



Sea snakes (Serpentes: subfamilies Hydrophiinae and Laticaudinae) in Vietnam: a comprehensive checklist and an updated identification key

ARNE REDSTED RASMUSSEN¹, JOHAN ELMBERG², PETER GRAVLUND³ & IVAN INEICH⁴

¹The Royal Danish Academy of Fine Arts, School of Conservation, Esplanaden 34, DK-1263 Copenhagen C, Denmark.
E-mail: arr@kons.dk

²Aquatic biology and chemistry, Kristianstad University, SE-291 88 Kristianstad, Sweden. E-mail: johan.elmberg@hkr.se

³Natural History Museum, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen, Denmark.

E-mail: pgravlund@snm.ku.dk

⁴Muséum national d'Histoire naturelle, Département de Systématique et Evolution, UMR CNRS 7205 (Origine, Structure et Evolution de la Biodiversité), CP 30 (Reptiles), 25 rue Cuvier, F-75005 Paris, France. E-mail: ineich@mnhn.fr

Abstract

Sea snakes (Elapidae, subfamilies Hydrophiinae and Laticaudinae) reach a very high species richness in Southeast Asia, but most countries in the region still lack comprehensive and up-to-date identification tools for these snakes. We present an updated checklist of sea snakes in Vietnam. We also provide diagnostic characters for all species and a new complete identification key, chiefly based on easy-to-use external characters. The checklist and key cover the 25 species documented from Vietnam, as well as three likely future additions to its sea snake fauna. By surveying incoming fishing vessels between Nha Trang and the mouth of Mekong River in 2000–2001, we were able to document two species new for Vietnamese waters: *Hydrophis belcheri* and *H. pachycercos*. Through these surveys we also secured four specimens of the rare endemic species *H. parviceps*, formerly known only from two specimens. A comprehensive bibliography of the literature treating sea snakes in Vietnamese waters is provided.

Identification key: bibliography, biodiversity, diagnostic characters, Vietnamese waters

Introduction

Many new species have been described from Vietnam and neighbouring countries in the last two decades, increasingly marking the area as a 'biodiversity hotspot' (e.g. Beck *et al.*, 2007). The list of new discoveries comprises truly unexpected elements such as large mammals (Giao *et al.* 1998), but also many freshwater fishes, amphibians and reptiles (e. g. Bain & Truong, 2004; Ziegler *et al.*, 2007). As of yet, the herpetological exploration of Vietnam has focussed on terrestrial and freshwater habitats, with much less emphasis on coastal and marine areas. This is despite the fact that Vietnam has a long coastline comprising many distinct habitat types and embracing 13 degrees in latitude.

Globally there are some 65 species of sea snake (aquatic elapids, in the subfamilies Hydrophiinae and Laticaudinae), found in tropical and subtropical waters of the Indian Ocean and the Pacific Ocean, from the east coast of Africa in the west to the Gulf of Panama in the east. Most species are found in the Indo-Malayan Archipelago, the China Sea, Indonesia, and the Australian region (Shuntov, 1966; Golay *et al.*, 1993; David & Ineich, 1999; Iskandar & Colijn, 2001). Indeed, Vietnam can be termed as 'a biodiversity hotspot' for sea snakes, also, with many species recorded from its waters (Nguyen *et al.*, 2009), including *Hydrophis parviceps*, which appears to be endemic (Smith, 1935; Taylor, 1963; personal observation).

Over the last 80 years the number of sea snake species recorded in Vietnam has doubled, but its waters still remain much understudied. Further addition of species can be expected, the geographical ranges of already documented species are poorly known, and previously published studies have not been comprehensively reviewed. A recent checklist of Vietnamese sea snakes (Kharin 2006) overlooked *Emydocephalus annulatus* and *Hydrophis spi-*