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SHORT PAPER

Interstadial Conifer Wood from Northern Maine

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Conifer wood, probably spruce (*Picea* sp.), of middle Wisconsinan age ($29,200 \pm 500$ yr B.P.) was recovered from late-glacial lake sediments from Upper South Branch Pond, Maine. If the wood was derived from a local source, deglaciation of part of northern New England is suggested for this time. The occurrence also has implications for understanding the problem associated with radiocarbon dating of bulk lake sediment containing small amounts of organic matter. © 1988 University of Washington.

INTRODUCTION

While an increasing number of pre-late Wisconsinan stratigraphic profiles have been investigated from the St. Lawrence lowland (LaSalle, 1984), the Canadian Maritimes (Grant and King, 1984; Mott and Grant, 1985; de Vernal *et al.*, 1986), and Long Island, New York (Sirkin and Stuckenrath, 1980), fewer studies have focused on pre-late Wisconsinan events in northern New England. This is due largely to the lack of exposures of multiple till sections and, where found, the lack of organic materials suitable for dating the sections. Thus, studies from northern New England have focused primarily on the deglaciation history of the region (Genes *et al.*, 1981;

Davis and Jacobson, 1985; Lowell *et al.*, 1986; many papers in Burns *et al.*, 1985).

We report here on the occurrence of interstadial-age wood, dated $29,200 \pm 500$ yr B.P. (SI-4519), obtained from late-glacial sediment in Upper South Branch Pond, Baxter State Park, northern Maine (Fig. 1). Detailed accounts of those sediments can be found elsewhere (Anderson *et al.*, 1984, 1986). The date has potential importance for interpretation of the pre-late Wisconsinan glacial history of the region. Few dates of interstadial age have been reported from the area. Prescott (1973) reported a radiocarbon age of $>38,000$ yr B.P. (W-2572) for wood obtained from well borings in the Ft. Kent, Maine, area. However, its stratigraphic placement was not well con-

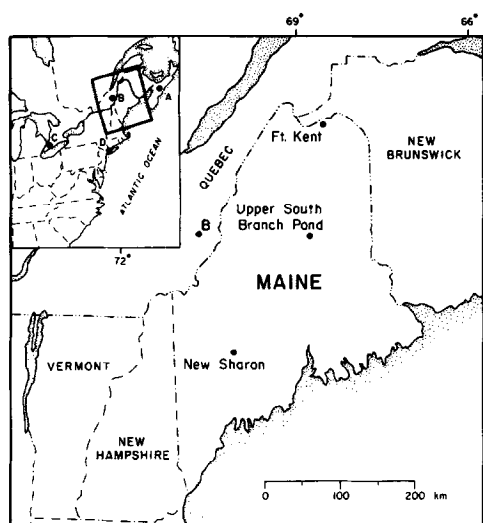


FIG. 1. Location of Upper South Branch Pond, Maine, and other sites mentioned in the text. A = sites located in Nova Scotia, including several on Cape Breton Island (Grant and King, 1984; Mott and Grant, 1985; de Vernal *et al.*, 1986; among others). B = sites within the St. Lawrence lowland (LaSalle, 1984; McDonald and Shilts, 1971). C = sites of the Plum Point/Port Talbot interval (Dreimanis and Karrow, 1972; Dreimanis *et al.*, 1966; among others). D = the Port Washington, New York, site (Sirkin and Stuckenrath, 1980).

strained. Working in New Sharon, western Maine, Caldwell (1959, 1960) described two tills separated by a nonglacial deposit dated $>35,000$ yr B.P. (Y-689). Borns and Calkin (1977) reinvestigated the section and obtained a radiocarbon age of $>52,000$ yr B.P. (Y-2683) for wood of white spruce (*Picea glauca*). Recent evidence suggests that the deposit is lacustrine (R. Nelson, personal communication, 1988). Both of these dates suggest at least a middle Wisconsinan age or older for nonglacial deposits at those locations. Middle-Wisconsinan-age materials have not been recovered elsewhere in northern New England.

In addition to contributing to knowledge of the regional glacial history, the determination reported here is also important in demonstrating one of the problems of bulk dating of late-glacial sediments.

DESCRIPTION OF THE WOOD

A small branch segment ca. 5 cm long

was extracted from a Livingstone core of late-glacial sediments during routine sampling for macrofossils. Since the wood came from a core segment below the first indication of the continuous presence of spruce at ca. 10,500 yr B.P. (Anderson *et al.*, 1986), several sections were made to identify the species, as well as to measure ring widths.

The samples studied are cross sections with some branch traces. No ray tracheids could be found on the sections. Compression wood is concentrated in one quadrant, indicating that the specimen is more likely a branch than stem (compression wood is absent in roots). Normal and traumatic resin canals are present with thick-walled epithelial cells. Ray parenchyma have nodular end walls with mostly double rows of pits. The wood is from a conifer, not *Pinus*, *Tsuga*, *Abies*, or *Cupressineae*. Most of the rings show a gradual transition between earlywood and latewood and, therefore, the specimen is more likely *Picea* than *Larix*. The mostly double row of pits in the ray parenchyma suggest *P. mariana*. Had radial sections been made prior to processing the specimen for radiocarbon dating, the genus and species identification could have been more definite.

Average diameter of the sections was 6.25 mm; 32 rings were counted. This suggests an average growth rate of 0.2 mm/yr. A conventional radiocarbon date of $29,200 \pm 500$ yr B.P. (SI-4519) was obtained on the entire piece of wood, making it at least 18,000 yr older than the first indication of sustained presence of spruce during late-glacial time at Upper South Branch Pond (Anderson *et al.*, 1986). The obvious conclusion is that it has been reworked from a much older deposit.

DISCUSSION

To our knowledge, this is the first finite late middle Wisconsinan-age determination for organic materials from northern New England. It corresponds in age to published dates from Plum Point deposits of the east-

ern Great Lakes region (Dreimanis *et al.*, 1966; Dreimanis and Karrow, 1972) and the Gayhurst Formation of southeastern Quebec (McDonald and Shilts, 1971). The wood also correlates with nonglacial deposits from various localities in Nova Scotia (Grant 1971,; Prest, 1977; Mott and Grant, 1985; de Vernal *et al.*, 1986), and the proposed Portwashingtonian warm interval on Long Island, New York (Sirkin and Stuckenrath, 1980).

Two explanations of the origin of the wood are possible. One hypothesis is that the conifer wood is of local origin. If so, it implies that north-central Maine was at least partially deglaciated during the late middle Wisconsinan. At present, there is no independent stratigraphic evidence for this. Alternatively, the conifer wood could have been carried to its final location as englacial debris, eroded from an organic deposit as the Laurentide Ice Sheet advanced over the region. While much is known about the movement of inorganic materials within glacial ice, far less has been documented about the preservation and movement of organic materials in continental ice sheets. Neither of these hypotheses can be discounted at present; however, special conditions of preservation would have to be envisioned for movement of these organic remains over long distances. The occurrence of ice-free conditions at the aforementioned sites, and at more northerly locations during this time (Gratton *et al.*, 1986), strongly favors the former hypothesis.

An additional relevant aspect is the implication regarding radiocarbon age determinations obtained from bulk lake sediment of low organic content (Björck and Håkansson, 1982). Loss-on-ignition for sections of the core in which the conifer wood was retrieved was very low (generally <2.5% of dried sediment). Thus, a substantial proportion of the organic matter could have come from reworked, pre-late Wisconsinan organic debris. This may have been the case for an additional radiocarbon

determination obtained from a somewhat lower level in this core (SI-4320; $15,110 \pm 440$ yr B.P.; Anderson *et al.*, 1986). Bulk dates for sediments containing confirmed, incongruously old organic matter should be expected to be much older than the sediment matrix. This same concern has been raised by Davis and Jacobson (1985) regarding the chronology of their reconstruction of deglaciation and early vegetation of northern New England and adjacent areas of Canada. Accelerator mass spectrometry (AMS) radiocarbon determinations on macroscopic plant remains may alleviate this problem.

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REFERENCES

- Anderson, R. S., Davis, R. B., Miller, N. G., and Stuckenrath, R. (1986). History of late- and postglacial vegetation and disturbance around Upper South Branch Pond, northern Maine. *Canadian Journal of Botany* 64, 1977–1986.
- Anderson, R. S., Homola, R. L., Davis, R. B., and Jacobson, G. L., Jr. (1984). Fossil remains of the mycorrhizal fungal *Glomus fasciculatum* complex in postglacial lake sediments from Maine. *Canadian Journal of Botany* 62, 2325–2328.
- Björck, S., and Håkansson, S. (1982). Radiocarbon dates from late Weichselian lake sediments in southern Sweden as a basis for chronostratigraphic subdivision. *Boreas* 11, 141–150.
- Borns, H. W., Jr., and Calkin, P. E. (1977). Quaternary glaciation, west-central Maine. *Geological Society of America Bulletin* 88, 1773–1784.
- Borns, H. W., Jr., LaSalle, P., and Thompson, W. B. (1985). "Late Pleistocene History of Northeastern New England and Adjacent Quebec." Geological Society of America, Special Paper 197.
- Caldwell, D. W. (1959). "Glacial Lake and Glacial Marine Clay in the Farmington Area, Maine." Maine Geological Survey, Special Geological Studies, Series 3.
- Caldwell, D. W. (1960). The surficial geology of the Sandy River Valley from Farmington to Norridge-

- wock, Maine. In "New England Intercollegiate Geological Conference Guidebook, 52nd Annual Meeting" (A. Griscom and D. Milton, Eds.), pp. 19-24.
- Davis, R. B., and Jacobson, G. L., Jr. (1985). Late glacial and early Holocene landscapes in northern New England and adjacent areas of Canada. *Quaternary Research* 23, 341-368.
- de Vernal, A., Causse, C., Hillaire-Marcel, C., Mott, R. J., and Occhietti, S. (1986). Palynostratigraphy and Th/U ages of upper Pleistocene interglacial and interstadial deposits on Cape Breton Island, Eastern Canada. *Geology* 14, 554-557.
- Dreimanis, A., and Karrow, P. F. (1972). Glacial history of the Great Lakes-St. Lawrence Region, the classification of the Wisconsin(an) Stage, and its correlatives. In "24th International Geological Congress Report." Sect. 12, pp. 5-15.
- Dreimanis A., Terasmae, J., and McKenzie, G. D. (1966). The Port Talbot interstade of the Wisconsin glaciation. *Canadian Journal of Earth Sciences* 3, 305-325.
- Genes, A. N., Newman, W. A., and Brewer, T. B. (1981). Late Wisconsinan glaciation models of northern Maine and adjacent Canada. *Quaternary Research* 16, 48-65.
- Grant, D. R. (1971). "Glacial Deposits, Sea Level Changes and Pre-Wisconsin Deposits in Southwest Nova Scotia." Geological Survey of Canada, Paper 71-1B, pp. 110-113.
- Grant, D. R., and King, L. H. (1984). A stratigraphic framework for the Quaternary history of the Atlantic Provinces, Canada. In "Quaternary Stratigraphy of Canada: A Canadian Contribution to IGCP Project 24" (R. J. Fulton, Ed.), pp. 173-191. Geological Survey of Canada, Paper 84-10.
- Gratton, D., Dubois, J.-M., Painchaud, A., and Gwyn, H. (1986). L'île d'Anticosti; a-t-elle été récemment englacée? *Geos (Ottawa)* 15, 21-23.
- LaSalle, P. (1984). Quaternary Stratigraphy of Quebec. In "Quaternary Stratigraphy of Canada: A Canadian Contribution to IGCP Project 24" (R. J. Fulton, Ed.), pp. 151-171. Geological Survey of Canada, Paper 84-10.
- Lowell, T. V., Becker, D. A., and Calkin, P. E. (1986). Quaternary stratigraphy in northwestern Maine: A progress report. *Geographie Physique et Quaternaire* 40, 71-84.
- McDonald, B. C., and Shilts, W. W. (1971). Quaternary stratigraphy and events in southeastern Quebec. *Geological Society of America Bulletin* 82, 683-698.
- Mott, R. J., and Grant, D. R. (1985). Pre-late Wisconsinan paleoenvironments in Atlantic Canada. *Geographie Physique et Quaternaire* 39, 239-254.
- Prescott, G. C., Jr. (1973). "Groundwater Favorability and Surficial Geology of the Lower St. John River Valley, Maine." U.S. Geological Survey, Atlas HA-485.
- Prest, V. K. (1977). General stratigraphic framework of the Quaternary in eastern Canada. *Geographie Physique et Quaternaire* 3, 7-14.
- Sirkin, L., and Stuckenrath, R. (1980). The Portwash-ingtonian warm interval in the northern Atlantic coastal plain. *Geological Society of America Bulletin* 91, 332-336.