REPTILES & AMPHIBIANS

Beyond the Ordinary: Thanatosis During Shedding in *Daboia russelii* (Shaw and Nodder 1797) and a Predator-Prey Interaction of *Fowlea piscator* (Schneider 1799), *Hoplobatrachus tigerinus* (Daudin 1803), and *Lissemys punctata* (Lacépède 1788) in Gandhinagar, Gujarat, India

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Thanatosis (death-feigning, tonic immobility, playing dead, playing possum, animal hypnosis) has been documented as an effective anti-predation strategy in snakes (e.g., Vogel and Han-Yuen 2010; Humphreys and Ruxton 2018; Parmar 2018; Chandramouli 2020; Deshmukh et al. 2020, 2021; Ramani and Trivedi 2021; Trivedi and Kumar 2022). At 1740 h on 1 November 2022, during fieldwork at the Serenity Trust Campus, we encountered a Russel's Viper (*Daboia russelii*) (Fig. 1) coiled in the shade near a hiking path flanked by an open area with scattered small and large bushes along its edges. As we approached, the snake began hissing loudly, and we noted that it was shedding. When I attempted to pick it up with a hook, the snake turned onto its back and exhibited death-feigning behavior (Fig. 2). It initially remained completely still but with its head raised, apparently assessing the level of threat. However, when tapped lightly on its side with the hook, it lowered its head, began rubbing the top of its head against the ground, slightly lifted its forebody, subtly vibrated its body while slowly waving its tail, began breathing rapidly before gradually slowing until it became motionless once more. The snake subsequently remained still unless approached or tapped again, and, when tapped, it reacted as before until again lying utterly still. After a few minutes, I turned the snake upright and gently tapped its tail with the hook, which triggered an attempt to escape. However, when I picked it up again with the hook, it resumed its death-feigning behavior. To ensure that this observation was not a fluke, I repeated the same experiment four times, and each time, the snake played dead. We observed this behavior for 19 minutes before leaving the snake, which remained motionless on its back. We returned 15 minutes later, but by then the snake was gone.

Death-feigning behavior and duration of thanatosis vary considerably; some species display this behavior for 50–60 seconds, while others have been observed for as long as 18 minutes; certain species hide their heads within coils, whereas others keep their heads exposed; some rest their heads on the ground, while others don't; some extend their bodies without coiling, others twist their entire bodies and still others only twist their heads and forebodies (Chandramouli 2020; Deshmukh et al. 2020, 2021; Ramani and Trivedi 2021; Trivedi and Kumar 2022). In our case, *D. russelii* displayed thanatosis for 19 minutes while we were present and presumably continued for a few more minutes after we left. It alternated between elevating its head and resting it on the ground. When approached with its head up, it can either strike or flee and, in this position, it remains alert. However, when its head is on the ground, the likelihood of a sudden bite or rapid escape is comparatively lower. When in this position, the snake may take more time to move and apparently continues to act as if it is dead. This is the first record of *Daboia russelii* exhibiting this behavior. It is better known for two primary defense mechanisms, loud hissing and venom-injection through biting (Whitaker and Captain 2008), suggesting that thanatosis is rarely employed. In this case, we think that the individual displayed the thanatosis because it was

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Figure 1. A Russel's Viper (*Daboia russelii*) well-camouflaged while concealed in the shade (left); the same individual with opaque ocular scales indicating an early stage of ecdysis (right). Photographs by Dikansh S. Parmar.

Figure 2. Thanatosis in a Russel's Viper (*Daboia russelii*) when mildly threatened, during which the snake kept its head raised to assess the threat level; in this position, it can still deliver a bite if approached (left). When tapped with a hook, the same individual exhibited full thanatosis by lowering its head to the ground (right). Photographs by Dikansh S. Parmar.

shedding. However, Kaushal Patel, a rescuer from the NGO Wildlife Rescue Trust Navsari, in Navsari District, Gujarat, has observed thanatosis by a *D. russelii* that was not shedding. This occurred during the release of the snake, when one of the volunteers, mistaking the snake for dead, attempted to perform a head-catch. As he reached for the snake's head, it suddenly turned upright and attempted to bite. Fortunately, the volunteer moved his hand on time.

Predator-prey relationships in amphibians and reptiles are extensively documented (e.g., Hossain and Sarker 1995; Bohra et al. 2023; Joshi et al. 2023). I herein report an instance of predation by a Checkered Keelback (*Fowlea piscator*) on an Indian Bullfrog (*Hoplobatrachus tigerinus*), in Gandhinagar District, Gujarat, India, that escalated when an Indian Flap-shelled Turtle (*Lissemys punctata*) snatched the mostly swallowed prey from the mouth of the original predator. At 1036 h on 5 November 2022, near a lake on the Serenity Trust Campus, we observed movement in the water that had been triggered by a *F. piscator* with a *H. tigerinus* frog in its mouth. The snake was attempting to swallow the frog, but the latter had inflated its body, making itself difficult for the snake to swallow. The snake made a vigorous effort to subdue its prey, gripping the frog in its mouth while swimming across a 15-m stretch in a small section of the large lake, repeatedly "chewing" on the frog, injecting saliva in an attempt to weaken it, and jerking the frog underwater before resurfacing. However, an unusual behavior — reminiscent of a crocodile's death roll — stood out. The snake executed this rolling maneuver in the water while gripping the frog, likely an attempt to disorient the frog and further reduce its resistance, ultimately forcing it to surrender. Despite the snake's relentless efforts, the frog did not give up easily. The snake, equally determined, continued its attempts to weaken the frog, leaving the water three times (Fig. 3). The first time was

Figure 3. A Checkered Keelback (*Fowlea piscator*) struggling to feed on an Indian Bullfrog (*Hoplobatrachus tigerinus*); the snake had swum to the edge of the water and had nearly swallowed the frog, with only its head and forelimbs outside its mouth (note that the snake was swallowing its prey hindlimbs first). Photograph by Dikansh S. Parmar.

at 1045 h, nine minutes after we initially encountered the snake; the second was at 1052 h, just seven minutes later, and the third was at 1106 h, 14 minutes after the second. At that time, the snake had almost swallowed the entire frog, with only the head and forelimbs visible outside the mouth. Triggered by disturbances caused by workers in the area, the snake retreated into the water once more at 1113 h, carrying the frog to some nearby vegetation along the lake's edge. Within 20 seconds, an Indian Flap-shelled Turtle (*Lissemys punctata*) appeared out of nowhere, grabbing the frog (Fig. 4), and, in just 12 seconds, it extracted the frog from the snake's mouth. The turtle resurfaced with the frog, tearing at it vigorously before disappearing with its meal. This observation is the first to reveal the "death roll" employed by *Fowlea piscator*. Also, although frogs are well documented prey of both *F. piscator* (e.g., Kalki 2021) and *Lissemys punctata* (e.g., Hossain et al. 2012), this marks the first report of an interaction between these two predators.

Most studies in Indian herpetology emphasize taxonomy, diversity, and distribution, but novel observations such as those described herein offer invaluable insights into the complex behaviors of reptiles, reminding us that much remains to be learned about their ecological interactions and survival strategies in nature.

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Literature Cited

Bohra, S.C., P. Swargiary, R. Roy, and J. Purkayastha. 2023. Observation of an Indo-Chinese Ratsnake (*Ptyas korros*) preying on a Mock Viper *(Psamodynastes pulverulentus*). *Reptiles & Amphibians* 30: e18679. https://doi.org/10.17161/randa.v30i1.18679.

Chandramouli, S.R. 2020. Death-feigning and defensive behavior in two snakes of the Andaman and Nicobar Archipelago of India. *Reptiles & Amphibians* 27: 237–238. https://doi.org/10.17161/randa.v27i2.14190.

Deshmukh, R.V., S.A. Deshmukh, S.A. Badhekar, S. Katgube, and A. Bhelkar. 2021. Notes on behavior in Green Keelbacks, *Rhabdophis plumbicolor* (Cantor 1839) (Reptilia: Squamata: Natricidae) *Reptiles & Amphibians* 28: 34–36. https://doi.org/10.17161/randa.v28i1.15300.

Deshmukh, R.V., S.A. Deshmukh, S.A. Badhekar, U.M. Udapure, and S.K.Hattimare. 2020. Death-feigning behavior in the Common Sand Boa, *Eryx conicus* (Schneider 1801) (Erycidae), and the Common Wolfsnake, *Lycodon aulicus* (Linnaeus 1758) (Colubridae). *Reptiles & Amphibians* 27: 65–67. https://doi.org/10.17161/randa.v27i1.14457.

Hossain, M.L. and S.U. Sarker. 1995. Ecology and food habit of Indian roofed turtle, *Kachuga tecta* in Bangladesh. *Dhaka University Journal of Biological Science* 4: 19–24.

Hossain, M.L., S.U. Sarker, and N.J. Sarker. 2012. *Bangladesh Journal of Zoology* 40: 197–2005.

Figure 4. An Indian Flap-shelled Turtle (*Lissemys punctata*) (blue arrow) stealing an Indian Bullfrog (*Hoplobatrachus tigerinus*) (yellow arrow) from the mouth of a Checkered Keelback (*Fowlea piscator*) (orange arrow). Photograph by Dikansh S. Parmar.

Humphreys, R.K. and G.D. Ruxton. 2018. A review of thanatosis (death feigning) as an anti-predator behaviour. *Behavioral Ecology and Sociobiology* 2018: 22–72. https://doi.org/10.1007/s00265-017-2436-8.

Joshi, P., S. Soni, and A. Figueroa. 2023. Cannibalism in the Oriental Ratsnake, *Ptyas mucosa* (Linnaeus, 1758), in Mumbai, Maharashtra, India. *Herpetology Notes* 16: 661–663.

Kalki, Y. 2021. Notes on the diet of the Checkered Keelback (*Fowlea piscator*) including the first record of saurophagy. *Reptiles & Amphibians* 28: 275–277. https://doi.org/10.17161/randa.v28i2.15630.

Parmar, D.S. 2018. Notes on the Checkered Keelback, *Xenochrophis piscator* (Schneider 1799), in Gujarat, India. *Reptiles & Amphibians* 25: 115–119. https://doi.org/10.17161/randa.v25i2.14256.

Ramani, D. and K. Trivedi. 2021. Death-feigning behavior by a Banded Racer, *Platyceps plinii* (Merrem 1820) (Squamata Colubridae). *Reptiles & Amphibians* 28: 506–507. https://doi.org/10.17161/randa.v28i3.15804.

Trivedi, K. and P. Kumar. 2022. Death-feigning behavior by a Spectacled Cobra, *Naja naja* (Linnaeus 1758) (Squamata: Elapidae). *Reptiles & Amphibians* 29: 273–274. https://doi.org/10.17161/randa.v29i1.16972.

Vogel, G. and H.K. Han-Yuen. 2010. Death feigning behavior in three colubrid species of tropical Asia. *Russian Journal of Herpetology* 17: 15–21. https://doi.org/10.30906/1026-2296-2010-17-1-15-21.

Whitaker, R. and A. Captain. 2008. *Snakes of India: The Field Guide.* First reprint edition. Draco Books, Chennai, India