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Predation on the sleeper goby, *Guavina guavina* (Perciformes, Eleotridae), by the military ground snake, *Erythrolamprus miliaris orinus* (Serpentes, Dipsadidae), in a mangrove area of Southeastern Brazil

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The military ground snake, *Erythrolamprus miliaris* (sensu Zaher et al., 2009), is a common highly polymorphic Xenodontinae with a wide distribution in South America (Gans, 1964; Dixon, 1989). The subspecies *E. m. orinus* occurs in the Southern Coastal Atlantic Forest between the States of São Paulo and Paraná (about 23°26'N, 25°52'S, 45°04'E, and 48°50'W), on the eastern slopes of the Brazilian "Serra do Mar" covered by rainforest (Pizzato and Marques, 2006). It diet consists of frogs and small fishes (Amaral, 1977; Michaud and Dixon, 1989; Marques and Souza, 1993), but reports of scavenging are known (Sazima and Strüssmann, 1990).

Although true sea snakes (Hydrophiidae) do not occur in the Atlantic Ocean, some terrestrial and semi-aquatic snakes as *Erythrolamprus miliaris orinus* can be found in the marine environment and in brackish estuarine waters of Southeastern Brazil (Marques and Souza, 1993; Pauwels et al., 2008). However, the occurrence of non-sea snakes in coastal environments is poorly studied, and records regarding the foraging activity of species in these areas remain scarce (Marques and Souza, 1993; Murphy, 2012).

Here we described a predatory event in a tiny mangrove estuarine island by an adult of the military ground snake, *Erythrolamprus miliaris orinus* (Serpentes, Dipsadidae), on a sleeper goby, *Guavina guavina* (Perciformes, Eleotrididae). The event was registered on 13 November 2013, between 10:30 to 12:00h, during fieldwork in the Saponim Island, São Vicente, São Paulo State, Southeastern Brazil (about 23°58'53"S - 46°24'26"W) (Figure 1). The "ad libitum" sampling rule (Martin and Bateson, 1986) was used throughout the observational session, conducted at distances of 3 to 5 m in order to minimize the observer effect. Additionally, the fish was collected for its determination and digital photographs and video were taken to check the visual observations.

The snake (total length 1,500 mm) was observed moving through roots, holes and pneumatophores

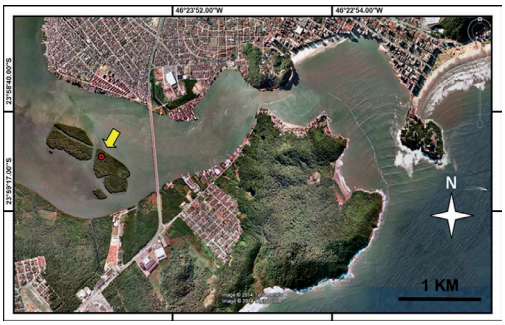

Figure 1. General view of the São Vicente Estuary, São Vicente, São Paulo State, Southeastern Brazil, with sampling area in the Saponim Island (arrow). This figure was modified from www.google.com.br.

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Figure 2. The military ground snake (*Erythrolamprus miliaris*) foraging at Saponim Island, Southeastern Brazil, with dorsal view of *Guavina guavina* thas was preyed and abandoned during observation.

in mangrove forest composed by 50% *Avicennia schaueriana* (Avicenniaceae), 2% *Laguncularia racemosa* (Combretacea), and 48% *Rhizophora mangle* (Rhizophoraceae). The snake was in an apparent foraging activity, searching for food inside retreats and galleries excavated by mangrove crab, *Ucides cordatus* (Decapoda, Ucididae – *sensu* Ng et al., 2008), abundant in the study area. An exemplar of the sleeper goby, which was inside one of the holes inspected by the snake, was spotted and captured. The snake snapped up the fish (total length 147 mm) in the head and searched for a shelter in one of the existing crab galleries. The snake was not coiled and kept the fish in the mouth, remained stationary with its head out of the hole (Figure 2 and 3). After about ten minutes of observation, the authors removed the dead fish from the snake, observing a remarkable scar near the orbital and preopercular regions (Figure 4).

Marques and Souza (1993) had already reported the occurrence of *Erythrolamprus miliaris orinus* in coastal environments, emphasizing the ability of the species to include estuarine and marine animals in the diet.

Figure 3. Foraging behaviour of Military ground snake (*Erythrolamprus miliaris orinus*) inspecting the burrows of the 'uçá'crab (*Ucides cordatus*).

These authors reported the predation of a frillfin goby, *Bathygobius soporator* (Perciformes, Gobiidae), by an individual of *E. m. orinus* inside a tide pool. Marques and Souza (1993) also cited information of third parties regarding to the observation of *E. m. orinus* preying the sleeper goby, *Guavina guavina*, in mangroves areas close to the study site (Marques and Souza, 1993).

The frillfin goby, *Bathygobius soporator*, is a very similar species in size, shape and behaviour when compared to *Guavina guavina*, which may indicate that this last one is a potential common prey of *Erythrolamprus miliaris orinus*. Our observations support this possibility, adding information about the feeding activity of *E. m. orinus* in coastal environments, as well as that this species can attend more than tide pools, beaches and rocky shores. The record of its feeding activity in a tiny mangrove estuarine island, near to the coast (about 500 m), suggests that the *E. m.*

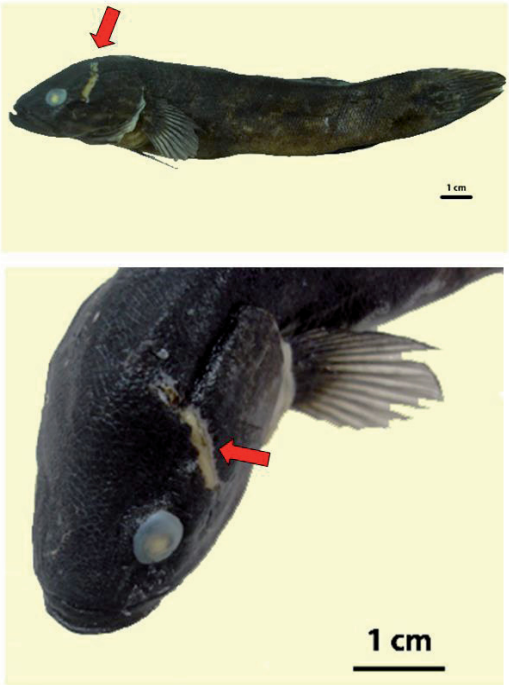

Figure 4. The guavina (*Guavina guavina*) preyed by the military ground snake (*Erythrolamprus miliaris orinus*) in Southeastern Brazil. The scar in the head (arrow) is where the snake snapped up the fish.

orinus moves through brackish water (and possibly into salt water) searching for food. Probably, tidal range can exert an important influence on this species behaviour in mangroves and other coastal environments, since our observations and Marques and Souza (1993) have associated the presence of this snake in these areas to the existence of tide pools near beaches and rocky shores.

If we take into account that the period of low tides allows greater exposure of retreats and galleries of crabs in mangroves (including with the presence of fish and others animals inside) as well a decreasing in the distance between inland areas and coastal and estuarine islands, it is plausible to expect that *Erythrolamprus miliaris orinus* may have benefits associated with this variable. Salinity can be another important variable to be measure and associated to the feeding behaviour of *E. m. orinus*. Differently that observed in marine reptiles, which have specialized glands to maintain the osmotic balance, *E. m. orinus* should not tolerate high concentrations of salt, including the quantities ingested during foraging in water. Thus, further studies are needed to a better understand of the real influence of these critical variables in the way of life of *E. m. orinus* (and other snakes with similar habits) in coastal environments.

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