

TILL STRATIGRAPHY AND OLEAN ICE RETREAT
IN EAST-CENTRAL NEW YORK

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ABSTRACT OF THE THESIS
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Pebble counts, garnet ratios, till textures and fabric analyses were used to distinguish Mohawk from Valley Heads drift on the northern edge of the Appalachian Plateau. Till texture is closely related to underlying bedrock, with areas underlain by similar lithologies showing a secondary discrimination attributed to drift provenance. Valley Heads drift is siltier, more erratic rich and contains a higher proportion of purple garnets than Mohawk drift.

Till stratigraphy and drumlin morphology demonstrate Valley Heads drift to have been deposited by a major readvance of the Ontario lobe subsequent to Mohawk recession.

A previously unrecognized moraine was delineated between Cassville and Cooperstown, New York. The moraine crosses several divides permitting calculation of ice front gradients, which compare favorably to those

of active, steady-state, temperate glaciers. Ice slope considerations and topography suggest correlation of the Cassville-Cooperstown drift border with the Peekamoose substage of the Catskill moraine.

A depositional origin for the Mohawk drumlin field is suggested from analysis of till fabric. First approximation values for the spatial distribution of drumlin fields can be calculated based on the accretional theory of drumlin origin (Muller, 1963) and the dilatant properties of till (Smalley and Unwin, 1968). Drumlins form where differential stresses exist on opposing sides of obstacles in the glacial bed. Differential stresses are limited to ice thicknesses of 1100-1400 meters, depending on bed roughness. The equation for ice sheet profiles (Nye, 1952c) gives maximum distances for drumlin formation of 60-100 km. behind the ice margin. Calculations agree with location and distribution of most drumlin fields.

Mapping of the Cassville-Cooperstown moraine enables tracing of additional recessional positions of the Olean ice sheet. Recession was uniform, with little local valley control, suggesting an active, retreating ice front rather than widespread ice stagnation. In contrast to suggestions of previous writers, ice recession

was sub-parallel to the Olean terminal moraine as well as perpendicular to striations and ice-scoured through valleys.

Regional correlations imply deposition of the Cassville-Cooperstown-Peekamoose moraine was simultaneous to the 15,000 years B.P. Rosendale positions in the Wallkill Valley. Recession of the Mohawk lobe and readvance of the Ontario lobe is suggested to be concurrent, resulting from initial isostatic rebound subsequent to deglaciation of the Adirondack dome. The Valley Heads moraine is therefore a morphostratigraphic rather than a time-stratigraphic unit.

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