

Field observations on the predation of the caecilian amphibian, genus *Ichthyophis* (Fitzinger, 1826), by the red-tailed pipe snake *Cylindrophis ruffus* (Laurenti, 1768)

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The red-tailed pipe snake *Cylindrophis ruffus* inhabits humid habitats in lowland areas in southeast Asia (e.g. Smith, 1943; Manthey and Grossmann, 1997). It is well adapted to burrowing in loose soils (Smith, 1914; Taylor, 1965; Greene, 1983; pers. obs.). Given its phylogenetic position, anatomy, and behaviour, the diet and feeding biology of pipe snakes is of special interest in studies of the evolution of feeding on large prey by caenophidian snakes (see Greene, 1983; Cundall, 1995; Cundall and Greene, 2000) because “*Cylindrophis* might in fact come closest to the mode of life expected in the earliest snakes” (Rieppel, 1978: 24). From the dissection of museum specimens and observations of laboratory maintained animals, it is known that *Cylindrophis* consume relatively large and elongate prey items such as snakes and eels (e.g. Smith, 1914; Saint Girons, 1972; Cox et al., 1998; Pauwels et al., 2000) and caecilians (Greene, 1983). However, field observations on feeding behaviour have apparently not been reported.

Caecilians are limbless and snakelike amphibians distributed in moist tropical environments of the Old and New World. Most adult caecilians are terrestrial and fossorial, living within the soil. Due to their secretive habits, little information is available on the ecology of caecilians, including their predator-prey relationships. Although it is known from museum specimens that snakes prey on caecilians (e.g. Boulenger, 1913; Taylor, 1968), reports of field observations are extremely rare. Burger (1997) published a field record of a coral snake *Micrurus multifasciatus hertwigi* preying on an adult *Gymnopsis multiplicata* in Costa Rica, and Grossmann and Schäfer (2000) observed the predation by a Malayan krait, *Bungarus candidus*, on *Ichthyophis* sp. Here we report two field observations of cylindrophiid snakes feeding on ichthyophiid caecilians.

During a survey on the diversity of amphibians and reptiles in an agricultural landscape of the Mekong valley (north-eastern Thailand, Ubon Ratchathani Province, Khemmarat District) *Cylindrophis ruffus* was commonly recorded near brooks, ponds, pools and many other humid habitats. On 4 June 2001, the perimeter of a large fishpond was studied (N 16°03.094', E 105°01.781', 170 m a.s.l.). A subadult *C. ruffus* (360 mm total length, 49.6 g) was found about 15 cm deep in loose sandy soil. Immediately upon being



Figure 1. A red-tailed pipe snake, *Cylindrophis ruffius*, regurgitating an adult caecilian, *Ichthyophis* cf. *kolhataensis*.

excavated, the snake regurgitated a prey item that was identified as an adult ichthyophiid caecilian by its yellow lateral stripe at first sight (fig. 1). Closer examination revealed the prey item to be a male *Ichthyophis* cf. *kohtaoensis* (326 mm TL, 23.9 g). The head of the caecilian was partly digested, indicating that it was swallowed head first. On 22 June 2001 at about midday, a second *Cylindrophis ruffus* feeding on *Ichthyophis* cf. *kohtaoensis* was observed, near a brook (N 16°04.509', E 105°05.377', 160 m a.s.l.). A female *Ichthyophis* cf. *kohtaoensis* (343 mm TL, 33.8 g) was observed on the surface, being constricted by a subadult *C. ruffus* (420 mm TL, 75.2 g). The snake had just started to transport the head of the caecilian towards its mouth but, being disturbed, the snake released its prey and moved away. The caecilian was still alive and showed several severe bite marks on its head. The prey/predator weight ratios were 0.48 and 0.45 in the first and second field record, respectively. These values are consistent with the range for *Cylindrophis* of 0.01 to 0.83 (mean 0.24) given by Greene (1983).

The field observations reported here qualify *Cylindrophis ruffus* as a predator on *Ichthyophis* cf. *kohtaoensis* in the study area. The observations are entirely consistent with Greene's (1983) and Cundall's (1995) reports of captive *C. ruffus* repeatedly biting their prey, constricting at least larger prey, and swallowing them head first. It is also consistent with Greene's findings that non-caenophidian alethinophidian snakes predominantly feed on elongate and relatively narrow but heavy vertebrate prey.

The ecological relations of soil-dwelling vertebrates are poorly understood, and this is particularly true for amphibians and reptiles. This study adds to reports (e.g. Sarasin and Sarasin, 1887-1890; Greene, 1983; Presswell et al. 2002) of sympatric distributions of often diverse groups of fossorial amphibians and reptiles, at least some of which have predator-prey relationships.

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Unusual karyotype in the Malagasy colubrid snake *Mimophis mahfalensis*

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The extant reptile fauna of Madagascar has in great parts been shaped by dispersal events from Africa (e.g., Mausfeld et al., 2000; Vences et al., 2001a, b), but no conclusive hypothesis is available at present for the biogeographic origin of the 18 endemic Malagasy colubrid genera. One especially enigmatic genus is *Mimophis* which has been classified in several different subfamilies, e.g. in the Boodontinae and Psammophiinae (Meirte, 1992;