

Fossil feces point to a shark attack 15 million years ago

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Image credit: Calvert Marine Museum.

(PhysOrg.com) -- Paleontologists Stephen Godfrey and Joshua Smith have been studying marine fossils in the Maryland area of Calvert Cliffs for many years, and Godfrey has catalogued over 26,000 items found on the local beaches. Many of these items are fossilized shark teeth belonging to several genera, but they have also found fossils of a wide range of other creatures, including fish, birds, sea cows, crocodiles, and seals.

Now, in a new paper, they report on coprolites (fossilized feces) found on the beach, that probably came from a crocodile, and which bear characteristic tooth marks of a prehistoric shark. The coprolites are examples of extremely rare trace fossils, which are fossils that provide evidence of <u>animal behaviors</u> that cannot be determined from body



fossils.

Analysis of the two coprolites bearing teeth marks, and a third found nearby, suggested they came from a vertebrate predator that was not a shark, and while it is not certain, Professor Godfrey believes they were most likely produced by a crocodile. One of the coprolites had been severed by teeth, while the other bore a row of impressions of teeth. The fossils were dated to around 15 million years ago. Coprolites are fairly common at Calvert Cliffs, an area that was underwater at the time, but no coprolites had ever been found bearing teeth marks.

The researchers made silicone casts of the tooth impressions to help them identify the creature that made them. There are eight shark genera bearing the characteristic asymmetrical teeth, but the best fit for the tooth marks were the Miocene ancestors of the tiger shark (*Galeocerdo cuvier*).

Godfrey and Smith reasoned that the positions of the marks and their curvature suggested the bulk of the fecal masses were in the sharks' mouths. There are several possible explanations: the shark may have bitten into the feces and then spat them out, or it could have bitten into the feces during an attack on the crocodile. Tiger <u>sharks</u> are indiscriminate eaters and do tentatively bite into objects to see if they are palatable, but Godfrey said if the shark had bitten into the feces after they were expelled from the body, there should have been bite marks on both sides, and they should have been deeper. He said the pattern is more consistent with the shark biting into the feces while they were still in the body, or after the animal had been disemboweled.

Godfrey and Smith's paper is published in *Naturwissenschaften*. The fossils will be displayed in the Calvert Marine Museum in Solomons, Maryland, where Professor Godfrey is Curator of Paleontology.



More information: Shark-bitten vertebrate coprolites from the Miocene of Maryland, *Naturwissenschaften*, March 10, 2010. DOI:10.1007/s00114-010-0659-x

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