



Extending the Depth Range of the Marine File Snake, *Acrochordus granulatus* (Schneider 1799): First Known Record below 30 m

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Snakes represent an exceptional radiation of squamates, thriving in a diversity of habitats (O'Shea 2018). Of the roughly 3,400 species, marine snakes are widely represented by two major groups of elapids. The Hydrophiinae are the most diverse and are known as “true” sea snakes (Sanders et al. 2013; Sherratt 2018), whereas the Laticaudinae are amphibious sea snakes that forage underwater and rest on land (Bonnet et al. 2005; Brischoux and Bonnet 2009). Species from both groups are venomous, active swimmers, and capable of diving to considerable depths when foraging (Brischoux et al. 2007, 2009; Rasmussen et al. 2021). A third group, the Acrochordidae, is a small radiation represented by just three extant species in a single genus (*Acrochordus*) that possess none of the listed characteristics of the marine elapids (Lillywhite 2020). Only one species, the Marine File Snake, *Acrochordus granulatus* (Schneider 1799), occurs in salt and brackish water. This species is widely distributed in

diverse coastal environments across the Indo-Pacific Region (Dunson and Minton 1978; Feder 1980; Voris and Glodek 1980; Lillywhite and Ellis 1994; Whitaker and Captain 2004; Iskandar and Erdelen 2006; Sanders et al. 2010; Lillywhite 2020). Marine File Snakes are known to have very low metabolic rates (Heatwole and Seymour 1975; Lillywhite and Smits 1985), an unusual prey-capture behavior (Dowling 1960), and are well-adapted to the marine environment, with nostrils and eyes directed upward, sublingual salt glands, flexible bodies, and centrally positioned cardiovascular systems (Lillywhite 2020).

Marine File Snakes usually are associated with slow-moving shallow-water (Lillywhite 2020). In fact, these snakes appear to be bottom dwellers rather than mid-water swimmers. Shallow habitats such as coastal flats and mangroves appear to be the most common habitats used by this species, where they appear to be accustomed to resting on the substrate

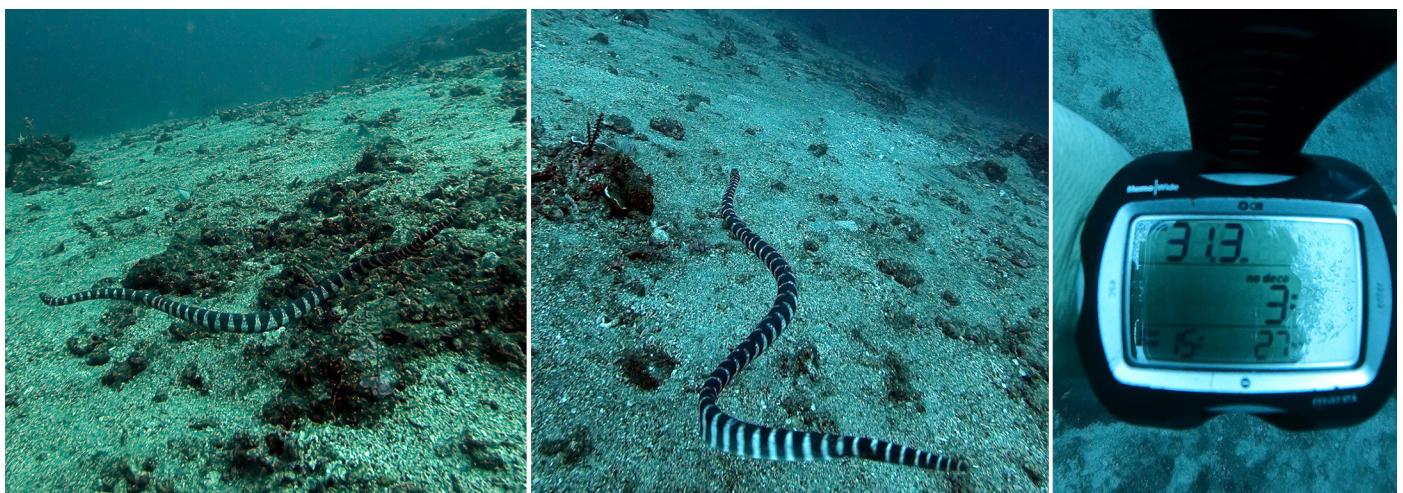


Figure 1. Images from a video-recording in Bali documenting a new depth record (> 30 m) for the Marine File Snake (*Acrochordus granulatus*): The snake on an underwater slope (left), the same individual moving toward deeper water at the end of the recording (center), and an image of the dive computer (Mares Nemo Wide 1) recording a depth of 31.3 m and a water temperature of 27 °C (right). Video recording by David Hudry.

and hiding in burrows or among mangrove roots (Dunson and Minton 1978; Lillywhite and Ellis 1994; Garcia et al. 2014). Previous studies suggested that Marine File Snakes are limited to maximum depths of 20 m (Lillywhite 1989, 2020; Greene 1997; Vitt et al. 2001) with no reports of them diving to greater depths. On the other hand, viviparous “true” sea snakes (Hydrophiinae) and sea kraits (Laticaudinae) are known to be capable of diving to depths of 250 m and 82 m, respectively (Cook et al. 2016; Crowe-Riddell et al. 2019). We herein provide the first evidence of an acrochordid diving to a depth of over 30 m, triggering new insights into the physiological capabilities of these snakes and challenging their reputation as non-active swimmers.

At 0946 h on 13 January 2025, during a recreational dive at the Emerald Dive Spot, Tulamben, Bali (-8.28472, 115.60028), DH, using a GoPro Hero 8 Black series on a 4k | 30 fps | large view setting, recorded a 27-sec video of a snake unambiguously identified as *A. granulatus*. According to the dive computer (Mares Nemo Wide 1), the snake was swimming at a depth of 31.3 m and a water temperature of 27 °C at the end of the observation (Fig. 1). The snake seemed undisturbed when approached and continued to behave naturally, apparently foraging along the sea floor before appearing to go even deeper as the video ends.

Although elapid seasnakes dive to greater depths in search of prey (e.g., Brischoux and Bonnet 2007; Brischoux et al. 2011; Shine et al. 2020), encountering *A. granulatus* at a depth greater than 30 m was unexpected. Although suitable prey (e.g., small fishes, crustaceans, and snails) is known to occur in the intertidal zone (Voris and Glodek 1980; Garcia et al. 2014; Lillywhite 2020), the snake we recorded could have been in search of a mate. Although our knowledge of reproduction in this species is limited (Voris and Glodek 1980; Wangkulangkul et al. 2005; Sanders et al. 2010), Wangkulangkul et al. (2005) indicated that the mating season in *A. granulatus* occurs from July to December, suggesting that searching for a mate was an unlikely explanation for this observation. Futures studies using new technological advances such as miniature telemetry are needed to gain insights into habitat use and behavior of the species.

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