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Three new species of striped *Ichthyophis* (Amphibia: Gymnophiona: Ichthyophiidae) from the northeast Indian states of Manipur and Nagaland

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Abstract

Three new ichthyophiid species, *Ichthyophis khumhzi* **sp. nov.**, *Ichthyophis moustakius* **sp. nov.** and *Ichthyophis sendenyu* **sp. nov.**, from the northeast Indian states of Manipur and Nagaland, are described on the basis of morphological analysis of new material. The new material (16 specimens) more than doubles the number of northeast Indian caecilian specimens reported in previous literature, and increases the caecilian fauna of the region to seven species. Two of the new species have very distinctive, moustache-like stripes between their tentacles and nares, a feature not reported in other ichthyophiids. Diagnoses, type descriptions, illustrations, data on variation, distribution, and natural history are provided for the new species. Concern for the conservation of northeast Indian caecilians is raised, given the paucity of previous work, evidence of unrecognized diversity, and ongoing habitat destruction.

Key words: caecilians, conservation, ichthyophiids, new species, northeast India, systematics

Introduction

Northeast India, comprising the states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim and Darjeeling district of West Bengal (Fig. 1), lies at the junction of the Indo-Burma and Himalaya global biodiversity hotspots (Mittermeier *et al.* 2004). Currently this region has 118 named amphibian species (Frost 2009) representing just over half of India's recognized amphibians. However, only four species of caecilian amphibians (Gymnophiona) are currently documented from this region, representing only 16% of the Indian caecilian fauna and very few specimens have ever been reported (e.g., Pillai & Ravichandran 1999), indicating a lack of organized basic research. One of the biggest challenges to studying terrestrial caecilians is their secretive, generally burrowing lifestyle (Gower & Wilkinson 2005). They are rarely encountered in routine herpetological surveys and excavation is generally required for their sampling (Measey *et al*. 2003; Gower & Wilkinson 2005). Although sometimes locally abundant (Oommen *et al.* 2000), even with specific effort it can sometimes prove difficult to find them, and many species are known from very small samples. However, dedicated field effort in the Western Ghats of peninsular India has resulted in a great increase in available material, and a dramatic increase in number of species new to science (Gower *et al.* 2004). Similarly extensive and dedicated surveys in northeast India might be expected to uncover taxa still unknown to science.

Based on the presence or absence of a longitudinal cream or yellow stripe on each side of the body in metamorphosed animals, the genus *Ichthyophis* can be divided for the purpose of identification into two non-monophyletic groups (Taylor 1968; Gower *et al.* 2002). Two unstriped (*I. husaini* and *I. sikkimensis*), and a single striped (*I. garoensis*) *Ichthyophis* are known from northeast India (Pillai & Ravichandran 1999). We agree with Dutta (2002) in considering a report of a specimen of *I. glutinosus* from Goalpara in Assam (Pillai

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