Lithofacies analysis of the Catfish Creek till: Bradville, Ontario

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Sedimentologic and facies analyses are used to interpret a section of Catfish Creek till at Bradville, Ontario. Repetitive passive lodgement of debris-rich ice and gradual melt-out beneath active ice produced four massive matrix-supported diamicts (Dmm) separated by sand (Sg) and gravel (Gm) horizons. This sequence was partly reworked by melt-water focused along sand horizons, depositing cross-cutting Dcm, Sg and Gm facies. Post-depositional faulting also occurred. Deposition and glaciofluvial reworking are inferred to have occurred at some distance behind an alternately floated and grounded margin of the late Wisconsinan Erie Lobe.

Une approche sédimentologique et une analyse des faciès sont utilisées pour interpréter une coupe du till du ruisseau Catfish à Bradville, en Ontario. La succession de la mise en place passive de glace riche en débris et de la fonte graduelle sous le glacier ont produit quatre diamictes à support par la matrice (Dmm), séparés par des horizons de sable (Sg) et de gravier (Gm). Cette séquence a été en partie remaniée par de l'eau de fonte concentrée le long d'horizons sableux, qui a déposé les faciès discordants Dcm, Sg et Gm. Des mouvements de failles postérieurs au dépôt se sont aussi produits. Il est déduit que le dépôt et le remaniement fluvio-glaciaire se seraient produits à une certaine distance de la marge du lobe Érié, du Wisconsinien tardif, laquelle était alternativement flottante et échouée.

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INTRODUCTION

During the Wisconsinan, southwestern Ontario was the major zone of confluence between the Huron and Erie lobes of the Laurentide ice-sheet (Dreimanis, 1987). In the Bradville area (Fig. 1a), the Huron Lobe preceded the Erie Lobe deforming the mid-Wisconsinan Tyrconnell Formation as it moved south (Dreimanis, 1987). The composition of the Catfish Creek till, deposited during the mid-late Wisconsinan, reflects interaction between the westward advancing Erie Lobe and the Huron Lobe, flowing south (Hicock and Dreimanis, 1985; Dreimanis et al., 1987). The result of ice-stream interaction was a southwestward ice flow direction. By the late Wisconsinan, the Erie Lobe had overrun the interlobate zone and the Port Stanley till was deposited (Fig. 1b; Dreimanis et al., 1987).

Evenson et al. (1977) demonstrate that towards Plum Point (Fig. 1a), the Catfish Creek till comprises subaqueous flow tills produced at the margin of a glacier lobe grounded in a glacial lake. Gibbard (1980) and May et al. (1980) recognize that at least part of the Catfish Creek till is the result of basal melt-out. From examination of the Catfish Creek till at Bradville, Dreimanis et al. (1987) inferred a complex depositional cycle of alternating lodgement, melt-out and subglacial debris flows.

To date there is incomplete documentation of all lithofacies types in the Bradville area. This paper examines a 26 m section of Catfish Creek till exposed approximately 1 km northeast of Bradville (Fig. 1b), in an attempt to improve the working knowledge of depositional processes operating beneath the Erie Lobe during the mid-late Wisconsinan period.

METHODOLOGY AND RATIONALE

Heavy rain and mud flows thwarted numerous efforts to expose the entire section. The composite structure of the section exposed between November 1987 and February 1988 is shown in Figure 2. Non-genetic field descriptions with lithofacies coding (similar to Eyles et al., 1983; Table 1) and sedimentological analysis were employed to describe the section. Graphic logs were drawn at 1 m, 13.3 m, 17.5 m and 22.3 m (Figs. 2, 3). Observed facies relationships were used to propose a depositional environment and facies model.

Various sedimentologic techniques, including analysis of in situ pebble fabrics, granulometric distributions and clast shapes, have been employed to demonstrate glacial transport paths and depositional environments (Boulton, 1978; Sugden et al., 1987). In the Bradville area, Dreimanis et al. (1987) and others have used lithological content and limestone-dolomite ratios to determine stratigraphic relationships of local glacial sequences. These sedimentologic techniques were followed in the present study.