

Fossil tooth of a cookie cutter shark (*Isistius triangulus*) from the late Miocene of Panama

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RESUMEN

Los registros de tiburones perforadores (corta-galletas) fósiles son escasos en el hemisferio occidental. Estos son conocidos de unas pocas localidades incluyendo Panamá. En este manuscrito reporto el hallazgo de un diente fosilizado de la mandíbula inferior de un tiburón corta-galletas extinto (*Isistius triangulus*) recolectado en un afloramiento de la Formación Chagres (Mioceno tardío), en la costa Caribe de la región Central de Panamá; además del depósito de esta pieza en el Museo de Peces de Agua Dulce e Invertebrados de la UNACHI. Esta es una de las pocas colecciones locales de orientación académica en donde se ha depositado material fósil de origen panameño.

ABSTRACT

Fossil records of cookie cutter sharks are scarce in the Western Hemisphere. They are known from a few localities including Panama. Here I report the finding of a fossilized lower tooth from an extinct cookie cutter shark (*Isistius triangulus*) from an outcrop from the Chagres Formation, in the Caribbean coast of Central Panama and the vouchering of this sample in the Museo de Peces de Agua Dulce e Invertebrados (freshwater fishes and invertebrates collection) at UNACHI. This is one of the few local collections with an academic orientation where Panamanian fossils have been vouchered.

PALABRAS CLAVES; KEY WORDS

Isistius triangulus, Dalatiidae, cookie cutter shark, Panama, Chagres Formation, natural history collections.

INTRODUCCIÓN

Cookie cutter sharks, is a relatively poorly known group of sharks (Family Dalatiidae) that live in deep oceanic waters. They have peculiar feeding habits and peculiar circadian behavior associated with vertical migrations into pelagic waters (Strasburg 1963, Papastamatiou *et al.* 2010, Wenzel & Suárez 2012). Living species include *Isistius brasiliensis*, *I. plutodus* and *I. labialis* (Kyne and Simpfendorfer, 2007; Dwyer and Visser, 2011), and the genus has a wide distributional range in tropical and subtropical oceans (Zidowitz *et al.* 2004).

These sharks are also known from the fossil record represented by the species *I. triangulus* (Probst 1879); however, the reports of this extinct shark are geographically scarce. For example, in the Western Hemisphere, this species is only known from a few localities: the Cubagua Formation (late Miocene) in Northern Venezuela (Aguilera & Rodrigues De Aguilera, 2001); from Alto Guayacan (late Miocene) in Costa Rica (Laurito 1997); Punta Bellaca and Punta la Colorada (Pliocene) in Ecuador (Longbottom 1979); Onzole Formation (late Miocene- Early Pliocene) in Ecuador (Carrillo-Briceño *et al.* 2014); Baja California Peninsula (late Miocene) in Mexico (González-Rodríguez *et al.* 2013); and Yorktown Formation (Pliocene) in North Carolina- USA (Purdy *et al.* 2001). In Europe, *I. triangulus* has being reported from Mucin (early Miocene) in Slovakia (Holec *et al.* 1995), Antwerp (middle Miocene) in Belgium (Probst 1879); and from Hungry (late Paleocene) (Kocsis 2007).

In Panamá, *I. triangulus* has been reported specifically from the Gatun Formation (middle Miocene) in central Panama (dubiously) (Gillette 1984), and from the ongoing works of De Gracia and collaborators at the Chagres Formation (late Miocene) (O’Dea *et al.* 2007, De Gracia 2012, Pino 2013). Despite the number of chondrichthyans reported from the Culebra Formation (earlier Miocene) by Pimiento and collaborators, cookie cutter shark remains absent from those deposits (Pimiento *et al.* 2013).

Here I report the vouchering of a lower tooth from a cookie cutter shark, found in the Chagres Formation (on December 2012), along the Caribbean coast of Panama. Although, *I. triangulus* has already been reported from this formation in the Colon Province, this tooth is from a different collecting locality, which is georeferenced as 9.285 degrees (North) and -80.047 degrees (West). The tooth was found in the upper section of a cliff exposed to intertidal erosion near Piña town in Colon (Fig. 1). Based on age estimations for the middle to upper Chagres Formation (Collins *et al.* 1996), this tooth is expected to be between 8.6-5.6 million years old.

The tooth was in a relative good condition and measured 4.5 by 6.0 millimeters, wide and height respectively (Fig. 2). It has an overall morphology that fits the diagnosable features of *I. triangulus*, as follow: the lower tooth was thin and labiolingually flattened with triangular crown resembling an equilateral triangle in shape; crenulated along the edge of the crown. The root is relatively similar in height and width to the crown; also poses a buttonhole in its lower half, and a mediolingual foramen that opens at the lower edge of the crown and upper edge of the root (Laurito 1997, Kocsis 2007).

The specimen was digitalized with a high resolution imaging system at the Florida Museum of Natural History and vouchered in the Museo de Peces de Agua Dulce e Invertebrados -MUPADI (Freshwater Fish Collection) at Universidad Autonoma de Chiriqui (UNACHI), under the catalog number # MUPADI-MF-001.

Despite the great production of vertebrate fossil material that has been collected from Panamanian outcrops, a minimal or imperceptible number of specimens have been deposited in Panamanian institutions; and they are even less represented when referring to academic-based collections (at universities), similar to was is observed with other type of materials (Pino 2012, Samudio Jr. & Pino 2014).

This specimen is of special importance because it represents the first fossil specimen vouchered in the MUPADI at UNACHI; which is one of the few academic collections in Panama where fossil materials have been vouchered, and likewise one of the few local collections that have received fossil material in decades.

Despite the intrinsic importance that this fossilized material may represent due the relatively low number of localities reported for *I. triangulus* (see the Paleobiology Database -Fossilworks. <http://fossilworks.org>), the vouchering of this paleontological sample represents an iconic event that opens an entire new perspective and a multidimensional challenges for this Ichthyology Collection at UNACHI; for example curatorial caring, outreaching, collection growing, among others. Although, the magnitude of the academic importance of this specimen might not be perceived in a short term, it still is rewarding to contribute with the main goal of the natural history collections, preserving the local patrimony for future generations; and also with the support of local institutions that conserve this type of material.

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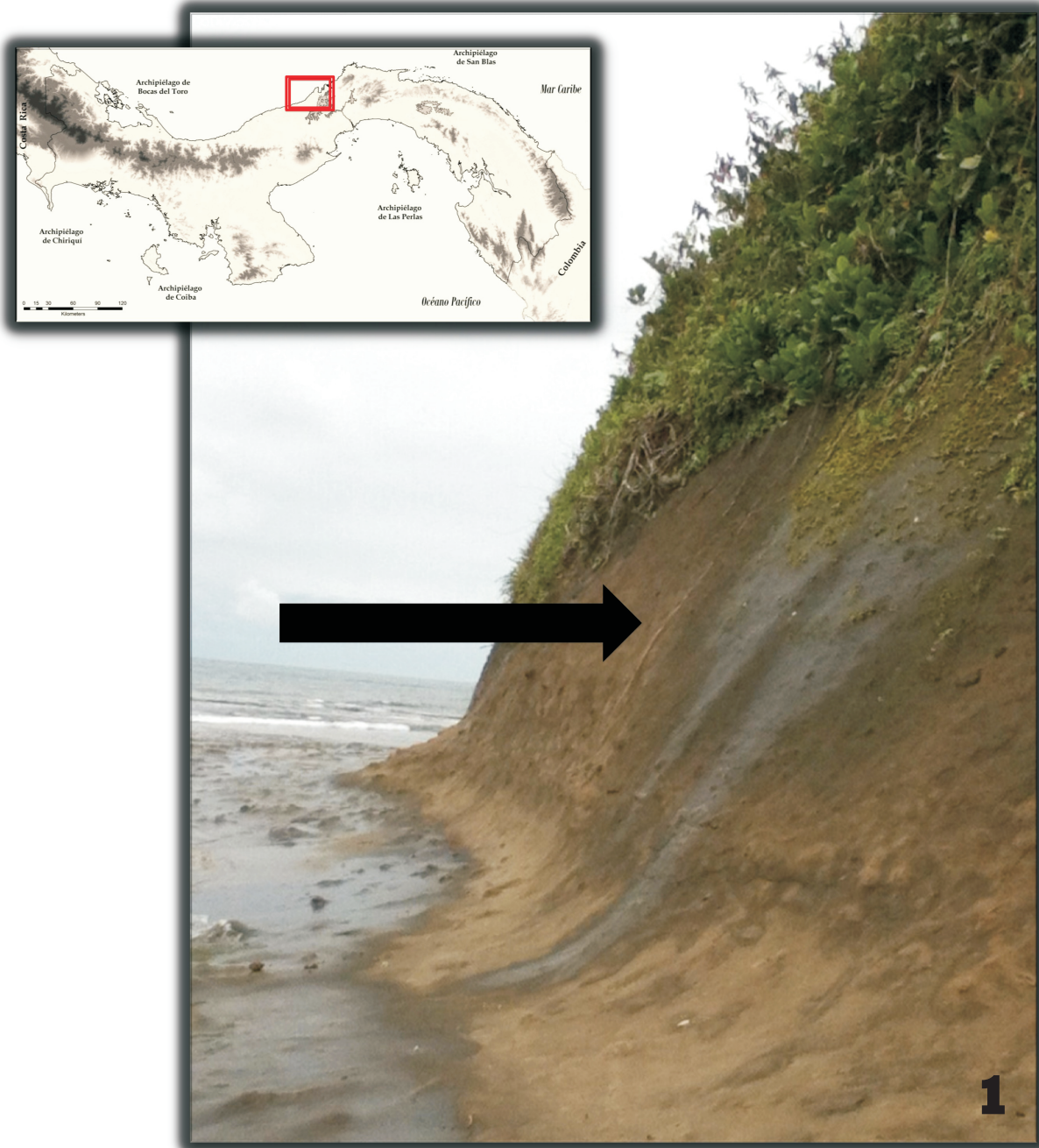


Fig. 1. Coastal cliff at Piña town in Colon; black arrow points to where the tooth was collected.

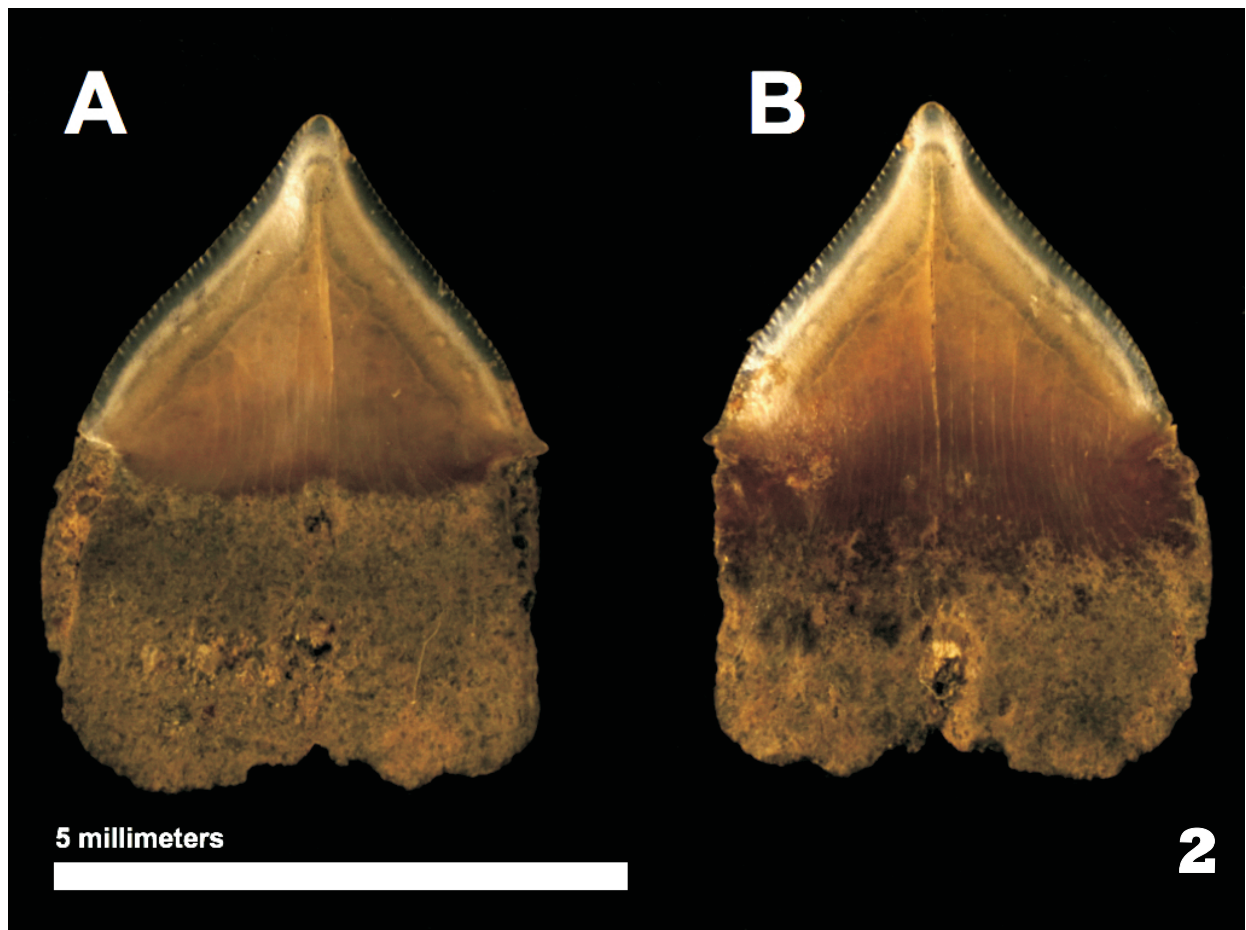


Fig. 2. Lingual (A) and labial (B) view of a lower jaw tooth from the extinct cookie cutter shark *Isistius triangulus*; Chagres Formation, Panama.