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Hydrophis donaldi (Elapidae, Hydrophiinae), a highly distinctive new species of sea snake from northern Australia

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Abstract

A new species of viviparous sea snake, *Hydrophis donaldi* **sp. nov.** (Hydrophiinae), is described from the Gulf of Carpentaria, northern Australia. Molecular analyses reveal this species as a deeply divergent lineage within the *Hydrophis* subgroup, and separate it from all other sampled taxa by fixed nucleotide substitutions at three independent mitochondrial and nuclear loci. The new species is assigned to *Hydrophis* based on the current morphological diagnosis of this large but paraphyletic genus, and is distinguished from all other *Hydrophis* species and closely allied genera by a combination of morphological characters relating to scalation, colour pattern and osteology. Using current keys for sea snakes, *H. donaldi* **sp. nov.** might be mistaken for *H. coggeri, H. sibauensis* or *H. torquatus diadema* but it is readily distinguished from these species by a higher number of bands on the body and tail, lower ventral count, strongly spinous body scales, and a wider, more rounded head. Sea snakes have been sampled intensively in the Gulf of Carpentaria due to their vulnerability to bycatch in the region's commercial prawn-trawl fisheries. That this highly distinctive new species has evaded discovery in the region until now is surprising, but might be explained by its habitat preferences. All known specimens of *H. donaldi* **sp. nov.** were found in estuarine habitats that are relatively poorly surveyed and are not targeted by commercial fisheries.

Key words*:* Estuary, Gulf of Carpentaria, *Hydrophis*, phylogenetics, taxonomy

Introduction

The Gulf of Carpentaria (GoC) in northern Australia supports a diverse marine fauna (Mummery & Hardy 1994). Sea snakes are a major component of this fauna and have been sampled intensively due to their vulnerability to bycatch in the region's commercial prawn-trawl fisheries (Redfield *et al.* 1978; Wassenberg *et al.* 1994; Ward 2001). Most sea snake sampling has targeted open (off-shore) habitats, because commercial trawling is restricted to these regions. As a result, coastal habitats such as estuaries, lagoons and tidal creeks have been poorly sampled for sea snakes. Recently, nine specimens of a distinct species of 'viviparous or true' sea snake (Elapidae: Hydrophiinae) were collected (by BGF) from the coastal estuarine habitats of Weipa on the Queensland coast of the GoC. In this paper we describe this new species using morphological and molecular data. Currently 60 species of viviparous sea snakes are recognised (Rasmussen *et al.* 2011). These occur in a wide range of mostly coastal habitats throughout the Indian and western Pacific oceans, but reach their highest diversity in the Indo-Australian region (Rasmussen *et al*. 2011). Viviparous sea snakes form two morphologically (Smith 1926; Voris 1977; Rasmussen 1997; 2002) and genetically (Lukoschek & Keogh 2006) distinct lineages - the *Aipysurus* and *Hydrophis* groups. The *Hydrophis* group is the most diverse with thirteen morphologically distinct genera: *Acalyptophis, Astrotia, Enhydrina, Ephalophis, Hydrelaps, Hydrophis, Kerilia, Kolpophis, Lapemis, Pelamis, Parahydrophis, Thalassophina, Thalassophis. Hydrophis* (Latreille in Sonnini & Latreille, 1801) is the largest of these, comprising 36 nominal species (Rasmussen 2001; Rasmussen *et al.* 2001, 2007) including most of the marine snake species that have been described in the last 10 years (Rasmussen & Ineich 2000; Rasmussen *et al.* 2001, 2007). However, phylogenetic evidence shows *Hydrophis* to be paraphyletic with respect to at least eight other genera and therefore much in need of taxonomic revision (Cadle & Gorman 1981; Lukoschek & Keogh 2006; Sanders *et al.* unpublished data). In

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