

ICHNOFOSSIL DISTRIBUTION IN SEQUENCE STRATIGRAPHIC UNITS OF THE EOCENE CLAIBORNE GROUP, U.S. GULF COASTAL PLAIN

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The Middle Eocene Claiborne Group in SW Alabama and SE Mississippi encompasses a single large supercycle (Tc) in sea-level change, which in turn is composed of four third order cycles (TE2.1 - TE2.4) corresponding to the Tallahatta, Lower Lisbon, Middle Lisbon, and Upper Lisbon Formations and their equivalents. Each of these cycles exhibits (to varying degrees of development) the characteristic transgressive, condensed, and highstand deposits of a standard sedimentary sequence. In each case, the sequence boundary corresponds to the transgressive surface. The overlying Gosport Formation, the uppermost unit of the Claiborne Group, is part of the next major supercycle and is separated from the underlying units by a type 1 unconformity.

While sequences are defined primarily on the basis of lithology, biological signatures often lend valuable support to sequence stratigraphic interpretations based on lithologic criteria. Trace fossils have proven especially useful in recognizing depositional sequences within the Claiborne Group. The regularity with which certain traces appear in particular parts of a stratigraphic sequence allows the construction of a generalized scheme for ichnofossil distribution in Claiborne sequences:

- Sequence boundaries overlying marginal or non-marine sands are often characterized by deep, near-vertical, branching, meandering, unlined burrows. These may represent root traces from plant growth along the exposure surface prior to transgression.
- The transition between normal and marginal marine conditions is often marked by the occurrence of the corkscrew-shaped burrow *Gyrolithes* and/or the thick boxwork burrows of *Thalassinoides* or *Ophiomorpha*. These traces occur at the base of sequences corresponding to the transgressive surface and near the tops of sequences just before the shift to marginal clays.
- Transgressive deposits are characterized by ubiquitous burrow mottling and discrete burrows. Individual burrows are generally thin (less than 1 cm), oblique, and often cross-cutting and/or backfilled.
- Traces from shell-borers such as lithophagid or pholadid clams and *Cliona* sponges are common on substrates within the condensed interval. This is consistent with the surface of maximum transgression being an interval of sediment starvation.
- Fully marine portions of highstand deposits are usually completely bioturbated and homogenized. Burrow mottling is common but discrete structures are rare.
- Marginal to non-marine sands of highstand deposits may be characterized by *Skolithos* escape burrows.

This scheme should apply at least to Paleogene sequences in similar environments, and more generally to other time periods so long as the trace makers associated with the above ichnofossils are present.

The consistency in the pattern of ichnofossil distribution agrees with patterns derived from studies of body fossils showing tracking of preferred environments and recurrence of characteristic assemblages in similar positions within stratigraphic sequences.