

NATURAL HISTORY NOTES

The Natural History Notes section is analogous to Geographic Distribution. Preferred notes should 1) focus on observations in the field, with little human intrusion; 2) represent more than the isolated documentation of developmental aberrations; and 3) possess a natural history perspective. Individual notes should, with few exceptions, concern only one species, and authors are requested to choose a keyword or short phrase that best describes the nature of their note (e.g., Reproduction, Morphology, Habitat, etc.). Use of figures to illustrate any data is encouraged but should replace words rather than embellish them. Articles submitted to this section will be reviewed and edited prior to acceptance.

Electronic submission of manuscripts is requested (as Microsoft Word or Rich Text format [rtf] files, as e-mail attachments). Figures can be submitted electronically as JPG, TIFF, or PDF files at a minimum resolution of 300 dpi. Please DO NOT send graphic files as imbedded figures within a text file. Additional information concerning preparation and submission of graphics files is available on the SSAR web site at: <http://www.ssarherps.org/HRinfo.html>. Manuscripts should be sent to the appropriate section editor: **Laine Giovanetto** (amphibians; lgiovanetto@ymail.com); **James Harding** (turtles; hardingi@msu.edu); **Mason J. Ryan** (crocodilians, lizards, and *Sphenodon*; MRyan@azgfd.gov); and **John D. Willson** or **Andrew M. Durso** (snakes; hr.snake.nhn@gmail.com).

A reference template for preparing Natural History Notes may be found here: ssarherps.org/publications/herpetological-review/. Standard format for this section is as follows: SCIENTIFIC NAME in bold, capital letters; standard English name in parentheses with only first letter of each word capitalized (if available, for the United States and Canada as it appears in Crother [ed.] 2017. Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding, 8th ed. Herpetol. Circ. 43:1–102, available for download here: <https://ssarherps.org/publications/>); KEY WORD(S) referring to the content of the note in bold, capital letters; content reporting observations and data on the animal; place of deposition or intended deposition of specimen(s), and catalog number(s) if relevant. Then skip a line and close with author name(s) in bold, capital letters (give names and addresses in full—spell out state names—no abbreviations, e-mail address after each author name/address for those wishing to provide it—e-mail required for corresponding author). References may be briefly cited in text (refer to this issue or the online template for citation format and follow format precisely). One additional note about the names list (Crother 2017) developed and adopted by ASIH-HL-SSAR: the role of the list is to standardize English names and comment on the current scientific names. Scientific names are hypotheses (or at least represent them) and as such their usage should not be dictated by a list, society, or journal.

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CAUDATA — SALAMANDERS

ANEIDES AENEUS (Green Salamander). PREDATION. Few predators have been reported for *Aneides aeneus* (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 587 pp.). Pauley and Watson (2005. In Lannoo [ed.], Amphibian Declines: The Conservation Status of United States Species, pp. 656–658. University of California Press, Berkeley, California) reported *Diadophis punctatus* (Ring-necked Snake) and *Thamnophis sirtalis* (Common Garter-snake) as predators. Rossell et al. (2019. Amer. Midl. Nat. 181:40–52) reported 167 occurrences of at least 12 species of potential predators of either adult *Aneides* or their eggs during 2578 surveys of 74 rock outcrops containing *Aneides* in North Carolina, but predation was not directly observed.

On 14 June 2019, while monitoring a granitic outcrop known to be used as a breeding site by *A. aeneus* (DuPont State Recreational Forest, Henderson County, North Carolina, USA), one female *A. aeneus* was found ovipositing in a rock crevice. Two additional crevices on another portion of the same outcrop contained two gravid female *A. aeneus* each. When the site was checked again on 16 June 2019, the single female was attending her egg clutch, but of the two crevices containing salamanders

on 14 June 2019, one was vacant and one contained a juvenile female *Pantherophis alleghaniensis* (Eastern Ratsnake: 416 mm SVL, 498 mm total length). The snake was collected, euthanized, and later dissected to reveal it had consumed two gravid female *A. aeneus* (Fig. 1). To our knowledge, this is the first documented record of predation on *A. aeneus* by *P. alleghaniensis*. Moreover,



FIG. 1. *Pantherophis alleghaniensis* and stomach contents consisting of two gravid female *Aneides aeneus*, Henderson County, North Carolina, USA.



FIG. 1. *Thamnophis elegans vagrans* preyed upon by an invasive crayfish in Arizona, USA.

Forks in the Apache-Sitgreaves National Forest in Arizona, USA (33.84956°N, 109.31322°W; WGS 84; 2499 m elev.), we discovered a *T. e. vagrans* (252 mm SVL; Fig. 1) being consumed by an invasive *Orconectes virilis* (Virile Crayfish). When we first observed the snake, the anterior portion was exposed and floating in the water, not quite reaching the surface, while the posterior portion of the body was pinned under a large rock. The water was fast-flowing and ca. 35 cm deep. When we overturned the rock, we found two large crayfish underneath. One crayfish had the snake's body in its claw and released the snake when we overturned the rock. We measured the claw length of one of the crayfish, which was 48 mm.

Predation by invasive crayfish has been listed as a threat to other native gartersnakes in Arizona (Holycross and Rosen 2011. The narrow-headed gartersnake in the United States [*Thamnophis rufipunctatus*]: A report on its status, natural history, and threats. Unpublished report, Center for Biological Diversity. 28 pp.). Although crayfish are known to prey on garter snakes and especially on *T. elegans* in other parts of its range (Weaver 2004. Herpetol. Rev. 35:278), direct observations of predation remain rare. Our observation presents a valuable piece of evidence that invasive crayfish can and do prey upon *T. elegans* in Arizona.

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THAMNOPHIS EQUES (Mexican Garter Snake). DIET. *Thamnophis eques* is a medium-sized natracine distributed throughout the central plateau of Mexico. It is known to feed on a wide variety of prey including leeches, slugs, earthworms, fishes, amphibians, reptiles, and rodents (*Peromyscus maniculatus* and *Microtus quasiater*; Macías García and Drummond 1988. J. Herpetol. 22:129–134; Rosen and Schwalbe 1988. Status of the Mexican and narrow-headed garter snakes [*Thamnophis eques megalops* and *Thamnophis rufipunctatus*] in Arizona. Report to U.S. Fish and Wildlife Service. iv+ 50 pp.; Manjarrez 1998. Herpetol. Rev. 32:464–468; Venegas-Barrera and Manjarrez 2001. Herpetol. Rev. 32:187).

On 27 September 2018 at 1651 h, during a tour of the wetland “Bordo las Maravillas” within the university campus “El Cerrillo” of the Autonomous University of State of Mexico, Toluca, Mexico (19.41270°N, 99.70088°W; WGS 84; 2609 elev.), we captured an adult male *T. eques* (476 mm SVL, 153 mm tail length, 55 g without prey) that regurgitated a partially digested



FIG. 1. Partially digested *Peromyscus melanotis* (Black-eared Mouse) recovered from a *Thamnophis eques* from Toluca, Mexico; inset: rodent guard hair showing lanceolate cuticular scale.

mouse pup (53.4 mm length, 6.3 g; Fig. 1). Analysis of rodent guard hair shows a lanceolate pattern of cuticular scales that is characteristic of *Peromyscus melanotis* (Black-eared Mouse; Baca y Sánchez-Cordero 2004. An. Inst. Biol. Univ. Nac. Auton. Mex. Zool. 75:283–437). Our record increases the small mammals known to be consumed by *T. eques* to three species.

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THAMNOPHIS EQUES MEGALOPS (Northern Mexican Gartersnake). REPRODUCTION. *Thamnophis eques megalops* is a semi-aquatic snake distributed in Arizona and New Mexico, USA and northern Mexico (Rossman et al. 1996. The Garter Snakes: Evolution and Ecology. University of Oklahoma Press, Norman, Oklahoma. 332 pp.; Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Books, Washington, D.C. 668 pp.). This species has suffered a 90% population decline throughout its historical range and was listed as Threatened under the Endangered Species Act in 2014 (U.S. Fish and Wildlife Service. 2014. Fed. Reg. 79:38678–38746). Little is known about *T. e. megalops* reproductive cycles and strategies. Ovulation occurs in females in late March or early April, and copulation was speculated to occur in the fall (Rosen and Schwalbe 1988. Status of the Mexican and narrow-headed garter snakes [*Thamnophis eques megalops* and *Thamnophis rufipunctatus*]). Final Report to U.S. Fish and Wildlife Service. Arizona Game and Fish Department, Phoenix, Arizona. 98 pp.). In other species and subspecies of *Thamnophis*, physiological and behavioral data indicate that fall mating is common (Blanchard and Blanchard 1941. Pap. Michigan Acad. Sci. 26:177–193; Aleksyuk and Gregory 1974. Copeia 3:681–689). Mating balls of gartersnakes are common in parts of North America, but there are very few mating ball records for *Thamnophis* spp. in the southwestern U.S. (Seigel et al. 2000. Am.