



Death-feigning Behavior in the Ring-necked Coffee Snake, *Ninia diademata* Baird and Girard 1853

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Death-feigning or thanatosis is a behavior during which an organism fakes its death to avoid predation (Miyatake et al. 2004; Honma et al. 2006; Gregory et al. 2007; Humphreys and Ruxton 2018). In snakes, thanatosis can involve characteristics that include a fixed posture, tonic immobility, inversion convulsions, mouth-gaping, and tongue-protrusion (Humphreys and Ruxton 2018; Fuentes Magallón et al. 2021). Although observed across major snake clades (Gehlbach 1970), thanatosis likely is underreported in the literature (Honma et al. 2006; Humphreys and Ruxton 2018).

Herein we describe two observations of thanatosis in Ring-necked Coffee Snakes (*Ninia diademata*), in the Toucan Ridge Ecology and Education Society (T.R.E.E.S.) Research Center in the Stann Creek District of Belize (17.052627, -88.565579). Individuals were identified as *N. diademata* based on keeled dorsal scales, median row of dark spots on the ventral scales, and a light yellow collar beginning at the posterior margin of the parietal scales (Lee 2000; Köhler 2008). We also describe observations of iridescent ventral scales not currently noted in the literature for this taxon.

On two separate occasions we opportunistically encountered two Ring-necked Coffee Snakes during nocturnal surveys. The first individual (Fig. 1), found at approximately 2000 h on 20 June 2023, was partially hidden under leaf litter on a trail in riparian broadleaf rainforest. When gently handled, it assumed a rigid, circular posture; when placed back onto the ground, it exhibited tonic immobility; when placed in an inverted position, it did not right itself (Fig. 1B–C); when repeatedly nudged, it refused to move. Only when nudged after being placed under leaf litter near the edge of the trail did it retreat.

The second individual (Fig. 2) was found at approximately 2045 h on 21 June 2023, alongside a Red-backed Coffee Snake (*Ninia sebae*), emerging from leaf litter on a trail close to heavily disturbed habitat with cabins and a large, cleared field. When gently handled, it curled into a ball with most of its venter directed upward. When placed on the ground, it remained tightly coiled and immobile despite repeated nudging. It retreated only after being placed in leaf litter near the edge of the trail.



Figure 1. A Ring-necked Coffee Snake (*Ninia diademata*) exhibiting death-feigning behavior that included tonic immobility and inversion. Note the iridescence evident on the venter. Photographs by Dillon Jones.



Figure 2. A Ring-necked Coffee Snake (*Ninia diademata*) exhibiting death-feigning behavior that involved coiling into a ball and tonic immobility. Iridescence is visible on some ventral scales. Photographs by Dillon Jones.

Although we did not witness convulsions, mouth-gaping, or tongue-protrusion, both observations are broadly consistent with descriptions of thanatosis in other species of snakes (e.g., Gehlbach 1970; Honma et al. 2006). Interestingly, the first individual assumed a rigid circular position, whereas the second snake remained balled, suggesting the presence of some individual variation in thanatosis.

Although death-feigning with tonic immobility and inversion has been described in a congener, the Pacific Banded Coffee Snake (*N. maculata*) from Panama and Costa Rica (Fuentes Magallón et al. 2021), we have not observed thanatosis in *N. sebae*, which occurs sympatrically with *N. diademata* on the T.R.E.E.S. property, and we were unable to find any relevant records in the literature.

Ventral scales of both Ring-necked Coffee Snakes exhibited iridescence that was readily apparent in the beam of a headlamp. No iridescence was visible on the dorsum of either individual. Iridescence might be indicative of microornamentation that aids in friction reduction or water repellency (Gower 2003; Doucet and Meadows 2009; Wang et al. 2020). However, inversion during death-feigning and the associated display of iridescence could be suggestive of the possibility that iridescence plays a role in the anti-predator response (Doucet and Meadows 2009). Structural, functional, or behavioral elements of iridescence in *N. diademata* require further study.

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