

**AMBYSTOMA OPACUM** (Marbled Salamander). **COLORATION.** At 1100 h on 7 November 2007, I found one adult male *A. opacum* (57 mm snout-vent length) that lacked the normal color pattern for this species (Fig. 1). Adults typically have white or gray saddles that run the full length of the dorsal surface. Some specimens may lack crossbands and have two longitudinal stripes (Trauth and Richards 1988. Bull. Chicago Herpetol. Soc. 23:87); however, this specimen had no saddles on the dorsal surface of the body. It did, however, have numerous small flecks of gray color across the dorsum and extremely faint, nearly imperceptible saddles on the tail. I discovered this specimen in Big Cypress Tree State Park, Weakly County, Tennessee (36.199260 °N, 88.890351 °W; WGS84) and photographed and released it at the site of capture.

Several color variants have been reported for marbled salamanders. Albinism is the most widely documented. It has been noted to occur in larvae in Rhode Island, Connecticut, Maryland, Mississippi (Deegan et al. 1998. Herpetol. Rev. 29:229), and Illinois (Walston and Register 2004. Herpetol. Rev. 35: 365) and in adults from Tennessee (Campbell 2011. Herpetol. Rev. 42: 80-81) and Illinois (Walston and Register *op. cit.*). There are also reports of a hypomelanistic adult from Tennessee (Simpson and Wilson 2010. Herpetol. Rev. 41: 185-186) and leucistic larvae from Virginia (Mitchell and Church 2002. Banisteria 20:67-69). Two reports document hypermelanism (i.e. “melanoid mutants” per Richards and Nace 1983. Copeia 1983: 979-990). Connior

(2013. Herpetol. Rev. 44: 114) discovered a variant in Arkansas that was characterized by a significant reduction, but not absence, of the white saddles; however, Simpson & Wilson (*op. cit.*) reported the first known specimens of a completely melanoid *A. opacum*. These were collected at the Volunteer Army Ammunition Plant in Hamilton Co., Tennessee. They found one adult male and two females. The male was completely black and lacked any trace of the white saddles; however, both females expressed the normal pattern, but the back pattern was faint and nearly undetectable. The specimen I discovered appears to be a variant like those reported by Simpson and Wilson (*op. cit.*); however, they did not report the presence of small flecks of gray on the dorsal surface. No photograph was published in their report for comparison.

To my knowledge, this is only the third report of a color variant for *A. opacum* in Tennessee and the first report of such an occurrence in West, Tennessee. Thus, color variants have now been reported in East (Hamilton Co.; melanoid – Simpson and Wilson 2010, *op. cit.*), Middle (Franklin Co.; albinism – Campbell 2011, *op. cit.*), and West (Weakley Co.; melanoid - this report) Tennessee. The presence of melanoid specimens in both East and West Tennessee indicates that such variants may exist at low frequencies across the full extent of this species’ range within the state.

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FIG. 1. A melanoid adult marbled salamander (*Ambystoma opacum*) discovered on 7 November 2007 at Big Cypress Tree State Park, Weakley County, Tennessee. Photograph by Joshua M Hall.

**LITHOBATES SYLVATICUS** (Wood Frog).

**DAVIAN BEHAVIOR.** Davian behavior, mating attempts by males with dead females, is a well-documented phenomenon observed in mammals, birds, amphibians, and reptiles (Costa et al. 2010. Herpetology Notes 3:79). Among anurans it has been reported in Bombinatoridae (Sinovas 2009. Herpetological Review 40:199), Bufonidae (Miller 2018. Tennessee Journal of Herpetology 1:23), Ranidae (Pearl et al. 2005. American Midland Naturalist 154:126-134), and Hylidae (Bedoya et al. 2014. Herpetology Notes 7:515-516). Wood frogs are an explosive breeder that have been shown to exhibit Davian behavior with a heterospecific spotted salamander (*Ambystoma maculatum*) (Moldowan et al. 2013. Herpetological Review 44:296-297). *Rhinella proboscidea*, another explosive breeding anuran, has been shown to practice functional necrophilia in which males are able to squeeze oocytes out of a dead female and fertilize them. It is hypothesized that amplexus with a dead conspecific may provide an adaptive advantage and could select for more aggressive males in explosive breeding anurans (Izzo et al. 2012. Journal of Natural History 46:2961-2967). A literature search yielded no previous records of Davian behavior between conspecific wood frogs. On 12 February 2019 at 2030 h, we

found an amplexed pair of wood frogs exhibiting Davian behavior in an explosive breeding area among three other conspecific amplexed pairs and a large collection of fertilized egg masses (Fig. 1). The breeding group was located in a large, roadside wetland in Roan Mountain State Park, Carter County, Tennessee, USA (36.169943°N 82.098942°W, WGS 84, 852 m elev.). The female was dead and bloated but the male appeared healthy. The female was fully submerged with the male being partially submerged. We did not observe any other dead conspecifics in the breeding area. The amplexing pair was observed for approximately 30 minutes with the male making no apparent movement or sounds. It is unknown when amplexus began or ended.

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FIG. 1. A male Wood Frog (*Lithobates sylvaticus*) amplexed with a dead conspecific female on 12 February 2019 in a wetland, Roan Mountain State Park, Carter County, Tennessee.

**CHELYDRA SERPENTINA** (Common Snapping Turtle). **REPRODUCTION.** *Chelydra serpentina* is a wide-ranging species that occurs throughout much of central and eastern North America (Powell et al. 2016. Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America. 4<sup>th</sup> Ed. Houghton Mifflin Harcourt Publishing Company, New York, New York. 512 pp.). While this species has been extensively researched, there is a limited amount of literature on breeding behavior and copulation of wild turtles. Breeding season occurs from early spring throughout late summer (Niemiller et al. 2013. The Reptiles of Tennessee. University of Tennessee Press, Knoxville, Tennessee. 366 pp.). Schwab (1988, *Catesbeiana* 8(2):33) described copulation as a violent act. In both Schwab's (1988, *op. cit.*) and Hamilton's (1940, *Copeia* 1940:124-6) accounts, the male was observed on top of the female gripping her with his claws. He then forces the vent of his tail underneath the tail of the female so that their vents align and sperm is transferred to the female (Hamilton 1940, *op. cit.*). Snapping turtles have also been observed to mate plastron to plastron (Schwab 1988, *op. cit.*). Depending on the time of year that mating occurs, the female will either store sperm for delayed fertilization or use it to fertilize and lay eggs between mid-May and late June (Niemiller et al. 2013, *op. cit.*). Copulation has been reported twice in shallow water and in both instances the female attempted to escape but was thwarted by the male's advances (Hamilton 1940, *op. cit.*; Schwab 1988, *op. cit.*). The male bit and scratched the female while attempting to maintain a solid grip (Schwab 1988, *op. cit.*). The act lasted upwards of twenty minutes, leaving both animals exhausted (Schwab 1988, *op. cit.*).

On 4 April 2016 at 1851 h, a mating pair of common snapping turtles was found in a shallow muddy pool between Sugar Creek and the South Fork of the Forked Deer River in Chester Co., TN (35.432999, -88.625880). The

pool was ca. 18.29 x 9.14 m and was ca. 0.76 m deep. It was partially in forest and partially in a strip cleared for power lines. The male grasped the female's carapace with all four feet (Fig. 1) and bit the head of the female, holding her head under water and then periodically allowed both animals to breathe. The male wrestled the female until they were both on their sides (Figs. 1, 2), and then until both were upside down. The male remained tightly attached to the female's carapace throughout these movements. The female seemed to submit, however she did make a few attempts to walk at which time the male would bite her head and hiss. The male's tail was wrapped around the female's tail (Fig. 2). The duration of the event was approximately eight minutes, ending with the male and female quickly departing the site in different directions. It is uncertain how long the two turtles had been breeding before they were discovered.

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FIG. 1. A male common snapping turtle, *Chelydra serpentina*, grasps a female's carapace tightly with his claws during copulation.



FIG. 2. Mating pair of *Chelydra serpentina* in copula. The male's tail has been wrapped firmly underneath the female in order to line up both individual's cloacae.

**NERODIA SIPEDON** (Northern Water Snake). **TERRESTRIAL FORAGING.** On 7 October 2017 at 1230 h, we discovered a juvenile Northern Water Snake (*N. sipedon*, approx. total length 25 cm) attempting to consume an adult Northern Gray-cheeked Salamander (*Plethodon montanus*, snout-vent length 3.5 cm). The interaction was observed 20 m from the south side of Birchfield Camp Lake on Rich Mountain, Unicoi County, TN (36.077292°N, 82.551618°W, elevation 1175 m). Although the location was submerged 4 months prior, the lake had retracted due to a breach below the earthen dam. The snake was initially positioned with its body exposed and its head underneath a small rock. Upon moving the rock, the snake was observed grasping the salamander around the torso with the dorsum of the salamander oriented upward (Fig. 1). T Chapman grabbed the snake as it attempted to escape, and the snake released the salamander

after approximately 30 s. The salamander suffered numerous lacerations on the dorsum and autotomized its tail upon being released from the snake's mouth. Although the salamander survived the encounter due to observer intervention, it was discovered dead the following morning at 0900. Previous reports indicate that the preferred diet of *N. sipedon* consists of primarily fish (Bowen 2001. *Herp. Rev.* 32:264) and aquatic vertebrates (King 1993. *J. Herpetol.* 27:90-94). Researchers have described in *N. sipedon* a specialized aquatic foraging behavior where individuals will swim open-mouthed until they contact prey (Gillingham & Rush 1974. *J. Herpetol.* 8: 384-385). Predator-prey interactions between *N. sipedon* and caudates have been reported in larval Small-mouthed Salamanders (*Ambystoma texanum*) (McCallum 1995. *Herp. Rev.* 26:39) and Spring Salamanders (*Gyrinophilus*



FIG. 1. A juvenile Northern Water Snake (*N. sipedon*) attempting to consume an adult Northern Gray-cheeked Salamander (*P. montanus*).

*porphyriticus*) (Blackburn et al 2003. *Herp. Rev.* 17:61), adult Red Salamanders (*Pseudotriton ruber*) (T Chapman pers. obs.), and semi-aquatic adult *Desmognathus* spp. (Himes 2004. *Herp. Rev.* 35:123). To our knowledge, this is the first observation of *N. sipedon* attempting to consume a fully terrestrial adult of the genus *Plethodon*. We hypothesize that the unusual encounter resulted from the rapid retraction of a historic lake bed. This led to reduced aquatic foraging opportunities for *N. sipedon* and increased

***SISTRURUS MILIARIUS STRECKERI***  
(Western Pygmy Rattlesnake).

**REPRODUCTION.** Snakes have a wide diversity of reproductive strategies, which generates a large range of reproductive behaviors (Shine 2003 *Proc. Roy. Soc. B* 270:955–1004). Due to snake's secretive nature (Parker and Plummer 1987 in Seigel et al. *Snakes: Ecology and Evolutionary Biology*), observing these reproductive behaviors in the wild is extremely rare. With the aid of radio-telemetry, we can not only get a better understanding of snakes' movements, but also increase our chances of observing their reproductive behaviors. Through this note we report two courtship events and one copulation event observed while radio tracking tagged Western Pygmy Rattlesnakes in west-central Tennessee. We observed the first courtship event on September 26<sup>th</sup>, 2018 where we encountered one of the telemetered males in an open low elevation grassland field in contact with an unmarked female located underneath the male snake (Fig. 1). We restrained both individuals with snake tongs and acrylic tubes to record weight (g), total length (TL, cm), snout-vent length (SVL, cm), and sex. We also marked the female with a passive integrated transponder (PIT) tag (Biomark, Boise, ID, USA) prior to release. The female (weight = 73g, TL = 37cm, SVL = 33cm) was larger than the male (weight = 70g, TL = 43cm, SVL = 36cm). On September 28<sup>th</sup>, 2018 both

terrestrial habitat availability for *P. montanus*. Future research should investigate the extent to which extreme landscape alterations can influence predator foraging behavior and predator-prey relationships within overlapping communities.

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individuals were again observed approximately 4 m from the original location. We observed the second courtship event on November 5<sup>th</sup>, where we encountered the same marked male from the September 26<sup>th</sup> and 28<sup>th</sup> observations basking on top of a different unmarked female (Fig. 2) at a location approximately 480 m north on a hillside within a stand of mixed deciduous forest. We did not record measurements of this female due to lack of equipment, however; we were able to confirm through photographic evidence and size difference that the snake was different than the female snake observed of September 26<sup>th</sup> and 28<sup>th</sup> and was also considerably larger than the male. In addition to the courtship events, we also observed copulation on October 4<sup>th</sup>, when we encountered one of the telemetered females (weight = 66g, TL = 41cm, SVL = 34cm) on a southern facing slope within a stand of deciduous forest with an unmarked male (Fig. 3). The snakes remained in copulation for the entirety of the observation (approximately 30 minutes) and were still connected when we left the observation site. We did not collect information on the male to not disturb copulation; however, the male was considerably larger than the female.

The Western Pygmy Rattlesnake is considered Threatened in Tennessee (TDEC 2016. A guide to the rare animals of Tennessee) due to its limited distribution, minimal reconfirmed records, and lack of physiology,

ecology, and life-history data. Since 1950, there has only been ~30 confirmed sightings of this species in West-Central Tennessee (Scott and Redmond 2008. Atlas of Reptiles in Tennessee, <http://www.apsubiology.org/tnreptileatlas/>), and to our knowledge this is the first-time courtship and copulation has been observed and reported for this species in Tennessee. This indicates that even though Western Pygmy Rattlesnake populations in Tennessee may be small and scarcely distributed within its range

in the state, Tennessee may hold functional (i.e., populations with recruitment of young) populations within suitable habitat areas.

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FIG. 1. Marked male *Sistrurus miliarius streckeri* (1) with an unmarked female of the same species underneath it (2) in an open low elevation grassland field located in west-central Tennessee.



FIG. 2. Marked male *Sistrurus miliarius streckeri* with an unmarked female of the same species underneath it on a hillside within a stand of mixed deciduous forest located in west-central Tennessee. The male in this picture is the same individual presented in Figure 1 with a different female.