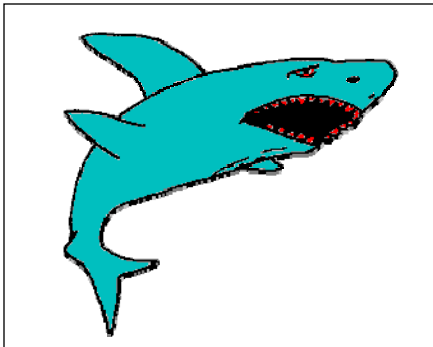


## Miocene Sharks Teeth of Calvert County

The sharks teeth collected along the shore of the Chesapeake Bay between Chesapeake Beach and Calvert Cliffs in Calvert County are records of a far distant past when the climate, geography, and living creatures in this area were quite different from those of today.



Back in the Miocene Epoch, about 17 million years ago, the sharks that bore these teeth lived in the warm, shallow sea that covered southern Maryland. Luxuriant growths of sea algae and succulent aquatic plants that flourished here provided abundant food for marine life. Among the vertebrate inhabitants were seacows, whales, turtles, porpoises, rays, and sharks. The invertebrate population included ostracods (small crustaceans), clams, oysters, corals, sand dollars, and microscopic foraminifera. Along the margins of the sea were low, sandy shores and cypress swamps. Presumably a warm temperate climate prevailed similar to that of North and South Carolina today. As generations after generation of these animals lived and died, and sank to the sea floor, they were covered by layers of

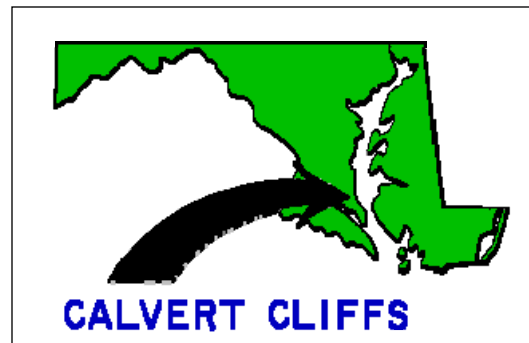
sand and silt that sealed them off and helped to preserve their skeletons. These fossiliferous deposits belong to the Miocene Calvert formation.

During the course of millions of years, the margins of this sea fluctuated gently and the climatic regime changed. Land surfaces exposed periodically were eroded, and streams and rivers carved new channels which altered the topography.

After the last great ice sheet receded and the sea level rose again, the lower reaches of the Susquehanna River and its tributaries were flooded. The present-day configuration of the Chesapeake Bay emerged, with the deposits of the Calvert Cliffs that were once sea bottom now standing 100 ft. above the water line. Fossil remains of animals from that ancient sea floor are now exposed as wind and water erode the cliffs, and represent the most extensive assemblage of this period in the Eastern United States.

The teeth of extinct sharks most commonly found here belong to the following species: *Galeocerdo contortus*, and *G. triqueter* (Tiger Sharks), *Hemipristis serra* (Requiem Shark), *Oxyrhina desorii* (Mackerel Shark), *Sphyrma prisca* (Hammer-head Shark), and the Sand Shark, *Odontaspis elegans*. Teeth of the spectacular giant White Shark, *Carcharodon megalodon*, are found here too, but are rare.

From the great number of teeth that have been and are still found here, initially one wonders how so many sharks could have lived in a relatively restricted area.



There are several reasons for this abundance. First, sharks have an unlimited supply of teeth. No cavities, permanently missing teeth, or tooth aches for them! Shark teeth are not set firmly in the jaws, but in the gums, where they occur in layered rows. If a tooth is lost, it is gone but briefly, for

# Miocene Sharks Teeth of Calvert County



another from the reserve layer moves forward to take its place. Therefore, one "full set" by no means represents the total tooth production of one shark. Also, recent studies indicate that the young of one common modern shark replace their upper teeth every 7.2 days, and the lower ones every 8.2 days! It is possible that this may have held true in fossil sharks.

Another factor may control the abundance of teeth. The predominance of bones of young and immature whales that have been recovered suggests that this was a calving ground. Many of these bones are scratched and scarred by the teeth of sharks. Thus, it would appear Miocene sharks shared their descendent's predatory habit, and were attracted to this area by the young whales that made easy prey.

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Geologic Age		Age (millions years)
Recent		present to 0.01
Pleistocene		0.01 to 1.8
Pliocene		1.8 to 5.3
MIOCENE	St. Mary's formation	5.3 to 23.7
	Choptank formation	
	Calvert Formation	
Oligocene		23.7 to 36.6

Since bones are so common in the Calvert deposits it may seem curious that shark "bones" are not found. This is explained by the fact that sharks belong to the Class Chondrichthyes, which means cartilaginous fishes. Their skeleton is composed of hard gristly material that is reinforced on the surface at stress points with calcium phosphate (apatite). Therefore, only their hard, enamel-covered teeth are well preserved. A rare exception to this were specimens of *Cladoseleache* (meaning Branch-toothed Shark), the earliest shark remains now known, that were found in the 1880's in the late Devonian Black Cleveland Shales exposed on the banks of the Rocky River southwest of Cleveland (Ohio). These remarkable specimens, consisting of calcified skeletal cartilage, and impressions of the skin

## Miocene Sharks Teeth of Calvert County

and body shape, were preserved in large petrified concretions of mud. The shark reconstructed from these remains was 4-5 feet long, and not very different from the sharks of today, even though it roamed the Devonian seas more than 350 million years ago.

While the bones of vertebrate fossils generally are found on privately owned land, and are commonly the provenance of geologists who study and preserve them, amateur collectors exploring the public beaches on the Chesapeake Bay in Calvert County, are rewarded with finds of sharks teeth, shells, small pieces of coral, and the dental plates of rays.

Jeanne D. McLennan, 1971  
*Geologist*

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Suggested reading:

- Ashby, W. L., 1986, *Fossils of Calvert Cliffs: Calvert Marine Museum, Solomons, MD, 20 p.*
- Clark, W.B. and others, 1904, *Miocene Text: Maryland Geol. Surv. Systematic Report, 509 p.*
- Cartmell, C., 1988, [Let's Go Fossil Shark Tooth Hunting : A Guide for Identifying Sharks and Where and How to Find Their Superbly Formed Fossilized Teeth](#)
- \_\_\_\_\_, 1904, *Miocene Plates: Maryland Geol. Surv. Systematic Report, 135 plates.*
- Vokes, H.E., *Miocene Fossils of Maryland: Maryland Geol. Surv. Bulletin 20, 85 p.*
- Vokes, H.E., J.D. Glaser and R.D. Conkwright, 2000, [Miocene Fossils of Maryland: Maryland Geol. Surv. Bulletin 20, Second Edition, CD-ROM only](#)

This pamphlet is available on the internet at <http://www.mgs.md.gov/esic/brochures/sharks.html>.

For more information on sharks teeth fossils see <http://www.mgs.md.gov/esic/freeseries.html>.

Maryland Geological Survey is a part of the Resource Assessment Service  
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