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NORTHERN NEWS

Superficial geology of the Firth River archaeological site, Yukon Territory

Aided by a research grant from the Banting Fund provided through the Arctic Institute, J. R. Mackay and W. H. Mathews were able to spend the period from August 18 to September 3, 1956 at the Firth River archaeological site under excavation by Dr. R. S. MacNeish (*Arctic*, Vol. 8, 1955, p. 195) and his party. Close and helpful collaboration was maintained with MacNeish during the visit. Seventeen days were spent studying geomorphic and stratigraphic problems associated with the archaeological site and with the nearby terrain. Approximately 1,000 linear feet of pit walls were examined in order to relate the archaeological complexes to the stratigraphic succession. In addition, 161 test pits were dug at strategic points (over 150 of these were excavated to the permafrost table that varied from about 17 to 48 inches below the surface) for

the purpose of extending the stratigraphic data beyond the areas under excavation by the archaeological party. Several traverses were made to areas within a day's walk from the camp-site. Observations were made during the flights to and from Firth River on geomorphic features of the arctic coastal plain. On the return flight, a brief stop was made at Herschel Island in order to compare its soils with those of the Firth River area to the south.

As has been pointed out by MacNeish ("The Engigstciak Site on the Yukon arctic coast", *Anthropological Papers of the University of Alaska*, Vol. 4, 1956, pp. 91-111), the stratigraphy of the site is complicated. Some of the factors making interpretation difficult are:—

1. A shallow active layer that limited the depth of excavations and hence the depth of the sections available for study.
2. Duplication within the original sequence of clay, sand, and muck members.
3. Extensive solifluction, slumping, and frost heaving that have disturbed the original sequence in many areas.
4. Possible inversion of topographic slope by growth of ground ice causing a reversal in the direction of solifluction and slumping.
5. A geographical position on the borderline between glaciated and unglaciated areas.

Added to these difficulties were poor weather and the rapid collapse and filling with water of many of the freshly excavated pits. However, a fair measure of success was achieved in establishing the stratigraphic position of the older archaeological complexes and in estimating subsequent disturbances by geomorphic processes. The relationship of the stratigraphic succession to a late glacial advance westward along the coastal plain was determined. Minimum figures for the extent of marine submergence, apparently associated with this advance, were obtained.

Specimens of clay were collected in collaboration with Dr. MacNeish for further study. Carbon 14 datings, to be obtained from Dr. MacNeish's specimens, will aid in estimating rates of geomorphic processes in this arctic environment and may help to relate the late glacial advance in this area to those that occurred elsewhere. When the study is completed, a full report of the superficial geology and its relationships to the archaeological complexes will be prepared in collaboration with Dr. MacNeish.

J. R. MACKAY and W. H. MATHEWS

Studies on the flora and vegetation of the taiga zone of northern Manitoba

The investigations were confined to a small upland area (at 59°03'N 96°47'W), which lies about ten miles northwest of the western tip of Great Island, on Seal River. Excellent camping facilities were provided by Mr. E. Kronlund, a local trapper and prospector. His camp is situated on a small, unnamed lake about ten miles due north of the junction of Big Spruce and Seal rivers. Transportation from Churchill, Man. to this camp was provided by Transair; the direct flight by Norsemen aircraft on June 30 lasted 70 minutes. The entire period in the field was spent at Kronlund's camp, which was most conveniently located for the purpose of the investigation. Field work was completed on August 2 and the return flight to Churchill was made on August 4.

The area of the investigation lies within the Precambrian Shield region of Manitoba, and the greater part of the land surface consists of low hills of glacial till; occasional outcrops of bedrock are present. A large esker passes through the area in an approximately north-south direction. Many shallow basins are filled with peat deposits of considerable depth, which bear a tundra vegetation and show soil polygons.

Comprehensive collections of vascular plants, mosses, and lichens were made. Because of the absence of basic rocks in the substratum, which are present in the Hudson Bay Lowlands a short distance to the east, the area yielded only about 150, mainly subarctic, species of vascular plants. The collections include a number

of additions to the flora of Manitoba and several range extensions of previously recorded species.

Travel was by powered canoe and on foot, the latter being greatly facilitated by the proximity of the large esker mentioned above. Detailed descriptive accounts and quantitative analyses were compiled for the various vegetation types encountered, and various edaphic studies were made. The area is of great phytogeographical and ecological interest. It lies just at the transition between continuous forest and forest tundra, and some progress was made toward an elucidation of the factors that limit the extension of forest into the tundra on upland sites.

There are divers patterns of vegetation that are associated with particular features of surface geology. In regions undisturbed by fires the predominant coarse till substratum of the area bears a black spruce (*Picea mariana*) forest, with the ground cover dominated by lichens and various ericoid shrubs. Many of these well drained habitats are occupied by subseral types, among which larch (*Larix laricina*)—in distinct contrast to its behaviour in southern areas—plays an important rôle as the dominant after fire. White spruce (*Picea glauca*) is the dominant tree of the esker, forming open stands on stable areas. Elsewhere on the esker an intricate pattern of degeneration and pioneer vegetation units is common. Certain exposed slopes have a close cover of lichen-heath vegetation; in large depressions various aquatic, marsh and bog communities are present. The nature of the vegetation on the flanks of the esker is often largely controlled by the type of community that occupies the adjacent terrain. Along the banks of the Big Spruce River a local fringe forest of white spruce is present, in which trees of considerable stature occur. Many tree height and trunk diameter data, as well as increment cores were collected from species in all community and habitat types. Just above the junction with Seal River, the course of Big Spruce is marked by a pattern of terraces and oxbows, with which various interesting plant communities are associated.

The formulation of general conclusions, both phytogeographical and ecological, must await the complete analysis and collation of data. The work was made possible through a grant from the Banting Fund provided through the Arctic Institute. J. C. RITCHIE

A field and laboratory study of the ecology, life history and behaviour of ptarmigan in Alaska

The objects of the project in 1956 were to acquaint the investigator with ptarmigan habits and habitats, and to begin the compilation and analysis of data relating to specific aspects of their breeding biology. The work was supported by a grant from the Banting Fund received through the Arctic Institute and began with the search for a suitable study area on May 1. Reconnaissance was hampered by deep snow and the relative scarcity of ptarmigan. The most promising location was Eagle Summit, 105 miles northeast of Fairbanks, Alaska, adjacent to the Steese Highway, and field work began there on May 17.

The study area consists of 20 square miles of high, rolling hills, mainly above timberline that lies here at about 3,000 feet elevation. The narrow valley bottoms contain scattered stands of spruce and willow; the slopes and hill tops are covered by tundra. The vegetation of the tundra is not homogeneous, but decreases in density and number of species with increasing altitude.

A census taken immediately after arrival showed approximately 30 pairs of rock ptarmigan (*Lagopus mutus*) and three of willow ptarmigan (*Lagopus lagopus*). Courtship, pairing and mating had commenced at that time, and by the second half of May most of the birds had started incubating. During May and June four nests from 1954, 14 from 1955, and nine from 1956 were found; eight of the nests of the current season belonged to rock ptarmigan. The average clutch of this species contained six eggs; the single willow ptarmigan clutch had

nine. The peak of hatching occurred between June 10 and 20, after an incubation period of approximately 21 days.

During July and August the behaviour, movements, and cover preferences of broods were studied. A total of 26 rock ptarmigan broods and three willow ptarmigan broods were observed in July. By the middle of that month all young ptarmigan were able to fly.

Several specimens collected during the season were examined for crop contents and parasites, and duplicate blood smears were taken from 18 birds. The analysis of this material will be completed during the winter of 1956-7.

Predation appeared to be of minor importance during this investigation. In the three summer months only nine freshly killed ptarmigan were found. However, the remains of 87 ptarmigan were discoverd, the great majority of which had been killed during the previous winter or early spring. This indicates considerable mortality among wintering populations, and presents an interesting problem for future research.

During this work the investigator enjoyed the help of many persons interested in the project. It would be impossible to mention here the names of all those who were of assistance during the summer, but I am very grateful to several scientists at the Arctic Health Research Center, Anchorage, Alaska, to personnel of the U.S. Fish and Wildlife Service, and to residents of the Berry Mining Camp at Eagle Creek, Alaska. Dr. John Buckley, leader of the Alaska Cooperative Wildlife Research Unit, was especially generous in providing transportation, supplies, and special equipment, in addition to giving valuable advice on several phases of the work and making available the facilities of the Unit.

ROBERT B. WEEDEN

Geomorphological and glaciological investigations in the Torngat Mountains of northern Labrador

The writer and his wife, Pauline, left Montreal by air for Goose Bay, Labrador on July 2, 1956 and from there travelled by Beaver aircraft to Northwest River, where they enjoyed the generous hospitality of the British Newfoundland Corporation. The departure from Montreal had been delayed for two weeks on account of the unusually late break-up in the Eastern Arctic. Further delay was unavoidable as a reconnaissance flight to Nain showed that the northern lakes and fiords were still ice-bound on July 5.

In order to make the fullest possible use of the time during the delay the party was flown to a lake south of Makkovik on the Labrador coast and worked there on the local glacial geomorphology until July 26. The party reached the Torngat Mountains finally on July 27, and even at that late date many of the inland lakes were frozen, so that only two food and fuel caches could be established. Base camp was set up on a sand spit on the south side of Upper Kangalaksiorvik Lake, inland from Seven Islands Bay. One cache was placed on Lower Komaktorvik Lake, twenty miles to the south, and the second on an inland lake at an altitude of about 1,000 feet, a few miles west of the Labrador-Quebec boundary.

Two major field excursions were made, each of about two weeks' duration. The first used the cache on the inland lake about sixteen miles west of the base camp and penetrated to the head of Abloviak Fiord on the Ungava Bay side of the Labrador Peninsula. Short excursions were made along the way through the Torngat Mountains, which here exceed 4,000 feet. The land to the west of the mountains was examined from a camp near the head of Abloviak Fiord.

The second major excursion was centred on a camp at the head of Lower Komaktorvik Lake. It involved work in the mountains north of this lake and between it and Nachvak Fiord to the south. In this area the higher summits are more than 5,000 feet above sea level. The final two weeks were spent working from the base camp.

Despite the very short season and much bad weather most of the originally planned work was accomplished and 13

of the main summits were climbed in an attempt to assess the degree of glaciation that the mountains have suffered and the stages by which the final ice cover disappeared. The conclusion has been reached that at the height of the glaciation even the highest summits were deeply submerged by continental ice flowing toward the Atlantic Ocean. It has also been discovered that the rôle of the Torngat "local" glaciations in the main glaciations of eastern North America was very slight. Contrary to a current theory that these mountains have been one of the "source" areas and areas of final dispersal of the continental ice masses, it appears that tongues of the continental ice sheet continued to flow through the great west-east troughs of the Torngats after the mountain valleys had become free of local ice and only cirque glaciers remained. There is also evidence that at least two major glaciations occurred in this area.

Routine observations were made on the geology, geomorphology, snow line, and remnant cirque glaciers. This material, together with the main work on the glaciation of the Torngat Mountains, will be published at a later date.

The Beaver aircraft landed at the base camp on Sept. 17 and the party arrived at Northwest River the same day and finally reached Ottawa. This work was made possible by a grant from the Banting Fund provided through the Arctic Institute, a McGill University-Arctic Institute Carnegie Scholarship, and the provision of air transport by the British Newfoundland Corporation. J. D. Ives