

Note

Side to Side Swaying as a Defensive Behaviour in the Dekay's Brownsnake (*Storeria dekayi*)

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When discovered by humans, Dekay's Brownsnake (*Storeria dekayi*) exhibits a range of defensive behaviours that are likely used to cope with a variety of potential predators. After being handled, a brownsnake at Rondeau Provincial Park, Ontario, Canada, was observed to coil the anterior portion of its body and to sway the coil from side to side as it attempted to flee. Swaying has rarely been documented in Dekay's Brownsnake and may be a tactic to distract or confuse a visually oriented predator.

Key Words: Dekay's Brownsnake; Northern Brownsnake; *Storeria dekayi*; defensive behaviour; swaying; Rondeau Provincial Park; Ontario

Dekay's Brownsnake (*Storeria dekayi* (Holbrook, 1836)), is a small, terrestrial snake found throughout much of eastern North America, although its Canadian distribution is limited to southern and central Ontario and extreme southwestern Quebec (Cook 1984; Rowell 2012). Dekay's Brownsnake may be common to abundant in appropriate habitat (Catling and Freedman 1980), such as meadows and forest edges, where it preys on invertebrates, primarily terrestrial snails, slugs, and worms (Freedman and Catling 1978; Ernst and Ernst 2003; Rowell 2012; Gray 2014a). The small size of this species makes it vulnerable to predation by a variety of wildlife, including mammals, birds, other snakes, and even arachnids (Bittner 2003; Ernst and Ernst 2003).

When faced with a predator, Dekay's Brownsnake may respond to both visual and tactile stimuli by demonstrating a suite of defensive postures and behaviours (Ernst and Ernst 2003; Gray 2014b, 2015). Here, I present an observation of defensive behaviour that combines the more commonly observed dorso-ventral flattening with swaying of the body, as described by Gray (2014b), in a free-ranging, surface-active Dekay's Brownsnake, near the northern limit of the species' range. Some defensive behaviours may vary geographically or by population (B. S. Gray, personal communication, 2016), with Ontario's Dekay's Brownsnakes possibly being an intergrade between two subspecies: *S. d. dekayi* and *S. d. wrightorum* (Rowell 2012).

On 20 May 2016, at approximately 1800, I encountered an adult female Dekay's Brownsnake, about 25 cm total length, crossing the Marsh Trail at Rondeau Provincial Park, southwestern Ontario (42°17'N, 81°51'W). Although I did not record temperature at the time of the observation, the maximum daily temperature was 16.7°C, and approximately 15.9°C at 1800 (Environment Canada 2016). As I approached the snake, intending to remove it from the trail, it remained still and flat-

tened its body dorso-ventrally. When grasped, the snake voided the contents of its cloaca. I placed the snake back on the trail, fully outstretched, to take photographs. After a minute, it began to exhibit the well documented defensive behaviour (Gray 2014b,c, 2015) of coiling the anterior portion of its body to form a large, open loop flattening its body dorso-ventrally to reveal the checkered pattern on the expanded skin of the coil (Figure 1).

Soon afterward, I observed a novel behaviour: the snake began to move forward while maintaining the defensive position, slowly swaying the coil from side to side, approximately 1 cm to the left and right, slightly raised over the ground. The snake was allowed to escape after photos were taken.

Many small natricine snakes exhibit a great variety of anti-predator responses, often a greater repertoire than some larger snakes (Gray 2015; Gregory 2016). In the case of Dekay's Brownsnake, a wide range of responses to predation attempts has been documented. These include non-intimidating defensive behaviours, such as fleeing, head-hiding, remaining still, and smearing cloacal contents on its own body or on the captor; escalated responses, such as biting, open- and closed-mouth striking; and defensive posturing, such as creating an S-shaped curve with the anterior portion of the body and dorso-ventral flattening of the body, presumably to appear larger (Gray 2015). Defensive reactions of Dekay's Brownsnakes may include a combination of these behaviours and postures (Ernst and Ernst 2003; Rowell 2012; Gray 2014c, 2015). Tactile contact with the animal is required to elicit many defensive responses (Gray 2014b, 2015).

The brownsnake I observed displayed several typical and well-documented responses to discovery (Gray 2014b, 2015). However, my observation of the snake slowly moving forward in an attempt to flee and swaying an anterior coil appears to have not been previously



FIGURE 1. Dekay's Brownsnake (*Storeria dekayi*) exhibiting dorso-ventral flattening and a defensive coil, which was swayed side to side as the snake slowly fled, 20 May 2016, Rondeau Provincial Park, Ontario. Photo: D. LeGros.

reported. Gray (2014b; personal communication, 2016) mentions the swaying behaviour of an exceptionally cold (-0.6°C) Dekay's Brownsnake that was uncoiled and restrained in hand. Snakes that exhibit a variety of responses to potential predators may be limited by suboptimal temperatures to stationary responses, such as gaping, death feigning, and flattening (Keogh and DeSerto 1994; Gerald 2008; Gray 2015). The slow crawl, featuring the defensive S-curve of the Dekay's Brownsnake in my observation may have been related to the moderate ambient temperature (roughly 16°C), as snakes that are warmer may flee from predators faster, limiting their time of exposure to a threat (Gray 2015).

Dekay's Brownsnakes exhibit bimodal seasonal activity; thus, encounters with people peak in spring and autumn and snakes may be observed in the open during the day in these seasons (Rowell 2012; Gray 2014a). Presumably, many snakes tend to avoid open areas and potential exposure to predators; however, they may respond either by moving quickly to reduce exposure time or by moving very slowly to draw minimal attention to themselves (Gregory 2016). Because of the secretive nature of Dekay's Brownsnake, most formal research on this species is conducted by sampling cover objects (Hecnar and Hecnar 2010; Gray 2014a,b,c,

2015). As a result, snakes that are encountered are typically under cover and not active on the surface, allowing few opportunities to study their defensive behaviour.

Small snakes that are actively moving during the day, such as Dekay's Brownsnake, are exposed to many kinds of visual predators that forage in the leaf litter. I speculate that ground-foraging birds might be the predators that elicit the behaviour I observed. Ernst and Ernst (2003) cite American Robin (*Turdus migratorius*) and Brown Thrasher (*Toxostoma rufum*) as confirmed predators of this snake, and Blue Jay (*Cyanocitta cristata*) has also been observed attempting to prey on this species (B. S. Gray, personal communication, 2016). My observation coincided with the end of spring migration of birds through Rondeau Provincial Park, and both American Robins and Brown Thrashers were abundant, both as migrants and residents in late May (eBird 2016; personal observation, 2016). Many birds prefer small or juvenile snakes to large or adult individuals (Bittner 2003), and Dekay's Brownsnake is rather small and inoffensive. Swaying possibly serves to confuse visual predators, such as birds, increasing time for escape. Swaying may also make it more difficult for a predator to strike accurately. Contrary to a swaying tail

display, which diverts attention away from vital organs and body parts (Greene 1997), swaying of the anterior region may draw attention to this vulnerable region, and, thus, the exact function of this display remains unclear. Despite the difficulty of studying the defensive behaviour of free-ranging snakes (Gray 2015; Gregory 2016), opportunistic field observations, such as this one, may contribute to our understanding of such behaviour.

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