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Natural History Note: Crotalus Viridis Viridis (Prairie Rattlesnake). Predation.

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More potential refuges seemed to be available to the second skink. In addition to the large board near which I first saw it, yucca and other terrestrial vegetation was available a few meters up the gentle slope from the pond. In both cases, algae and other aquatic vegetation obscured my view into the water. Both times I felt around on the bottom of the water but was unable to locate either skink, and did not see either one return to land.

Submitted by **LAUREN J. LIVO**, 1215 S. Osceola Street, Denver, CO 80219, USA ●

UTA PALMERI (San Pedro Side-blotched Lizard). **CANNIBALISM.** Cannibalism in iguanid lizards, which typically are insectivorous or herbivorous, is infrequently reported (Polis 1981. *Ann. Rev. Ecol. Syst.* 12:225-251; Polis & Myers 1985. *J. Herpetol.* 19:99-107), although in some populations it has been observed frequently (J. Stamps, pers. comm).

On 15 April 1987 we observed an incidence of cannibalism in the insular endemic iguanid *Uta palmeri* by an adult male (75 mm SVL) on a juvenile (ca. 40-50 mm SVL). We first observed the adult carrying the limp body of the juvenile, biting it at the middle of the trunk. The male then carried the body several m, disappearing under a rock for less than ten sec. He was next seen biting the body by its head and, after a few seconds, he began engulfment. His forelimbs were not used to assist in engulfing the body, but we observed small, side-to-side head movements during this period.

The frequency of cannibalism in *U. palmeri* is unknown. Wilcox (1980. PhD Dissertation, University of California, San Diego) observed an adult male carrying a dead juvenile, but was unsure if subsequent ingestion occurred. We and our coworkers have conducted over 3,000 man-hours of observation on *U. palmeri* during two-month field seasons in three different years (not always the same months each year), and have seen only this one case of cannibalism. However, only the 1987 field season coincided with a period when hatchlings and very small juveniles were abundant on the study grids.

U. palmeri is substantially larger in body size than other *Uta* (Ballinger and Tinkle 1972. *Misc. Pub. Mus. Zool. Univ. Mich.* 145:1-83) with adult male body size ranging from 70-80 mm SVL (Hews, unpublished data). Hatchling size ranges from 27-32 mm (N=7) (Hews, unpublished data) and thus a large disparity in size between adults and small juveniles might facilitate cannibalism in *U. palmeri*.

Submitted by **DIANA K. HEWS**, Department of Zoology, The University of Texas at Austin, Austin, TX 78712, USA and **JEFFREY C. DICKHAUT**, 3822 Hope Lane, Erlanger, KY 41018, USA ●

SERPENTES

COLUBER CONSTRICTOR PALUDICOLA (Everglades Racer). **FORAGING.** Two adult racers were observed employing widely searching foraging behavior. Although reports of diets and accounts of wild snakes swallowing

food are fairly common, observations of prey capture are rare, and consequently foraging modes are poorly known (Siegal and Fitch 1984. *Oecologia* 61:293-301).

My observations were made on 3 January 1989 in Everglades National Park (Florida) at the boardwalk in Mahogany Hammock. Habitat was open mature subtropical hardwood hammock. Filtered sunlight reached the ground in several spots in the area snakes were observed. Shade temperature on the boardwalk at 1400 h was 27.4°C.

At 1346 h we heard a racer (ca. 100 cm SVL) emerge from a cabbage palm 6 m W of the elevated portion of the boardwalk. It foraged ca. 17 m in 13 min over a slightly circuitous path, passing under the boardwalk, and finally investigating and disappearing into an elevated cavity in a strangler fig at 1359.

At 1401 h a slightly larger racer (ca. 105-110 cm SVL) emerged from an upturned stump about 10 m S along the boardwalk from where the first snake disappeared. It basked briefly and then foraged 6 m S along the boardwalk. At 1412 the racer dashed forward after a treefrog. The frog jumped from the leaf litter to ca. 0.5 m up a tree trunk, and thence immediately to leaves of an adjacent shrub. The racer simultaneously turned from the tree trunk and cleanly picked the frog from leaves ca. 0.7 m off the ground. The snake moved immediately to a sunny patch and basked in a loose coil for 14 min (until 1429). It then foraged an additional 6 m S, climbing into a palmetto and onto the boardwalk. At 1439 it dashed down the palmetto and seized another fleeing treefrog. Foraging resumed immediately, and the snake vanished into a thicket at 1441.

Both treefrogs were brown and ca. 2.5-3 cm SVL, and thus were probably *Hyla squirella*, which I have seen in this hammock. In both cases the frog was swallowed less than 5 sec after capture. The second frog managed to emit a single squeak before being swallowed. I estimate that the foraging racers covered 31 linear meters in 25 minutes of movement (1.24 m/min). Both crawled steadily while darting the head side to side in arcs ca. 15 cm wide. They would occasionally stop to investigate an area more extensively, probing quickly into the leaf litter or investigating a log or stump. No rapid movements were seen except the two strikes at prey.

Over 40 people walked within 2-4 m of the two snakes from 1346-1441, and two walked past while the second snake was on the boardwalk. Neither species responded visibly to the other. The snakes seemed conditioned to ignore the steady human traffic, allowing us to make these observations.

Submitted by **PHILIP C. ROSEN**, Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ 85721, USA ●

CROTALUS SCUTULATUS SCUTULATUS. (Mojave Rattlesnake). **MATING BEHAVIOR.** We have seen references to the minimum length of the gravid rattlesnake (Klauber, L.M. 1972. *Rattlesnakes*. Univ. Calif. Press, pp. 175-176). However, we have no knowledge of reports that indicate the minimum age or length for copulation. This is a report of the copulation of two juveniles (both one

year old) observed on 13 October 1988 in the Museo de Historia Natural, Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Nuevo León, México. The snakes were siblings and were housed in a 5 gallon covered container laterally perforated. The male had an SVL of 523 mm; CL = 38 mm; mass = 111.2 g, and the female presented SVL = 435 mm; CL = 25 mm; mass = 101.3 g. The temperature in the container was 26°C. Copulation began at 0900 h and ended at 1726 h. The female shed before copulation; the male shed after copulation. We suggest that ecdysis of the female stimulated copulation in a manner similar to that reported for adult snakes. In reptiles, precocious sexual behavior has only been observed in turtles (Kramer 1987. *Joint Ann. Meet. Veracruz, Mexico. Programs and Abstracts*).

We thank David Lazcano for providing information, and Ivan Parra and Lea Andersen for criticism and suggestions.

Submitted by **MANUEL NEVARES**, Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Nuevo León, México, and **ADRIAN QUIJADA-MASCAREÑAS**, Escuela Superior de Ecología, Centro de Estudios Superiores del Estado de Sonora (CESUES), Calle Ley Federal del Trabajo, Col. Apolo. Hermosillo, Sonora, México ●

CROTALUS VIRIDIS VIRIDIS (Prairie Rattlesnake). **PREDATION.** Among viperids, mark-recapture studies have suggested that survivorship of young snakes is low, however, little information is available concerning causes of such mortality. The following observations concern prairie rattlesnakes that overwintered in a perennially occupied hibernaculum in Coal Creek Canyon, Carbon County, Wyoming in the spring of 1986. These animals were captured as they emerged, transported to camp for SVL and mass measurements as well as radio telemetry implants (\bar{X} mass of telemeters = 3.4 g, range = 3.1 - 3.5 g), then returned to the den site for release.

On 27 May at 1130 h a 14.9 g, 28 cm snake which had a transmitter implanted surgically on 7 May was found dead and being eaten by many ants (*Formica* spp.). It had moved 57 m south between 2045 h on 25 May and 1620 h on 26 May. On 28 May at 2000 h a 14.0 g, 27 cm snake which had a transmitter implanted surgically on 3 May was found dead and being eaten by *Formica*. This snake had moved 35 m east between 1415 and 2000 h on 28 May. On 30 May at 1700 h an 18.2 g, 30 cm snake that had a transmitter implanted surgically on 28 May was found with its transmitter wedged between a rock and a sagebrush. Many *Formica* were on the snake and biting it, and there was a column of ants traveling between the snake and an ant mound. The snake was alive, although it responded very sluggishly to tactile stimuli. The snake had moved 36 m southeast between 1000 h on 30 May (when it was released) and the time of the above observation. Many ants clinging to it by their mandibles were removed manually and the snake was returned to camp where it died during the night. On 4 June at 1940 h a 9.0 g, 31 cm snake that had a transmitter forced into its stomach on 2 June was found dead and

being eaten by *Formica*. The snake was 30 cm from a large *Formica* colony. It had moved 48 m southeast between 1020 h (when it was released) and 1515 h on 4 June, and another 76 m south by the time of the above observation.

These four observations suggest that ant predation on small rattlesnakes may not be uncommon. Although in three of the four instances snakes were found dead (and thus could represent instances of scavenging rather than predation), the snake found on 30 May was alive, currently being attacked by ants, and died later presumably from toxins delivered via ant bites. Also, all of the snakes made lengthy movements (compared to near-daily movements for all neonates tracked in the spring of 1986 was 3.7 m; SE = 3.9; Graves, B. M. Unpubl. Ph.D. dissertation, University of Wyoming, Laramie) immediately prior to their deaths, suggesting that they were in relatively healthy states and that their movements may have brought them vicinal to foraging ant colonies.

Submitted by **BRENT M. GRAVES**, Department of Biological and Environmental Sciences, McNeese State University, Lake Charles, LA 70609, USA.

ELAPHE BAIRDI (Baird's Rat Snake). **DRINKING BEHAVIOR.** On 13 February 1988, at 1600 h, a captive-bred (hatched July 1985) male *Elaphe bairdi* (TL = 136.9 cm, SVL = 89.54 cm), maintained in a 50.5 x 25 x 30 cm terrarium was accidentally splashed with water. As beads of water on the snake's head rolled down to the upper labial scales, swallowing was observed. The water on the labial scales was drawn into the mouth while it was closed. This behavior lasted 42 sec.

This behavior was repeated 23 out of 24 trials conducted during the next 24 days. The duration of swallowing was 9-62 sec (\bar{X} = 35.8, N = 25). Swallowing was observed when water touched the head, even though it did not always reach the mouth. During two of the trials the snake tilted its head and rubbed its labial scales along its dorsum, sucking water droplets off its body.

A bowl of clean water was always present and the snake has been observed drinking from it. Water falling on the head seems to stimulate swallowing regardless of the snake's hydration state. This may be a stimulus-response behavior that is an adaptation to living in an arid environment with limited standing water (e.g., west Texas). It would allow the snake to utilize water in the form of precipitation or condensation.

More complex variants of this behavior have been observed in the lizards *Moloch horridus* (Gans and Blumer 1982. *Amphibia-Reptilia* 3:57-64), *Phrynosoma cornutum* (Sherbrooke 1981. *Horned Lizards*. Southwest Parks and Monuments Assoc.) and *P. douglassii* (pers. obs.), and the snakes *Bitis peringueyi* (Louw 1972. *Symp. Zool. Soc. Lond.* 31:297-314; Robinson and Hughes 1978. *Ann. Transvaal Mus.* 31:189-193), *Bothrops asper* (Greene 1986. 99-108. *In: Predator-Prey Relationships*. Univ. Chicago Press), and *Nerodia fasciata compressicauda* (Miller 1985. *Herp. Review* 16:71). Unlike *E. bairdi*, these species have or appear to have scales modified to collect water.

I am indebted to John F. Lokke for providing me with the snake and its breeding history.

Submitted by **LOUIS A. SOMMA**, Department of Zoology, University of Florida, Gainesville, FL 32611, USA

LOXOCEMUS BICOLOR (Burrowing Python). **SIZE.** Wilson and Meyer (1985. *Snakes of Honduras*. Milwaukee Public Museum, Milwaukee. 150 pp.) list *Loxocemus bicolor* as having a maximum recorded total length of 130.9 cm.

In the Dr. Rafael Lucas Rodriguez National Wildlife Refuge (Palo Verde), Costa Rica (10° 21'N; 85° 21'E), eight live individuals of *L. bicolor* were measured during March and April, 1984. Their SVL measured to the nearest 0.5 cm in order of capture were: 1) 121, 2) 127.5 (UCR9376, female), 3) 129 (UCR8787, female), 4) 115, 5) 141.5 (UCR9375, female), 6) 75, 7) 79.5, and 8) 76.5. UCR initials indicate the catalog number of the specimen at the Museum of Zoology, University of Costa Rica. The fifth individual caught was the longest (SVL 141.5, TL 153 cm) specimen of *L. bicolor* that has been recorded anywhere.

The eight Palo Verde snakes were found at, or near, nests of *Ctenosaura similis* and *Iguana iguana*, whose eggs they are known to predate (Mora, J. M. 1987. *J. Herpetol.* 21:334-335). The nest sites lacked vegetation because of the lizards' burrowing activities. The nests were located in the interface between two types of habitat: fresh water swamps, where cattail (*Typha domingensis*) was the dominant vegetation, and the tropical dry forest.

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MASTICOPHIS FLAGELLUM (Coachwhip). **BEHAVIOR.** *Masticophis flagellum* is a large whipsnake that occurs in relatively warm, dry habitats across the southern half of the United States (Wilson 1973. *Catalogue of American Amphibians and Reptiles*. p 145.1). Behler and King (1979. *The Audubon Society Field Guide to North American Reptiles and Amphibians*, p 629) noted that *Masticophis*, when cornered, coils and vibrates its tail, and strikes repeatedly, often at the enemy's face.

Death feigning (letisimulation) has not been reported in this typically aggressive snake. On 16 April 1988, a large *M. flagellum* was collected by members of the Oklahoma State University herpetology class near Quartz Mountain in Kiowa County, Oklahoma. The snake was found in a mesquite grassland under a piece of corrugated aluminum siding.

The weather was cloudy and rainy with the air temperature at 21°C. Upon capture, the snake was placed in a cloth sack and held for ca. one hour. Prior to release, the snake was handled extensively by the class; yet it made no attempt to bite and little effort to escape. While being handled the snake became limp. When released, it pushed its nose into the substrate, twisted its head and protruded its tongue in a manner similar to that of the hog-nose snake (*Heterodon* sp.) (Ditmars 1936. *The Reptiles of North America*, 291-292). When turned on its back it demonstrated fighting reflexes, but continued to tilt the head and leave the tongue out, rolling in the dirt. After ca. ten minutes of this behavior the snake was moved to tall grass and observed. Two minutes elapsed before the snake began to crawl away slowly.

This snake's actions may be due to its depressed body temperature, which would make any behavior requiring speed (e.g. biting, flailing, striking, etc.) extremely difficult. This observation suggests that alternate behavior strategies may be found in ectothermic organisms. The "typical" behavior observed during warm weather may be considered typical only because the animal is most commonly encountered in warm weather. During colder weather, when it is more difficult to move, perhaps alternate behavior such as letisimulation is the most adaptive behavior. Field and laboratory studies of known temperature specimens are needed to support this hypothesis.

Submitted by **MATTHEW TUCKER**, Department of Zoology, Oklahoma State University, Stillwater, OK 74078, USA

MASTICOPHIS FLAGELLUM TESTACEUS (Western Coachwhip). **PREDATION.** On 18 June 1988, on the northeast bank of the Colorado River (35 km south, 24 km west of Coleman, Coleman County, Texas), we observed a male western coachwhip (SVL = 915 mm, TL = 1149 mm, mass = 190 g without prey items) preying upon a female western rough green snake (*Opheodrys aestivus majalis*; SVL = 396 mm, TL = 618 mm, mass = 21.2 g). The encounter lasted 3 h 49 min from when we first noticed the snakes at 0940 h.

We were drawn to the snakes by a rustle in the vegetation under a pecan tree (*Carya illinoensis*) 7 m from the river. There we observed the coachwhip searching for the nearby, slowly-moving green snake. The coachwhip sighted the green snake as it was half-way up a 30 cm cedar elm (*Ulmus crassifolia*) sapling, and seized its dorsum just anterior to the cloaca. The green snake reacted by wrapping its tail around the coachwhip's neck and pulling the rest of its body into the branches of the cedar elm. After 28 min of occasional tugging by both snakes, the green snake was released. The green snake immediately crawled to the upper limbs of the cedar elm sapling. It was seized in the tail region after a short, seemingly-frantic search by the coachwhip.

After 2 h 7 min of repeated seizing of the green snake near the cloaca, the coachwhip finally grasped the green snake in the neck region. This was the coachwhip's first grip near the head in eight attempts. The green snake immediately bit the coachwhip on the