GLACIATION OF WESTERN LONG ISLAND

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In western Long Island there is evidence of only two glaciations. The most recent (the Laurentide Ice Sheet) reached its greatest extent twenty-two thousand years ago, late in the Wisconsinan Glacial Stage. The earlier glaciation took place either before forty thousand years in the early Wisconsinan or in the next older glacial stage, the Illinoian. Field studies of glacial deposits in southern New York and New England, and especially in Long Island, reveal the existence of two distinct layers of glacial deposits, each the result of a separate glaciation. The lower, older drift was derived from a glacial lobe that traversed the Hudson lowland and adjacent upland of eastern New York and western Connecticut. In a similar fashion, the Hudson Lobe of the last glaciation advanced southward and spread eastward into western Long Island. Key elements of this two part glacial history are the identification of the boundary between the two drift sheets, the structural complexities imposed by the younger ice sheet, the radiocarbon-dated pollen record of sedimentary deposits of the warm climatic intervals, including those of the mid-Wisconsinan, or Portwashingtonian, warm interval centered around thirty thousand years ago, and the very consistent and well documented radiocarbon-dated late-glacial pollen record of eastern North America. The Portwashingtonian beds include a sequence of marine and glacial sediments dated between more than forty-three thousand years and twenty-one thousand seven hundred fifty years; the latter age provides the time of arrival of the Laurentide Glacier on Long Island. During warm intervals seal level rose, while during glaciations sea level was lowered. Low sea level during the last glaciation may have allowed meltwater to cut deep channels into the drifts. Later, as the sea rose, both marine and fluvial sediments were deposited in the channels.

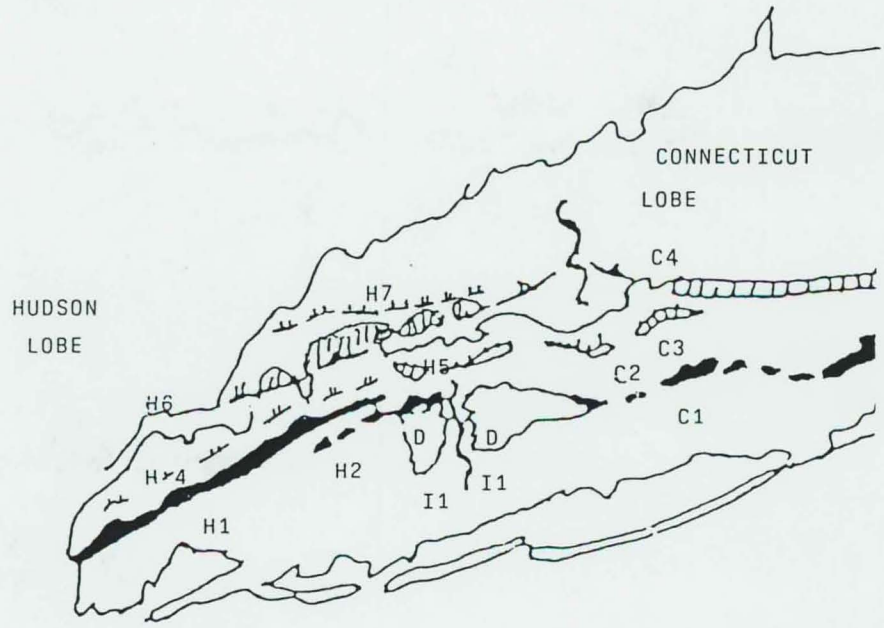
The upper drift sheet, the sediments deposited by the late Wisconsinan glacier, covers much of Long Island. The lower drift sheet was deformed into tight folds, ripped into large blocks and thrust southward by the younger ice. The rip-ups are surrounded by lighter-colored outwash and deltaic sands of the upper drift. Ice-thrusted masses of sediment also include blocks of Cretaceous strata. The upper drift incorporates relatively undeformed tills that cover the older sediments. Early on, geologists misinterpreted this structural unconformity- undeformed till over deformed outwash and till- as the boundary between the drift sheets. The boundary is correctly placed below the late Wisconsinan outwash which engulfs the thrusted older sediments. In western Long Island, the surface till of the upper drift is the Roslyn Till. This till thins northward over the proximal surface of the terminal moraine and merges with thin, recessional tills. Northward these tills thin to layers of till stones and erratics.

The terminal moraine of the Hudson Lobe of the Laurentide Ice Sheet in western Long Island, west of the Interlobate Zone is known as the Harbor Hill Moraine (Figure 1). The Hudson Lobe collided with the Connecticut Lobe of the glacier to form the Interlobate Zone. The terminal moraine of the Connecticut Lobe is the Ronkonkoma Moraine of central Long Island. A minor surge or readvance of a sublobe of the ice, the Westbury Lobe, deposited a row of small kames, the Jericho Moraine, along the proximal margin of the Harbor Hill Moraine. These kames have been mistakenly identified as the Ronkonkoma Moraine (now restricted to the east). Soon after the ice reached its terminus, the ice front began to melt and recede. North of the Harbor Hill Moraine, a broad, thick band of drift was emplaced as a recessional moraine, the Oyster Bay Moraine, which is set off from the terminal moraine by a topographic lowland. To the east the Oyster Bay Moraine intersects a somewhat younger recessional moraine, the Northport Moraine, which cuts into the Oyster Bay Moraine to the west and abuts the Stony Brook Moraine of the Connecticut Lobe in an interlobate angle to the east.

An ice stand near what is now the north shore of western Long Island deposited the Sands Point Recessional Moraine west of the intersection of the Hudson and Connecticut lobes. This moraine is separated from the moraines to the south by lateral meltwater channels and incorporates large proglacial lake deltas and bogs, and kames capped by till stones. The lateral meltwater channels mark the ice margin between Lloyd Neck and Eatons Neck and the mainland to the south. In Lloyd Neck, the ice formed a segemented, washboard topography with morainal deposits alternating with smaller meltwater channel swales and kettles. Thrusted Cretaceous sediment can be seen in the bluffs along the north shore. A minor recessional moraine, the City Island Moraine, marks the next ice margin to the north. Traced eastward from the east coast of the Bronx, this moraine may have outposts in till-capped kames on the northern tips of Glen Cove and Lloyd Neck.

The chronology of late Pleistocene events in western Long Island is keyed to the radiometrically-dated pollen stratigraphy of eastern North America. All of the pollen records and ages from the glacial surfaces cover the same time span, late-glacial to recent, and confirm the late Wisconsinan age of the surficial glacial deposits. By

twenty thousand years ago, Long Island was ice free. This age is confirmed by dates that indicate the margin of the ice well to the north by nineteen thousand years.



Long Island end and recessional moraines:

Hudson Lobe
- H1 Harbor Hill
- H2 Jericho
- H4 Oyster Bay
- H5 Northport
- H6 Sands Point
- H7 City Island

Interlobate Zone
- I1
- D Deltas

Connecticut Lobe
- C1 Ronkonkoma
- C2 Stony Brook
- C3 Mount Sinai
- C4 Roanoke Point

Figure 1 Moraine Map for Western Long Island.

REFERENCES. Additional references, as well as more detailed discussions of this glacial history and descriptive field sites can be found in the author's latest book, **WESTERN LONG ISLAND GEOLOGY**, (Sirkin, Les, 1996, Western Long Island Geology. Watch Hill: The Book and Tackle Shop Publishers.