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PRELIMINARY REPORT ON THE AGE AND DISTRIBUTION OF THE LATE PLEISTOCENE ICE IN NORTH CENTRAL MAINE

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ABSTRACT. A marine fossiliferous esker delta in the Bangor, Maine area and the radiocarbon age relationship of the fossils within to fossils from the Champlain Sea deposits present more evidence that an ice cap may have existed at least in central Maine at the time that the Champlain Sea occupied the Saint Lawrence lowland.

In the Bangor, Maine region below the late Pleistocene marine limit, eskers at many places have had their tops and flanks reworked by marine action upon the transgression and regression of the late Pleistocene sea. At many places Pleistocene marine shells are within these reworked esker gravels and sands. However, there is little indication in these deposits of the proximity of the retreating ice at the time of the reworking.

Recently the author has investigated an esker delta in the Bangor, Maine quadrangle approximately ten miles WNW of Bangor at lat 44°49′ N and long 68°58′ W. This delta is at an elevation of approximately 185 feet and contains Pleistocene marine shells in both the topset and foreset beds. This deposit indicates that as the last ice advance into this region was dissipating, the meltwater stream that was depositing granular esker materials within the ice-bound channel was also flowing from the ice front directly into the sea, building a small proglacial delta. The shells found within the foreset beds of this delta are listed in table 1. Further evidence of the ice front standing in the sea was presented by Trefethen and Harris (1940) in their interpretation of an esker like deposit of stratified drift in East Orrington, approximately 12 miles southeast of Bangor, Maine. They considered the deposit to be a body of drift that was deposited and contemporaneously colonized by late Pleistocene marine fauna in an ice front reentrant.

TABLE 1

Fossils found in the Bangor esker delta

Amauropsis islandica
Astarte subaequilatera
Macoma balthica
Mya arenaria
Mya truncata
Mytilus edulis
Saxicava arctica

A radiocarbon age of 12,800 ± 450 years B.P. was reported by M. Rubin (personal communication) for U. S. Geological Survey lab. sample W-1011, a mixture of *Astarte subaequilatera* and *Mya arenaria* shells collected by the author from the Bangor esker delta.

He also reported (personal communication) a date of 11,800 ± 240 years B.P. for U. S. Geological Survey lab. sample W-737, and 11,950 ± 350 years B.P. for sample W-947. Sample W-737, composed of *Saxicava arctica* and *Panomya arctica* shells from the Waterville, Maine area and sample W-947, a

shell mixture from the Norridgewock, Maine area were both collected from wave reworked portions of eskers. The latter two samples were collected by R. L. Dow, Department of Sea and Shore Fisheries, Maine.

The shell assemblage found in the esker delta of the Bangor area (table 1) is typical of the late Pleistocene marine fauna of Maine and contains many of the species found in the samples W-737 and W-947.

All deposits described here were undoubtedly the product of the same late Pleistocene marine inundation. Samples W-737 and W-947 were from wave-worked deposits showing no evidence of the ice front while sample W-1011 from the esker delta, which formed in the sea by melt water flowing directly from the ice front, has an older radiocarbon age than the other two, as might be expected.

Three dates obtained from shells associated with Champlain Sea deposits are Y-215 at 10,630 ± 330 years B.P.; Y-216 at 10,850 ± 330 years B.P.; and Y-233 at 11,370 ± 360 years B.P. (Preston, Person, and Deevey, 1955, p. 956). The validity of these dates has been questioned by several authors. Recently, however, archaeological evidence has been presented in support of these dates (Mason, 1960, p. 374).

It is generally assumed that the border of the last extensive Wisconsin advance retreated northwest across at least part of Maine and eastern Quebec eventually uncovering the St. Lawrence lowland, allowing the Champlain Sea to transgress from the northeast into the lowland. If the dates discussed above are accepted, then the earliest date available for the formation of the Champlain Sea is 11,370 ± 360 years B.P. It then follows that the shortest time involved in the recession of the ice front from Bangor, Maine to the closest shore of the Champlain Sea, a distance of about 200 miles, was approximately 620 years, giving an exceptionally high recession rate of approximately 1580 feet per year. Using the same dates but employing the opposite age variations reduces the rate of retreat to approximately 480 feet per year.

Evidence of the rates of recession for Pleistocene ice sheets is not abundant; however, Flint (1955) in studying retreat rates for the last Wisconsin ice sheet in the midwest found that the rates did not exceed 500 feet per year in any instance. Antevs (1922, p. 75-76), using varve chronology in New England, reported a maximum rate of 1100 feet per year. However, the rates found in the majority of his sections were considerably less than 500 feet per year.

In the author's opinion, evidence such as the magnificently developed esker systems of Maine strongly indicates that the ice in this region dissipated by stagnation and separation rather than by "normal" recession. In either case the recessional rates interpreted above are marginal and perhaps unreasonable in the light of the work of Antevs and Flint.

An alternate hypothesis is presented here to account for the apparent rapid recessional rate. It has been suggested that the Drummondville moraine just south of the St. Lawrence river in Quebec marks the furthest advance of Mankato ice towards the southeast and that the advance antedates the Champlain Sea deposits (Mason, 1960, p. 369; Gadd, 1960, p. 27-28). As this ice front retreated, the Champlain Sea flooded towards the southeast along the St.

Lawrence lowland. This reasoning excludes the possibility of a continuous ice sheet from Quebec southeastward across the St. Lawrence to some indefinite position in central Maine during Mankato time, and therefore the rates of retreat based on radiocarbon dates and on the assumption that the ice retreated from Maine northwestward across the St. Lawrence cannot be applied.

It is suggested, therefore, that during Mankato time the divide area between the St. Lawrence lowland and the Maine coast was occupied by active ice while the Champlain Sea existed. Gadd (personal communication) supports this view that the divide was occupied by ice during Champlain Sea time in order to reconcile his interpretation of the age of the Champlain Sea. Flint (1953, pl. 2) has also discussed the possibility of a Mankato ice cap on *this* divide, while Clark (1937) and Cooke (1937) have both cited convincing evidence of northward moving ice in Quebec during late Wisconsin time; Clark from the area of Bedford and Cooke from Thetford Mines.

This ice mass may have been rejuvenated during Valders time while the main Valders sheet halted north of the St. Lawrence (Mason, 1960, p. 370-371) allowing the Champlain Sea to persist in the lowland. The author has found no evidence of a Valders ice in the Bangor region. Bloom (1959, p. 68), however, suggested that the Kennebunk Advance is of Valders age in southwestern Maine and that it came from the direction of and perhaps from a center in the White Mountains.

This hypothesis is presented only as a preliminary analysis based on a minimum of field study but including supporting evidence from other sources, the sum of which strongly suggests that a late Wisconsin ice cap straddled the divide between central Maine and eastern Quebec.

The author realizes the possibility that the radiocarbon ages obtained from these shells, and shells in general, may be subject to large errors, as M. Rubin (personal communication) has indicated, but he feels nevertheless that the findings should be published in the hope of stimulating research in this area to test the hypothesis of such an ice cap.

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