Notes and Institute News

DEVON ISLAND PROGRAMS, 1965

The Arctic Institute of North America has made available for future research the facilities left by the Devon Island Expedition of 1960-63. These facilities consist of four Jamesway huts equipped to support research workers at the base, two Massey Ferguson tractors, one weasel and a large range of equipment designed to outfit scientists working in the field away from the base camp.

In 1965, taking advantage of these facilities, two scientific programs were followed. The first, in geomorphology, was essentially a base-camp-oriented project run by two men. The second, in glaciology, was a field-oriented program run by two men and one woman working on the ice cap and three outlet valley glaciers. The geomorphology program was supported entirely by the Arctic Institute of North America. The glaciology program received financial support from the Arctic Institute of North America, U.S. Army Natick Laboratories, and the Royal Geographical Society. Glaciological equipment was supplied on loan by the Arctic Institute of North America, the Quartermaster Corps of the U.S. Army, the Royal Geographical Society, and the British Meteorological Office.

Glaciology

The first two scientists landed on Devon Island on 16 May 1965 but field work did not start until 7 June after vehicles and huts had been put in order and fuel and food transported to the ice cap. Routes were followed to the southeastern, eastern, southwestern, northern, and northwestern parts of the ice cap along traverses set up in 1961, 1962, and 1963 (Fig. 1). Poles were found only with difficulty as the 1963-64 accumulation had been particularly high. However, as melting had been low it was not difficult to differentiate between the 1963-64 accumulation and that immediately preceding and following it. In this way the 1963-64 mass balance was measured and a very detailed picture gained of the 1964-65 fall and winter snow accumulation. The mass change was measured with a vertical density sampler. Dye and percolation trays were emplaced at each station to measure summer melt and accumulation. This work was completed by 17 July.

Between 17 July and 7 August 5 m. cores from five points on the northwest side of the ice cap were studied and vertical slides from the entire length of the cores photographed between crossed polaroids. It is hoped that this work will enable a long period accumulation/ablation line to be drawn.

There was insufficient time left to remeasure all the traverses again in August and only the two most important, i.e. the northwest and southeast were covered. All mass change measurements were repeated to determine the amount of summer accumulation or melt. The glaciological party returned to the base camp on 23 August and the whole expedition left Devon Island via icebreaker on 26 August for Resolute Bay.

The summer on the ice cap proved to be the third successive summer of low melting. Although the winter accumulation on the northwest side was

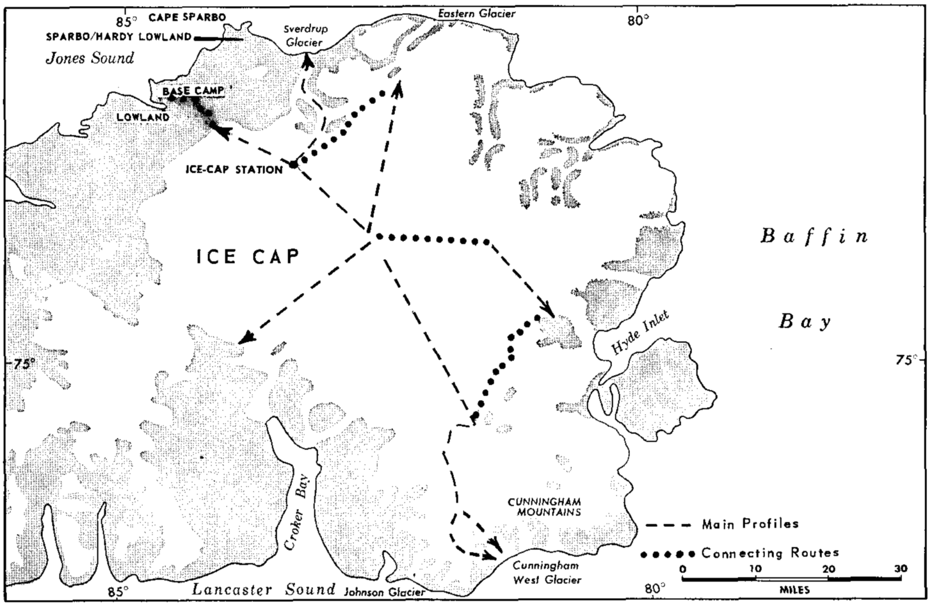

Fig. 1. Traverses completed on the Devon Island Ice cap, 1965.

the lowest for at least five years (c. 7.0 cm. water equivalent), the southeast side showed its usual high (c. 40.0 cm. water equivalent). In three spring measurements there has been very close agreement between snow depths and densities on the southeast side, which indicates a remarkable uniformity of accumulation conditions.

The 1965 melt season was short and late, and on the ice cap melting was confined mainly to early August. The top of the ice cap remained above the dry snow line. For the third year in succession the entire ice cap lay in the accumulation area and only the lower reaches of valley glaciers showed net negative mass change. The plateau adjoining the ice cap on the northwest side had a cover of more than 30.0 cm. of ice in August as a result of high accumulation during the summer of 1964 and the lack of melt in the summer of 1965. The effect of the high accumulation from 1962-65 on the progress of future melt seasons should prove interesting.

In August, on the last traverses, long period markers were put up with percolation trays and dye nearby. This will allow accurate mass change and percolation measurements to be made in the future.

Geomorphology

The geomorphological program was primarily concerned with the high-level marine features of several areas of the coast of North Devon Island. Field work was started in the Base Camp Lowland on 26 June, immediately after snow-melt, and the investigations in this area continued until late July. Several days were then devoted to the Skogn Lowland which is southwest of Sparbo/Hardy Lowland and northeast of Base Camp (Fig. 1); this portion of the field work was undertaken from a field camp established by means of tractor. Soon after breakup which occurred on 2 to 3 August, two weeks were spent in studying the raised beaches of the Sparbo/Hardy Lowland. For this purpose, a camp was established near Cape Sparbo by canoe.

In the case of the Base Camp Lowland, and the Sparbo/Hardy Lowland, a detailed levelling program, involving all the significant raised beach ridges, was conducted. In the Skogn Lowland, the raised marine deposits are almost completely devoid of any significant traceable ridges. Here a levelling traverse was carried from sea level to the apparent marine limit, and back to sea level.

The featureless raised marine deposits of the Skogn Lowland are in strong contrast to the esker-like beach ridges found in the Base Camp and Sparbo/Hardy Lowlands. That these pronounced ridges are not also found in the Skogn Lowland indicates that they are not primarily due to an apparent stillstand in the sequence of isostatic recovery, caused by eustatic sea-level rise balancing the glacio-isostatic uplift of the land. All the evidence suggests that uplift has been continuous since deglacierization, and is still continuing, although no doubt at a greatly reduced rate, in conformity with the normal type of glacio-isostatic uplift curve.

The pronounced beach ridges in both the Base Camp and Sparbo/Hardy Lowlands frequently separate either lakes or marshy hollows floored with a very viscous marine clay. These ridges appear to be the result of a falling sea level on a very gradually shelving shoreline, as is found in the two lowland areas under discussion. Offshore bars and recurved spits develop, and with uplift, are converted into raised beach ridges, separated by lakes which were originally tidal lagoons.

In the Sparbo/Hardy Lowland, significant raised beach ridges and terraces were found to occur at irregular intervals from the present storm beach at 1.0 m. to 47.7 m. above high-water mark. In the Base Camp Lowland, raised beach ridges were found at heights from 0.8 m. to 44.6 m. above high-water mark, again spaced at irregular intervals. As might be expected from the rapid initial uplift, the beaches in both areas are spaced at much wider intervals in the upper part of the range. Up to 18 distinct and separate beach ridges could be differentiated in each area.

Marine shells were collected at over thirty locations throughout the area. They were found at heights ranging from sea level to 41.0 m. above high-water mark in the Base Camp Lowland, and up to 64.1 m. above high-water mark in the Sparbo/Lowland. In the Skogn Lowland, shells were less plentiful, but were found up to 44.8 m. above high-water mark. It is intended to have some of the marine-shell samples dated by C^{14} methods, in an attempt to ascertain the present and former rate of uplift of this area.

The shells collected were predominantly *Saxicava Arctica* and *Mya truncata*. It is hoped that after positive identification, a study of the percentage composition of the mollusc population by species at the various levels will be possible. From a knowledge of the present-day tolerance of the various species, particularly as regards temperature, it may then be possible to establish a sequence of postglacial climatic change for this area.

As a further check, several samples of whalebone were collected from various sites, and from heights ranging from sea level to 58.8 m. above high-water mark. In every case, these samples were collected from large pieces of whalebone, well embedded in the beach material, and frequently also embedded in the permafrost. They can thus be assumed to be contemporaneous with the formation of the beaches on which they were found. With the exception of the present beach, no driftwood was found at any level.

The height of the apparent marine limit was determined at many different points, on the basis of the height of the lowest disturbed ground moraine, and of the lowest perched boulders. The results were found to vary quite widely throughout the area: 65.9 m. in the Base Camp Lowland, 82.7 m. in the Skogn Lowland, and 74.1 m. in the Sparbo/Hardy Lowland. Such variations over a distance of some 25 miles are not really surprising. The altitude of the marine limit is the result of many factors; not the least of these is the fact that the marine limit cannot be formed until ice retreat has permitted the sea access to that particulard area. Thus only small variations in the rate of deglacierization can produce considerable differences in the height of the marine limit over fairly short distances.

It was found that the north-south beaches in the Sparbo/Hardy Lowland display a tendency to rise in a southerly direction, as one might reasonably expect, on the assumption that the ice-mass which affected the isostatic equilibrium of this area was a greatly extended, and greatly thickened Devon Island ice cap. The actual degree of tilt of the various beaches, and variations in tilt between higher and lower beaches have still to be elucidated.

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Technical Papers of the Arctic Institute

The latest publication in this series is the following: Number 18. PLEISTOCENE GEOLOGY OF ANAKTUVUK PASS, CENTRAL BROOKS RANGE, ALASKA. By Stephen C. Porter. 1966. 100 pages, 22 figures (including folding map), 25 plates. *Price: to Members of the Institute $2.00; to non-members $3.00.*

Anaktuvuk Pass, a broad low valley that crosses the crest of the north-central Brooks Range, experienced intensive alpine glaciation during the later part of the Pleistocene Epoch. Ice of the last major glaciation flowed north from an ice divide south of the present stream-drainage divide and formed a broad piedmont lobe beyond the range front. At glacier maximum Anaktuvuk Pass was buried under ice to a depth of at least 2,000 feet. At that time the meteorological pattern was grossly similar to that of the present, but the mean summer temperature was at least 3.8°C. lower than today. A major readvance, which occurred during the final phases of glacier recession, produced a prominent end moraine that crosses the valley floor north of the pass. Extensive ice-contact topography behind the moraine points to subsequent stagnation and rapid wastage of the glacier as the climate became noticeably milder. Radiocarbon dates indicate that the last major glaciation at Anaktuvuk Pass is equivalent in age to late Wisconsin glaciation of central North America. Modern alpine glaciers, which appear to be in a condition of disequilibrium, are shrunken remnants of more extensive post-Wisconsin glaciers that were restricted to cirque valleys in the higher parts of the Brooks Range.

Fellows and Associates of the Institute Honoured

MOUNTAINS NAMED

Three pioneer Alaskan scientists, all Fellows of the Arctic Institute, were recently honoured posthumously by having prominent mountains in the Central