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A record of Lateglacial and Holocene vegetation and climate change from Woods Lake, Seymour Inlet, coastal British Columbia, Canada

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Abstract

The Lateglacial and Holocene vegetation and environmental history recorded in a small coastal lake in the Seymour Inlet area, British Columbia, is described. *Pinus*-dominated vegetation and a cool and moist climate prevailed in the early phase of the Lateglacial. Later stages of the Lateglacial were characterised by a mixed coniferous forest with *Tsuga* species, *Picea* and *Abies* and slightly warmer conditions and increased moisture. *Alnus, Picea* and *Pteridium aquilinum* dominated the vegetation of the early Holocene. Warmer and drier conditions prevailed during this phase. Increased moisture and decreased temperatures characterised the mid-Holocene as indicated by the dominance of Cupressaceae, *Tsuga heterophylla*, *Alnus* and *Picea* in the forest around the study site. This represented a transitional stage to the late-Holocene Cupressaceae–*T. heterophylla* phase, when the modern climate regime characterised by temperate and wet conditions became established. The vegetation succession identified correlates well with Lateglacial and Holocene records from other sites in the Coastal Western Hemlock biogeoclimatic zone of British Columbia. Sedimentological and microfossil records from the examined sediment core indicate that saltwater intrusions into the lake basin occurred during the early Lateglacial and the middle to late Holocene resulting from changes in relative sea level.

Keywords: pollen analysis; Lateglacial and Holocene; vegetation history; palaeoclimate; Coastal Western Hemlock biogeoclimatic zone; British Columbia

1. Introduction

Large areas of coastal British Columbia are influenced by a temperate and wet climate that favours the formation of coniferous forest communities dominated by western hemlock and western redcedar. Previous research on the Lateglacial and Holocene vegetation history in this region (Fig. 1), referred to as the Coastal Western Hemlock (CWH) biogeoclimatic zone, has mainly concentrated on areas of Vancouver Island (Hansen, 1950; Hebda, 1983; Brown and Hebda, 2002; Lacourse et al., 2003; Lacourse, 2005), the Queen Charlotte Islands and the adjacent mainland coast (Banner et al., 1983; Warner, 1984; Quickfall, 1987; Lacourse et al., 2003, 2005) and the southern mainland coast (Hansen, 1940; Mathewes, 1973; Mathewes and Rouse, 1975; Pellatt et al., 2002). These studies indicate that climate has varied considerably throughout the Lateglacial and Holocene. However, regional interpre-

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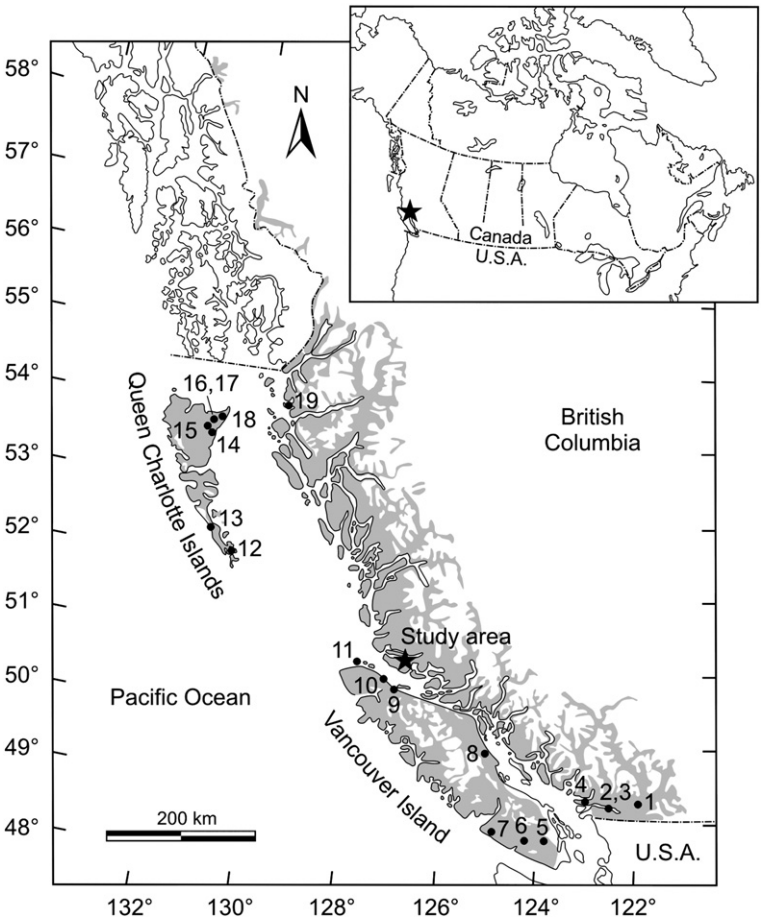

Fig. 1. Map of British Columbia, Canada, showing the distribution of the Coastal Western Hemlock biogeoclimatic zone (grey) and the locations of the Woods Lake study site and other palynologically investigated sites within this zone: (1) Mathewes and Rouse (1975); (2) Mathewes (1973); (3) Pellatt et al. (2002); (4) Hansen (1940); (5–7) Brown and Hebda (2002); (8) Hansen (1950); (9) Lacourse (2005); (10) Hebda (1983); (11) Lacourse et al. (2003); (12) Quickfall (1987); (13) Lacourse et al. (2005); (14–15) Warner (1984); (16–17) Quickfall (1987); (18) Warner (1984); (19) Banner et al. (1983).

tation is currently hampered by the limited data constraining vegetation and climate history of the central mainland coast of British Columbia.

This study focuses on a lake basin in the Seymour Inlet area, a remote part of the central mainland coast located northeast of Vancouver Island. Palaeoenvironmental research in this area allows a more detailed reconstruction of vegetational and climatic changes in the CWH biogeoclimatic zone. Based on sedimentological and microfossil analyses, the local variation in vegetation and climate at the investigated site are constrained and compared to changes that occurred elsewhere in the region during the Lateglacial and Holocene.

2. Study area

The Seymour Inlet, a large marine inlet complex that extends ca. 50 km inland (Fig. 2), comprises a network of islands and glacially scoured, steep-sided fjords in mountainous terrain, which are characteristic of the mainland coast north of Vancouver Island (Pojar and MacKinnon, 1994). The Seymour Inlet area lies within the CWH zone (Fig. 1), which occurs at low to middle elevations along the coast of British Columbia, mostly west of the Coast Mountains. The CWH zone is characterised by a cool mesothermal to temperate and wet climate with cool summers and mild winters. These conditions are primarily the result of variation in atmospheric and oceanic circulation in the northeast Pacific, which are governed by the Aleutian Low, the North Pacific High, the Jet Stream and the equatorial El Niño/La Niña cycle (Patterson et al., 2004).

Characteristic soils in the CWH zone are podzols with mors as the prevailing humus form (Pojar et al., 1991). Dominant trees include western hemlock (*Tsuga*