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# Nerodia clarkii (Saltmarsh Watersnake): Retreat site/Habitat use

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Sazima 1997. *Herpetol. Nat. Hist.* 5:88–93; Viana and de Mello Mendes 2015. *Herpetol. Notes* 8:445–447).

At 1440 h on 22 May 2016, a *M. narduccii* was observed feeding on a *Oscacilia cf. bassleri* (Fig. 1A) at the Jatun Sacha Biological Reserve in the tropical rainforest region of the upper Napo River in the Ecuadorian Amazon (1.0730°S, 77.6158°W, WGS 84; 437 m elev.). When approached for closer inspection, it reacted by flipping its entire body in order to display its ventral coloration, without releasing its prey (Fig. 1B). *Micrurus narduccii* has not been previously reported feeding on caecilians. Marques and Sazima (1997) suggested that caecilians might be underrepresented in gut content analyses of neotropical *Micrurus* due to the fact that they leave few identifiable remains after digestion. There is an obvious knowledge gap regarding behavior and general ecology of the genus *Micrurus*; some species may prey on caecilians more frequently than has previously been recognized.

I am very grateful to Andrea Narvaez and Mark Wilkinson for their assistance in identifying the coral snake and caecilian, respectively.

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**MIXCOATLUS BARBOURI (Barbour's Montane Pitviper). DIET.** Formerly known as *Porthidium barbouri* or *Cerrophidion barbouri* (Jadin et al. 2011. *Zool. J. Linn. Soc.* 163:943–958), *Mixcoatlus barbouri* is a small (30–40 cm), stout pitviper endemic to pine-oak and cloud forests in two highland areas of the Sierra Madre del Sur in central Guerrero, México (Campbell and Lamar 2004. *The Venomous Reptiles of the Western Hemisphere*. Cornell University Press, Ithaca, New York. 976 pp.). Almost no information on the natural history of this species exists. Campbell (1988. *Acta Zool. Mexicana* 26:1–32) reported “a small unidentified mouse,” “rodent hair,” and two *Mesaspis gadovii* (Gadow's Alligator Lizard; formerly *Barisia gadovii*) from the stomachs and scat of six individuals. Here we report a novel prey item (*Neotoma picta*; Painted Wood Rat; species *fide* Edwards and Bradley 2002. *J. Mammal.* 83:20–30) eaten by *M. barbouri*.

At 0130 h on 31 August 1999, we caught an adult *M. barbouri* (SVL = 37.92 cm, tail length = 8.10 cm) actively crawling on the forest floor, in a cloud forest fragment at Parque Ecológico de Omiltemi, 2 km SE of Laguna Agua Fría, Ejido Chacuilapa, municipality of Leonardo Bravo, Guerrero, México (2380 m elev.). The *M. barbouri* regurgitated three juvenile *N. picta* (verified by Héctor Olguín Monroy) measuring 5.5, 5.3, and 4.4 cm SVL



FIG. 1. Litter of the *Neotoma picta* (Painted Wood Rat) regurgitated by *Mixcoatlus barbouri* at Parque Ecológico de Omiltemi, Guerrero, México.

(Fig. 1). Presumably all three individuals were littermates (three is the maximum litter size of *N. picta*; Cornely and Baker 1986. *Mammalian Species* 262:1–7). This cricetid rat is abundant and endemic to the Sierra Madre del Sur in Guerrero (Ceballos 2014. *Mammals of Mexico*. Johns Hopkins University Press, Baltimore, Maryland. 974 pp.).

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**NERODIA CLARKII (Saltmarsh Watersnake). RETREAT SITE / HABITAT USE.** Crayfish (*Procambarus* spp.) burrows provide shelter for a number of semiaquatic snake species and may be ecologically significant structures owing to their abundance in many aquatic habitats (Kofron 1978. *J. Herpetol.* 4:543–554). *Nerodia clarkii* are semiaquatic snakes adapted to living in coastal brackish habitats along the Gulf of Mexico and Atlantic coast of Florida, USA (Gibbons and Dorcas 2004. *North American Watersnakes*. University of Oklahoma Press, Norman, Oklahoma. 438 pp.). Little is known about the natural history and retreat sites of *N. clarkii* relative to other *Nerodia* species.

At 1037 h on 28 January 2017, at Turtle Cove Research Station, St. John the Baptist Parish, Louisiana, USA (30.294°N, 90.335°W, WGS 84; 0.5 m elev.), we observed an individual *N. clarkii* (SVL = 300 mm) sharing a crayfish burrow (*Procambarus* sp.) with a similarly sized individual *N. fasciata*. The crayfish burrow was located underneath a wooden plank (5 cm x 10 cm x 1.2 m) in a thicket of Saltbrush (*Baccharis halimifolia*) and was constructed in clay soil adjacent to a tract of open marsh dominated by Bull-tongue (*Sagittaria lancifolia*). Upon flipping the plank, we observed the head of an individual *N. clarkii* retract into the burrow entrance. We immediately excavated the snake, and discovered an individual *N. fasciata* cohabitating the burrow. The burrow opening was 15 cm above the water table, and thus was almost fully inundated, and was ca. 20 mm in diameter.

The snakes may have been overwintering in the burrow, given the time of year and weather conditions (overcast, air temperature = 9°C). However, an unusually mild winter may have facilitated intermittent activity. Both animals appeared lethargic from the cool weather but were otherwise externally healthy. We are unaware of any other observations of *N. clarkii* utilizing crayfish burrows.

In addition to this being the first recorded observation of crayfish burrow use by *N. clarkii*, it also represents one of the most northerly observations of *N. clarkii*, with few individuals having been found on the north shore of Lake Pontchartrain (Lawson et al. 1991. *Copeia* 1991:638–659). Prior to recent hurricane events, *N. clarkii* rarely had been recorded in the northern and western Pontchartrain Basin (B. Crother and C. Fontenot, Jr., pers. comm.), but this and recently collected specimens nearby in March 2009 and March 2016 (vouchers SLU 390, SLU 5950) suggest that this species is now resident in more northern reaches of the Gulf Coast than it was historically, potentially moving inland along with saltwater intrusion (Barlow and Reichard 2010. *Hydrogeology J.* 18:247–260, and references therein).

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**PANTHEROPHIS SPILOIDES (Gray Ratsnake). DIET AND MORTALITY.** Snakes are major predators of birds, particularly of their eggs and nestlings (DeGregorio et al. 2014. *J. Avian Biol.* 45:325–333). As such, snakes frequently face defensive tactics of parent birds while raiding their nests (Fitch 1963. *Copeia* 1963:649–658). When a snake raids a bird nest and is attacked by the parent(s), outcomes include successful consumption of eggs or nestlings, the parent birds successfully driving off the snake, or both. Perhaps a less likely outcome would be the parent bird(s) killing the snake after the snake had consumed a nestling. Here we report finding a dead *P. spiloides* that was apparently killed by one or more *Picoides villosus* (Hairy Woodpecker), after the snake had consumed a nestling.

At 1302 h on 20 March 2016, we discovered a dead *P. spiloides* in a hardwood bottomland forest in the Bonnet Carre Spillway near New Orleans, Louisiana, USA (30.023996°N, 90.444811°W, WGS 84; 8 m elev.). The snake was on leaf litter at the base of an *Acer negundo* (Box Elder) tree. It had an obvious (bulging) prey item in its stomach, and was freshly killed (it had no foul smell and showed no signs of *rigor mortis*). We dissected the snake with a knife, revealing a nestling *P. villosus* in the stomach (Fig. 1; distinguished from *Dryobates pubescens* [Downy Woodpecker] by the relatively longer bill). The *P. villosus* showed no evidence of being digested other than being wet. Pin feathers indicated that the bird was near fledging. Further inspection of the snake revealed puncture marks that apparently proved fatal. One puncture mark went completely through the body (bloodied holes on either side of the body) and a second puncture that had caved in the top of the skull. There was no evidence of attempted predation on the snake. There were two nest cavities in the tree above the dead snake at heights of 7 m and 8 m. We did not observe any adult birds. The snake was a subadult male (SVL = 76.4 cm, TL = 93.6 cm), based on Blouin-Demers et al. (2002. *Can. J. Zool.* 256:1–10).

The weight of the evidence suggests that the parent bird(s) killed the snake after it had consumed a nestling, and perhaps as it attempted to consume a second nestling. The snake was found directly below two woodpecker chambers, and the wounds matched those which a woodpecker would inflict; a predator would likely not have abandoned the snake, unless the predator was chased away. An alternative possibility is that a mixed species flock of birds mobbed and killed the snake. For example, Fitch (*op. cit.*) reported Downy Woodpeckers (*Dryobates pubescens*) mobbing *P. obsoletus* (Western Rat Snake) along with up to nine other species of birds. However, while mixed-species mobbing is common (pers. obs.), it rarely includes killing (Lorenz 1966. *On Aggression*. Harcourt, Brace and World, Inc., New York. 273 pp.). It is also unlikely that any bird species that would not prey upon the snake could inflict the injuries that we observed on the snake.

Predator-prey interactions between rat snakes and nesting woodpeckers appear to be common in North America, and include a diversity of responses. For example, a *Hylatomus pileatus* (Pileated Woodpecker) attacked and probably killed a *P. obsoletus* at the bird's nest (Nolan 1959. *Wilson Bull.* 71:381–382), and a male *Centurus carolinus* (Red-bellied Woodpecker) successfully defended its nest against a *P. obsoletus* (Boone 1960 in Jackson 1970. *Wilson Bull.* 82:329–330). In two contrasting cases, *C. carolinus* showed limited nest defense as their young



FIG. 1. Dead *Pantherophis spiloides*, showing puncture marks and nestling *Picoides villosus* (Hairy Woodpecker) extracted from its stomach. A deep puncture wound is visible about 7 cm behind the head.

were preyed upon by *P. obsoletus* and *P. spiloides* (Stickel 1962. *Auk* 79:118–119); [www.youtube.com/watch?v=Dk2gb3qKsnM](http://www.youtube.com/watch?v=Dk2gb3qKsnM)). Similarly, a female *Colaptes auratus* (Northern Flicker) perched quietly nearby as a *P. obsoletus* preyed upon three of its nestlings (Jackson, *op. cit.*).

Our observation is the first to document a Hairy Woodpecker apparently killing a nest-raiding *P. spiloides*, and may represent the first record of that species in the diet of *P. spiloides*. Stevenson and Anderson (1994. *The Birdlife of Florida*. University Press of Florida, Gainesville. 892 pp.) stated that “rat snakes” prey upon Hairy Woodpeckers, but no specific references are given. Fitch (*op. cit.*) reported that birds (mostly eggs and nestlings) comprised 23% of the diet of *P. obsoletus* in Kansas (42% during the peak of bird breeding activity), but did not report woodpeckers. However, based on the anecdotes cited above, and on their shared microhabitat, woodpecker nestlings and eggs, including Hairy Woodpeckers, are likely a common food item of both *P. spiloides* and *P. obsoletus*.

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**PHILODRYAS NATTERERI (Paraguay Green Racer). DIET.** *Philodryas nattereri* is a medium-sized dipsadine snake that is widely distributed in open landscapes of Brazil and Paraguay, in the Caatinga, Cerrado, and Pantanal biomes (Wallach et al. 2014. *Snakes of the World: A Catalogue of Living and Extinct Species*. CRC Press, Boca Raton, Florida. 1227 pp.; Smith et al. 2013. *Herpetozoa* 26:91–94). It is diurnal, mostly terrestrial, and has generalist feeding habits, consuming mainly lizards, small rodents, amphibians, and birds (Vitt 1980. *Pap. Avul. Zool.* 34:87–98; Guedes et al. 2014. *Zootaxa*. 3863:1–93). Here we report the second documented event of *P. nattereri* feeding on snakes, and the first of it preying on another species of Dipsadidae.

At 1432 h on 11 July 2005, an adult male *P. nattereri* (SVL = 84.0 cm; tail length = 40.0 cm; 198 g) was collected alive on the grounds of the Seridó Ecological Station, in the municipality of Serra Negra do Norte, state of Rio Grande do Norte, Brazil (6.57944°S, 37.25527°W, SIRGAS-2000; 500 m elev.). When