). Across North America the northern limit of the alder closely corresponds with that of the white spruce, so on botanical as well as on climatic grounds there would appear to be reasons to expect that white spruce (Picea glauca) and possibly also paper birch (Betula papyrifera) and several other species of North American trees might be able to grow in favourable places in Greenland.

In collaboration with the Danish Forest Service and National Arboretum, the National Museum of Canada has undertaken to obtain seeds of trees from places in Canada having a climate comparable with that of Greenland. The initial step was taken in September this year when W.K.W. Baldwin and H.L. Shearman of the National Museum staff spent a week at Goose Bay, Labrador where a quantity of seeds of white and black spruce and paper birch as well as of other tree species was obtained for shipment to Greenland.

The visit to Goose Bay was made possible by the Defence Research Board which was able to arrange transportation by air through the courtesy of the Royal Canadian Air Force for Messrs. Baldwin and Shearman from Ottawa to Goose Bay and back.

A.E. Porsild

The changing climate of the Arctic

During the last three decades there has been a marked change in the climate of the Arctic which is being felt throughout the northern hemisphere where, especially, the mean temperature of the winters has increased considerably. In the North American sector this change is perhaps best understood and also most marked in Greenland, where long meteorological records exist from a number of points on the west coast. Thus at Jakobshavn, in latitude 69° 13 North, the mean winter temperature for the years 1913-1922 was about 5°F. above the mean of 50 years ago and that of 1923-1932 almost 10°F. above. In 1935-1936 the mean for the winter at Godhavn was 13.4° higher than the normal at the end of last century, that of Godthaab 7.6° and at Julianehaab 9.8°F.

Increasing temperatures are not limited to the air; sea temperatures also have increased and while the amplitude is not so great, the result is even more profound and far reaching.

Meteorologists have advanced a number of possible explanations for this steady increase in temperature in the northern hemisphere. The most obvious one is that over a number of years the low pressure areas over the northern Atlantic have shifted north and east, thereby causing movements of warm air masses towards the Arctic. Predominance of southerly winds has increased and accelerated the northward flow of warm Atlantic surface waters which in the North Atlantic and in the Greenland and Norwegian Seas now reach higher latitudes than formerly. The amelioration of the climate of the Arctic has been accompanied by changes that are equally profound if not always so easily noted in the Tropics. Thus there has been a catastrophic drop in the annual precipitation in some parts of Africa. At Naivasha near Nairobi, Kenya

the mean annual precipitation in the last 30 years has dropped from 31 to 20 inches. In Lake Victoria this has caused a drop of 35 feet in the mean water level between 1932 and 1945 while in other lakes lowering of the water level has caused total suspension of navigation.

The warming up of the Arctic has resulted in a general recession of glaciers in the northern hemisphere. Glaciers are formed by the accumulation of frozen precipitation of countless years. By studying the stratification of glacier ice and the advance and recession of glacier tongues, as shown by their terminal moraines and fluvial deposits, glaciologists may be able to reconstruct the climate of that period during which the ice accumulated. When properly correlated the cumulative evidence derived from the study of glaciers in different regions may eventually make it possible not only to interpret past advances and recessions in terms of regional climates but also to predict future climatic trends. In this connection it is interesting to note that the amount of water released by the melting of glaciers has already caused a measurable increase in the level of the oceans.

The warming of the arctic seas has caused a diminishing of the arctic drift ice, which again has improved shipping conditions. In the 1907-1917 period Norwegian coal mines in Spitsbergen were able to load and export coal an average of 94 days each season, while 20 years later this period has been extended to 192 days. In 1878-80 Nordenskjöld in the Vega was the first to navigate the North East Passage, but to do this he had to winter twice. In 1936 a convoy of fourteen Russian ships made the trip in one season without encountering serious ice difficulties and during the last war this northern sea route was used extensively by Soviet shipping. During 1942-45 even war ships, which are especially vulnerable to ice, were able to reach Thule without difficulty.

The seas around Greenland have also been remarkably open in later years. The east coast, which frequently remained completely blocked by pack-ice, in 1931-33 was almost free from ice. Where formerly only wooden ships specially reinforced for ice work were considered suitable normal vessels are in use. On the west coast of Greenland in the past all shipping was suspended during the winter. From Disko Bay northward the shore ice each winter normally extended to the outlying islands, bridging all fjords and bays, so that dog travel was possible between west coast towns from New Year at least to the end of March. As far as I know no dog sledge has crossed Disko Bay from Godhavn to Egedesminde since 1918. In late years most West Greenland ports have remained open throughout the winter and in 1942 a Greenland supply vessel unloaded freight at Upernavik in latitude 72° 43 N. during the Christmas week in almost complete winter darkness. In 1941-42 the low-powered, 80-ton R.C.M.P. schooner St. Roch made

the North West Passage for the first time from the Pacific to the Atlantic and again in 1944 in the opposite direction in only 87 days.

The warming of the arctic seas has profoundly affected marine life. The Irminger Current, that branch of the Gulf Stream which washes the southwestern part of Greenland's west coast, can now be traced as far north as Melville Bay. The increase in sea temperature of Greenland waters, varying from 5 to 8 degrees F., has brought the Atlantic cod and the halibut, besides numerous other Atlantic fishes to Greenland, so that today the fishing banks off the west coast are among the richest in the world. At the same time many arctic marine animals, including the beluga or white whale, the arctic cod and the capelin, to mention only a few, have retreated north.

Corresponding changes have taken place on land. In Finland, in northern Sweden and in Norway the northern limits for agriculture have been advanced and the average growing season materially prolonged; likewise, seed production, natural afforestation and tree growth have increased markedly near the northern limit of forest. Similar changes have occurred throughout the Arctic in the natural vegetation, although as yet few examples have been recorded. Thus, in 1937, when approaching Disko Island in Bob Bartlett's schooner Morrisey, I noticed that the flat tops of mountains west of Godhavn that formerly showed no green vegetation above the 2000-foot level were distinctly green from several miles away. During the summer of 1926, which I spent in Alaska, I noticed that on Seward Peninsula the vegetation was fully one month farther advanced that in 1879 when the Swedish botanist Kjellman collected there.

No one knows how long the present cycle will last. Meteorological records show that during the last two centuries there have been several short and long-term fluctuations in the climate of northern Europe, although none comparable with the present. Greenland records show that in the middle of the last century the cod was abundant in Greenland waters between 1845 and 1849, but in 1851 it had again disappeared, only to return in numbers in 1917.

A.E. Porsild

Hydrographic observations

The Dominion Hydrographer, Mr. R.J. Fraser, has kindly sent the following note in answer to a request from the Editor for ideas on the kind of hydrographic observations that northern travellers could make incidental to their own studies.

With the rapid development of Arctic regions, it is desirable that all marine features observed and nautical information collected be routed to a central office for co-ordination and improvement of the official Sailing Directions and charts. Functions of the Canadian Hydrographic Service include the surveying and charting of all navigable waters of Canada, recording and analysis of tidal action and the publication of the results with related marine data. Therefore, any observations, measurements, recorded descriptions of features, or the experiences of travellers, in any way related to the ocean, the coast, or inland waterways, or to ports, harbours, sea routes, to ships and the men who sail them, are grist to the hydrographers' mills that turn out the aids to navigation.

In Arctic regions very little original hydrographic work has been undertaken and all information is desired that can be obtained from any reliable sources. It is remarkable how comparatively little nautical information or recorded matter describing the water-covered features of northern territory, comes into the possession of the Hydrographic Office from sources or individuals not on that staff. The response to specific requests to interested services and individuals has been encouraging, and where the hoped-for information has not come to hand, the cause can generally be traced to a lack of precise knowledge of the class of information desired.

Scientific observers or explorers attached to vessels are not necessarily more advantageously situated for obtaining hydrographical information than their opposite numbers travelling on dry land. In order to make measurements, either depth, or angular or directional for position-finding, they are dependent upon the co-operative use of a ship's navigational gear, and this cannot always be made readily available. Nevertheless, any isolated sounding obtained by any method whatsoever - the lowering of a weighted line, to be later measured against a tape or surveyor's chain - is better than no sounding at all.

If a traveller finds he is going to be aboard a vessel he can equip himself with a light line suitably marked for taking soundings, which should be no extra burden to him, for it can always serve him or others in any other capacity where a rope or line may be required. Good pocket compass bearings, if taken to three, four or five fairly distinguishable and identifiable points of land, even in the region of extreme magnetic variation, are valuable for locating the position of the sounding. The happy situation would be that where the traveller finds ships' navigators eager to operate the vessel's sounding apparatus for him whether echo, or measured wire, and to take bearings by gyro compass, with sextant fixes, along the course of the ship's journeyings. Next best is to obtain

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Ninth Meeting of the Arctic Circle

The Ninth Meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess at 278 Sparks Street on Thursday December 9. The President, Mr. A.E. Porsild, was in the Chair, and introduced the speaker, Mr. Paul Serson.

Mr. Serson spoke on Operation Magnetic and illustrated his talk with kodachrome slides. Mr. Serson's account of Operation Magnetic was published in the Circular for November 1948 (Vol.1, No.7, p.79).

Amendment to the Constitution

At the Eighth Meeting of the Arctic Circle on 4 November 1948, it was proposed that Paragraph 4 of the Constitution should be amended to include a combined membership fee for husband and wife. Due notice having been given, this proposal was voted on at the Ninth Meeting on 9 December 1948 and was carried unanimously. Paragraph 4 should now read: "The annual membership fee shall be Two Dollars for residents of the Ottawa District, and One Dollar for non-residents (defined for this purpose as those living more than ten miles from Ottawa). A combined membership of $3.00 covering husband and wife may be paid by couples requiring only one copy of the Arctic Circular and other club papers. Membership fees become due on January 1st, each year, but fees paid by members joining in October or later shall cover the period to the 31st December of the following year. Members whose fees remain unpaid after March 1st shall have their names removed from the club list."

Afforestation experiments in Greenland

Although the southern tip of Greenland is in approximately the same latitude as Oslo, Helsingfors or Leningrad the rugged shores of Greenland are treeless. No matter what the latitude, the northern limit of forest growth coincides approximately with the course of the 50°F. isotherm for the warmest month of the year, regardless of the mean temperature of the winter or of the annual mean. Actually the climate of the west coast of Greenland is oceanic rather than arctic

permission to make extracts from the ship's log book of any navigational data, records of soundings and their positions, strength and direction of currents, stage of the tide, courses followed in relation to the land, sea temperatures, magnetics. In fact, anything important enough to have been entered by the Ships' Officers in their log books that has to do with the sea, the adjacent land, with a chart, or a volume of Sailing Directions, is of value to the hydrographer.

The interested observer can always equip himself with the charts of the territory he intends to visit. The Hydrographic Service is glad to supply these on request. Any differences observed between charted features and those inspected, whether on foot along the coast, or from the deck of a ship, can be indicated on the chart, and the latter returned to the Hydrographic Office. A single, isolated sounding might show up some surprising feature. It could represent the general depth of a passage or sound, or channel, or inlet, where perhaps nothing was shown before. It might disclose an unexpected bathymetric deep where much shoaler water had generally been assumed. But, more important, it might bring to light some dangerous shoal-water rock or bank. Also, any sounding or depth measurement helping to define the edge of the continental shelf has its peculiar value. It is important to note the height or stage of the tide at or near the time of the sounding: whether high, low, or somewhere in between.

A day or two of observation every few hours at the same point may result in most valuable tidal information when the hydrographer or tidal analyst has related this recording to others at some neighbouring established station. The important measurements are the extreme height and the lowest level, which can be easily found by setting up any kind of a pole and marking these limits on it. At the time of observation, the date and hour should be noted and the state of the weather - wind, its direction and strength; a barometer reading, if possible, and a general note telling if this particular weather has been of some duration or not.

Even from the shore, standing on a headland or clear observation point, the traveller can estimate the direction and rate of a tidal current, if floating ice is going by. If on an anchored vessel, and there be no ship's log or other conventional gear for measuring speed or current, he can drop an empty tobacco tin or piece of wood overboard at the bow and note the time for it to arrive abreast of the stern - recording the length of the ship with the elapsed time.

The Hydrographic Office wants other more easily observed and recorded data, such as whether a beach is strewn with boulders; if it will bear the weight of heavily-burdened men unloading supplies; or, if it is sandy, shingly, and clean, lending itself to the safe and easy hauling ashore of boats.

Ice, of course, is a subject of ever present interest, especially in northern latitudes. Important facts are the dates of the freezing up or the closing in of a bay, harbour, anchorage or passage; equally so, the date on which the ice broke up or disappeared.

If an observer or explorer finds himself located at some community where a small boat is available, he can, of course, make a comprehensive sketch survey of a bay or river mouth, an anchorage or landing approach. Soundings taken in any convenient pattern, over the area, with an improvised sounding line and weight, can be located by setting up lines of transit on the shore; or, if the traveller is so fortunate as to acquire a sextant, (there are useful pocket types), he can take angle "fixes" to natural or other features within easy range.

I would suggest that the traveller "pick the brains" as well as the log books and journals of the seasoned vessel captains and post managers, R.C.M.P. administrators, and the "old timers" of the district.

The Hydrographic Service gladly welcomes the receipt of all data that will assist in producing a new chart of formerly unsurveyed waters, or in improving the existing ones. A plan with shore and water features properly related to one another, on a reasonably large scale, can be made into an aid to navigation where none existed before.

At anytime the Hydrographic Service is glad to "brief" or instruct the keen and interested traveller or exploring scientist on the technique of hydrographic investigation, and to supply charts, maps and publications both to aid the traveller in getting from place to place, and to illustrate the class of field material he might collect and furnish these headquarters on his return.

Marine Investigations, Ungava Bay, 1948

The programme of oceanographical study of the Eastern Arctic, begun in 1947 by the Fisheries Research Board of Canada, continued in the 1948 season. Two parties were in the field; the first, consisting of Mr. Henry Hildebrand and Mr. Philip Orkin, spent the summer on Ungava Bay, chartering a native-owned Peterhead boat for their work. The results consist of (1) collections of material from seals for the investigation of food habits and parasitic organisms, (2) similar material from codfish in the northeastern part of the bay, (3) smaller collections of bottom fauna, including fish, and plankton, (4) information on the habits and abundance of seal and shark, and (5) temperature records. This work was completed by the end of August. Hildebrand also brought back collections of birds and small mammals for the National Museum

of Canada, and greatly added to the known distribution of frogs in the Ungava Peninsula, discussed in a separate note in this number. The collection on fish from both the 1947 and the 1948 season is at present being worked up for publication.

The second party in the field were engaged during July in supervising the completion of the new research vessel Calanus (see Circular Vol.1, No.5, p.53). This party consisted of Dr. M.J. Dunbar, in charge of the investigations, Captain E.L. Ritchie, Mr. W.E. Wilson, engineer and scientific assistant, and Mr. K. Morrison, radio operator and "pharmacist's mate". The Calanus sailed on August 7, but Dr. Dunbar was unable to proceed farther than Halifax owing to a virus infection. The Calanus continued north with Corporal Haley, R.C.M.P. (Marine Section) making up the ship's complement. The scientific programme was abandoned for 1948, and the ship was sailed up to Fort Chimo and beached for the winter.

The Calanus will begin her scientific work next season. This includes trawling operations, the sounding of the bottom of Ungava Bay, hydrographic sections across the mouth of Ungava Bay and in Hudson Strait, and experimental line-fishing for various fish of possible value to the Eskimo. In 1949 particular emphasis will be laid on the physical oceanography and trawling.

M.J. Dunbar

Wood Frogs at Chimo

Henry Hildebrand, working on the Fisheries Research Board investigations in the waters of Ungava Bay during the 1948 season, greatly extended the known northern distribution of the wood frog, Rana sylvatica. The following information has been obtained from Hildebrand in advance of his own publication on this subject.

Adult wood frogs were collected from a small pond above the settlement at Fort Chimo on 18 June 1948. Egg clusters were found on June 21, with tadpoles just emerging. Tadpoles were collected on July 21 and September 2, and the first metamorphosed young frogs were taken on September 20. The collections were of necessity made erratically whenever Hildebrand returned to his base at Chimo. Had there been someone on hand at Chimo who could have continued collecting all through the summer, the series would have been complete. This would have been an unpopular activity among the natives; as it was, Hildebrand's collection of the adult frogs in June was blamed for the bad weather which followed.

Rana sylvatica (setting aside the question of subspecies) is known in its northern limits from Carmacks, Yukon; Fort

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Resolution, Great Slave Lake; Moose Factory, Charlton Island and Cape Hope Islands, James Bay; and Gaspé Basin, Quebec (Patch 1939)(1). Vladykov collected it from the Laurentide Park (Vladykov 1941)(2); and Jacques Rousseau found it at Mistassini. Rousseau's specimens are at present at the University of Montreal, and have not so far been published (personal communication, Dr. Rousseau and Mr. Cuérier). Previous to Hildebrand's observations, therefore, Lake Mistassini seems to have been the most northerly established locality for sylvatica in the Labrador Peninsula. There is however an interesting reference in Hantzsch (3) of finding tadpoles in 1906 at Nersitok on the east side of Ungava Bay, a little north of the tree-line. He states that "On the evening of the 18th August I observed in a pond near our tent very large tadpoles of a species of frog or toad, but I was not fortunate enough to secure a specimen of it."

M.J. Dunbar

References:
(1) Patch, C.L., Copeia 1939 (4) p. 235
(2) Vladykov, V.D., Can. Field-Nat. 55 (1941) pp. 83-4
(3) "Contributions to the knowledge of extreme north-eastern Labrador by Bernard Hantzsch". Can. Field-Nat. 45 (1931) p. 89

New ships for the Canadian Arctic

During the past year three important ships for work in the Canadian Arctic have been under construction. The keel of the Government's Eastern Arctic Patrol vessel (see Circular Vol.1, No.2, p.11) was laid on December 18 in the Davie Shipbuilding yard at Lauzon, P.Q. The Hudson's Bay Company's 600-ton MV Rupertsland for the Eastern Arctic was launched from the Fairfield yard at Glasgow on November 30 and their wooden 350-ton M.S. Fort Hearne for the Western Arctic is partly finished in Etherington's yard at Shelburne, N.S. For full descriptions and photographs of these two ships see the Beaver for December 1948, p.51 and Arctic Vol.1, No.2, 1948, p.121.

The Minister of National Defence, the Hon. Brooke Claxton, announced on December 24 that the contract for the Royal Canadian Navy's new icebreaker had now been placed with Marine Industries of Sorel, P.Q. This firm last year built the large train and car ferry S.S. Abegweit, which operates between Cape Tormentine, N.B. and Charlottetown, Prince Edward Island, and is specially fitted to break through the ice of Northumberland Strait.

The contract for this icebreaker is the first placed for new ship construction for the Canadian Navy since the war.

"The new icebreaker", Mr. Claxton stated, "will be of great value in facilitating the work of the Canadian Navy in northern waters, and will add to Canada's ice-fighting resources. It will be available, provided operation requirements permit, for use in emergencies generally, and is an important addition to Canada's modern fleet."

The vessel will be a Wind Class ship with some modifications. She will be 269 feet in length with a beam of 63 feet 6 inches, and will be propelled by Diesel electric machinery of 10,000 horse power, giving a speed of 16 knots. Her standard displacement will be 5,400 tons. Approximately 13 officers and 159 men will be required to man the ship.

There are at present four ships built as icebreakers in Canada: N.B. McLean, Ernest Lapointe, Lady Grey and Saurel. of these, the N.B. McLean, built at Halifax in 1930, is the largest. She is a little smaller than the new icebreaker: 260 feet in length with a beam of 60.3 feet, and considerably lower-powered with a rating of 6,500 h.p. She is manned by 51 officers and men when on northern work.

A summer journey down the Mackenzie and along the western Arctic coast by J.K. Fraser

During the summer of 1948, I carried out a geographical reconnaissance of the Mackenzie waterway and the western Arctic coast for the Geographical Bureau of the Department of Mines and Resources.

Reaching Waterways by R.C.A.F. plane from Edmonton, I travelled down the Athabasca, Slave, and Mackenzie rivers in tugs of the Northern Transportation Company, visiting Fort Smith, Providence, Simpson and Fort Norman. After a week at Norman Wells, I was flown to Kittigazuit and Port Brabant (Tuktuk) by the R.C.A.F., where the following week was spent in assisting Lieut. K. Boggild, R.C.N. in a resurvey of the harbour.

The next part of my journey was in the Hudson's Bay Company's motor vessel Fort Ross, which left Tuktuk on July 25, arriving at Coppermine three days later. Here we met the smaller H.B.C. vessel Nigalik, and the R.C.M.P. patrol ship St. Roch arrived while we were still unloading. The Fort Ross made a very quick run eastwards to the post at Burnside Harbour and back in fine weather. The journey down Bathurst Inlet was both beautiful and interesting. Several islands were noted which are not shown on the existing charts and with the assistance of Captain Summers, who has a most intimate knowledge of this region, the best sailing routes were marked.

On our return to Coppermine I left the Fort Ross and spent the next ten days there with the hospitable R.C.M.P. It is expected that there will be eighteen white inhabitants at the post this winter of whom half will be women. The H.B.C. post manager, Leo Manning, who is noted for his fluent Eskimo, arrived with his wife and two small daughters during my stay. Canon Webster and his family have occupied St. Andrew's Mission at Coppermine since 1931. Johnnie Jackson and family and an assistant take care of the radio signals station, while Mr. and Mrs. Craigie and an assistant take meteorological observations. These, with two R.C.M.P. and a Roman Catholic father, provide Coppermine with a wider social life than most Arctic posts.

I crossed Coronation Gulf in the Nigalik to Cambridge Bay where I met Scotty Gall who was planning to come out last August. The H.B.C. Canso on an inspection flight of the Company's northern posts, arrived soon after the Nigalik. Mr. Cheshire, general manager, kindly invited me to accompany the aircraft on a flight to Boothia Peninsula where a new post site was to be investigated.

We landed at one point on the northern coast of Spence Bay but conditions were unsatisfactory and a better site farther east, which was eventually chosen for the new post, was reconnoitred from the air.

At Gjoa Haven, on the return trip, I arranged to be left with the two carpenters who were to build the new post to wait for the Nigalik. Bad weather forced the Nigalik to shelter for five days off Jenny Lind Island in Queen Maud Gulf, and we three left at Gjoa Haven spent nine days wondering whether she would arrive or not.

The post at Gjoa Haven, the only permanent settlement on King William Island, is in the snug shelter used by Amundsen. George Porter, who has spent many years in the north, his family, and two Eskimo families are the only residents. A marble slab still marks the site of Amundsen's observatory and many cairns dot the surrounding raised beaches. In the graveyard lie the remains of some of the members of the Franklin Expedition buried there by Learmonth, three-quarters of a century after their deaths.

The Nigalik, favoured with good weather and a following breeze, steamed to Spence Bay in just about twelve hours. Here rugged granites have been folded into five-hundred to six-hundred-foot folds running approximately north-south on the west side of the bay. The downfolds appear to be filled with deposits and are low and swampy. The south side of the bay is low with little relief.

The new post site is on a narrow shingly neck of land separating a chain of freshwater lakes from the sea. A great variety of mosses and lichens grow in the more swampy sheltered

positions, and Arctic willow over two feet high was noted. Two families of Netsilik Eskimo met the ship as we dropped anchor and more arrived before the Nigalik left three days later. Many small cairns in the vicinity had been used to help in driving the caribou but these animals do not appear to visit this part of Boothia Peninsula now.

All hands aided in unloading the lumber and supplies, for the skipper, Johnny Norberg, was afraid of being caught in the freezeup before he returned to Tuktuk. I made a sketch survey of the harbour using a surveying sextant, measured heights of nearby hills with an aneroid, took some photographs and collected geological specimens. I made soundings at the entrance but it was difficult to do this accurately alone and no help could be spared.

The Nigalik left the new post site on September 3. Dropping two of the natives at Gjoa Haven she continued west, steaming through thick fog across Queen Maud Gulf. These uncharted waters have many dangerous shoals, some clearly visible, others only a few feet below the surface. The Nigalik, an old schooner built in 1927, already leaked badly and several brushes with these reefs did not improve her condition. From Cambridge Bay I was flown out by Canso, while the Nigalik made her way back to Tuktuk.

The surprising part of the summer to me was the extremely small amount of ice all along the coast. The first two days out of Tuktuk travelling east we met very light scattered drift ice, presenting no navigation problem, but the seas appeared absolutely clear from that time on. The weather was extraordinary, much warmer than the usual in that region. I recorded no temperature during the summer below 34 degrees.

Operation Snowbird

During last summer the Yellowknife Transportation Company carried out a supply operation for the R.C.A.F., known to the Air Force as Operation Snowbird. Snowbird II, a converted LSM (landing ship medium) of approximately 1000 tons, sailed from Vancouver to Port Brabant (Tuktuk) in record time. From there she carried supplies to Cambridge Bay, making two trips during the summer. Because of its shallow draft the LSM is particularly well-suited for work in the Western Arctic. F/L S.E. Alexander was the official R.C.A.F. observer aboard the Snowbird II.

Arctic cruise by the Royal Navy

The Admiralty has announced that a small experimental force of the Royal Navy will cruise in the North Atlantic and

Arctic during the early part of this year to study the effects of cold weather conditions. The aircraft carrier H.M.S. Vengeance, with a specially equipped air group including jet planes, will lead the force of two destroyers, a frigate, a submarine and an oiler.

Restoration of Amundsen's ship 'Gjoa'

Mr. Richard Finnie, who is now living in San Francisco, has sent the following quotation from the San Francisco Chronicle of 18 November 1948: "A check for $12,303 was handed to Mayor Robinson yesterday by the Gjoa Foundation of San Francisco to assist in restoration of Arctic Sloop Gjoa in Golden Gate Park".

After the first successful voyage through the North West Passage Amundsen put in to San Francisco on 19 October 1906. It seems to have been largely due to the efforts of the Norwegian colony there that his ship, the 47-ton Gjoa, is now in the Golden Gate Park. After the official reception the ship was towed to Mare Island, where she remained for two years. During that time subscriptions were collected, and on 8 December 1908 the Norwegian Consul, Henry Lund, advised the Park Commissioners that the Norwegian colony was ready to place the historic vessel at their disposal as the fund was sufficient for the purchase. On 16 June 1909 the Gjoa was formally turned over to the City of San Francisco, and on July 5 she was successfully beached and placed in her present position in the Golden Gate Park, facing the Pacific Ocean.

During the years the weather has caused much damage to the ship. The Gjoa Foundation, which was organized in 1939, is a "self-perpetuating body having definite responsibilities for the restoration and upkeep of the little vessel". The sum raised by this foundation, together with an earlier appropriation of $12,500 from the City of San Francisco, covers the total cost of restoration involving complete new planking, new deck and deck houses, new mast, new rigging, and many minor replacements.

Arctic Holiday

During the summer months of 1947 Lewis and Betty Rasmussen made a documentary film in colour of the Caribou Eskimo called "Arctic Holiday". The first part of the film was photographed in the vicinity of Churchill, the second part around Eskimo Point. The film lasts for an hour and a half and includes a complete sequence of a white whale hunt in the Churchill river and a caribou hunt at Eskimo Point. More information about this film can be obtained from Lewis and Betty Rasmussen, 5615 16th. Avenue, Kenosha, Wisconsin, U.S.A.

The Arctic, Desert and Tropic Information Center

The Arctic, Desert and Tropic Information Center, closed down by the AAF in 1945 after four years of research work, has been re-established at The Air University of the U.S.A.F. at Maxwell Field, Alabama. The new ADTIC is staffed by civilian scientists of broad experience and training and their primary mission will be to collect and disseminate information of military value to the Air Force on the non-temperate areas. Liaison with federal and civilian agencies conducting research and experiments in the non-temperate regions will be made by both civilian and military personnel. Information will be sent out in the form of bulletins, technical manuals, and reports.

The ADTIC staff is now making a survey of agencies conducting research in the arctic, desert and tropical regions. The places where problems are under investigation are being plotted on a large scale world map and summaries of each of these investigations are being prepared.

Meetings of the Arctic Circle

The next three meetings of the Arctic Circle will be held on Thursday February 10, Thursday March 10 and Thursday April 7 at 8.00 p.m. at the 1st. Corps Troops R.C.A.S.C. Mess, 278 Sparks Street.

Editorial Note

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

Mrs. Graham Rowley,
Editor Arctic Circular,
411 Echo Drive,
Ottawa.

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Annual General Meeting of the Arctic Circle

The Annual General Meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess at 278 Sparks Street on Thursday January 13. The President, Mr. A.E. Porsild, was in the Chair and opened the meeting with a brief review of the progress of the Club. During this first year nine meetings have been held, seven in the R.C.A.S.C. Mess, one in the R.C.A.F. Mess, and one at the summer home of Dr. and Mrs. Diamond Jenness. The club wished to thank Col. R.C.D. Laughton for the use of the R.C.A.S.C. Mess and Sgt.-Major Chesshire for making the arrangements at the Mess. The Club Membership has continued to increase steadily: at the time of the meeting there were 175 Ottawa members and 188 out-of-town members, making a total of 363.

After the President's statement the meeting was asked to vote for Committee Members. In accordance with the Constitution the following five members of the Committee resigned and were not eligible for re-election: Mr. Eric Fry, Dr. Trevor Lloyd, W/C K.C. Maclure, W/C R.I. Thomas, and Mr. J.G. Wright. To fill their places the Committee proposed the following names: Mr. A.D. McLean, Capt. B.P. O'Connell, Mr. Charles Rose, Mr. F.C. Goulding Smith, and Mr. A. Stevenson. After this list had been circulated to the members Mr. Charles Rose found that he would have to remove his name as he would be unable to attend meetings. W/C D.A. Willis seconded by W/C K.C. Maclure proposed that F/L K.R. Greenaway's name should be substituted. With this amendment the list proposed by the Committee was accepted unanimously. The Officers and Committee Members for 1949 are as follows:

President:	Mr. A.E. Porsild
Vice-President:	Mr. Frank Davies
Secretary:	Mr. T.H. Manning
Editor:	Mrs. G.W. Rowley

Committee Members

F/L J.F. Drake, R.C.A.F.
Dr. T. Freeman
F/L K.R. Greenaway, R.C.A.F.
Mr. A.C. Jones
Mr. R.G. Madill
Mrs. T.H. Manning
Supt. D.J. Martin, R.C.M.P.
Mr. A.D. McLean
Capt. B.P. O'Connell
Mr. G.W. Rowley
Mr. F.C. Goulding Smith
Mr. A. Stevenson
Mr. L.J. Weeks
Mr. J.A. Wilson
Mr. B.J. Woodruff

Following the election of Committee Members the Secretary, Mr. T.H. Manning, read the annual financial statement and the meeting thanked and re-appointed the Auditors, Mr. W.K.W. Baldwin and Dr. George Hooper, for 1949.

At the conclusion of the Club business, Mr. B.J. Woodruff spoke on "The recent work of the Geodetic Service in northern Canada", illustrating his talk with lantern slides and two films.

Some notes on ice and weather conditions in the Canadian Arctic during the summer of 1948

In contrast to the 1946 and 1947 seasons, ice conditions in the north, particularly in the Eastern Arctic, were extremely favourable to navigation during the summer of 1948. According to reports from various sources ice cleared earlier from the different routes and channels, was rarely a serious obstacle to navigation and was throughout the whole area considerably less in amount than during the two previous seasons.

Along the Labrador coast, fjords and harbours which are not normally expected to be ice-free until early July were clear several days before the last week in June. From Resolution Island south to Nain the sea approaches at this time were completely ice-free except for the occasional small growler or bergy bit. The only serious ice condition along the Labrador in middle and late June was in the "inner passage" between Nain and Hopedale where the island fringe protected the fast ice against break-up by wind and tide. This region, on the eastern edge of the prevailing high pressure centres characteristic of this summer, was one of the very few areas which did not show mean temperatures well above normal for the season.

By the last week in June the ice in Frobisher Bay had been broken up and fairly well cleared out of the bay except in the north-west corner. Here the barrier islands prevented wind and tide from being fully effective. Ice in Hudson Strait seemed mainly to consist of strings of small rotting pans which drifted out around the headlands in varying directions depending on the local wind. The greatest concentration of ice seen at this time was in Ungava Bay from about Akpatok Island south. Here the loosely packed pans gave about 70 per cent. cover to the surface and were themselves covered with pools of melt water.

Voyages to service the northern stations were completed without much difficulty and in some instances well ahead of schedule. Mr. A. Stevenson and Mr. S.J. Bailey of the North-west Territories Administration who were aboard the Terra Nova and the Regina Polaris respectively have commented upon the

exceptionally good weather, freedom from ice hazard and absence of severe storms until late in August, when the Polar Front was pushing southward and temporarily establishing itself across Hudson Bay and Ungava. The Terra Nova was able to complete her trip north and return 23 days ahead of schedule (4 weeks and 4 days). After clearing fog along the Labrador coast she encountered good weather and very little ice. She was able to sail close to the east coast of Baffin Island all the way unlike the 1947 trip when heavy field ice forced her route almost over to the Greenland side of the channel in the area east of Cape Dyer. Eclipse Sound and Lancaster Sound were ice-free and the only delay on the whole trip was at Dundas Harbour. A southerly wind persisting for several days had packed ice along the southern coasts and the landing at Dundas had to be made at a point a few miles from the main station.

The Regina Polaris, leaving Montreal in early July, encountered some bergs in the Strait of Belle Isle, a good number around the Button Islands and a few in Hudson Strait as far west as the vicinity of Cape Dorset. On the return trip in early October she sighted about half a dozen bergs between Resolution Island and Cape Chidley, but except for some scattered field ice around Coats and Mansel Islands in late July had clear sailing. Her report of good sailing weather and ice-free sea routes contrasts sharply with the 1941 reports when fields of heavy close pack ice were encountered all the way north from Hopedale and held ships harbour bound for days at a time.

Ice also appears to have cleared early in the Western Arctic and although large areas of open water gave widespread fog patches at times, the landing facilities and weather conditions for flying boats were definitely more favourable than during the previous summer.

Throughout the north mean temperatures were well above normal for the months of June and July except in the area of coastal and south-eastern Labrador. The highest temperatures recorded were in many cases 10 to 20 degrees higher than the mean maximum computed over a considerable period of years. Arctic Bay, with a normal mean maximum of 51°F in July, reported a maximum temperature of 68°F and a mean temperature of 46°F as compared with the normal mean of 43°F. Nottingham Island with a mean maximum temperature of 49°F for July and a mean of 42°F reported a mean of 49°F and a maximum of 68°F.

The high and low pressure systems which crossed the Arctic during the summer were extremely slow moving and thus the weather tended to be more consistent for longer periods than can usually be expected. Both high and low pressure systems were for the most part of surprisingly large extent. The high pressure systems in particular, with their long north-south axis, in some cases extended their influence from the

southern states of the Gulf of Mexico as far north as the southern coast of Ellesmere Island.

For considerable periods during July and August these systems were centred over Hudson Bay or over Baffin Island and northern Ungava. In addition to bringing persistent warm southerly winds to the Arctic they gave exceptionally good photographic weather which permitted the photographic reconnaissance of Baffin Island to be completed earlier and more satisfactorily than had been hoped. This contrasted markedly with conditions in 1947 when such work had been almost impossible. The low pressure systems also showed a tendency to a north-south range of influence and drew their circulation from well south in the continental interior.

This persistence of warm southerly winds not only gave higher temperatures to speed the destruction of Arctic ice, but tended to pack what ice survived against the southern shores of the Arctic Islands rather than on the northern coasts. Ice bergs appear to have been fewer than usual and would seem to have travelled more rapidly southwards through the ice-free waters. The earliest reports of bergs in the North Atlantic were received by the U.S. Hydrographic Office almost two months earlier than usual.

M.R. Montgomery

The work of the St. Roch during last summer. By Inspector H.A. Larsen

After spending the fall and winter outside I was flown back to the St. Roch, in winter quarters at Herschel Island, by police aircraft, arriving on April 4. Trapping had been very poor there and many of the natives had suffered from influenza and very bad colds so the detachment left with the ship had been kept busy assisting them with their hunting, rendering medical attention, and fulfilling other routine tasks. It was of course full winter when I returned and the spring was very late in coming; even on July 1 we could still travel across to the mainland by dog-team. On July 3 however a very strong westerly gale with very high water broke up the ice and drove it nearly out of sight. We left for Tuk Tuk on July 23 arriving the following day having seen very little ice on the way.

Our job for the summer was to assist the Hudson's Bay Company in hauling cargo accumulated at Tuk Tuk. This consisted mainly of building materials for the new school and hospital at Coppermine. The ice conditions were very good and we managed to make three trips with full loads: two to Coppermine and one to Read and Holman Islands, taking in the H.B.C. supplies for those islands.

A strong north-west wind had been blowing for several days when we left Coppermine on August 29. On reaching Booth Island we found Franklin Bay packed with ice and, owing to thick fog, we became entangled for a few days. From Pullen Island to Herschel Island the ice was very heavy and we had to follow round Mackenzie Bay to get on the inside of the ice. We managed to reach Herschel on September 5 and found the ice packed right up to the island on the north and west as far as we could see from the highest point. But on September 9 we managed to squeeze past the island and head west.

We got caught in the ice for two days off Demarcation Point. A strong westerly gale was blowing at the time so we were fortunate in finding a large floe grounded in 9 fathoms to which we could make fast. After working ice all the way we reached Point Barrow at midnight on September 12. The ice was very heavy here so we continued close to shore in the very shallow water inside the grounded pack, with not even room to turn back had it been necessary. The residents at Barrow turned on all lights which helped us considerably in following the shoreline. Had we waited for daylight to round Point Barrow we should probably have had a lot of trouble as we ran into a strong north-westerly gale with heavy rain, which obscured visibility, shortly after passing Cape Smyth. From there the weather continued bad with violent snow squalls all the way to Dutch Harbour though there was very little ice. On September 23 we anchored south of the spit at Point Hope for three days. The natives there could not even get aboard for a visit as we were nearly rolling our rails under. Fortunately the weather cleared for a time passing through Bering Strait. Leaving Dutch Harbour on September 28 we passed to the south of Kodiak Island, through Cross Sound and south through the inside passage, anchoring at Vancouver on October 18. On this passage the weather was the dirtiest, I think, we have met so far.

Trichinosis in animals of the Northwest Territories

In the account of the second summer's work of the Queen's University Expedition to Southampton Island (Circular Vol. 1, No. 7, p. 81) it was reported that the results of skin-testing of Eskimo had suggested trichinosis. The January number of the Canadian Journal of Public Health includes a note on "Trichinosis in Animals of the Northest Territories" (p.20) by the members of the Queen's University Expedition and Dr. E. Kuitunen-Ekbaum giving the results of the examinations of the tissues of a number of walrus, white whale, polar bear, square flipper, jar and harp seals. Two of the three polar bear were found to be infected, but none of the 7 walrus, 9 whales and 6 seals. The note also contains a summary of other work on trichinosis in the arctic, showing that in addition to polar bears Trichinella have

been found in sledge dogs and a square flipper seal in Greenland, and in two arctic foxes kept in the London Zoological Gardens. Trichinosis is the probable cause of a number of epidemics in the north one of which has been attributed to typhoid.

The note concludes: "The fact that Trichinella infection has been demonstrated in the bear should be known to parties travelling or at work in the north and the danger of eating inadequately cooked polar-bear meat realized. For the Eskimo it constitutes a real problem. He has to eat what is at hand, and if he is in a hurry or if fuel is in short supply, he will eat it raw. The results of this combination of necessity and habit were distressingly evident during our work in 1948, and there is no easy solution, for though he will change his habits on advice, advice will not change his occasional necessity."

The Northwest Territories and Yukon Radio Telegraph System

The Northwest Territories and Yukon Radio Telegraph System, which is operated by the Royal Canadian Corps of Signals, has completed twenty-five years of running wireless communications for the Canadian northwest. The first two stations of the System were established in 1923: at Dawson and at Mayo Landing. To-day there are 23 stations which provide northern regions with radio telegraph communications and 5 radio stations which broadcast programmes similar to those heard in any part of Canada. There is an additional R.C.C.S. broadcast station at Churchill.

The choice of Dawson and Mayo as the first two stations was to provide an "outlet" for the important silver mining activities at Mayo to the land line which already existed from Dawson to Hazelton, B.C. The service between these two stations was so successful that in 1924 the Department of National Defence agreed to establish a chain of stations along the Mackenzie River route which included Aklavik, Fort Simpson, Edmonton and Fort Smith. This network of permanent stations was gradually increased, largely as a result of increased air activity in the north, until 1939 when a number of stations were closed down, though many of these were subsequently reopened during the war. In addition to the permanent stations temporary stations have been set up wherever there was some special need as for the 1937 mining exploration in the regions of Lake Athabasca and Great Slave Lake when stations were opened at Goldfields, Norito Bay and Viola Lake.

In addition to providing communications for the residents of the far north, who are allowed to use the facilities of the System through their own receiving and transmitting sets, meteorological services are established

at each station. The Meteorological Service in Toronto receives synoptic weather reports twice daily and weather reports are also provided for aircraft and ships on request. As the System has connection with the telegraph companies it can exchange traffic with any part of the world.

The value of the System for defence requirements was shown during the recent war when it was expanded to assist with communications for such major operations as the Canol pipeline, the Alaska Highway and airfield developments. During the period of defence projects the following stations were placed in service: Norman Wells, Providence, Good Hope, Wrigley, Embarras, Hay River and Port Radium. As a result of this defence expansion the System has been left in a most advantageous position for post-war work.

The following list gives the stations of the Northwest Territories and Yukon Radio Telegraph System with the dates on which they were opened.

Canadian Army Signals Stations

Dawson, Y.T., 1923
Mayo Landing, Y.T., 1923
Aklavik, N.W.T., 1924
Fort Simpson, N.W.T., 1924
Edmonton, Alta., 1924
Fort Smith, N.W.T., 1925
Fort Resolution, N.W.T., 1927
Fort Norman, N.W.T., 1930
Fort McMurray, Alta., 1933
Fort Chipewyan, Alta., 1933
Whitehorse, Y.T., 1935
Yellowknife, N.W.T., 1937
Fort Providence, N.W.T., 1939, closed same year, reopened by R.C.C.S. 1943
Brochet, Man., 1939, closed same year, reopened 1948
Wrigley, N.W.T., 1942
Embarras, Alta., 1942
Hay River, N.W.T., 1942
Norman Wells, N.W.T., 1943
Port Radium, N.W.T., Cameron Bay, 1934-40, reopened 1944
Fort Good Hope, N.W.T., 1944
Snare River, N.W.T., 1946
Baker Lake, N.W.T., 1947
Fort Reliance, N.W.T., 1948

Canadian Army Broadcast Stations

C F W H -- Whitehorse, Y.T., 1946
C H A K -- Aklavik, N.W.T., 1948
C F Y T -- Dawson, Y.T., 1948
C F N W -- Norman Wells, N.W.T., 1948
C F H R -- Hay River, N.W.T., 1948
C H F C -- Fort Churchill, Man.

Damage to the U.S.C.G.C. 'Eastwind'

In the early hours of January 19 the Tanker Gulfstream and the U.S.C.G.C. Eastwind were in collision sixty miles south-east of Barnegat on the New Jersey coast. The Eastwind,

one of the Wind Class Icebreakers, took part last summer in the supplying of weather stations in the Canadian Arctic. (See Circular Vol. 1, No. 8, p. 90). The damage to the ship was considerable and the casualties serious: eleven lives were lost, mainly petty-officers, and twenty of the crew were injured. At the time of the accident the Eastwind was bound for Curtis Bay, Md., sailing from Boston. The bow of the Gulfstream was badly damaged but there were no casualties.

The Gulfstream, a comparatively new tanker of 10,000 tons, rammed the icebreaker just forward of 'midships in thick fog. After the crash the Eastwind caught fire and burned for 7 hours. The fire was finally brought under control and the icebreaker, which by that time had a list of more than 8-9 degrees to starboard, was towed to Staten Island.

When the order to abandon the Eastwind was given, owing to fire hazard, Captain John A. Glynn and 46 of the crew remained aboard. The injured sailors, mainly badly scalded by steam from the damaged boilers, were transferred to the freighter Susanne, the first rescue vessel to arrive, and taken back to hospital as soon as possible. With the exception of the skeleton crew left aboard, the remainder of the ship's complement of 160 officers and men was taken to New York by the Junior, another rescue freighter.

The Eastwind, which cost in the neighbourhood of $10,000,000, is cork-lined to prevent sweating on Arctic patrols. This lining seems to have proved a serious fire hazard. Survivors believe that a short-circuit caused by the collision set the cork lining on fire. The cork smoke cut off visibility throughout the ship and caused great discomfort to the crew who were choking and gasping for breath in the acrid smoke.

Discussion on navigation in Polar regions

On 11 January 1949, a joint meeting of the Washington Section of the Institute of Navigation and various Polar Societies was held in the auditorium of the Department of the Interior, to discuss navigation in Polar regions and to hear about recent developments in those regions. The Societies represented were the American Polar Society, the Arctic Institute of North America, and the Arctic Institute of the Catholic University in Washington.

Lt.Comdr. Alton B. Moody, U.S.N.R., Chairman of the Washington Section, Institute of Navigation, was in the Chair and introduced the speakers. After a general paper by Dr. Paul Siple on "Recent activity in the Polar regions"

and an account of the work of the Arctic Institute of North America by Dr. A.L. Washburn, the Chairman directed attention to the main subject of the meeting - Polar navigation.

Commander T.D. Davies, U.S.N., remembered as Captain of the "Truculent Turtle", which flew from Perth, Australia, to Columbus, Ohio, non-stop, establishing a long-distance record, outlined the problems of Polar navigation. He stressed failure of the Magnetic Compass, inadequate mapping, extreme convergency of the meridians, and twilight conditions.

F/L K.R. Greenaway, Arctic Research, Defence Research Board, who also represented the Arctic Circle, then discussed the present status of Polar navigation. In general, F/L Greenaway described what was being done to overcome the problems mentioned by Comdr. Davies. He reviewed maps and charts, stressed the importance of astronomical observations, and explained the use of search radar. On long-range Polar flights two and sometimes three navigators have been used. F/L Greenaway suggested two approaches to overcome the difficulties and reduce the man-power requirement: the first, to provide the navigator with better in-flight facilities and equipment; the second, to provide the navigator with better training, standardized techniques and procedures. F/L Greenaway then reviewed Canadian efforts to improve high latitude navigation. These included navigation training in the RCAF, research and development of in-flight instruments and the improvement of maps and charts.

Captain P.V.H. Weems, U.S.N. (Ret.), then read a paper on "The Future of Polar Navigation", prepared by Comdr. W.J. Catlett, U.S.N., Military Air Transport Service. This paper assumed that all the difficulties mentioned by the previous speakers had been overcome. The theme was an imaginary flight using a stratocruiser, travelling at supersonic speed, and controlled by automatic methods.

At the close of the meeting it was recommended that a joint meeting of the various Polar societies in the Washington area be held on 6 April 1949, the fortieth anniversary of the attainment of the North Pole by Admiral Peary. The topic for this meeting was suggested as "The Weather of the Polar Regions".

Operation Ostan

Early this year news was received from Igloolik that Father Ostan, a Roman Catholic missionary, had been bitten by a mad dog. Since Dr. Plummer's recent work has shown that rabies is present in the Canadian Arctic (see Circular Vol. 1, No. 4, p. 37) no risks can be taken. It was therefore decided that serum must be sent in to the priest. As

there is no landing strip at Igloolik the Air Search and Rescue Coordination Centre at Winnipeg arranged to have the serum dropped by parachute. An R.C.A.F. plane, carrying the serum, left Winnipeg for Churchill on January 9, where it remained overnight, and proceeded to Igloolik the following day flying over Coral Harbour. The drop was made successfully and the plane refuelled at Coral Harbour on the return flight to Churchill, afterwards continuing to Winnipeg. The pilot was F/L T. Winslow and Sgt. W.B. Fairbairn supervised the dropping of the parachute with the serum, syringe, instructions for their use, and other medical supplies.

Geography Summer School

McGill University is planning to hold a third Geography Summer School at Stanstead College, Quebec, from July 4 to August 13. The School, which is under the direction of Professor G.H.T. Kimble, will include a graduate course on Polar Problems given by Mr. P.D. Baird, Drs. Dugal, Siple and Stefansson, and Sir Hubert Wilkins and an undergraduate course on The Geography of the Arctic by Mr. P.D. Baird. The Canadian Geographical Society is awarding two scholarships for this course on the basis of professional record and financial need.

The Polar Record

We have now received another exchange number of the Polar Record, published December 1948. For convenience of members who may wish to borrow this number from the Editor the articles are listed:

Lady Kennet - an appreciation. By Frank Debenham
The position of the Magnetic Poles. By Sir Harold Spencer Jones
The economic resources of Labrador
Aviation in Arctic North America and Greenland. By Trevor Lloyd
Cryolite and the mine at Ivigtut, West Greenland. By J.G. Elbo
Edward Augustus Inglefield, 1820-94. By F.J. Woodward
Expeditions: notes on recent expeditions

The 'Beaver' for March 1945

The Library of the Lands and Development Services of the Department of Mines and Resources find that their set of the Beaver is missing the copy for March 1945. If any member should have a copy of this number, which is out of print, and would part with it the Library would be most

grateful as it would complete the set for binding. Their telephone number is 9.5087.

Future Meetings

At the meeting of the Arctic Circle on Thursday March 10 Comdr. David C. Nutt will show a film "The Antarctic in colour".

On Thursday March 24 there will be a joint meeting of the Arctic Circle and the Canadian Geographical Society in the National Museum at 8.30 p.m. Captain Ejnar Mikkelsen will read a paper on "East Greenland: past and present".

At the Annual General Meeting of the Canadian Geographical Society on Friday February 25 at 8.30 p.m. in the National Museum, Mr. Bradford Washburn will speak on the "Conquest of Mount McKinley", illustrating his talk with a colour film and slides. This meeting is open to the public.

Editorial Note

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

Mrs. Graham Rowley,
Editor Arctic Circular,
411 Echo Drive,
Ottawa

CORRESPONDENCE

Migration of the Caribou

In a letter to the Secretary dated January 4, Mrs. J.J. Wood writes from Oxford House, "the migration of the barren-ground caribou now is passing here on its way south. According to local natives they turn back north again someplace between here and Island Lake."

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Eleventh Meeting of the Arctic Circle

The eleventh meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess at 278 Sparks Street on Thursday February 10. The President, Mr. A.E. Porsild, was in the Chair and introduced the speaker, Mr. P.D. Baird, Director of the Montreal Office of the Arctic Institute of North America, who showed a kodachrome film of Project Snow Cornice, kindly loaned by Mr. W.A. Wood. The following brief account of the work of this Project gives the main points of Mr. Baird's commentary to the film.

Project Snow Cornice

Project Snow Cornice, carried out by the Arctic Institute of North America last summer, was essentially an experiment and part of a longer programme of intensive research work in the Seward Ice Field, St. Elias Range, and its distributary the Malaspina Glacier. The leader was Mr. W.A. Wood, Director of the Institute's New York Office, and Professor R.P. Sharp, California Institute of Technology, was responsible for the glaciological and geological programmes.

The objects of the project were to establish a semi-permanent research station on the Seward Ice Field, to initiate a long-range glaciological programme and to acquire information on the meteorology and biology of the region.

Owing to the inaccessible nature of the Seward Ice Field all transport was planned by air. The 21 persons working on the project assembled at Yakutat, Alaska, late in June 1948 and made their base headquarters at the airport. One of the problems had been to design equipment for taking off on a hard runway and landing on snow. The combination ski-wheel produced for the Institute's Norseman, the only plane used throughout the project, functioned but was not considered altogether satisfactory.

On June 30 the Norseman took off from Yakutat and flew the 55 miles to the Seward Ice Field landing safely at 5700 feet. The first party found a satisfactory site for the research station on a rocky nunatak beneath Mount Vancouver,

where a Jamesway hut, 16 x 24 feet in floor area, was subsequently set up and remains for work in other years. During the season approximately 4 tons of supplies were taken in, more than half being parachuted or free-dropped from the plane, with less than 5 per cent. damage in the free-dropping.

Owing to delays in starting and an accident to the Norseman, which over-turned on the ice field, not as much time was available for research as had been hoped. During the months of July and August glaciological and other research work was carried out. Borings were made in the firn by electrically heated hot points reaching a depth of 204 feet and the temperature in mid-July was found to be 0°C at all levels. The amount of melt-water circulating in the firn, which appeared to be saturated at 65 feet, was surprising. Provided that two dirt layers in the ice field do in fact mark the summers of 1946 and 1947 the excess of accumulation over ablation for 1946-7 was 17.5 - 17.9 ins. of water. Attempts to measure the depth of ice in a valley glacier by radar appeared promising.

Meteorological records were kept throughout the time the party were on the glacier. The summer temperature was found to be higher than expected for the 6000-foot altitude. At the research station the mean maximum temperature for July was 50°F and the mean minimum 32°F.

It is hoped that these studies of the Seward Ice Field, which are the first fundamental studies of ice fields and the upper reaches of glaciers in North America, may in subsequent years add considerably to our knowledge of Alaskan glacier regimes.

Expedition to the new islands in Foxe Basin

The Geographical Bureau of the Department of Mines and Resources is planning to send a party to investigate the islands which lie in the northeast of Foxe Basin. Two of these islands, one of which is over 80 miles long, were discovered only last summer by an R.C.A.F. photographic plane.

The party will be led by Mr. T.H. Manning, who will make a special study of the vertebrate fauna. He will be accompanied by two other geographers, a botanist, a geologist and a cook. To transport the party a 45-foot Peterhead boat with a 12½-foot beam is being built at Upper LaHave, Nova Scotia. It will be powered with a 64-h.p. diesel motor, and equipped with radio and depth recorder. The boat will be shipped by rail from Nova Scotia to Moosonee. During June and early July, the party will work on the islands and coasts of James Bay. By mid-July ice conditions should permit a start up the east coast of Hudson Bay.

Firth River Gold. By C.S. Lord

Late in 1947 reports that placer gold had been "discovered" that summer on the Firth River, Yukon, attracted widespread attention. This river, entering the Arctic Ocean near Herschel Island, lies in a little known area and few data were readily available to combat what were probably, in part, over-coloured accounts. Thus, by mid-winter, predictions of a 1948 gold rush to the area, from such points as Fairbanks, Dawson, Fort Nelson, and Aklavik, began to appear in the less responsible press. Although no such rush materialized the area did see a little activity as recorded below.

Contrary to some recent reports, the gold placers of Firth River have been known for many years, probably since 1899 when whaling crews are reported (4) to have panned the river bars. The deposits were examined about 1930 by a prospecting organization known as Dominion Explorers. Rumours that gold had been found in quartz veins led others, including R.W. Sandy of Fort Nelson and E.M. Maxwell of Yellowknife, to visit the area in 1947. Early in 1948 A.A. Gillespie (1) reported prospectors en route to Firth River. The district has not been examined by the Geological Survey of Canada and many of our inferences as to the geology of the placer area stem from exterpolations of data gathered by the United States Geological Survey (2) during the study of the Alaska-Yukon boundary, 10 to 25 miles to the west. The river and adjacent territory have been photographed from the air.

Brief accounts of the 1947 season have been published (3, 4) and these will not be summarized here. They are supplemented by the following notes, based mainly on a conversation with N.S. Edgar, a mining engineer of Yellowknife who, with two companions, visited Firth River during the summer of 1948.

About seven white men and twelve Eskimo entered the district last summer. The natives have recovered a little gold there annually for a number of years. Nearly all gold has come from a point on Firth River about 40 miles from its mouth. Mr. Edgar's party travelled by schooner from Aklavik to the R.C.M.P. post on Herschel Island. Light aircraft (Waco and similar types) are available for charter at Aklavik and one of these, operating on wheels, moved the party from Herschel Island to a gravel bar about 40 miles up Firth River. No nearby lakes suitable for pontoon equipped aircraft are known. The coastal plain is devoid of timber and estimated to be about 15 miles wide; inland from this, including the placer gold district, are unglaciated mountains rising to heights of 5,000 feet or more. Walking from the coast would be difficult because of "niggerheads". The river is not navigable and, after leaving the aircraft, the party resorted to back-packing as the only practicable means of transport. Pack dogs might be used provided food is available. An alternative route of access

is by the valley of Malcolm River, 10 miles to the west, and thence through a low pass to Firth River. Timber is sparse but sufficient for a few cabins, sluice boxes, and fuel. Game was scarce (only two caribou killed), weather severe (snow blizzard in August), and air service unreliable.

A shallow mantle of gravel of 10 feet or so in thickness forms broad benches resting on bedrock. The river has cut through the gravel and bedrock to form a gorge as much as 80 feet deep. The rocks are mainly steeply dipping black slates and limestone without quartz veins. Neither granitic nor volcanic rocks were seen, either in place or in gravels. Only a little gravel occurs in the river bed in the productive area, and most of the placer gold recovered to date lay in natural riffles of slate slabs that lie transverse to the stream flow. Gold can be recovered by removing and scraping these slabs. No gold has been found upstream from the productive area. Efforts to test (by panning) the high level gravels that flank the river gorge were found to be slow and tedious because no water was available there and each sample of gravel had to be carried down to the river, in the bottom of the gorge. Bench gravels along Firth River have been reported (4) to contain gold but, as far as known, no systematic sampling has been done and their average gold content is unknown.

References:

(1) Gillespie, A.A.: "The Firth River gold strike"; Western Miner, vol. 21, No. 5, May 1948, p. 78.

(2) Maddren, A.G.: "Geologic Investigations along the Canada-Alaska Boundary"; U.S.G.S., Bull. 520 (1912).

(3) Maxwell, E.M.: "Eskimo gold stories start search for Firth River lode deposits"; Northern Miner, 18 September 1947.

(4) Sandy, R.W.: "Placer Gold on the Firth River - routes to the area"; Western Miner, vol. 21, No. 6, June 1948, pp. 85-86.

(5) Surveys and Mapping Bureau: Herschel (Aeronautical Edition), Alaska-Yukon, 8 miles to 1 inch: Mines, Forests, and Scientific Services Branch (1946).

Canadian Ionospheric Stations. By J.H. Meek

Canadian radio communications circuits are affected by fading of signals and extended periods of loss of long distance communications more frequently, and to a much greater extent, than more southerly circuits. With the increased activity in the Canadian north it is more important than ever before to discover the reasons for the poor radio communication, to

predict its occurrence, and to find alternative methods of radio communication during such disturbed periods. In order to do this a much more detailed knowledge of the ionospheric variations in polar and auroral regions is required.

In an attempt to fill in some of the gaps in this knowledge it was decided that the existing network of six ionospheric stations should be increased by the addition of three more fixed stations and one mobile observatory. (For an earlier account of Canadian ionospheric stations and their work see Circular Vol.1, 1948, No.1, p.3). The fixed stations, Fort Chimo, Baker Lake and Resolute Bay, Cornwallis Island, lie within the northern auroral zone, while the mobile observatory has operated along the Churchill-Portage la Prairie railway.

New Fixed Stations

The three new fixed stations were set up by the Department of Transport Radio Division and by January 1949 all were in regular operation using equipment built by the Defence Research Board Radio Propagation Laboratory. New automatic recording equipment is being provided for the new stations and the first was set up and put into operation at Baker Lake during February.

The Fort Chimo station is situated near the H.B.C. post, down the river from Chimo Air Base. There is some heavy radio equipment still to be transported to complete the installation.

The Baker Lake station is about one half mile to the east of the settlement. In addition to the regular ionospheric equipment a high-power radio transmitter is being set up in a hut by itself, about half a mile east of the main station, where it will cause a minimum of interference to local radio reception. The R.C.A.F. has assisted in handling equipment which was not taken in by ship during the summer.

The Resolute Bay station has been set up at some distance from the main camp to eliminate mutual radio interference. It is the most remote of the stations and the most difficult to supply. It is hoped that the remainder of the ionospheric equipment will be flown in shortly by the R.C.A.F.

Mobile laboratory

In the summer of 1948 the DRB Radio Propagation Laboratory took over a standard CNR sleeping car for use as a mobile ionospheric laboratory. The car was stripped and rebuilt to DRB specifications and now includes sleeping and living accommodation as well as working space. The following equipment was provided by the RPL: Ionospheric vertical-incidence equipment; standard loran receiver; auroral light-intensity recorder; magnetic recorders for two components of the earth's field; signal strength recorder; and a 500-watt communications transmitter.

On completion the laboratory was moved out west and regular ionospheric, magnetic and auroral observations have been made for a week at a time at the following places:

Portage la Prairie	49°9N. 98°3W.
The Pas	53°8N. 101°2W.
Wabowden	54°2N. 98°7W.
Pikwitonei	55°6N. 97°2W.
Gillam	56°5N. 94°2W.
Herchmer	57°5N. 94°2W.
Churchill	58°8N. 94°2W.

The mobile laboratory will continue to operate back and forth along the above series of places until a complete year's data has been collected.

Since these places extend from the southern part of central Canada to the region of maximum auroral occurrence (Churchill) it is expected that definite information will be obtained on the contribution of the auroral zone to the attenuation of radio waves passing through and near it, both during normal and during ionospherically disturbed periods.

The following is a list of personnel at the northern fixed ionospheric stations:

Personnel at northern ionospheric stations, 1948-9

Clyde River 70°5N. 68°8W.

A.B. Neil
B.F. McManus
S.H. Hitchman
C.D. McKenzie

Fort Chimo 58°2N. 68°3W.

J.E.C. Leggatte
D.R. Naismith
D. Torraville
D. Fraser

Baker Lake 64°3N. 96°1W.

E.E. Stevens
J.A. Simpson
G.E. Bulger
J.R. Connor
D.A.H. Bentley
E.W. West

Resolute Bay 75°0N. 96°2W.

D. Bower
P.R. Wharton
L.W. Colpitts
V.J. Carmichael
E.H. Leaver (will join staff soon)

Churchill 58°8N. 94°2W.

R.R. Curtis
N. Yakubowitch
G.E. Salter
J.M. Kempton
M.A. Ruymar
F.G. Ruddick
A.W. Bolton
R.R. Brown

Poliomyelitis in Keewatin District

Last fall Dr. J.P. Moody, medical superintendent of Indian and Eskimo Health Services at Chesterfield Inlet, heard that there had been severe sickness among the Eskimo in the area around Eskimo Point. Travelling by dog-team from Chesterfield he found evidence of two separate causes, one was food poisoning probably from a tainted caribou, but the other appeared to be a disease related to poliomyelitis which left some of its victims suffering from paralysis. There had been five deaths at Tavani and two at Padlei but it was not possible to determine the cause in each case.

On February 24 and 25 Dr. Moody reported that a very serious epidemic had broken out at Chesterfield. Accordingly the Minister of National Health and Welfare, Mr. Paul Martin, announced on February 25 that an area extending 200 miles inland from Chesterfield Inlet and the same distance south to Eskimo Point was in quarantine. Owing to the few means of communication it is extremely difficult to make such an order effective but police instructed the inhabitants not to leave the area and the warning was passed round the north by radio. The major problems are to prevent the disease spreading north to Melville Peninsula and the Eskimo population in Baffin Island, and northwest to the Netsiliks and the Coronation Gulf tribes.

To assist Dr. Moody a team of five doctors: Dr. J.D. Adamson, professor of medicine, and Dr. J.C. Wilt, assistant professor of pathology, at the University of Manitoba; Major Smiley; Dr. W.J. Wood, regional superintendent of Indian Health Services in Winnipeg and Dr. A.F.W. Peart, Chief of the Division of Epidemology in Ottawa, were flown to Chesterfield together with supplies and equipment, arriving on March 2.

Medical work at Chesterfield established that the disease was anterior poliomyelitis. Specimens of blood and spinal fluid have been brought back to Ottawa for further research. The epidemic appears to be now under control but according to the most recent figures available there have been over 60 cases, 28 with paralysis, and 13 deaths in an Eskimo population of about 300. Thirteen of the more seriously paralysed natives have been brought out to hospital in Winnipeg, fifteen are being treated in the Catholic mission hospital at Chesterfield Inlet.

The worst features of the epidemic are the comparative lack of resistance to the disease among the Eskimo and the difficult struggle for existence faced by a native who is left partially paralysed.

As very little is known of the ways in which poliomyelitis is transmitted it is possible that a study of this outbreak will produce new evidence of value in combating the disease. It is

usually considered a warm weather disease and its occurrence in mid-winter in the arctic is surprising. The suggestion has been made that an Eskimo carried the disease from Churchill to Eskimo Point and that a white missionary, who did not catch the disease, acted as carrier to the Chesterfield Inlet area, but this requires substantiation.

In addition to the epidemics described above, a number of deaths among Eskimo in Cresswell Bay, North Somerset Island, have been reported, but the cause is at present obscure. It is hoped to publish an account of this when more information is available.

Commercial Fishery, Great Slave Lake

Winter 1947-8

The season opened officially on December 1 but no nets were set until December 5 owing to transportation conditions on the Grimshaw-Hay River Road and late freezing of the ice on Great Slave Lake. The limit for the winter season had been set at 1,000,000 lbs. dressed weight of whitefish and trout plus a carry-over of about 600,000 lbs. from the previous summer, but only 913,000 lbs. of whitefish and 172,000 lbs. of trout were in fact taken. In addition about 100,000 lbs. of inconnu were caught. Rather over half of the fish were shipped fresh, the rest frozen. As the weather continued cold the closing date of the season was extended for ten days from March 15 to March 25. Apart from a poor first month due mostly to lack of knowledge of the lake, the season was considered good, the best fishing being found 12 to 15 miles offshore from the mouth of Hay River.

In addition to a number of groups of fishermen, four fishing companies operated: W.R. Menzies of Edmonton, Western Fisheries of Vancouver, F.M. Clarke of Meadow Lake, Saskatchewan, and Alaska Fisheries of Edmonton. For a short period in the early part of the season trucks were used for hauling the fish on the lake but the snow soon became too deep. Half-tracks were employed extensively throughout the season and snowmobiles were found to be very successful. Dog-teams and an Anson aircraft were also employed.

Summer 1948

Two separate commercial fishing operations were carried out at Great Slave Lake in the summer of 1948, one at Gros Cap and the other at Hay River. Though the season opened officially on June 15 the first lift at Gros Cap was not till June 23 while at Hay River operations were delayed until August 27 as the Grimshaw-Hay River Road was not passable till then. The season closed on September 15. Of the limit for trout and

whitefish of 2,500,000 lbs. dressed weight, nearly 1,950,000 lbs. were taken leaving a carry-over of some 550,000 lbs. for the winter season. 1,140,000 lbs. were trout and 810,000 lbs. whitefish while 66,000 lbs. of inconnu and 3,700 lbs. of pickerel were also caught. At Gros Cap the McInnes Products Corporation obtained about 1,086,000 lbs. of trout and 703,000 lbs. of whitefish; this was rather less than the previous year probably owing to stormy weather. At Hay River the W.R. Menzies Fish Company obtained 52,000 lbs. of trout and 105,000 lbs. of whitefish. The effect of the completion of the Grimshaw-Hay River Road will probably be to increase commercial fishing in the Hay River area.

Operation Moore

Early on January 21 it was reported that an R.C.A.F. Dakota aircraft, piloted by F/L K.O. Moore, was overdue at Churchill on return from a mercy flight to Arctic Bay where two sick men, Mr. Harold Dunne, a Department of Transport radio operator and Akoolimik, an Eskimo, had been taken aboard. The aircraft, which had left Coral Harbour at 1838 hours bound for Churchill, sent S.O.S. signals from 0220 until 0235 hours when transmitting ceased. During the last hour-and-a-half of its flight, bearings on the aircraft were obtained from Churchill and Chesterfield. At this time the temperature was -32°F. and the wind was approximately 40 m.p.h.

At 0930 hours a very weak signal from the missing Dakota was picked up at Churchill and the aircraft was called and an acknowledgement received before the signals faded. Churchill then instructed the aircraft to operate its "Gibson Girl", a hand operated emergency transmitter on 500 Kcs. International Distress Frequency, and a Dakota piloted by F/L Winslow, which had arrived at Churchill to take part in the search, set out to home on this signal. At 1236 hours the missing aircraft was sighted at 58°28N. 92°18W. on the ice of Hudson Bay 67 miles from Churchill and 27 miles from the nearest land, and a tent, stoves and rations were free-dropped. A wide lead of water was seen between the aircraft and the shore. F/L Keene, piloting a ski-equipped Norseman, then took off from Churchill and surveyed the area but a landing did not appear possible within ten miles of the stranded aircraft. Further supplies were also dropped by another search Dakota piloted by F/L Hall and carrying F/L Maitland who had been designated Search Master.

Five methods of rescuing the personnel were considered: by ski-equipped Beaver aircraft, by snatch glider, by helicopter, by amphibious vehicle and by dog-team. The first two seemed the most practicable, and preliminary arrangements were made. In the meantime however a further reconnaissance was made by F/L Keene accompanied by Mr. Gunnar Ingebrigtson, the civilian Arctic Wings pilot, in the Norseman. It was decided that a

landing close to the stranded Dakota was possible.

At 1245 on January 22 a landing was made and four of the men were evacuated safely to Churchill. The Norseman returned at 1635 and took off the remaining eight. On both occasions a Dakota circled the rescue scene and reported the proceedings directly to Churchill and Winnipeg.

A subsequent reconnaissance on February 6 failed to find any trace of the stranded Dakota which presumably had disappeared through the rotten ice.

The French Arctic Research Expedition to Greenland, 1948

The French Arctic Research Expedition to Greenland returned last October after a successful preliminary summer. The main expedition, which intends to make a detailed scientific study of the Greenland Ice Cap, will leave France in 1949. Monsieur Paul-Emile Victor, the leader and organizer, has been granted funds by the French Ministry of National Education for this Arctic Expedition as well as for an Antarctic expedition to Adélie Land. The research programmes for both expeditions are planned by a Scientific Commission headed by M. Charles Maurain.

The main purpose of the preliminary expedition was to save valuable time in 1949 by taking all the heavy equipment up on to the Ice Cap and in addition to enable some of the members to gain experience and to initiate their research studies.

Sailing in the Norwegian vessel Force, the expedition left Rouen for West Greenland on May 14 stopping at Edinburgh, Godthaab, Godhavn and Jakobshavn. On June 1 the Force anchored opposite Disko Island in a fjord practically free from sea ice at the foot of the Ege Glacier (69°46N., 50°15W.). The choice of this place, where the Swiss Expedition under de Quervain had landed in 1912, was based on preliminary reconnaissance by Eskimo, Danish information on ice conditions, and the short direct distance of six miles to the Ice Cap.

A landing place for the heavy equipment, some 90 tons in all, was found 2 kms. away and the cargo was put ashore with Greenland help from June 3 to 8, with the loss of one weasel. The supplies included seven remaining weasels, 14 duraluminum sleds to be towed by the weasels, 3 trailers on sleds, measuring 12 x 6 x 5 feet, to be used as laboratories, 5000 gallons of gasoline, tents, wire cables winches, and food in addition to scientific instruments.

Owing to lack of snow the route followed by de Quervain to the Ice Cap was impracticable for weasels which are the main form of transportation, and the expedition had to

reconnoitre a new way. A permanent coast camp, Camp 1, was set up on a platform about 150 feet above sea level and equipment was moved there largely by winch. Between Camp 1 and Camp II, at the foot of a high cliff, a six-mile trail was built over difficult ground. On June 20 this trail was in use and supplies were dumped at Camp II ready for lifting up the cliff. This lift was made by a cable car, specially designed in France, which carried a load of 1000 to 1500 lbs. on each trip, and ultimately lifted 43 tons up 700 feet. After establishing Camp II the weather, which had been excellent, deteriorated and large numbers of mosquitoes also hampered work.

The four-mile trail from Camp II to Camp III on the Ice Cap proved more difficult but it was completed by July 13 and the 43 tons of equipment needed on the Ice Cap was carried to Camp III by July 25. Some reconnaissance on the Ice Cap was attempted but difficulties due to thaw led to a decision to defer further penetration inland till 1949, when it is hoped that an early start will be possible.

The Norwegian ship Brandal arrived on September 22 to take the party off. After stopping at Atâ, Jakobshavn, Godhavn, Sukkertoppen, Godthaab, Prins Christian Sund and Edinburgh, the party reached Rouen on October 13 after only five months' absence.

The scientific results of the preliminary expedition will be printed in the publications of the French Polar Expeditions, and will be available at their office at 22 Avenue de la Grande Armée, Paris.

Restoration of Amundsen's ship 'Gjoa' completed

In the Circular for January 1949 (Vol.II, No.1, p.14) a short account was given of the restoration of Amundsen's ship Gjoa, beached in the Golden Gate Park in San Francisco. Mr. Richard Finnie has now informed us that this restoration was completed on March 8 when a new mast was fitted. At a small ceremony five coins, three Norwegian ore and two U.S. dimes, were placed in the mast's base. Only the keel, the 13 h.p. engines, winches and bilge pumps remain of the original 47-ton vessel after the restoration, which finally cost $34,806, subscribed by the city and the Gjoa Foundation.

Editorial Note

The Editor would welcome contribution from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

Mrs. Graham Rowley,
Editor Arctic Circular,
411 Echo Drive,
Ottawa

Future Meetings

The next meeting of the Arctic Circle will be on April 14 not April 7 as announced in the Circular for January. Mr. J.C. Wyatt, Department of Transport, will show a film entitled "Construction problems in the Arctic".

It is expected that the fourteeenth meeting will be held on May 12.

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Twelfth Meeting of the Arctic Circle

The twelfth meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess at 278 Sparks Street on Thursday March 10. The President, Mr. A.E. Porsild, was in the Chair and introduced the speaker, Commander David C. Nutt, U.S.N.R., of Dartmouth College Museum. Commander Nutt showed a kodachrome film, "The Antarctic in Colour", which he had taken on the Second U.S. Navy Antarctic Development Project in 1948. This expedition was in part a continuation of Operation High-Jump in the previous year. The 1948 expedition was commanded by Commander G.L. Ketchum, U.S.N., and consisted of the icebreakers U.S.S. Edisto, Commander E.C. Folger, U.S.N., and U.S.S. Burton Island, Commander E.A. MacDonald, U.S.N. Commander Nutt was aboard the Burton Island for most of the trip. Between 15 December 1947, when the ships reached the Antarctic pack, and 23 February 1948, when the Task Force left for home, they had travelled from the region of the Shackleton Ice Shelf to the 1947 base of Little America on the Ross Shelf Ice and thence eastward to Marguerite Bay where they assisted the Finn Rönne Expedition's ship Port of Beaumont to break out of the ice. The helicopters which were carried by the icebreakers are shown in Commander Nutt's film by many striking photographs. They played a large part in the expedition in landing shore parties at the so-called Antarctic Oasis reported on the 1947 expedition and at other points along the Antarctic coast.

Special Meeting of the Arctic Circle

A Special Meeting of the Arctic Circle was held jointly with the Canadian Geographical Society in the Lecture Hall of the National Museum on Thursday March 24. Mr. J.A. Wilson and Mr. A.E. Porsild presided and introduced the speaker, Captain Ejnar Mikkelsen, the Danish explorer, who gave an illustrated lecture on "Greenland past and present".

Captain Mikkelsen's first visit to the Arctic with Amdrup in 1900 developed a lasting enthusiasm. He has since

led a number of arctic expeditions, of which the Alabama Expedition of 1909 - 1912 to Northeast Greenland is perhaps the best known. He later spent many years as Senior Danish Representative in East Greenland. In his lecture Captain Mikkelsen described the life of the East Greenlanders and their transition from the Stone Age conditions which he observed on his first visit in 1900 to the present level of their previously more advanced countrymen on the West Coast.

Ice Conference

The first scientific meeting of the Section of Meteorology and Hydrology of the Associate Committee on Geodesy and Geophysics of the National Research Council of Canada was held on April 12 in the auditorium of the National Research Council in Ottawa. Mr. Andrew Thomson, Chairman of the Section, presided.

Three papers were read on the meteorological and climatic conditions prevailing in Canadian Eastern Arctic waters during the winter. Professor F.K. Hare of McGill University and Miss M.R. Montgomery of the Defence Research Board presented a joint paper on ice and open water surfaces as climatic influences in the Canadian Eastern Arctic. Professor Hare dealt with the winter gulfs of warmth indicated by a study of the temperature charts for the months October to May. These gulfs of warmth occur in Baffin Bay, in Hudson Strait, and along the east coast of Hudson Bay in early winter. Miss Montgomery then gave a summary of known ice conditions throughout these areas with special reference to the findings of the recent reconnaissance flights.

The third paper, given by Mr. F.E. Burbidge of the Department of Transport Meteorological Service, dealt with the modification of continental polar air over Hudson Bay in winter. From a study of the humidity charts he was able to demonstrate that appreciable modification due to open water surfaces is evident only during the early winter months.

The evidence brought forward by these three papers suggests that, contrary to generally accepted opinion, the central portion of Hudson Bay has an almost 100 per cent ice cover during the second half of the winter.

Following the reading of these papers, short reports on a W.E.E. (Winter Experimental Establishment) flight over Hudson Bay and the Ice-Cake flight in 1948 were given by Mr. Burbidge. Miss Montgomery gave a similar report of the Cariberg flight in May 1948 and Mr. G. Merrill described the ice reconnaissance of March 1949. A few slides of ice conditions observed over Hudson Bay on the various flights were then shown.

Ice reconnaissance flights over Hudson Bay

On 8 March 1949 a Lancaster of 413 Photo Squadron left Rockcliffe on an ice reconnaissance flight to Churchill. On board as observers were Miss Margaret Montgomery and Miss Moira Dunbar of the Defence Research Board and Mr. Gordon Merrill of McGill University. The captain of the aircraft was F/O T. Shore. The flight was a continuation of the programme begun in the winter of 1947-8, which included the W.E.E. flight, Operation Ice-Cake and Operation Cariberg. (Circular Vol.I, No.6, p.60).

The aircraft flew overland from Rockcliffe to Great Whale River and from there north over the Bay to Port Harrison. At this point course was altered due west for Churchill. Visibility was excellent for the entire time the plane was over the Bay.

Observations showed that ice conditions in the centre of Hudson Bay were similar to those noted the previous year. A continuous ice-sheet extended across the entire surface except for a shore lead about 8 miles off the west coast which varied in width from about 1 to 1½ miles in the vicinity of the flight line. Smaller leads of varying widths and lengths were seen throughout the flight, more in the western half of the Bay than the eastern. Some of these were recently re-frozen and the new ice showed clearly as darker and smoother patches among the older, snow-covered pack. Many of these leads trended NNW, thus running more or less parallel to the line of the west coast shore lead. This was probably due largely to the influence of the prevailing northwesterly winds in this area. The wind direction also explains the complete absence of open water off the east coast.

A network of pressure ridges, some of which were estimated to be at least 20 feet high, criss-crossed the ice in all directions. Some excellent photographs of these ridges were taken at an altitude of about 150 feet and showed them to contain blocks of ice and snow some of which were more than 5 feet across. No pressure ridges were seen in the land-fast ice, which in spite of its smooth appearance is known from ground experience to be often rough and hummocky.

In spite of the ridges the overall effect from 5000 feet was one of uniform smoothness, due to the cover of hard wind-packed snow. A closer inspection showed this smoothness to be deceptive, as the whole surface was rippled by sastrugi facing the direction of the prevailing wind.

From the time the plane crossed the coast at Great Whale River vertical photographs were taken at 10-minute intervals. This was increased to overlapping coverage in

the vicinity of the shore lead. In addition some oblique photographs were taken with a hand-held K20 camera. A similar procedure was followed on the return flight.

Owing to engine trouble the return flight from Churchill to Rockcliffe was not made until March 17, when Mr. Gordon Merrill was again an observer. Also on board were Dr. M. de Quervain and Mr. D.C. Pierce of the National Research Council. The aircraft flew north towards Eskimo Point, then southeast to Cape Henrietta Maria and from there direct to Ottawa. Visibility was not very good, but ice conditions observed were similar to those seen on the previous flight.

Magnetic Observatories in the Canadian Arctic

One function of the Division of Terrestrial Magnetism of the Dominion Observatory is to compile and construct all magnetic maps of Canada. The accuracy of the information shown on magnetic maps depends on a knowledge of the long continued changes in the earth's magnetic field so that magnetic data may be brought up to date at any time. This is of particular importance in northern Canada where the change from year to year in the declination, or variation of the compass, is quite rapid. For example, the annual change in declination at Baker Lake is 9 minutes and at River Clyde 25 minutes. What the change is within a radius of 200 miles from the north magnetic pole is not known at present.

The north magnetic pole has moved a distance of 200 miles from Boothia Peninsula to northern Prince of Wales Island between 1904 and 1947. This would indicate that the pole had travelled at an average rate of approximately five miles per year. It is not known whether or not the pole has actually moved at a steady rate or has changed its position suddenly at infrequent intervals. Probably the best way to determine this is by following its movements in the future.

The only way to study both short and long term changes in the earth's magnetic field in northern Canada and thereby the movements of the north magnetic pole is by continuous recording of the fluctuations at fixed magnetic observatories. With this end in view, two magnetic observatories have been established recently in the Canadian Arctic.

One observatory was established at Baker Lake in December 1947, and observations were continued at frequent intervals by eye-reading methods. Electrical recording

instruments, designed and constructed at the Dominion Observatory, were provided in 1948. A non-magnetic building was laid down at the site but was not erected due to labour shortage. It is expected that construction will proceed as soon as winter is over and in the meantime the instruments are mounted in temporary housings. Mr. W.L.W. Hannaford is in charge at Baker Lake.

The second magnetic observatory was established at Resolute Bay during the summer of 1948 with Mr. J.F. Clark in charge. A non-magnetic observatory building was erected and recording instruments of the electrical type installed.

At both Baker Lake and Resolute Bay the magneticians are quartered at the Ionosphere stations through the courtesy of the Department of Transport. The arrangement has mutual advantages since a knowledge of the changes in the earth's magnetic field as recorded by the observatory instruments adds to the interpretation of conditions in the ionosphere.

It is of interest to note that Mr. Clark has recently increased our knowledge of the distribution of the magnetic field in the Arctic by making magnetic measurements at Mould Bay, Prince Patrick Island. These measurements verified the location of the isomagnetic lines including the lines of equal magnetic declination or variation of the compass which had been constructed from data gathered in other parts of the Arctic on Operations **Polco** (see Circular Vol.I, No.3, p.20) and Magnetic (Circular Vol.I, No.7, p.79) and by sea supply missions to weather stations.

R. Glenn Madill

The nutrition and health of the James Bay Indian

A study of the Canadian Bush Indian carried out by Dr. P.E. Moore and Dr. F.F. Tisdall in northern Manitoba in 1941, 43, and 44 showed evidence of marked malnutrition and high susceptibility to many diseases, particularly tuberculosis. To continue this work a group of doctors (which included Dr. Moore and Dr. Tisdall), anthropologists, and a dentist, under the Chairmanship of Dr. Percy Vivian, selected the James Bay area for a further study because of easy accessibility.

The Cree Indians of the James Bay area are typical of the Canadian Bush Indian and, except for the Moose Factory Band, the local bands are as unaffected by outside influences as the most remote bands. Of the five local bands: Moose Factory, Albany, Attawapiskat, Fort George and Rupert's House, the Attawapiskat and the Rupert's House were chosen for

detailed study as the economic status of the former was very low while that of the latter was good. The study covered both medical and sociological aspects and two anthropologists spent approximately one year living with these bands: Dr. J.J. Honigman with the Attawapiskat and Mr. A.J. Kerr with the Rupert's House.

Medical and dental examinations of the Indians of these two bands were carried out in August 1947 and a detailed account is published in the Canadian Medical Association Journal for December 1948 (Vol.59, No.6, p.506-518). In all 728 Indians were examined; of these 278 were from the Attawapiskat, and represented 60 per cent of the band, and 214 from the Rupert's House, representing 57 per cent, the remainder being from the Albany and Moose Factory bands. Chest X-rays were made of the 492 Indians from the Attawapiskat and Rupert's House bands only.

Briefly it was found that the high incidence of both pulmonary and extra-pulmonary tuberculosis constitutes the most serious medical problem. The incidence was higher in the Attawapiskat band, in which 6.9 per cent of the persons examined (including 8 cases in sanatoria) have active pulmonary tuberculosis. In a comparable white population in Ontario X-ray evidence showed only 0.15 per cent giving a ratio of 46:1. The Indians spend some 3 to 5 months during spring and summer around the trading posts "where most outbreaks of disease occur". Sanitary conditions, always deplorable, were found to be particularly bad around the posts.

Very careful estimates were made of the food intake from all sources over a period of one year. The total calories in the case of the Rupert's House band was probably adequate while that for the Attawapiskat was probably inadequate for health. The intake of ascorbic acid and calcium appeared inadequate. "However, the average nutrient figures tend to be misleading because of marked seasonal variations in the food supply". The clinical evidence clearly showed inadequate nutrition particularly in the 10-19 year-old age group and in girls from earlier age groups. "Before the institution of family allowances and relief, and in the case of the Rupert's House band, the establishment of the beaver conservation scheme by the Hudson's Bay Company, records of actual starvation were encountered in both bands".

The incidence of dental caries and gingivitis was high in both bands but very much worse in the Rupert's House than in the Attawapiskat.

The group concluded that "Comparison of the physical condition of the two bands studied shows that raising the

economic level will accomplish little without accompanying health and nutrition programs". They recommended that the provision of adequate local health and medical services was the most immediate need. The new Indian Services hospital at Moose Factory, when completed, would presumably be the centre for this work. They also recommended that every effort should be made to increase the use of locally available foods and improve preservation of seasonal foods. Following this the H.B.C. is installing a deep-freeze unit at Rupert's House for the use of the Indians in that area. It was suggested that thiamine, riboflavin, niacin, vitamin D and calcium should be added to the flour and that the practicability of adding vitamin A to the lard and vitamin C to the powdered milk should be investigated. The free distribution of cod liver oil and vitaminized biscuits by the Indian authorities was considered beneficial as was the sale of iodized salt only in trading posts.

Recent lead stakes at Detention Harbour

Some eighteen years ago A.M. Berry, a western bush pilot, and J. Hall, a Toronto mining engineer, landed at Detention Harbour, Coronation Gulf, on a flight for the Northern Aerial Mining Exploration Company. There they found a vein of galena which was not staked by them as the price of lead at the time could not carry high transportation charges. Hall was killed a few years after this find and it was not until March of this year that Berry, realizing the increase in value of lead, interested Gateway Gold Ltd., an Edmonton mining company, in this possible source.

That lead existed in the region of Detention Harbour has been known since Franklin's journey there in 1821. Travelling with two canoes, Franklin's party was detained in this harbour by drifting ice from July 25-28. He describes Detention Harbour, which he entered thinking it to be a narrow passage between an island and the mainland, as "a secure anchorage, being sheltered from the wind in every direction; the bottom is sandy" ("A journey to the shores of the Polar Sea", p.369). On July 28 his party carried their canoes across Galena Point, opposite Detention Harbour. Franklin continues, "Dr. Richardson discovered near the beach a small vein of galena, traversing gneiss rocks, and the people collected a quantity of it in the hope of adding to our stock of balls: but their endeavours to smelt it, were, as may be supposed ineffectual" (p.370). J.J. O'Neill again mentions small veins of galena in this area which he found when with the Canadian Arctic Expedition of 1913-18 (Vol. IX, p.47a).

The vein staked by Matt Berry early in March of this year appears to be much larger than anything previously noted

and in the Northern Miner for April 7 is said to contain a width of up to 4 feet of solid galena. The photograph of this vein in the Northern Miner was presumably taken previously as it shows open sea.

With George Midgley, a mining engineer, and two newspapermen, Berry left Edmonton by air on March 1 stopping at Fort Smith. Here they picked up Berry's own small Fairchild plane and continued to Detention Harbour. After staking claims in the area they loaded 500 lbs. of ore and returned to Edmonton. The ore has since been reported to assay at 83 per cent. which implies that the samples came from a vein of nearly pure galena. The ore of the average lead mine assays 6 to 8 per cent. but veins of pure galena are usually comparatively small. The size of the Detention Harbour find has not been made known.

If the deposit proves to be of sufficient extent for working the problems of transportation will be considerable. Ice conditions in the shallow Coronation Gulf limit navigation to a very short and uncertain season. Presumably the ore would be stock-piled until a boat could get in and take it out to the west, as the cost of transporting even pure galena by air would be prohibitive.

Tragedy on the coast of Cumberland Peninsula

At the beginning of August last year, the Norwegian fishing vessel Sveip of Bergen, which had been fishing off the Cumberland Peninsula of Baffin Island, put into a cove because of engine trouble. Some of the crew took a trip ashore, and there they discovered a hut made of stone. In this hut they found ten human skeletons, presumably Eskimo as some of them were skeletons of children. The crew also found cooking vessels, kettles, a rusty gun barrel, cartridges, fishing implements, buttons and some religious papers in the Eskimo syllabic.

The skeletons were not buried, therefore it was presumed that all the persons died at about the same time. There was a low ring of stones around the camp site of a size suitable for a tent, but no trace of any tent was found. Nearby were found caribou horns and animal and fish-waste. The actual encampment where the tragedy occurred was at Exeter Sound, latitude 66°26N. and longitude 62°15W.

Through the Canadian Legation in Oslo, various items of equipment and remains that had been brought back with the vessel to Norway, were forwarded to the Northwest Territories Administration in Ottawa.

As the discovery was made in an area patrolled by the Pangnirtung Detachment of the R.C.M.P. they were contacted

to ascertain if they had any knowledge of this matter. In March a report was received from the Pangnirtung Detachment to the effect that the human skeletons were the remains of a number of Eskimo who had died of starvation in the Exeter Sound area during the winter of 1938. The bodies had been buried by members of an R.C.M.P. Patrol, who had proceeded to the site of the tragedy. Possibly, during the years, these remains were uncovered by bears.

Arctic Cruises by the Royal Navy

During February two small experimental forces of the Royal Navy cruised in Arctic waters. The light fleet carrier H.M.S. Vengeance, Captain John Terry, R.N., led a squadron which included the battle class destroyers H.M.S. Gabbard and H.M.S. St. Kitts, the frigate H.M.S. Loch Arkaig, the submarine H.M.S. Artful, and the oil tanker Wave Premier.

In the course of this cruise, which lasted six weeks, the Vengeance penetrated more than 450 miles north of the Arctic Circle. Thirty-three special observers were aboard to watch trials on new methods of keeping guns, radio and radar equipment free from ice, the effects of extreme cold on the ship's company, and the efficiency of the latest type of survival suit. The weather throughout was abnormal for that time of year, and instead of northerly winds and extremely cold weather there were southerly winds, with higher temperatures, strong gales and snowstorms, which restricted flying operations. Owing to these unexpectedly warm conditions the trials were stopped on March 4, a week ahead of schedule.

Much new information was obtained on the handling of carrier aircraft under cold conditions. It was pointed out that some of the aircraft accidents which occurred could be avoided by keeping the hangars as free from obstruction as possible during winter work. Ice accretion on landing decks was a serious problem which might be overcome by central heating under the decks. The helicopter, which was fitted with special winching equipment for rescuing airmen who had come down in the sea, and the Swordfish biplane appeared to function well throughout the trials.

In order to test how a warship would stand up to ice, the Vengeance on February 15 reduced speed to 2 knots and nosed her way through the outer fringe of an ice field off Greenland. For a short distance she passed through safely but on reaching heavier ice farther in a hole 10 ins. x 6 ins. was made in her bow and she immediately returned to open sea. Within ten minutes about 250 tons of water had flooded the forecastle tank. The ship's pumps were set working and another

tank in the aft part of the ship was deliberately flooded to raise the hole out of water. Repairs were completed the next day.

The second force of three motor torpedo-boats cruised mainly off the Norwegian coast. Lieutenant D. Syms, R.N., was the senior officer of the flotilla which consisted of motor torpedo-boats 2012, 2016, and 2017.

Personnel for northern schools and nursing stations

The Minister of Mines and Resources and the Minister of National Health and Welfare have recently issued a joint statement about vacant positions for social welfare workers, nurses, and teachers in arctic and sub-arctic areas.

Both graduate and practical nurses are required for the fourteen new Indian Health Services nursing stations described in the Circular for December 1948 (Vol.I, No.8, p.97).

A new class of Welfare Teachers has recently been made by the Northwest Territories Administration and the Indian Affairs Branch of the Department of Mines and Resources. These teachers are expected to improve the living conditions and the general welfare of the community in which they are stationed in addition to the usual classroom duties. For this they will receive extra salary, as well as the living allowance granted to all Government employees in the north and comfortable furnished quarters.

The nurse and welfare teacher are expected to work together in taking every precaution to maintain the health and welfare of the community. It is suggested that the most desirable combination is for a married couple, in which the wife is a trained nurse or social welfare worker and the husband a qualified teacher, jointly to run a station. Those who are interested in this kind of service in the north should write to R.A. Gibson, Deputy Commissioner, Northwest Territories Administration, Ottawa, or to Dr. P.E. Moore, Director, Indian Health Services, Department of National Health and Welfare, Ottawa.

The Journal of Glaciology

For those working in Arctic regions information on current work on the scientific aspects of Snow and Ice is frequently of great value. The Journal of Glaciology is the only periodical in English devoted to papers on Snow and Ice. This journal is published twice yearly by the British Glaciological Society formerly the Association for the Study of

Snow and Ice and is edited by Mr. Gerald Seligman, President of the Society. The March number of this publication has just been received by the Editor who will be pleased to lend it to any member of the Arctic Circle and to give any further information about membership of the British Glaciological Society. The titles of the main papers in the March number, which also includes notes, reviews and a list of Glaciological literature indicate the field covered by the publication and are listed below:

Glacial Drifts of the Leinster Mountains. By A. Farrington
Comments on the Antarctic Research Discussion:
1 Snow Cover and Sea Ice. By A. Reece
11 Temperature Measurements in Polar Ice. By Arnold Court
Joint meeting with British Rheologists' Club and Institute of Metals
Snow Survey of Great Britain, 1947-48. By E.L. Hawke and D.L. Champion
Velocity distribution in a glacier. By M.P. Perutz
Variations of Iceland glaciers. By Jón Eythórsson
International Geological Congress, 1948. By S.E. Hollingworth
Growth of the glacier crystal. By G. Seligman
Crystal measurements at Kebnekajse. By H.W. Ahlmann
Equatorial glaciers of East Africa. By P.C. Spink
Dome-shaped Icebergs. By F. Loewe

Index and list of contents to Volume I

The Index and list of contents to Volume I of the Circular are being sent out with this number to all those who subscribed in 1948 or have since bought back numbers. Members binding their Circulars are reminded that the page numbers of the second issue should be amended to read 10-19.

Editorial Note

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

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Thirteenth Meeting of the Arctic Circle

The Thirteenth Meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess, 278 Sparks Street, on Thursday April 14. The President, Mr. A.E. Porsild, was in the Chair and introduced the speaker, Mr. J.C. Wyatt, of the Department of Transport.

Mr. Wyatt showed a film of "Construction Problems in the Arctic", taken while putting up buildings for the ionospheric stations at Resolute Bay and Fort Chimo by Mr. Jacobsen of Montreal. Mr. Jacobsen, who designed the buildings, was present and answered questions after the meeting. The following note describes these buildings in some detail.

Stressed skin plywood buildings for permafrost areas. By George Jacobsen

Owing to the great extent of the permafrost area in Northern Canada and to the varying soil conditions at different sites, it is difficult to apply a uniform construction method over the whole territory. As local permafrost tables, water conditions and soil strata vary widely, a detailed permafrost engineering survey should be made over a minimum period of one year at each site before starting construction.

With the rapid expansion of the meteorological station network and other scientific stations, and at the same time a lack of engineers skilled in this type of survey, a construction method had to be found which would apply to most of the station sites. The aim was to provide adequate and comfortable permanent shelter within as low a cost range as possible. As transportation is one of the main cost features in Arctic buildings, a light weight, stressed skin plywood building of a permanent nature has been developed by the writer. It can be assembled by a small crew in a few days and incorporates the latest scientific design features.

The building is floated on a two-to three-foot high gravel bed. This gravel bed should be built up of dry gravel, preferably washed seashore gravel, and placed on a well-drained location. Any vegetation cover should be left undisturbed as

the function of the gravel bed is to maintain the existing permafrost regime as much as possible by providing insulation and drainage. In locations where this gravel bed cannot be built up on a well-drained site, drainage ditches should be built around it with proper regard to icing conditions and to the orographic direction of the water table.

The building is set on top of the gravel bed. It consists of highly insulated floor, roof, and wall panels which for all practical purposes make a rigid frame when nailed and screwed together. The building then forms a sort of land raft which floats on this gravel bed, and can rise and sink with any changes in the permafrost table without receiving structural damage. There are no short-range changes in the permafrost table under these buildings as the high insulating factor of the floor panels (U-.065) allows very little heat to radiate to the ground. The long-range changes of the permafrost table are compensated through the floating construction. Long-range changes are the general rising of the permafrost table under the gravel bed, the building up of a higher ridge on the north side and any other changes caused by local soil characteristics.

The building panels consist of a stud frame on which marine plywood is glued and nailed. Marine plywood is a special weather-proof plywood which consists of fine layers of veneer which are glued together with a water resisting plastic glue. Apart from the use described it is employed in ship building and airplane construction. Between the outer plywoods the panels contain a sandwich of triple insulation of fibreglass, aluminum foil and fibreboard to obtain the highest possible insulation against convection, radiation and conduction. The panels are held together by special connectors. All outside joints are covered with felt-lined joint strips which assist in making the buildings air-tight. The standard size of the panels is four feet by eight feet and they are light enough to be easily handled by two men. In special cases, where only a small aircraft was available to fly the building components to the site, these panels have been made as small as two feet by eight feet.

The outside of the building is painted with high grade aluminum paint which has proved very resistant to weather action in the Arctic. Aluminum sheet roofing covers the roof. The gable ends and corners have specially made flashings to keep the building snow-tight. All overhangs, jut-outs or sharp corners are avoided to prevent any finger-lift action by the wind. Owing to the smooth exterior of the building they withstand storms up to 65 m.p.h. without having to be tied down. At locations where higher wind velocity and gusts are expected, tie rods with turn buckles are used to anchor the building to the ground. Steel cables are not recommended as it is difficult to tighten them once they have slackened.

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The chimneys are either of pre-cast, light weight concrete in which ground mica is used as concrete insulation or galvanized pipe chimneys of the Yukon type. The triple-glazed windows cannot be opened. Above them there is a built-in ventilator with a refrigerator type door which provides all the air conditioning necessary.

As the operators in these stations spend the greater part of their northern service inside, special care is taken to make the buildings as comfortable and cheerful as possible. The floor is covered with coloured linoleum and the walls and ceilings are painted with bright fire resistant paint. The colours for the different rooms were chosen by psychologists to counteract the feeling of monotony on Arctic stations.

The buildings are heated with oil space heaters which are placed at a central point to insure even heating distribution. A station with living quarters 54 feet long by 24 feet wide and a laboratory 48 feet long by 24 feet wide used only 244 gallons of oil during February 1949. Last winter temperature measurements inside the building were taken on diverse meteorological and ionospheric stations with gratifying results. According to information received from one station before Christmas, operators walked barefoot on the floor at an outside temperature of -42°F. with a 50 m.p.h. gale.

The usual station layout for the Department of Transport consists of a living-quarters building, which is connected by an aluminum-covered passage with a laboratory building. This arrangement enables the operators to walk from one building to the other without having to dress fully and insures a more frequent and better supervision and reading of the instruments. The aluminum passage also serves as a fire-break. This summer the Radio Division of the Department of Transport plans to connect all their new buildings at Fort Chimo with 50-foot long aluminum-covered passages.

In the last two years building of the type described have been built on the shores and islands of the Arctic Ocean from Aklavik to the Coast of Labrador. They are permanent buildings with a long life-span and should assist the work of the personnel on Arctic stations.

For bigger structures of an industrial nature like power houses, garages and warehouses, a different variant of the floating construction method is used. These buildings generally have no panel floor. They lose therefore the principle of the rigid frame as the floor panels no longer tie the buildings together. Wherever possible a reinforced concrete slab is used as a floor. Solid bedrock with no water veins or decomposed upper layer is the best foundation for such a slab, but on certain occasions, a slab can be laid on a gravel fill which carries a special insulation of celboard (a two-inch thick concrete insulation material made out of

shavings which are sprayed with concrete). Where the slab is not practicable, the gravel bed itself is used as the floor of the building. In this case special ballasted outriggers have to be spaced alongside the building to prevent it from moving or being blown over by the wind.

A building of this type will be put up at Cornwallis Island this summer. The outriggers consist of heavy timbers and tie rods which start at the eaves and spread about five feet away from the building. At the bottom they are connected with horizontal wooden beams to the wall panels. They are spaced eight feet apart and are ballasted with gravel. They are very similar in action to the outriggers the natives of many countries use on their boats. During the winter these outriggers will catch the snow and the resulting snow drift on each side of the building will keep the building stable and warm.

Temperature measurements and other pertinent observations are taken in the buildings. The results of these observations, together with the latest building research, help to improve the design every year.

Report on health conditions in Greenland

On 28 February 1946, at a joint meeting of the Royal Commission on Greenland, with delegates of the Greenland Advisory Council and representatives of the Greenland administration in Copenhagen, Dr. Johannes Frandsen, Director of the Department of Health in Copenhagen, briefly reported on health conditions in Greenland. He pointed out that although tuberculosis was the most serious problem in Greenland, he did not consider the general health and sanitary conditions entirely satisfactory and strongly urged the immediate appointment of one or two medical officers who were to be responsible directly to the Department of Health in Copenhagen.

Acting upon Dr. Frandsen's report, the Commission resolved that an expedition consisting of two Danish medical officers should be sent to Greenland at once. Their report on health conditions was to be submitted to the Director of Health who would then be in a position to make suitable recommendations for the improvement of Greenland medical services, and especially the control and treatment of tuberculosis.

The doctors appointed for this work were the chief medical officers for Holbaek and Viborg counties, Dr. Erik Lynge and Dr. Vagn Sindbjerg Hansen. In the course of somewhat over a year spent in West Greenland they covered a distance of 4000 miles. Travelling by small boats in summer and dog-sleds in winter they visited all the principal towns and all but fourteen of the 128 villages and small trading posts. In the eleven medical districts into which the West Coast of

Greenland is divided, 12 Government doctors, assisted by 18 trained nurses, 12 trained midwives and some 80 assistant midwives, served a native population of approximately 20,000 Greenlanders. The public health service in Greenland maintains twelve hospitals with a total of 308 beds. In addition there are two sanitoria for children, with a total of 40 beds, operated by independent private organizations.

The report written by these doctors was submitted to the Danish Parliament on 21 October 1948 by Dr. Johannes Frandsen. It has been published in "Beretninger vedrørende Grøndlands Styrelse", (Reports of the Greenland Administration) No. 1, 1949, pp. 168. The translated title reads: "Report of the Department of Health Medical Expedition to Greenland, 1947-8".

The report is very complete and covers practically all problems pertaining to health and welfare, sanitation, nutrition and medical administration in Greenland. Before publication it was submitted to Dr. Johannes Holm, who is in charge of the Danish Red Cross tuberculosis campaign in Europe, to Dr. Paul V. Marcussen, an authority on the control of venereal diseases and to Dr. E. Juel Henningsen an authority on contagious diseases. These doctors submitted recommendations on the report included as Appendices 2,3, and 4 respectively.

In his covering letter, the Director of Health stated that the existing Greenland medical service has been in operation over a long period of years and during the last generation has been greatly improved in the treatment of diseases. Dr. Frandsen warns that, irrespective of the amount of money which could be made available, it would be impossible within a short period to advance health conditions in Greenland to the same high level which exists in Denmark. By the construction of new hospitals and by the enlarging and modernization of existing ones, it might be possible to obtain a greater benefit from such installations than is now the case.

Even though the health service in Greenland presents a number of serious problems and makes numerous and large demands, the best results cannot be achieved by simultaneously attacking all major problems in the hope that spectacular and immediate results will follow. By far the most serious problems confronting Greenland health authorities today are the control and treatment of tuberculosis and venereal diseases, and to these the closest and immediate attention must be given. In the case of tuberculosis the present incidence of deaths is perhaps the highest in the world and out-numbers all other causes.

Dr. Frandsen's recommendations may be summarized as follows:

(1) The immediate appointment to Greenland of a senior

supervising medical officer who is to function in the manner of a Danish County Health officer (Amtslaege) and who is to report direct to the Department of Health.

(2) Immediate measures for the control of tuberculosis and venereal disease in Greenland along the lines recommended by Drs. Holm and Marcussen.

(3) The preparation and execution of a plan for the maintenance and improvement of existing hospitals in Greenland along lines which permit of expansion as the need arises.

(4) Revision of existing regulations for isolation and treatment of contagious diseases in Greenland.

(5) Increase of the Greenland health personnel as required.

(6) Provision for more abundant and better water supply to Greenland towns and villages.

(7) Plans for more intensive work for the improvement of hygienic conditions in Greenland based to a lesser degree upon suggestions from Copenhagen than upon local initiative resulting from collaboration between elected representatives of the Greenland population, the supervising medical officer, and the local administration.

Dr. Frandsen suggests that every effort be made to implement the recommendations contained in points 1 to 5. The remainder should be implemented gradually as part of the general programme for improvement of conditions in Greenland.

A.E. Porsild

Trichinosis in Greenland

All concerned with the problem of parasitic diseases in the Arctic will be interested in a recent communication of Hans Roth and his colleagues on trichinosis in Greenland.* In the Disko Bay region early in 1947 an epidemic occurred which involved some 300 cases with 33 deaths, and Dr. N.B. Thorborg

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* N.B. Thorborg, Svend Tulinius, Hans Roth, Acta Pathologica, 25, (1948) pp. 778-794

was dispatched from the State Serum Institute, Copenhagen, to investigate it. By means of differential counting of the white blood cells, intradermal testing, serological testing and by histological examination of the muscles in one case, it was demonstrated to be trichinosis. The symptom picture which is described is the protean picture known to be associated with infection with Trichinella spiralis and included often an influenza-like onset followed by fever of varying duration, different types of skin rashes and aches and pains in almost every part of the body. Characteristic features were the oedema of the face and extremities and the severe muscular weakness and pain.

One might differ with the authors' view that it is not difficult to diagnose trichinosis by the clinical picture alone, for the picture is so variegated that supporting evidence should always be obtained. It is to be emphasized, however, that trichinosis is to be considered by medical people in the north perhaps more often than it has been in the past. We now have Roth's proof of it in West Greenland. The Queen's University party has demonstrated it on Southampton Island having become suspicious of its existence in 1947 because of a high incidence of eosinophilia and because of suggestive clinical histories (see Circular Vol.I (1948) pp. 81-2). Dr. Moodie reports that he has seen similar cases at Chesterfield Inlet. Parnell in 1934 demonstrated the parasite in the Arctic Fox in the Canadian Eastern Arctic. And Pedersen is said by Roth to have reported that the disease has occurred in Northeast Siberia. Clearly it is widespread throughout the Arctic and has probably been so for a long time.

In West Greenland the walrus and the dog have been implicated as the source of infection. On Southampton Island it has been found in the polar bear and in Siberia it was presumably found in the polar bear for the Russians forbade the use of polar bear meat as human food. Any carnivorous animal may become infected. A point of practical importance is that the parasite is destroyed at the temperature at which muscle protein coagulates, which is to say that properly cooked meat will contain only dead parasites.

Malcolm Brown

Geological reconnaissance in northeast Baffin Island

During the summer of 1948, Dr. W.A. Deer and Mr. C.W. Brasher of St. John's College, Cambridge, undertook a geological reconnaissance of part of the northeast coast of Baffin Island (see Circular Vol.I (1948) p. 70). One of the objects of the party was to determine whether the extensive development of Tertiary Igneous activity of the Kangerdlugssuaq region of East Greenland and the Disko area of West Greenland continued

westward into Baffin Island. The party left Ottawa on July 20 and arrived via Churchill at Coral Harbour, Southampton Island on July 22. The intention was to fly in with one of the geodetic parties to either Pond Inlet or River Clyde, transport being provided by Canso aircraft of No. 10 Photo. Detachment of 413 Squadron, R.C.A.F. Owing to unfavourable weather and other difficulties, a successful flight was not made until August 5. During the enforced stay on Southampton Island a detailed examination was carried out of the Pre-Cambrian complex of the Coral Harbour area.

The first flight to northeast Baffin Island, in support of the Geodetic Survey, was made to Pond Inlet, and Deer and Brasher accompanied the survey party, consisting of D.F. Coates and D. Coombes. The combined party planned to travel in a trap boat manned by two Eclipse Sound Eskimo, Idlaute and Ukpuliak, as far south as Maud Harbour, then return across Pond Inlet and coast north to Bathurst Bay, Bylot Island. This programme was not completed owing to the delay in exploring the previously unentered North Arm of Coutts Inlet, and to the rough sea which prevented the crossing, in an open boat, to the east coast of Bylot Island.

The North Arm of Coutts Inlet, some 30 to 35 miles in length, maintains a general south-westerly direction. The head is formed by a very active glacier which descends steeply from the ice field to the north of the fjord. This glacier has dammed the valley giving rise to a small lake, the western margins of which consist of a second glacier. The latter also has dammed the valley and impounded a much larger lake some five miles in length. At the time of the visit a small river connected the two lakes, but it would appear that during the winter the second glacier had reached the ridge which forms the south-eastern boundary of the lakes, forming an ice dam of 150 to 200 feet in height. During the early part of the summer the lake is over 10 miles in length, its higher level and extent being clearly demonstrated by a well-marked shore line, which on August 10 was 175 feet above the level of the lake. This easy access into the hinterland was of considerable value in enabling a more detailed examination of the geology of the interior, and it is now certain that the area between the North Arm and Pond Inlet consists of igneous gneiss and intensely metamorphosed sediments of Pre-Cambrian age.

The party left Coutts Inlet on August 15 for Erik Harbour. Several attempts to make the crossing to Bylot Island were prevented by rough sea, but the delay in this area was not unprofitable. During the short night halt at Erik Harbour on the outward journey an extensive series of highly metamorphosed sediments and basic sills had been seen, and the geological party was now able to make a more detailed survey of the area than would otherwise have been possible. The final attempt to cross to Button Point was made on August 20

but the weather had deteriorated and it was necessary to shelter at Guy's Bight, a large bay between Albert and Erik Harbours, and here the westerly junction of the sediments and gneisses of acid to intermediate composition was found. The following day Pond Inlet was reached and the geological party remained to carry out a more detailed examination of the area which included basic igneous gneisses that had not been found in other areas. Bad weather over Eclipse Sound prevented the plane which should have taken the party out from reaching Pond Inlet on schedule, and it was decided to leave on the Terra Nova when she called on August 29. Short stops were made at Clyde and Pangnirtung, and at the latter a collection was made of a series of rocks of Charnockific affinities. The Terra Nova arrived at Churchill on September 8, where the geological party disembarked after a most enjoyable voyage.

W.A. Deer

Fisheries Research in the Eastern Arctic

During the first week in June, Dr. Max Dunbar and three student assistants left Montreal by air for Chimo to join the research vessel Calanus. In the Circular for May 1948 (Vol.I, pp. 53-54) there is a description of this boat, the first to be specially built for marine research in arctic Canada.

The Calanus, which was completed in July 1948, was sailed up to Chimo at the end of last season to be ready for an early start this season. The three students, all of McGill University are E.H. Grainger, T.W. Greery and Emerson Reid. Another McGill student, W.E. Wilson, an engineer, preceded the party to prepare the vessel for the summer's work. An Eskimo pilot and two Eskimo deckhands will be engaged through the Hudson's Bay Company.

The Fisheries Research Board plan that the investigations carried out for them by Max Dunbar in 1947-8 in Ungava Bay (see Circular Vol.I (1948) pp. 6,29,53) may be extended to cover the whole of the Eastern Arctic area, which includes the waters of Hudson Bay, Hudson Strait, Foxe Basin and Ungava Bay, the waters from Belle Isle north to Baffin Bay and the polar area.

As a result of the 1947-8 preliminary work, the extent of cod-fishing possibilities in Ungava Bay has been studied. Marking experiments on these cod, to determine their migrations, will be initiated this year. The young Arctic halibut have been found in Ungava Bay, and efforts will be made to locate the adult fish by means of otter-trawls and long-lines. At

the same time experimental fishing for shrimp and Greenland shark will be undertaken and the study of the biology of the seals, begun in 1947, will be continued.

As a background to this work, the programme includes studies of the physical oceanography of Eastern Arctic waters. In due course it is proposed to extend these investigations to the Western Arctic waters.

Snow Cornice, 1949

In 1948 Col. W.A. Wood led an **Arctic** Institute expedition to the Seward Ice Field, St. Elias Mountains for intensive research work, which he planned to continue in 1949. (For an account of the 1948 party see Circular Vol.II (1949) No.3, p. 27-28). We have received the following information about the work of the 1949 party from Mr. P.D. Baird.

In 1948 all transport was by air and the same plan has been followed in 1949, with the same pilot and aircraft. The Institute's Norseman, which had been fitted with a new version of the ski-wheel under-carriage used the previous year, did not reach Yakutat, where the party was assembled, until June 14. The following day, after a reconnaissance flight, Col. W.A. Wood and Professor R.P. Sharp landed on the Seward Ice Field, and on June 16 reached the nunatak where the Jamesway Hut had been erected in 1948. The hut was found to be intact though about 4 feet of drift snow had accumulated inside it, which took seven hours to dig out. At the landing strip they were able to find the high pole left over a cache, which was buried under 18½ **feet** of snow. This practically represented the winter snowfall since they considered that only a few inches had already melted.

It was reported on July 8 that a party of three: N.E. Odell, R.S. McCarter and A. Bruce-Robertson had successfully climbed Mount Vancouver on July 5. Mount Vancouver, 15,700 feet, has been described as "the highest unclimbed peak on the continent".

The personnel of the 1949 expedition are as follows:

Henri Bader: Glaciology, Univ. of Minnesota
Alan Bruce-Robertson: Medical Officer, Univ. of Toronto
E. Domenico: Geophysics, California Inst. of Technology
F. Gross: Radar, California Inst. of Technology
William R. Hainsworth: Mountaineering
James M. King: Pilot
Robert S. McCarter: Mountaineering, Stanford Univ.
Laurence Nobles: Glaciology, California Inst. of Technology
Noel E. Odell: Geology, Univ. of British Columbia

John Reese: Radar, California Inst. of Technology
Robert P. Sharp: Senior Scientist, Glaciology and geology, California Inst. of Technology
Bernard O. Steenson: Radar, California Inst. of Technology
Foresta H. Wood: Photography and organization
Peter H. Wood: Meteorology and biology
Walter A. Wood: Director, Snow Cornice, Arctic Institute of North America

The Blue Dolphin Party, 1949

On June 18, Commander David Nutt, U.S.N.R., left Woods Hole, Mass., for northern Newfoundland and Labrador with a party intending primarily to study oceanographical and hydrographical problems. The party sailed in the Blue Dolphin, a 100-foot schooner of blue-nose racing fisherman construction, which Commander Nutt has made available to the Arctic Institute of North America, under whose auspices the present expedition is being carried out. The vessel was built in 1926 and has a beam of 22-foot and draws 12 foot with a gross registered tonnage of 91. This year some modifications have been made to the area of sail, and navigational loran and special research instruments have been added. The main engine, a 140 h.p. Wolverine, gives the Blue Dolphin a cruising speed of 7 knots and a maximum speed of 8 knots. Next year Commander Nutt plans to have the hull sheathed for ice work.

The party of 20, which includes a nucleus professional crew with student assistants, a hydrographer, marine biologist, archaeologist, and three geographers from the Geographical Bureau of the Department of Mines and Resources, plans to return towards the end of September. Detailed physical and biological investigations will be carried out in the coastal waters of Labrador in representative areas from the Strait of Belle Isle to the vicinity of Nachvak Bay in northern Labrador. A special study is planned of the following areas: Belle Isle Strait, Hawke Bay, Kaipokok Inlet, Nain Bay, and Nachvak Bay. Parties equipped to spend at least one week ashore can be landed at these places, and the archaeologist, Mr. Elmer Harp, will remain in the vicinity of St. Anthony's for the summer. Dr. M.J. Dunbar has acted as scientific advisor to the Blue Dolphin programme.

A trip on the Mobile Ionospheric Observatory

We have received the following account of a trip on the Mobile Ionospheric Observatory from Mr. C.A. McKerrow. The Mobile Observatory will have completed one year's observations along the Hudson Bay Railway at the end of August 1949 and will then be dismantled. In the Circular for March 1949,

pp. 30-32, there is a brief account of this Observatory and other ionospheric work in Canada.

The Defence Research Board Mobile Observatory is an 80-foot Canadian National Railway coach, which has been completely stripped down and rebuilt to the Radio Propagation Laboratory's specifications. The car is designed to house six persons and the special radio research equipment. It is divided into diesel generator compartment, laboratory, kitchen, combined living and dining room, sleeping quarters and washroom.

In the diesel room there is a pair of two-cylinder Turner Diesel V engines in conjunction with 10 kva. generators for 110 volt electric supply.

The laboratory contains a manually-operated pulse transmitter (somewhat similar to radar) operating at frequencies from 1 to 16 megacycles. Pulses are emitted from the transmitter and the returning echoes from the ionosphere are examined. In addition there is equipment for measuring Loran echoes, light intensity of aurora, and two components of the earth's magnetic field. Wireless communication is established on a twice-daily basis with Ottawa, Portage La Prairie, and Churchill.

The combined living and dining room is 12 feet by 8 feet, furnished with a small table, writing desk, book shelf, radio and five upholstered leather chairs. The sleeping quarters are of the conventional upper and lower berth type supplied in most Pullman coaches.

When ready to move, the Observatory car is attached to the end of the regular train and taken on to the next stop. On arrival, whatever the time or the weather, the antennae are raised. The major operation is the laying out and erection of a 65-foot aluminum-alloy pipe mast. This supports a specially designed Delta type antenna for operation of ionospheric equipment. Other antennae suitably designed for this work are erected from two 20-foot steel pipes which are fitted into permanent mountings on each end of the car. In preparation for the frozen ground of the winter, anchors were previously driven in at prepared sites. We found that we frequently had to do a great deal of snow shovelling to reach these anchors. Ionospheric absorption measurements are taken at hourly intervals throughout the 24 hours, so that the crew had to work in shifts.

The regular routine of the Mobile is to spend two weeks in Portage La Prairie, then one week at each of the following stops on the Hudson Bay Railway: The Pas (mile zero); Wabowden (mile 136); Pikwitonei (mile 213); Gillam (mile 327); Herchmer (mile 412), and two weeks at Churchill (mile 510).

Portage La Prairie, our southernmost stop, is 53 miles west of Winnipeg on the Assiniboine River. The community is the centre for a rich farming district, and the town is the largest as well as the most beautiful at which we call. The streets are well-shaded and the sidewalks are paved. The Mobile is located on a siding two blocks from the main street, Saskatchewan Avenue.

The Pas, at the junction of the Saskatchewan and The Pas Rivers, is our supply centre, and the second largest of the towns on our route, with a population of approximately 2,000. Much of the land about the settlement is wooded making lumbering one of the main industries. Farming is also important as although the growing season is short growth is rapid owing to the longer daylight period. The Pas is the last stop where we can attend a cinema and see the oldest cowboy pictures imaginable, which we seem to enjoy more on our way south than north. The C.N.R. maintains large shops and a railway yard at The Pas, which is the terminus of the Hudson Bay line as well as the line into Flin Flon.

The village of Wabowden, on Bowden Lake, was named after its founder, W.A. Bowden. It consists of the railway station, two general stores, Hudson's Bay Post, Silver Leaf Hotel, a couple of churches, a school and Post Office with adjoining Coffee Shop. The latter has a good attendance except on train nights when the population congregates at the station. At Wabowden the Mobile is located on the outskirts of the community at the far end of the railroad wye. The surrounding countryside is mainly muskeg with stunted trees, although there is some lumbering. This was the first stop at which it was necessary to erect our 65-foot mast on top of soft muskeg. However little difficulty was experienced when a base 4 feet square made of slab wood was anchored by guys of sharpened slabs.

Pikwitonei is an Indian name, which means "sore mouth" or "broken mouth", and evidently got its name from the results of drinking water from the Pikwitonei River. Here the Mobile is placed one mile southwest of the village at Matago siding. At this location we experienced a full week of 48 degrees below zero weather, and instead of taking a couple of hours to assemble our antenna system it took nearly five. The village itself is very small and a goodly number of the population is Indian. There are two stores, a Post Office, and a public school. The inhabitants here are trappers and section men on the railway. The trees are noticeably more stunted than farther south, and permafrost is found about two feet under heavy sphagnum moss.

The next stop on our tour is Gillam. Here the countryside is more pleasing: rolling and dotted with spruce and tamarack. Gillam is primarily a railroading village. The C.N.R. operates a roundhouse and shops and employs most of the inhabitants. There are the usual hotel, school and three stores. The Mobile is located on the wye a short

distance from the station. To us, the most important thing about Gillam is that we can get our first shower since leaving The Pas.

Herchmer is the dreariest and most desolate of all our stops. The countryside is monotonously flat, covered with heavy thick moss and muskeg. The small trees are few and far between. This community of four or five whites who work as section men is situated on the Owl River. The Mobile is located on the far end of the wye directly to the north of the village.

Churchill is at the northern end of the Hudson Bay Railway, which was built to provide a short route to the sea for grain from the western provinces. There is a modern grain elevator and good harbour facilities. The civilian population is quite small although the town, which is situated on the eastern side of the Churchill River, is spread over quite a large area. The army camp, Fort Churchill, is a few miles to the east on the shore of Hudson Bay. The R.C.A.F. also has a large base, and it is expected that C.P.A. will run a commercial flight to Churchill in the near future. The Mobile is located near the railway station but the numerous obstacles make it difficult to erect our antennae. The town lies just slightly to the north of the tree line and vegetation is scarce, although there are many flowers in the summer.

The Mobile Observatory takes approximately two months over the regular run from Portage La Prairie to Churchill. The project is under the direction of one of our fellow Circle members, Mr. J.H. Meek. During the first four months of operation from mid-August to mid-December, 1948, Mr. Delos Hansen was Officer-in-Charge while the last five months the writer has been in charge. The rest of the R.P.L. staff and others who have been on the Mobile are as follows: C. Baker; C.K. Bedal; Sgt. E.L. Hagg (on loan from R.C.C.S.); J. Hogarth (Univ. student); Cpl. E. Lushington (on loan from R.C.C.S.); E. MacDonald; J.H. MacLachlan (Univ. student); W. Penn; J. Petry; H.V. Serson.

C.A. McKerrow

Loss of the "Polarbjørn"

On April 15, the Norwegian sealing vessel M/S Polarbjørn caught fire off Newfoundland and the ship and cargo of some 9,000 seals were lost. The crew were taken off by the Canadian sealer Illinois, and later transferred to the Norwegian sealer Herøyfjord. The 24-hour delay caused by this exchange resulted in the loss of the Herøyfjord and her cargo of 20,000 seals in a heavy storm off the Norwegian coast; the combined crews were saved. The Herøyfjord, a new steel vessel on her first sealing

trip, would probably have been used as the ship for the Norwegian-British-Swedish Antarctic Expedition, which plans to leave for the south in November of this year.

The Polarbjørn, a vessel of 326 tons, had had a long career of sealing in the spring and combined scientific and hunting expeditions in the summer. She was built in Narvik in 1919 by the sealing captain Jens Øien from a gift he received for **rescuing** Count Koteritz and his wife when they were lost in the vicinity of Clavering Island, Northeast Greenland, in 1913. The well-known sealing captain, Kristoffer Marø had been skipper of the ship from 1937-48, and it was his son, Henrik, who was skipper this year.

Between 1931 and 1948, the Polarbjørn had been used for nine summer expeditions to Northeast Greenland by Norges Svalbard og Ishavsundersøkelser (now known as the Norsk Polarinstitutt). Dr. Kåre Rodahl, who has sent us the information for this note, sailed in the Polarbjørn to Clavering Island in the summer of 1939 to carry out vitamin studies and meteorological observations, and in 1941 he set up a laboratory on the ship to make vitamin determinations on a sealing trip off Newfoundland and Labrador.

During the war the Polarbjørn was used by the U.S. Air Force for work in Greenland and Labrador.

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Fourteenth Meeting of the Arctic Circle

The fourteenth meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess, 278 Sparks Street, on Thursday May 12. The President introduced the speaker, Mrs. T.H. Manning, who gave an illustrated talk on "Travels in Hudson Bay and Foxe Basin".

New Canadian icebreaker

The Department of Transport has announced that a new twin-screw icebreaker will be built for their Service. The main task of the vessel will be to carry supplies for the far northern stations during the summer; the rest of the year she will be employed icebreaking in the Gulf of St. Lawrence and in the St. Lawrence River.

Details of the plans have not been announced, but it is reported that the icebreaker will be the largest in North America. Her hull will be of exceptional strength and specially designed for manoeuvering among the narrow leads in northern waters. Wing tanks running nearly the whole length of the vessel and double bottoms will provide buoyancy in the event of damage to the hull.

Special facilities for carrying supplies will include large refrigerated storage; two 2-ton cranes and two 10-ton cranes for moving heavy equipment; two scows for landing cargo on open beaches, and a shelter for mobile equipment such as bulldozers, tractors, or snowmobiles which can be carried for moving stores over the ice.

The vessel will be very well-equipped with navigational aids and will carry: radio, long and short range radar, direction finding and loran equipment, echo-sounding gear and gyro compasses. In addition two powerful searchlights will be provided. As a result of the large number of aerials and navigating appliances the mast will be stronger than usual and tripod in form.

A helicopter landing deck is incorporated in the plan for the two helicopters which it is anticipated will normally be carried for reconnaissance.

Accommodation will be provided for a crew of 70 and at least 22 passengers. There will be a hospital on board.

Launching of the Eastern Arctic Patrol ship

The new vessel for the Eastern Arctic Patrol, the C.D. Howe, was launched from the Davie Shipbuilding and Repairing Company's yards at Levis, Quebec, on September 7. Owing to delays in construction she was not ready for the 1949 northern patrol as originally contracted. A full account of this ship, which will be operated by the Department of Transport, was given in the Circular for February 1948 (Vol.I (1948) pp. 11-13). During the summer months the C.D. Howe will carry the Government freight and personnel for the Eastern Arctic, formerly carried by the Hudson's Bay Company's R.M.S. Nascopie; the rest of the year she will be assigned to Department of Transport duties on the East Coast and the Gulf of St. Lawrence.

The C.D. Howe is not an icebreaker, but is heavily reinforced to withstand ice. On northern patrols a helicopter will normally be carried for ice reconnaissance and for landing emergency supplies. The long range of the ship, which can sail 10,000 miles without refuelling, is also specially designed for northern work. Her appearance is workmanlike, but modern, with a raked stem and a cruiser stern, two continuous decks and three cargo holds which have steel covers on their weather deck hatches. Her overall length is 294 ft. 6 ins. and her draft fully loaded 18 ft. 6 ins., not 18 ft. as announced previously in the Circular. The C.D. Howe will be registered in Ottawa.

Influenza epidemic at Cambridge Bay

During April a serious epidemic of influenza started at Cambridge Bay and spread to the surrounding district, including Coppermine and Read and Holman Islands.

The disease was reported by the R.C.M.P. at Cambridge Bay on March 30. At first the attack seemed to be comparatively mild though it affected nearly all the natives and some of the white members of the settlement. In addition natives came in from camps nearby also suffering from the disease. The latter were well enough to return to their homes on April 5 and were instructed to come back to Cambridge Bay on April 17 for the x-ray unit which was due at that time.

By April 15 some of the natives came to the settlement bringing word that many Eskimo were ill and some had died in their homes. Attempts at isolation proved impossible and by

the time Dr. Callaghan arrived from Aklavik on April 20 with the x-ray unit he found the majority of the Eskimo at the settlement affected and markedly prostrated. From native reports it was estimated that there had been 14 deaths.

Clinically the disease was entirely pulmonary, the typical history being headache, sore throat and malaise for a day, then retrosternal pain, painful coughing bouts and shortness of breath. The sputum was greenish yellow and sometimes streaked with blood. Chest examinations showed gross pneumonic processes in all the sick and many who claimed they were no longer sick. A period of a few days of feeling somewhat better was often followed by return of symptons, dyspnoea and death. Not all the patients had high temperatures, but in some it ranged from 102-104°.

Dr. Callaghan immediately arranged with the Officer Commanding the R.C.A.F. station, to make use of Jamesway huts for an emergency hospital. These huts were 16 x 16 feet and contained five beds and an oil heater. Three huts were available at once and fifteen of the most serious cases were brought in by snowmobile. They were given 300,000 units of penicillin in oil as a first treatment. The care of the sick was planned jointly: the native help of the Hudson's Bay Company fed the sick, the food was prepared by the R.C.A.F., who also provided blankets, and sanitation was looked after by the R.C.M.P.

On the same day word was brought that natives at a sealing camp near Anderson Bay, to the east of Cambridge Bay, had all been taken ill and that there had been several deaths. The plane used for transporting the x-ray unit was emptied and Ernie Boffa flew Dr. Callaghan to the camp. Only two men were outside the five snow houses. Both their wives had died and they had been sick themselves though they were improving. Nine sick Eskimo were taken to the aircraft on sledges and flown back to hospital at Cambridge Bay. About mid-night the same night an Eskimo girl was brought in who died subsequently.

The following day, April 21, all the patients in the hospital were much improved with lower temperatures, most likely a result of the penicillin treatment. At the chest clinic held that day each person was stripped to the waist, temperatures were taken, and chests examined and x-rayed. Any individual showing signs of the illness as evidenced by malaise, elevation of temperature, or chest signs, was given 300,000 units of penicillin and admitted to hospital.

About 5 p.m. Dr. Callaghan heard that a dog team, which had come in from Wellington Bay a few days before, had brought news of sickness. Flying there at once he found two families

who had been sick but were recovering. As they showed no residual signs Dr. Callaghan decided to leave them in their camp, and returned to Cambridge Bay where he completed the examination and x-ray of all the persons in the camp by midnight. At this time there were 42 patients in hospital, all of whom had received penicillin.

On April 22 most of the patients showed more improvement and no deaths occurred during the night. Dr. Harvey and two nurses from the Charles Camsell Hospital at Edmonton arrived and Dr. Callaghan, after giving them a summary of the epidemic and the steps taken to combat it, left to continue his x-ray survey.

On April 24 one old woman died and there were four new native cases at the settlement, who were admitted to the hospital on the 25th.

Following reports on the serious nature of the epidemic, Dr. P. Moore, Director of Indian Health Services, and Mr. J. Gibbard, Director of the Dominion Laboratory of Hygiene, arranged for Dr. F.P. Negler, of the Laboratory of Hygiene, and Dr. J.H. Sturdy, Pathologist of the Royal Alexandra Hospital, Edmonton, to fly to Cambridge Bay in an effort to track down the disease.

Dr. Negler and Dr. Sturdy arrived on April 26, and Dr. Harvey returned to Edmonton. Two days later Dr. Negler wired that there had been three new cases, making 8 cases since the 23rd; 53 patients were in the emergency hospital, 8 of whom had developed pleurisy with effusion or low-grade broncho-pneumonia, and 15 other patients were being treated in their snow-houses.

On May 4 it was arranged that Dr. W. Barr-Murray, who was at Edmonton, should leave for Coppermine as news had been received that 80 natives were sick, apparently with the same kind of influenza. When he arrived on May 6 he found 50 natives still ill but there had been no deaths. Dr. Murray then continued to Read and Holman Island by air as there were reports of disease. At both places practically all the natives had been affected though all were recovering. After leaving an emergency supply of penicillin and giving penicillin where necessary, Dr. Murray took off for Yellowknife.

At Cambridge Bay Dr. Negler and Dr. Sturdy obtained post mortem tissue from three subjects and nose and throat washings from 12 patients. This material was flown to the Connaught Medical Research Laboratories at Toronto. Preliminary results suggested that the disease was a virus influenza of Type A, PR 8 strain.

This epidemic, which spread so rapidly, disappeared almost as quickly, though there may have been a recurrence in the Coppermine area in July. It has been suggested that the disease was carried from Cambridge Bay to Coppermine and Read and Holman Islands by the x-ray unit. In these three districts no deaths were reported in the main epidemic though 2 deaths occurred in the Coppermine area in July from an attack with similar symptoms. It seems that the disease at Coppermine and elsewhere was of a milder form, or the resistance of the inhabitants greater, than in the Cambridge Bay area where there were estimated to be 23 deaths. Two isolated cases of a similar type of infection were reported by Dr. Callaghan from Perry River and Sherman Inlet in April.

The University of Alaska

We are indebted to Mr. J.S. Mehler, Librarian of the University of Alaska for the information on which the following note is based:

The University of Alaska had its conception in 1915 when on March 4 the Congress of the United States set aside certain lands in the Tanana Valley for the use and support of a Territorial agricultural college and school of mines. On 3 May 1917 the Territorial Legislature created "The Alaska Agricultural College and School of Mines" as a corporate body and accepted the lands reserved by the Act of Congress. Charles E. Bunnell, former Federal Judge of the 4th Judicial Division, was elected President on 11 August 1921 and assumed the duties of office on December 7. Classes started in September 1922 with six students and nine faculty members. In 1929 Congress reserved a further one hundred thousand acres of non-mineral lands for the support and maintenance of the college, which on 1 July 1935 became the University of Alaska.

From the six students who enrolled in 1922 the University has steadily grown to 377 students in the 1948/49 school year. There are ten departments offering instruction leading to Bachelor's degrees: Agriculture, Arts and Letters, Biological Science, Business Administration, Chemistry, Civil Engineering, Education, General Science, Home Economics, and School of Mines. In addition five-year engineering degrees are offered by the School of Mines and the Department of Civil Engineering, and the professional degrees of Civil Engineer and Mining Engineer are conferred on graduates who meet the requirements. Extension courses in mining, agriculture and home economics are given throughout the Territory. The Agricultural Experimental Stations, by an Act of Congress in 1947, were put under direct control of the Secretary of Agriculture, but on 1 July 1949 they reverted to the control of the University and a joint research programme will be undertaken.

Since 1929 the University has sponsored and participated in various phases of Arctic research. In cooperation with the American Museum of Natural History and the Childs Frick Laboratories palaeontological research has been carried on for many years. The University has sponsored archaeological expeditions to St. Lawrence Island, the results being published in Geist and Rainey's "Archaeological excavations at Kukulik". In 1933 the University was one of the stations in the International Polar Year. A particular interest has been the physical phenomena of the Arctic, and this has now culminated in the passage by Congress of a bill establishing the Geophysical Institute, the buildings for which are under construction. Magnetic and seismic observations were made in cooperation with the Carnegie Institution and this work is now carried on by the U.S. Coast and Geodetic Survey observatory, located on the campus. In connection with the Anthropology Department the University maintains a museum which has an outstanding collection of Eskimo artifacts, many of them the results of the University's field work. At present J.L. Giddings, Jr. is carrying out dendrochronological research in an attempt to date Eskimo sites by the tree-ring method.

Dr. Bunnell held office until 30 June 1949, when he became President-Emeritus and was succeeded as President by Dr. Terris Moore of Cambridge, Mass.

Supply of northern weather stations

The annual supply mission to the joint Canadian/U.S. weather stations in the Canadian Arctic left Boston Harbour on July 15. This is the fourth season that this work has been carried out by the U.S. Navy. (For accounts of the 1947 and 1948 seasons see Circular Vol.I (1948) pp. 2 and 90).

The Task Force, which consisted of three ships: the U.S.S. Edisto, an icebreaker; the U.S.S. Wyandot, a transport; and the U.S.S. LST-533, serving as a cargo vessel, was under the command of Captain Basil Rittenhouse, U.S.N. embarked in the Edisto. The Edisto and the Wyandot have both seen service on Task Force 68 in 1947, and Task Force 80 in 1948. The use of an LST was an experiment. Task Force 80 had an additional icebreaker, the U.S.C.G.C. Eastwind, which suffered considerable damage by fire off the New Jersey coast on 19 January 1949. (Circular Vol.II (1949) pp. 22-23).

It had originally been planned that supplies would be landed at the four joint weather stations at Prince Patrick Island, Ellef Ringnes Island, Cornwallis Island, and Ellesmere Island. In addition it was hoped that supplies might be landed at Alert, the site near Cape Sheridan, northern Ellesmere Island, selected for a future station by Task Force 80.

This site was named after Sir George Nares' ship, H.M.S. Alert, which wintered off this coast in 1875-6.

A less favourable ice season combined with one less icebreaker probably accounts for the small range of this year's Task Force compared with the previous year. During the summer all supplies for the four joint stations were landed on Cornwallis Island, at the Resolute Bay station, and will be distributed from there by air. The supply mission was not able to land supplies for the proposed station at Alert.

The three ships of the Task Force returned to Boston Harbour on September 7. The U.S.S. Edisto was commanded by Comdr. W.F. Morrison, U.S.N., the U.S.S. Wyandot by Capt. T.S. Webb, U.S.N. and the LST-533 by Lieut. J.E. Vautrot, U.S.N. The senior Canadian representative on the supply mission was Mr. J.W. Burton of the Arctic Division of the Northwest Territories Administration.

The death of Nukashook

At Cambridge Bay on September 2 and 3, two 21-year old Netsilik Eskimo from Boothia Peninsula, Eeriykoot and Ishakak, were tried before Stipendiary Magistrate A.H. Gibson with a six-man jury on charges of assisting the suicide of a 45-year old Eskimo woman, Nukashook, the mother of Eeriykoot.

The evidence showed that Nukashook, who was in an advanced state of tuberculosis and in pain, had repeatedly requested her son to help her to die, in accordance with an old Eskimo custom whereby it is the duty of the children to assist old or sick Eskimo who desire to kill themselves. Last summer Eeriykoot asked his friend Ishakak to help him in this task. They went to Nukashook's tent and arranged a loop of sealskin line from the ridge-pole. Nukashook placed her head through the loop, requesting her son to hurry the procedure. Eeriykoot then pressed down on the back of her head until she was dead. No attempt was made to conceal the act and the neighbours were informed and assisted with the burial.

Both Eeriykoot and Ishakak are intelligent men, able to read and write in syllabics. At the trial Eeriykoot said that he would have considered it wrong not to help his mother when she asked him. Apparently realizing that the white man might object to their action, both men were reluctant to take part and only agreed on the insistence of Nukashook.

Eeriykoot was found guilty and was sentenced to one year's imprisonment, while Ishakak, who took only a minor part, and was to some extent under the domination of Eeriykoot, was acquitted. Eeriykoot will serve his sentence at Cambridge Bay,

apparently not in close confinement and his punishment will in fact lie in his isolation from the rest of his own people in Boothia Peninsula.

It is hoped the trial will have the desired effect of bringing home to the Eskimo that assisted suicides are forbidden. The comparatively light sentence given Eeriykoot avoided, however, any unnecessary harshness toward an individual whose sense of filial duty and adherence to Eskimo custom led him to contravene the Criminal Code.

This trial illustrates well the difficulty of applying laws based on the usages of civilization to a people as remote as the Netisiliks, to whom tribal custom must still appear a more immediate obligation.

A Hunting Incident in Foxe Basin

During the first week in February, 1949, a party of five men and one boy from the Eskimo settlement at Quarman, Melville Peninsula, were hunting some miles north of their camp on the moving ice beyond the floe-edge. They had travelled out from the floe-edge for about two hours when, on the far side of a wide crack, they saw a walrus on the ice which they killed but had some difficulty in reaching. After cutting it up and loading the meat on the sledges they set off for the bay ice.

When they reached the shore lead it was discovered that the moving ice on which they had been hunting had parted from the bay ice. It is not uncommon for parties to be marooned on the moving ice, and this occurs in Foxe Basin probably once every three or four years on the average. Near Quarman it is not considered as dangerous as farther north, where the current may carry the ice far off-shore. In this case, however, the weather was particularly cold and stormy, and some concern was felt when the hunters did not return.

The party marooned on the ice sledged southwest, hoping somewhere to find the moving ice touching the bay ice so that they could return to their camp. The first night was spent in the lee of some rough ice. The second day they continued their journey and were fortunate in finding sufficient snow to build an igloo for the night. The walrus which they had killed provided an ample supply of food and fuel. The third day they again spent on the moving ice but on the fourth, after passing the night in the shelter of a sledge, they were able to make the bay ice between Usugarsuk and Amitiok. One day's travel up the coast took them safely to their camp.

The only serious casualty was due to a deep gash in the leg of one of the Eskimo, sustained while cutting walrus meat on the sledge during the journey, while another froze his left hand slightly.

G.W. Rowley

A further account of tragedy on the coast of Cumberland Gulf. By T.A. Harwood

The April number of the Arctic Circular contains a short account of the finding of some Eskimo bodies in Cumberland Gulf. (Vol.II (1949) pp. 46-47). The following is the full story of the tragic death of these natives, whom I knew personally.

During the fall of 1937 two natives from Blacklead Island, Pangat and Iggyuapik, men of few resources, decided to move to Exeter Sound. Pangat's decision was probably influenced by the fact that his daughter's husband hunted in Hoare Bay (Touadjuak Fjord), and thus could be relied upon for some support. By early winter they had made their way into Exeter Sound and had set up camp on the shores of a small bay named Karmakjueet. This bay is separated from Davis Strait by a narrow peninsula on the northern side of which a small house had been built by whalers, probably in the late '80's. The district is reported to have the heaviest snowfall in the Pangnirtung area. The bays facing north have such a heavy fall during the winter that they are almost impassable for dog teams.

During the winter I do not think the two families made any efforts to obtain deerskin for winter clothing, although caribou were plentiful on the land crossing between Hoare Bay and Exeter Sound in the late fall and early winter. As a result their hunting capabilities were affected by the lack of warm clothing, and by early spring they were living a hand to mouth existence. As the days lengthened the snowfall increased until by early April over four feet of soft snow lay over Exeter Sound and the adjoining fjords.

This heavy snow covered the seals' breathing holes completely, making seal hunting difficult, if not impossible. As the meat situation deteriorated, the families ate their dogs. This in turn made normal hunting still more difficult, and finally the vicious circle closed, and without dogs to move out of the immediate camp area it became impossible to obtain any food. At this stage, one of the family heads, Iggyuapik, attempted to walk over to the only other Eskimo camp south of Exeter Sound. His abandoned gun shows that he

reached the head of Touadjuak Fjord, 22 miles from his destination, having already walked 50 miles. It seems likely that he collapsed and died a few miles from this point. No trace of his tracks or body were found by my party.

Pangat died early in April in his tent. Since he was by repute the lazier and certainly the feebler, his efforts towards survival were weaker and less coordinated than his younger partner Iggyuapik, and with his death his family could not have lasted much longer. Iggyuapik's family, alone but probably in better physical condition than Pangat's, lived on a little longer, the mother dying last from malnutrition and cold on April 28. Before she died she left a short message on a prayer calendar stating the days on which her three children died.

On the instructions of Mr. J.A. Thom, H.B.C. post manager at Pangnirtung, I left for Exeter Sound on 28 April 1938 arriving at the campsite on May 3, five days after the wife of Iggyuapik had died. The bodies of the family were in a skin tent covered with snow. The bodies of Pangat and his family were completely buried and to find them we had to use saws and ice spears.

We were not able to bury the bodies owing to the deep snow, but a prayer was said by Kilabuik, a Pangnirtung native catechist, and arrangements were made with the Touadjuak natives for a burial in the spring when the snow thawed and exposed Pangat's tent.

A small cairn was built in which my name and those of the Eskimo of the party were enclosed. The return trip to Pangnirtung was made in four days despite adverse conditions of warm thawing winds and rain, which turned the south-facing slopes in Cumberland Gulf into a maze of rivers and streams.

Visit to Mackenzie District in February 1949. By Dr. H.A. Procter

The Mackenzie District covers an area of 527,490 square miles and the provision of an adequate medical service presents a gigantic problem. The only practicable solution is the lavish use of air transport with existing facilities.

During February, 1949, I visited most of the major settlements in the Mackenzie District by air and covered over 6,500 miles on the trip. The population of 11,250 consists of 1,574 Eskimo, 4,322 Indian and mixed bloods, and 5,354 other races. For the medical care of this population there are eight doctors; nine hospitals, providing a total of 311 beds, and four Indian Health Services nursing stations, each capable of accommodating four patients.

The hospitals are established at Fort Smith, Fort Resolution, Yellowknife, Port Radium, Fort Simpson, Norman Wells, Hay River, and two at Aklavik. During the summer of 1948 the Indian Health Services nursing stations at Coppermine, Fort Norman, Fort Good Hope and Fort McPherson were opened. There are Indian Health Services medical officers at Fort Smith, Fort Resolution, Fort Simpson, and Aklavik. In addition the industrial projects at Norman Wells and Port Radium have resident doctors and the town of Yellowknife has two practitioners and the only dentist resident in the North-west Territories.

Mid-winter would appear at first thought to be a poor choice of season for a visit. Actually February is in many respects the best time for official calls. The resident officers are not so busy as during the summer; they can spare time for casual conversation and visitors, being less common, are doubly welcome. It is perhaps the best month of the whole year for flying weather, and with reasonable skill a light plane can set down within a short distance of any port-of-call. It is a good time for observing the effects of the climate on construction and, not least, there are no mosquitoes or flies.

Most of this trip was over common routes with the exception, perhaps, of a visit to Read and Holman Islands. I was alleged, at the time, to be the first physician to visit Holman Island within living memory.

It is about 125 air miles from Coppermine to Read Island and a further 135 air miles on to Holman Island. Ernie Boffa of C.P.A. was our pilot. His detailed knowledge of the area was very necessary as Read Island is misplaced by about 14 miles to the west on current maps, while the post at Holman Island is not on the island of the same name, but on the mainland opposite. To come down in this area would be a grim experience, hence the Police Officer at Coppermine assures himself that all reasonable precautions are taken. Being the one unknown person in the party I received his special attention and was outfitted with skin trousers and a double skin parka over what I had reason to believe was a fairly good outfit. The result was a private turkish bath from which there was no relief. Such is the price of security.

I must admit to seeing very little of Read Island. I was followed in to the Post Manager's house by about twenty Eskimo and more arrived steadily until the small residence was pretty well filled. When the doctor's visits are rare no one stands upon ceremony. The consultation and treatment are a community affair. The show could have gone on for hours but minutes began to be important as the early sunset approached. and it was urgent that one patient should be taken out that

evening. The landing at Coppermine was made in that treacherous period at dusk when there is neither sun or moon. Fortunately a single flare patch had been set out to give a general indication of the best place to land, but when down the pilot is blind and must practically feel his way to a berth. It is such small incidents which make the difference between air travel and bush-flying--even where there is no bush.

Protection of the Beluga

On 9 June 1949, the Federal Department of Fisheries announced regulations for the protection of the Beluga, or White Whale, in the areas of Hudson Bay, Hudson Strait, James Bay and Ungava Bay.

Mature male belugas average 13 feet in length and weigh close to 3,000 pounds, while some have been taken over 4,000 pounds. Females are one to three feet smaller than the male. The beluga is protected against the cold by a thick skin, without pores, and a substantial layer of blubber. The blubber yields oil of a very good quality and the skin, with its outer layer of muktuk, is considered a delicacy by the Eskimo. Commercial fisheries are primarily interested in the oil, which averages 30 to 40 gallons from a 12- to 13-foot whale though as much as 150 gallons has been reported from the largest animals in the Gulf of St. Lawrence.

The new regulations permit only those with licenses granted by the Minister of Fisheries to fish or kill belugas; exceptions being made for the Indian, Eskimo, halfbreed Indian or Eskimo, or members of the Royal Canadian Mounted Police who are allowed to take belugas without a license for their own domestic use and for the feeding of their dogs. However, any person may dispose of the meat of a beluga lawfully killed to travellers for food for themselves or their dogs.

"Expeditions to the Canadian Arctic"

Mr. Clifford Wilson, Editor of the Beaver, the Hudson Bay Company's magazine, has most generously given us reprints of a paper by P.D. Baird on "Expeditions to the Canadian Arctic" for distribution to members of the Arctic Circle. These reprints are being sent out with this number of the Circular to all members who are not Associates of the Arctic Institute; the latter will receive their copy through the Arctic Institute. Mr. Baird's paper, which gives an outline of sea voyages and land expeditions carried out by explorers of the Canadian Arctic up to the year 1918, was first published in three parts, in the Beaver for March, June, and September 1949.

We should like to take this opportunity of expressing our thanks for this thoughtful gift.

Department of Transport personnel killed in Canso aircraft crash

The following note has been received from Mr. Frank T. Davies, Superintendent of the Defence Research Board Radio Propagation Laboratory:

Four of the Department of Transport 1948-9 staff at Clyde Ionospheric Station were killed on 22 August 1949 in the Canso aircraft crash halfway between Churchill and Winnipeg. Their names are:-

A.B. Neill, Observer-in-Charge, 1948-9; B.F. McManus, Operator; C.D. McKenzie, Operator; W. Groff, Cook.

S.H. Hitleman, the only surviving member of the 1948-9 complement of Clyde, remained at Clyde for another year.

These names were listed in the Arctic Circular for March 1949 (Vol.II (1949) p.32).

It is hoped to publish a note on this accident in a future number of the Circular.

Meetings of the Arctic Circle

The next meeting of the Arctic Circle will be held on Thursday, November 10 in the R.C.A.S.C. Mess, 278 Sparks Street. Dr. J.C. Callaghan will give a talk entitled "Experiences of a Government Medical Officer in the North".

The following meeting will be held on Thursday, December 8.

Editorial Note

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

Mrs. Graham Rowley,
Editor Arctic Circular,
411 Echo Drive,
Ottawa.

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Fifteenth Meeting of the Arctic Circle

The fifteenth meeting of the Arctic Circle was held in the 1st Corps Troops R.C.A.S.C. Mess, 278 Sparks Street, on Thursday November 10. The President, Mr. A.E. Porsild, was in the Chair and introduced the speaker, Dr. J.C. Callaghan.

Dr. J.C. Callaghan, who had recently returned from a year at Aklavik as Medical Health Officer, spoke on "Experiences of a medical officer in the Arctic". During the time he was at Aklavik he was responsible for carrying out the x-ray survey in his area which involved visiting most of the settlements in the Western Arctic. In the course of his talk, illustrated with kodachrome slides, Dr. Callaghan described this work as well as the influenza epidemic at Cambridge Bay in April 1949. Dr. Percy Moore, Director of Indian Health Services, opened the discussion after Dr. Callaghan's paper. We should like to take this opportunity of thanking the Indian Health Services for having made it possible for Dr. Callaghan to speak to the Circle.

Cosmic rays in the Arctic

Few explorers in the Arctic realize the extent to which they helped to open up one of nature's greatest physical laboratories. Scientific stations in the Arctic are helping in the study of one of the most intriguing of natural phenomena, namely, "cosmic rays". These rays include radiations and very high speed particles found everywhere on the earth's surface, which come primarily from cosmic regions well beyond the earth's atmosphere - perhaps beyond the solar system or even beyond the local galaxy. Their source is still very uncertain but the possibility that they originate in sun spots is being investigated vigorously.

The primary rays outside the earth's atmosphere are nuclear particles carrying an electric charge and moving with almost the velocity of light. Like any other moving charged particle their motion is affected by a magnetic field. Thus

the magnetic field of the earth, although it is relatively weak, acts on these over great distances and influences the paths by which they reach the earth's surface. Since the particles spiral around the lines of force the majority tend to move toward the magnetic polar regions; only the more energetic resist the effect of the magnetic field sufficiently to reach the equator. Particles require energies of about fifteen thousand million volts to reach the equator from a vertical direction, but at the magnetic poles there is no lower limit caused by the earth's field to the energy of the rays that may reach the outer atmosphere. However, if the sun has a magnetic field it will prevent the weakest rays from reaching the earth at all.

Actually when the primary rays strike the earth's atmosphere they are quickly absorbed and create secondaries of various sorts. It is these secondary particles which we observe at sea level. To penetrate to sea level secondary particles must have an energy corresponding to about two thousand million volts. These penetrating secondaries follow the direction of the primaries and are proportional in number.

Since the weaker cosmic ray particles can only reach the earth in polar regions it is necessary to study cosmic rays near the magnetic pole in order to learn more about the sun's magnetic field. Because of the absorption in the earth's atmosphere it is also desirable to study them at high altitude.

The magnetic pole, as it is usually understood, is not the pole of interest in studying cosmic rays. Cosmic rays see only the average effect of the earth's magnetism as though it were concentrated in a bar magnet somewhere near the earth's centre. The point at which the axis of this magnet cuts the surface of the earth is known as the geomagnetic pole and is situated on the west coast of Greenland approximately one hundred miles north of Thule. Geomagnetic latitudes which are used in cosmic ray studies refer to a system wherein this point is the north pole.

Last summer the National Geographic Society in cooperation with the Bartol Research Foundation sent an expedition to Churchill to study cosmic rays. The expedition was directed by Dr. Martin Pomerantz of the Bartol Foundation. Geiger-Mueller counters were flown in free balloons; the number of counts and pressure data were received at the ground station by radio. Several flights were made reaching altitudes of about one hundred thousand feet and rays were recorded with energies as low as one hundred million volts. The observations made by Dr. Pomerantz indicate that the magnetic field strength of the sun must be only a fraction of that expected from other observations.

Two scientists from the Physics Division of the National Research Council, Dr. E. Pickup and Dr. L. Voyvodic, also visited Churchill last summer with a view to planning further cosmic ray work in the upper atmosphere. They arranged their trip to coincide with Dr. Pomerantz' expedition and assisted him with his work.

The general intensity of cosmic rays depends upon meteorological conditions since absorption of the secondary rays varies with the density of the air through which they must pass. Studying these gives information about the energy spectrum of the rays. The way primary rays behave in magnetic fields is also demonstrated by intensity changes associated with magnetic storms. These must be studied at high magnetic latitudes and compared with measurements taken at other places on the earth. The observation of changes occurring with magnetic storms is expected to give some information on whether or not the source of these rays may be at least partly in sun spots.

The opening of the joint Canadian American weather stations in the Arctic has made possible the first continuous observations in this sector of the polar regions. Many expeditions for measuring cosmic rays have been made previously by ship and air, but this summer the Physics Division of the National Research Council set up a station at Resolute Bay for continuous recording of cosmic ray intensities.

The U.S. Navy resupply mission carried to Resolute Bay about one and a half tons of equipment consisting of Geiger-Mueller counters, amplifiers, recording equipment and lead for shielding. This was set up by Dr. D.C. Rose who travelled with the mission. After being put in operation the instruments were left in charge of Mr. John Galt of the Dominion Observatory who is directing magnetic work at Resolute Bay this winter. The equipment has been operating continuously since September 1. An identical set of instruments is being operated in Ottawa for comparison.

Many more expeditions to arctic regions will be necessary before everything is known about cosmic rays. In other countries a great deal of valuable work is being done on high mountain tops. It would be very useful to have a well equipped laboratory and living quarters on the top of a mountain ten or eleven thousand feet high in northern Ellesmere Island. A plan for such a place would seem rather fantastic now but probably no more fantastic than the present weather stations would have seemed to Franklin.

D.C. Rose

Operation Magnetic, 1949

During July and August, 1949, the magnetic survey of the Canadian Arctic was furthered by an airborne expedition similar to operations Polco of 1947 and Magnetic of 1948 (Circular Vol.I (1948) pp. 20 and 79).

The objects of this expedition were first to confirm the position of the north magnetic pole as calculated from previous observations, secondly to investigate regions where anomalies exist and secondary poles have been suspected, thirdly to re-occupy former magnetic stations for information on secular change, and finally to extend the network of observation points required for the production of reliable magnetic charts. All of these objects were achieved, and no secondary poles were discovered.

The R.C.A.F. assigned a Canso to the task, with F/Lt D.R. Cuthbertson as pilot and detachment commander, and F/O J.E. Goldsmith as navigator. Both these officers have been on previous magnetic-survey expeditions. The scientific party consisted of R.D. Hutchison and P.N. Daykin of the Division of Terrestrial Magnetism, Dominion Observatory, and B. Shindman of the Geographical Bureau.

The party left Rockcliffe on July 5, but were delayed a few days at The Pas by the lateness of the ice break-up in the northern lakes. During this delay observations were made at The Pas, both at an established magnetic station in the town, and at the airport some 20 miles away; and a flight was made to Nueltin Lake, where two stations had been established by the Dominion Observatory in 1923 but not re-occupied since. By July 14 there was enough open water for a landing on Dubawnt Lake, the starting point of the official programme. From then on progress was more rapid.

The second stage of the operation was carried out from the R.C.A.F. base at Coral Harbour, Southampton Island. It consisted of trips to Wager and Repulse Bays, in the north-western part of Hudson Bay, and to Lakes Pelly and Franklin, on the Back River. No ice was encountered except at Repulse Bay, where the harbour of the trading post was choked and the only possible landing-place was a small inlet two or three miles away. From here the instruments were carried overland to a magnetic station near the post, the object being to obtain a comparison with readings made there in 1937. Since the local geology is Precambrian, large space-changes in magnetic values might be expected, and the accurate measurement of time-change required and exact re-occupation of the original station. Some additional observations were made at the point of landing.

At each of the above stations observations were carried on continuously for 24 hours or more. The magnetic elements - declination, inclination and field intensity - were measured every hour, and astronomic observations for position and azimuth were made between magnetic readings. At all points Mr. Shindman gathered geographical information.

The final part of the season's work was based on Resolute Bay, Cornwallis Island. The stations visited are listed below, with notes on their significance and the number of complete sets of magnetic observations made at each.

(i) George Island, Prince Albert Sound, west Victoria Island: 22 sets - to check a regional anomaly suggested by observations on the coasts of Victoria Island and beyond.

(ii) Sawmill Bay, Great Bear Lake: 6 - a useful addition to the magnetic-survey network because many local anomalies exist in this region.

(iii) Hobhouse Inlet, south Devon Island: 21 - for repeat observations at a station of 1946.

(iv) Spence Bay, Boothia Isthmus: 25, (v) Union River, east Somerset Island: 24, and (vi) Cunningham Inlet, north Somerset Island: 22 - to outline a major magnetic anomaly apparently associated with the Precambrian outcrop running north through Boothia and Somerset.

(vii) Barrow Harbour, southwest Grinnell Peninsula: 25 - no other modern readings in this region. Compass observations made all around the Grinnell Peninsula by the Belcher expedition of 1852-4 show that the declination at Barrow Harbour was 152½°W. at that time. It is now 118° 53'W., a decrease of 33½°.

(viii) Erebus Bay, southwest Devon Island: 40 - for repeat readings at a station on Beechey Island occupied by Amundsen in 1903 and by the Meteorological Service of Canada in 1908, and also at a station a few miles away occupied by a U.S. expedition in 1946. Some magnetic observations in the immediate vicinity of Beechey Island were made by the earliest explorers; and the known values are given here as an illustration of long-period secular change.

Year	Declination	Inclination	Field Intensity
1819	129° 00' W.		
1850		87° 29'	
1853			.5865 C.G.S. units
1903	128° 28.5'	88° 20'	.58975
1908		88° 30.5'	.59824
1946	99° 54'	88° 26'	.5710
1949	94° 23.4'	88° 35.4'	.57678

(ix) Berlinguette Inlet, Brodeur Peninsula: 24 - no other readings in this region.

(x) Igloolik Island, Foxe Basin: 24- few modern readings in this region, but complete observations were made here in 1822-3 by Parry's expedition.

(xi) Ommanney Bay, west Prince of Wales Island: 50 - nearest possible landing to the north magnetic pole; mean inclination 89° 46' in a north-easterly direction, greatest observed inclination 89° 57'. On this flight, August 19 and 21, new ice was observed on many of the small lakes in northern Prince of Wales Island.

(xii) Pelly Bay, Gulf of Boothia: 7 - no other readings in this region.

It had been hoped to obtain readings also at two points in Melville Island, where information is scarce, but this island was completely ice-bound in the middle of August and showed no signs of clearing. Even Liddon Gulf, which had been used on last year's expedition, was unbroken.

Altogether the expedition brought back information from 19 stations, having set out with a programme of 17. A period of unusually clear weather in August sped the work both of flying and of astronomic observing; but ice conditions were poor, and there would have been delays on this account if the pilot had not been agreeable to visiting several stations not on the programme but suggested by the magnetic observers as useful additions to the survey. With this flexibility of operations none of the good weather was wasted.

More northerly observations are always hoped for, because the pattern of the geomagnetic field is distorted north of the pole, and present information is limited. The realization of these hopes rests with the fickleness of ice and weather; but on last year's magnetic expedition the R.C.A.F. made their farthest north water-landing, in latitude 75° 54, and this year their record was pushed to 76° 36, at Barrow Harbour.

R.D. Hutchison

Further notes on Poliomyelitis in Keewatin District

Poliomyelitis outbreaks are not unknown in arctic regions, but since 1914 only four appear to have been reported, three from Greenland and one from Canada. In 1948-49 in Keewatin District there was a serious epidemic of poliomyelitis, which should more correctly be considered as two separate outbreaks, though the second was a result of the first. A preliminary note on this outbreak was published in the Circular for March 1949 (pp. 33-34), but at that time reports were incomplete.

Two important papers and an editorial comment have now been published on the Keewatin outbreak in the Canadian Journal of Public Health for October 1949 (Vol. 40 (1949) pp. 405-417; 418-419; and 440-442); and the following note is based on their information. The editorial points out that this outbreak, which occurred in an isolated part of the subarctic with a native population of about 800, afforded a unique opportunity for tracing possible sources of infection.

Dr. A.F.W. Peart, Chief of the Division of Epidemiology in Ottawa, who flew to Chesterfield Inlet in March 1949 to study the disease, discusses the epidemiological features of the outbreaks. "The first outbreak dates back to July 1948 in the Eskimo Point and Padlei districts, 150 miles north of Churchill, but cases from this source did not gather momentum until October, November and December 1948". In July 1948 an Eskimo and an Indian Chippewyan girl who lived north of Churchill, but in separate localities, developed paralytic poliomyelitis. The next recorded outbreak was not until October 2 when 2 cases of paralytic poliomyelitis developed at Nunnilla and 3 at Eskimo Point. It appears that an Eskimo, who lived at Pistol Bay, north of Tavani, had visited these places on his way home from Churchill and presumably acted as the carrier. The next 7 cases, with 2 deaths, occurred in the Padlei area; all these cases were in camps visited only by a special native constable and an R.C.M.P. constable. The native constable had had the disease three weeks before travelling, and was partially paralyzed. Subsequently five new cases have been reported in this district, making 12 paralytic cases.

The second and more extensive outbreak of the epidemic developed at Chesterfield Inlet. The first paralytic case occurred on February 14 five days after the visit of a Catholic missionary from Eskimo Point who had arrived by air on January 28. The priest had no clinical symptoms, but he visited the cases at Eskimo Point before leaving and general evidence strongly suggests that he must have been the carrier. At Chesterfield Inlet he visited patients in the hospital and the inmates of the Industrial Home, in which institutions over 20 per cent of the cases occurred. Moreover some of the patients

had been in the hospital for a considerable time, and could not therefore have been infected elsewhere.

Most of the information on this outbreak was obtained by Dr. J.P. Moody, Medical Health Officer at Chesterfield Inlet, who carried out a very careful investigation. He returned from leave outside on February 11, and learning of the first outbreak of sickness left for Eskimo Point and Padlei on February 13. At Tavani he was recalled by a wireless message telling of the outbreak at Chesterfield, and arrived on February 21. He immediately asked for the whole area to be placed under quarantine and for assistance from the Indian Health Services of the Department of National Health and Welfare. Two trips were made to Chesterfield Inlet by air, the first on March 2, which included a medical team of five doctors, and the second on April 23, which included four doctors, a physiotherapist and a nurse.

At Chesterfield between February 14 and March 7 there were 54 paralytic cases including 14 deaths. All the deaths appeared to be caused by respiratory paralysis. Of the 275 Eskimo in the district 18.5% were paralyzed and approximately 5% died. It seemed likely that at least 50% of the population had mild symptoms which could be attributed to the poliomyelitis virus.

Pathological specimens from Eskimo who had been ill were obtained by scientists on the two visits to Chesterfield on March 2 and April 23, and were shipped by air in the frozen state to Toronto. The results of laboratory investigations in Toronto are described by Dr. A.J. Rhodes, Eina M. Clark, Dr. Alice Goodfellow and Dr. W.L. Donohue. Experiments at the Connaught Medical Laboratory showed that the poliomyelitis virus, producing typical clinical and histological appearance in rhesus monkeys, existed in the brain and cord of 2 cases of suspected poliomyelitis at Chesterfield. The virus was also demonstrated in two stool preparations and one sample of throat washings. Histological examination of the monkey material at the Hospital for Sick Children in Toronto confirmed the earlier findings. It therefore seems to be proven that the epidemic was, as diagnosed, of acute anterior poliomyelitis.

The epidemic of poliomyelitis at Chesterfield Inlet occurred in extremely cold weather in a comparatively isolated community in the Arctic. It is therefore of exceptional medical interest. Not only could it throw new light on how the disease is transmitted but poliomyelitis is generally considered to be a warm weather disease. At Chesterfield in January, February, and March 1949 the highest temperature recorded was 18°F. and the average for the three months -27°F. Flies were therefore excluded as carriers. It seems to have been possible to trace suggested carriers of the disease: in one case a man who never appeared to have had any illness, and

in another a man three weeks after he had had the disease, a much longer period than patients are usually considered infectious. The latter case was presumably infectious by means of faeces, rather than through the respiratory tract, as the virus is known to persist in the faeces for several weeks, whereas it can be recovered from the pharynx for a few days only. The danger of transmitting the disease in this way under northern sanitation conditions should be stressed. All the evidence at Chesterfield would support the view that poliomyelitis is a disease of high communicability spread by contact between humans.

Lack of immunity to the disease appears to have played an important part. At Chesterfield when cases are compared with age groups it becomes apparent that all age groups were attacked approximately to the same extent, contrasting with less isolated communities where most of the cases occur between 5-20 years. In many of the families more than one member was stricken by paralytic poliomyelitis, which is also unusual.

A very high percentage of the population was affected compared with epidemics farther south in Canada. At Chesterfield 18.5% of the population and in the whole area 8.4% was attacked by paralytic poliomyelitis. By comparison in the Ontario epidemic of 1937 only 0.068% of the population was affected and in Manitoba in 1941 0.11%, though both these figures include non-paralytic cases as well. At Chesterfield the disease appeared to attack in two waves of increasing severity. At present the area is still in quarantine, but it is intended that this will be lifted with the freeze-up. So far as can be determined no new cases have arisen since March 1949.

Attempts to collect meteoritic matter in atmospheric dust at Baker Lake and Fort Smith. By D.K. Norris

Studies of meteoritic material in the atmospheric dust are of great value in attempts to determine such problems as the age of the solar system, the effects of cosmic radiation on meteorites, and the distribution of small particles in space.

If particles of extra-terrestrial origin are continuously settling on the earth, as appears to be the case, they should be expected to fall equally over the earth's surface. In fact telluric contamination results in the daily amounts of dust collected decreasing with distance from regions of habitation.

In 1947 a series of collections of atmospheric dust was started at the David Dunlap Observatory at Toronto, in an attempt to isolate genuine meteoritic particles. This study was confined to magnetic particles as there was no immediate

hope of being able to differentiate non-magnetic atmospheric particles from telluric particles. Nickel is always present in metallic meteoritic fragments, but recognition is difficult if there is any appreciable quantity of telluric matter. It was therefore decided that studies should be made in the far north during the winter months, where telluric contamination should be very low and where it would be possible both to expose silicone coated dust-plates, 24 x 18 inches in area, and to collect material from melted snow.

Through the kindness and keen interest of Professor E.C. Bullard, of the Department of Physics of the University of Toronto, and Mr. G.W. Rowley, the writer was able to visit Baker Lake, N.W.T. during February 1949. At the same time comparable collections were made at Fort Smith.

At Baker Lake 200 micrograms of dust were collected in 70 days. This would correspond to less than ½ a kilogram a year per sq. kilometre. The spherules and cindery material common farther south were found to be greatly reduced, while certain types of fresh metallic fragments seemed to be more or less constant in number both at Baker Lake and Fort Smith and in southern localities. With further collections the segregation of these metallic particles into groups and their subsequent analysis should be relatively simple and it ought then to be possible to discover whether they are of cosmic or of terrestrial origin.

North East Land expedition

A party from Oxford University spent seven weeks in North East Land this summer. Those taking part were J.M. Hartog, J.L. Olsen, C.J. Harley, W. Scott-Moncrieff, and H.R. Thompson.

The main object of the expedition was to collect data bearing on the formation of Brasvellbreen, discovered in 1938 from aerial photographs to be the largest glacier in the Spitsbergen archipelago.

A base camp was established at Torellneset (Cape Torell). Three main sledge journeys were made (man-hauling). The first was from Isispynten (Isis Point) on the east coast, via Etonbreen (Eton Glacier) at the head of Wahlenbergfjorden back to Torellneset (106 miles - 14 days). The second to Brasvellbreen (82 miles - 14 days) allowed three of the party to spend four days actually on top of that glacier. The third was in order to survey and study the Black Mountains of Glen (1935-36), north of Gaeverneset.

The very large amount of sea-ice necessitated complete cancellation of the marine programme.

No other details have yet been published.

J.M. Hartog

Between 1936, when A.R. Glen and N.A.C. Croft, members of a former Oxford University party, travelled along the south coast of North East Land and 1938, when Norges Svalbard og Ishavs-Undersøkelser carried out their aerial survey, there has been a dramatic advance of the ice-front of about 13 miles to the west of Cape Mohn. This is the area of the Bråsvellbreen. In a short note published in the Geographical Journal for October 1941 (Vol. 98 (1941) 206-7) Mr. A.R. Glen, leader of the 1935-6 expedition, writes, "The aerial photographs reveal the chaotic crevassing caused many miles inland by this movement. The cause is still unknown except that it certainly was not a developing glaciation, and can only have been either a tectonic disturbance, or some internal glacial cataclysm, perhaps of the kind described by Professor Mason in his "Study of threatening glaciers" (Geogr. J. 85 (1935) 24-41)". The findings of the 1949 North East Land Expedition should prove to be of great interest to glaciologists.

Protection of Seals

On 21 October 1949, the Federal Department of Fisheries announced that regulations had been made to preserve seals in northern Canada as a food supply for Eskimo.

Under these regulations no person except a resident is allowed to kill any seals in Canadian waters and territories north of 60°N., or in the waters of Ungava Bay, Hudson Bay and James Bay. For this purpose a resident is defined as a person residing continuously in these areas during a period of not less than twelve months. In addition scientists may kill seals necessary for their research work.

In future no person is allowed to sell or otherwise dispose of seal meat, except to other residents or travellers for human or dog food.

These regulations do not affect the commercial sealing operations off the east coast of Canada or on the Pribilof Islands, which lie outside the defined area.

Laying of the keel of the R.C.N. icebreaker

The keel of the new R.C.N. icebreaker was laid on Friday November 18 at the Marine Industries yards at Sorel, P.Q. Some details of this icebreaker were given in the Circular for January 1949 (Vol. II, No. 1 (1949) p.11). It is expected that the new ship will be completed in the summer of 1952.

Selection of a bishop for the Diocese of the Arctic

On October 22 the Ecclesiastical Province of Rupert's Land announced that selection of a bishop for the Diocese of the Arctic had been deferred until April 1950. The appointment

has been vacant since Bishop Archibald Fleming retired on 19 September 1949 after 16 years as Bishop of the Arctic.

Lecture on Arctic Nutrition

On 11 October 1949 Dr. Kåre Rodahl spoke on Arctic Nutrition to a joint meeting of the Science Association of the National Research Council and the Defence Research Board. Members of the Arctic Circle were invited to be present. Dr. Rodahl is a research member of the Institute of Physiology at Oslo University and has made a special study of nutritional and vitamin problems in the North. One of his interests has been an investigation of the toxicity of polar bear liver, which he has demonstrated to be caused by the very great concentration of Vitamin A in the liver.

Game Laws of the Northwest Territories

In the Arctic, conservation of game for the native population is essential and wanton destruction of animals may result in very real hardship to the inhabitants. People who go north for short periods frequently seem to be ignorant that strict game laws are in effect for the Northwest Territories. The following short summary of these laws has been prepared by the Dominion Wildlife Service. This summary also indicates a number of changes which have been introduced recently.

The Game Ordinance of the Northwest Territories

The Game Ordinance, Chapter 12 as amended by Chapter 27 of the Ordinances of the Northwest Territories, is an enactment by the Commissioner and Council of the Territories. It first came into effect 1 July 1949. Previous to that date game matters in the Territories were regulated by the Northwest Game Act, a statute of Canada, and the "Regulations Respecting Game in the Northwest Territories" issued under authority of the Act.

Most of the important features of the Act and Regulations were embodied in the Ordinance. The regulations were rewritten, consolidated, and grouped into parts. Some new provisions were included.

The important provisions of the Ordinance and the new provisions may be described as follows:- (New provisions are underlined throughout.)

PART II - General Prohibitions and Restrictions.

1. No one may hunt or take game or birds' eggs or nests without a licence.

2. Prohibited is the use of:

(a) rifles of less than .25 calibre in big game hunting;

(b) rim-fire shells or cartridges for big game hunting;

(c) firearms of any kind for hunting beaver;

(d) autoloading weapons for hunting game;

(e) shotguns for hunting muskrats;

(f) snares for hunting other than rabbits or hares.

3. Traps must not be set or left set in the close season, or for wolves between April 1 and October 31. When traps have been lawfully set by a trapper it is an offence for another person to remove them.

4. Game and furs must not be wasted by being neglected and left to spoil.

5. It is an offence to be in possession of game taken illegally or to make an agreement with a native to take game illegally.

6. Moose meat may not be sold or offered for sale.

7. Caribou meat may be sold by the holder of a general hunting licence. It may not be sold by traders or in cans.

8. The meat of game must not be served with meals for which a charge is made.

9. Moose and caribou meat must not be fed to domestic animals and game meat must not be used for bait if fit for human consumption.

10. Aircraft may be used by hunters only for transportation to their trapping headquarters. Permission must be secured to transport game meat or furs by aircraft. Hunting game from an aircraft is prohibited.

11. It is an offence to molest or interfere with a muskrat house or a beaver dam or beaver house.

12. Poison must not be used in hunting except by authorized scientists and game officers.

PART III - Game Preserves and Sanctuaries*

1. Six game preserves, comprising some 900,000 square miles, are reserved for exclusive hunting by Indians and Eskimo.

2. More than 15,000 square miles is included in two sanctuaries where hunting game of any kind is forbidden.

3. Hunting beaver is forbidden in the Mackenzie Delta Beaver Sanctuary, an area of approximately 14,000 square miles.

PART IV - Close Seasons

1. Hunting in the close season is prohibited. Exceptions are that Indians and Eskimo may

(a) hunt male caribou in March for food;

(b) hunt caribou in August and September to get skins for clothing;

and that any one may take game as needed to prevent starvation in the close season or otherwise.

2. The season is closed throughout the year on a number of animals and birds, including musk-ox and buffalo.

3. Hunting females or young under one year of age of moose, mountain sheep and mountain goats is prohibited.

4. The bag limit on moose is one male per year.

PARTS V AND VI - Licences and Certificates

1. Some fifteen licences and certificates are issued under the Ordinance. In general, applications are taken and licences issued by local game officers. Exceptions are trading post or outpost licences, scientific licences, and licences to export live animals which are issued at Ottawa. Certificates of registration, fur-farm licences, and licences to take fur-bearers, are issued by the office of the District Administrator, Fort Smith when they apply to Mackenzie District, otherwise by the Ottawa office.

2. Indians and Eskimo are required to take out General Hunting Licences in order to hunt. Formerly they were not so required. No fee is charged them.

* At the next meeting of the Arctic Circle a map giving the present boundaries of preserves and sanctuaries will be shown.

3. A general hunting licence is issued to a white person only in the case of

(a) a person who held a hunting and trapping licence 3rd May, 1938, and has continued to reside in the Territories; or

(b) a child of a resident who continues to reside in the Territories and is dependent on hunting for a livelihood.

The fee charged is $5.00; it was formerly $2.00.

4. Caribou licences may be issued to resident heads of families, representatives of missions, and government employees, but only for the purpose of obtaining meat for their own use.

5. Game bird licences are obtainable by all.

PART VII - Registration in Mackenzie District. This part is entirely new.

1. Certificates of registration may be issued to holders of general hunting licences and give them exclusive trapping rights in their trapping areas. A certificate covers a period of five years.

2. Trapping areas may be registered by groups or bands of natives if they so desire. The certificate is issued in the name of the chief or leader.

3. Hunters may hunt big game over registered areas, and registrants may go off their areas to hunt big game. The latter must not trap off their areas except by special permission.

4. Registration certificates are free to Indians and Eskimo. For others the fee is $10 per person.

5. The registrant must make proper use of his area or lose his certificate. Improvements made by him on the area may be sold or disposed of.

PART VIII - Beaver and Marten Licences

1. The season is closed throughout the year for beaver and marten hunting except in defined areas in Mackenzie District where hunting by general hunting licence holders is permitted under special free beaver and marten licences.

2. In registered areas the limit is one beaver for each colony established on the area over a minimum of three. For

unregistered hunters the limit is 10. The limit is 5 marten south of the 63°N. parallel, 10 marten north of it. In the basin of the Anderson River limits of 20 beaver and 25 marten are provided.

3. When a hunter obtains a beaver or marten licence he is given a number of seals to correspond with the number of beaver or marten allowed on the licence. He must attach one seal to each beaver or marten pelt. Possession of unsealed pelts is an offence.

PART IX - Trading and Trafficking in Game

1. Anyone wishing to trade and traffic in game in the Territories, except Government employees, who are forbidden to do so, must first obtain a licence to establish a trading post or outpost. In order to carry on the business he must obtain an annual trading and trafficking licence.

2. Residents may purchase skins for clothing and temporary residents and visitors are allowed to buy up to $200 worth of fur without a licence.

3. Fees for trading and trafficking licences are based on status of owner or manager. Indians, Eskimo, and religious organizations accepting furs as contribution to their maintenance are not charged a fee. For others, resident fee is $10, non-resident Canadian $150, and alien $300.

4. Each trader must give his customer a record of any sale or purchase, must keep proper accounts, and must display his prices on his merchandise. Provision is made for inspection of the books and records of traders by authorized officers.

PART X - Fur-farms and Live Game

1. No one may establish a fur-farm or take or export wild live fur-bearing animals without a licence.

2. A fur-farm licensee is required to keep proper records, make annual returns, and submit to inspection of his farm.

3. The number of fur-bearers which may be taken or exported is limited, and regulations are provided for trapp and shipping the animals.

PART XI - Powers of the Commissioner

For convenience and clarity the various powers of th Commissioner of the Northwest Territories under the Ordi

are grouped together in one part and include new provisions (subsections (g), (h), (i) and (j)).

PART XII - Administration and Enforcement

1. Game Officers are appointed under the Ordinance, or they are members of the R.C.M. Police.

2. Disputes between trappers may be settled by game officers. Appeal is allowed to Justices of the Peace.

3. Provision is made for search and seizure in case of suspected infractions and for disposal of seized articles after conviction is obtained. Game officers may suspend licences for suspected infractions. They may arrest offenders without a warrant.

4. A false statement in an application or report made under the Ordinance is an offence.

5. A licence is automatically cancelled if the holder is convicted of a violation.

6. Penalities of fine and imprisonment are provided. The maximum fine is $5000 for hunting or trading and trafficking without a licence, for illegal use or possession of poison, and for killing buffalo or musk-ox. The maximum for other offences is $500. Minimum fines are $50 and $5.00 respectively.

Subscriptions for 1950

Members are reminded that their subscriptions for 1950 ($2 for Ottawa members, or $3.00 for combined membership for husband and wife, and $1.00 for out-of-town members) are due on January 1, and are payable to the Secretary, Mr. T.H. Manning, 37 Linden Terrace, Ottawa. It will be greatly appreciated if members would pay promptly. Members in England should send 5/- to the Scott Polar Research Institute at Cambridge.

Changes of Address

Members are earnestly requested to advise the Secretary, Mr. T.H. Manning, 37 Linden Terrace, Ottawa, promptly of any change of address. The Circular is sent by 3rd. class mail and is therefore not forwarded by the post office. Apart from the inconvenience to members, who will not get their copies, an extra postage is charged to the Club when these copies are returned. It would be helpful if members sending in changes of address would include their telephone numbers, both office and home.

Correction to the October Number

On p. 77 of the October number of the Circular it was stated that Mr. S.H. Hitleman remained at Clyde River. In fact he came out from Clyde River with the other four members of the Department of Transport's post there, but was not aboard the Canso which crashed.

Meeting of the Arctic Circle

The Annual General Meeting of the Arctic Circle will be held on Thursday, January 12.

Editorial Note

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. All material for the Circular should be sent to:

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Sixteenth Meeting of the Arctic Circle

The Sixteenth Meeting of the Arctic Circle was held in the 1st. Corps Troops R.C.A.S.C. Mess, 278 Sparks Street, on Thursday, December 8. The President, Mr. A.E. Porsild, was in the Chair and introduced the lecturer, Dr. M.J. Dunbar of McGill University.

Dr. M.J. Dunbar spoke on "Marine Resources of the Eastern Arctic", and illustrated his talk with kodachrome slides. He described the oceanography of the Eastern Arctic in general and the marine resources in Ungava Bay in detail. A short account of Dr. Dunbar's work in Ungava Bay during the summer of 1949 follows:

Marine Investigations, Ungava Bay, 1949

The programme of oceanographical research in Ungava Bay, begun in 1947 and continued in 1948, was completed in 1949. This was the first year the Fisheries Research Board's new vessel the Calanus (Circular Vol.I (1948) pp. 6-7, 53-4; Vol.II (1949) pp. 8-9) was used in the work. Dr. M.J. Dunbar and four McGill University graduate students, E.H. Grainger, T.W. Creery, E.E. Reid, and W.E. Wilson, spent two months aboard the Calanus, making hydrographic sections and investigating fish and plankton. This vessel, which was sailed up in 1948 and wintered at Chimo, proved highly satisfactory.

The Calanus was launched and afloat by June 16, after some delay caused by shore ice. Supplies were loaded at the air-base and the expedition left the Koksoak River on June 27 and reached Port Burwell on June 29. This was exceptionally early for reaching Port Burwell, perhaps a record, and was possible owing to the speed with which the ice left Ungava Bay. Burwell was used as base for two weeks, after which the Calanus sailed across the mouth of the bay to Akpatok Island, thence to Payne Bay on the west coast of Ungava Bay, back to Akpatok and then south to Fort Chimo, arriving there on July 22.

The second cruise was again to Burwell, where the cod had arrived since the first visit, and to the Button Islands.

Proposed hydrographic work in Hudson Strait had to be abandoned for this year owing to stormy weather. Instead course was set for Cape Hope's Advance and then back to Chimo, arriving there on August 16. A final short cruise to Payne Bay and Leaf Bay, from August 19 to 26, ended the season's work. The vessel was once again beached at Fort Chimo having completed almost the full programme in spite of some bad weather.

Sixteen hydrographic stations were occupied for purposes of physical oceanography, some of them more than once during the season. Sections were made from Burwell to Akpatok, from Akpatok to Payne Bay, and from Akpatok to the mouth of the Koksoak River. Salinities, temperatures, and oxygen concentrations were measured. A bathythermograph was used at all hydrographic stations. The highest temperature recorded during the season was 5.80°C. at the surface on August 24, and the lowest was -1.50°C. at a depth of 140 metres. The greatest depth measured was approximately 360 metres.

Plankton studies were continued and sufficient material has now been obtained for a full taxonomic study of the summer plankton of Ungava Bay. The benthonic fauna was collected with the dredge and beam-trawl, but as no bottom sampler was used little of the burrowing or buried life was included. The significance of the littoral fauna in estimating the nature of the marine environment was studied. It appears that the presence or absence of Littorina saxatilis, Mytilus edulis, and Balanus balanoides is indicative of the productivity of the water although the nature of the relation is not yet known.

Trawling experiments, with otter- and beam-trawl, were not successful owing to the uneven and rocky bottom. Exploration with the echo sounder showed that this type of bottom, with crevices or small valleys filled with mud, appears to extend over most of the bay. Long-line fishing was also unsuccessful. The quickest way of catching cod proved to be by hand-line and jig. The behaviour of the Atlantic cod in the cold waters of Ungava Bay is significantly different from that in more southern waters, or in West Greenland, where long-line fishing is very successful.

This programme of research in Ungava Bay was planned to investigate the possibilities of additional food supplies from fishing, as there were cases of serious malnutrition among the local native population. It has now been shown that both the Atlantic cod and the Greenland shark may probably be profitably exploited by the Eskimo.

According to the Eskimo the cod (Gadus callarias) usually arrives off Port Burwell between June 29 and July 16 and leaves at the end of September. This year the Eskimo reported that

they arrived shortly after the Calanus left Burwell on July 16. They were found to be numerous when the ship returned on August 3. It would be unwise however to place too much reliance on Eskimo reports as they very rarely do any cod-fishing.

Codfish were found to be plentiful both at the mouth of Foxe Harbour and in Forbes Sound in the Burwell region. Jigging off McColl Island in the Button group, only fifteen miles to the north, produced nothing. The nature of the water and the littoral fauna are quite different from at Burwell and it may be that there is a sudden change in marine conditions between the two localities across Gray Strait. Fish described as "Atlantic cod" are reported to be common in Acadia Cove, in the Resolution Islands, some forty miles north of the Button Islands. If they are, in fact, Atlantic cod, it is just possible that they may be from West Greenland, whereas the Burwell cod come, in all probability, from the Labrador.

Owing to lack of success with trawl nets or long-lines it was difficult to obtain undamaged specimens of Atlantic cod for tagging. Eighty-eight cod taken by jigging were tagged in the Burwell region in 1949. The tags were numbered between EA 1 and EA 90 and attached to the left gill-cover. It is unlikely that any of these will be picked up but Labrador and Newfoundland fishermen have been asked to return any seen to the Fisheries Research Board.

Five shark (Somniosus microcephalus) were seen during the summer; of these two were shot by the Calanus party and one was caught on a long-line. According to Eskimo reports shark are abundant at Burwell and have also been seen in numbers in the region of Cape Hope's Advance and Diana Bay. There is no doubt that, as in Greenland, shark-fishing could become a valuable industry provided instruction is given to the Eskimo and that it is possible to find a market for the liver-oil and the skins. The whole skin with only the denticles removed dresses to a hard durable leather, which can be used for luggage, boots and shoes. With the hard epidermal layers removed, an excellent soft leather of the chamois type is obtained in large even sheets. The meat when dried and mixed with a little shark- or seal-liver oil makes adequate dog-feed. In 1949, a supply of shark tackle was left with the natives at Burwell and instructions were given on how to prepare dog-feed. It is hoped that the tackle will be used and that a start will thus be made towards familiarizing the Eskimo with shark-fishing.

The young of the Greenland halibut (Reinhardtkus hippoglossoides) were taken in some numbers from the stomachs of Atlantic cod at Burwell in 1947 and 1948. In 1949, they were also taken in the beam-trawl and in the dredge, though so far the adult halibut has eluded capture. An Eskimo at Burwell

said that he had seen adult halibut, two to three feet in length, on the northern side of Killinek Island. If sufficient quantities of halibut could be discovered a profitable native fishery might be developed.

Though no walrus were recorded by the Calanus, shortly before her arrival off Akpatok Island twenty-nine had been taken by the Eskimo. The walrus, which had been numerous, had left with the ice.

Seal-hunting off Chimo was not very productive in the 1949 season. This was partly because of alternative employment for the Eskimo but also because the ice left the bay early and the best of the hunting was over quickly. The Payne Bay people were said to have been more successful and the Burwell natives who visited the Button Islands, made a good catch. The Button Islands are almost always good seal territory and there is no doubt that some connection exists between the abundance of seals and the altered hydrographic and biological conditions there compared with Ungava Bay.

Beluga hunting in Ungava Bay up to the end of August was very poor. The Chimo and George River natives obtained scarcely any, though the Payne people killed fourteen in July and a few others during the rest of the summer.

It appears that the inadequate food resources of the region could be supplemented to a marked extent by fishing, and both cod and shark offer possibilities. The natives in Ungava Bay, owing to lack of knowledge and skill have not so far exploited these resources while their hunting of walrus, beluga and seal suffers from poor initiative and insufficient effort.

Operation Lyon. By Graham Rowley

"Lyon" was an R.C.A.F. operation of providing transport in the Foxe Basin area for certain scientific projects sponsored by the Defence Research Board. The name was chosen in honour of Capt. G.F. Lyon who was Capt. W.E. Parry's second in command in the original exploration in H.M.S. Fury and Hecla of much of the area. His account of his experiences during the expedition is, incidentally, my favourite arctic book.[1] The primary object was to enable the Queen's University arctic expedition, which had carried out medical research in Southampton Island in 1947, 48 and 49 (Circular Vol.I (1948) pp. 17-18; 37; 81-2), to extend their activities to another part of the north to see if the results they had obtained were representative of the Eastern Arctic or due to special conditions on Southampton. Igloolik was chosen as the most suitable locality for their work owing to its large Eskimo population which is comparatively unaffected

by white influence. At the same time the opportunity was taken to carry out other scientific work in the area.

The party left Winnipeg on August 12 in an R.C.A.F. Canso aircraft piloted by F/O Earle D. Harper with F/O R. Roane as co-pilot, F/O W. Kereliuk as navigator, F/O J. Hynds as radio officer, and Corporal K. Johnston and LAC W. Mutt as engineers. The passengers were Dr. O.M. Solandt, Chairman of the Defence Research Board, Major-General Elliot Rodger, Quartermaster-General, Drs. Malcolm Brown and Morley Whillans of the Queen's University expedition, Dr. Brian Roberts of the Scott Polar Research Institute, Dr. J.T. Wilson of Toronto University, and myself. At Churchill we picked up our equipment and on August 13 flew on to Coral Harbour, Southampton Island. Here we met the remainder of the Queen's University party, two of whom, Dr. T. Boag and J. Green, were to accompany us to Igloolik. With the heavy X-ray equipment and other medica supplies we had become too large a load for one trip, so the next day some of us flew first to Frobisher Bay and then across Foxe Basin to Igloolik. En route we had hoped to drop mail and some urgently needed supplies to T.H. Manning's party in the Nauja. We had heard by radio that they were near Cape Dominion, but we could not make direct wireless contact and though we flew to their last reported position we could not see them. The weather then deteriorated and we had to give up the search.

We were most hospitably received at Igloolik by Fathers Cochard and Trebaol at the R.C. Mission and Reub Ploughman and Harold Tucker at the Hudson's Bay Company Post. The next two days were spent in setting up camp and collecting geological specimens while the Canso returned to Southampton Island and brought the rest of the party.

The Department of Health and Welfare had asked us to examine an Eskimo boy who was sick at Admiralty Inlet. Accordingly some of us set out on August 17 and went first to Resolute Bay to refuel and then to Arctic Bay where loose ice nearly prevented our landing. Flying over Brodeur Peninsula we had a magnificent view of the small residual, and probably rapidly disappearing, ice caps, with remarkable deep canyons running from their edges. Earlier in the day we had noticed similar canyons on Somerset Island which is now free of ice. We had to wait at Arctic Bay while I arranged for a boat to go to Strathcona Sound to pick up the patient. He arrived the next morning and was examined by Dr. Brown who decided that there was no point in evacuating him. We then returned to Igloolik passing over the mission in Moffet Inlet which had been the scene of the well-known and difficult operations to assist Canon Turner (Circular Vol.I (1948) pp. 14-17). The Canso had to return to Ottawa for a 250-hour check which was now due, so on the same day it set off with Drs. Solandt, Brown and Wilson, and General Rodger.

It had been expected that the aircraft would return in a few days, but it was delayed both in Ottawa and later by bad weather. Meanwhile the medical party was kept busy with thorough clinical observations of many of the Eskimo and inoculations of them all. The Eskimo had been told of the expedition and about 170 had arrived providing ample material for the medical party. It is hoped that a note on the medical work will be published in a future number of the Circular. Dr. Roberts and I decided to excavate at Arnacotsiaq on the southwest corner of the island, where I had carried out a trial dig in 1939. We pitched a tent there and spent several days at what turned out to be an exceptionally interesting site with both Thule and Dorset material and some evidence of stratification. The weather, which had been unusually fine for the first stage of the expedition, turned as unusually bad and for five consecutive days we had snow.

It was not until August 31 that the Canso returned bringing A.J.G. Langley, I. Bowen and F/L Greenaway of the Defence Research Board, and Majors Berry and Gillis. We had hoped to spend a few more days in the area and to get in touch with the Nauja, but the poor weather conditions and the approach of another low pressure system forced us to take off immediately for Coral Harbour. The next day we said good-bye to the Canso and its crew, to whose skill and consideration we owed so much. They flew to Edmonton, stopping en route at Churchill to leave an Igloolik Eskimo, Ooyarak, who was being evacuated for an operation while we and the rest of the Queen's University party at Southampton returned to Ottawa via Chimo in a Dakota.

1 Lyon, G.F. 'Private Journal'. London: John Murray, 1824.

Baker Lake Hydrographic Survey, 1949

In August and September, 1949, a Hydrographic Survey party carried out charting operations in the channel leading from Chesterfield Inlet to Baker Lake. The party, which was headed by Mr. R.E. Hanson, travelled north on the Regina Polaris and arrived at the east end of Baker Lake on August 4. Supplies and equipment were landed at once and tents pitched.

Charting operations in the channel to the south of Christopher Island were begun the next day using the new Hydrographic motor launch Grebe, which is equipped with an echo sounder and was specially designed and built for the Survey in Nova Scotia. She was shipped by rail to Churchill and from there was taken north as deck cargo on the Regina Polaris.

As a result of this party's work a new route through the difficult mile and a-half channel connecting the Chesterfield Inlet and the east end of Baker Lake was charted and marked with beacons. The new passage will be shown on charts which should be distributed in time for use in the 1950 navigation season. This passage will enable the shallow draft vessels supplying the Baker Lake settlement at the west end of the lake to negotiate the channel with greater speed and safety. It is unlikely that any change will be made in the piloting arrangements. At present Eskimo pilots are employed to guide ships through the 100-mile Inlet joining Hudson Bay and Baker Lake.

In addition to this passage the Survey party took soundings over a 15-mile area of the lake and located what may prove to be a more direct route to Baker Lake and through deeper water than the channel to the south of Christopher Island. It is planned that further work in this area will be carried out next summer.

Charting operations were stopped on September 13 as work on the new passage was complete and depletion of supplies and the imminent approach of winter made further work inadvisable. To assist in taking the equipment and boats to Baker Lake settlement, a distance of 50 miles, a native boat, and two men were hired from the settlement. As soon as everything was safely stored the party, which included hydrographers A.L. Mack, S.J. Murphy, and Gordon Merril, Gasoline Engineer Frank Morrison and a cook and two seamen from Churchill, left for Churchill by R.C.A.F. aircraft.

The concluding notes and much of the above information were kindly sent to us by Mr. R.E. Hanson:

The following remarks are based on one season's operations supplemented by inquiries from residents in the area. They must not all be considered reliable until further investigation is made.

The land bordering Baker Lake consists of bare rolling hills, rising to three or four hundred feet. The shores are generally low or gently sloping and landings from boats can be made almost anywhere. The region is poorly mapped, many islands being missed altogether and a few non-existent islands shown.

In the narrows at the extreme east end of the lake the tide was observed to rise over four feet and outward currents of seven knots were measured. A few miles to the west no tide or current could be detected and the water at both places was fresh.

The high water mark on shore at Christopher Island indicated that the water rose during break-up to a height of seven feet above the low water mark in September. This was probably caused by an ice jam in the narrows.

The average opening of navigation between Baker Lake and Chesterfield is between July 17 and July 20 but in 1949 it was about one week later. Navigation usually ceases after the first week in October since the lake may be expected to freeze at any time after this date. The ice in Baker Lake is reported to freeze to a depth of seven or eight feet.

The weather is usually cool in this area and freezing weather with snow may be expected at the end of August. Small patches of snow on steep northern slopes remain all summer. Strong winds are common, but a well-pitched tent will withstand any wind usually encountered during the summer months. Rainfall is light as is the case over most of Northern Canada.

Fish are plentiful, those most commonly taken being lake trout and whitefish. Several flocks of duck, geese and ptarmigan and a few caribou were sighted and a few seals were observed in the fresh water at the east end of the lake. Parry Ground Squirrels were common around the camp site and frequently invaded the cook and store tents. Gulls were rare but a few visited the camp during the season.

Royal Canadian Naval Cruise 1949

In September, 1948, three ships of the Royal Canadian Navy sailed for northern waters on the first of a series of annual training cruises (see Circular Vol.I (1948) p. 75-6). This year the frigate H.M.C.S. Swansea, commanded by Lieut. J.P.T. Dawson, left Halifax on August 24 for the east coast of Baffin Island to continue the work of familiarizing officers and men with operating conditions in the north. In addition hydrographic observations were carried out and Mr. A.A. Onhauser of the Dominion Observatory accompanied the Swansea to make magnetic measurements. (See p. 105).

The first port of call, Frobisher Bay, was reached on August 30. On September 1 the frigate continued to Padloping Island, arriving on September 4, and after remaining overnight sailed for River Clyde where she put in late at night on September 6. River Clyde is the most northerly place ever to have been visited by a vessel of the Royal Canadian Navy. On the return trip the frigate called at Godthaab on the west coast of Greenland on September 12 and then made for Hebron, in north Labrador, arriving on September 14. At Hebron the frigate had a rendezvous with the naval auxiliary tanker

Dundalk for refuelling and the ship's arctic pilot, Commander G.H. Stephens, was transferred to the Dundalk as it was felt that his services would not be necessary on the straight return trip to Halifax. Commander Stephens, who in the years before the war had been first mate of the Nascopie and later skipper of the M/V Therese, had been in the Nootka in 1948. The following day, September 15, the Swansea left Hebron and sailed south down the Labrador coast. Preparations were going forward for the ship's concert as the end of the cruise was near and the ship was pushing ahead slowly in ice and fog when orders were received to proceed as quickly as possible to assist the R.C.A.F. supply vessel Malahat, which was drifting disabled off Mansel Island at the entrance to Hudson Bay. This rescue operation is described in the next note.

A long tow in northern waters

During the morning of 15 September 1949, the R.C.A.F. M/V Malahat, a 200-ton vessel of the West Coast Seine Fishing type, developed serious engine trouble 10 miles northeast of Mansel Island in Hudson Bay. The ship was en route to Halifax from Coral Harbour, Southampton Island, where she had delivered a cargo of fuel oil and was loaded on deck and below with empty steel drums.

The weather at the time of the breakdown was very heavy with an easterly gale and high seas running. The Malahat had been labouring heavily since the gale commenced on the previous day and when the engine was stopped she rolled more violently than ever, making it almost impossible for the crew to attempt repairs.

A sea anchor consisting of drums, chain and canvas was constructed and streamed out astern and a tarpaulin was rigged as a staysail from the forerigging in order to ease the vessel as much as possible. Inspection of the engine revealed that repair was beyond the capacity of the crew at sea, so R.C.A.F. Maritime Group Headquarters was notified and the assistance of the Royal Canadian Navy was requested. As a result H.M.C.S. Swansea, a frigate which was operating off the north coast of Labrador, 565 miles away, was dispatched to take the Malahat in tow.

The Swansea reached the Malahat during the early morning of September 18 after an arduous trip through heavy ice floes in fog and bad weather. Meanwhile the Malahat had drifted to within 2½ miles of Mansel Island and dropped her anchor. Fortunately the wind and sea had decreased on September 17 and were quite moderate when the Swansea arrived.

W.O. 1st. Class V. Nicholson, in command of the Malahat, who has considerable experience of Hudson Bay waters was greatly

relieved when the Swansea hove in sight. He and Lieut. Dawson, commander of the frigate, had discussed by wireless the method of towing, prior to the rendezvous, and all was in readiness after food and fresh water had been passed to the Malahat.

The Swansea got underway for Goose Bay with the Malahat in tow and the voyage proceeded without incident. Goose Bay was reached in 5 days and 5 hours, thus completing one of the longest tows in Canadian Naval history: a total of 1200 miles.

H.M.C.S. Swansea's commitments did not permit her to continue the tow to Halifax, so the Royal Canadian Mounted Police were contacted and made available their Cutter MacBrien with Inspector Cassivi in command, to complete the tow. The two ships left Goose Bay on October 6 and encountered heavy easterly swell when the open sea was reached. The first night, the towing hawser carried away and it took an arduous three hours to make it fast again. A stop was made at Chateau Bay, Labrador, where an all-wire hawser was rigged. The voyage from Chateau Bay was accomplished at a greatly reduced speed owing to bad weather and seas which at times were 20 feet high. It was necessary to put in to Sydney for 24 hours but from there the weather improved and the ships arrived in Halifax at noon on October 14.

This tow was a long trying experience but it demonstrated fully the efficiency and cooperation of all services concerned. Special mention should be made of the assistance rendered by the Department of Transport wireless operators on Nottingham Island in relaying messages between the ships.

S.C. Burridge

Magnetic observations on the Royal Canadian Naval Cruise 1949

A.A. Onhauser of the Division of Terrestrial Magnetism, Dominion Observatory, Department of Mines and Resources, accompanied H.M.C.S. Swansea on her northern cruise during August and September 1949. Mr. Onhauser was responsible for gathering magnetic data at coastal points in Labrador and Baffin Island.

Stations were re-occupied at Frobisher Bay, River Clyde, and Hebron, and a new station was established at Padloping. The dip, total force, and declination secured will be used in the revision of navigation charts and in determining secular change.

The cruise gave Mr. Onhauser the opportunity of making observations at sea. Comparisons were made between the gyro compass and magnetic compass readings, through eastern coastal

waters from the Strait of Belle Isle to River Clyde. An unscheduled trip to Mansel Island to rescue the disabled Malahat permitted observations to be made through Hudson Strait. Upon analysis, this information may serve to reveal discrepancies in present magnetic charts, the existence of offshore anomalies, and the rate of annual change.

The Royal Canadian Navy cruises of 1948 and 1949 enabled the Dominion Observatory to obtain invaluable magnetic data at points which otherwise would be accessible only with difficulty.

R. Glenn Madill

The French Research Expedition to Greenland, 1949

In the Circular for March 1949 (pp. 36-37) we gave a short account of the 1948 French Expedition to Greenland. This preliminary expedition was planned to save the time of the main expedition which would leave the following year. A suitable landing place was found in de Quervains Havn (69°48N., 50°15W.), near the snout of the Eqe glacier (Eqip Sermia), and a large amount of the heavy stores for the main expedition, including weasels, upon which the expedition depends for transport, were taken up on to the Ice Cap.

In a letter dated September 30, Monsieur P.E. Victor, leader of the expedition, has given us some details of the main 1949 expedition. The idea of the expedition was to study the Greenland Ice Cap and to establish and man a research station on the Ice Cap throughout the winter. It was intended that this station should be set up as near as possible to the site of Wegener's 1931 Eismitte. The 33 members of the expedition, most of whom had been with the 1948 party, left Rouen on April 13 aboard the Fjellberg. Putting in to Reykjavik, 70 tons of stores were unloaded to be parachuted in later when the Ice Cap station had been established. On approaching Greenland they found unexpectedly heavy pack and were delayed for nearly three weeks. The remainder of the stores brought in in the Fjellberg were finally unloaded at the 1948 base and the trail and cable-way, put up in 1948, were found to be in good order.

An unexpectedly early thaw caused much trouble: "The weasels, the sledges, and even the men and dogs were sinking deep in the melting ground. Worse still, it threatened to drown our equipment....However, we won the race, hauling the equipment further inland and higher daily....We reached the location of our future research station on July 17th. The rest of the equipment, that was waiting in Iceland, was parachuted to us in August. 10 missions were necessary, but the loss among the food, fuel, and equipment was less than 2%."

The summer party, who were to return to France, set out for the coast on August 24, leaving behind a completed station and eight men who would remain until the summer of 1950. Their main work will consist of weather observations, including radiosonde ascents every second day when possible, and a programme of physical research. Weather observations are sent out four times a day by radio to the International Weather Network.

By the beginning of January a minimum temperature as low as -85°F. had been recorded and at times there were winds of 80 m.p.h. The temperature of the elaborate installations dug into the snow where equipment was stored varied between -25 and -30°F., and the temperature of the laboratory trailers and living quarters could be maintained between 50° and 65°F. A 25-foot deep pit has been dug for ice specimens used in glaciological studies. It is planned that the winter party will be isolated for nine months until the return of the summer party in the summer of 1950.

Operation Noramex

During the latter part of October, 1949, ships of the United States Naval Task Force carried out exercises in the Northern Atlantic and off the coast of Labrador. The Task Force, led by Rear Admiral Lyman A. Thackrey U.S.N., consisted of more than 40 vessels and 11,000 marine and naval personnel. Brigadier General W.J. Whaling U.S.M.C., commanded a landing force, which comprised an infantry battalion of the 9th U.S. Marines reinforced by units of the 10th and 11th U.S. Marines.

The exercises included an amphibious landing exercise, known as Noramex, on the Labrador coast. This was carried out in cooperation with the Canadian Government, and the Canadian destroyer H.M.C.S. Haida, which last year took part in the Canadian northern cruise into Hudson Bay, was a unit of the support force.

On October 21 more than 2,000 marine and naval personnel made an assault landing at Cape Porcupine (53°56N., 57°09W.) in southern Labrador. Specially clad underwater demolition team personnel swam ashore to reconnoitre the beach prior to landing. Before dawn on D-Day other underwater demolition team men came ashore in rubber boats from the troop-carrying submarine U.S.S. Sea Lion to report on beach and surf conditions.

Within six days the attacking troops had captured their objective, an "enemy-held" weather reporting station and partially completed airstrip. Numerous problems of health, subsistence and operational procedures were dealt with on the exercise, which was carried out without any serious case of illness or injury.

"News of the North"

The Editor has been receiving copies of the News of the North as an exchange with the Arctic Circular and would be pleased to lend them to any member of the Arctic Circle. The News of the North is a weekly Yellowknife paper edited by Mr. E.R. Horton and can be obtained at a cost of $4.00 a year. It contains general news about the Western Arctic as well as Yellowknife news and has much in it to interest members of the Circle.

National Museum Lecture

On Wednesday February 15 at 8.15 p.m. Dr. Y.O. Fortier will speak on "The Modern Arctic" in the National Museum. This lecture is open to the public and members of the Arctic Circle would be welcome.

Meeting of the Arctic Circle

The next meeting of the Arctic Circle will be held on Thursday, February 9 in the R.C.A.S.C. Mess, 278 Sparks Street at 8.00 p.m. Mr. A.E. Porsild will speak on "Plant life in the Arctic" and will illustrate his talk with kodachrome slides.

Index

A short Index to Volume II has been prepared by Mr. Trevor Harwood and will be sent to members as soon as possible.

Editorial Note

The Editor wishes to thank Miss Moira Dunbar for her assistance with the Circular, Mr. A.E. Porsild and Mr. T.H. Manning for advice, and Mr. Trevor Harwood for preparing the Index to Volume II.

The Editor would welcome contributions from those who are at present in the Arctic or have information about work in the Arctic. Material for the Circular should be sent to:

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411 Echo Drive,
Ottawa.

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