

Petrography and Bedrock Origin of Shelter Rock, a Large Glacial Erratic in Western Long Island, New York

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Shelter Rock (Figure 1) is a large and historically significant glacial erratic located just south of Shelter Rock Road on the grounds of the Greentree Estate in Manhasset, New York. Despite the significance of Shelter Rock in the archeology and folklore of Long Island, it has never been subjected to close geological analysis, perhaps because of its presence on private property. An article from the New York Times (Feb. 29, 1999) describes Shelter Rock as a 55-foot-high, 35-foot-wide “great granite boulder” and an article on the web describes it as “slightly metamorphosed granite of northern origin” (Bielskas). Direct observation of Shelter Rock in the field reveals that it is a blocky mass of bedrock deposited within the boulder-rich till of the Harbor Hill moraine (Figure 2). Inspection of less weathered surfaces reveals a distinct micaceous mineral foliation and small crystals of garnet. We collected hand samples for thin section petrographic analysis to better constrain the mineralogy and petrography of Shelter Rock. The dominant mineral suite consists of plagioclase feldspar, biotite, and hornblende, with lesser amounts of quartz and accessory garnet and sphene. Based on the mineral composition and texture of Shelter Rock, the most appropriate lithological description for it would be metadiorite or diorite gneiss.

Glacial striations measured on the bedrock surface exposed at Orchard Beach in the Bronx, located northwest of Manhasset along a line perpendicular to the trend of the Harbor Hill moraine, provide a flow direction for the Late Wisconsinan ice sheet of S32°E. A possible bedrock source for Shelter Rock can be found by tracing a line back along this bearing from the current location of the erratic (Figure 3). The formation that most closely matches the lithology of Shelter Rock in the region of the flow direction line is the Harrison Gneiss / Brookfield Diorite Gneiss / Ravenswood Gneiss which are collectively described as biotite-hornblende-quartz-plagioclase gneiss with accessory garnet and sphene (Fisher et al., 1970). Outcrops of diorite gneiss intrusives are located along the southern margin of Connecticut north of the probable transport path of Shelter Rock. Given the large size and angular form of Shelter Rock it is unlikely that it was transported more than a few miles (Pacholik and Hanson, 2001) from its point of origin, indicating the presence of an unmapped body of diorite gneiss beneath the western end of Long Island Sound.



Figure 1. Shelter Rock glacial erratic with people for scale standing under the overhanging south end of the boulder that forms the rock shelter.

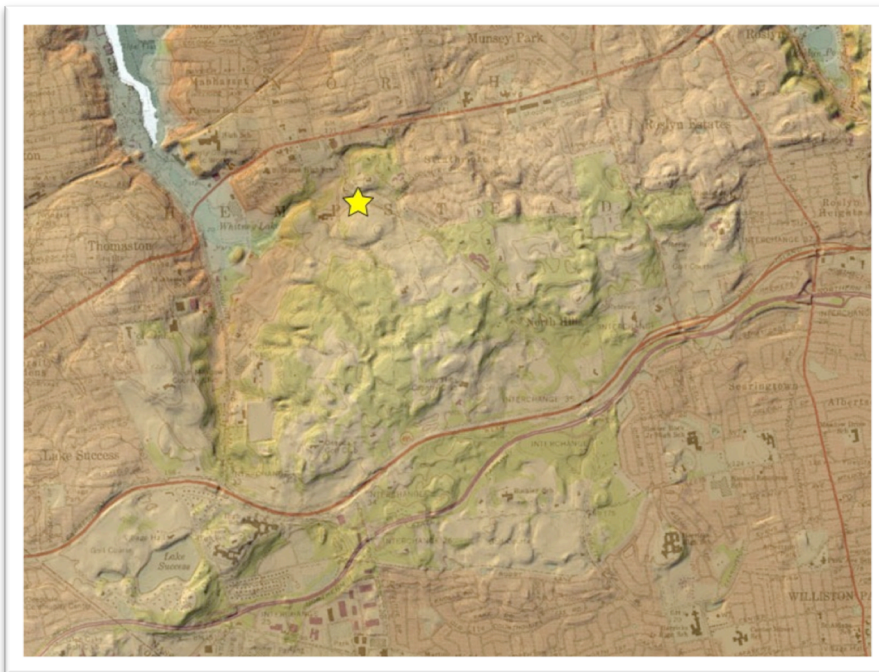


Figure 2. Location of Shelter Rock within the Harbor Hill moraine.

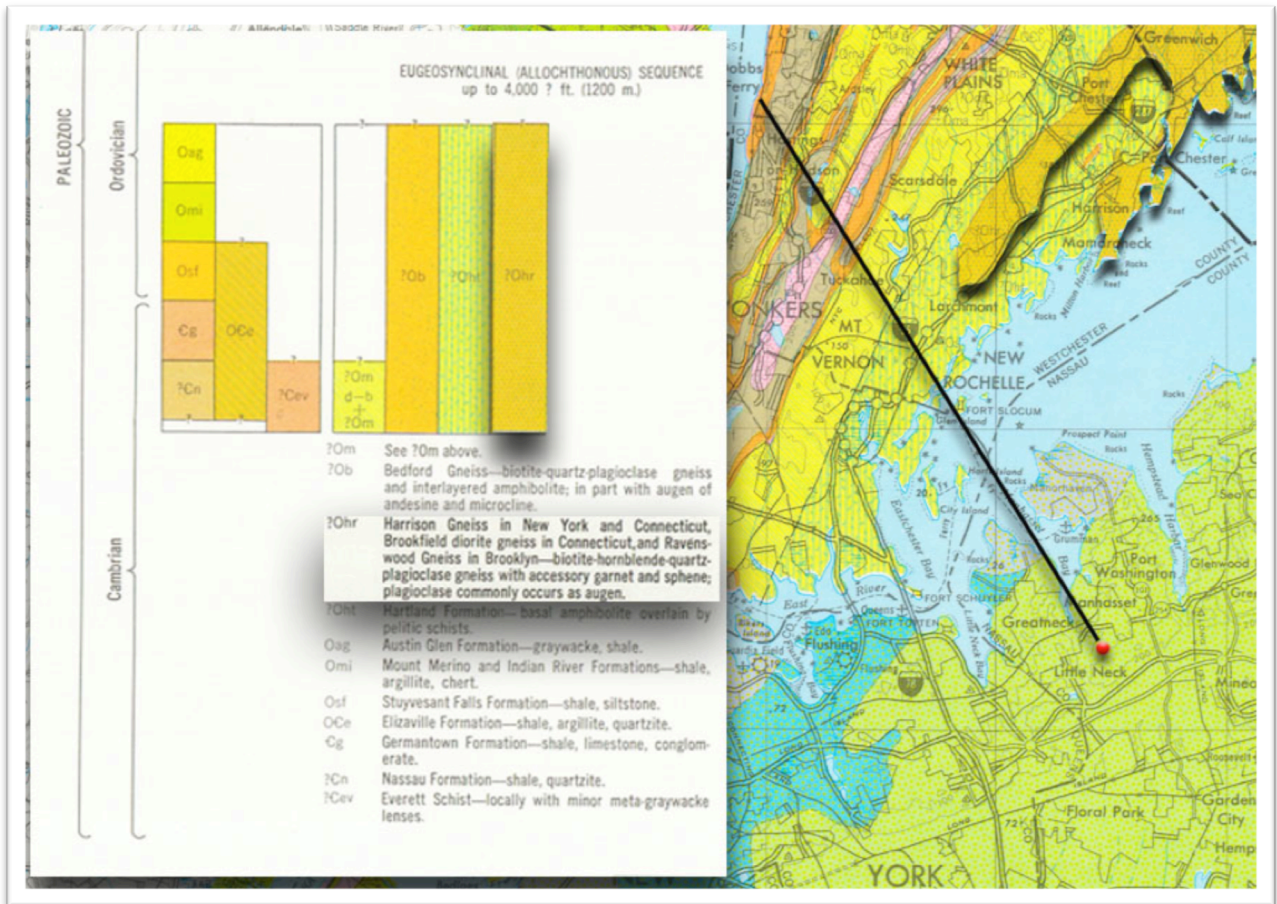


Figure 3. Detail of Lower Hudson sheet, Geologic Map of New York State, showing location of Shelter Rock, trend line of glacial transport, and outcrops of diorite gneiss in the region (light orange – Ohr – Harrison Gneiss).

References

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Pacholik, Waldemar and Gilbert N. Hanson, 2001, Boulders on Stony Brook Campus May Reveal Geology of Long Island Sound Basement, Online: <http://www.geo.sunysb.edu/lig/Conferences/abstracts-01/Pacholik/Pacholik-GNH-abst.pdf>