Short note

Feeding and reproductive behavior of captive sea snakes

*Hydrophis cyanocinctus*

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**Abstract.** The annulated sea snake (*Hydrophis cyanocinctus*) is a black and yellow banded neurotoxic hydrophiid, widely distributed along the Indian coast. Observations on the feeding and reproductive behavior of the snake were made for the first time in captivity. It consumed live or chopped fish; prey size depended on snake size. Breeding commenced in October and the matured neonates were observed during the following January. Twenty five gravid snakes gave birth to 87 neonates, i.e. 3-5 neonates per snake. During delivery, they exhibited a different type of movement to release the neonates, and all were delivered only at night. All neonates were measured for the morphological traits of weight, snout-vent length, tail length, head length, head width, neck girth and body girth. The relative size of females and males differed significantly. But the relative size of tail length showed an opposite trend compared to other morphological traits. At the end of the experiment, the snakes and neonates were released in the open sea.

**Key words:** Breeding; captivity; feeding; *Hydrophis cyanocinctus*; neonates; sea snake.

The sea snakes (Hydrophiidae) are a major reptilian group inhabiting tropical waters (Ahemed, 1975), known for their neurotoxic venom and valuable skin (Senanayake et al., 2005). From the Indian waters, 29 species have been reported (Ahemed, 1975). Their most powerful venom toxins (Murthy, 1977) and their role in the marine food chain (Voris, 1972) have attracted studies but could not make a significant contribution as they cannot be kept in captivity. Failures to maintain them in captivity have inhibited studies on their feeding and breeding habits.

The sea snakes are highly adapted to marine life (Heatwole, 1999; Ineich and Laboute, 2002). Most sea snakes are piscivorous predators that hunt during the day, or at night. To find their prey in turbid waters, olfactory and visual cues may be
the best or only option. Like fish and other aquatic vertebrates (Kalmijn, 1988), sea snakes may also use cutaneous mechanoreceptors and/or inner ear receptors to detect weak water motions such as those generated by prey objects (Westhoff and Fry, 2005).

The reproductive behavior of reptiles has attracted increasing scientific research over recent years, but detailed analyses have been firmly focused on only a few ‘model systems’ (Shetty and Shine, 2002). Although now extensive descriptive and experimental data on the mating tactics of American garter snakes (Noble, 1937; Whittier et al., 1985) and European adders (Madsen and Shine, 1993) are available, other lineages of snakes have attracted much less attention. This is especially true for field studies, because most snake taxa make relatively difficult subjects for quantitative research on reproductive behavior under field or captive conditions (Seigel, 1993).

*Hydrophis cyanocinctus*, commonly known as the annulated sea snake, is widely distributed along the Indian coast and inhabits the shallow waters with muddy and rocky bottom (Ahemed, 1975). It is viviparous and even small female snakes were found to be reproductively active (Karthikeyan and Balasubramanian, 2007). So far there is no report on feeding and reproductive biology of these creatures. Our data on the behavior of this sea snake in captivity contributes to an understanding of its biology.

Adult sea snakes were collected from the wild and stocked in concrete tanks of 10,000 l capacity. The height of the water was maintained at 1 m and rocks and stones were added as refuges. Filtered seawater was used with a daily water exchange of 80%. Water temperature was maintained at 28 ± 2°C during the study period. Photo exposure was provided as alternating 12 h light and dark periods. Salinity, pH, dissolved oxygen and ammonia–nitrogen concentrations in the water were measured once in a week following the method of Strickland and Parsons (1972).

Twenty-five large, healthy gravid snakes were maintained in a tank. The snakes were fed with live (Zimmerman et al., 1990) or chopped fish (Murthy, 1986). Gravid females were captured and maintained in captive condition to detect the embryonic development and maturation of neonates by sacrificing the snake before parturition. Only gravid snakes with well developed embryos were selected which were detected by palpation (Bonnet et al., 2001). The snakes were maintained in the tanks until they gave birth. Daily observations were made on behavior of the snakes on feeding and parturition.

Finally, all neonates were weighed, measured and sexed. Snout-vent length (SVL) and tail length (TL) were measured from the tip of the snout to the vent, and the vent to tip of tail, respectively using a measuring tape. Neck girth (NG) was measured at two-third of the snake’s head length (HL). HL was measured from the tip of the snout to the anterior portion of the two parietal head scales. Head width (HW) was measured directly behind the snake’s eye. Both were measured using vernier calipers. Total body length was not measured since TL and SVL were used as the