On the Origin of Parabolic Dunes Near Friar's Head, Long Island, New York

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An analysis of the Grandifolia Sandhills (Long Island, New York) reveals that a series of duneforms and an associated endemic forest dominated by American beech (Fagus grandifolia) located on and adjacent to Long Island Sound bluffs exceeding 100 feet in height are probable Late Pleistocene climatic relics. Information derived from both historic U.S. Coast and Geodetic Survey charts and U.S. Geological Survey digital elevation maps demonstrates that the Sandhills are parabolic dunes that have been truncated by long term erosional recession of the Long Island north shore. Extrapolation of original dunefield structure indicates that many individual dunes spanned approximately one mile in length and that all originated from a northwesterly sand source that appears to have been drowned by the post-glacial eustatic rise of sea level. Shoreface retreat has removed more than half of the initial length of surviving Grandifolia dunes, a process that could only have occurred over thousands of years. Large parabolic dunes similar to these occur in contemporary periglacial regions. The Grandifolia Sandhills apparently began to form approximately 16,000 years before present when the last periglacial climate effected coastal New York. Many of these dunes ascended the east-west spine of the Harbor Hill Moraine and were stranded in their present position when winds powerful and persistent enough to move them dissipated as the climate ameliorated. Although tundra vegetation probably helped trap and bind loose sand to create these parabolic dunes, when the climate warmed enough to support trees Fagus grandifolia--possibly in a dwarf form living at the edge of the range of the species--may have been the earliest tree to colonize. Once established, this species helped modify dune sand into a soil that promoted its domination and taller forms. As shoreface retreat undercut dune and forest over thousands of years the parent Fagus grandifolia population tenaciously evolved--or reverted to--a unique dwarf morph that may have been the pioneer. Dwarfism occurs in places other than where the forest is undercut. The pygmy form appears to grow in particularly stressed micro-environments such as dune crests. Dwarf trees are most abundant where the fabric of the forest runs down the steep Sound shore bluff to be continually cut back by slumping and other effects of storm waves. This biogeologic phenomenon appears to be globally singular. Preservation for scientific research, study, and education is recommended.

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