

RADIOACTIVE "BLACK SAND" DEPOSITS on the NORTH SHORE OF LONG ISLAND

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Long Island has a core of Upper Cretaceous sedimentary strata of coarse sand, gravel and clay overlain by Late and Mid Wisconsinan interstadial deposits above Altonian (Early Wisconsinan) drift. The Late Wisconsinan (Woodfordian) multi-lobed ice sheet reached its terminal position about 21,750 years BP (Sirkin and Stuckenrath, 1980), and was responsible for the present Ronkonkoma and Roanoke Point Moraines (Sirkin, 1986).

Heavy, mineral-rich "black sands" occurring as placers on the beaches of Long Island were mined in Colonial times for their iron content (Fuller, 1914), and have been found, like beach placers in India, Brazil and elsewhere in the USA to contain elevated concentrations of both uranium and thorium (Gilbert and Park, Jr., 1986, Roger and Jasta, 1962). A number of radioactivity measurements including the levels of U and Th in sands and erratics on the shoreline of Long Island were published in Laymon et al. (1994). The heavy minerals were found to include magnetite, monazite, thorite, xenotime and garnet.

Previous radioactivity measurements tested specimens taken from the South Shore of Long Island (Laymon et. al, 1994 and Ward et al., 1988). In the present investigation, a set of new samples have been collected from the North Shore, improved techniques have been developed for the gamma-ray spectroscopy of naturally-radioactive nuclides (Harbottle, 1993, Harbottle and Evans, 1997) and an improved software has been exploited to yield actual uranium and thorium concentrations rather than the more approximate "equivalent uranium" and "equivalent thorium". This software also allows us to estimate the state of disequilibrium found in the thorium and uranium decay chains. Calculations will be presented relating the radioactivity measurements to the gamma- radiation exposure of beach-goers with its subsequent potential impact on health.

Finally, the distribution of Th/U ratios will be compared to the same ratios for samples collected elsewhere to see if this ratio also characterizes a particular granitic source (thought by some to be the Adirondack Mountains (Flint, 1947)) that might have furnished the heavy mineral component of the Long Island beach placers. Specifically, one could test the possibility that the heavy minerals in the glacial sediment had a more local source, for example the underlying Cretaceous sediments and/or the basement rocks immediately to the north in Long Island Sound and Connecticut.

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