

Mini Lecture: Upper Cenomanian planktic foraminifera from North Central Texas

During the late Cretaceous, Texas was covered by a shallow epicontinental sea, the Western Interior Seaway. Texas was located in the southeastern margin of this seaway. The rocks exposed now in the Dallas–Fort Worth area are all sedimentary rocks. The Cretaceous rocks in Texas are divided into two series: the older Comanche Series (Lower Cretaceous) and the younger Gulf Series (Upper Cretaceous).

The Eagle Ford Group of the Upper Cretaceous is very extensive in Texas. It is divided into three Formations, from older to youngest: Tarrant, Britton and Arcadia Park. The Eagle Ford is subdivided into a lower transgressive sequence (Tarrant and Britton) and an upper highstand sequence (Arcadia Park Fm). The Arcadia Park Formation contains a stratigraphic marker bed named locally Kamp Ranch which has been interpreted as a tempestite deposit.

The Eagle Ford has been interpreted to range from late Cenomanian (94 Mya) to mid – Turonian (89.5 Mya). The Cenomanian/Turonian boundary is contained within the Upper Britton (Camp Wisdom Member) of the Eagle Ford Group. The dip of the Eagle Ford varies slightly but is, for the most part, 2 degrees southeast.

The sediments represented by this sample were collected from the lower Britton (Turner Park Member) in the southeastern part of the Dallas- Fort Worth area.

The Britton is the thickest Fm. within the Eagle Ford. It underlies most of Dallas-Fort Worth International Airport. Bentonites are concentrated in the Britton, where at least 34 bentonite seams have been reported.

Planktic forams indicate that the age of the lower Britton is late Cenomanian corresponding to the *Rotalipora cushmani-greenhornensis* subzone of Pessagno (1969). Additional data using calcareous nannofossil biostratigraphy indicate that the age of the sediments is 'late but not latest Cenomanian' (Watkins, 2003 written comm.).

The following forams were found in the sample: *Heterohelix moremani*, *Heterohelix* sp. *Herbergella amabilis*, *H. brittoensis*, *H. delrioensis*, *Guembelitria harrisi*, *Schakoina cenomana*, *Rotalipora cushmani*, *R. greenhornensis*.

Analysis of the microfaunal assemblage of the outcrop indicates that diversity of the planktic foraminifera of the lower Britton is low, with abundant shallow-dwelling opportunistic species of *Herbergella* and *Heterohelix* and rare rotaliporiids. The assemblage is entirely planktic. This is an indication that the bottom of the ocean was either dysoxic or anoxic creating an environment unsuitable for the benthic forams to inhabit. This deposit is stratigraphically close to the Cenomanian/Turonian boundary where the last occurrence and eventual extinction of the planktic forams *Rotalipora cushmani* and *R. greenhornensis* are events recognized worldwide (C/T Anoxic Event, OAE-2).

The Eagle Ford shale is an important source of hydrocarbons in East Texas. The lower Britton of the Eagle Ford Group where the sample was collected is interpreted as have been deposited under low energy (below wave base) or quite, nearshore, shallow to moderately deep marine environment. In addition to the abundant planktic foraminifers a variety of

macrofauna inhabited the ocean eventually accumulating on an anoxic ocean floor devoid of bottom-dwelling scavengers where they were slowly covered by thinly laminated sediments (Friedman, 2004).

The outcrop and surrounding area have yielded the remains of several fish: *Enchodus*, *Xiphactinus*, *Pachyrizodus*, *Thryptodus*, *Protosphyraena* as well as the oldest saurodontid record in North America (Stewart and Friedman, 2001). Shark remains: *Cretolamna*, *Cretodus*, *Ptychodus Squalicorax*, *Scapanorhyncus*, etc.). Countless very well preserved coprolites attributed to these fish and sharks have been recovered from the area (Friedman, 2012 in press).

Reptilian remains were also found belonging to plesiosaur, turtles, as well as rare marine lizards, *Coniasaurus*.

As a last note, I would like to add that this facies also contains remains of low-oxygen tolerant inoceramid pelecypods and occasionally their epibionts *Pseudoperma*. These are the only bottom dwelling inhabitants in these sediments. Their presence in an environment that was anoxic or dysoxic adds to the evidence that these organisms were probably in symbiotic association with zooxanthellae or some other organisms that allow them to survive in stressed low-oxygen conditions (Friedman, 2004). The inoceramid clams were the pearl producing organisms of the Cretaceous seas and their fossil pearls have been also found in the locality (Friedman and Hunt 2004).

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