

to intromission and mating, which may last for 18–29 h (Gillingham et al. 1983, *op. cit.*). The brevity of courtship may contribute to its scarcity in field observations. Fifth, lack of rattling during courtship has been noted in both captive (Lederer 1935, *op. cit.*; Hoessle 1963, *op. cit.*; Petzold 1963, *op. cit.*; Klauber 1972, *op. cit.*; Gillingham et al. 1983, *op. cit.*) and field (Taylor 1935, *op. cit.*; Whisenhunt Jr. 1949, *op. cit.*) observations of courtship and mating. Selection to avoid detection is likely strong for a largely immobile and likely vulnerable courting and mating pair. Hence, suppression of rattling may help to maintain crypsis-dependent concealment similar to that described for pregnant female Prairie Rattlesnakes (*C. viridis*; Kissner et al. 2010. *Ethology* 103:1042–1050). Finally, the reproductive phenology of *C. atrox* from the Suizo Mountains, ca. 34 km southwest of our observation and at a near-identical elevation (927 m), extends over two intervals annually: late summer-early fall pre-overwintering and spring post-overwintering (Clark et al. 2014, *op. cit.*). Though technically in late winter, our 11 March date represents the latter period (mating season two) and is among the earliest reports of courtship and mating from the Sonoran Desert (Taylor and DeNardo 2005. *Copeia* 2005:152–158; Schuett et al. 2016, *op. cit.*).

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CROTALUS OREGANUS HELLERI (Southern Pacific Rattlesnake). DIET. *Crotalus oreganus helleri* is considered a dietary generalist, consuming lizards when young and transitioning to a nearly exclusive mammalian diet at ca. 500 mm total length (Mackessy 1988. *Copeia* 1988:92–101). Avian prey are rarely taken, and field observations of predation on birds are uncommon (Klauber 1972. *Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind*. University of California Press, Berkeley, California. 1533 pp.; Dugan 2011. Ph.D. Dissertation, Loma Linda University, Loma Linda, California. 143 pp.).

On 18 July 2020, at 1345 h, an adult *C. o. helleri* (995 mm total length) was observed consuming a *Sialia currucoides* (Mountain Bluebird) along the margins of a riparian zone within a native conifer pine forest in the San Jacinto Mountains, Riverside County, California, USA (33.79692°N, 116.74893°W; WGS 84). Upon discovery, the snake had struck, killed, and held onto the bluebird. After



FIG. 1. *Crotalus oreganus helleri* consuming a *Sialia currucoides* (Mountain Bluebird) in the San Jacinto Mountains, California, USA.

33 min, the snake had entirely consumed the bird, and was left in place, untouched by the observer. This observation represents the first record of *S. currucoides* in the natural diet of *C. o. helleri* and adds to the short list of documented avian prey species.

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CROTALUS PYRRHUS (Southwestern Speckled Rattlesnake).

DIET. *Crotalus pyrrhus* is considered a dietary generalist, consuming lizards when young and transitioning to a largely mammalian diet as adults (Meik and Babb 2020. *In* Holycross and Mitchell [eds.], *Snakes of Arizona*, pp. 588–599. Eco Publishing, Rodeo, New Mexico). Predation on avian prey is relatively uncommon, representing only 6.7% of prey items identified in a recent study on the natural diet of *C. pyrrhus* (Cochran et al. 2021. *J. Herpetol.* 55:77–87). As a result, field observations of predation events by rattlesnakes on birds are exceptionally rare. Recent popularity and increased use of trail cameras have increased observations of secretive wildlife species, while also capturing rarely observed natural behaviors.

At 1551 h on 21 August 2021, an adult *C. pyrrhus* (995 mm total length) was observed striking and consuming a *Melospiza crissalis* (California Towhee) at the edge of a freshwater spring within a mixed oak-riparian woodland in the Santa Ana Mountains, Orange County, California, USA (33.5896°N, 117.5051°W; WGS 84). The predation event was captured on film by a Wing-Home 360 trail camera. The snake was concealed in a sedentary ambush coil on the back side of a small rock. Upon landing on the rock to drink from the spring, the towhee was struck, held by the head until it died, and subsequently consumed. The duration of the predation event was ca. 30 min. This observation represents the first record of *M. crissalis* in the natural diet of *C. pyrrhus* and adds to the short list of documented avian prey species.

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CROTALUS SCUTULATUS (Mohave Rattlesnake). PREDATION.

Crotalus scutulatus is a medium-sized rattlesnake that inhabits arid grasslands and deserts in the southwestern United States and northern Mexico. *Crotalus scutulatus* possesses a potent neurotoxic venom with some populations containing both neurotoxins and hemotoxins (Glenn et al. 1983. *Toxicol.* 21:119–130; Dobson et al. 2018. *Comp. Biochem. Phys. C.* 205:62–69). Rattlesnakes use their venom both for predation and defense (Hayes et al. 2002. *In* Schuett et al. 2002. *Biology of Vipers*, pp. 207–234. Eagle Mountain Publishing, Eagle Mountain, Utah) and some predators of rattlesnakes include mammals, birds, and other snakes. Herein we report on a novel case of predation on *C. scutulatus* by *Masticophis flagellum* (Coachwhip).

We examined the gut contents of 144 *M. flagellum* specimens from the collection at the Museum of Vertebrate Zoology, University of California, Berkeley (MVZ). Stomach contents were identified to the lowest taxonomic level possible. We found 179 items of which 140 were identifiable to the genus level, representing no fewer than 39 species. These contents included many items previously reported including arthropods, one amphibian, lizards, snakes, birds, and mice. Among them we found the partial remains of *Crotalus* spp. in two of the *M. flagellum* specimens. In one of the specimens (MVZ 6836) the *Crotalus* remains were

determined to be *C. scutulatus*. The species was determined based on the posterior remains and tail, which exhibited narrow dark rings and wider light rings adjacent to an existing rattle. The locality of the specimen (Kern County, California, USA) also comported with the range of *C. scutulatus*.

Masticophis flagellum is a widespread North American colubrid that consumes a variety of prey items including reptiles, birds, mammals, and insects (Hamilton and Pollock 1956. Ecology 37:519–526). Our work indicates that this species is capable of consuming *C. scutulatus*, however the frequency at which this occurs remains unknown. Ophiophagy in snakes is not uncommon and North American colubrid genera that are known to eat rattlesnakes include *Lampropeltis* (Wiseman et al. 2019. Herpetol. Conserv. Biol. 14:1–30), *Drymarchon* (Keegan 1944. Copeia 1944:59; Babis 1949. Copeia 1949:147), and *Masticophis* (Ernst and Ernst 2003. Snakes of the United States and Canada, Smithsonian Books, Washington, D.C. 668 pp.). *Masticophis flagellum* have been documented eating *C. oreganus* (Western Rattlesnake; Tabor and Germano 1997. Herpetol. Rev. 28:90), *C. cerastes* (Sidewinder; Secor 1995. Herpetol. Monogr. 9:169–186), and *C. atrox* (Western Diamond-backed Rattlesnake; Ortenburger 1928. Univ. Michigan Stud., Mem. Univ. Michigan Mus. 1:1–247), but to the best of our knowledge, this is the first report of predation on *C. scutulatus*. Klauber (1972. Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind, 2nd edition. University of California Press, Berkeley, California. 1534 pp.) reported that the closely related *M. lateralis* (California Whipsnake) consumed a *C. scutulatus*. Some snakes that regularly consume rattlesnakes (e.g., *Lampropeltis* spp.) are known to have resistance to rattlesnake venom (Weinstein et al. 1992. J. Herpetol. 26:452–461). Predation on *C. scutulatus* by *M. flagellum* raises the possibility that *M. flagellum* have some degree of resistance to *C. scutulatus* venom; however, more research is needed in this area.

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DRYMOBIUS MARGARITIFERUS (Speckled Racer). COURTSHIP and THANATOSIS. *Drymobius margaritiferus* is a widely distributed colubrid, both on the Atlantic slope from southern Texas, USA, to northern Colombia, and on the Pacific slope from southern Sonora, Mexico to central Panama (McCranie 2011. The Snakes of Honduras: Systematics, Distribution, and Conservation. Society for the Study of Amphibians and Reptiles, Ithaca, New York. 714 pp.). It is diurnal, slender, fast, and usually has a rather irritable temperament (Köhler 2008. Reptiles of Central America. Herpeton Verlag, Offenbach, Germany. 400 pp.). This species occurs in diverse habitats (Dixon and Werler 2000. Texas Snakes. A Field Guide. University of Texas Press, Austin, Texas, United States, 384 pp.) and uses arboreal habitats (Harrington et al. 2018. Biol. J. Linn. Soc. 125:61–71) to search for prey (Altamirano-Alvarez et al. 2012. Revista de Zoología 23:21–36). In addition, this species sometimes exhibits a death feigning behavior known as thanatosis (Farr and Lazcano 2011. Herpetol. Rev. 42:613), where it remains immobile for a short period of time to avoid predators, and then escapes at the first opportunity. In this



FIG. 1. *Drymobius margaritiferus* showing thanatosis as a defense mechanism in Palomares, Municipality of Matías Romero Avendaño, Oaxaca, Mexico.

PHOTO BY LUIS FRANCISCO NIETO-TOSCANO

note, we describe new aspects of courtship and defensive behaviors in *D. margaritiferus*.

At 1604 h on 20 August 2021, at Rancho Santa Lupita, located between Bacalar and Reforma, Municipality of Bacalar, Quintana Roo, México (18.76199°N, 88.52454°W; WGS 84; elev. 55 m), one of us (PMBG) found three adult *D. margaritiferus* (two males and one female) during courtship activity in a patch of secondary vegetation. These observations were recorded in several videos. In a first observation, a male is seen descending between the branches of the tree canopy and encounters another male upon leaf litter on the ground. Afterwards, the same male explores the surrounding area, seeming to be searching for something. Moments later, a female that was hidden in the leaf litter appears, observes the searching male for ca. 25 s, and then climbs up into the branches. Then, the male begins to follow the female (while the other male remains immobile on the ground), climbing up the same branches, catches up with the female and they intertwine for a few seconds, and then the pair continue climbing until they are lost in the canopy (<http://dx.doi.org/10.26153/tsw/40743>). Moments later, one of the snakes falls to the ground, while the other remains in the branches. These observations are novel, as they involve a new spatial substrate (tree branches) that *D. margaritiferus* may use not only for hunting, but also for courtship and possibly mating.

At 1250 h on 4 December 2021, in Palomares, Municipality of Matías Romero Avendaño, Oaxaca, Mexico (17.11523°N, 95.05496°W; WGS 84; elev. 103 m), one of us (LFNT), observed and documented through photography and video, death feigning (thanatosis) in an adult *D. margaritiferus*. The snake was found hidden in grassy vegetation in an open area near small bodies of water. When caught and handled for measurement, the snake behaved very defensively, trying at every moment to bite, in a first attempt to escape. After ca. 5 min, during which time the snake remained alert and trying to bite, it began to remain still, to the point of not moving. When released on the ground in an open area, the snake did not move and its dorsal posture appeared to be tense; when touched with a pair of snake tongs, it did not react, remaining in that state for ca. 2 min (Fig. 1). When the observer stepped back to see the snake's reaction, the snake began to relax its body and then began to move quickly