Late Pleistocene Benthic Foraminifera of the Southern Champlain Sea:
Paleotemperature and Paleosalinity Indications

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Introduction

Lake Champlain (Fig. 1) is a long, narrow lake lying between New York and Vermont. It trends north-south and has a maximum depth of about 244 metres. The Champlain Valley was glaciated during the Woodfordian stade and between 14,500 and 11,500 years BP, the lake basin was gradually freed of ice. During this interval, pro-glacial lakes at several levels occupied the Champlain Valley (Chapman, 1937; Schafer and Hartshorn, 1965; Thomas, 1964; Connally and Sirkin, 1970). With the departure of the ice blocking the St. Lawrence lowland, which was then below sea level, the Champlain Sea penetrated into the Champlain Valley (Chapman, 1937; Gadd, 1964). This southern arm of the Champlain Sea gradually shallowed as glacio-isostatic uplift proceeded until the sill at its northern end reached sea level between about 8500 and 10,000 years BP (Fillon, 1970; and Chase and Hunt, 1972), and the present freshwater lake was created.

Samples for this study were taken from five piston cores recovered from Lake Champlain by the research vessel U.V.M. MELOSIRA and from three sections exposed above lake level (Fig. 1). The coring program in Lake Champlain has been successful in providing sediment samples from the pro-glacial lake, Champlain Sea and Lake Champlain phases of sedimentation (Chase and Hunt, 1972). The cores are sampled at 50-cm intervals by removing 25-cc portions of sediment. The samples are then washed through a 61-micron sieve and examined for microfossils. In the Champlain Sea sediments these are largely benthic foraminifera with occasional ostracodes and juvenile pelecypods. No planktonic foraminifera have yet been found. Lake Champlain sediments are recognized by their abundant fresh water diatoms (Sherman, 1971) while pro-glacial lake sediments can be distinguished by their stratigraphic position, texture (Chase and Hunt, 1972) and lack of fossils.

Paleotemperature

Examination of southern Champlain Sea foraminiferal faunas has so far resulted in the identification of 21 species (Table 1). The most abundant forms are Protelphidium orbiculare, Siphidium bartletti, S. clavatum, Islandiella teretis, and I. islandica, one or several of which typically compose over 90 per cent of the total fauna. Zones representing the intervals of dominance of these species appear to be correlatable throughout the lake (Fig. 2).

The evident high degree of dominance and low diversity is characteristic of both very shallow

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