

Geology of the Cretaceous Period Around Midlothian, Texas

Although the Cretaceous Period (about 144 to 65 million years ago – MYA) is usually thought of as the 'Age of Dinosaurs', marine life was flourishing more than ever before. Seafloor upwelling and increased volcanism produced enough carbon dioxide to create unprecedented global warming - some say up to 30°F warmer than today. This produced an ice-free, near tropical world with sea levels 100-300 meters higher than today. Tectonic activity on the east and west coast of the United States created a shallow basin from the Colorado border to Missouri and extended from the Gulf Coast to the Arctic Ocean. This increase in sea level caused flooding and created a shallow seaway known today as the Western Interior Seaway.

In many marine environments, sediments eroding from the land are being continually accumulated on the ocean floor capturing the organisms that lived and died in that ocean. Fluctuating temperatures varied the sea level/shoreline and consequently affected the depositional environment and composition of the sediments from sandy, near shore deposits, to finer silts that produced shales and eventually open ocean, deep water calcareous deposits that would eventually become chalks and limestone.

Following the Cretaceous time, the poles returned to ice and the seaways retreated. Tectonic activity elevated the former marine basins and erosional forces sculpted the surface to produce what we know today as Texas.

Underlying Midlothian, Texas are ancient sea floor sediments composed of shales and chalks deposited about 90 million years ago. The Eagle Ford Shale was formed from muds washed into a relatively shallow sea. The sea retreated creating a shallower and more turbulent environment eroding the top of the Eagle Ford and allowing little deposition of calcareous material. This activity resulted in what is now referred to as the 'condensed zone' or simply the 'Austin-Eagle Ford contact' as the ocean became much deeper and eventually produced the overlying Austin Group (Atco Formation and Austin Chalk). Cement manufacturers employ the high-quality Austin Chalk to make their cement with pits dug into the underlying Eagle Ford Shale for its aluminum content – a catalyst in the cement cracking process.

This foot-thick contact zone has gained popularity because of its relatively high fossil content comprised mostly of shark and ray teeth as well as disarticulated bones and teeth of other fishes, turtles, plesiosaurs, mosasaurs and crocodiles with some invertebrate material including snails, clams, gastropods, inoceramids and rarely ammonites. Also, of interest to collectors are sizable Marcasite nuggets that formed sometime after deposition of the Basal Atco Formation.

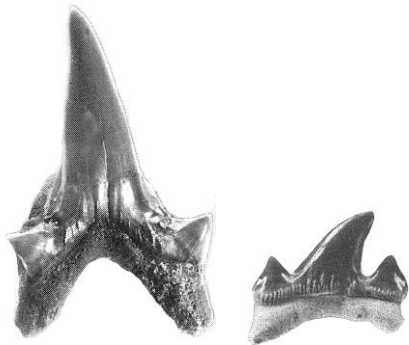
Shawn Hamm and David Cicimurri authored a paper in 2011 entitled, *Early Coniacian (Late Cretaceous) Selacian Fauna from the Basal Atco Formation, Lower Austin Group, North Central Texas* where they identified twenty-nine elasmobranch (shark and ray) species from the contact zone. The identifications are based primarily on teeth since these animals are only cartilaginous meaning they have no bones in their bodies. Rarely prismatic cartilage and dermal denticles are preserved.

Hamm and Cicimurri identified the following elasmobranch taxa: cf. *Meristodonoides* sp., *Ptychodus atcoensis*, *P. latissimus*, *P. mammallaris*, *P. martini*, *P. whipplei*, *Heterodontus* sp., *Chiloscyllium greeni*, *Cantioscyllium dicipiens*, cf. *Ginglymostoma* sp., *Scapanorhynchus raphiodon*, *Cretodus crassidens*, *Cretoxyrhina mantelli*, *Cretalamna appendiculata*, *Protalamna compressidens*, *Dallasiella willistoni*, cf. *Paraisurus* sp., *Johnlongia parvidens*, *Squalicorax falcatus*, *Pseudocorax laevis*, cf. *Microcorax* sp., *Sclerorhynchus* sp., *S. priscus*, *Ischyrhiza schneideri*, *Ptychotrygon triangularis*, *Texatrygon hooveri*, *Keistus texanus*, *Rhinobatos lobatus* and *Pseudohypolophus* sp.

On the reverse side are some of the larger shark teeth that are to be found in this basal Atco 'contact zone'.

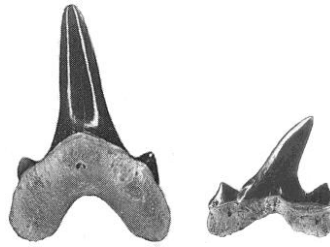
SHARK AND RAY TEETH

Around Midlothian, Texas (Cretaceous Age, Coniacian Stage, Austin Group, Atco Formation)



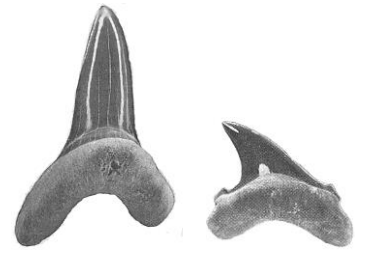
Anterior lateral

Cretodus crassidens



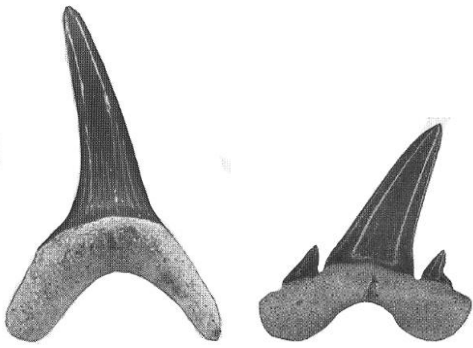
anterior lateral

Cretalamna appendiculata



anterior lateral

Cretoxyrhina mantelli

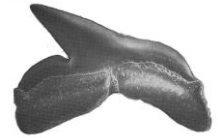


anterior lateral

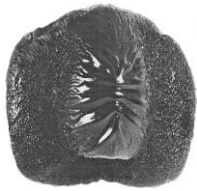
Scapanorhynchus raphiodon



Squalicorax falcatus



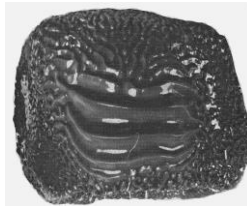
Pseudocorax laevis



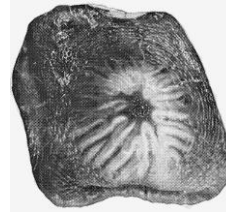
Ptychodus atcoensis



Ptychodus mammalaris



Ptychodus latissimus



Ptychodus mortoni



Ptychodus whipplei



Shark Vertebra