EVIDENCE OF TILL
SOUTH OF RONKONKOMA MORAINE

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INTRODUCTION

The generally accepted glacial history of Long Island is that the Ronkonkoma Moraine is the terminal moraine of Late Wisconsinan glaciation for this area. Surface sediments south of this moraine are generally considered to be part of an outwash plain (Fuller, 1912; Lewis and Stone, 1991; Sirkin, 1986). Sanders and Merguerian (1994), however, proposed that lake sediments exposed at Montauk Point required the existence of a now-vanished moraine south of Montauk which acted as a freshwater dam. We provide here evidence for the presence of till south of the Ronkonkoma Moraine from Westhampton to the east to North Amityville to the west provides evidence that a glacier extended south of the Ronkonkoma moraine. (Figure 1). The till generally is a surface layer often covered by loess. Immediately underneath the till are stratified sand and gravel or clay.

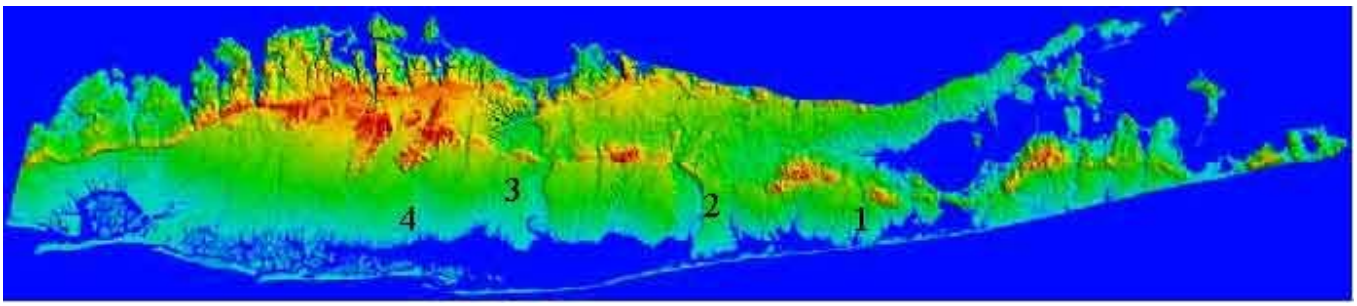


Figure 1 - Locations of till (diamicton) found in excavations on south shore of Long Island.
1 - East Moriches
2 - North Bellport
3 - Central Islip
4 - North Amityville

HAMLET OF EAST MORICHES
(Charles King)

This study is approximately two miles south of the Ronkonkoma moraine in the hamlet of East Moriches, Southeastern Brookhaven Township (1 in Fig. 1). The observations includes till, an erratic field of boulders and glacially induced deformation. Most of the sections were at construction sites and are, thus, no longer available for viewing.

The new East Moriches K-4 Elementary School is located just north of the intersection of Montauk Highway and Adelaide Avenue. Observations at this location were made during the initial excavation of the

site and are no longer available. The land here has been historically undeveloped and unfarmed, being used as firewood acreage (personal communiqué, Moriches Bay Historical Society). An inspection of the Long Island 1834 Coastal Survey map, as well as more recent area maps (1897, 1910 and 1927), indicate that this location has not been cleared. The composition of the forest at the site was much different from the surrounding pitch pine/scrub oak forest in that it contained abundant white oak, hickory, sassafras and mature wild cherry trees.

Figure 2 - Till exposure (dark tan) located above outwash sediments (light tan) at the new East Moriches K-4 Elementary School. Stick is one meter in length. South is to the right of the figure.

Excavation in the southern portion of the property began in the Spring of 2002 with a large pit, measuring 12 meters E/W by 65 meters N/S, exposing fresh outcrops of till. Using a site map, the highest elevation of 28 feet was in the SE corner down to 22.5 feet in the NW corner. The till is found at the top of the outcrops (Figure 2) being fairly uniform in composition and thickness (28 cm to 45 cm) and follows the local landscape. The till is predominantly hard packed to the point of requiring a rock hammer to break and is massive with no apparent sorting of sediments which range in size from small cobbles (rarely to 10 cm) to silt/clay.

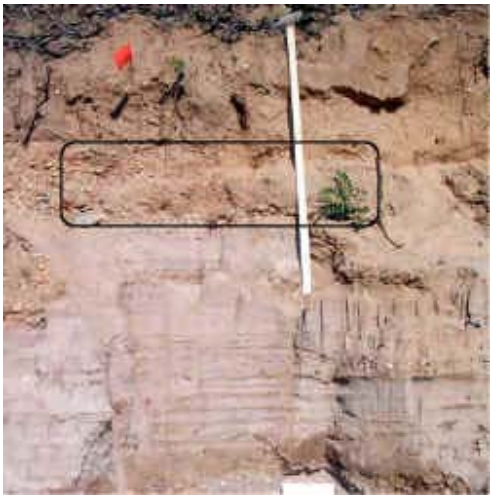


Figure 3 - Sheared till lens (framed) injected into the outwash sediments below. South is to the right. Stick is one meter in length.

Figure 3 shows a sheared lens of till that has been injected into the outwash sediments below. The lower part

of the section is primarily sorted sand. Some bedding of the outwash sediments (Figure 4) have also been disturbed one meter below the till. Ventifacts are quite numerous and well sculpted near the uppermost part of the till.

Figure 4 - Disturbed outwash sediments located approximately one meter below the till. Darkening of outwash sediments is due to iron oxide. South is to the right of the figure.

Approximately 1.5 mile N/NW of the school site is another outcrop of till at the new East Moriches Retirement Village on Frowein Road, 1 mile west of the intersection with Pine Street. Till at this location is very similar to that of the school site and drapes the local topography. Figure 5 shows it draping a small hill of outwash sediments.

Figure 5 - Till draping hill of outwash material at East Moriches Retirement Village. South is to the left of figure. Stick is one meter in length.

At both locations the diamicton seems to be a basal till with uniform texture and thickness representing the shear zone between the moving glacier and the underlying sediments (Boulton *et al*., 1996; Benn and Evans, 1998). In draping the landscape the till appears to preserve remnants of the paleo-topography. The author proposes the name of the Moriches Bay till for this formation.

Another interesting aspect is the erratic field of large cobble to boulder sized sediments that exists over a large area of the East Moriches hamlet roughly south of Frowein Road from the Terrell River to the west and Harts Cove to the east. They represent a range of rock types and roundnesses both within the till (Figure 6) and those removed from the till (Figures 7 and 8). 45% are in the .2 to .4 range of roundness and the remaining are in the .5 and .7 range using the visual technique of Krumbein (1941). Many of the cobbles and boulders are quite smooth and sculpted by aeolian erosion. The estimated proportion of rock types is:

40% schist with some gniessic texture, 25% Triassic-Jurassic red sandstones, 15% quartzite, 15% basalt, and minor cemented sandstone. The large erratics may represent material initially transported from their bedrock sites within the Moriches Bay till or may have been removed by an earlier glacier and picked up and transported with the Moriches Bay till.

Figure 6 - *In situ* boulder located in East Moriches at King's home. Excavation around the boulder revealed that is over two meters in length being surrounded by till sediments. The stone was reburied.

Figure 7 - Boulder-sized erratics located at the East Moriches home of King. These boulders were removed from the till approximately fifty years ago.

Figure 8 - Large boulder erratic located just south the existing East Moriches Elementary School in the ball field area off of Adelaide Avenue. The ball field were constructed in the mid-Sixties. According to local sources, the boulder was found in the field area and move approximately twenty feet to the west. The boulder exhibits fluting from glacial transport. South is located to the lower left of the figure. The stick is one meter in length.

Spot inspections show that the Moriches Bay till extends over a much wider area in Eastport and Westhampton to the east and Shirley to the west.

NORTH BELLPORT, BROOKHAVEN, NEW YORK
Lance Mion

Recent construction in North Bellport has exposed sediments including diamicton which is interpreted to be till (Fig. 9) The sites were accessible during July through August 2001. Two of the sites were construction sites one was located approximately one half mile east of Sills Road, County Road 101, along Horse Block Road the other located off Montauk Highway, at the end of Swamp Road. The third site is an active sand and gravel pit located approximately one mile east of Sills Road, on Horse Block Road.

The lowest beds are cross-bedded tan to white sands with some gravel. These are overlain by 50 cm of a dark green to gray folded clay layer (Approximately three meters below grade at N40^{o}50.85' , W72^{0}33.036' and continuing more than 1000' to the south.). The clay is overlain by poorly sorted coarse sand with some fines, pebbles and cobbles. This layer ranges in thickness from a centimeter to almost one meter thick and exhibits some folded laminar bedding (Fig. 10). This is overlain by an up to two meter-thick layer of diamicton, interpreted to be basal till. The diamicton is typically well indurated, light brown, poorly sorted with a wide range of particle sizes. Rock fragments are well rounded. At the gravel pit boulders were observed. Throughout the study site, the surface is covered by up to one-meter of loess overlying the diamicton.

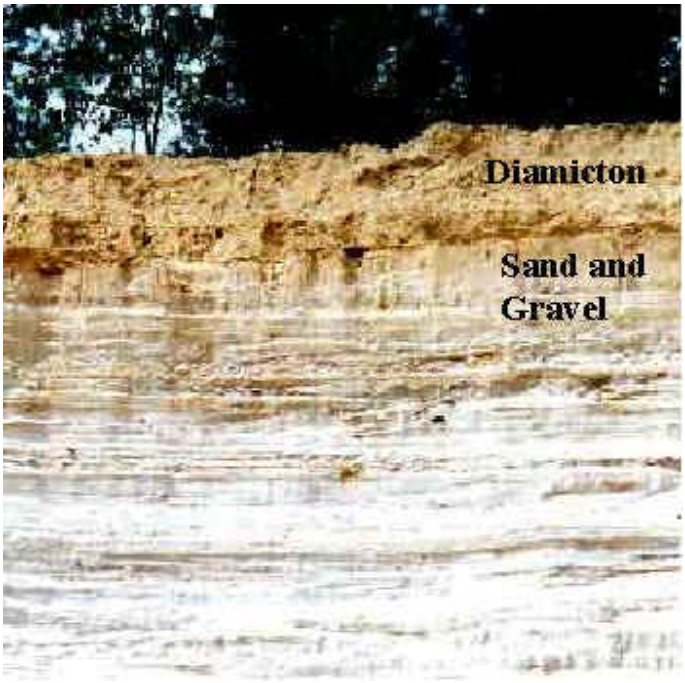


Figure 9. Gravel Mine, Horse Block Road, Bellport Brown diamicton overlying layered sand and gravel.

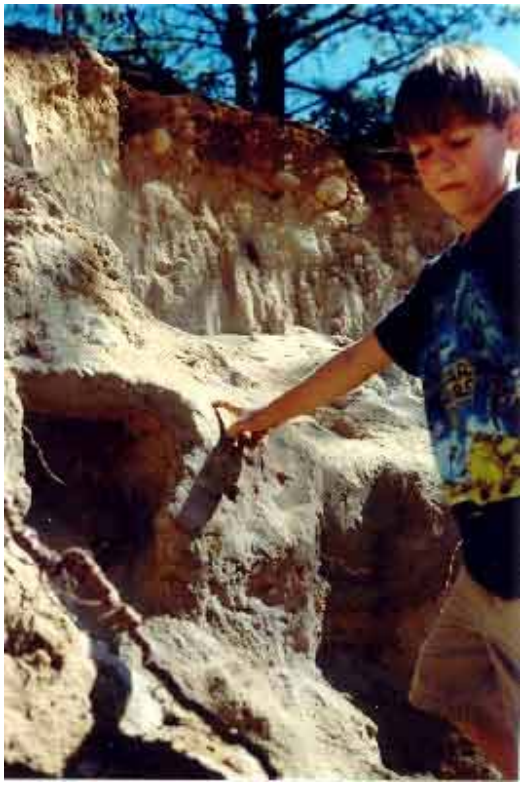
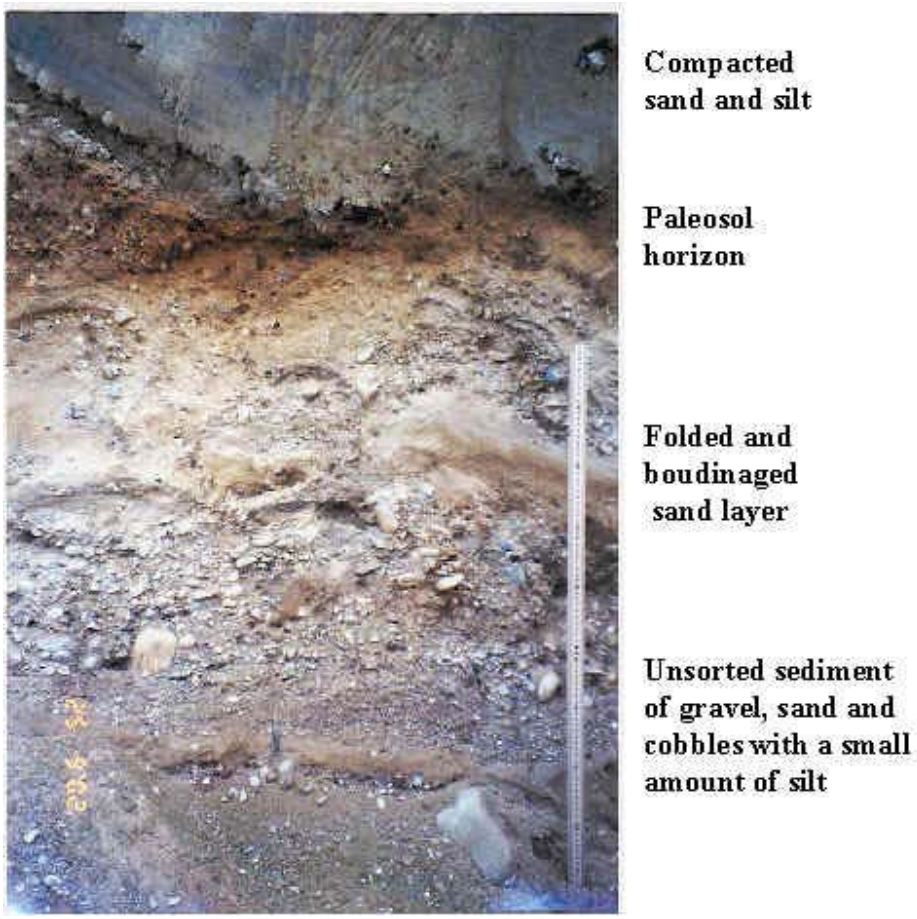


Figure 10. Boy is pointing to green-gray clay layer lying beneath till with cobbles at the top of the section.

CENTRAL ISLIP AND NORTH AMITYVILLE
Waldemar Pacholik

Diamicton interpreted as till was excavated by the Central Islip High School which is three-fourths of a mile south of the Ronkonkoma moraine. The till is overlain by loess in undisturbed places. A 30 cm thick, tightly compacted, and evidently deformed layer of mixed fine sand and silt underlies the diamicton. Below that, is a 1.2 m thick, deformed, unsorted, mixed gravel, sand, and cobble layer with a very small content of silt. Upper 20 cm of this stratum appears to have evidences of soil development. The thin, approximately 10 cm., layer of sand, also included in this mixed material deposit, is significantly folded and boudinaged. This glacially disturb sediment sequence is underlain by outwash type deposits.

Figure 11 Section exposed in excavation near Adams Rd. by Central Islip High School, 3/4 of a mile south of the Ronkonkoma Moraine



Figures 12. Section exposed in excavation site near Adams Rd. by Central Islip High School, 3/4 of a mile south of the Ronkonkoma Moraine

In an excavation site on the western side of Carlton Avenue, one mile south of the Long Island Expressway in Central Islip, there is a 1 meter thick, unsorted layer of brown sediment made of silt, sand and gravel interpreted to be till. This deposit is underlain by stratified, light colored sand. The lack of boulders and cobbles in this till could be a result of the long distance of transport from the nearest bedrock source, which is located approximately 20 miles north in Long Island Sound (Pacholik, 1999). Previous studies show that basal, glacially transported material, quickly decrease in size. Goldthwait (1968) found that less than 0.1% of a rock type is found beyond 21 miles of it source. Drake (1972) observed that rhyolite disappeared from glacially transported sediment after a distance of 20 miles from its source. Pacholik (1999) estimated that granite boulders could sustain only about 15 miles of basal transport.

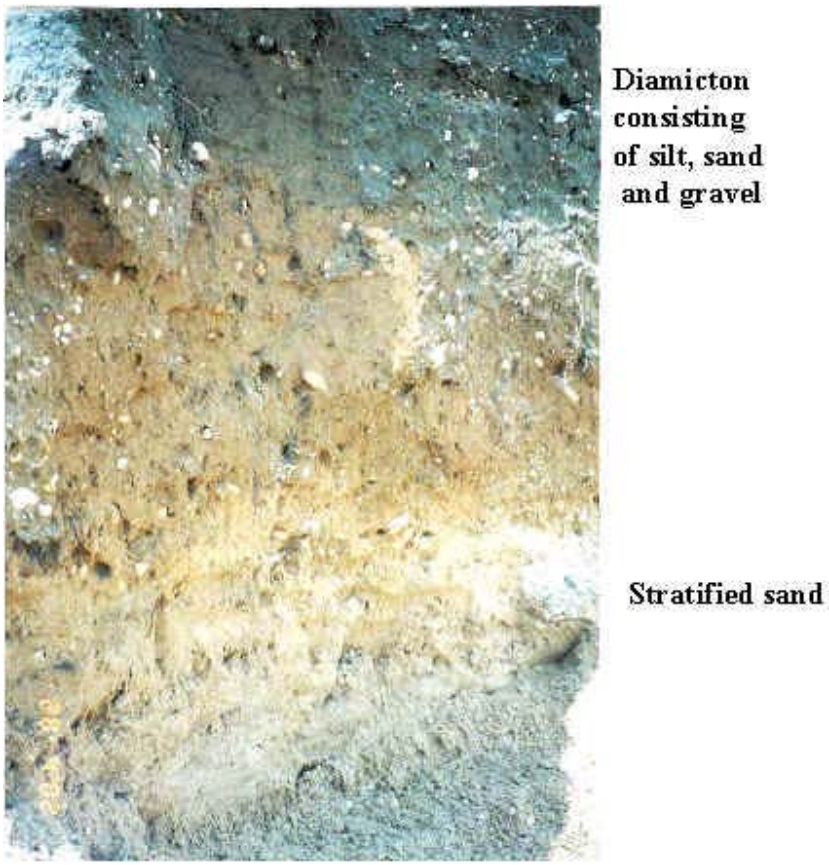


Figure 13. Excavation site one mile south of Ronkonkoma Moraine, Central Islip west side of Carleton Avenue.

Figure 14 Till in an excavation site in North Amityville. The sediment is similar to deposits on the west side of Carleton Avenue.in Central Islip.

CONCLUSION

The till found south of the Ronkonkoma Moraine generally has fewer cobbles and boulders than that along the North Shore of Long Island. This is most likely a result of the longer distance of basal transport from the bedrock. The presence of till south of the Ronkonkoma Moraine on Long Island suggests that glaciation extended further south than previously documented. In addition, the existence of clay found at some locations suggests the presence of proglacial lakes. Whether these were small bodies or a larger body of water dammed by a moraine further to the south is not known.

REFERENCES CITED

*Benn, D. I. and Evans, D. J. A., 1998. Glaciers and Glaciation: Arnold Publishing, Inc., London, pp. 142 - 160.

*Boulton, G. S., van der Meer, J. J. M., Hart, J., Beets, D., Ruegg, G. H. J., van der Wateren, F. M. and Jarvis, J., 1996. Till and moraine emplacement in a deforming bed surge; an example from a marine environment: Quaternary Science Reviews, vol. 15, pp. 961 - 987.

*Drake, L. D., 1972. Mechanisms of clast attrition in basal till: Geological Society of America Bulletin, vol. 83, pp. 2159 - 2166.

*Fuller, M. L., 1912. The geology of Long Island, New York: U. S. Geological Survey Professional Paper no. 82, 231 pp..

Goldthwait, R. P., 1968. Superficial geology of the Wolfeboro-Winnipesuakee area, New Hampshire: New Hampshire Department of Resource and Economical Development, 60 pp..

*Krumbein, W. C., 1941, Measurement and geological significance of shape and roundness of sedimentaryParticles: Jour. Sed. Petrology, p. 64-72

*Lewis, R. S. and Stone, J. R., 1991. Late Quaternary stratigraphy and depositional history of the Long Island Sound basin: Journal of Coastal Research - Special Issue No. 11, pp. 1 - 23.

*Pacholik, W., 1999. Boulders from Stony Brook - Analysis of Distances of Transportation: www.geo.sunysb.edu/esp/589_99/Pacholik/pacholik_bio.htm.

*Sanders, J. E. and Merguerian, C., 1994. Fitting Newly Discovered Northshore Gilbert Type Lacustrine Deltas into a Revised Pleistocene Chronology of Long Island: abst. Geology of Long Island and Metropolitan New York, 103-116
http://people.hofstra.edu/Charles_Merguerian/Abstracts%20and%20Papers/CM2003.htm

*Sirkin, Les, 1986. Pleistocene Stratigraphy of Long Island, New York: in Cadwell, D. H., (ed). The Wisconsinan Stage of the First Geological District, Eastern New York, New York State Museum Bulletin No. 455, pp 6-21.