



# Notes on Behavior in Green Keelbacks, *Rhabdophis plumbicolor* (Cantor 1839) (Reptilia: Squamata: Natricidae)

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Green Keelbacks (*Rhabdophis plumbicolor*), also known as Lead Keelbacks, are distributed throughout much of India, absent only along the eastern coast, the Ganges Valley, and the extreme northeastern parts of the nation. These snakes generally are associated with uplands at elevations of 600–1,800 m asl (Daniel 2002).

In order to avoid predation, snakes, despite being legless, exhibit a diverse repertoire of anti-predator mechanisms (Greene 1988). Herein we describe three types of defensive behavior in Green Keelbacks along with a report of diurnal mating. All were observed in Maharashtra, India, where the species is quite common (Whitaker and Captain 2004; Deshmukh et al. 2015).

**Body-bending behavior.**—Marques et al. (2006) described body-bending behavior as “a cryptic defensive

behavior in arboreal snakes,” although imitating a branch or vine is not limited to arboreal species (Maddock et al. 2011). In either case, the sudden transition from a stretched posture to a bent one quickly removes a predator’s visual cue (an elongate “search image”) (Marques et al. 2006). Khate and Deshmukh (2020) documented such behavior in the Arrow-Headed Trinket Snake (*Coelognathus helena nigriangularis*) from the Indian Subcontinent. Herein, we report the second observation of this behavior in an Indian snake.

During a road survey at about 2030 h on 19 October 2020, RVD, SK, and AB observed a young female Green Keelback (*Rhabdophis plumbicolor*) (~450 mm in total length) lying motionless along a road divider on the outskirts of Kalmeshwar (21.241526°N, 78.904850°E). On closer observation, we noticed multiple, regular bends in the body, caus-



**Fig. 1.** A young female Green Keelback (*Rhabdophis plumbicolor*) observed lying motionless along a road divider at the outskirts of Kalmeshwar, Nagpur, Maharashtra, India, with multiple regular bends of the body. Photograph by Rahul Deshmukh.



**Fig. 2.** Death-feigning behavior in an adult male Green Keelback (*Rhabdophis plumbicolor*): (A) Body coiled, head hidden, and venter exposed; (B) slowly righting its head; and (C) reverting to a natural position. Photograph by Rahul Deshmukh.

ing it to resemble a piece of bamboo (Fig. 1). We observed the snake for 18 min, during which it exhibited body-bending behavior for 11 min.

**Death-feigning behavior.**—Death-feigning is a form of catalepsy or tonic immobility; in most cases, animals exhibiting this behavior “play dead” by maintaining a rigid posture or by simulating fully relaxed muscles (Greene 1988) in response to external stimuli, including predation attempts (Bhattarai et al. 2017). Death-feigning often serves as a last resort when attempts to escape have failed. Records of death-feigning in Indian snakes exist for the Checkered Keelback (*Fowlea piscator*), Copper-headed Trinket Snake (*Coelognathus radiatus*), and Common Wolfsnake (*Lycodon aulicus*) (Mirza et al. 2011); Large-Eyed False Cobra (*Pseudoxenodon macrops*) (Bhosale and Thite 2013); Yellow-collared Wolfsnake (*Lycodon flavicollis*) (Muliya et al. 2018); Common Sand Boa (*Eryx conicus*) (Deshmukh et al. 2020a), Nicobar Kukri Snake (*Oligodon woodmasoni*), and Tytler’s Keelback (*Fowlea tytleri*) (Chandramouli 2020). Herein we present the first report of death-feigning behavior in a Green Keelback (*Rhabdophis plumbicolor*) from India.

During a rescue operation at 1300 h on 11 December 2018 in Kalmeshwar (21.224727°N, 78.895595°E), RVD and SK rescued an adult male Green Keelback that had been moving actively but suddenly coiled its body, hid its head, exposed its venter, and feigned death (Fig. 2). After being left undisturbed for one minute, it slowly raised its head and assumed a natural position.

**Tail-waving behavior.**—Defensive tail displays are widespread in snakes and such a response to a perceived threat appears to be especially common in young snakes (Mehta 2006). Tail-vibrating involves the rapid shaking of the tail in response to a predatory threat in order to divert an attack to the tail, confuse a predator, or dissuade an attack by advertising a venomous bite (Greene 1973). In India, this behavior has been reported for the Indian Egg-eater (*Boiga westermanni*), Common Catsnake (*Boiga trigonata*), Banded Kukri (*Oligodon arnensis*), and Common Wolfsnake (*Lycodon aulicus*) (Deshmukh et al. 2020b). Tail-waving behavior, albeit slower, appears to serve a similar function. Herein we report the first record of tail-waving behavior in a Green Keelback (*Rhabdophis plumbicolor*).



**Fig. 3.** When approached, this young Green Keelback (*Rhabdophis plumbicolor*) assumed a defensive position and began to wave its tail. Photograph by Rahul Deshmukh.



**Fig. 4.** A mating pair of Green Keelbacks (*Rhabdophis plumbicolor*) in a grassy area at the Kuber Resort near Dahegaon Village, Nagpur, Maharashtra. Photograph by Sagar Deshmukh.

At 2215 h on 30 September 2020, RVD, SK, and AB encountered a young Green Keelback near Kalmeshwar (21.246628°N, 78.908123°E). When approached, the snake assumed an S-shape and started waving its tail (Fig. 3; video available at: <https://www.youtube.com/watch?v=F0QnS11D0Bg>). The snake waved its tail for 3 min while hissing and arching its neck by pressing its head against the ground. Once left undisturbed, it moved into an adjacent agricultural field.

**Diurnal mating.**—Green Keelbacks typically are nocturnal or crepuscular (Whitaker and Captain 2004). At 1430 h on a sunny day on 10 November 2020 in a grassy area at the Kuber Resort near Dahegaon Village, Nagpur, Maharashtra (21.213462°N, 78.954804°E), SAD, SAB, and SK encountered a mating pair (total length of male ~730 mm, female ~500 mm) (Fig. 4). Mating lasted ~45 min after the initial observation. After separation, both snakes moved into a nearby bush. We cannot say how frequently mating occurs by day, but suspect that it most commonly occurs during usual activity periods.

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