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A NON-FATAL ATTACK BY THE TIGER SHARK, *Galeocerdo cuvieri*, ON THE NORTHEAST COAST OF BRAZIL (CHONDRICHTHYES:CARCHARHINIDAE)

Um ataque não fatal de tubarão-tintureira, *Galeocerdo cuvieri*, na costa Nordeste do Brasil (Chondrichthyes:Carcharhinidae)

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ABSTRACT

This paper presents a description of a non-fatal attack by the tiger shark, Galeocerdo cuvieri, *whose identification based on a tooth fragment removed from the victim's wounds. He was a 25-year-old surfer attacked on March 1, 1994, at Boa Viagem Beach, Recife, Northeastearn Brazil, suffering lesions in the left leg, caused by, at least, one biting. A tooth fragment measuring about 2.5 mm was surgically removed from the upper portion of the fibula. According to a more careful analysis, this fragment seems to be from the comissural margin of the third to fifth right upper tooth of that species. The estimated size of the attacking tiger shark was about 2.0-2.5 m TL, judging from the comparative analysis of the tooth fragment, the size and position of the wounds, and the victim's description.*

Key words: *tiger shark, attack, surfboarder, Northeastern Brazil.*

RESUMO

Este trabalho apresenta a descrição de ataque por um tubarão-tintureira, Galeocerdo cuvieri, *cuja identificação foi feita com base no exame de um fragmento de dente removido da lesão. A vítima, um surfista de 25 anos, foi atacado no dia 1 de março de 1994, na Praia de Boa Viagem, Recife, Nordeste do Brasil, e sofreu lesões na perna esquerda, decorrente de, pelo menos, uma mordida do tubarão. Um fragmento de dente, medindo cerca de 2,5 mm, foi removido da porção superior da fíbula e, segundo um exame mais cuidadoso, constatou-se que o mesmo corresponde à borda comissural do 3° ao 5° dente superior de um tubarão-tintureira. O tamanho estimado do animal foi de 2 a 2,5 m de comprimento total, a julgar pela análise comparativa do fragmento de dente, tamanho e posição das lesões, mais a descrição fornecida pela vítima.*

Palavras-chaves*: tubarão-tintureira, ataque, surfista, Nordeste do Brasil.*

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INTRODUCTION

The tiger shark, *Galeocerdo cuvieri*, has a world-wide distribution in tropical waters, being found in waters deeper than 40 m during the day and in shallow waters at night (Tricas *et al*., 1981; Randall, 1992). This carcharhinid shark attains a large size, up to 6 m in total length, and has a diet which includes such large prey as Sea turtles and marine mammals (Randall, 1992; Lowe *et al*., 1996; Simpfendorfer *et al*., 2001). The above-mentioned features may render the tiger shark more prone to attack humans than most of the other large carcharhinid sharks. Indeed, attacks on surfboarders, swimmers, and divers by the tiger shark are recorded in tropical coastal waters world-wide (Baldridge, 1974; Randall, 1992). Although occurring along all of the Brazilian coast, where it is named *tubarão-tigre, tintureira* or *cação-jaguara*, this species seems to be more abundant in the lower latitudes of the Northeastern region, where is frequently reported by several studies (Gadig, 2001).

Although at least 30 cases of shark attacks by *G. cuvieri* have been recorded world-wide (Baldridge, 1974; Randall, 1992), no attack by this species is scientifically documented in the Southwestern Atlantic. From this area only an attack by the great white shark, *Carcharodon carcharias*, is documented in the scientific literature (Gadig & Rosa, 1996). Herein we present and comment on a non-fatal attack by the tiger shark on a surfboarder off the northeastern Brazilian coast.

MATERIAL AND METHODS

The victim was thoroughly interviewed and his wounds were examined, measured and photographed. The victim's description and the characteristics of the wounds (see Campbell & Davies, 1960 for details on shark bite wounds) allowed a first, tentative identification of the attacking shark, later confirmed by a tooth fragment surgically recovered from the victim's wounds. The fragment was directly compared with teeth on jaws preserved in ichthyological collections (se Fulgosi & Mori, 1979 for details on tiger shark teeth). The medical team, the victim's relatives, as well as the media professionals who covered the case were additionally interviewed. The tooth fragment is deposited at the Fish Collection of the Museu de História Natural, Universidade Estadual de Campinas (ZUEC. 5084), and photographs of the wounds are on file under the same number. The attack is filed in the International Shark Attack File (ISAF 2686), and the Brazilian Shark Attack File (BRASAF 061). Shark sizes used throughout are total length, TL (Compagno, 1984).

RESULTS

On March 1, 1994 at about 06:45 h, AGDF (mulatto male, 1.66 m, 60 kg, 25 yr) was attacked by a shark while surfboarding at Boa Viagem beach, Recife (08°01'S, 34°56'W), Pernambuco State, Northeastern Brazil. The attack occurred at the surface, about 70 m from the shoreline on 2.5 m water depth. The victim wore a dark blue short and was sitting on a 1.8 m, yellow, scarlet and turquoise surfboard. His legs trailing in the water, he was suddenly charged by a shark from below and obliquely at his front on the left side, at an angle of about 60 degrees relative to the longest axis of the surfboard. The shark passed by the left leg and reached at about the mid portion of the right one. The jarring strike by the shark did not dislodge the victim from the surfboard, probably owing to causes that include the victim being bitten on the leg opposite to the side of the charge, the size of the shark (about the size of the surfboard, see below), and the sitting posture of the victim. After the initial strike, the shark was not seen again and he was able to reach the shore where he was given medical care.

The victim was apparently bit only once, some of the minor lacerations probably caused by a slow and progressive release of the shark hold along his leg. During the bite the upper jaw of the shark (probably the right side) embedded on the outer side of the leg and the lower jaw reached the inner portion. This bite damaged leg muscles, tendons, and broke the fibula. A photograph taken after the surgical procedure reveals the position of the wounds and the extent of the damage (Figure 1). A tooth fragment about 2,5 mm

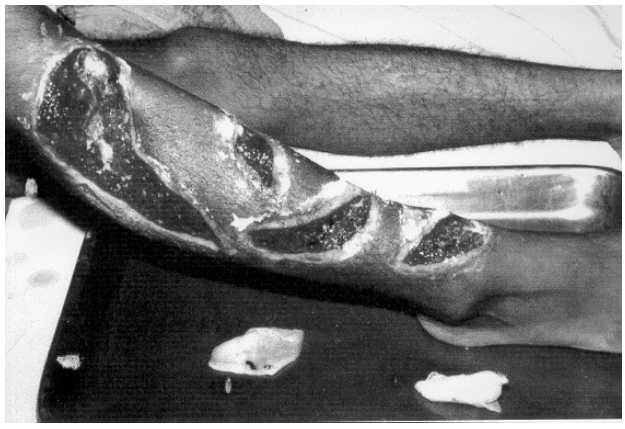

Figure 1 - position of the wounds and the extent of the damage (photo R. S. Rosa).

in greatest length was surgically removed from the upper portion of the fibula. This fragment seems to be from the comissural margin of the third to fifth right upper tooth and its serrated edge and characteristic shape (Figure 2) leave no doubt about the identity of its owner, the tiger shark, *G. cuvieri*.

The estimated size of the attacking tiger shark is about 2.0-2.5 m TL (80-120 kg in weight, after Kohler *et al*., 1996) judging from the comparative analysis of the tooth fragment, the size and position of the wounds, and the victim's description. This figure is within the average size for most sharks implicated in human attacks (Baldridge, 1974).

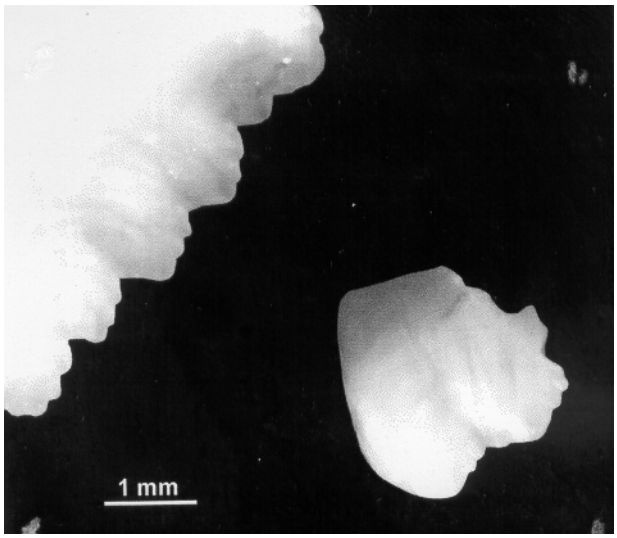

Figure 2 – A 2.5 mm wide tooth fragment surgically removed from victim - right, compared with the margin of a whole tiger shark tooth – left (photo C. L. Francini).

DISCUSSION

The tiger shark, *G. cuvieri*, is a generalist predator known to consume a large array of food items, including humans (Gudger, 1949; Randall, 1992; Lowe *et al*., 1996; Simpfendorfer *et al*., 2001). Although the latter may sometimes be consumed already dead, and hence the tiger shark would be classified as a scavenger, a few of the attacks on humans may be directed to consume this kind of food (Randall, 1992; Iscan & McCabe, 1995).

Non-fatal attacks by the tiger shark may perhaps be regarded as probing bites during prey selection and/or assessing its potential danger, such as that posed by larger and armed prey, e.g., other sharks, small odontocetes, and leopard seals (Cockroft *et al*., 1989; Randall, 1992; Rosas *et al*., 1992; Long & Jones, 1996). This behavior has been also recorded for the great white shark, which bites potential prey and may release it without further damage (Klimley *et al*., 1996, but see Tricas & McCosker, 1984 for other hypotheses for the bite-release behaviour). The great white and the tiger sharks show ontogenetic shift in diet, from small benthic slow-moving prey to larger mid-water fast prey. However, in tiger sharks the mechanisms that regulate the dietary shift are unclear (Lowe *et al*., 1996; Simpfendorfer *et al*., 2001).

Tiger sharks are known to remain in deep water during the day, being active in the shallow waters at night (Tricas *et al*., 1981; Clark & Kristof, 1990). However, prey types found in tiger sharks about 2 m TL and larger, caught in Hawaiian and Australian waters, are consistent with diurnal foraging at the surface (Lowe *et al*., 1996; Simpfendorfer *et al*., 2001). Thus, a surfboarder would be exposed during the day to attacks of tiger sharks about 2 m TL and larger, and tiger sharks up to 3.5 m TL are habitually caught over 10-25 m deep water in Northeastern Brazil (Alves, 1977; Bezerra *et al*., 1990). For instance, a tiger shark about 2 m TL was recorded at early morning (0600h) chasing a green sea turtle, *Chelonia mydas*, in 3-meter deep waters and 20 m away from shoreline at Abrolhos Archipelago, Northeastern Brazil (R. B. Francini Filho, pers. comm.). The similarity between the time of day for the Pernambuco attack and the Abrolhos chasing probably is not a coincidence, and may represent one habitual foraging period for tiger sharks of that size.

In the last decade, about 30 shark attacks to surfboarders and swimmers were recorded on the beaches of Pernambucol (Hazin *et al*., 2000; pers. obs.), involving at least two shark species: the bull shark, *Carcharhinus leucas*, and the tiger shark, *G. cuvieri*, two large carcharhinids often implicated in shark attacks in tropical areas (Baldridge, 1974). The high number of shark attacks to humans on the Pernambuco coast may be due to several causes, namely the depletion of natural prey (sea turtles, manatees, large fishes), changes in the sea currents and formation of channels close to the shore after a large harbour installation in 1989, and increasing garbage disposal by the commercial fleet (Hazin, 1995). In Australia, Simpfendorfer *et al*. (2001) indicated that tiger sharks are able to learn to exploit anthropogenic sources of food, and that they periodically move to areas where this kind of food resource is available. Tiger sharks in Northeastern Brazil may display similar tendencies and this would partly explain their regular occurrence close to shore and their attacks on humans. Whatever the causes, shark attacks in Pernambuco are expected to continue and even increase, unless the advice outlined by Baldridge (1974) is followed, and common sense among both beach people and local authorities prevails.

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