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Note

WERE PARTS OF THE NORTH COAST OF LABRADOR ICE-FREE AT THE WISCONSIN GLACIAL MAXIMUM?

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INTRODUCTION

The question of Wisconsin ice-free refugia in the Torngat Mountains has now been under consideration for some 20 years (IVES, 1960). The primary supporting data for this hypothesis derive from studies of differential weathering and from attempts to determine the significance of the Saglék Moraines (IVES, 1976). Following an early phase of fieldwork in the Labrador/Nouveau Québec region attention was transferred to Baffin Island (IVES and ANDREWS, 1963) and this resulted in substantive support for the concept of Wisconsin Maximum ice-free areas between Cape Dyer and Pond Inlet (LØKEN, 1966; IVES and BUCKLEY, 1969; PHEASANT and ANDREWS, 1973; BOYER and PHEASANT, 1974; IVES, 1974). These results, in contrast to the early work in Labrador, were based upon many ^{14}C , uranium series, and amino acid datings of 'old' deposits. It is remarkable that so few samples of mollusc shells from raised marine shore deposits along any section of the coastline of Labrador/Nouveau Québec have been located. Nevertheless, in 1975 it was considered timely to revisit the Torngat Mountains and to renew the attempt to resolve this and some related problems (IVES, NICHOLS and SHORT, 1976). This note has been prepared so as to place on record information relating to the discovery of what I believe may prove to be the first sample of 'old' marine mollusc shells from the entire Labrador/Nouveau Québec region. By 'old' it is implied that the sample in question is older than the limits of the radiocarbon dating method; in this particular case, older than 42,730 years.

It is stressed that the sample was collected on the basis of an intuitive assumption that mollusc shells would be found in that particular locality. The supporting float plane could only be landed within 5 km of the site, there was no time for a detailed investigation, and the party was very much over-extended, being far from their base camp, on short fuel, and in dubious weather conditions. These remarks are recorded to at least partially excuse the lack of scientific rigour in this

presentation. The results are very preliminary, and have only been published because of a chance question by Dr. Gilles Samson following the paper presented by Dr. John T. Andrews. Certainly there is no objection on my part to my colleagues using the information, or even to anyone who would attempt to secure better samples and data by additional fieldwork along the Labrador coast. Despite the paucity of dated mollusc shell samples, 'old' or Holocene, I believe that important samples will be found given a persistent and imaginative search. This note, therefore, can be regarded as a challenge to arctic and subarctic Quaternary enthusiasts, to help reduce the degree of scientific ignorance concerning this important region.

SITE DESCRIPTION

North of Seven Islands Bay, there occurs a long stretch of low coast underlain by marine, glacio-fluvial, and glacial deposits behind which towers the Four Peaks group of the Torngat Mountains (Fig. 1). It is named Iron Strand on the official maps and extends northwestward as a sand-bar that closes the seaward end of Miriam Lake. The sample was collected in latitude $59^{\circ}33'\text{N.}$, longitude $63^{\circ}50'\text{W.}$, on the outer coast approximately 3 km from the northeast corner of Miriam Lake. It is best described as a low bluff cliffed to a height of 7 m by marine erosion. The low cliff section is badly slumped but has the appearance of being cut in clayey till, or marine clay, with several thin gravelly horizons. It is capped by a bouldery horizon between 1 and 2 meters thick that may be a till. The top is a conspicuous terrace remnant, presumably the result of marine abrasion.

A large number of small mollusc shell fragments were found to be weathering out from the cliff face, and with some shallow digging it was soon possible to collect 200 g of unwashed shell fragments. There was only time to walk a short distance along the coast in either direction, although it would appear that shell fragments

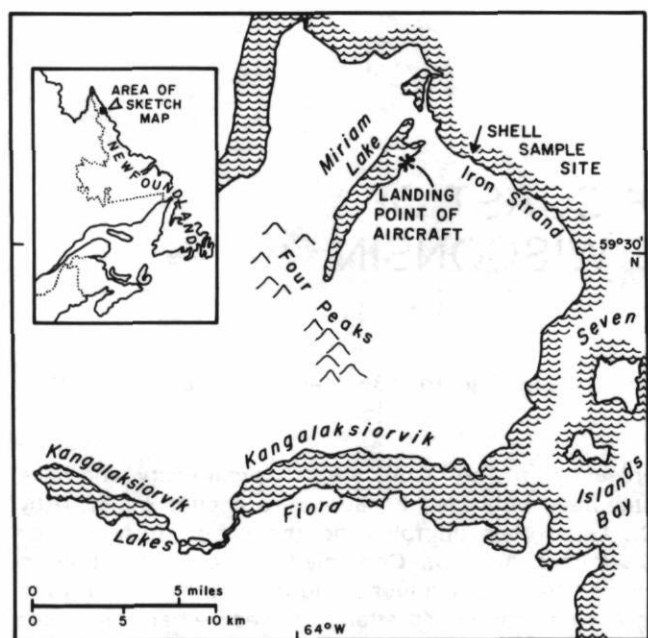


FIGURE 1. Location map.

Carte de localisation.

could have been collected over a considerable distance. Later from the air, after take-off, the entire length of Iron Strand was inspected and photographed as far south as the north side of Kangalaksiorvik Fiord. Marine shore features and 'old' lateral moraines are abundant in this area. It is believed, although by no means proven, that the collection site is located distally to the outer limits of the Saglek Glaciation (= Wisconsin) in this area (IVES, 1976).

LABORATORY ANALYSIS

The shell fragments were not found *in situ* and the nature of the deposit which contained them cannot be identified beyond stipulating that it is a diamicton of glacial, marine, or combined glacio-marine origin. Thus the full significance of the age determination cannot at the moment be realised.

The sample consisted predominantly of fragments of *Balanus* sp. (at least 2 species) with much smaller amounts of *Hiatella arctica* and *Mya truncata*. Since INSTAAR, through Dr. Gifford Miller, has been involved in the development of an amino acid dating laboratory, the first reconnaissance dating utilized this method. Fragments of *Hiatella arctica* and *Mya truncata* only were used, since the method had been developed using large samples of these species obtained from Baffin Island. They were analysed for the racemization of -isoleucine to -alloisoleucine, and the extent of natural hydrolysis. In addition to time, the major control on rate of protein diagenesis is temperature; the higher tem-

peratures of Labrador, compared with Baffin Island, should result in more rapid diagenesis. On this basis an age of approximately 8500 years was proposed (G. Miller, pers. comm., Nov. 1975).

Finding this result unsatisfactory, but only on intuitive grounds, I determined to have a radiocarbon assay made. A sample of the *Balanus* fragments was sent to the Dicar Radioisotope Laboratory. The fragments were scrubbed in distilled water and the outer 15% was acid leached and discarded. Initial counting indicated an age much greater than the original estimate of 8500 years so that the sample was rerun in a different counter which verified the 'old' date. The final result was $42,730 \pm 6680$ BP (DIC-517). The great disparity

in age between the amino acid and radiocarbon age determinations is most likely related to the one analysing only the *Hiatella arctica* and *Mya truncata* and the other the *Balanus* fragments. Since the altitude above present sea level of the field site is only 3 to 6 m and the late-glacial marine limit in the vicinity is about 60 m, there has been ample opportunity for 'recent' shell material to be mixed with an older deposit. The *Balanus* fragments 'look' old compared with the *Hiatella arctica* and *Mya truncata* fragments. It is also stressed that the site, on the basis of qualitative comparison with similar sites in Baffin Island, which have yielded copious 'old' material, was expected to produce 'old' material. It is also emphasised that the 42,730 dating represents the limits of the counter's capabilities. Thus the suggested age is probably minimal.

CONCLUSION

Admittedly, the way the sample has been handled leaves a considerable margin of ambiguity. Also, there is inadequate information on the specific nature of the diamicton in which the shell fragments were discovered. For instance, the distance that they may have been transported cannot be determined. LØKEN (1964) discovered shell fragments on the surface of the Kangalaksiorvik moraines at an altitude of 280 m some 30 km to the southwest which he speculates may have been picked up during a glacial readvance from Ungava Bay. However, the Iron Strand site is backed by high mountains rather than by a glacial through trough as is the case of the Kangalaksiorvik moraines.

It is therefore concluded that Iron Strand *probably* is comparable to many sites in eastern and northeastern Baffin Island that are presumed to have remained ice-free during the Wisconsin Glacial maxima. It is postulated that the *Balanus* fragments are at least 42,730 years old and that they lie beyond the outer limits of the Saglek Moraines (= Wisconsin Maximum). Additional, and much more detailed investigation of the glacial geomorphology and glacial geology of the Seven

Islands Bay — Four Peaks area is planned for the near future. The remaining part of the original shell sample should be subjected to further analysis.

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