A R C T I C C I R C U L A R

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THE ARCTIC CIRCULAR

VOL. XV No. 1 Published by The Arctic Circle 1962
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(January 1963)

One hundred and sixteenth meeting. The one hundred and sixteenth meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on October 10.

Mr. F.R. Crawley discussed filming in the north and showed the new film "Top of a Continent", which was produced by his company for the Shell Oil Company.

One hundred and seventeenth meeting. The one hundred and seventeenth meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on November 13.

Mr. C.R. Harington spoke on "The life of polar bears".

The Annual Dinner was held at H.Q. "G" Division, R.C.M. Police, on Tuesday December 11. Some 180 members and guests attended this buffet meal, which made a feature of northern foods. In introducing the speaker, the President, Mr. Graham Rowley, thanked the Officer Commanding "G" Division, Superintendent J.T. Parsons, for the use of the Mess and the members of the Dinner Committee, Mr. A. Stevenson, Col. J.P. Richards, and Dr. R.G. Blackadar, for making the arrangements. He also expressed the club's gratitude to the Department of Northern Affairs and National Resources for much of the northern food and to Mr. Erich Hofmann, who prepared it. Mr. Rowley then called on Mr. Eric Morse, who spoke on "Paddle and portage across the Barrens", describing his journey down the Thelon River during the summer of 1962. Mr. Morse was thanked by the Minister of Northern Affairs and National Resources, the Hon. Walter Dinsdale. For those interested in the northern foods provided the menu is included at the end of this issue.

Discovery of Vinland. By Helge Ingstad

Recently, my third expedition searching for Norse remains returned from L'Anse aux Meadows, on the northern tip of Newfoundland. Here we have discovered and excavated a number of very old house-sites. The excavations and what we know from the old Icelandic Sagas show that it is overwhelmingly likely that these sites date from the Vikings, who discovered North America about the year A.D. 1000. They sailed from their settlements in western Greenland, crossed over to Baffin Island, which they probably called Helluland, followed the coast of Labrador, which presumably was their Markland, to the south and reached the northern tip of Newfoundland, which I believe was their Vinland.

During the last hundred years a number of scientists have tried to locate the Vinland of the Sagas. But up to now no certain Viking remains have been found on the North American continent. There is a large literature on the subject and the many theories locate the landfall of the Vikings at many different places along the tremendous coastline from the Gulf of Mexico to Hudson Bay.

Most scientists believed that the Vinland of the Sagas must lie well to the south. I interpreted the Sagas differently. For many reasons, and partly in accordance with the distinguished Finnish scientist, Professor Tanner, and the Canadian historian, W.A. Munn, it was my opinion that the Vikings had landed to the north - in northern Newfoundland.

In the first place I agreed with the late Swedish linguist, Professor Sven Soderberg, who interpreted the prefix "vin" in Vinland as indicating a grazing area for animals and not as the wine made from grapes. In order to find places where wild grapes can grow it was necessary to go fairly far to the south, while pastures could be found in many places. Another reason was based on a certain interpretation of sailing distances in the Sagas. It is stated that it took two days to sail from Markland to Vinland, but most scientists believed that there must be some mistake here as the time mentioned was too short to reach any country where wild grapes grew. I believed that this information of distance must be right - the Norsemen were sea-faring people and distance was the one thing they would have kept unchanged in their tradition. Furthermore, Norsemen could not sail from their

settlements in Greenland for North America before probably the late part of July or early August on account of the ice and the Labrador Current, supposing conditions were not very different from today. Because of this late start, and the fact that they had to stop early in order to build their houses and fish and hunt before the winter in the new country, their sailing distance was limited. It is also important that these Nordic people would be likely to settle in a region fitted to the whole pattern of their culture. And, finally, there was a sixteenth century Icelandic map, Sigurd Stefansson's map, which most historians did not believe, but which I thought to be of great value; according to this map Vinland seems to be located right on the very tip of Newfoundland, where we discovered it.

My plan was to make a systematic examination by aircraft and boat of certain sections of the North American coast. I started in 1960 in Rhode Island, and examined the shores of Massachusetts, Nova Scotia, Newfoundland, and Labrador. I continued the work in 1961 with a boat of my own and an expedition of six members. The leader of the archaeological work was my wife, Anne Stine. We sailed from Montreal, examined the coasts of Quebec, Newfoundland, and Labrador, and covered about 4,000 miles. That year we started our excavations at L'Anse aux Meadows. These proved so promising that it was obvious we had to return with a larger party of scientists.

A few words about the discovery. After examining the northern coast of Newfoundland we were particularly attracted to L'Anse aux Meadows because here we found level country covered with more grass than we had seen during our many examinations in Labrador and Newfoundland. The ruins were located on a terrace about 300 feet from the sea. It was not surprising that no one had found them before. In only a few places could we trace the faint outline of houses; elsewhere hardly anything could be seen above the ground except perhaps a few uneven lines when the sun was very low. I may add that the old houses were located directly on the terrace, which is of sand. Unfortunately, preservation conditions were extremely bad. The iron we found was very much corroded and all the bones that had not been burnt had disintegrated. Close by the site there was a river, which made it a fine dwelling place for people who very often pulled their large boats ashore - as they probably had to do here as the water was very shallow. It would not have been a practicable place for European fishermen, and in

Sigurd Stefansson's Map.

(Reproduced from 'Landet under Leidarstjernen' by Helge Ingstad).

fact the fishermen have selected another bay to the east where they can bring their boats right in in deep water.

Difficult ice conditions delayed work in 1962 but by the middle of June we were back in L'Anse aux Meadows. Besides my wife as the archaeological leader, the party included a Norwegian pollen analyst, Kari Egede-Larsen, a photographer, Hans Hvide Bang, three scientists from Iceland, Dr. Kristian Eldjarn, Gisle Gestsson, Professor Thorhallur Vilmundarsson, and one from Sweden, Dr. Rolf Petré. A representative from the Memorial University, St. John's, Dr. Ian Whitaker, joined the expedition for a short period, also Dr. William Taylor from the National Museum, Ottawa.

The results were very satisfactory. We excavated eight house-sites with remains of sod walls and a smithy. Without going into details I may mention that one of the house-sites is about 60 feet long and 45 feet wide; it has one large hall connecting with four rooms. The hall is some 48 feet long, which is about the same size as the hall in Greenland where the discoverer of America, Leif Eriksen, had his home. In the middle of the hall there is a long fire and ember pit of the same kind as in Greenland.

Of particular interest is the smithy with an anvil of stone. In the smithy we found many hundred pieces of iron and slag. Close by there was a large hole in the ground where charcoal had been made. It seems clear that the people living there had made iron from bog iron - a rather complicated process well known to the Vikings, but unknown to Indians and Eskimos. In one of the house-sites we found a piece of bronze.

It is very interesting that in the same region we also found remains left by natives, probably Eskimos, overlying the remains we excavated. From the old Sagas we know that the Vikings met the natives and called them "Skraelings".

We have made a number of tests, but it will be some time before the different scientists have worked up all their material. According to the rules of every expedition the final statement will have to be postponed until all this work is finished. The facts we already have are, however, so strong that I consider it overwhelmingly likely that the houses at L'Anse aux Meadows were built and lived in by the Vikings.

It is of particular importance that we already have seven carbon dates from house-sites excavated in 1961. They all group around the year A.D. 1000. It was about the year 1000, that Leif Eriksen and other Norsemen, according to Icelandic Sagas, sailed from Greenland to America and built houses there.

During the years I have got valuable assistance from Canadians and this has been of great importance for the success of the expedition. I wish to mention members of the Government of Newfoundland and particularly Premier Smallwood, the Memorial University, St. John's, and its president, Dr. Gushue.

At the federal level the Department of Northern Affairs and National Resources has earned my gratitude, both through assistance from the National Museum of Canada and the detailed mapping of the site by the National Parks Branch. So too, have the Royal Canadian Navy and the Royal Canadian Air Force for their assistance in transportation and air photographs. I am also indebted to the Grenfell Mission, the Canadian Embassy in Oslo, and the Arctic Institute of North America for their assistance and advice.

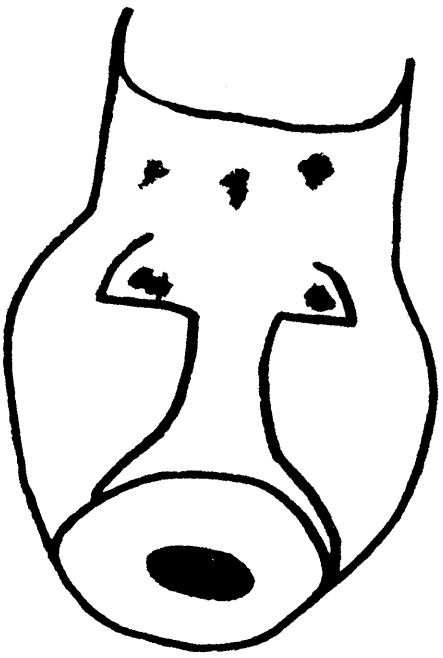
I am very happy that the Government of Newfoundland has made an historic site of the discovery and has erected wooden buildings to protect the site for the future.

Discovery of petroglyphs near Wakeham Bay. By Bernard Saladin d'Anglure

During the summer of 1961 I spent five months at Wakeham Bay carrying out a social anthropological study of the local Eskimos under contract with the Northern Co-ordination and Research Centre of the Department of Northern Affairs and National Resources. This was my third visit to the shores of Hudson Strait. In 1955-6 I had spent the winter at Koartak, and in 1960 I had spent the summer at Koartak, Sugluk, and Wakeham Bay.

In 1961 I arrived at Wakeham Bay on June 5. I can manage some conversation in Eskimo, but the Rev. H. Mascaret, O.M.I., the Roman Catholic missionary at Wakeham Bay, kindly assisted me by interpreting in my first questioning of the Eskimos about the history of the area. While discussing the old camp sites and archaeological sites I was most interested to hear several Eskimos mention

PETROGLYPHS FROM QAJARTALIK



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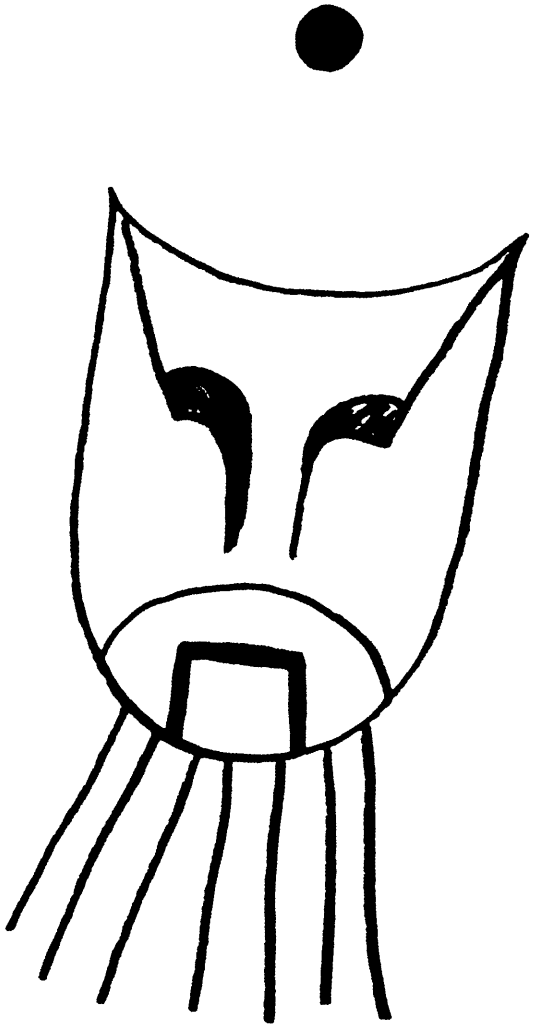

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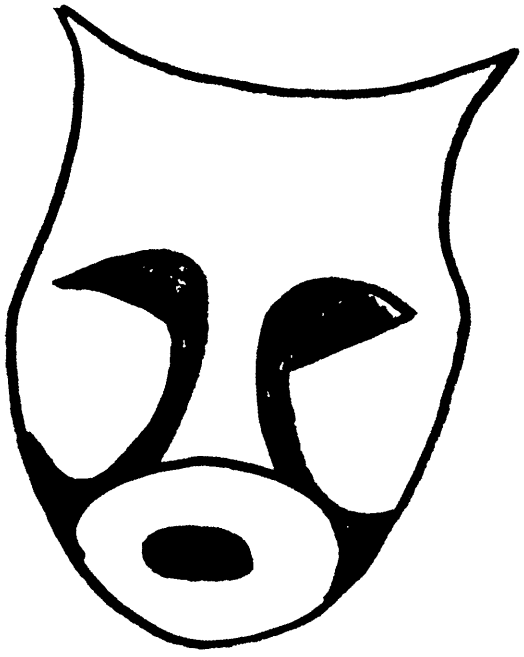

TYPE 1b (VARIANT)

that they had seen "devils' heads" carved in stone at a place on Qikertaaluk Island, where they used to quarry soapstone. I at once decided that I should investigate this fascinating story as soon as possible before the break-up, and fortunately this fitted in well with the Eskimos' plans for hunting.[1]

On June 12, with three sledges driven by Nallak, Pingok, and Poasi, I left Wakeham Bay. We headed across land to Okiivik Island,[2] where there is a spring camp. I was told that there were stone houses of the "Tunit" near the camp and was shown some worked flints. Here, I found Yogine, an old friend from Koartak, and arranged to continue with him as his father-in-law was living at the spring camp on Qikertaaluk Island. Our next stop was at Cape Aivertok, where there is also a spring camp and more "Tunit" houses. On the way south, we sledged round many small islands and saw numerous Inukshuk, or unusual types of stone cairns, possibly navigation aids, and also several dome-shaped stone structures which the Eskimos told me were bear-traps.

Finally, on June 13, we reached Cape Qajartalik on the north coast of Qikertaaluk Island. The rocky cape, which rises to about 100 feet in height, is separated from the spring camp of the Eskimos by a small bay. It was on this cape that the Eskimos showed me the petroglyphs. They were at a height of about 60 to 80 feet above high-water mark in a deposit of soapstone. In my diary for that day I wrote: "... we arrived at an old soapstone quarry which had in the past been used for lamps; there were about sixty inexplicable carvings ... the Eskimos quarried stone for their sculptures, they did not spare the old carvings very much". Unfortunately, we could not stay more than the short time the Eskimos were cutting soapstone for their own sculptures, and I planned to return soon, but it was an unusually early spring break-up. On June 16 all the Eskimos of the Qikertaaluk camp decided to go to Cape Aivertok because of the ice conditions. On

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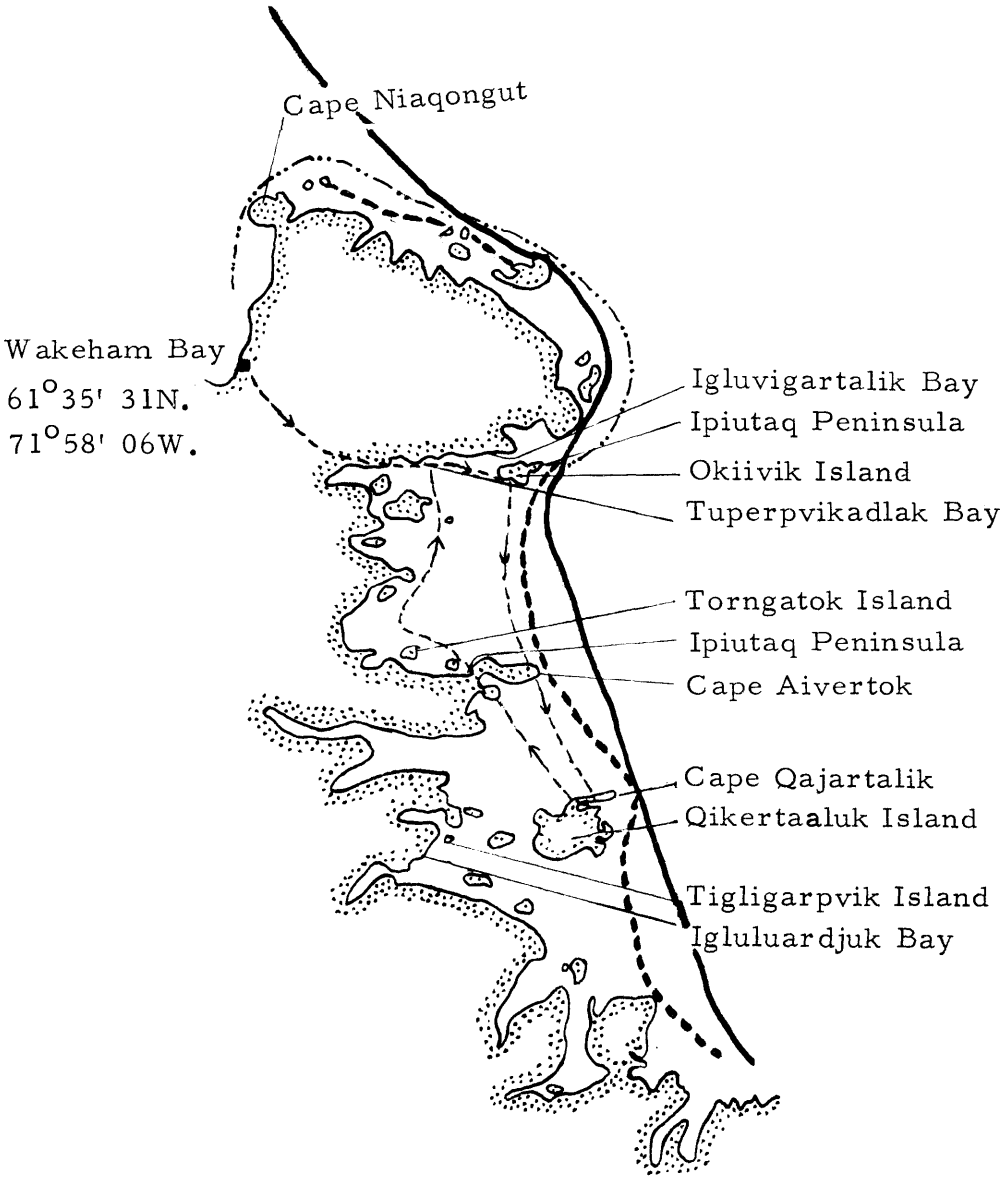
1. An account, rather similar to this article, but a little shorter, was published in North for November/December 1962.

2. The place names given in this version are those used in North. They have not been transliterated according to the new orthography and have not been officially adopted.



Limit of landfast ice in winter ——————

Limit of landfast ice in spring - - - - - -

Route followed -→- by sledge; -··→·· by boat

the way I was able to spend about one hour looking at the petroglyphs. An approximate, but more careful count, gave a figure of 44 carvings, but there are probably more than this number as some of them can be seen only in certain lights and others are obscured by lichen. The carvings are in a group covering a fairly small area; they are at different heights, but all seem to be within a man's reach.

Dimensions and types of petroglyphs. All the carvings seem to represent faces or masks, some of humans, others of animals. The size of these faces does not appear to exceed 8 inches in width and 12 inches in height, but most are much smaller. I noticed two principal types of carving: in one the features of the face were engraved giving a certain relief, in the other the faces were merely scratched on the rock. These differences in style do not appear to be accidental, but whether they correspond to different periods or to different artists, it is not possible to say. The first type can be divided into two main groups: oblong faces and round faces. The following are some of the details:

Type 1: carvings in relief

a) Oblong faces, which represent the most stylized motifs. Some of the faces are surmounted by a hollowed-out circle and generally have a series of engraved lines descending from the chin. These lines may also be associated with Type 1b. The depth of the engraved lines was a little under 1/4 inch. I saw 5 carvings of this form.

b) Round faces. These faces are not completely round, but the cheeks are larger than the upper part of the face, which is sometimes surmounted by a headdress. The mouth is rounded and more marked than in Type 1a, and the engraving is also deeper. I found 13 carvings of this form.

Type 2: carvings scratched on the rock. In general these are smaller than those of Type 1 and seem less elaborate. I saw 26 carvings of this type.

Antiquity and interpretation of the petroglyphs. There do not seem to be any real parallels from other Eskimo sites. Carvings have been found at Kodiak Island, Alaska,[1] but these are not very close to the Qikertaaluk faces. It is not possible to say who made the latter carvings, but it is worth noting that the greater proportion of the artifacts collected in the area is of the Dorset culture and that the style of the faces bears some resemblance to faces and masks carved on Dorset artifacts from other sites.

Some of the carvings were covered with moss and lichen, which show well on colour photographs. This obviously indicates considerable age and it is hoped that it will be possible to date the carvings from the lichen growth rings. The Eskimos did not appear to know anything about the origin of the carvings. Their first comment was "... these are the heads of devils". The Eskimos who accompanied me said that they might have been carved by the old Angakoqs, or shamans. They did not seem to attach any great importance to these relics of the past and I had difficulty in making them understand that they must not damage them or quarry the stone at that place. As a protection measure I got one of the Eskimos to carve in syllabics in the soapstone near a group of rather well-preserved carvings: "Do not damage this site".

Apart from a very recent use of the quarry at Qajartalik for stone sculptures the quarry has not been used for several years. One of my informants, Ningioruvik-Masiu, told me that in the past the people came here to get stone for their lamps, but that they could no longer find large enough blocks of good resistant stone for lamps, though there was plenty for small sculptures. In the Wakeham Bay area I heard of about nine soapstone quarries in actual use, or that had been in use.

One of these quarries, according to Kinisasi-Pita, also contained petroglyphs similar to those of Qajartalik. He indicated that the site of the quarry was on Torngatok, a rather small island.

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1. R.F. Heizer. 1947. "Petroglyphs from southwestern Kodiak Island, Alaska". Proc. Amer. Phil. Soc. Vol. 91, pp. 284-93

However, according to the testimony of other informants, it seems that the quarry is not on the island, but opposite on the mainland on a little cape called Nuvuguluk. Father Mascaret hopes that he will be able to visit the quarry.

Richness and antiquity of the archaeological sites of the area. The past occupation of the region was obviously of some importance. The worked artifacts I brought back have been deposited with the National Museum of Canada and it is hoped that these will give some idea of the date of the sites.[1] On a boat trip during the summer I have personally surveyed the following sites:

Ipiutaq-Okiivik: At least 50 old stone houses, quantities of whalebone, a large number of stone artifacts which have been collected by the Eskimos. The altitude of the sites varied, but some are at least 100 feet above the present sea level.

Tuperpvikadlak: I counted at least 7 stone houses and quantities of stone artifacts.

Ipiutaq: Here I counted at least 10 stone houses and many artifacts.

Near Wakeham Bay I surveyed 3 stone houses; these were better preserved than those elsewhere and apparently of more recent date. The Eskimos told me that there are 6 stone houses at Niaqongut, and about 12 at Igluluardjuk. The existence of other sites on several little islands lying between Niaqongut and Okiivik was mentioned.

This whole region is very rich in game, certainly it is the richest area on the south shore of Hudson Strait. For at least the past ten years the present camps, whether the temporary seasonal or the more permanent winter camps, have all been adjacent to ancient sites and appear on the map as follows:

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1. The archaeological finds will be discussed in a note in the next number of the Circular.

Okiivik: At present a spring camp, but has served as a winter camp.
Igluvigartalik: An important winter camp until 1958.
Tuperpvikadlak: At present a summer camp.
Ipiutaq-Aivertok: Winter camps until about 1958 and at present spring camps.
Tigligarpvik: A winter camp until 1960.
Qikertaaluk: Has always served as a spring camp as long as can be remembered; the Eskimos came here in the winter also, but only for hunting.

Point Barrow Conference on Native Rights: Inupiat Paitot

The Point Barrow Conference on Native Rights was held from 15 to 18 November 1961. This conference, the first of its type, was sponsored by the Association on American Indian Affairs, but was organized and managed completely by the Eskimos. The conference chairman was Guy Okakok of Point Barrow and representatives were present from Eskimo settlements throughout Alaska. The federal government was represented by Mr. John A. Carver, Assistant Secretary of the Interior. The conference adopted a statement of policy and recommendations covering their aboriginal rights, or what they term "Inupiat Paitot", an Eskimo phrase meaning "The Eskimo's Heritage".

The statement defines the aboriginal rights as the right of the Eskimo to own their land and its minerals and to hunt and fish for food without restriction. It draws attention to encroachments on these rights, such as the prohibition of eider duck hunting under the Migratory Birds Treaties with Canada and Mexico, the stumpage fees required on timber cut by Eskimos for sale, the fact that the Eskimos cannot use the natural gas discovered by the U.S. Navy at Point Barrow, and the plans for the Project Chariot explosion at Cape Thompson. Reference is also made to the killing of polar bears on the Arctic Ocean from light aircraft by white hunters which is depriving the Eskimo of an important resource.

The distance of the boarding school at Mount Edgecumbe from the Eskimo area, the need for an Eskimo housing programme, competition in the labour market from labour imported from outside Alaska, the importance of commercial transportation and health facilities,

better marketing of native arts and crafts, and the need for some form of newspaper are among the matters aired.

A second Inupiat Paitot conference was held at Kotzebue on 18 to 20 October 1962.

The "Tundra Times"

The first issue of the Tundra Times was published in Fairbanks on Monday, 1 October 1962. It is a well-produced, eight-page newspaper, and is to appear twice monthly. The editor is Howard Rock, an Eskimo from Port Hope.

The Tundra Times describes itself as "The Eskimo-Indian all-Alaskan newspaper". An editorial explains that there has long been a need for a newspaper for the northern natives of Alaska. Civilization has left the Eskimos, Indians, and Aleuts bewildered and insecure between assimilation and, particularly among the Eskimos, the desire to retain some of their culture. The suggestion of a newspaper was made at the first meeting of the Eskimo "Inupiat Paitot" Conference in November 1961. The editorial goes on to say that the Tundra Times will be the medium to air the views of the Inupiat Paitot organization and of Dena Nina Henash, a parallel organization of Athabaskan Indians of the interior of Alaska organized at Tanana last June. It will also provide news on matters of interest to all native peoples of Alaska. The Tundra Times will not support any political party, and intends to be independent and to be non-partisan in giving the views of individual political candidates. If it favours any candidate editorially it will be because of his position on issues affecting the native peoples rather than because of his political party.

As well as the editorial, the first issue includes a report on the visit to Alaska of the Secretary of the Interior, a notice on the Second Inupiat Paitot Conference, to be held at Kotzebue on October 18 to 20, an appreciation of Miss LaVerne Madigan, Executive Director of the Association on American Indian Affairs, who died recently, a translation of two Eskimo songs, an account of the use of tape-recorders by Eskimos, and many other well-written articles. To Canadian readers a note by Guy Okakok on his meetings with Angulalik at Herschel Island and Cambridge Bay in the late twenties will be of particular interest.

The address of the Tundra Times is, Box 970, c/o Jessen's Weekly, Fairbanks, Alaska. Copies are priced at 15 cents and subscription rates are $2.50 for six months and $5.00 per year by regular mail in Alaska, $3.00 and $6.00 to other States, or $6.00 and $12.00 by air mail.

Institute of Low Temperature Science, Hokkaido University

The Institute of Low Temperature Science at Hokkaido University in Japan was established in 1941 to carry out research into natural phenomena at low temperatures, but its early development was hampered by the war and the subsequent occupation. The Institute now has a total staff of about seventy and is divided into six sections - pure physics, applied physics, meteorology, oceanography, biology, and medicine. The facilities include six cold chambers, one equipped with a wind tunnel. These can attain a temperature of -60°C. There are also three smaller cold boxes for lower temperatures, one of these containing a remote-control microscope.

The main areas of research have been in studies of natural and artificial snow, the causes and prevention of frost heaving, sea fog, sea ice, death from cold, preservation of living organisms at low temperature, the theory of long-period weather forecasting, and the properties of fallen snow.

Most of the results of the Institute's research are published in the journal Teion Kagaku (Low Temperature Science), printed in Japanese with English summaries, and in Contributions from the Institute of Low Temperature Science, published in English. The Arctic Circle has exchange arrangements with the Institute and copies of most of their periodicals may be borrowed from the Editor.

Menu of the Annual Dinner

Turkey Garnished
Ham Garnished
Jellied Meats
Reindeer Roasted
Reindeer Vinaigrette
Reindeer Garlic Sausage, Wine Dressing
Buffalo Flanks, smoked with Arctic Willows
Wild Meat Salad
Buffalo Mortatella
Muskrat Peperone
Whale (Beluga) Meat in Chianti
Muktuk (Beluga), Garlic Dressing
Muktuk (Beluga) with Mayonnaise
Whale (Beluga) Heart Vinaigrette
Arctic Char Cocktail
Arctic Char, Glazed and Garnished
Greenland Shrimp

Devilled Eggs
Macedoine Salad
Potato Salad

Labrador Baked-apple Berry Sundae

Coffee

Lateness of the "Circular"

The Editor much regrets that the Circular has fallen rather further behind in publication dates, but wishes to assure members that all numbers for 1962 as well as those for 1963 will be produced in due course.

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. G.W. Rowley,
245 Sylvan Road, Rockcliffe Park,
Ottawa 2, Ontario.

T H E A R C T I C C I R C U L A R

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(April 1963)

Annual General Meeting. The Annual General Meeting was held in the No. 9 Transport Company Mess, R.C.A.S.C., on 8 January 1963. The President, Mr. G.W. Rowley, was in the Chair.

In the absence of the Treasurer, the financial statement was circulated and adopted. In view of the relatively favourable financial position, it was agreed that for this year there was no need to increase membership dues.

In accordance with the Constitution the following Officers and Members of the Committee retired: Mr. G.W. Rowley, President; Mr. C.M. Bolger, Mr. E.I. Loomer, Mr. A.H. Macpherson, Dr. E.F. Roots, Dr. D.C. Rose, Mr. D. Snowden, and Maj.-Gen. G.R. Turner. The Secretary, Dr. R.G. Blackadar also resigned. To fill these vacancies the Committee proposed: for President, Miss Moira Dunbar; for Secretary, Dr. R.L. Christie; for Committee, Mr. K.C. Arnold, Dr. A.H. Clarke, Brig. A.B. Connelly, Dr. B.G. Craig, Dr. R.J.E. Brown, Mr. C.R. Harington, Dr. M.J.S. Innes, and Mr. V. Valentine. These candidates were elected unanimously. Dr. R.G. Blackadar agreed to serve as Vice-President for 1963 in the absence of Supt. W.G. Fraser. The Officers and Committee members for 1963 are as follows:

Officers

President:	Miss Moira Dunbar
Acting Vice-President:	Dr. R.G. Blackadar
Secretary:	Dr. R.L. Christie
Treasurer:	Mrs. A.H. Macpherson
Publications Secretary:	Miss Mary Murphy
Editor:	Mrs. G.W. Rowley

Committee members

Mr. K.C. Arnold
Dr. R.J.E. Brown
Dr. A.H. Clarke
Brig. A.B. Connelly
Dr. B.G. Craig
Mr. C.R. Harington
Dr. G.F. Hattersley-Smith
Dr. M.J.S. Innes
Dr. D.R. Oliver
Rev. A. Renaud, O.M.I.
Col. J.P. Richards
Mrs. A.G. Sangster
Mr. B.G. Sivertz
Dr. A. Taylor
Mr. V. Valentine

Following the election Mr. Rowley expressed his thanks to all Officers and Members of the Committee for their assistance during his term as President.

The new President, Miss Moira Dunbar, then took the chair. She first thanked Mr. Rowley on behalf of the Club. Following a vote of thanks to the auditors, Mr. J. Cantley and Maj.-Gen. G.R. Turner, the meeting re-appointed them for 1963.

It was noted that approximately 180 members and guests attended the Annual Dinner for 1962. The meeting felt that the dinner had been a marked success and that the Annual Dinner for 1963 should be held in the fall and should follow the established pattern of a buffet meal with northern foods. A number of suggestions were made and it was agreed that these would be discussed nearer to the date of the dinner. The president then thanked Col. J.P. Richards, Mr. A. Stevenson, and Dr. R.G. Blackadar for organizing the dinner.

The President expressed the gratitude of the Club to Major R.A.D. Kelly for the use of the Transport Company Mess and to Captain W.E. Preston for making the arrangements.

At the conclusion of the Club business two Russian films, loaned by the Embassy of the U.S.S.R., were shown: "The atomic icebreaker Lenin", a colour film, and "The Koryaks" a description of the life of these Siberian reindeer-breeding people.

Ward Hunt Ice Shelf: new breakaway and recent movements of ice island WH 5

On 18 April 1962 an R.C.A.F. reconnaissance flight from 408 Squadron saw a hut on a small ice island off the mouth of M'Clintock Inlet. This surprising sight indicated that part of the Ward Hunt Ice Shelf, where the hut had been placed in 1960, must have broken away. Photographs taken on May 27 and June 13 showed that the calving had been extensive, the shelf having lost about 200 square miles [1] or, assuming a mean thickness of 100 feet, from 5 to 6 cubic miles of ice. On June 10, a flight made by G. Hattersley-Smith, in an Otter aircraft piloted by R. Dublicquy, along the entire front of the shelf with landings at three places, showed the full extent of the breakaway. Air photographs taken on 19 August 1961 had not shown any changes in the ice shelf so the calving must have taken place during the winter of 1961-62. As far as is known, it had been restricted to the Ward Hunt Ice Shelf, and the other three main ice shelves off the coast of Ellesmere Island had not been affected. The eastern end of the breakaway was in the same region where a large island had broken off, presumably in 1946.

The new part of the ice shelf that had broken away had been a strip along almost the whole length of the shelf, about 40 miles long and up to 8 miles wide. Breaks, roughly at right angles to the coast, had divided it into five large ice islands, with several small ones and many fragments. The five large islands have been provisionally named, from west to east, WH 1, 2, 3, 4, 5, and they range in size from 28 square miles (WH 2) to nearly 55 square miles (WH 5).

Observations from ice island T 3 have shown that movements of ice islands in this region are mainly determined by wind stresses and that the prevailing drift pattern is to the west and southwest of Ward Hunt Island. By June 13 the four westernmost islands had followed the expected course and moved west along the coast; WH 5 had however drifted in the opposite direction. Presumably WH 5 was unable to move past Ward Hunt Island under the influence of easterly or northeasterly winds, and was therefore affected by occasional westerly winds. This contrary movement was of considerable interest and members of the Polar Shelf Project placed radar reflectors on the island to assist in tracking it.

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1. All measurements are in statute miles.

The recent movements of WH 5 have been even more remarkable. On July 29 the island had moved about 13 miles in a southeasterly direction from its position of June 13 off Parr Bay. On December 12 a U.S. Naval ice reconnaissance flight found that it was about 10 miles north of Cape Hecla at 83°04N., 64°45W. Their flight of 25 February 1963 showed that its movement had speeded up and that it had rounded the northern coast of Ellesmere Island, passed down Robeson Channel, and was lying off the northern part of Judge Daly Promontory, a distance of at least 130 miles. Only three days later, on February 28, it had moved more than 40 miles and was stationary between Carl Ritter Bay on Ellesmere Island and Hans Island. It appeared that WH 5 might be halted for the present and that the island was having a marked effect on the passage of the polar pack down Robeson Channel. It blocked the channel to the west of Hans Island and, as far as Franklin Island, a heavy bridge of polar ice had formed to the southeast.

The movements of this island may possibly be the result of a southeasterly longshore drift off the northeast coast of Ellesmere Island. They also suggest that the large ice island last seen in May 1948 20 miles east of Cape Columbia, which had broken away from the Ward Hunt Ice Shelf in 1946, may have followed the same route and passed down Robeson Channel. It is interesting that the new break did not entirely follow the old fracture. WH 5 has about 2.5 square miles of ice formed since 1946 at its eastern end. The very large ice island T 1 also drifted eastward as far as Clements Markham Inlet in 1951, but then turned westerly again and followed the drift pattern of the other ice islands clockwise round the Arctic Ocean Basin.

Polar bear study: east coast of Baffin Island, 1961.[1] By C.R. Harington[2]

Because of a marked decline in the number of polar bears over the past few decades in the Soviet Union and parts of Greenland, Canada must keep a careful watch on her northern bear populations. To discover more about the ecological and biological factors governing distribution and numbers of the species, the Canadian Wildlife Service has initiated a three-year polar bear project.

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1. Subsequent work in 1962 and 1963 will be summarized in a future issue.
2. Canadian Wildlife Service.

Field work to date has centred around studies of winter activity, especially denning, for very little is known about the habits of these large carnivores during this season. From the end of January to mid-March 1961, I collected preliminary data on Southampton Island; most denning information was obtained on dog sled reconnaissances among the low, rolling hills and valleys of the Porsild highlands.[1] I am very grateful to Barrie Gunn, the area administrator, Pameeolok, Tony Eecherk, Joe Curley, and Pootoolik for their assistance.

From November 7 to December 18, I undertook similar studies in the Clyde area of Baffin Island (Scott Inlet to Cape Hooper), where the annual bear kill is relatively high. Using the settlement of Clyde as a base, I made a number of local sled trips and two longer ones with three main objectives: to find out more about bear-den locations, the movements of the species during the dark period, and the numbers and use made of caribou in various Eskimo settlements tributary to Clyde.

On a sled journey from November 13 to 20, along Cormack Arm to a point about eight miles up Clyde River, I found that the major denning zones were nearer the Baffin Bay coast, and that a steady movement of male bears toward the mouth of Clyde Inlet and the floe edge was taking place. Although only four caribou were seen en route, they were fairly abundant at the heads of most inlets - especially Inugsuin Fiord. Remains of an Eskimo winter camp were observed on the southeastern margin of Cormack Arm, as were signs of a 1950 Arctic Institute expedition camp at the mouth of Clyde River.

Both coastal and peninsular areas were inspected for wildlife during a sled reconnaissance between Clyde and the Eskimo settlement on Ekalugad Fiord to the south from December 1 to 15.

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1. Officially the Porsild Mountains.

Information gathered in the course of the study shows that some male bears occupy dens from September to November, or perhaps later, while others may remain actively hunting seals near the floe edge all the time. Their early dens are usually found near the coast at elevations less than 400 feet above sea level and consist of cavities bridged by ice and floored with dry, stream gravels. Numerous trails discovered and a few animals encountered indicate that a large number of males head eastward to the floe edge or shifting pack ice of Baffin Bay and Davis Strait in November and December. Probably all males vacate their dens, which may be only very temporary bases, by January.

More females than males den, and they remain in or near their excavations for much longer periods than the males. Females are not known to den in the Clyde area until late September or early October. The initiation of den construction may well be prompted by a stage of embryonic development in gravid animals. Of course, the beginning of the cold, dark period is another factor which makes denning desirable. Four cases have been recorded in which macroscopic embryos were found in females taken during the first week of October. Contrary to the opinion that most females near Clyde make their "igloos" in drifts among offshore pressure ice, only one den of 29 recorded proved to be of this nature. Almost 60 per cent of the dens inhabited by females were on heavily drifted, leeward slopes near hill summits, at an average height of about 1, 200 feet above sea level. Although some overlap existed, females generally occupied higher, less accessible sites than males. This situation may have some survival value for the species, for males will eat small cubs.

Polar bear dens may be discovered in many ways. At first it is advisable to travel by dog sled in a region where dens have been reported frequently by local inhabitants. Leeward, south-facing slopes of coastal hills and valleys offer the most promising sites - especially where the earliest snowdrifts form in autumn. Although a few dens at lower levels may be seen with the unaided eye, there is no substitute for methodically "glassing" the upslope areas with binoculars from suitable vantage points. Ventilation holes of maternity dens are more often observed by this means. Usually they appear as small, black

spots with adjacent platforms of pushed out snow. If a search is made during the onset of the denning period in autumn, or when the bears are about to leave their dens in the spring, tracks may be found leading to or from the sites. Sled dogs, with their keen sense of smell, may also lead one to polar bear "igloos". In June 1961 I was able to detect an abandoned polar bear den from a low-flying, light aircraft over southern Bathurst Island.

A close watch will be maintained on the yearly kill of white bears in the Clyde region in relation to hunting pressure and environmental conditions, so that any significant decrease in numbers may be quickly detected. Present protection of females with young cubs has done much, I believe, to sustain the large bear population of the area.

I sincerely wish to acknowledge the cooperation and hospitality of Harvey Gale, community teacher; Constable Bob Kraus, R.C.M. Police; Vic Pearson, Hudson's Bay Company; and the Department of Transport staff at Clyde. Konilosie, Simiounie, and Simonie provided some extremely useful information and observations. Above all, I wish to thank Jacobie for his assistance during the sled trips. He proved to be a good traveller, competent interpreter, and fine companion.

Archaeological collections from the Joy Bay region, Ungava Peninsula.

By William E. Taylor, Jr. [1]

In the preceding issue of the Arctic Circular (Vol. 15, No. 1, pp. 6-13 with map and illustrations) and in a recent issue of North (Nov.-Dec. 1962), Mr. Bernard Saladin d'Anglure reported his discovery of petroglyphs and archaeological sites east and southeast of Wakeham Bay on the south shore of Hudson Strait. The present note includes comments on the age and possible cultural context of the petroglyphs, supported by the aid of lichenometry (Beschel, 1957), brief observations on the sites, and a summary description of the artifacts found. The artifacts described are in the archaeological collections of the National Museum of Canada. Place names are those given in the publications noted above.

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1. National Museum of Canada.

D'Anglure (1963) has suggested that the Qikertaaluk petroglyphs show stylistic features resembling those on masks and carvings of faces from the Dorset culture. A miniature ivory mask found in the early Dorset Tyara site on Sugluk Island (Nat. Mus. Can. No. KkFb-7-308) shares with the petroglyphs the distinctive concave upper line of the mouth region and a suggestion of alveolar prognathism, a blowing action, or pursing of the lips. A similar treatment of the mouth appears on a miniature ivory mask from Igloolik (Mathiassen, 1927, Pt. 1, Fig. 35) and on a small wooden figure from Bylot Island (Mathiassen, 1927, Pt. 1, Pl. 62, No. 8). Collins (1962, Pl. 9) has illustrated a low relief Dorset carving of faces from Prince of Wales Island some of which show the same mouth formation. It appears again on a Dorset figurine from Inuarfigssuaq in northwest Greenland (Meldgaard, 1960, Pl. 21), and on a miniature soapstone Dorset mask from Igloolik (Pl. 27). Although various attributes of the petroglyphs may occur in widely separated places, two wooden carvings, a mask (Meldgaard, 1960, Pl. 6) and a figurine (Meldgaard, 1960, Pl. 41) with the oval gaping mouth and protruding lips, collected at Angmassalik, east Greenland, are of special interest as they date to the nineteenth century. By a comparison of stylistic features, and recalling their estimated height above sea level, 60 to 80 feet (d'Anglure, 1963), it may tentatively be concluded that the Qikertaaluk carvings are the work of Dorset culture Eskimos.

Additional evidence comes from Beschel's lichenometric method of estimating age (Beschel, 1957). Dr. Roland Beschel has examined two kodachrome transparencies of lichen-encrusted petroglyphs at Qikertaaluk, Warning that with the evidence available to him a long series of assumptions was necessary, Beschel estimated the petroglyphs to be at least 500 years old (Beschel, personal communication, 9 January 1963); with his method there remains the possibility that the petroglyphs are very much older. They may, therefore, have been carved some centuries before A.D. 1460. With the available bits of evidence it might be expected that the Dorset culture persisted in this region until about A.D. 1350. Consequently it is unlikely that the petroglyphs belong to the period of European contact and they may well have been made in Dorset rather than in Thule times.

The rather high ratio of Dorset to Thule artifacts in the collections made by d'Anglure is general support for the dating of the petroglyphs. The absence of Dorset tools in the small artifact sample from Cikertaaluk Island itself is likely fortuitous. A high ratio of Dorset to Thule artifacts was also noted during a survey that visited Sugluk, Ivugivik, and Mansel Island in 1957, 1958, and 1959 (Taylor, 1958, 1959, 1960). The samples of Ungava artifacts that came to the National Museum between the wars show a similar ratio. This is not surprising since Dorset culture Eskimos occupied the Ungava coast for a much longer time than their Thule culture successors.

The sites

Tuperpvikadlak. This site, roughly 8 miles southeasterly from the Wakeham Bay settlement, is on the mainland north shore of Joy Bay. Near the present summer camp stand some 7 semi-subterranean house ruins. D'Anglure saw no whalebone, did not recall seeing entrance passages to the houses, and guessed the elevation of the site to be 20 metres above present sea level. This suggests a Dorset site; the artifact sample described below confirms that suggestion for all the specimens are Dorset types, none are Thule, and only a few have parallels in pre-Dorset sites. A multiple sidenotched ground slate end blade provides a weak hint of an early Dorset occupation, but the low frequency of ground slate in this small sample does not support this. The fine-grained black quartzite, the black cherty quartzite material, the triangular, stemmed, and sidenotched chipped end blade forms, and the two end scraper forms recall the Dorset sample from the Imaha site, about 125 miles to the southeast in Payne Bay (Laughlin and Taylor, 1960).

Okiivik I. There were four main sites on Okiivik Island, just east of Tuperpvikadlak. The positions of these sites given in the text below come from a quick sketch prepared by d'Anglure prior to his departure for France. A comparison of this sketch with the 1950 edition of the Topographical Survey's eight mile to one inch sheet, Wakeham Bay N.W. 60/72, suggests that d'Anglure's directions are 90 degrees too far to the east. Okiivik IV may be on the north side of Tuttle Point at the southeastern corner of the island with Okiivik I at the west end of the

island. Should this be so, Okiivik II and III would lie on the south coast of the island facing Joy Bay and nearer to Tuttle Point than to Okiivik I.

The Okiivik I site according to d'Anglure's sketch-map, lay on the south coast of the island near the present spring camp. At least 4 semi-subterranean houses were seen at an estimated elevation of 25 to 30 metres above sea level. Whalebone lay near, but not in, the houses. A Dorset occupation is documented by the artifacts.

Okiivik II. This site, about 1 kilometre north of Okiivik I, is on the island's northeasterly coast. It comprises at least 10 well-defined, passage-less house depressions set in dense vegetation, lying roughly 20 metres above sea level. The depth of these depressions, one metre or more, seems rather unusual. No whalebone was seen. The only artifact recovered is a retouched, amorphous quartz asymmetric knife blade. It has a straight base, weak sidenotches forming a tang, one slightly convex edge, one strongly convex edge, and a rounded tip. It measures 3.4 by 1.5 by 0.4 cm. Both the artifact and the site suggest a Dorset occupation.

Okiivik III. This site is about 100 metres to the southwest of, and slightly inland from, Okiivik II, and roughly 1 kilometre to the north of Okiivik I. At about 30 metres above sea level there were some five old-looking house depressions, with no whalebone visible. No artifacts were found.

Okiivik IV. This large site lies on the west side of a point of land projecting from the north end of the island. It is called "Ipiutaq" by the local Eskimos, and "Ipiutaq-Okiivik" in d'Anglure's note in the Circular. There are perhaps 50 house ruins at various elevations. Some show the outlines of two rooms; some have porches and passages, and in a few cases passage roofs remain intact; one has a part of a whale skull incorporated in its construction. These facts suggest a Thule or recent Ungava Eskimo occupation and, on architectural evidence, the Thule occupation seems a safe assumption. D'Anglure's previous note mentioned a large number of stone artifacts having been collected there by Eskimos,

which does not suggest Thule culture or post-contact Eskimos but Dorset or pre-Dorset people. However, the sample in hand consists of five soapstone fragments only. Two are of rather shallow, thin-walled vessels with outsloping walls and rounded rim profile, which were probably made by Dorset people. The third came from a deeper, thin-walled vessel with an inwardly bevelled rim. The remaining two came from vessels 10 to 13 mm. thick with flat bases, near vertical walls, and rounded rim profiles, which might well be of Thule culture. Thus the large Okiivik IV site very likely contains the remains of several occupations representing both the Dorset and Thule cultures.

Okiivik Graves. D'Anglure recalled seeing some 5 undisturbed and about 15 disturbed graves on the island. The latter contained much human skeletal material but no wood, cloth, or metal. Since Cape Prince of Wales lies a scant four miles to the northwest, I may quote F. F. Payne's unanswered siren call to physical anthropologists, "The graves of the Eskimo are found everywhere along the coast, some well built over with stones while others only show where the body was laid, the bones being scattered in every direction. The favorite place of burial is an island where the foxes and wolves cannot get at the bodies, and near Cape Prince of Wales an island, about ten acres in area, was seen literally covered with graves; and monuments ten feet high were erected here and there throughout it. These were evidently built for service in common, and like our beacon were covered with scraps of food" (Payne, 1889, p. 228). As Okiivik far exceeds ten acres in area, Payne presumably described another island, nearby but smaller. The three artifacts found in association with Okiivik graves came from a small cache placed outside a surface grave made of large stones. The latter had a rectangular interior and a subrectangular exterior. The artifacts were a thin flake of mica, a 6-cm. long scrap of bone with three drilled holes, and a scraper, 13.7 -cm. long, made from the scapula of a caribou. They, and the grave form, suggest Thule or, less likely, recent Ungava Eskimo culture.

Tunit Ipiutaq. This site on the south side of Joy Bay has about 10 rather large semi-subterranean house ruins. In some instances entrance passages were visible but no whalebone was seen in the dense vegetation. The elevation was guessed to be 20 metres above sea level.

Inukshutuyok Island. This island, between Aivertok and Cikertaaluk, contains some 7 or more inukshuks, and at least 10 graves ranging forward in time almost to the present. Wooden sled runners and a fragment of whalebone shoeing were found under a pile of stones.

Nallak Grave Site. This site is on a mainland point adjacent to Okiivik Island.

Cikertaaluk Island. The petroglyphs discovered by d'Anglure in a soapstone quarry at Cape Cajartalik are on the north coast of the island.

Artifacts

Tuperpvikadlak

1. Chipped biface end blades

   (a) Three concave-base specimens with straight or convex margins show competent over-all chipping and, in one case, basal thinning. They are of quartzite, amorphous quartz, and fine-grained black quartzite. The last mentioned, the largest and only intact specimen of the three, measures 5.6 by 2.5 by 0.4 cm. It has a concavo-convex longitudinal section, but, like the others, a bi convex cross-section.

(b) Two stemmed points are slightly asymmetrical in plan and have convex bases. They are of black fine-grained quartzite and black cherty quartzite. The larger measures 5.4 by 2.8 by 0.6 cm. The other, 4.7 by 2.3 by 0.7 cm., flares slightly at the base so that it might reasonably have been classed as sidenotched; its stem length, 2.2 cm., suggests its placement here. The stem margins in both are thoroughly dulled to reduce chafing of a lashing.

(c) Three broken base fragments have broad, shallow sidenotches. The bases are straight to convex; one shows basal thinning. They are of amorphous quartz, grey quartzite, and black fine-grained quartzite. No significant measurements are available.

2. Ground stone tools

(a) Except for a small fragment with a trace of rubbing and chipping, the only slate in the sample is a base fragment of a ground slate end blade that had at least three pairs of neatly formed narrow sidenotches on its faceted stem which is 2.7 cm. wide and 7 mm. thick.

(b) There are two small tabular fragments of soft grey-green schistose rock with rubbed surfaces and edges. Their maximum thicknesses are 4 and 5 mm. respectively.

3. Others

(a) One broken quartzite biface was probably, despite its thickness, a semi-lunate side blade; it has pointed ends, one slightly convex margin, one markedly convex margin, and biconvex cross- and longitudinal-sections. It measures 4.0 by 1.3 by 0.7 cm.

(b) Two quartzite blade fragments, whose original widths were about 12 and 15 mm. respectively (Taylor, 1962), represent the microlithic technique. One, 4 mm. thick, shows considerable bifacial edge and surface retouch such that it might be a fragment of a

perforater or side scraper. The other, much thinner, has retouch along the edge of one surface suggesting casual use as a knife or scraper.

(c) The concave side scraper form seems represented by a long, thin prismatic flake or blade of quartzite showing careful unifacial edge retouch on part of its slightly convex margin and diligent steep retouch along the opposite concave margin. A tapering tang, formed by steep retouch, likely facilitated hafting. The specimen measures 7.3 by 1.2 by 0.6 cm.

(d) The first of two uniface end scrapers is of grey chert and has a rounded base with a pair of crude poorly defined side notches and a spatulate forward part; its scraping edge is only slightly convex. The artifact measures 3.1 by 2.0 by 0.7 cm. The second, of black quartzite, measures 3.2 by 1.8 by 0.6 cm. it approximates a tear-drop in shape with a steep and convex scraping edge and margins that converge to an asymmetric straight-cut, narrow base.

(e) That common Dorset form, the asymmetric chipped stone knife blade, is represented by only a single unifacially chipped grey chert flake with a pair of crude, asymmetrically placed sidenotches. The specimen measures 3.7 by 1.7 by 0.4 cm.

(f) Three random flakes of chert, slate, and black fine-grained quartzite show use or intentional chipping along one or more of their edges so that they may be termed flake scrapers. Probably they served briefly as side scrapers. In one instance the edge retouch is bifacial. The largest is a rough prismatic flake which, although broken, is 6.3 cm. long.

(g) There are five bifacially retouched fragments whose previous form or function can only be guessed. Two are point tips from end blades; one might be from a large, thick knife blade. They are of quartz crystal, amorphous quartz, and quartzite.

(h) Ten small soapstone vessel fragments, ranging in thickness from 3 to 10 mm., suggest thin rounded soapstone vessels. Two are rim fragments showing rounded rim profiles.

Okiivik I

1. Chipped end blades

(a) Four triangular end blades include two of quartz and two of quartzite. Two show concave and two have straight bases. The single intact specimen is uniface and measures 4.3 by 1.6 by 0.7 cm. The other three are biconvex in cross-section; margins are generally convex to straight. All four show basal thinning.

(b) Two of the three sidenotched points are intact; two are quartzite, the other is chert. Bases are approximately straight; sidenotches are broad and shallow; edges are otherwise gently convex. The two intact specimens measure 3.9 by 2.2 by 0.7 cm. and 2.5 by 1.8 by 0.4 cm. respectively.

2. Ground stone

(a) Three of the five ground slate pieces are small grey nondescript fragments of ground slate end blades. The fourth, a thick grey piece, shows grinding and chipping. The fifth, red in colour, is an end blade base with three pairs of precise, sawed notches on its bevelled edges. Its minimum width, at the straight base, is 2.3 cm.

3. Soapstone

(a) One small well-finished rim fragment of a grey soapstone vessel, 8 mm. thick, shows a flat rim profile and the curvature of a round or oval vessel. The other, only 2 mm. thick, has a pointed rim profile, a similar curvature, and faint red ochre stains on the inner surface.

Okiivik Island, random finds

Some 15 specimens from this island lack specific site data. Three nondescript soapstone fragments, ranging from 6 to 14 mm. in thickness, are likely of Thule or more recent times. The remainder duplicate common Dorset culture forms. Amorphous quartz biface artifacts include a straight-base triangular end blade, three end blades, each with a pair of broad sidenotches, a fragment of a semi-lunate side blade, and the tip of an end blade. Quartzite pieces are a blade fragment with a retouched edge, a uniface, sidenotched, asymmetric knife blade, two tips of end blades, and an unfinished, rather ovate fragment with percussion chipping scars. The sole chert object is the base of an end blade with broad, shallow sidenotches.

Nallak Grave Site

The artifacts collected are a 7.3-cm. long wood fragment showing the remains of four perforations possibly drill-made, and three pieces of perforated antler trim. Although the longest piece is incomplete their lengths are 10.7, 15.4, and 19.3 cm., respectively; each is 1.7 cm. wide and 3 to 4 mm. thick. The drilled perforations, through the medial line of each, are on 1-to 2-inch centres and have diameters ranging from 5 to 7 mm. Where intact, the ends are straight cut. Cross-sections are plano-convex to concavo-convex, the latter probably a result of warping. A post-Dorset period occupation is certain.

Tunit Ipiutaq

The four specimens recovered include two thin slate fragments, each with a bifacially polished edge as for ulu blades, and two soapstone

vessel fragments. The smaller, a 2.1-cm. thick fragment, shows a rounded rim profile; the other, 1.4-cm. thick, also has a similar rim form and, on its slightly convex exterior 4 cm. below the rim, a deep incised horizontal line. Just beneath that line and adjacent to a broken edge of the fragment is a large round hole evidently for a lashing to mend a crack in the vessel wall. These four noncommital fragments are probably of Thule culture.

Inukshutuyok Island

The artifacts in the collection brought to Ottawa from this island are a small flake of mica, a bone sled shoe fragment, a broken bone knife handle, a wooden brow band, a badly decayed ivory pendant, two toy soapstone pots, and three wooden dolls. The dolls have lengths of 6.7, 11, and 12 cm.; all are faceless: two lack any clothing or anatomical indications of sex; the shortest of the three is marked to indicate a man's parka. The smaller of the toy pots, measuring 4 by 2 by 1.5 cm. is a crude model of a rectangular vessel. The larger, 13.1 by 5.8 by 2.7 cm., is a careful copy of a subrectangular vessel complete with lug handles at either end, diagonally set holes through the rim at each corner, near vertical walls, a slightly convex plan, and a flat floor. An incised line runs around the vessel's interior, directly below its rim which, except for another incised line along it, has a flat profile. The wooden brow band, 12 mm. wide, 2 mm. thick, and 16.8 cm. long around its curve, has three drilled perforations at one end and two at the other. The knife handle has a knob end with a drilled suspension hole; its broken distal end has had at least two drilled rivet holes. The remains of the blade slot suggest a metal blade. The sled shoe fragment, 22.7 by 3 by 7 cm., has seven drilled rivet holes, each about 6 mm. in diameter; one broken rivet, probably of antler, sticks firmly in one of these holes. The thin badly decayed pendant has a narrow oval form, a small suspension hole at one end, and faint scratch marks of a pair of parallel lines bordering one margin of the specimen. The data suggest that these artifacts belonged to post-contact Eskimos and perhaps their Thule culture ancestors as well.

Qikertaaluk Island

The National Museum collection includes five specimens from this island; a whalebone fragment, probably of a snow knife handle, a rough length of whalebone with a drilled hole at one end, and three tabular, perforated whalebone fragments very likely of sled shoes. One of these is 6.2 cm. wide and 1 cm. thick with three rivet holes and a straight-cut end. The second, somewhat smaller, is 5 mm. thick and it too is straight at its partly intact end. The third and largest, 24 cm. long, 5.3 cm. wide, 9 mm. thick, shows seven drilled holes, each about 6 mm. in diameter. One contains the remains of a bone rivet. These specimens could represent either Thule culture or more recent Eskimos.

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Subscriptions for 1963

Members are reminded that their subscriptions for 1963 ($2.00 for Ottawa members, or $3.00 for combined membership for husband and wife, and $1.00 for out-of-town members, other than institutions) are payable to the Treasurer, Mrs. A.H. Macpherson, Box 68, Postal Station "D", Ottawa.

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Members are earnestly requested to advise the Treasurer, Mrs. A.H. Macpherson, Box 68, Postal Station "D", Ottawa, promptly of any change of address.

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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245 Sylvan Road, Rockcliffe,
Ottawa 2, Ontario.

T H E A R C T I C C I R C U L A R

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One hundred and twentieth meeting. The one hundred and twentieth meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on February 12.

Dr. J.D. Ives spoke on "Landscapes of north central Baffin Island" and illustrated his lecture with kodachrome slides.

One hundred and twenty-first meeting. The one hundred and twenty-first meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on March 12.

Dr. D.B.O. Savile spoke on "Some plant-geographical problems in the Queen Elizabeth Islands".

The life of the polar bear. By C.R. Harington [1].

In briefly outlining the life of the polar bear, it seems best to start at the beginning. This beginning may occur along the Colville River in Alaska, on the coasts of Wrangel Island, northern Novaya Zemlya, Franz Joseph Land, or Spitsbergen, near Scoresby Sound in Greenland or on northeastern Baffin Island. These are only a few of the important denning areas in the bear's circumpolar range. But we must focus more closely still to find the locations usually chosen as den sites. In the following account the life of one typical family will be described.

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[1] Canadian Wildlife Service

In early October the pregnant female searches for deep snowbanks on the south-facing slopes of hills or valley sides. Usually the thickest drifts are situated well up the slopes and to leeward of the prevailing wind in the region. She excavates her den, seldom leaving it before, or soon after, giving birth unless her hunger is urgent.

Early in December she enlarges her dwelling prior to bringing forth twin cubs - a male and a female. The cubs are remarkably small, measuring about 10 inches in length and weighing 750 grams, or little more than 1 1/2 pounds. They are blind and deaf, being unable to see or hear well until a month or more after birth.

During the first few months, the mother suckles them almost continuously on her fat-rich milk. Polar bear milk has the appearance and consistency of cow's cream; it smells somewhat like seal and tastes like cod-liver oil.

The oval-shaped, white-walled dens must be quite comfortable. The earliest den of the mother is small and may become very warm, as heat loss is decreased by continual depositions of snow above. This is shown by the thickness of ice found on the roof. The bear supplies the heat.

If we open a small hole in the two-foot-thick roof of the enlarged room in late February, we will see the irritated mother treading around in circles below. She has quickly emerged from her lethargic state and is uttering low growls. The two small cubs are cowering - backs to the wall - near the passage leading down to the mother's earlier room. Surprisingly, the den is very clean and there is little or no ice on the walls. A little fresh air and light penetrates through a ventilation hole, punched through the end of the room. The hole is almost 2 feet in diameter, and the room itself is 8 feet by 10 feet by 4 1/2 feet high. The temperature inside is just over 14° F; 37° warmer than the local air temperature.

In March or April when the noon sun becomes hot on the slope, the mother breaks out of the den. Soon after, she leads the young down to the sea ice. On their journey, the cubs play a great deal - sliding, tumbling, and wrestling with one another.

If we watch the group closely for a few hours during early April, we will observe the mother prowling, head down along the drifted leeward margin of some hummocky ice. Catching the scent of a snow-covered seal den, she crouches motionless before it - the cubs

behind following her example. With lightning-like blows of her paws she scatters the hard upper layer of snow, rises on her hind legs and drives both forelegs down with the entire weight of her body. The den collapses and the breathing hole is stopped with snow. She scoops out the young "whitecoat" seal within - almost simultaneously dispatching it.

Hunting polar bears are not always so successful though, because of their own misjudgment, alertness of the seals, or obstacles, such as great thicknesses of snow and ice covering the seal holes or dens.

If we look in on the family again at the end of April, we will catch sight of one of the cubs - about the size of a retriever - sliding down the drifted side of an iceberg. The second cub appears and both run up again and slide down on their haunches. Meanwhile, the mother is poised over a seal breathing hole a few hundred yards away. She is downwind of the hole and able to watch her cubs. Stretching out her left paw very slowly, she strikes the rising seal and pulls it out on to the ice, proceeding to immobilize it with paws, claws, and snapping teeth. The little bears scamper towards her, and although the cubs tug at the flippers, they eat little of the seal. In a short time the adult female has devoured most of her kill and the family departs.

Thus, during their early life on the pack ice, the young cubs follow their mother closely, and are usually attentive during her hunting lessons. But sometimes they may become impatient and succeed in spoiling her efforts. She is very solicitous of her young and appears to take such frustration philosophically; yet when extremely provoked she sends them head over heels with disciplinary swats of her paw.

Although lactation in adult females may continue for 21 months, the cubs are generally weaned by July. Before this time, they have acquired a taste for seal blood and fat.

By August or September, when much of the pack ice has broken up, drifted ashore, or melted (depending upon latitude and environmental conditions), the bears may vary their routine by wandering along the coast of an island or the mainland. They sniff continually for scent of washed-up seal, whale, or walrus carcasses - regardless of the fact that they may be Eskimo caches. At this time the small cubs seem to take pleasure in swimming with their mother. It is cooling, instructive, and safe - provided they keep close to her shoulders. When large

numbers of male polar bears gather at some of the carcasses near the coast, the mother may lead her cubs far inland to avoid danger from them and to feed heavily on succulent berries and grasses. The cubs weigh about 130 pounds by this time, and are becoming woredly wise under their mother's care and guidance.

Having built up a good fat supply before the winter becomes severe, the family once more occupies a snow den. Denning may take place later than October in this instance; especially if a good seal hunting area is found on the new ice of a fiord, and weather conditions are not unusually rigorous. The second den is larger than the maternity den, although no higher, and may consist of a big room with two adjoining smaller ones. Mother and cubs may interrupt their stay in the den, depending on weather conditions and physical needs. Sometimes a group of this nature is seen hunting well out on the fast ice in early January. In any case, by March the family is usually seeking out seal maternity "igloos", where tasty "whitecoats" may again be killed and devoured. If the bears happen to discover abundant patches of grass, not thickly covered by snow, while patrolling a stretch of coast, they may eat it to vary their diet.

When August has come again, the cubs - now 21 months old, 5 feet in length, and weighing over 400 pounds - will be seen along the coast of a small island completely surrounded by open water. They have been abandoned by their mother who has swum away to hunt by herself on the drifting ice farther north. Both young animals have fed well on a large walrus carcass found near one of the rocky, hauling-out areas, and once more have had small "salads" of grasses and scouring rushes.

The male cub is climbing over heavily eroded coastal rocks, while the female is one-half mile offshore, cooling herself by swimming and floating in the sea. Soon they will have to face the long winter without their mother's care and help. It will be a test of their learning, their strength, and their skill. Having become separated, they may still wander over the dark, snow-covered coasts in mid-December, but will take shelter temporarily during storms. They are prey to starvation if they have been unable to store sufficient energy in fat, and rarely may be prey to wolf packs.

Probably the female reaches sexual maturity in her third year and the male in his fourth. Their mother can mate again the third year after the birth of her cubs. However, if the female loses her cubs, she is able to mate and conceive again the following spring.

Mating centres around mid-April, but may last from March to May, or even later.

If we focus our attention on the mother polar bear, the spring after she has left her young, we will see that she is followed by two adult male bears who have had little trouble detecting her trail, owing to the fact that she has urinated at brief intervals. The younger of the bears in trying to approach the female has been threatened and wounded by the larger male after a short, vicious scuffle. He has been bitten particularly severely in the hind-quarters, but still trails the female. His opponent approaches her, and they remain close together, often wandering around in small circles, touching each other simultaneously with their muzzles.

Not long after mating, the animals part. The female continues her normal routine of hunting, grazing, and scavenging, until implantation of the blastocyst takes place, and the embryo begins its development, perhaps in early October. Influenced by these internal changes, she moves inland along a steep-sided stream valley, searching its banks for suitable drifts in which to make her new maternity den. In mid-October she begins clawing out a den near the top of a heavily drifted slope facing south-southeast. Its elevation is approximately 800 feet above sea level. Unsatisfied, she leaves the pit with its scattered chunks of snow and builds her final den at a higher level, in deeper snow.

It is worth noting that adult male bears (perhaps one for every ten females) may den nearer the coast and at lower levels from September to December or even January. In some cases their dens may be used as a centre for hunting operations, or as a temporary shelter during very poor weather. Many adult males hunt continuously during the winter.

If we catch a later glimpse of the first male "cub" mentioned (now six feet in length) after he has just passed his fourth winter, we will find him hunting for seals along a tension fracture in the ice. He has just departed from the south-facing slope of an island nearby, where he had lain, basking and dozing in the warmth of the April sun. Surprised, he looks up to see an Eskimo with his dog team 300 yards away. He quickly rises up on his hind legs to test the new scent; drops to all fours and moves hesitantly forward, as if curious, to a distance of 200 yards. The Eskimo cuts his dogs loose, just after the bear has swivelled and galloped awkwardly over a narrow promontory of the island. Still rather inexperienced, the bear finds himself surrounded on flat ice with no protecting ice hummocks at hand.

The snarling huskies surrounding him make periodic, sharp attacks, nipping at his hind legs, while he continually turns and swats at them. Although one of the leaping sled dogs is accidentally shot in the confusion, the second and third bullets from the Eskimo's rifle hit the bear's neck and head, and he slumps down with clenching jaws.

Had this bear lived to a greater age, he would probably have approached his maximum size by eight years. Fully adult males commonly measure eight to eleven feet in total length and may weigh about 1,000 pounds. Their muscular development at this stage is truly amazing. Females appear to grow little after their fourth year. Adult females commonly weigh 700 pounds, being approximately 25 per cent smaller than the fully adult males.

It has been estimated that polar bears remain fertile to 25 years of age. With respect to life span, one female in the Washington Park Zoo in Milwaukee died a natural death at the age of 35. It is recorded that another polar bear lived to an age of 40 years in the Regent's Park Zoo, London.

Many injuries may be sustained by the white bears as they grow older. Numerous gashes can be received in fights during the mating season. These show up as scars on the bear pelts, and are much commoner in older bears. Small septic wounds in the feet are also common. They have been known to cause inflammatory synovitis, and consequently lameness in walking. Arthritis deformans and osteo-arthritis are not unusual. Bone fractures of ribs, carpus, tarsus, zygoma, and possibly the lower jaw have also been observed. Decayed and broken teeth are a normal affliction of very old polar bears, and must cause them considerable pain. As far as I know, ectoparasites have never been found, and, apart from Trichinella worms which are often embedded in the diaphragms of older bears, internal parasites of the polar bear are poorly known.

The injuries and infections mentioned - combined with other mortality factors, such as killing of the young by older polar bears, and rare losses to wolves and adult male walruses - plague the species throughout life.

In conclusion, I wish to emphasize the great influence of man on the polar bear. He is not only displacing the animal in its ecological niche as a ruling carnivore of the arctic coasts, but, in a methodical and efficient manner, hunts the seal - the main prey species of the polar bear. Not stopping here, man has become the primary predator of the bear itself.

Anthrax and the bison. By John S. Tener [1].

Anthrax, an old scourge of man and livestock, appeared quite unexpectedly in a population of bison 60 miles north of Fort Smith, Northwest Territories, in July 1962. Anthrax is a bacterial disease, which is spread not through contact with a sick animal, but by ingesting spores produced by the disease which may be present on vegetation or in soil or water. It is almost endemic in some parts of eastern Canada but until the outbreak in bison it had never been found in wild animals in this country.

The bulk of the bison population in Canada is found in Wood Buffalo Park, a 17,300-square-mile area in Alberta and the Northwest Territories. At present there are about 10,000 to 12,000 bison in the park. In addition some 3,000 bison roam outside the park limits, north of the 60th parallel in the Northwest Territories. It was the latter group in which the outbreak of anthrax occurred.

On 28 July, 1962, G.B. Lolenosky of the Canadian Wildlife Service, while making a range survey in the Hook Lake area on the east side of the Slave River, observed 32 dead bison, some 15 miles from the northeast boundary of Wood Buffalo Park. Ottawa was at once notified and pathologists of the Canadian Wildlife Service and the federal Department of Agriculture undertook field examinations of carcasses, collected specimen material, and sent it to laboratories for examination. The Provincial Laboratory in Edmonton made the first diagnosis of anthrax on August 8 and this was confirmed by the federal Department of Agriculture Veterinary Laboratory in Lethbridge on August 14.

On that day in Ottawa senior officials of the Departments of Northern Affairs and National Resources, Agriculture, Citizenship and Immigration, and National Health and Welfare met to formulate general plans to effect control of the outbreak; the execution was delegated to the various departmental representatives in Fort Smith. On August 17 the sport hunting of bison, which had been allowed in the area since the fall of 1959, was prohibited for the approaching season because of the danger of the disease to man and of its spread to uncontaminated areas.

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On September 27 the Minister of Agriculture signed a quarantine order covering a large segment of the country between Great Slave Lake and the 60th parallel. This had the effect of prohibiting the carriage of bison or bison products out of the area. The public in nearby settlements were informed of the action by the press and by radio announcements.

Altogether 281 bison were found dead in a 700-square-mile area (60° 35N., 112° 15W. to 61° 00N., 113° 15W.) and 8 sick animals were shot for examination. In the summer months the bison in this area on the east side of the Slave River are isolated from the rest of the animals in the park, but unfortunately this is not the case in the winter when the animals can cross the river on the ice.

The control operation was of considerable magnitude. An outbreak in domestic livestock can be relatively easily controlled, as infected carcasses are found quickly and burned or limed and buried, other livestock are inoculated, and a tight quarantine placed around the outbreak. In wild animals, which may be widely scattered in densely forested areas or in meadows in country difficult to travel through, the problem is much more difficult. However, the steps taken to control the outbreak in bison were essentially the same as employed with domestic animals. Carcasses were limed and buried under eight feet of soil. Those which could not be buried were burned until nothing but ash remained and the ash was then limed. An attempt was made to burn the entire infected area to discourage the animals from returning to it, but this proved impossible because of the wetness of the ground and vegetation. Inoculation of surviving bison was not possible.

The field parties disposing the carcasses were under the supervision of Dr. William Norton, a federal Department of Agriculture veterinarian. By August 20, forty men, five caterpillar tractors, two bombardier snowmobiles, and one bombardier muskeg tractor were on the scene and an isolated base camp set up. Using a helicopter, a crew spotted and flagged every buffalo carcass that could be found. Disposal of the carcasses was completed by September 5 and burning operations ceased on October 4. During the entire operation strict measures were taken to ensure the good health of crews by decontaminating clothing and all equipment, including bulldozers and helicopters. However, two men, who were employed in the initial stages of the outbreak before the disease was diagnosed, contracted anthrax. Because of prompt medical action both men recovered.

Apart from being an expensive operation - it cost over $100,000 to control the outbreak - the appearance of the disease had a serious effect on the sport hunting business. Unfortunately, anthrax spores are extremely hardy, resisting very low temperatures and dessication, and may live in the soil for twenty years or more. The disease may be transmitted from an infected animal to a healthy one by biting flies and the spores may be carried by any bird or mammal (including man) which comes in contact with them. The outbreak, besides presenting a danger to the remaining bison, presents a potential threat to migrating barren ground caribou and other big game.

It is not yet known how the disease was introduced. Any one of a number of ways, such as by birds, mammals, or even man, may have been instrumental in bringing the disease to the area. It is certain, however, that the disease will remain a potential danger for decades and will require careful attention for a long time. The Wildlife Service has initiated a three-year study in the outbreak area to try to determine the extent of the disease in bison and to attempt to determine how it arrived in the first place.

Jacobsen-McGill Arctic Research Expedition: permafrost investigations at Winter Harbour

During the fall and winter of 1961-2 a group of oil companies, headed by Dome Petroleum Limited, drilled an oil well at Winter Harbour, Melville Island, to a depth of 12,540 feet. Winter Harbour Well No. 1 is about 3/4 mile from the sea on an elevated strand line 75 feet above present sea level. The well, which was the northernmost oil well in the world, was declared dry and was handed over by the Dome Petroleum Group to the Jacobsen-McGill Arctic Research Expedition for research purposes. To comply with petroleum regulations of the Canadian Government the expedition had the hole cased with 9 5/8-inch casing and plugged with a 150-foot cement plug at 2,000 feet. The casing was then filled with arctic diesel oil. The expedition decided to install a thermistor cable in this hole to measure the depth of permafrost and the temperature gradient. It is expected that analysis of temperatures measured will yield information on recent climatic changes and post-glacial emergence in the northern Canadian Arctic.

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The permafrost team of the expedition, consisting of A.R. Lachenbruch and Gordon Greene, both of the Geophysics Laboratory, U.S. Geological Survey, George Jacobsen, Department of Geography, McGill University, and A. Milis, Peter Bawden Drilling Company,

left Edmonton on July 19 by R.C.A.F. aircraft for Resolute. The following day, an Otter aircraft of Bradley Air Services equipped with low-pressure tires, piloted by R. Dublicquy, flew the party to Winter Harbour.

On July 21 the thermistor cable was successfully installed to the planned depth of 2,000 feet, the depth to which the hole had been kept open with casing. The cable contains 25 thermistors, each on a separate circuit and spaced at regular depth intervals. After installation, thermistor resistances were measured from the surface with a Wheatstone bridge and resistances were converted to temperatures from calibration tables previously prepared for each thermistor.

These preliminary measurements, accurate to about 0.01°C, indicate that sub-freezing temperatures presently extend to a depth of about 1,500 feet in the recently completed well. As the temperature of the circulating drilling fluid was substantially greater than natural ground temperatures in the upper 2,000 feet throughout most of the eight months of drilling, the temperatures at each depth are not expected to approach their pre-drilling values for several years. The cable will be left permanently in place and read periodically.

The party returned to Resolute by Otter aircraft on July 25. The operation had been greatly speeded by extraordinary good weather. From Resolute the party took the Nordair scheduled flight to Montreal.

The temperature cable and all the electrical measuring instruments were supplied by the Geophysics Laboratory, U.S. Geological Survey, Menlo Park, California, which also looked after the transportation of Messrs. Lachenbruch and Greene from Palo Alto to Edmonton and Montreal respectively. A contribution for casing and plugging expenses and northern transportation was given by the Northern Coordination and Research Centre of the Department of Northern Affairs and National Resources.

"Paddle and portage across the Barrens"

At the Annual Dinner on 11 December 1962, Mr. Eric W. Morse described his experiences on a canoe trip from Artillery Lake to Baker Lake. The party of four were flown from Yellowknife to the head of Artillery Lake on July 14 with their two 16-foot aluminum canoes and equipment by an Otter aircraft on floats. The members were: Mr. and Mrs. Eric W. Morse, A.R.C. Jones, and W. Nicholls.

Although it was a pleasure trip, time was important as the party had to reach Baker Lake to catch a weekly aircraft. The following notes were compiled by Mr. Morse, at the request of the R.C.M.Police, to assist other travellers in small craft, particularly over the same route.

Notes on a trip in 16-foot canoes from Artillery Lake to Baker Lake by way of the Hanbury and Thelon rivers, 1962. by Eric W. Morse

Maps and navigational aids

In 1962 the best maps available for this section were the Topographical Survey 8-mile-to-the-inch sheets. For certain sections of the Hanbury River and for two archipelago sections of the Thelon River we took along air photographs. Their large (better-than-one-mile-to-the-inch) scale was an advantage. A warning in the use of air photographs, however, is that in shallow sections a different water-level from that prevailing when the photograph was taken can be confusing. Also, channels tend to shift from year to year.

The required maps can be bought at 50 cents per sheet from the Map Distribution Section of the Department of Mines and Technical Surveys, Ottawa. Air photographs can be obtained from the National Air Photographic Library, Ottawa, at 50 cents per print.

Firewood

A party travelling by this route should know that not a stick of wood grows west of Lac du Bois (so named) nor east of a point about 25 miles above Beverly Lake, that is, for more than half the total distance. Nevertheless, driftwood is to be found sporadically in the upper waters of the Hanbury; and also below the forested section of the Thelon as far as the head of Aberdeen Lake. Our party carried two pocket Primus stoves and a gallon of gasoline, but by good luck, diligence at every stopping point, and portaging firewood over all but the longest portages, these stoves were required for only three meals in three weeks.

Firearms

Because of the risk of meeting a solitary, socially mal-adjusted muxkox bull or a Barren Grounds grizzly, the Department of Northern Affairs advised the party to be armed. Actually we had no occasion to use arms.

We took a .375 magnum revolver (for which a licence from the R.C.M. Police is required) and a .303 Lee Enfield carbine with the heaviest procurable bullet. There should be no difficulty in selling a rifle at the end of the journey at Baker Lake, at its cost in Edmonton or Winnipeg.

Fishing

The fishing along this whole uninhabited route is on the whole excellent, but not uniformly so. The fish caught were lake trout, pike, and grayling (in that order); char are reported present on the lower Thelon. Lake trout were caught trolling at ordinary paddling speed and, owing to the coldness of the water in the big lakes, were right at the surface. All the proteins required on this route could be fished for, but the time required for sometimes indifferent fishing should be taken into account in scheduling. Our schedule was based on requiring no fish, except as a pleasant supplement where we were pinned down. A 2 1/2-inch gill net might be useful to have in hand for such emergencies.

Rapids in general

Because of the distance from help, more than ordinary care in inspecting rapids in this wild area is recommended. Also, canoeists unfamiliar with rapids in this latitude should be aware that the tremendous mass of the running spring ice tends to spread out an apron of large boulders at the foot of most rapids, which looks quite harmless from upstream. Inspection should always be carried to the foot of any steep rapids in the rocky sections. On the other hand, in sections where the river bed cuts through sand, clay, or gravel (which is characteristic of most of this route) less care in pre-inspection is required. For a mile or two at a time, rapids and fast water can be run with no more precaution than taking the bends wide for maximum visibility, and standing up from time to time in the canoe. The ear gives enough warning to land and reconnoitre the few necessary spots more thoroughly.

Portages

There are about eight miles of portaging on the Hanbury and one mile on the lower Thelon; but it would be a disservice to paddlers on this route to suggest that there was any set place to take out, or put in, or a given side to run the rapid. These questions are completely dependent on the current water-level and inspection is required.

J.W. Tyrrell (1900), travelling the Hanbury three weeks earlier than we did, had a good deal less portaging. W.H.B. Hoare (1928) travelling later in the summer, had more portaging. By and large, we found Tyrrell's survey report (Ann. Rept. Dept. Int. for 1901) extremely helpful. Tyrrell indicates both the length of the portage and the side on which to portage. The navigation notes below merely up-date or add to Tyrrell's notes, where necessary. It should be stressed that there is no set portage path as in travelled areas. On the other hand, caribou trails are present everywhere, and there is nothing to obstruct vision.

Navigation notes at a few special points

Rapids at foot of Siften Lake: Tyrrell here portaged 500 yards on the left. At lower water we found landing difficult, and the left bank extremely rough with big rocks piled everywhere; we therefore lined down the left side of the rapid, shooting the last bit.

Portage below Hanbury Lake: Of this mile-and-a-half rapid, Tyrrell ran two-thirds. Hoare, travelling in September, was forced to portage the full distance. The first drop at the outlet of Hanbury Lake certainly should be portaged; the other dangerous section is a gorge heading southeast just around a big bend. The level of the water, the steepness of the banks, and the zig-zag water course made us decide that more time might be lost in reconnoitring, loading, and unloading than would be saved in running part of the rapid. We portaged a good mile in a straight line, roughly a continuation of the first leg of the rapid, on the left side; and ran the last half-mile of the rapid. A party in less of a hurry might save sweat by taking time to reconnoitre for a safe take-out around the big bend, above the dangerous gorge.

Dickson Portage: This is a two-and-a-half-mile portage in nearly a straight line, on the right side. The foot of the portage is a prominent bay across from a cut esker, well down from the end of the canyon, and visible from the hill a mile from the end of the portage. The canyon walls, not visible from the hill above, make it impossible to put in sooner.

Helen Falls Portage and last rapids: A mile above Helen Falls the river enters a low canyon, a point which Tyrrell ignores. Care should be taken to watch for the beginning of the canyon walls, or there is risk of being trapped into being carried over the 60-foot Helen Falls. Moreover, the canyon continues below Helen Falls to the last rapid, half a mile below, making it very difficult if not impossible to get down to the water between the two falls.

After reconnoitring, we found a small cove on the left, just around the first turn in the canyon and above the first broken water, which permitted a take-out after running this first bit of the canyon, and thus reducing the total length to portage. Then we portaged along well-grooved caribou tracks a full mile to a point opposite the last rapids, whence there are steep caribou trails down to water-level. Though Tyrrell portaged on the right, the portaging terrain is much better on the left side.

This last canyon on the Hanbury is a danger spot for the unwary. The procedure recommended is:

1. At the beginning of the canyon, above where it starts its sharp left bend, get out on the right and reconnoitre around the corner to identify the tiny cove on the left side where there is a take-out and access up the steep bank.

2. Paddle slowly down the left side with canoes well spaced apart to this take-out.

3. Portage the full mile past Helen Falls to the last rapid.

Short-cut between Beverly and Aberdeen lakes: The big-lakes section of this route, extending for 150 miles below the head of Beverly Lake, is by far the most hazardous for small craft. Very strong polar winds, though not normally due so early, hit us on Beverly Lake on July 26 and hardly let up day or night for ten days. The north shore of these lakes offers both better protection and a more direct course. A serious difficulty here, however, is that Beverly Lake has its outlet on its south shore. By going up a long deep bay at the east end of Beverly Lake and portaging only a half-mile over to a point just a couple of miles above the entrance of the Tibielik River, it is possible to cut fifteen miles off the river course and to stay on the windward shore.

Rapids below Schultz Lake: About eight miles below Schults Lake is a rapid which has claimed a few lives. It should be approached with care, from the right side, where there is a "gate"; but this requires going at a 45-degree angle to a very heavy current with ten-foot standing waves below. An outboard can manage this, and a lightly laden canoe might make it if it had at least four paddlers. The Tyrrell brothers' crew of picked Iroquois made it in an unloaded canoe in 1893. Hanbury in 1899 portaged it; and this would seem sensible for any small canoe. The portage is a mile long, dead straight, from the deep bay south (right) of the rapid over the

saddle of a prominent ridge running parallel and close to the river course; this brings the canoe to the river again about a mile below the start of the big rapid.

Final Thelon Rapid, eight miles above Baker Lake: The Thelon passes through a formidable unnamed, turbulent gorge about eight miles above its mouth. For small paddled craft the recommended course is to avoid the turbulence of the centre and run down the right side, keeping just outside the eddies; white water on the right side at the end of the bend is a warning well before this point to start gradually working over to the left bank and to shorten the distance out.

Schedule

Early records show risk of enough ice on the big lakes in some years to impede canoe progress as late as mid-July. Our recommended schedule is:

Date	Camp at or near
July 14	Head of Artillery Lake
July 18	Foot of Sifton Lake
July 22	Junction of Hanbury and Thelon
July 25	Lookout Point
July 27	Head of Beverly Lake
July 29	Head of Aberdeen Lake
Aug. 5	Foot of Schultz Lake
Aug. 6	Baker Lake.

On river sections we averaged 38 miles per day and on long portaging sections 10 miles per day; on big lakes the schedule should allow for being windbound for one day in two, or for covering only fifteen miles a day.

Soil-inhabiting and plant-parasitic nematodes of the Lake Hazen area, Ellesmere Island, 1962. By Roland H. Mulvey[1].

Collections of soil-inhabiting and plant-parasitic nematodes were made between 18 June and 21 July 1962 at Hazen Camp (81° 49N., 71° 18W.) of the Defence Research Board, on the north shore of Lake Hazen. This collection is the first to be made of these microscopic unsegmented worms in the Canadian High Arctic. The

1. Chairman, Nematology Section, Entomology Research Institute, Canada Department of Agriculture.

only previous collection in the Canadian Arctic came from stations along the western mainland coast and Alaska and has only recently been reported upon. It was taken during 1915-16 by a member of the Canadian Arctic Expedition of 1913-18 and includes 22 genera, comprising 47 species.

The Lake Hazen collection consists of at least 30 described and several undescribed genera, comprising 60 or more species. Two of these genera are important for the damage they cause to the vegetation. Anguina agrostis (Steinbuch), which attacks the inflorescence of Arctagrostis latifolia, and a Ditylenchus sp., which causes galls in the leaves of Dryas integrifolia, were found in several locations in the Lake Hazen area.

I am indebted to the Defence Research Board and to Dr. G. Hattersley-Smith, the leader of Operation Hazen, for making available the facilities at Hazen Camp.

Subscriptions for 1963

Members are reminded that their subscriptions for 1963 ($2.00 for Ottawa members, or $3.00 for combined membership for husband and wife, and $1.00 for out-of-town members, other than institutions) are payable to the Treasurer, Mrs. A.H. Macpherson, Box 68, Postal Station "D", Ottawa.

Change of Address

Members are earnestly requested to advise the Treasurer, Mrs. A.H. Macpherson, Box 68, Postal Station "D", Ottawa, promptly of any change of address.

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. G.W. Rowley,
245 Sylvan Road, Rockcliffe,
Ottawa 2, Ontario.

THE ARCTIC CIRCULAR

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One hundred and twenty-second meeting. The one hundred and twenty-second meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on April 9.

Mr. W.E. Taylor spoke on "Archaeological problems in the Canadian Arctic".

One hundred and twenty-third meeting. The one hundred and twenty-third meeting of the Arctic Circle was held in the No. 9 Transport Company Mess, R.C.A.S.C. on May 14.

Mrs. Alma Houston spoke on her impressions of living in the Arctic, based on her five years of residence at Cape Dorset.

Work of the Division of Building Research, National Research Council in northern Canada.

By G.H. Johnston [1].

The activities of the Division of Building Research of the National Research Council in northern Canada have been reported to 1961 in some detail in an earlier article (Arctic Circular, 1961, Vol. 14, pp. 28-35). This note will describe the work carried out from that time until December 1962.

A re-arrangement of the northern work of the Division was made early in 1961. Problems of building superstructure design, differing in degree and not in kind from those in other parts of Canada, are now the responsibility of the Housing Section. The Northern Research Group, responsible for engineering studies of permafrost, has been made an integral part of the Soil Mechanics Section of the Division.

1. Published with the permission of the Director of the Division of Building Research, National Research Council, Canada.

Foundations in permafrost: Field observations were continued at Inuvik, N.W.T., and at the Kelsey Generating Station on the Nelson River in northern Manitoba in order to follow the performance of various structures erected on permafrost at these sites. Inuvik is located in the continuous zone of permafrost, and little or no trouble has been experienced with foundations there. Large-scale ground subsidence resulting from thawing of ground ice in disturbed areas, e.g. borrow pits, has occurred, however, and has affected short lengths of utilidor lines, necessitating remedial maintenance. Kelsey is in the discontinuous zone, where perennially frozen ground occurs in scattered patches. Significant settlements (up to 4 feet) of two major sand-fill dykes built on permafrost have required that additional material be placed in 1962 to bring the dyke crests up to grade. Periodic measurements of ground temperatures and foundation movements are being continued at both locations.

Mackenzie delta lake investigations: The magnitude of the thawing effect of water in contact with permafrost is a problem of considerable interest to engineers engaged in construction work that may involve the flooding of areas underlain by perennially frozen ground. As a first approach to providing some information on this effect, a drilling programme was carried out in April 1961 to determine the present level of permafrost under a small lake in the Mackenzie River delta near Inuvik.

Four holes were drilled to depths of 115 to 260 feet, one under the centre of the lake and three at varying distances (33, 132, and 550 feet) from the shore. No frozen ground was encountered in the hole (230 feet deep) under the lake, but it did occur throughout the three other holes. Ground temperature measurements indicate that the permafrost is about 250 feet thick at a distance of 130 feet from the lake, and about 300 feet thick 550 feet from the lake (Johnston and Brown, 1961[1]).

Because of the increasing interest and importance of problems of this nature, a simple graphical method for estimating the temperature regime in the ground and the resulting position of the permafrost table under shallow bodies of water, assuming steady-state conditions, was derived. For more complex and irregular situations involving a great deal of calculation, programmes were devised for the Bendix G-15 and the IBM 1620 computers.

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[1] Johnston, G.H. and R.J.E. Brown, 1961. "Effect of a lake on permafrost distribution in the Mackenzie River delta, N.W.T." Nature, Vol. 192, No. 4799, pp. 251-2.

Thompson, Manitoba: At Thompson, located in the southern fringe of the permafrost region, perennially frozen ground occurs in scattered patches of varying thickness and depth below the ground surface and has a temperature close to 32°F. Construction operations in this area are complicated by difficulty in predicting the existence of permafrost. In addition, very little disturbance or change in the local environmental conditions, such as removal of the insulating moss cover or erection of a building, will cause significant thawing. Large-scale settlements may result from thawing because of the thickness of the extensive ice lenses in the soil.

Detailed studies have been carried out to determine the occurrence and distribution of permafrost in the townsite and adjacent areas. Special emphasis was placed on a study of climatic factors and terrain features, e.g. relief, drainage, and vegetation, in an attempt to establish correlations between these features and the existence and location of the permafrost bodies. Ground temperatures are being measured at selected locations. Surface and subsurface observations have revealed that perennially frozen ground is generally found in gently sloping, moderately drained areas with sphagnum moss cover. Permafrost was not encountered in poorly drained, low, flat sphagnum-moss-covered areas, or in well-drained, high areas free of sphagnum moss and adjacent to the sloping areas. Exceptions were noted, however, that are not easily explained because of the complex interrelationships between the various factors affecting the existence of permafrost.

Engineering studies have also been initiated to follow the performance of the various types of foundations constructed in the townsite. Reference points have been established on a number of buildings so that movements can be followed by means of level surveys. Several deep bench-marks were placed to depths of 40 to 60 feet to facilitate these observations. A number of buildings have experienced differential settlements of as much as 2 feet as thawing of the underlying frozen ground occurs.

Permafrost distribution: The collection of information on the occurrence and distribution of permafrost in Canada has continued, with particular emphasis on the southern portion of the permafrost region. These studies indicate a lack of information on the more southerly occurrences of permafrost primarily in the northern parts of the western provinces, and a programme of field investigations in these areas, to be carried out over the next few years, has therefore been planned.

A start was made in September 1962 when a detailed survey was made of permafrost distribution along the Mackenzie Highway from Keg River in northern Alberta to Hay River, N.W.T. Air photographs were examined and probable areas of permafrost, selected on the basis of terrain features, e.g. relief, drainage, and vegetation, were investigated in the field. Permafrost was predominantly associated with muskeg areas, which had a sphagnum moss cover and were not too wet. Observations were made to determine the extent and thickness of the permafrost bodies, wherever possible, as well as the depth to permafrost, the type of vegetation and thickness of surface cover, and the type of soil and ice occurrence. Further field work will be undertaken in northern Saskatchewan in 1963.

General permafrost investigations: Observations of ground temperatures at depth in permafrost were made at various locations in northern Canada. Two 100-foot thermocouple cables at Inuvik, one 200-foot cable in the Mackenzie delta, and two 200-foot cables at Norman Wells were read at intervals to provide information on the thermal regime at these sites.

Five thermocouple cables were fabricated and installed to depths of from 50 to 200 feet at the site of a proposed asbestos mining development in northern Quebec near Sugluk. Six cables were also fabricated and installed to measure ground temperatures at depths from 50 to 200 feet at the iron mines near Schefferville.

Instrumentation: The measurement of ground temperatures forms an important part of all field studies of permafrost. Considerable time has been spent in developing and improving measuring equipment and methods, and instrumentation to provide reliable results. Recently a detailed study of the factors affecting the measurement of ground temperatures was conducted in both the laboratory and the field, with special emphasis on the use of thermocouples and various types of reading instruments. Some modifications to equipment in use at present have been made as a result of these investigations. The development of a small light-weight recorder for the measurement of maximum and minimum ground temperatures at various depths in a borehole (which will run unattended for about one year) is also under way.

Northern housing: Studies of prefabrication, undertaken initially in relation to housing in the north, have been extended to include the study of the application and development of prefabricated systems to housing in Canada generally. The information obtained in this way can be readily applied to northern housing because the technical problems are very similar.

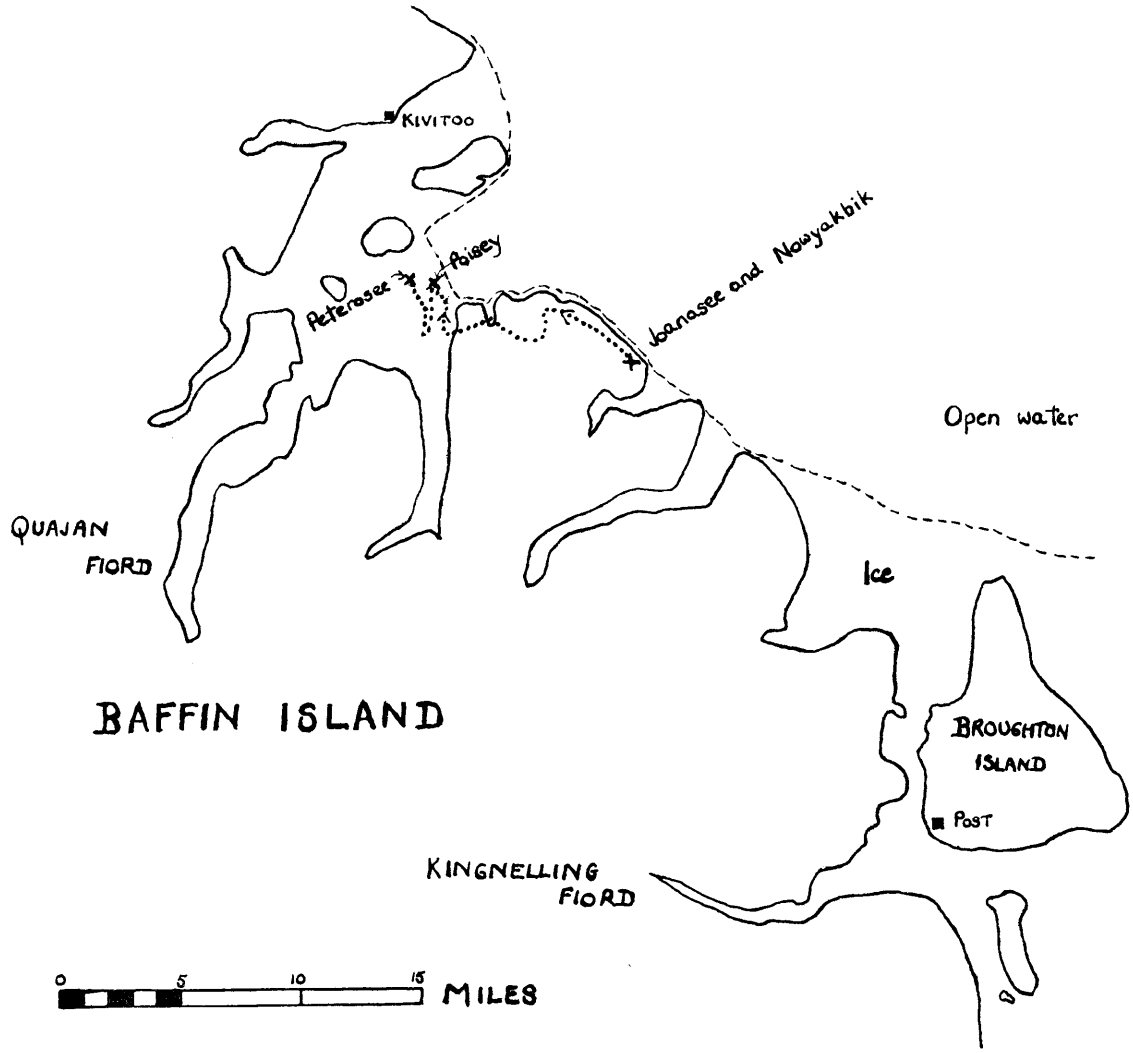
Serious condensation problems have been reported in houses and buildings at several northern settlements. During 1962 a member of the Housing Section visited these sites to make a survey of the problem; as a result a detailed programme for studying the performance of houses during the winter of 1962-3 has been organized. This study will consist of a regular survey of temperature, humidity, and condensation in selected houses in which certain construction modifications have been made. A report will be prepared on this survey in 1963.

Accident at Broughton Island: the miraculous survival of Joanasee

On 19 January 1963 Nowyakbik (E6-71), Peterosee (E6-74), Poisey (E6-75), and Joanasee (E6-148), four Eskimos from Kivitoo on the east coast of Baffin Island, visited Broughton Island to trade at the Hudson's Bay Company. At about 9.00 o'clock in the morning of January 22 they left with their supplies to return to Kivitoo some fifty miles away. Nowyakbik, who at 63 was much the oldest of the party, and Peterosee (26 years old) were together with a team of eight dogs, Joanasee (31 years old) had six dogs, and Poisey (33 years old) on a third sledge had eight or nine. Heavy snow had fallen during the night but after they left there was a very strong northwest wind which lasted for three days.

On January 28, six days later, eight dogs seen in the settlement at Broughton Island were recognized as being those that Poisey had been driving when he left. One had no harness, three appeared to have been unhitched as there were no traces attached to their harnesses, and the other four had harnesses with the remains of heavy duck traces which had been chewed through. One dog looked as if it had been in the water. The Eskimos at Broughton Island were at once very concerned about the fate of the travellers who had remarked to them on the poor ice conditions along the headlands between Kivitoo and Broughton Island with the ice moving in and out with the tides. It seemed likely that the four men had drifted out into Davis Strait on ice that had broken off from the land.

This information was passed to Frobisher and arrangements were made for the R.C.M.Police Otter to carry out a search. The aircraft, piloted by S/Sgt. J.F. Austin and with Cpl. C.B. Alexander and S/Const. Joanasee, arrived at Broughton Island during the afternoon of January 30. There was no time to begin the search before dark and the rest of the day was spent in getting detailed information. Take-off next morning was at 8.00 a.m. in calm but cold weather.


KIVITOO
Paisley
Peterosee
Joanasee and Nowyakbik
Open water
QUAJAN FIORD
Ice
BAFFIN ISLAND
BROUGHTON ISLAND
Post
KINGNELLING FIORD
0
5
10
15
MILES
..... Route followed by Eskimos
----- Limit of landfast ice

The coast to the northwest, between Broughton Island and Kivitoo, was first searched. The ice had broken off from the land into pieces of various sizes, and calm weather for the past thirty-six hours had allowed many of the leads to refreeze. This ice was then searched for about ten miles from the shore. More than ten miles out into Davis Strait the ice was very scattered and there was much open water.

After searching the ice for about three hours the aircraft began to pick up heavy hoar frost from fog near the open water and it was decided to search the coastline again where the sun might melt the frost off the aircraft. After about half an hour a dog was seen walking along the coast toward Broughton Island half-way between there and Kivitoo. Three more dogs were then seen to be following it but there was no further sign of life and the search moved again to the ice between there and Kivitoo. Again there was nothing and the search returned to the area where the dogs had been found. This was on a long, low, narrow shelf beyond which mountains up to 3,000 feet high rose in a sheer face. On the second pass over this shelf several more dogs were noticed in a small crevice near the shore and on rechecking a man was seen sitting up in a sleeping bag and waving his arms.

The police aircraft could not land near the crevice so arrangements were made for the Okanagan helicopter under charter to the D.E.W. Line to fly to Broughton Island where it picked up Cpl. Alexander and S/Const. Joanasee and took them to the crevice. Here they found Joanasee, wearing only a light shirt and trousers with an eider-down pulled around him and with his bare hands and feet severely frostbitten. He said the others were dead and pointed to the body of Nowyakbik, which was also in the crevice and parts of which had been eaten by the dogs. The crevice was about 100 feet long, 25 feet deep, 30 feet wide at the top, and four feet wide at the bottom. Joanasee was carried to the helicopter and taken first to Broughton Island and then to Frobisher and on to hospital in Montreal.

According to Joanasee the four men had had difficult travelling after they left Broughton Island. About the third night (it was probably the second night, January 23 - Editor) they camped as usual and built a single igloo on the sea ice, a short distance from the shore. Early in the morning they were awakened by the igloo falling in and the surrounding ice breaking up. All four men ran outside and made for the shore followed by the dogs. The other three were fully dressed; Joanasee had neither mitts nor boots but he alone carried his sleeping bag to shore. They had not been able to save any equipment or food

and Poisey and Peterosee decided to try to make Kivitoo on foot, starting off almost immediately and followed by some of the dogs. It was still blowing hard and the wind continued all day. Next morning was calmer but visibility was poor. Nowyakbik and Joanasee had got into the wet sleeping bag and they tried to keep each other warm. For three days they got weaker and colder and on the fourth night Nowyakbik died. The dogs dragged his body out of the sleeping bag and for four more nights Joanasee stayed there keeping the dogs away from himself. He had had nothing to eat since arriving on the shore.

On February 1 the helicopter returned first to the crevice and then flew on towards Kivitoo. Another dog was soon seen and its tracks were followed by helicopter. The ice had broken off completely from the shore and it was obvious that the two Eskimos would have had to walk inland over the mountains. A search on the ground found their tracks and these were followed both by foot and by using the helicopter. Poisey and Peterosee had had to climb to 3,000 feet, down into a valley nearly at sea level, over a range of mountains 2,000 feet high, across a small fiord and over a last headland of 1,000 feet. They had then started to walk in a straight line across the ice to Kivitoo, but half a mile from the shore the body of Poisey was found in the snow. A single set of tracks showed that Peterosee had then walked three miles south, discovered he was going in the wrong direction, and retraced his steps for half a mile before turning towards Kivitoo. A quarter of a mile further on his body was found, only about eight miles from his destination.

Joanasee was discharged from hospital on 6 June 1963 having made a very good recovery. Both legs had to be amputated below the knee, but he had been fitted with artificial legs and was able to walk without crutches. His rescue was owing to a combination of fortunate circumstances, first that the aircraft had been forced by hoar frost to return to search the shore, then that seeing the dogs had concentrated the search on the right area, and finally that he was seen during the second that he was visible while the aircraft was passing over the crevice.

	Broughton Island		Kivitoo	
Date	Wind	Temperature	Wind	Temperature
22	NW strong	-4 degrees	NW very strong	-10 degrees
23	NW strong	-4	NW strong	-23
24	NW strong	0	NW strong	-26
25	Calm	-12	Unknown	-30
26	NW light	-27	Unknown	-26
27	Calm	-21	Unknown	-20
28	Calm	-18	Unknown	-24
29	NW very strong	-27	Unknown	-21
30	Calm	-30	Calm	-18
31	Calm	-13	Calm	-19

New communications systems in the Western Arctic.

Construction of telephone pole line down the Mackenzie River

Canadian National Telecommunications began construction in 1963 of a 1,020-mile telephone pole line down the length of the Mackenzie River from Hay River to Inuvik. The work is planned to be completed in the fall of 1965 at a cost of over $2,000,000. The Alberta District of C.N.T. will be responsible for the project.

This multi-channel system will provide simultaneous long-distance telephone, teletype Telex, air operational, and weather communications to Fort Simpson, Wrigley, Fort Norman, Norman Wells, Fort Good Hope, and Inuvik. In addition, Aklavik, Fort McPherson, and Arctic Red River will be linked to the system at Inuvik by very high frequency radio communications. Service will be instituted at successive communities as construction of the line proceeds northward and should reach Fort Simpson by spring 1964, Wrigley by fall 1964, Fort Norman by early winter 1964, Fort Good Hope by spring 1965, and Inuvik by summer 1965. At present C.N.T. has local dial telephone exchanges at Fort Simpson, Norman Wells, and Inuvik in addition to a microwave and pole line system linking Yellowknife and other communities around Great Slave Lake with the south via Hay River.

The new line, to be known as the Mackenzie Valley System, will parallel the river for all but the last 90-mile stretch into Inuvik. This will facilitate stockpiling of poles and other materials carried on the river by barge, and will provide easy access for summer maintenance. Most of the poles will be cut in the area using local labour.

The line will consist of two high-tensile strength polyethylene-covered wires and some 50,000 poles, 40,000 of which will be native timber to be used for tripod construction where muskeg, rock, or permafrost prevent standard single pole installation.

The survey of the route has been completed, and by the end of 1963 the first sixty miles of pole line had been constructed despite delays caused by flooding. The work of clearing the route and providing poles is well advanced. Erection of the poles and installation of the line is being done by three C.N.T. crews. At strategic locations, landing strips have been cleared for small aircraft. Snowmobiles will be used to patrol the line during the winter.

The project will require 18 repeater or "booster" stations, with those at Fort Simpson, Norman Wells, and Inuvik staffed by C.N.T. technicians. The others will be unattended units operated by local power or line-fed power. Twelve of the repeater stations will be supplied with 440-volt power carried over the telephone line itself. All repeaters will have a battery fall-back system should regular power fail. The radio links between Inuvik and Aklavik, Fort McPherson, and Arctic Red River should be installed by midsummer 1965. They will provide long distance service from these points when the pole line has reached Inuvik.

Scatter-wave system to Victoria Island

Canadian National Telecommunications has completed a $5,000,000 communications system between Hay River, their communications centre in the Northwest Territories, and Lady Franklin Point on Victoria Island. It is a 554-mile tropospheric scatter-wave system with two intermediate relay stations, one at Snare River and the other at Port Radium. Some channels of the system will be inter-connected with the North American Defence Network.

Unlike conventional microwave systems which require stations to be in line of sight, and therefore spaced every 30 miles or so, scatter-wave is capable of skipping distances up to 200 miles without intermediate relay equipment. One-thousand-watt radio signals are generated and beamed skyward from parabolic, reflector-type antennae. These antennae are 60 feet in diameter and orientated in the direction of the next station. The signal is reflected by the troposphere and picked up at the next station where it is amplified and repeated along the chain of stations. The scatter-wave system has higher reliability under adverse atmospheric conditions than normal radio transmissions.

Over 3,000 tons of equipment were shipped north from Edmonton to the sites by truck, tractor train, barge, and air. Five-mile access roads were constructed at Snare River and Port Radium to the hill-top transmitter sites. The new system became operational at the beginning of 1964.

The Canadian National Telecommunications is also arranging for the use of D.E.W. Line communication facilities for commercial messages between Lady Franklin Point and Cambridge Bay and an automatic telephone exchange is being installed at Cambridge Bay. Telephone service from Cambridge Bay to outside points will be through Lady Franklin Point and Hay River and will be available by the spring of 1964.

Soviet arctic research agencies. By Moira Dunbar

The Arctic Institute of North America has just issued a most useful handbook entitled 'Institutions of the USSR active in arctic research and development', by Vladas Stanka. This volume, which is available from the Arctic Institute office at 1619 New Hampshire Avenue NW., Washington 9, D.C., price $3.50, is a revision of an earlier volume of the same title issued in 1958. The latter was mimeographed in relatively small numbers and was soon sold out.

The present volume has been not only brought up to date but greatly enlarged. It lists 756 agencies, as against 388 in the first edition, which operate in the Arctic or do research on arctic problems in the fields of physical, natural, and social sciences. All available data on their development, affiliations, scope of study, and serial publications are included, as well as a brief analysis of the institutional structure of Soviet research in general. A roster of 228 mainland, island, and drifting stations (with coordinates) is appended. The book is indexed both by institution and by subject, and is edited by Natalie Frenkley, under the benevolent eye of Miss Marie Tremaine, chief editor, whose admirable guidance has made the 'Arctic Bibliography' such a valuable work of reference.

This is a notable tribute, first to the scale of arctic research in the Soviet Union (many of the 756 agencies listed play only a relatively minor role in the Arctic but the total is nevertheless most impressive) and also to the wide experience and industry of Dr. Stanka, who has been following Soviet scientific literature for many years and has been on the staff of the 'Bibliography' since the inception of the project.

The arctic library of the late George M. Douglas

Mr. T.H.B. Symonds, the President and Vice-Chancellor of Trent University at Peterborough, Ontario, announced in January 1964 that Mrs. Douglas had given the library of her late husband to the University. The collection contains several hundred volumes and was one of the finer arctic libraries in private hands in Canada.

George M. Douglas, who died in June 1963, was well known in northern circles for his travels to the Coronation Gulf area in 1911-12 and for his book 'Lands forlorn', which described this trip. His keen interest and strong views on the north, which he retained all his life, led to a voluminous correspondence. These papers should be of particular interest to students of arctic history.

Date of the 'Circular'

Members are assured that they will receive all numbers of the Circular. The Editor apologizes for the slow appearance of Circulars and plans to improve the situation rapidly. Each number has the series date and also the actual publication date indicated to avoid confusion.

Change of Address

Members are earnestly requested to advise the Treasurer, Mrs. A.H. Macpherson, Box 68, Postal Station "D", Ottawa, promptly of any change of address.

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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