



H U S B A N D R Y

Hatching Buff-striped Keelback (*Amphiesma stolatum*) Eggs in a Home-made Incubator

Tapil P. Rai^{1,2} and Sabin Adhikari³

¹Turtle Rescue and Conservation Centre (TRCC), Arjundhara Municipality-9, Jhapa, Nepal (tapilprai19@gmail.com)

²Department of Environmental Science, Mechi Multiple Campus, Bhadrapur Municipality-8, Jhapa, Nepal

³TRCC-Turtle’s Club, Arjundhara Municipality-9, Jhapa, Nepal

The Buff-striped Keelback (*Amphiesma stolatum*) is an inoffensive natricid that is abundant and widely distributed from Pakistan across the Himalayas to Assam, India, Sri Lanka, the Andaman Islands, Burma, Thailand, Cambodia, Laos, Vietnam, and southern China (Whitaker 1978; Daniel 1983; Schleich and Kästle 2002). In Nepal, it occurs in the entire Terai (southern lowlands) and midlands to an elevation of 1,600 m (Kästle et al. 2013). Buff-striped Keelbacks generally are found in the vicinity of water but are not limited to wetland habitats. They also inhabit grasslands, shrublands, and cultivated and semi-cultivated areas where they are terrestrial rather than semiaquatic (Whitaker 1978; Kästle et al. 2013). These snakes consume a wide variety of prey; juveniles feed on insects and tadpoles, whereas adults consume snails, fishes, anurans, lizards, rodents, and birds (Whitaker 1978; Schleich and Kästle 2002; Kästle et al. 2013). Buff-striped Keelbacks are oviparous, laying 5–15 eggs from May to September (Schleich and Kästle 2002). These snakes are most active during the monsoon and they hibernate in winter and aestivate during the summer (Daniel 1983; Schleich and Kästle 2002). Although Buff-striped Keelbacks are harmless, they often are misidentified as baby cobras and needlessly killed (Whitaker 1978).

On 26 July 2020, the senior author received information about snake eggs in a pile of hay (Fig. 1) in Pokopada, Bhadrapur, Jhapa. Of the four eggs, one was damaged while removing hay to feed the cattle but the remaining eggs were safely transferred to the Turtle Rescue and Conservation Centre (TRCC) in Jhapa District in southeastern Nepal. The TRCC is the only organization in this region that has been working for the conservation of amphibians and reptiles since its establishment in 2012. The three rescued eggs had an average size of 23.1 x 11.9 mm (Table 1). On 14 September 2020, the senior author measured five Buff-striped Keelback eggs found in a stack of bricks at the Birtamod Bus

Park, Arjundhara, Jhapa. Average size of the eggs was 22.6 x 13.0 mm (Table 1). After taking measurements, the eggs were returned to the original positions. Female Buff-striped Keelbacks are known to show parental care by attending egg clutches for several days (Schleich and Kästle 2002); however, both of these clutches appeared to have been abandoned, which might be due to the presence of considerable human activity at both sites.

At the TRCC, we constructed an incubator (Fig. 2) from a styrofoam box that had been used to store fish. The box was lined with a plastic sheet to prevent leakage and aluminum foil for insulation; it was then equipped with an electric heater set at 30 °C to maintain a stable water temperature and an aquarium filter pump to circulate the heated water. We then placed a plastic bowl filled with a mixture of fine sand and soft soil on a pair of PVC pipes and placed the eggs on the substrate. On days 1–10, water and substrate temperatures were 32 and 28 °C, respectively; on days 11–19, respective temperatures were 33 and 31 °C. Relative humidity was 92% throughout the incubation period.



Fig. 1. Eggs of a Buff-striped Keelback (*Amphiesma stolatum*) in a pile of hay in Bhadrapur, Jhapa District, southeastern Nepal. Photograph by Swastika Karki.

Table 1. Morphometry of eggs laid by two females

Locality	Clutch Size	Egg Size (mm)	Remarks
Pokopada, Bhadrapur, Jhapa	4	23.1 x 11.5	Incubated at the TRCC
		23.0 x 12.2	Incubated at the TRCC
		23.1 x 12.0	Incubated at the TRCC
		Damaged	Discarded
Birtamod Bus Park, Arjundhara, Jhapa	5	22.0 x 13.0	Returned to original site
		23.0 x 13.2	
		23.0 x 13.2	
		22.5 x 13.0	
		22.5 x 12.5	

**Fig. 2.** Constructing a home-made incubator, placing Buff-striped Keelback (*Amphiesma stotatum*) eggs on the substrate, and incubating the eggs at the Turtle Rescue and Conservation Centre (TRCC) in Jhapa District, southeastern Nepal. Photographs by Tapil P. Rai (left and right) and Sabin Adhikari (center).

On 15 August 2020, after 19 days of incubation, we found two hatchlings during a routine observation and the third emerged from the egg 12 h later (Fig. 3). Average total length of the three hatchlings was 143 mm. All readily swam in the incubator water before they were transferred to a large aquarium, where they spent most of their time under cover. We observed one hatchling basking on a stone at 1100 h.

**Fig. 3.** Hatchling Buff-striped Keelbacks (*Amphiesma stotatum*) in the home-made incubator at the Turtle Rescue and Conservation Centre (TRCC) in Jhapa District, southeastern Nepal. Photograph by Tapil P. Rai.

We provided small insects but did not observe feeding. One hatchling shed six days after hatching. After 15 days of observation, all were released into suitable natural habitat.

The incubation period varies with temperature, being longer in cooler uplands (Daniel 1983). Ten eggs laid on 21 May began hatching on 7 June (Minton 1966), which appears to be the shortest incubation recorded. Schleich and Kästle (2002) mentioned an incubation period of 36–62 days at 25–30 °C and 90% relative humidity, and Parmar and Limbachiya (2020) noted hatching after 49 days of incubation at temperatures of 26–33 °C. Total lengths of hatchlings vary considerably, with Daniel (1983) and Schleich and Kästle (2002) listing a range of 133–177 mm and Whitaker (1978) a range of 90–170 mm.

Acknowledgements

We thank Swastika Karki and Samiksha Rai for informing us about the snake eggs; members of the TRCC Turtle Club, Saroj Chauhan, Bigyan Kharel, and Roshan Pahari, for helping to build the incubator; the Turtle Rescue and Conservation Centre (ARCO-Nepal and SUMMEF) for supporting our work; and the TK Company for bearing the expenses of constructing the incubator.

Literature Cited

- Daniel, J.C. 1983. *The Book of Indian Reptiles*. Bombay Natural History Society, Bombay, India.
- Kästle, W., K.R. Rai, and H.H. Schleich. 2013. *Field Guide to Amphibians and Reptiles of Nepal*. ARCO-Nepal e.V., München, Germany.
- Minton, S.A., Jr. 1966. A contribution to the herpetology of West Pakistan. *Bulletin of the American Museum of Natural History* 134: 29–184.
- Parmar, D.S. and V.P. Limbachiya. 2020. Artificial Incubation of Buff-striped Keelback (*Amphiesma stolatatum*) eggs. *Reptiles & Amphibians* 27: 335–336.
- Schleich, H.H. and W. Kästle (eds.). 2002. *Amphibians and Reptiles of Nepal: Biology, Systematics, Field Guide*. A.R.G. Gantner Verlag, Ruggell, Liechtenstein.
- Whitaker, R. 1978. *Common Indian Snakes: A Field Guide*. The Macmillan Company of India Limited, Delhi, India.