



A Terciopelo (*Bothrops asper*) Swimming in the Caribbean Sea, Bocas del Toro, Panamá

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Snakes are predatory vertebrates that inhabit a wide variety of environments in temperate and tropical regions, including mountains, deserts, and oceans (Greene 1997; Pauwels et al. 2008). Many species live near water and many venture into it; the ability to swim is present in all snakes and not limited to freshwater or marine species (Pauwels et al. 2008; Lillywhite; 2014). Increased tolerance of blood sodium concentration makes it possible for some semi-aquatic freshwater species to venture into brackish and saline habitats (Deso et al. 2021). Some snakes may even forage in mangroves, salt marshes, and intertidal zones (Lillywhite et al. 2008; Rasmussen et al. 2011). However, species with terrestrial habits are rarely observed in the open sea (Deso et al. 2021).

The Terciopelo (*Bothrops asper*) is a highly terrestrial viperid and a capable swimmer. At La Selva Biological Station in Costa Rica, individuals have been observed crossing a 60-m wide river on several occasions, although spending only a short time in the water (Sasa et al. 2009). These are generally sedentary snakes, and a study of one population in Costa Rica reported that individuals usually moved no more than 10 m per night (Sasa et al. 2009). Some observations suggest that the species has a great ability to float on water, allowing individuals to overcome dispersal barriers, such as large rivers, and establish new territories (Sasa et al. 2009). Ray and Pérez Huertas (2016) provided additional observations in Panama and Costa Rica on the use of freshwater habitats such as rivers and streams.

At 0730 h on 16 April 2018, while sailing in a boat, Sybille Nuenninghoff observed and photographed an adult *B. asper* swimming in the Caribbean Sea (Fig. 1) between Popa Island and the town of Chiriquí Grande on the mainland, Province of Bocas del Toro (9.0939 N; 82.1226 W; WGS84). The observation was of short duration and was made approximately halfway between the two sites (Fig. 2) without observing details such as the direction of movement. This is the first photographic record of marine swimming by *B. asper*.



Figure 1. An adult Terciopelo (*Bothrops asper*) swimming in the open sea between Isla Popa and Chiriquí Grande, Province of Bocas del Toro, Panamá. Photograph by Sybille Nuenninghoff.



Figure 2. Google Earth® map of the Laguna de Chiriquí, Caribbean Sea, Bocas del Toro, Panamá, showing the approximate area (yellow rectangle) where the Terciopelo (*Bothrops asper*) was observed swimming in the open sea.

Only a few records in Florida, USA, document marine swimming by viperids: the Florida Cottonmouth (*Agkistrodon contortrix*) and Eastern Diamondbacked Rattlesnake (*Crotalus adamanteus*) (Lillywhite et al. 2008; Lillywhite 2014). The Red Diamond Rattlesnake (*Crotalus ruber*) in California, USA, also has been observed swimming in marine waters, although this was involuntary as it was caused by being washed down rivers (Lillywhite 2014). In *B. asper*, marine swimming might have been triggered by searching for new territory or a mate. Solórzano (2004) mentioned that this viper has a seasonal reproductive cycle that, on the Caribbean versant of Costa Rica, is from February to April, which coincides with the date of this observation. Another possible explanation for its presence in the sea, as was the case in *C. ruber*, is that it was accidentally washed into the open sea.

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