



COVER PHOTOGRAPH: ROAD CUT THROUGH ANASTASIA FORMATION, TOWN OF PALM BEACH, FLORIDA, USA

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View looking west through one of the deepest road cuts in Florida, transecting the Anastasia Formation.

This impressive exposure of Anastasia Formation sediments occurs along Country Club Road on the island of Palm Beach in Palm Beach County. This exposure contains two disconformities with paleosols separating the beds. The formation, usually observed in exposure on the coast as notched bluffs with blow holes, extends up to 32 km inland in St. Lucie and Martin Counties. The Anastasia Formation contains interbedded sands and coquinaoid limestones, the most common facies being an orangish brown, unindurated to moderately indurated, coquina of whole and fragmented mollusk shells in a matrix of sand often cemented by sparry calcite. Sands occur as light gray to tan and orangish brown, unconsolidated to moderately indurated, unfossiliferous to very fossiliferous beds. Most outcrops in the Anastasia Formation contain laminated calcium carbonate surface crusts. This case hardening, which averages about 2.5 cm in thickness, follows the surface of the rock. The upper surface is usually reddish-brown and smooth. Individual laminae are alternating white and red-brown layers approximately 1 mm thick. Botryoidal growths and root impressions are also found on the surface of the crusts that probably formed in a subaerial environment by leaching and reprecipitation of calcium carbonate (Lovejoy, 1983). In addition to the case hardening of exposed formation surfaces, two types of solution features also occur in the Anastasia Formation. Surface pits form shallow depressions on the surface of the outcrop where the deeper, more than 1 m long inverted "dunce hat" cavities, form solution pipes or pits such as those that are so common in eolianite deposits along the coast of southwestern Australia, Bermuda, and in the Bahamas. The pits formed by acidic standing water but downward drainage formed the pipes. Pipes with an open bottom on cliff visors along the shore often function as "blow holes" during high tide. Pipes with a closed bottom are commonly filled by calcium carbonate lithified infillings or paleosols.

On the shore, the Anastasia Formation is characteristic of a wave-erosion coast with notches forming at the bottom of sea cliffs. There are often small sea caves and most cliffs have a wave abrasion platform at the base, which is often covered with sand. Small sea arches occur at the base of promontories that jut into the ocean making for a very interesting seascape.

With an age of about 130,000 years old, the Anastasia Formation is the youngest lithified marine deposit found along Florida's coast. It was formed during Marine Isotope Stage 5 (MIS 5e) when sea level during the Eemian Interglacial was a few meters higher than today. In addition to occurring on land and along the shore, the Anastasia Formation also occurs offshore on the continental shelf where it forms exposed bedrock that serves as a template for geomorphological development of seafloor features such as structural sand flats and reticulated hardgrounds (Finkl, Benedet and Andrews, 2005). (Photograph and caption by Charlie Finkl, Department of Geosciences, Florida Atlantic University, Boca Raton, Florida and The Coastal Education & Research Foundation, West Palm Beach, Florida).

Finkl, C.W.; Benedet, L., and Andrews, J.L., 2005. Submarine geomorphology of the continental shelf off southeast Florida based on interpretation of airborne laser bathymetry. *Journal of Coastal Research*, 21(6), 1178–1190.

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