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FIG. 1. Juvenile *Bothrops atrox* among *Eichornia* sp. in Bolivia.

*op. cit.*).

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**CROTALUS ADAMANTEUS (Eastern Diamond-backed Rattlesnake).** **REPRODUCTION.** Breeding behavior in most temperate crotalid species occurs in a continuous mating season between late summer and early fall (Aldridge and Duvall 2002. Herpetol. Monogr. 16:1–25). For *Crotalus adamanteus*, courtship and copulation are suggested to follow similar patterns (Timmerman and Martin 2003. SSAR Herpetol. Circ. 22:1–74). However, it has also been suggested that *C. adamanteus* might have a bimodal breeding cycle, with snakes mating in fall and again in early spring, interrupted by a retreat to and emergence from hibernacula to escape cool temperatures. Palis et al. (2012. Herpetol. Rev. 43:657–658) noted copulatory behavior in February and March in Georgia, USA, which suggests the possibility of an extended breeding season in the northern part of the *C. adamanteus* range. At the southern extent of their range, *C. adamanteus* may breed into December and January (Timmerman and Martin 2003, *op. cit.*), as this region experiences more stable year-round temperatures. However, limited data are available on breeding timing and life history for this species, particularly in the southernmost part of their distribution.

We conducted a radio-telemetry study on ten adult *C. adamanteus* (6F:4M) from Dec 2015 to Mar 2018 on the campus of Florida Gulf Coast University, Fort Myers, Florida, USA (26.4637°N, 81.7753°W; WGS 84). Over the course of this study, we observed multiple copulation events (N = 19; Table 1), with at least one event per month between the months of October and April. We observed additional instances of potential mating events, such as two known snakes within a few meters of each other yet report here only events where visual confirmation of copulation was obtained.

The data provided here provides a more comprehensive understanding of the mating phenology of *C. adamanteus* in southern Florida. The sub-tropical climate of southern Florida is defined by wet (May–October) and dry (November–April) seasons. The breeding season for *C. adamanteus* in South

TABLE 1. Confirmed copulation events of *Crotalus adamanteus* on the Florida Gulf Coast University campus, Fort Myers, Florida, USA, 2015–2018. Snake ID labeled “FGCU-#” were radio-tagged snakes, while “P-#” represent PIT-tagged but not radio-tagged snakes. “Unk” is given for any rattlesnake neither PIT-tagged nor radio-tagged.

Month	Day	Time	Temp (°C)	Female ID	Male ID
October	10	1208 h	28	FGCU-5	FGCU-4
	15	1626 h	29	FGCU-5	Unk
	19	1238 h	27	Unk	FGCU-4
	26	1257 h	28	FGCU-5	FGCU-4
November	4	1504 h	27	P-2	FGCU-4
	7	1219 h	26	FGCU-5	FGCU-4
	9	1223 h	23	FGCU-1	FGCU-8
	16	1314 h	26	P-5	FGCU-8
	28	1134 h	27	FGCU-1	FGCU-8
December	7	1153 h	26	Unk	FGCU-8
January	9	1600 h	25	FGCU-1	FGCU-2
February	16	1340 h	24	FGCU-5	FGCU-4
	21	1114 h	25	P-1	FGCU-7
March	11	1111 h	28	Unk	FGCU-8
	14	1429 h	23	Unk	FGCU-4
April	4	1511 h	25	FGCU-6	Unk
	11	1540 h	29	Unk	FGCU-7
	14	1502 h	29	P-1	FGCU-7
	29	1039 h	27	Unk	FGCU-1

Florida coincides with the dry season, and reproduction may be influenced more by precipitation than by temperature. Without the need to seek hibernacula for prolonged cold weather, snakes and other ectotherms in southern Florida remain active throughout the year. This more persistent breeding season differs from previous, albeit sparse, observations of mating behavior for this species. More research is needed to investigate behavioral and physiological characteristics of *C. adamanteus* throughout its range, including the timing of spermatogenesis, vitellogenesis, gestation, and parturition.

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**CROTALUS ATROX (Western Diamond-backed Rattlesnake).** **PREDATION.** Rattlesnakes in the genus *Crotalus* have various vertebrate predators, including Red-tailed Hawks (*Buteo jamaicensis*) and Coyotes (*Canis latrans*; Klauber 1982. Rattlesnakes. Their Habits, Life Histories, and Influence on Mankind. Abridged Edition. University of California Press. Berkeley, California. 350 pp). *Buteo jamaicensis* is known to prey on *Crotalus viridis* in Idaho, USA (Steenhof and Kochert 1985. Oecologia. 66:6–16) and *Crotalus cerastes* (Sidewinder) near the border of United States and Mexico. In some harsh environments, reptiles are the most abundant potential prey and can make up the bulk of the diet of *B. jamaicensis* (Babb 2017. Southwest. Nat. 62:284–285). Shaw and Campbell (1974. Snakes of the American West, Alfred A. Knopf, Inc., New York, New York. 330 pp.) included *C. latrans* as potential predators of rattlesnakes. *Crotalus enyo* and *C. ruber* have been reported as prey items of *C. latrans* in winter (1996–1997) in the Vizcaino region Baja California Sur, México





FIG. 1. *Crotalus atrox* preyed by a *Buteo jamaicensis* (Red-tailed Hawk) in Chihuahua, México.



FIG. 2. *Canis latrans* (Coyote) scat with a rattle segment of *Crotalus* sp. in Durango, México.

(Grajales-Tam et al. 2003. *Acta Zool. Mex.* 89:17–28). Here, we document two cases of predation on rattlesnakes in two natural protected areas in the Chihuahuan Desert in México.

At ca. 1100 h on 26 September 2020, we observed a *B. jamaicensis* at ground level devouring a *C. atrox* (Fig. 1) in a pecan field in the Natural Protected Area Médanos de Samalayuca, in the Municipality of Juárez, Chihuahua, México (31.20110°N, 106.47699°W; WGS 84; 1300 m elev.). We spent ca. 20 min filming and photographing the event. On 16 July 2011, at the Natural Protected Area of Mapimí, Durango, México (26.68730°N, 103.74071°W; WGS 84; 1160 m elev.), at ca. 1225 h, we discovered a scat of *C. latrans* with a rattle of *Crotalus* sp., composed of three segments and a final button (Fig. 2), the largest segment measured 8.5 × 5.1 × 3.3 mm in length, width, and height, respectively. Photos are deposited at the Colección Científica de Vertebrados UACJ (CCV-UACJ). Four *Crotalus* species are reported in the Natural Protected Area (*C. atrox*, *C. lepidus*, *C. scutulatus*, and *C. molossus*; Programa de Conservación y Manejo Reserva de la Biosfera Mapimí, México. 2006. CONANP. 179 pp.). Natural history observations of rattlesnake species are important because they contribute to the criteria that assigns the risk category in México.

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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 mammalian diet at ca. 0.55 m 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 15 July 2021, at 1300 h, a subadult *C. o. helleri* (575 mm total length) was observed consuming a *Chondestes grammacus* (Lark Sparrow) within native vegetation at a residence in Fallbrook, San Diego County, California, USA (33.38731°N, 117.25441°W; WGS 84). When initially observed, the snake had consumed the head and neck of the sparrow. The snake completed consuming the bird and was subsequently collected for relocation at the request of the homeowner. This observation represents the first record of *Chondestes grammacus* in the natural diet of *Crotalus o. helleri* and adds to the short list of documented avian prey species.

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***CROTALUS PRICEI* (Twin-spotted Rattlesnake) and *CROTALUS TRANSVERSUS* (Cross-banded Mountain Rattlesnake).** **REVERSE CRYPSIS BEHAVIOR.** Snakes employ a variety of antipredator tactics to evade predation, ranging from crypsis to elaborate threat displays. Among this diversity of antipredator tactics, reverse crypsis relies on breaking up the outline of a moving individual, and this is often achieved by an erratic pattern of movement deviating from normal modes of locomotion employed by snakes. Reverse crypsis behavior has been described in several species of colubrid snakes (Fleishman 1985. *Copeia* 1985:242–245; Ryerson 2017. *Copeia* 105:363–367) and is characterized by punctuated and jerky movements of the individual's head and neck while net movement of the animal continues in a forward trajectory.

At 1151 h on 15 July 2019, NRB and CPV encountered an adult male *Crotalus pricei* moving across a gravel road in Cochise County, Arizona, USA. The snake moved in a straight-line path across the road while alternately projecting the head anteriorly and retracting the head posteriorly (Fig. 1). A video recording of this observation is available here: <http://dx.doi.org/10.26153/tsw/23346>. The snake appeared unperturbed by our distant presence and continued to move in this fashion until we approached closely, at which point it ceased this behavior (and movement as a whole) at ca. 36 sec into filming. In total, we observed the rattlesnake moving for ca. 60 sec in a fashion consistent with reverse crypsis. Noticeable wind was not apparent, and the snake was active concurrent with the end of a light rain in partly cloudy conditions.

At 1600 h on 25 July 2021, RVM encountered an adult male *Crotalus transversus* *in situ* south of Mexico City, Mexico. Ambient temperature was ca. 18°C and the snake was observed in upland pine forest habitat prior to a storm event. The snake was handled and manipulated for photographs upon observation. After this disturbance, the individual commenced movement consistent with reverse crypsis behavior, alternately projecting the head