

Scientific Notes

Initial Findings of Field Research in the Grinnell Glacier, Everett Mountains Area of Southern Baffin Island, July and August 1981. Field work was conducted in the fiord area fronting Grinnell Glacier and along the lower Oogah River valley in the central Everett Mountains. Glacial drift from two distinctly different ice masses was recognized. These include 1) Glacial till and glaciomarine sediments deposited by ice moving down Frobisher Bay and 2) glacial till and glaciofluvial sediments deposited by an expanded Grinnell Glacier and former ice cap which probably occupied the crest of Meta Incognita peninsula.

The Grinnell Glacier tills are predominantly sandy tills which contain mainly crystalline clasts of local bedrock lithologies and scattered sedimentary rock clasts (mainly limestones) reworked from Frobisher Bay ice deposits. Boulder weathering data, morphostratigraphic relationships, and bedrock weathering zones suggest that at least three chronostratigraphic units exist. The youngest of these consists of extensive multiple continuous morainal and ice contact stratified deposits whose oldest lichenometric ages are around 150 to 200 years. Many of these deposits are still ice-cored and are yet unstable and so are barren of any lichens. The maximum extent of these deposits ranges up to 1.8 km from the present ice margins. Outside of these deposits are scattered discontinuous moraines and till veneers whose boulder weathering characteristics suggest they correlate to drift of Late Foxe age elsewhere on Baffin Island. In the area fronting Grinnell Glacier these moraines terminate from about 3 to 5 km down fiord from the present ice margins. Where Late Foxe ice reached the outer fiord areas the bedrock is typically scoured to an elevation of around 30 meters.

Moraines and outwash terraces of Late Foxe age were also identified along the Oogah River up valley from Ney Harbour. These deposits consist exclusively of crystalline clasts derived from local bedrock. No sedimentary rock clasts were found. Similar deposits (identified from air photos) throughout the Everett mountains indicate that an extensive icecap and ice divide lay over Meta Incognita peninsula during the Late Foxe glaciation.

In the Grinnell Glacier area the Late Foxe moraines are often closely associated with clayey limestone-bearing tills deposited by ice moving

down Frobisher Bay. Stratigraphic and morphostratigraphic relationships of these two tills suggest that there were Late Foxe Grinnell Glacier advances prior to and immediately after the advance and retreat of Frobisher Bay ice. In Watts Bay, limestone-bearing till is found below a bedrock weathering break clearly related to a Late Foxe expansion of Grinnell Glacier. This till is in turn cut by a prominent moraine deposited by a subsequent expansion of the Watts Bay outlet glacier. This prominent moraine contains a sandy beach deposit cut into its crest at 63 meters above high tide (m.a.h.t.). According to the post-glacial uplift curve for Frobisher Bay (Muller 1980) the 63-meter sea level corresponds to approximately 9500 R.C.Y.B.P. Therefore the younger Late Foxe moraines of Grinnell Glacier are at least this old.

Two key areas in Charles Francis Hall Bay contain lateral and end moraines of Frobisher Bay ice. The lateral moraines slope downward in elevation into the bay and a prominent end moraine loop opens in the down bay direction. Proximal to these moraines are numerous fresh concentric gouges with many indicating ice flow down Charles Francis Hall Bay. These gouges are most likely Late Foxe in age since many are found within the tidal zone and it seems doubtful that older flow indicators could be preserved in such an environment. These moraines are tentatively correlated to the Hall Moraine advance which dates just prior to 10,760 R.C.Y.B.P. (Miller 1980).

The morphology of the moraines in Charles Francis Hall Bay clearly show that the bay was free of Grinnell Glacier ice during the time of their deposition. This suggests that the mass balance of Grinnell Glacier is controlled by local precipitation and that significant ice cover in Frobisher Bay causes decreased precipitation and thus retreat of Grinnell Glacier ice.

Frobisher Bay till and glaciomarine deposits containing whole and abraded mollusk shells were found at four sites in the study area. These include Midnight Harbour, Promontory Bay, and two sites in Charles Francis Hall Bay. At these sites it appears that the shells may have been transported and deposited with the till. Therefore these samples have a good potential of providing a maximum radiocarbon age for the Frobisher Bay moraines.

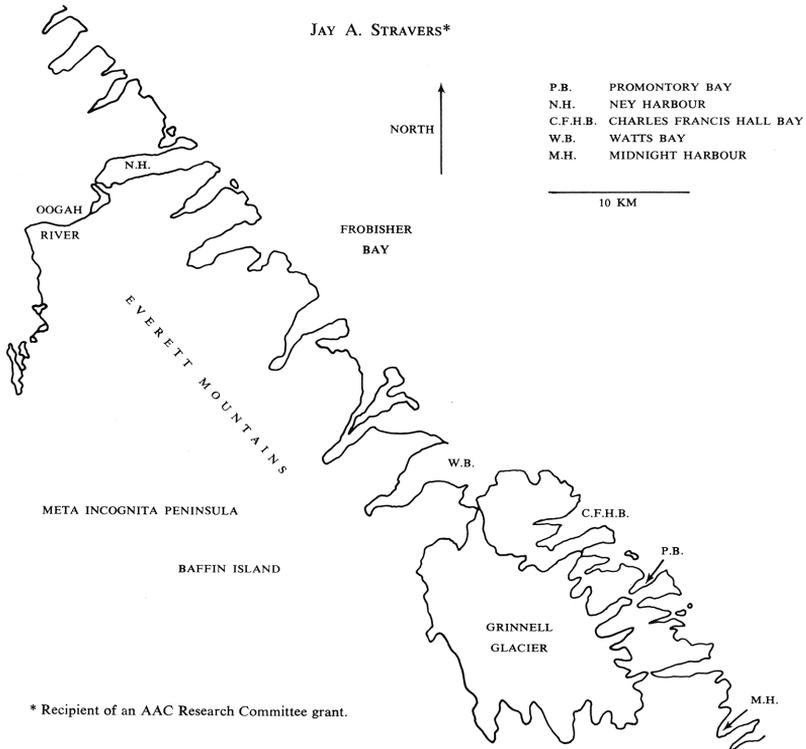
A glacial advance of pre-Late Foxe age was also recognized in the field area by scattered till veneers as well as highly weathered erratics and perched boulders on exposed bedrock. They are associated with highly weathered but recognizably ice-sculptured bedrock which indicate ice flow directions down valley. The tills are predominantly sandy with clasts derived from local bedrock. However, scattered limestone clasts are also present locally throughout the study area. Several up valley traverses revealed that the limestones were absent above about 250 m.a.h.t. This suggests that there was an advance of Frobisher Bay ice bearing limestones into the Grinnell Glacier fiord area at some time prior

to the deposition of the local pre-Late Foxe till. These limestones were then reworked into sandy tills during a pre-Late Foxe advance of Grinnell Glacier.

An extensive Grinnell Glacier icecap existed during this pre-Late Foxe glaciation. In the outer fiord areas the weathering break between the pre-Late Foxe till and unglaciated ridge crests typically occurs at about 300 m.a.h.t. This weathering break extends up to 450 m.a.h.t. along valley side slopes in inland areas.

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