

kg of pythons in the tunnel, the adult tortoise was unable to exit, and thus possibly impairing thermoregulation. Tortoises could also be excluded from entering a burrow, increasing chances of predation or exposure to unfavorable weather. Pythons could also negatively impact commensal species utilizing burrows.

Burrow use might afford pythons shelter from cold winter temperatures. Dorcas et al. (2011. *Biol. Invasions* 13:793–802) found that some pythons in a South Carolina outdoor enclosure used artificial subterranean retreats during frigid weather. Pythons in southern Florida could survive cold ambient temperatures while underground for reproductive activities. For regions of Florida north of the current range, this phenomenon might need to be incorporated in assessments of climatic suitability for sustaining a python population. Therefore, further study of burrow use by *P. bivittatus* is warranted.

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***SINOMICRURUS JAPONICUS BOETTGERI* (Hai Coral Snake).**

DEFENSIVE BEHAVIOR. *Sinomicrurus japonicus boettgeri* is a small elapid snake that is endemic to several islands of the Ryukyu Archipelago, Japan (Kaito et al. 2017. *J. Zool. Syst. Evol. Res.* 55:156–166). Although they rarely bite humans, this species often presses the pointed tip of its tail into the hand when caught by humans (Fig. 1A). Moreover, individuals are often observed to curl their tail when being handled by a human (Takada and Ohtani 2011. *Keys to the Illustrated Manual of Japanese Reptiles and Amphibians in Natural Color*. Hokuryukan, Tokyo. 296 pp.). In addition to the above behaviors, I have observed a new behavior where the snake slowly wags its curled tail. Here, I report three observations of tail-curling and wagging displayed by the snake.

On 15 May 2014, at 0020 h, I found an adult *S. j. boettgeri* (total length ca. 50 cm) lying on an asphalt road in Oshikawa, Ogimi, Okinawa-jima Island, Japan (26.6767°N, 128.1436°E, WGS 84; 284 m elev.). As I approached the snake with a flashlight, it began to quickly crawl away. When I picked the snake up, it pressed the tip of its tail against my hand. When I pressed the center of its body onto the ground, the snake curled its tail and maintained its posture. After pressing the snake for approximately 10 min, the snake began to raise the curled tail. I then released the snake and subsequently, the snake began wagging its curled tail and the posterior part of its body slowly back and forth in the air (Fig. 1B). When wagging its tail, the snake bent the posterior half of the body into an irregular S shape. After wagging the tail several times, the snake began to crawl away.

On 21 April 2016, at 0005 h, I found an adult *S. j. boettgeri* (total length ca. 40 cm) in Oku, Kunigami, Okinawa-jima Island, Japan (26.8347°N, 128.2755°E, WGS 84; 220 m elev.). The snake stayed motionless with its body partially exposed from the litter layer on the side of the road. I approached the snake with a flashlight, and it began to quickly crawl away. I picked the snake up and immediately kept it on the ground. When I held its body, the snake exhibited tail-curling behavior and hid its head under the fallen leaves. Because the snake did not attempt to escape, I



FIG. 1. *Sinomicrurus japonicus boettgeri* defensive behaviors: A) pressing the pointed tip of its tail into the finger; B) raising the curled tail and wagging it back and forth; C) raising the curled tail in the air; D) hiding its head and bending the posterior half of the body.

released it. The snake slightly lifted its tail and approximately 10 cm of the posterior part of its body from the ground with its tail curled. Then, it raised the curled tail and the posterior part of the body upright (Fig. 1C). Immediately after that, the snake began to crawl away into the leaf litter.

On 7 August 2017, at 2210 h. I found an adult *S. j. boettgeri* (total length ca. 40 cm) lying on an asphalt road in Iji, Kunigami, Okinawa-jima Island, Japan (26.7592°N, 128.2019°E, WGS 84; 181 m elev.). I approached the snake with a flashlight, and it remained stationary. On touching its body with my hand, the snake immediately attempted to crawl quickly away. As with the previous two observations, when I held the center of the body on the ground, it curled its tail and began waving the curled tail and the posterior half of its body left and right 2–8 times. The snake tried to hide its head either under the body or the litter layer, or its head remained still (Fig. 1D). The wagging angle and speed were irregular and the snake bent the posterior half of its body into an irregular S shape (Fig. 1D). As I released the snake, it escaped into the litter, while maintaining the curled tail until its body was completely hidden.

The body coloration of *S. j. boettgeri* has been suggested to work cryptically through background matching against avian predators (Mochida et al. 2015. *Zool. Stud.* 54:33). However, the tail shows transverse bands of vivid orange or red color compared to the body. Conspicuous curling and wagging movements of the

vividly colored tail might attract a predator's attention and divert it from the head. Further knowledge concerning the ecology and predators of *S. j. boettgeri* should be accumulated.

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SISTRURUS CATENATUS (Eastern Massasauga). DEFENSIVE BEHAVIOR. *Sistrurus catenatus* is a small, cryptic rattlesnake species endemic to the midwestern United States and southern Canada that is vulnerable to many predators including mammals, birds, reptiles, and even amphibians (Gibbons 2017. Snakes of the Eastern United States. University of Georgia Press,

Athens, Georgia. 320 pp.). *Sistrurus catenatus* is known to display a variety of defensive behaviors when threatened, including remaining still, fleeing, rattling, coiling up, positioning the neck in an S-shaped strike coil, biting, and envenomating would-be predators. We observed a defensive behavior previously unreported for this species on 14 May 2017 in Crawford County, Michigan, USA. Immediately following capture and introduction to captivity as part of a radio-telemetry study, an adult male *S. catenatus* (SVL = 51.8 cm; 213.5g) repeatedly inflated its throat for several minutes while in a coiled position (Fig. 1). Throat expansions were short intervals lasting only a few seconds during each pump. The snake rattled intermittently during the throat inflations, but no other audible sounds accompanied this display. The morphology of this eastern massasauga also appeared unusual in that its throat had loose, pouchy skin that was noticeable even when the snake was at rest and not exhibiting the throat expansion behavior. This behavior is decidedly uncommon in this population, as it has not been observed in over 150 adult *S. catenatus* captured and studied at this site over the past 15 years. We could find no documentation of throat inflation in eastern massasaugas elsewhere, although some viper species are known to behave similarly when threatened (e.g. buccal expansion in *Bitis arietans*; Young et al. 2001. Copeia. 2001:270–273).

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THAMNODYNASTES PHOENIX. DIET. Snakes of the genus *Thamnodynastes* are distributed throughout South America, from Colombia (Pérez-Santos and Moreno 1989. Boll. Mus. Reg. Sci. Nat. 7:1–9) to Argentina (Bellagamba and Veja 1996. Herpetol. Rev. 27:36). These snakes feed on amphibians, reptiles, and small mammals (Dorigo et al. 2014. Herpetol. Notes 7:261–264; Ruffato and Di-Bernardo 2003. Phyllomedusa 2:27–34; Manzanailla and Sánchez 2005. Memor. de la Fund. La Salle de Cien. Naturales 161–162:61–75). *Thamnodynastes phoenix* is found in

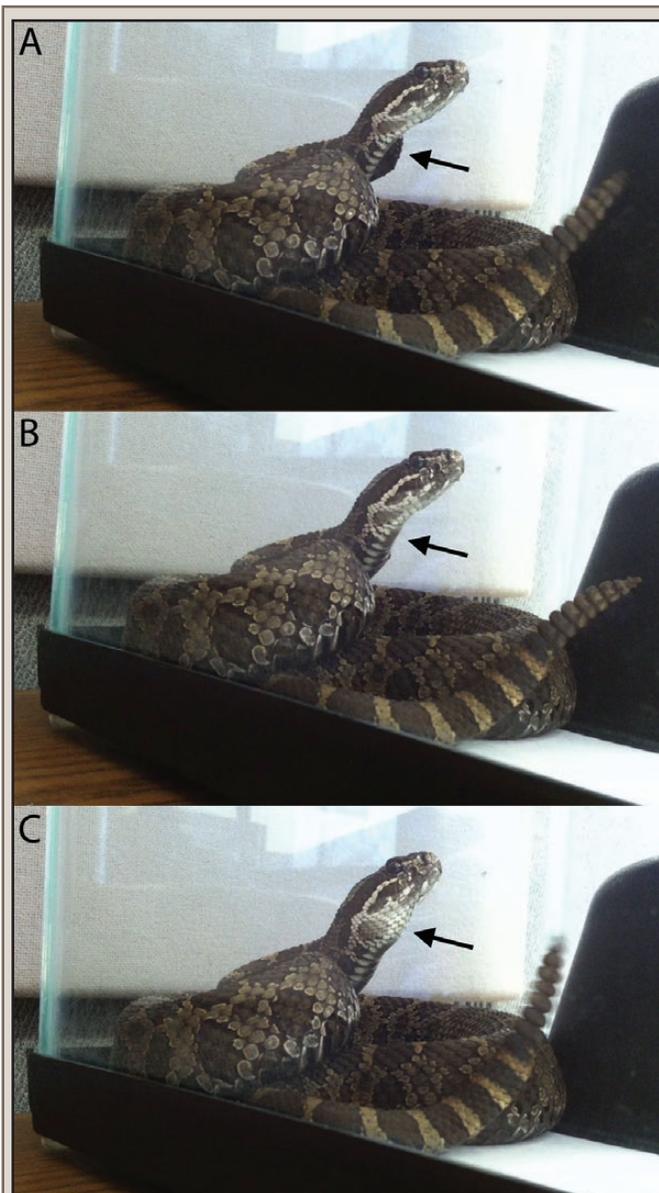


FIG. 1. Adult male *Sistrurus catenatus* exhibiting a throat inflation cycle: A) throat fully deflated (note coil behind throat is visible), B) throat partially inflated (note coil is barely visible), C) throat fully inflated (note coil is not visible). Arrows indicate the area of the throat where the changes in appearance are the most pronounced.



FIG. 1. Dorsal view of the lizard *Tropidurus semitaeniatus*, collected from the stomach of a *Thamnodynastes phoenix*.