South Florida Geological Site Guide series
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No. 04

Fossil Root Reef (rhizolith), Crandon Park Nature Reserve, Key Biscayne

(v.1.1, 7-04)

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Location and access

After crossing the bridge, drive miles and take the second turning on the left into Crandon Park (you must pay for parking). Drive toward the sea then turn left and the road leads to the Nature Center. You must report at the office, and for large groups the office must be consulted ahead of time (305-3616767). The entrance fee may be waived for educational groups, but you must send an e-mailto Mr Ernie Lynk at elynk@miamidade.gov to explain the purpose of the visit and the day of the intended visit.

Follow the nature trail (about 0.5 mile) to the boardwalk through the mangrove. The reef can be viewed from the end of the boardwalk. The mangrove "reef" is exposed within the tidal zone, so it is best viewed at low tide. Tides can be checked at http://tbone.biol.sc.edu/tide/sites_useastlower.html and then scroll to Virginia Key – Bear Cut.

What there is to see

An unusual fossil root reef (rhizolith) structure.

Rock type(s)

Observations

The exposed reef is about 100m by 300m, but may be more extensive under the coastal sands. It consists of vertical rods that give rise to an intricate interwoven lattice (Fig. 1) Many of these

Figure 1. Lattice-like structure of the fossil root reef

rods can be observed with their lower ends attached to a layer of horizontal rods. The rods are made up of brown –colored calcareous sand grains. The outer part of the root is case-hardend with a softer, carbonate paste in the interior. Occasional invertebrate fossils, usually clams, can be encountered, and this author has found a large (25cm long) queen conch fossil.

Dating of the carbonate paste by ^{14}C gave ages of 1960±180 and 1000±140 years before present, indicating a late Holocene age.

Interpretation

There seems to be little doubt that structure is formed of fossil root casts (rhizoliths), but there is controversy over which type of plant the root system belonged to. Traditionally it has been attributed to black and white mangrove (*Avicennia germinans* and *Laguncularia racemosa* respecively), living examples of which are seen nearby (Hoffmeister and Multer, 1965; Hoffmeister, 1974). This view has been challenged, however, by Froede (2002) who concludes that the root structure is that of a community of turtle grass (*Thallasia testudinum*). If this hypothesis turns out to be correct, then it implies that sea level was about 0.5 m higher than at present at the time of deposition of the root reef as *Thallasia* roots occur in water 0.5-1m deep.

Landform Development (geomorphology)

Until recently, the reef was covered and protected by sand, but in the last 35 years coastal erosion has stripped away at the sand and exposed the reef. The rate of erosion of the reef has probably increased since the urbanization of the Miami area.

References and further reading

Froede, Carl R., 2002, Rhizolith evidence in support of a late Holocene sea-level highstand at least 0.5m higher than at present at Key Biscayne, Florida, Geology, v. 30, p. 203-206.

Hoffmeister, J. E. and Multer, H. G., 1965, Fossil mangrove reef of Key Biscayne, Florida, Geological Society of America Bulletin, v. 76, p. 845-852

Hoffmeister, J. E.., 1974, Land from the sea: The geologic story of south Florida, University of Miami Press, 143pp.