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 which 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. The section's intent is to convey information rather than demonstrate prose. 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 files, although higher resolution TIFF or PDF files will be requested for publication. 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: **Sean P. Graham** (amphibians; grahasp@tigermail.auburn.edu); **James Harding** (turtles; hardingj@msu.edu); **Jackson D. Shedd** (crocodilians, lizards, and *Sphenodon*; Jackson.Shedd@gmail.com); and **John D. Willson** or **David A. Steen** (snakes; hr.snake.nhn@gmail.com).

A reference template for preparing Natural History Notes may be downloaded at: http://www.ssarherps.org/pages/HRinfo.php. 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.] 2012. *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding, 7th ed.* Herpetol. Circ. 39:1–92, available from SSAR Publications Secretary, ssar@herplit.com; for Mexico as it appears in Liner and Casas-Andreu 2008. *Standard Spanish, English and Scientific Names of the Amphibians and Reptiles of Mexico.* Herpetol. Circ. 38:1–162); **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 for citation format and follow format closely). One additional note about the names list (Crother 2012) 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

***AMBYSTOMA RIVULARE* (Toluca Siredon). REPRODUCTION.** *Ambystoma rivulare* is one of the four *Ambystoma* species inhabiting rivers in mountainous areas of Mexico's Transmexican Volcanic Belt, mainly around the Nevado de Toluca and in the boundaries between Michoacan and Mexico State. Here, we present data on reproduction and development of this species. On 28 June 28 2010 we collected six individuals (2 females and 4 males) in Capilla Vieja, Amanalco de Becerra, State of Mexico (19.1308°N, 99.5911°W; datum: WGS 84; elev. = 2785 m). They were transported to the Laboratory of Integrative Biology, Instituto de Investigaciones Biomedicas, UNAM. On 30 June 2010 a female (SVL = 100 mm; Total length = 197 mm; 38 g) oviposited a clutch of 463 eggs. The eggs were removed and placed in an aquarium (40 liters) with aeration and controlled temperature (18.0°C). The average oocyte diameter was 1.96 ± 0.19 mm (range 1.70–2.50) and the outer layer had a diameter of 4.77 ± 0.64 mm (range 4.0–6.0). Oocyte fertility was 86%. Embryonic development of the offspring was 288–312 h at room temperature (14.5–19.0°C). Embryo mortality was 12%. A total of 353 embryos hatched at stage 38, at an average total length of 10–11.5 mm.

Previous reports on reproduction of *A. rivulare* include those of Brandon and Altig (1973. Herpetologica 29:349–51), and Bille (2009. Salamandra 45:155–164) who found and collected eggs in the spring (March and April) and the summer months (July and August). These authors report finding the eggs in different stages of development singly or in clutches and distributed evenly along the stream. Reports on other Mexican endemic *Ambystoma* include those of *A. granulosum*: clutch size 664 eggs (Aguilar-Miguel et al. 2009. Acta Zool. Mexicana 25:443–454); *A. lermaense*: clutch size 841 eggs (Aguilar-Miguel et al. 2002. Herpetol. Rev. 33:197); *A. mexicanum*: clutch size 934 eggs (Armstrong, et al. 1989. *In* Armstrong and Malacinski [eds.], Developmental Biology of the Axolotl, pp. 220–227. Oxford University Press, New York), and *A. andersoni*: clutch size 518 eggs (Huacuz 2001. Estado actual de los ajolotes del género *Ambystoma* del lago de Pátzcuaro, Michoacán. Universidad Autónoma de San Nicolás de Hidalgo de Morelia, Michoacán. 75 pp.) This note represents the first report of clutch size and contributes information on development for *A. rivulare*.

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***ANEIDES AENEUS* (Green Salamander). MAXIMUM SIZE.** *Aneides aeneus* is a partially arboreal cliff specialist distributed discontinuously across the Appalachian Highlands and Cumberland Plateau ecoregions of the eastern United States. Maximum size in *A. aeneus* has been reported as 140 mm, with typical body size ranging from 83–125 mm total length (Conant and Collins 1998. Reptiles and Amphibians and Eastern and Central North America. Houghton-Mifflin, New York. 616 pp.). We encountered a number of individuals exceeding this average size range and approaching the record size for *A. aeneus* during a survey of several populations at the interface of the Appalachian Plateau and Valley and Ridge physiographic provinces in southwest Virginia during summer 2013.

One site, in particular, possessed multiple individuals exceeding this average size range and one individual exceeding the reported record size for the species. This site, located on the High Knob Massif in Wise Co., Virginia, is a previously undocumented locality for *A. aeneus* at a complex system of exposed sandstone outcrops extending over an approximately 3-ha region on a sheltered, north-facing slope of High Knob (36.89253°N, 82.62955°W; datum: WGS 84). We captured two individuals exceeding the typical size range for *A. aeneus* at this site on 8 July 2013 and 20 August 2013 (126.5 mm and 137.0 mm total length, respectively). A third individual, a female captured on 09 October 2013, measured 148.0 mm total length (78.0 mm SVL) and surpasses previously reported size records for the species by 8 mm. This individual appeared to be in the later stages of regrowth of a small portion of an autotomized tail tip, suggesting a potential size of up to 150 mm total length. All body size measurements were made with a set of Vernier calipers in the field, and, when possible, were verified via repeated measurements by two independent observers. Vouchers for all specimens were deposited in the University of Virginia's College at Wise Herpetological Collection (UVWHC 2013-01–2013-03).

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***ANEIDES LUGUBRIS* (Arboreal Salamander). LEUCISM.** Leucism has been reported in a number of plethodontid salamanders: *Plethodon* (Hayslett et al. 1998. Herpetol. Rev. 29:229–230; Mendyk et al. 2010. Herpetol. Rev. 41:189–190), *Desmognathus* (Mitchell 2002. Banisteria 20:70–74), *Phaeognathus* (Graham et al. 2009. Herpetol. Rev. 40:197), *Eurycea* (Miller and Braswell 2006. Herpetol. Rev. 37:198), and *Aneides* (Williams et al. 2013. Herpetol. Rev. 44:114– 115). In the genus *Aneides*, color variation has been documented for *A. ferreus* (Dyrkacz 1981. Herpetol. Circ. 11:1–31; Houck 1969. Herpetologica 25:54), *A. flavipunctatus* (Hensley 1959. Publ. Mus. Michigan State Univ. 1:135–159; Seeliger 1945. Copeia 1945:122), and *A. aeneus* (Williams et al. 2013, *op. cit.*).

Here we present the first record of leucism in *Aneides lugubris*. At 2205 h on 31 May 2013, an adult leucistic *A. lugubris* was found in Cañon Salsipudes, 23 km N of Ensenada, Baja California, Mexico (31.97875°N, 116.76974°W; datum: WGS84; elev. 123 m). The individual exhibited lack of normal pattern and appeared cream colored, except for small dorsal yellow-colored spots and the darkly pigmented eyes (Fig. 1). It was found foraging on the stream bank among riparian vegetation dominated by Arroyo Willow (*Salix lasiolepis*) and Western Sycamore (*Platanus racemosa*).

Fig. 1. Leucistic *Aneides lugubris* from Salsipuedes, Baja California, Mexico.

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The note below was first published in Volume 44(4), p. 651, but with printing errors.

***CRYPTOBRANCHUS ALLEGANIENSIS ALLEGANIENSIS* (Eastern Hellbender). CANNIBALISM.** Although cannibalism in the Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*) has been previously reported (Nickerson and Mays 1973. The Hellbenders: North American Giant Salamanders. Milwaukee Public Mus. Press; 106 pp.; Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 587 pp.; Phillips and Humphries 2005. *In* Lannoo [ed.], Amphibian Declines: The Conservation Status of United States Species, pp. 648–651. Univ. California Press, Berkeley, California), additional cases are worthy of note, since only a few specific reports of this behavior have been recorded from wild caught hellbenders, and there has been no discussion on the possible causes of this behavior. Cannibalism was first reported in *C. a. alleganiensis* by Reese (1903. Sci. Monthly 62:526–531). In captivity, he observed a larger hellbender consuming a conspecific about half the size of the larger one (sizes of either animal were not provided). He was able to remove the ingested smaller specimen with forceps, and it swam away unharmed when released in its enclosure. Smith (1907. Biol. Bull. 13:5–39) reported a two-year-old hellbender in northwestern Pennsylvania, when placed in quiet water after capture, regurgitated a partly digested 6-cm larva of its own kind. The size of the larger specimen was between 12.0 cm and 12.3 cm. The only other reported observation of cannibalism in this species from a wild specimen is that of Humphries et al. (2005. Herpetol. Rev. 36:428) who reported that a larger, wild-caught adult male *C. a. alleganiensis* (37.2 cm TL) regurgitated a smaller individual (18.5 cm TL) in the field. The North Carolina population where this occurred is very dense

Fig. 1. Cannibalized juvenile *Cryptobranchus alleganiensis*, Transylvania Co., North Carolina.

and comprised of all size classes (J. Humphries, pers. comm.; L. Williams, pers. obs.). Here we report another field case of cannibalism from a North Carolina population.

On 29 June 2010 an adult female (39 cm TL) *Cryptobranchus a. alleganiensis* was collected from a fast riffle, in a section of the French Broad River, Transylvania Co., North Carolina (the site is recorded with the North Carolina Wildlife Resources Commission and is withheld to protect the specific location). After data collection, the specimen was held in a mesh bag and lowered into the water in strong, swift current in preparation for its release. During this process and after being subjected to the strong current, it regurgitated a smaller hellbender (21 cm TL) while still in the mesh bag. The consumed hellbender was decaying, and there was a strong odor of rotten flesh (Fig. 1). From our observations and photographs of the carcass, it appears that the adult hellbender grasped the smaller hellbender laterally on its right side (tooth marks identified on dorsolateral surface of body confirmed by North Carolina Zoo pathologist Brigid Trovan). Unfortunately, this regurgitated hellbender was not saved due to its advanced state of decay. The locality where this observation was made contains a robust, reproductively active population of hellbenders of all age classes.

In a similar example, Max A. Nickerson (pers. comm.) informed us of wild caught Ozark Hellbenders (*C. alleganiensis bishopi*) eating smaller conspecifics from the North Fork of the White River in Missouri when they were placed in coolers under crowded conditions. On 12 March 1972 two Ozark Hellbender gilled larvae (9.5 and 13.0 cm TL) were cannibalized when placed in a cooler with 12 adults, between field collection and arrival at Nickerson's laboratory in Milwaukee, Wisconsin. In March 1977, three gilled larvae and eight adults were placed in a cooler which was primarily ice filled and transported to the St. Louis, Missouri, area overnight en route to Milwaukee. Nickerson's purpose of cooling these animals was that it might prevent cannibalism. However, all three larvae had been consumed before water and ice were drained and replaced upon arrival in St. Louis. All of these gilled larvae were reported by Nickerson et al. (2003. Southeast. Nat. 2:619–629), but his observation of their cannibalism was not mentioned in that publication.

Cryptobranchus a. alleganiensis feeds primarily on crayfish but also eats other aquatic food including snails, freshwater crabs, fish (Nickerson and May 1973, *op. cit.*), frogs (Smith 1907, *op. cit.*), and other salamander species (Alexander 1927. Buffalo Soc. Nat. Sci. 7:13–18; Hill 2011. Herpetol. Rev. 42:580; and pers. obs.). Hellbenders are opportunistic foragers and scavengers and are attracted to food by visual, chemical, and tactile stimuli (Nickerson and Mays 1973, *op. cit.*). It is possible that cannibalism in this species is a density-dependent behavior, primarily related to population size. Denser populations may provide adults with more opportunity to find younger, smaller hellbenders during foraging activities. All reported cases of hellbender cannibalism have come from dense populations (Smith 1907, *op. cit.*; Humphries et al. 2005, *op. cit.*) or in captive situations where they were crowded. Another possible contributing factor to hellbender cannibalism is that in denser populations less food may be available and cannibalism may increase due to fewer or more dispersed food resources. A similar explanation of this behavior has been suggested for other salamanders (Duellman and Trueb 1986. Biology of Amphibians. McGraw Hill, New York. 670 pp.). Our observations and reports from other field biologists working with hellbenders suggest that crayfish are less abundant in denser hellbender populations than in smaller or possibly declining hellbender populations.

We thank Max Nickerson for sharing his observations of cannibalism in hellbenders and for allowing us to publish them. Thanks to Brigid Trovan for examining our photographs. We also thank the many volunteers who worked with us throughout our hellbender surveys for their time and efforts.

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GYRINOPHILUS PORPHYRITICUS **(Spring Salamander). DIET.** Brook Trout (*Salvelinus fontinalis*) can have strong predatory and competitive effects on the survival and growth of *Gyrinophilus porphyriticus* (Lowe et al. 2004. Ecol. Appl. 14:164–172; Resetarits 1995. Oikos 73:188–198). However, *G. porphyriticus* still co-occur with Brook Trout in many headwater streams of the Appalachians (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 587 pp.). In this study, we report on the diets of larval and adult *G. porphyriticus* occurring within six headwater streams of New Hampshire, including three streams with Brook Trout and three streams without Brook Trout.

Salamanders were collected from six headwater streams at Hubbard Brook Experimental Forest, New Hampshire, USA (43.93333°N, 71.75000°W; datum NAD 83): Kineo Brook, Falls Brook, Zigzag West Brook, Bagley Trail Brook, Steep Brook, and Cushman Brook. Salamanders were collected from 200 m survey reaches in each stream by overturning all rocks of appropriate size. Salamanders were collected by dipnet from July–August 2012. Three streams had natural barriers that prevented fish from reaching the survey reaches, while survey reaches in the remaining streams were known to have fish (Warren et al. 2008. Northeast. Nat. 15:375–390). Fish presence or absence was confirmed in every stream by deploying minnow traps in survey stretches for 24 h.

Stomach contents of salamanders were collected using a non-lethal and non-anesthetic technique of stomach pumping (Cecala et al. 2007. J. Herpetol. 41:741–745). Before stomach flushing, all salamanders were weighed (± 0.1 g) and measured (SVL; nearest cm). Stomach contents were stored in 95% EtOH and examined under a dissecting scope. Prey items were

Table 1. Diet composition of larvae and adult *Gyrinophilus porphyriticus* from streams without Brook Trout and streams with Brook Trout at Hubbard Brook Experimental Forest, New Hampshire, USA. Numbers represent the total number of prey items per all individuals within a stream. Numbers in parentheses indicate the percentage of total diet composition. Prey items were identified to the overall lowest taxonomic level available (Order).

Fishless Streams							
	Bagley		Cushman		Steep		
Order	Adults	Larvae	Adult	Larvae	Adult	Larvae	Habitat
Araneae	-	-	1 (14.3)	-	-	-	Terrestrial
Coleoptera	3 (33.3)	-	2 (28.6)	-	-	-	Terrestrial
Diptera	2 (22.2)	2 (10)	2 (28.6)	-	-	-	Aquatic
Ephemeroptera	-	1 (5)	-	-	-	-	Aquatic
Gerridae	-	-	-	1 (17)	-	-	Aquatic
Hirundinea	-	-	-	-	-	-	Aquatic
Lepidoptera	3 (33.3)	2 (10)	-	-	1 (50)	-	Terrestrial
Megaloptera	-	5 (25)	1 (14.3)	-	-	-	Aquatic
Plecoptera	-	9 (45)	-	2 (33)	-	-	Aquatic
Soleolifera	-	-	-	-	1 (50)	-	Aquatic
Trichoptera	1 (11.1)	1 (5)	1 (14.3)	3 (50)	-	-	Aquatic
Totals	9	20	7	6	2	0	

Streams with Fish							
	Falls		Kineo		Zigzag W		
Order	Adult	Larvae	Adult	Larvae	Adult	Larvae	Habitat
Araneae	-	-	-	-	-	1 (14.3)	Terrestrial
Coleoptera	1 (25)	-	-	-	-	-	Terrestrial
Diptera	-	-	-	-	1 (16.7)	-	Aquatic
Ephemeroptera	-	-	-	-	-	-	Aquatic
Gerridae	-	-	-	-	-	-	Aquatic
Hirundinea	-	3 (50)	-	-	-	-	Aquatic
Lepidoptera	1 (25)	1 (17)	-	1 (11.1)	1 (16.7)	2 (28.6)	Terrestrial
Megaloptera	-	-	-	-	1 (16.7)	-	Aquatic
Plecoptera	1 (25)	2 (33)	1 (100)	5 (55.6)	1 (16.7)	2 (28.6)	Aquatic
Soleolifera	-	-	-	-	-	-	Aquatic
Trichoptera	1 (25)	-	-	3 (33.3)	2 (33.3)	2 (28.6)	Aquatic
Totals	4	6	1	9	6	7	

tabulated and classified to the lowest taxonomic level consistently available (Order).

Forty-eight food items from 59 larval and 38 adult *G. porphyriticus* were obtained (Table 1). Food items were identified to 11 taxonomic prey groups. The most abundant prey items in the guts of larvae were Plecoptera (41.7%). In adults, the most abundant prey items were Lepidoptera (20.7%) and Coleoptera (20.7%). Overall, 72.9% (43 of 59) of larvae *G. porphyriticus* and 91.4% (32 of 35) of adult *G. porphyriticus* contained stomach contents. In fishless streams, the mean percent (± 1 SE) of larval diets consisted of 95.0 % (± 0.04) aquatic prey and 5.0% (± 0.04) terrestrial prey, while the mean percent (± 1 SE) of adult diets consisted of 46.8% (± 0.06) aquatic prey and 53.2% (± 0.06) terrestrial prey. In streams with fish, the mean percent (± 1 SE) of larvae diets consisted of 76.5% (± 0.08) aquatic prey and 23.5% (± 0.08) terrestrial prey and the mean percent (± 1 SE) of adult diets consisted of 78.6% (± 0.12) aquatic prey and 21.4% (± 0.12) terrestrial prey. Although larvae are strictly aquatic, their overall diets across streams consisted of a mean percent (± 1 SE) of 14.2% (± 0.07) terrestrial prey. Our work is congruent with previous work at Hubbard Brook that has shown *G. porphyriticus* are euryphagic predators of invertebrates and that adults tend to take more terrestrial prey than larvae (Burton 1976. J. Herpetol. 10:187–204).

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***URSPELERPES BRUCEI* (Patch-nosed Salamander). DIET.** On 22 September 2013, we discovered an adult male *Urspelerpes brucei* under leaf-litter on a small streamside rock face at the species' type locality (Camp et al. 2009. J. Zool. 279:86–94) in Stephens Co., Georgia, USA. While we photographed it on wet leaves, several springtails (Collembola) caught the salamander's attention. The salamander used its projectile tongue (Camp et al., *op. cit.*) to catch and consume one springtail and unsuccessfully attempted to eat a second. Springtails are common prey for *Eurycea* (Hutchison 1958. Ecol. Monogr. 28:1–20; McMillan and Selmitsch 1980. J. Herpetol. 14:424–426), and their presence in the diet of *U. brucei* was not unexpected. However, this is the first record of a prey item for *U. brucei*, which was first discovered in 2007 (Camp et al., *op. cit.*). Additionally, we also observed captive adult *U. brucei* feeding on newly hatched house crickets (*Acheta domestica*) and a variety of collembolan species.

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ANURA — FROGS

***DENDROPSOPHUS RUBICUNDULUS* (Lagoa Santa Treefrog). PREDATION.** Amphibians are common prey for a great variety of vertebrates (Toledo et al. 2007. J. Zool. 271:170–177), invertebrates (Toledo 2005. Herpetol. Rev. 36:395–400), and carnivorous plants (Duellman and Trueb 1994. Biology of Amphibians. McGraw-Hill, Baltimore and London. 670 pp.). Belostomatids are medium to large-sized predaceous aquatic insects that occupy many types of aquatic habitats in tropical and temperate regions (Lauck and Menke 1961. Ann. Entomol. Soc. Amer. 54:644–657). *Dendropsophus rubicundulus* is a small tree frog that inhabits the Cerrado biome and occurs on the emergent or marginal herbaceous vegetation in permanent and temporary ponds (Bastos et al. 2003. Anfíbios da Floresta Nacional de Silvânia, Estado de Goiás. Goiânia, 82 pp.; Napoli and Caramaschi 1999. Bol. Mus. Nac., N.S., Zool. Rio de Janeiro 407:1–11). Here, we report the predation of an adult *D. rubicundulus*, by an adult water bug, *Lethocerus annulipes*.

At 2118 h on 07 January 2012, during the field work at the municipality of Chapadão do Céu, state of Goiás, Brazil (18.234944°S, 52.606222°W; datum SAD 69), we observed an adult *L. annulipes* feeding on an adult male *D. rubicundulus* (SVL = 22.28 mm) in a permanent pool. During the observation, the water bug remained submerged in the water to a depth of approximately 4 cm, and was feeding while attached to the frog by its venter. Predator and prey were collected and are housed at the Coleção Zoológica da Universidade Federal de Goiás (ZUFG), Goiânia, Goiás, Brazil (ZUFG 7334). Although there have been some reported cases of predation of amphibians by belostomatids, new cases may help in understanding the relationships between these predators and their anuran prey (Toledo 2005, *op. cit.*), and this note represents the first documentation of a belostomatid predating *D. rubicundulus*.

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***HYLA CINEREA* (Green Treefrog). DORSAL SPOTS.** *Hyla cinerea* have a uniformly white venter and a uniformly green dorsum. Many individuals show a white lateral stripe, and they may also show small white or yellow spots on their dorsum (Conant and Collins 1991. A Field Guide to Amphibians and Reptiles of Eastern and Central North America. Houghton Mifflin Company, New York. 640pp.). Here we provide information on the prevalence, number, size and pattern of geographic variation of these dorsal spots.

We examined 60 mature female *H. cinerea* from multiple locations within Jasper Co. Texas (N = 17), Rapides Pa. Louisiana (N = 21), Perry Co. Alabama (N = 13), and Ben Hill Co. Georgia, USA (N = 9). We took digital pictures of each frog, from which we (i) counted the number of spots of each frog, and (ii) measured the size (area in mm^2) of the largest spot of each frog. Variation in spot number ranged from 0–37 spots (Fig. 1), with the majority of frogs (98%) having at least one spot. Frequently (85%), at least one spot was bordered by a dark line (Fig. 1B, D). The same individual may have spots with and without a dark border (Fig. 1B). Spot size varied from 0.09–3.65 mm^2 (mean ± SD: 0.78 ± 0.6 mm^2). Individual frogs can have only small spots, only large spots, or a mixture of spot sizes. Average number of spots did not vary across sites (ANOVA: $F_{3,59} = 0.53$; $p = 0.66$). There was geographic variation in spot size, however: frogs from Texas had

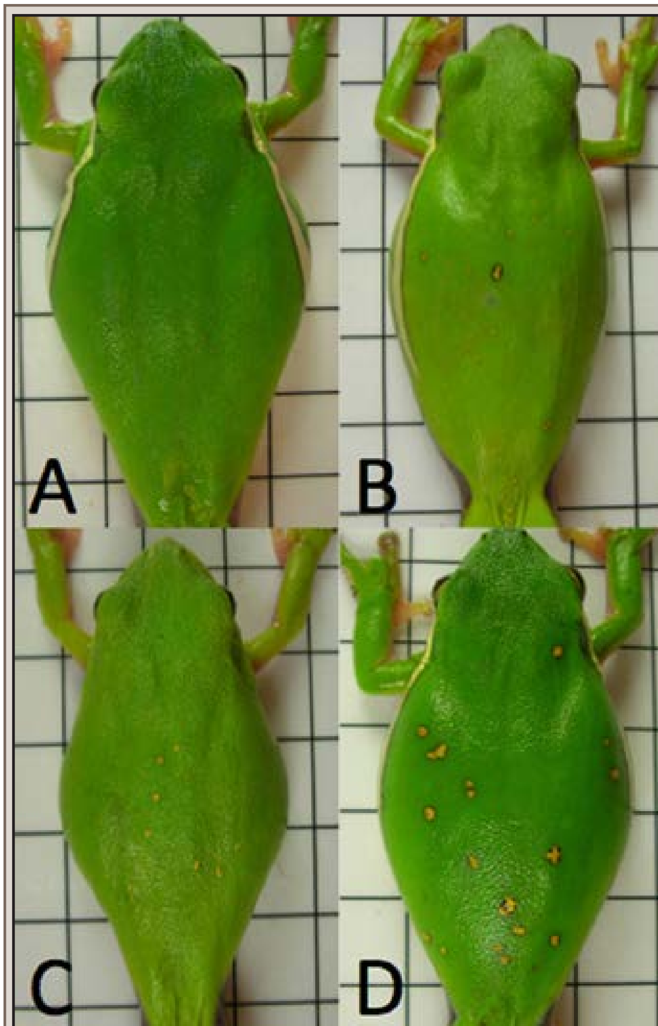

FIG. 1. Variation in dorsal spot number and size in *Hyla cinerea*. A) Individual with two very small spots. B) Individual with small and large spots, only some of which are bordered by a dark margin. C) Individual in which all spots are without dark border. D) Individual in which all spots show a dark border.

larger spots than those from the other three study sites (ANOVA: $F_{3,59} = 4.74$; $p = 0.005$).

To examine whether spots remained constant over time, we repeated the measurements after 3 months (N = 38). Both the number and the size of spots varied over time. Spot number remained constant in 36% of frogs, decreased in 32%, and increased in 32%. Spot size remained constant in 6% of frogs, decreased in 42%, and increased in 52%. Color pattern thus does not lend itself as a characteristic to be used in pattern mapping, a non-invasive method of identifying individuals for long-term studies (Heyer et al. 1994. Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians. Smithsonian Institution Press, Washington, DC. 384 pp.). For spots to be useful for individual identification, they must be unique to each individual and they must remain relatively unchanged over time, and in *H. cinerea* neither spot number nor size fulfilled those criteria. While morphology and mating calls of *H. cinerea* show geographic variation (Höbel and Gerhardt 2003. Evolution 57:894–904), the color pattern (lateral stripe length; spots) is highly variable within populations, but not always different among populations (Aresco 1996. Am. Midl. Nat., 135: 293–298; this study). *Hyla cinerea* is not the only species showing yellow or white spots (also termed dots, warts or pustules because of the elevated shape they sometimes can take). While they appear to be absent from other species of North American treefrogs with a green dorsum, such as *H. andersonii* or *H. squirella*, they do occur in some individuals of *H. gratiosa*, the sister species to *H. cinerea* (pers. obs). Similar spots can also be found in members of the Neotropical genera *Agalychnis* and *Phyllomedusa* (Savage 2002. The Amphibians and Reptiles of Costa Rica: a Herpetofauna between Two Continents, between Two Seas. University of Chicago Press, Chicago, Illinois. 954 pp.). Origin and function of these spots are unknown.

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***HYLA VERSICOLOR* (Eastern Gray Treefrog). LACRIMAL SPOT.** *Hyla versicolor* commonly have a bright spot under the eye, a characteristic they share with *H. chyrsoscelis* and *H. avivoca* (Conant and Collins 1991. A Field Guide to Amphibians and Reptiles of Eastern and Central North America. Houghton Mifflin Co., New York. 640 pp.). This spot is often quite conspicuous in this otherwise well-camouflaged treefrog (Fig. 1). Here we provide information on the prevalence, size, color, and relative brightness of the lacrimal spot, as well as on patterns of sexual dimorphism.

Fig. 1. Variation in lacrimal spot coloration and size in *Hyla versicolor*.

We examined 26 female and 30 male *H. versicolor* treefrogs from a pond near the University of Wisconsin-Milwaukee Field Station in Saukville, Wisconsin, USA (43.39000°N, 88.03000°W; datum: WGS 84). We took digital pictures of each frog (lateral view); each picture included a size reference, and a light and dark standard. We then scored the coloration of the spots (as either white or greenish), and used the program ImageJ (NIH, Maryland, http://imagej.nih.gov/ij/) to measure (i) the SVL (mm), (ii) the lacrimal spot size (area in mm^2), (iii) the lacrimal spot brightness, and (iv) the brightness of the dorsal color.

All except one frog had a clearly defined lacrimal spot. Lacrimal spot size was different between the sexes ($F_{1,52} = 4.16$; $p = 0.047$), with females having relatively larger spots than males (mean ± SD; 10.0 ± 2.2 vs. 7.8 ± 1.3 mm^2; SVL was used as a covariate in the model to account for sexual size dimorphism). Spot coloration was roughly split between white and greenish, and there was no difference between the sexes ($\chi^2 = 0.29$; $p = 0.59$). The absolute brightness of the lacrimal spot was also not different between the sexes ($F_{1,52} = 0.37$; $p = 0.54$). In both sexes the dorsum was darker than the lacrimal spot; contrast (the difference between dorsal brightness and lacrimal spot brightness) was larger in males, but this difference was not statistically significant ($F_{1,54} = 2.80$; $p = 0.099$).

The function of the lacrimal spot in this and other frog species is currently unknown. We suggest several hypotheses that might warrant further investigation. First, because of its conspicuousness the spot may function in intraspecific communication. Signals used in mate choice frequently show sexual dimorphism (Andersson 1994. Sexual Selection. Princeton University Press, Princeton, New Jersey. 599 pp.), and we did find some aspects of the lacrimal spot that differed between the sexes. Second, the lacrimal spot may be involved in camouflage via disruptive patterning, and help draw attention away from the body outline of the frog, or disguise the eye (Stevens and Merilaita 2009. Phil. Trans. R. Soc. B. 364:481–488). Finally, the bright spot might aid in nocturnal vision. Professional baseball and football players use eye black grease to reduce glare and improve contrast sensitivity in conditions of sunlight exposure (DeBroff and Pahk 2003. Arch Ophthalmol. 121:997–1001), and the opposite effect may occur with bright lacrimal spots at night.

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***HYPSIBOAS SEMILINEATUS* (Perereca Semilineada). BROMELIAD ASSOCIATE.** Many frogs use bromeliads as refuges (Peixoto 2005. Rev. Univers. Rural 17: 75–83). Most bromeliads have the capability to store rainwater between the leaves and are abundant across the sandy coastal plain of Brazil. Here we report

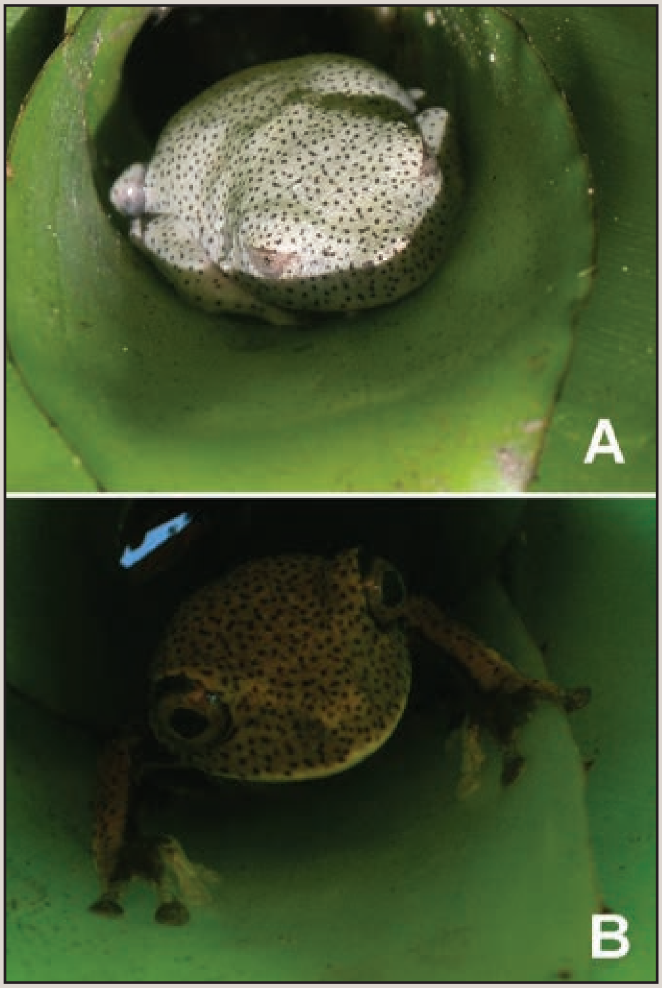

Fig. 1. *Hypsiboas semilineatus* using the bromeliad *Aechmea blanchetiana*. A) At night. B) Diurnal on the following day.

for the first time the use of bromeliad by *Hypsiboas semilineatus*. This observation was made during nocturnal fieldwork on 10 October 2012, at restinga Parque Estadual Paulo César Vinha, municipality of Guaraparí, Espírito Santo state, southeastern Brazil (7720940°S, 351400°E; datum WGS 84; elev. = 5 m). We observed an individual of *H. semilineatus* occupying the center axil of the bromeliad *Aechmea blanchetiana* (Fig. 1A), which remained in place on the following day (Fig. 1B). This frog species has a wide distribution across the coastal region of Brazil (Frost 2013. Amphibian Species of the World: an Online Reference. Ver. 5.6. Electronic database accessible at http://research.amnh.org/herpetology/amphibia/index.html. American Museum of Natural History, New York; accessed 12 Oct 2013) and is known for spawning in swamps and perennial ponds. Because we found *H. semilineatus* occupying bromeliads for purposes other than spawning, this species can be considered a bromelicolous frog.

We thank Universidade Vila Velha for the logistic support and Instituto Estadual de Meio Ambiente e Recursos Hídricos and Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, for the collecting permits (IEMA Process nº59666501; IBAMA SISBIO: 37762-2).

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***LEPTODACTYLUS INSULARUM* (San Miguel Island Frog). DIET.** This species is known throughout lowland Costa Rica, Panama, and Caribbean drainages of Colombia, Venezuela, and Trinidad and Tobago, and was previously considered a synonym of *Leptodactylus bolivianus* (Heyer 1974. Contrib. Sci. Los Angeles Co. Mus. Nat. Hist. Mus. 253:1–46; Savage 2002. The Amphibians and Reptiles of Costa Rica: a Herpetofauna beween Two Continents, between Two Seas. Univ. Chicago Press, Illinois. 934 pp.), but was resurrected as *L. insularum* by Heyer and de Sá (2011. Smithson. Contrib. Zool. 635:1–58). Little is known about the diet of *L. insularum*, and it has been suggested to feed primarily on arthropods and almost any small animal prey (Savage 2002, *op. cit.*). However, no specific information exists about food habits of this species. Herein we provided detailed information on the diet of *L. insularum* from Río Manso Reserve (5.66600°N, 74.77450°W; datum WGS 84; elev. 220 m) in the municipality of Norcasia, Caldas department, Colombia.

Seven individuals of *L. insularum* (mean 82.7 SVL; range 77.85–88.2 mm) were collected around a wetland between 1900 and 2200 h on 12–20 May 2010. Stomach flushing was used for the extraction of stomach contents and each prey item was identified to order or family, and measured for length and width using manual calipers (nearest 0.1 mm). The prey volume was estimated using the formula for a prolate spheroid. *L. insularum* was confirmed to be a generalist frog (Savage 2002, *op. cit.*). In addition, several freshwater insect families were found in the stomachs (e.g., Belostomatidae, Psychodidae, Lycosidae; see Table 1).

Table 1. Prey consumed by *Leptodactylus insularum* from "Reserva Rio Manso," Norcasia, Caldas, Colombia. Volume in mm^3.

Prey	Volume	Number (%)	Frequency
Insecta			
Coleoptera			
Elateridae	17.5 (1.2)	1 (4.5)	1
Erotylidae	83.1 (5.6)	1 (4.5)	1
Melolontidae	22.5 (1.5)	1 (4.5)	1
Passalidae	40.2 (2.7)	1 (4.5)	1
Hymenoptera			
Chaoboridae	0.1 (0)	1 (4.5)	1
Formicidae	9.8 (0.7)	6 (27.3)	2
Hemiptera			
Belostomatidae	837.6 (56.8)	2 (9.1)	1
Blattodea			
Blatiidae	76.4 (5.2)	1 (4.5)	1
Diptera			
Psychodidae	0.8 (0.1)	2 (9.1)	1
Orthoptera			
Tetrigidae	0 (0)	1 (4.5)	1
Unidentified larva	99.5 (6.7)	1 (4.5)	1
Arachnida			
Araneae			
Araneidae	92.1 (6.2)	1 (4.5)	1
Lycosidae	194.8 (13.2)	2 (9.1)	2
Myriapoda			
Chilopoda	0 (0)	1 (4.5)	1
Total	1474.3	22	

L. insularum is a species associated with ponds, explaining why the majority of their stomach contents were aquatic insects, as reported in other frogs found living near lentic waters, such as *L. bufonis*, *L. fragilis*, *L. latinasus*, and *L. poecilochilus* (Duré and Kehr 2004. Herpetologica 60:295–303; Gonzalez– Duran et al. 2011. Herpetol. Rev. 36:583–584; Savage 2002, *op. cit.*).

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***PSEUDIS LAEVIS* (Guyana Harlequin Frog). DIET.** *Pseudis laevis* have strong aquatic habits and often occur in permanent and vegetated water bodies of open flooded savannah areas in South America; they are found from southern Guyana and northern Brazil to north-central Bolivia (Reichle 2004. IUCN Red List of Threatened Species, ver. 2012.2. Electronic database accessible at http:// www.iucnredlist.org; accessed 16 May 2013). The diet of *P. laevis* is composed mainly of arthropods (Vaz-Silva et al. 2005. Comum. Mus. Ciênc. Tecnol. PUCRS, Ser. Zool. 18:3–12). Here, we report on the ingestion of fish as prey for *P. laevis* in the floodplain at Area de Proteção Ambiental do Curiaú (APA Curiaú), in the municipality of Macapá, Amapá, Brazil (0.150194°N, 51.038472°W; datum WGS84).

Twenty-one stomachs were analyzed during February (rainy season; N = 18) and November (dry season; N = 3) 2012. We recognized 17 prey categories in the diet of female *P. laevis.* The most important items in terms of number, frequency of occurrence, and index of relative prey importance were Diptera, Collembola and Hemiptera. Two fish were found in the stomach contents two adult females; to our knowledge this is the first report of piscivory in this species. The first female (20.7 mm SVL) contained an unidentified *Acestrorhynchus* sp. (Characiformes: Acestrorhynchidae; total length = 8.1 mm, width = 1.9 mm, volume = 39.7 mm^3). The second female (18.6 mm SVL) contained a *Hoplosternum littorale* (Siluriformes: Callichthyidae; Total length = 19.7 mm, width = 1.8 mm, volume = 13.5 mm^3). Voucher specimens will be deposited at the Coleção Didática do Laboratório de Zoologia (ICMBio collecting permit number 34238-1).

We thank the Ulisses Caramaschi, Museu Nacional do Rio de Janeiro, for confirming the identity of the *P. laevis*, and Huann Vasconcelos for the identification of fish species.

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***PSEUDOPALUDICOLA MYSTACALIS.* COLORATION.** *Pseudopaludicola* species (Leptodactylidae) are mostly cryptically colored, with light brown/gray pigmentation, and may exhibit three coloration patterns: 1) individuals without vertebral lines or dorsolateral stripes; 2) individuals with two dorsolateral stripes and 3) individuals with vertebral lines with variable colors (Pansonato et al. 2013. Zootaxa 3620:147–162). Herein we report for the first time in the genus a distinct aberrant colored specimen with a partially xanthic pattern.

Fig. 1. *Pseudopaludicola mysticalis* exhibiting a partially xanthic pattern.

At approximately 1900 h on 04 July 2013, we photographed and collected a partially xanthic female of *P. mystacalis* (14.53 mm SVL) at Lagoa da Coruja, Floresta Nacional de Nísia Floresta, Nísia Floresta municipality, Rio Grande do Norte State, Brazil (6.07360°S, 35.17750°W; datum: WGS 84; elev. 11 m). The individual exhibited normal pigmentation on the posterior region of the body, limbs, and ventral surface, whereas the anterior half of body dorsal surface was yellowish with absence of typical pigmentation; iris pigmentation was present (Fig. 1). We observed several hundred individuals in the area, but only one with such pattern was collected. The specimen is housed at Coleção de Anfíbios e Répteis da Universidade Federal do Rio Grande do Norte (AAGARDA 9188).

We are grateful to Adrian Antonio Garda for suggestions. Collecting occurred under the authority of SISBIO # 31248-1.

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***PSEUDOPALUDICOLA MYSTACALIS* (Cope's Swamp Frog). PREDATION.** Herein, we report an observation of the predation of an adult *Pseudopaludicola mystacalis* (Leptodactylidae) by a spider (Ctenidae: *Ancylometes* sp.). The event was observed in a pond of spring water near a permanent lake in pasture area around Goiânia municipality, Goiás state, Brazil (16.58314°S, 49.26983°W; datum: SAD 69). At approximately 2130 h on 13 January 2010, we observed an individual of *P. mystacalis* captured and immobilized by the spider. The spider inserted its chelicerae into the pelvic region of the frog, which tried unsuccessfully to escape using its hind limbs to push and attempt saltatory movements. The frog struggled for 10 min. before stopping all movements, by which time we assumed the frog's death. The complete ingestion of the frog lasted about 15 min. After this period we captured the spider, and collected the remains of the predated frog. All specimens were deposited in Coleção Zoológica da Universidade Federal de Goiás (ZUFG-7630; anuran with the spider).

Spiders are opportunistic and generalist predators that feed on small fishes, tadpoles, and frogs (Bastos et al. 1994. Herpetol. Rev. 25:118; Menin et al. 2005. Phyllomedusa 4:39–47; Toledo 2005. Herpetol. Rev. 36:395–400), however, this is the first report of a spider feeding on *P. mysticalis*.

We are grateful to Natan Medeiros Maciel for suggestions and revision on the manuscript and Janael Ricetti for identification of the spider.

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***RHAEBO GUTTATUS* (Amazonian Toad). MALFORMATIONS.** *Rhaebo guttatus* is a relatively widely distributed bufonid found from Amazonian Ecuador, Colombia, Venezuela, Perú, and Bolivia to the Guyanas and central Amazonian Brazil (Lötters et al. 2000. Bonn. Zool. Beitr. 49:75–78). At 0900 h on 12 August 2013 in a secondary forest area near the Suriname River, near Bergendal in the Brokopondo district of Suriname (5.143744°N, 55.067835°W; datum WGS 84), a juvenile (35 mm SVL), abnormal wild specimen of *Rhaebo guttatus* was collected and photographed. The specimen had six digits on the right hand and right foot and the left arm was absent. The left leg was normal and had five toes. Although amphibian malformations are well documented (Lannoo 1998. Malformed Frogs. University of California Press, Berkeley. 270 pp.), this is the first observation of malformed limbs reported for this species.

The specimen was released after photographs and measurements in accordance to the requirements of the owners Bergendal Eco & Cultural River Resort.

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RHINELLA ORNATA.* (Mexican Spadefoot). PREDATION BY *LEPTODACTYLUS LATRANS. Anurans of the genus *Rhinella* (Bufonidae) are known to produce toxic skin secretions, particularly in the parotoid glands, a form of chemical defense against microorganisms (Tempone et al. 2008. Toxicon 52:13–21) and predators (Cardoso and Sazima 1977. Ciência e Cultura 29:1130–1132). However, some invertebrates and vertebrates are known to prey upon species of *Rhinella* (Toledo et al. 2007. J. Zool. 271:170–177) by consuming the entire toad (Bernarde 2000. Rev. Brasil. Biol. 60:695–699), or by avoiding body regions containing more prominent poison glands (Crozariol and Gomes 2009. Atualidades Ornitológicas 149:4–5; Haddad and Bastos 1997. Amphibia-Reptilia 18:295– 298; Loebmann et al. 2008. Amphibia 7:31–34; Röhe and Antunes 2008. Wilson J. Ornithol. 120:228–230; Toledo 2003. Phyllomedusa 2:105–108). Herein, we report on a predation attempt of the toad *Rhinella ornata* by *Leptodactylus latrans* (Leptodactylidae). At 2140 h on 11 October 2011, during a nocturnal herpetofaunal survey conducted at a permanent pond in an Atlantic rainforest, municipality of Ubatuba, state of São Paulo, southeastern Brazil (23.36452°S; 44.82694°W; datum 35 ASL), we observed a nearly completed predation event, which we probably interrupted. The air temperature and relative humidity were 27.7°C and 83%, respectively. The shallow part of the pond had ca. 40 individuals of *R. ornata* and other anuran species engaging in calling activity. We then found a male *L. latrans* (125.02 mm; CFBH 30033; Fig. 1) that was collected in a plastic bag. By checking closely, we noticed a bunch of grass in the Butter Frog's mouth, and also the toes of another anuran. A few minutes later, the *L. latrans* regurgitated a male *R. ornata* (68.75 mm; CFBH 32630; Fig. 1). Because of the prey position when it was found, we assumed headfirst swallowing by *L. latrans*. The diet of *L. latrans* is considered to be generalist (Pazinato et al. 2011. Biotemas 24:147–151), and there are other records of Butter Frogs attempting to predate other toxic frog species (e.g., *Trachycephalus mesophaeus*; Mendes and Solé 2012. Herpetol. Notes 5:163–164). We cannot affirm whether or not the predation attempt we observed would have been successful if we had not interrupted it. Nevertheless, until now, no attempted or successful predations have been reported for *L. latrans* upon *R. ornata*.

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***SPEA MULTIPLICATA* (Mexican Spadefoot). FORAGING SITE SELECTION.** In amphibians, two kinds of foraging strategies are utilized: 1) sit and wait, and 2) active foraging. In anurans, the sit and wait strategy is most common (Duellman and Trueb 1994. Biology of Amphibians. Johns Hopkins Univ. Press, Baltimore, Maryland. 670 pp.). Anurans typically remain stationary and attack mobile prey that move within their field of vision, however, a factor that can be important to success when caching prey is foraging site selection. Livestock dung is a nutrient-rich habitat that is colonized by numerous species of arthropods (flies, beetles, ants, termites, mites and others; Hanski 1991. *In* Hanski and

Fig. 1. Individuals of *Spea multiplicata* (arrows) foraging on the surface of livestock dung.

Cambefort [eds.], Dung Beetle Ecology, pp. 5–19. Princeton Univ. Press, Princeton, New Jersey) and therefore it can represent an excellent foraging habitat for anurans. The use of this resource as anuran foraging sites has been documented in some species, e.g., *Hyla squirella* (Cline 2005. *In* Lannoo [ed.], Amphibian Declines: The Conservation Status of United States Species, pp. 456–458. Univ. of California Press, Berkeley California).

Between 0049–0208 h on 01 September 2013, we observed foraging site selection of *Spea multiplicata* in a livestock pasture located 3.7 km S of the town of San Luis Soyatlán, in the Municipality of Tuxcueca, Jalisco, Mexico (20.16523°N, 103.31288°W, datum WGS 84; elev. 2086 m). Air temperature and humidity were 19.6°C and 69.1%, respectively. We sampled an area of 5251 m^2, where we recorded 105 piles of livestock dung, 80 belonging to cows and 25 to horses. Of these, 17 cow patties (21.25%) had at least one individual of *Spea multiplicata* perched upon it (21 individuals total), in contrast to horse droppings, where only two (8%) had one individual frog each. All livestock droppings were wet due to rain of previous days. All frogs observed were metamorphic juveniles, and they were observed on the surface of the dung feeding on small invertebrates. None of the individuals observed were captured, but we documented the observations with photographs (Fig. 1). This note provides further evidence of the importance of livestock dung as a foraging microhabitat for anurans, and suggests that *S. multiplicata* may show a preference for cow dung as a foraging site.

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TESTUDINES — TURTLES

***ASTROCHELYS RADIATA* (Radiated Tortoise). NEST PREDATION.** Anthropogenic habitat disturbance can have lasting effects on the wildlife that recolonize the recovering patches. Some animals prefer to use partially disturbed habitats or ecotones for various activities, including nesting for many turtle species. The Critically Endangered Radiated Tortoise (*Astrochelys radiata*; IUCN 2011. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>) in southwest Madagascar may be one of these species. While surveying habitat during an ongoing radiotelemetry study (Ranaivoharivelo et al., unpubl.) on 19 March 2013, we found an approximate 0.9-ha patch of historically cleared forest near the village of Lavavolo (24.6333333°S, 43.9333333°E) where *A. radiata*, especially females, were reported to be in relative abundance. The patch was previously forested Southern Dry Forest (an endemic and highly threatened Malagasy ecosystem) approximately 2.7 km E of the shore, atop the Mahafaly Plateau. The surrounding forest is comparatively untouched and purportedly supports a reasonably healthy population of *A. radiata*.

Upon surveying the disturbed 0.9-ha patch, we found approximately 15 adult female *A. radiata* and five freshly predated nests. The predated nests were found in the sand along the edge of the open patch, just under a row of *Opuntia* cactus that is used as a "fence" to surround the patch (Figs. 1, 2). Nests contained 1–4 predated eggs, the freshest of which had presumably been broken opened and the yolks (not albumin) eaten. We suspect a small mammal predator capable of excavating the nests, such as the Giant-striped Mongoose (*Mungotictis grandidieri*), had depredated the eggs. Due to the freshness of the excavations, the nest predation had likely occurred within the previous few days. It seems reasonable to assume that such predation could occur repeatedly over the nesting season. At least two other instances of nest predation were reported in nearby habitat in May and June the previous year, but snake tracks were found and indicated the probable culprit.

Fig. 1. M. Ranaivoharivelo indicating the location of a freshly predated *Astrochelys radiata* nest.

Fig. 2. Freshly predated *Astrochelys radiata* nest with albumin still remaining in the broken eggshells. Excavated nest is under the *Opuntia* plant at the top right of the photo.

It appears that the ecotone provided by this disturbed patch was preferentially used by female tortoises for nesting, and that the relative high concentration of nests and openness of the habitat encouraged the ingress of nest predators. For a critically endangered and locally isolated species, such a repeated threat to reproductive success could lead to local population extirpation.

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CHELYDRA SERPENTINA **(Snapping Turtle). INTERSPECIFIC BASKING.** On 19 May 2006, at Standing Stone Lake (Standing Stone State Park, Overton Co., Tennessee, USA; 36.47113°N, 85.41553°W), we observed an adult *Chelydra serpentina*, a *Trachemys scripta* (Pond Slider), and a *Graptemys geographica* (Northern Map Turtle) basking on a log at the same time, within about 1.5 m of each other. This observation is noteworthy because Ernst et al. (1994. Turtles of the United States and Canada. Smithsonian Inst. Press, Washington, D.C. 578 pp.) indicated that other species of turtles typically avoid basking sites occupied by *C. serpentina*. However, *Chrysemys picta* (Painted Turtle) has been observed basking on the back of *C. serpentina* (Legler 1956. Trans. Kansas Acad. Sci. 59:461–462). We did not observe any aggressive basking behavior among species (but see Lindeman 1999. J. Herpetol. 33:214–219; Lovich 1988. Herpetologica 44:197–202; Selman and Qualls 2008. Herpetol. Rev. 39:214–215).

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PSEUDEMYS RUBRIVENTRIS **(Northern Red-bellied Cooter). BOAT PROPELLER MORTALITY.** Injury and death from boat propeller strikes have been reported for several chelonians in North America including *Apalone spinifera* (Galois and Quellet 2007. Chelon. Conserv. Biol. 6:288–293), *Chrysemys picta*, *Trachemys scripta*, and *Graptemys geographica* (Smith et al. 2006. J. Herpetol. 40:180–185; Bulté et al. 2010. Aquat. Conserv. Marine Freshw. Ecosys. 20:31–38), *Malaclemys terrapin* (Gibbons et al. 2001. Chelon. Conserv. Biol. 4:66–74), *Pseudemys floridana*, *P. nelsoni*, and *Sternotherus odoratus* (Bancroft et al. 1983. Misc. Paper A-83-5, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. 252 pp. + appendices), and *Pseudemys concinna suwanniensis* (Heinrich et al. 2012. Herpetol. Conserv. Biol. 7:349–357), Mortality rates were relatively high in some of these populations. Eleven of 78 *P. rubriventris*

Fig. 1. A female *Pseudemys rubriventris* showing lethal propeller strike damage near Jamestown Island, Virginia.

captured in the Jug Bay region of the tidal Patuxent River in central Maryland had scars and injuries indicative of propeller strikes (Swarth 2004. *In* Swarth et al. [eds.], Conservation and Ecology of Turtles of the Mid-Atlantic Region, a Symposium, pp. 73–83. Bibliomania! Salt Lake City, Utah) but mortality was not mentioned.

I found a dead female *Pseudemys rubriventris* on 5 July 2001 floating in Powhatan Creek, a channel in the tidal marsh separating Jamestown Island National Historic Park from the mainland in James City County, Virginia (37.222452°N, 76.781550°W; WGS 84). She was a large adult (268 mm CL, 253 mm PL) with three distinct propeller strikes on her carapace (Fig. 1). The anterior two strikes were deep and the one in the middle appears to have cut into the body cavity. The missing pieces of the marginals on the left rear and lower right portions of the carapace may have also been struck. Most information on injuries on turtles from propeller strikes involves living individuals that survived and were subsequently captured. Opportunities to document turtles killed by propeller strikes are rare. Reports by Bancroft et al. (*op. cit.*) and Galois and Quellet (*op. cit.*) are the exceptions. Observations of turtles killed by this anthropogenic hazard should be reported wherever possible.

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CROCODYLIA — CROCODILIANS

***ALLIGATOR MISSISSIPPIENSIS* (American Alligator). EPIBIOSIS.** *Alligator mississippiensis* has recently been documented to serve as a host for the obligate commensal barnacle *Chelonibia testudinaria* in a coastal estuary in northeastern Florida (Nifong and Frick 2011. Southeast. Nat. 10:557–560). Nifong and Frick (*op. cit.*) reported on two alligators, one of which hosted a single living *C. testudinaria*, and the other alligator bore a wound containing the empty shell of a barnacle. Both alligators were caught in an estuarine impoundment in Guana River Wildlife Management Area in Ponte Verda, Florida, USA. Herein we report on an American Alligator harvested in coastal Louisiana that hosted numerous barnacles from a family previously undocumented as epibionts of *A. mississippiensis*.

An adult male American Alligator (310 cm TL) was harvested on 15 September 2013 as part of the state of Louisiana's annual autumn commercial alligator season. The alligator was caught in Green Island Bayou in coastal Vermilion Parish. The trapper immediately observed numerous barnacles on the alligator's back and took numerous photos of the unusual occurrence. Additional photos were taken when the alligator was received at a check station/processing location. We conservatively estimate that some 120–130 barnacles were present on the alligator, and they were situated along the dorsal surface of the lower back and on the lateral surface edges of the tail scutes. Individual tail scutes hosted 6–8 barnacles (Fig. 1). The aforementioned trapper has never noted barnacles on alligators harvested in the past, and he caught another alligator in the same vicinity, on the same day, that hosted no barnacles.

Regrettably, no barnacles were collected for precise identification, but based on photographs it is apparent that the barnacles belong to family Balanidae and most likely represent *Balanus* sp. or *Amphibalanus* sp. It is unusual to note so many barnacles on an individual alligator, as prior reports of barnacle-crocodilian epibiosis describe only one or two barnacle specimens from each crocodilian host (Monroe and Garret 1979. Crustaceana 36:108; Nifong and Frick, *op. cit.*). The alligator described herein was slightly larger (thus presumably older) than the alligators reported hosting *C. testudinaria* by Nifong and Frick (*op. cit.*) and thus may have accumulated a larger aggregation of barnacles in response to size-related differences in habitat utilization and/or behavior (see Lance et al. 2001. *In* Grigg et al. [eds.], Crocodilian Biology and Evolution, pp. 327–340. Surrey Beatty & Sons, Chipping Norton). Additionally, it is possible that barnacle recruitment and growth differ between *C. testudinaria* and balanid barnacles, and that *C. testudinaria* does not display the high fecundity and fast growth previously documented for most balanid barnacles (Thiyagarajan et al. 2005. Mar. Ecol. Prog. Ser. 299:229–237). Nonetheless, the alligator documented in the present note appeared to be in good health, and showed no sign of emaciation, which may have occurred if the alligator was exposed to high salinities over an extended time period. Some species of balanoid barnacles tolerate low salinities and some thrive in brackish (approximately 15 ppt) waters (Dineen and Hines 1994. Mar. Biol. 119:423–430; Dineen and Hines 1994. J. Exp. Mar. Biol. Ecol. 179:223–234); thus particularly high salinities may not have been needed for the accumulation of barnacles seen in the case described.

In general, alligators prefer fresh to intermediate salinity wetlands, but can tolerate high salinities (Lance et al. 2010. J. Exp. Zool. 313A:106–113) and a single individual was observed in the open marine waters of the Gulf of Mexico ca. 56 km S of Marsh Island, Louisiana (and approximately 63 km from the nearest point on mainland Louisiana; Elsey 2005. Southeast. Nat. 4:533–536). The photograph therein documents an alligator near an offshore platform; the platform is covered with barnacles (family or species unidentified). The nearest border of the trapper's property where the alligator described herein was caught is only 0.33 km minimum distance from Vermilion Bay, and thus it may have been exposed to brackish salinities at some point or for a sufficient (i.e., extended) time period to allow barnacle accumulation. The wetlands on which the trapper is authorized to hunt alligators is categorized as brackish and intermediate marsh (46.6% and 53.4%, respectively).

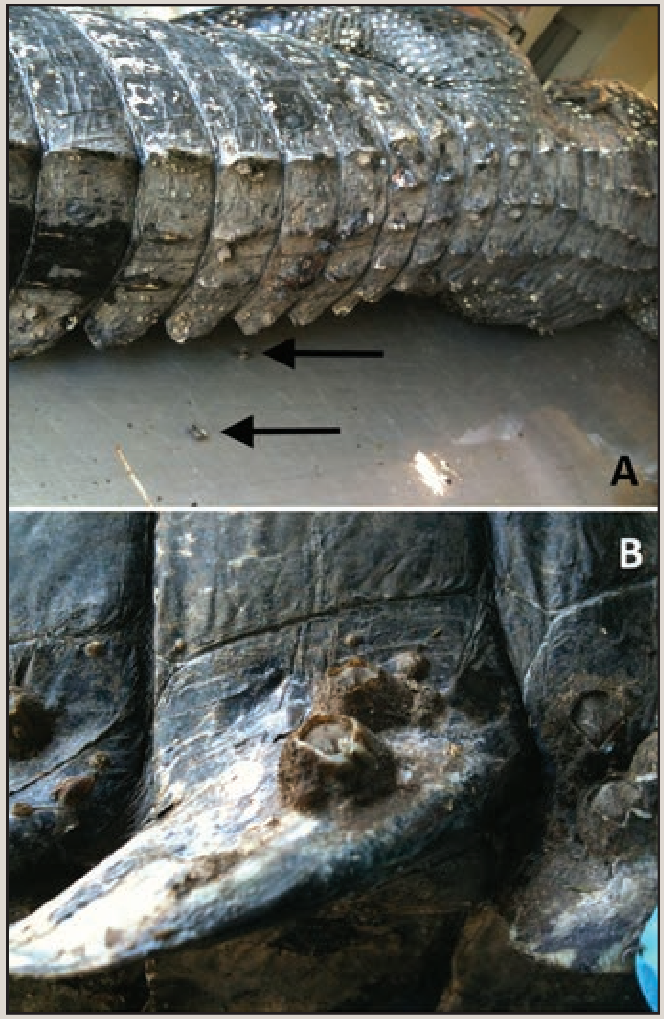

Fig. 1. Adult male American Alligator (*Alligator mississippiensis*) with numerous barnacles on dorsal surface and scutes (Panel A); as well as two barnacles apparently dislodged to the floor (arrows). Several barnacles also visible on lateral aspects of tail scutes (Panel B).

Several species of barnacles have also been reported on the American Crocodile (*Crocodylus acutus*) including *Lepas anatifera*, *Chelonibia testudinaria* (Cupul-Magana et. al. 2011. Herpetol. Notes. 4:213–214) and *Amphibalanus amphitrite* (Escobedo-Galvan et al. 2012. Crustaceana 85:1145–1148). American Crocodiles are widely distributed and inhabit higher salinity environments for longer time periods than American Alligators (Richards et al. 2004. Ecol. Modelling 180:371–394) and thus may be more prone to barnacle infestation.

Balanoid barnacles have also been found in brackish systems on an Alligator Snapping Turtle (*Macroclemys temminckii*; Jackson and Ross 1971. J. Herpetol. 5:188–189) and on two red-bellied turtle species in Alabama (*Chrysemys alabamensis*; Jackson and Ross 1972. Florida Acad. Sci. 35:173–176) and New Jersey (*Chrysemys r. rubriventris*; Arndt 1975. J. Herpetol. 9:357–359). Three species of barnacles (including *Balanus eburneus*) are documented to attach to Diamondback Terrapins (*Malaclemys terrapin*; Seigel 1983. Am. Midl. Nat. 109:34–39) in Florida, and unidentified barnacles have been seen on Diamondback Terrapins in coastal Louisiana (W. Selman, unpubl. data).

The dealer to whom the alligators were sold reported to us that in over 40 years of processing wild alligators in Louisiana he has only seen barnacles on alligators on three or four occasions (W. Sagrera, pers. comm.). Future efforts might be directed to noting other examples of barnacle infestation on alligators, and collection of additional species if present, to determine exact identification and conduct genetic analyses.

We acknowledge Eric Elias for details on the alligator he harvested, Jeb Linscombe for GIS and marsh type description assistance, and thank Steven G. Platt and Will Selman for helpful discussion about these findings.

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***ALLIGATOR MISSISSIPPIENSIS* (American Alligator). LARGE PRESUMPTIVE FEMALE: A CASE OF MISTAKEN IDENTITY.** *Alligator mississippiensis* can grow to impressive lengths, with reported maximum total lengths of 426.9 cm (male) and 309.9 cm (female) for alligators measured in Florida between 1977 and 1993 (Woodward et. al. 1995. J. Herpetol. 29:507–513). In South Carolina, a 294 cm female alligator has been documented (Wilkinson 2008. *In* Crocodiles. Proc. 19th Working Meeting of the Crocodile Specialist Group, pp. 182–187. IUCN – The World Conservation Union, Gland, Switzerland and Cambridge, UK). Large female alligators have also been measured during research efforts (a 309.9 cm female caught 12 June 2009) and in the sanctioned wild harvest (304.8 cm) in Mississippi in 2013 (R. Flynt, pers. comm.). In Louisiana, detailed records are kept on sex ratios of harvested alligators, but females over 9 ft TL (274 cm) are rare (Elsey and Kinler 2012. *In* Crocodiles. Proc. 21st Working Meeting of the Crocodile Specialist Group, pp. 136–148. IUCN – The World Conservation Union, Gland, Switzerland and Cambridge, UK).

It is unknown if large alligators reach reproductive senescence (Lance 2003. Exp. Gerontol 38:801–805; Scott et al. 2006. Southeast. Nat. 5:685–692) and we have planned to collect reproductive tracts should we encounter any extremely large females, to determine if those alligators appeared to have recently ovulated or are still capable of nesting. We herein report on an American Alligator harvested in coastal Louisiana that we initially believed to be a near record sized female alligator.

An adult American Alligator (307.3 cm TL) was harvested in coastal Vermilion Parish on 9 September 2013 as part of the state of Louisiana's annual autumn commercial alligator season. The trapper brought the alligators harvested that day to a processing shed where RK was collecting data. The sex of alligators is determined by palpation inside the cloaca to determine presence or absence of the penis (Chabreck 1963. Proc. SE Assoc. Game and Fish Comm. 17:47–53; DeNardo 1996. *In* D. R. Mader, Reptile Medicine and Surgery, pp. 212–224. Elsevier Publishing, New York). This alligator was noted to be a presumptive female by RK and two other persons (a trapper/biologist with 30 yrs experience with alligators and a dealer with 20 yrs experience as an alligator farmer/trapper) based on the lack of a penis in the cloacal vault. RK recognized this as an unusually large female alligator, and notified RME. Arrangements were made to collect the entire viscera, including the reproductive organs to determine if the presumptive female had recently nested, or if there were indications of reproductive senescence. Some reports suggest senescent processes affect female crocodilians (Pitman 1941. Uganda J. 9:89–114; Graham 1968. The Lake Rudolf Crocodile [*Crocodylus niloticus* Laurenti] Population. Report to the Kenya Game Department. 151 pp.; Joanen and McNease 1980. *In* Murphy and Collins [eds.], Reproductive Biology and Diseases of Captive Reptiles, pp. 153–159. SSAR Contributions to Herpetology No. 1, Athens, Ohio), particularly larger (> 290 cm TL), older females (Graham, *op. cit.*). Pitman (*op. cit.*) also reported a 13 ft (396 cm) female and a 14 ft (427 cm) female Nile Crocodile he measured were no longer breeding, but did not note how this was determined. The alligator herein described was missing the right rear leg, but otherwise appeared robust and reasonably heavy for its length.

Upon receipt of the viscera, a fourth person (RME, with 25 yrs experience in alligator research) palpated the interior of the cloaca and also presumed the alligator was a female, due to the absence of a palpable penis. Dissection of the gonads, however, revealed structures more consistent with testes (dense consistency, violet/purple color externally, some tan color internally after bisecting) than ovaries (more cystic/granular with follicles or ova present, white/pink in color) and nothing resembling active or regressed oviducts were observed. A small (approximately one cm) dense oval structure possibly suggestive of a portion of the fibrous penile crurae (Kelly 2013. Anat. Rec. 296:488–494) was palpated on one side. The gonads measured 9.9 mm L × 2.3 mm W and 10.1 mm L × 2.6 mm W. We could not visualize the ductus deferens, though they may have been markedly regressed during the post-breeding season. Both gonads were excised and fixed in neutral buffered formalin for histological examination. Detailed dissection of the kidneys was not done, but no gross abnormalities were observed.

Histological examination (Fig. 1A, B) of the gonad confirmed this alligator was actually a male. The spermatids appeared normal when present (Fig. 1B, S2), but spermatogonia (Fig. 1B, dSpA and B) and spermatocytes (Fig. 1B, dPI) were hypertrophied, degraded, and being sloughed (Fig. 1B, SE) to the lumen (Fig. 1B, L) with spermatogonia undergoing what appeared to be apoptosis. Mast cells (Fig. 1B, Ma) were also present, which likewise indicated that cell death and recycling was taking place within the seminiferous epithelium and also may be why blood vessels were dilated (Fig. 1A, BV). The interstitial tissue (Fig. 1A, IN) was thick compared to normal alligators in quiescence, with disorganized fibroblasts and overabundant collagen fibers. Sertoli cell nuclei (Fig. 1B, dSc) appeared atrophied and underdeveloped compared to spermatogenically dormant normal alligators (Gribbins et al. 2006. Acta Zool. 87:59–69). In light of the abnormal sloughing of the seminiferous epithelium and the apparent cell death of spermatogonia, it is doubtful these testes would be able to function normally and were unlikely to have been able to support a future round of spermatogenesis; it may have attempted spermatogenesis in the past. The alligator was a mature

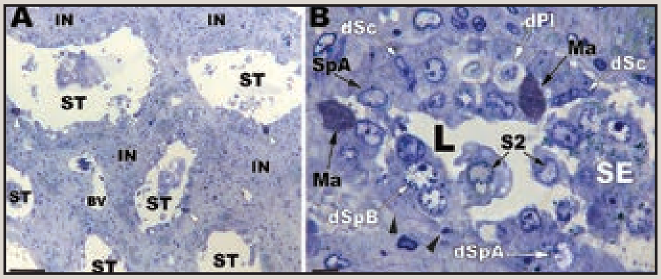

FIG. 1. Histological view of gonad removed from the presumed female American Alligator. A) Scanning view of gonadal tissue consistent with testicular tissue in reptiles. The seminiferous tubules (ST) are dispersed far from each other in cross section with a thick interstitial space (IN). Blood vessels (BV) are often large and dilated most likely because of the presence of mast cells (white arrowheads) within or near the seminiferous tubules. Bar = 50µm. B) Higher power of a single seminiferous tubule showing details of the seminiferous epithelium. The epithelium is being shed (SE) into the lumen (L) and contains mostly spermatogonia and spermatocytes. Spermatids (S2) appear normal when present and spermatogonia A/B (dSpA, dSpB) and spermatocytes (preleptotene, dPI) are hypertrophied and apoptotic in appearance. Sertoili cell nuclei (dSc) are atrophied and mast cells (Ma) are common. SpA, normal spermatogonium; Black arrowheads, basement membrane of seminiferous epithelium. Bar = 5µm.

animal at a length of 307.3 cm, although this male clearly was abnormal reproductively, it is not likely an age-related senescence as it had not obtained the extreme length common in very old male alligators.

Alligators exhibit temperature-dependent sex determination (TSD) (Ferguson and Joanen 1982. Nature 296:850–853); we have no knowledge of the nest cavity temperatures to which this alligator was exposed. A recent case of intersexuality has been noted in a captive adult African Dwarf Crocodile (*Osteolaemus tetrapsis*); the crocodile had a male-typical phenotype, but upon necropsy the gonads were histologically detected as ovotestes, possibly as a result of development in the transition range of temperature for a species with TSD (S. Langer, pers. comm). There may have been a gene mutation that controls sexual differentiation having an adverse effect on the gonadal/phallus development in this alligator. We are not aware of documented cases of congenital absence of the phallus in crocodilians.

A detailed anatomical study of the normal penile anatomy of the adult American Alligator has been published (Kelly 2013, *op. cit.*). Recent reports have documented reduction in penis size (Guillette et al. 1996. Gen. Comp. Endocrinol. 101:32–42) and abnormalities of gonadal morphology in juvenile alligators of both sexes (Guillette et al. 1994. Environ. Health Perspectives 102:680–688) related to endocrine disruption from environmental contaminants in Florida lakes. We have no evidence that a similar mechanism was a factor in this case.

The alligator described herein had loss of a lower limb, possibly due to aggressive intraspecific courtship encounters during breeding, which often involves bites sustained at the base of the hind legs and tail (Joanen and McNease 1975. Proc. SE Assoc. Game and Fish Comm. 29:407–451). Alternatively, trauma such as this specimen's injury may have occurred from a boat propeller strike resulting in limb amputatation; it is possible a penile injury or amputation may have transpired at the same time as the limb trauma. Indeed, we have observed partial penile amputations in captive juvenile alligators provided feed on platforms on commercial alligator farms; we suspect when alligators crawled onto the feeding platform the penis was extruded and bitten by other alligators attempting to gain access to the food. We hypothesize bites to the penis may have become infected and subsequently partially sloughed away, as remnant "nubs" of the penile shaft were palpated in the cloaca of these alligators. Prolapse of the copulatory organ has been described in captive reptiles; the exposed tissues may become swollen and traumatized, leading to desiccation and necrosis (DeNardo 1991, *op. cit.*; Frye 1991. Biomedical and Surgical Aspects of Captive Reptile Husbandry. Krieger Publ. Co., Malabar, Florida. 712 pp.).

In the case of this alligator, without the benefit of necropsy to visualize gonads and confirmation of male gender by histology, we would have incorrectly noted the alligator as a near record-size female if only cloacal palpation had been undertaken. It is possible (though likely very rare) that unusually large "female" alligators noted in field studies might also have been males, as in the present case. Conversely, on three occasions we captured live adult alligators (223.5 cm, 228.6 cm, and 248.9 cm TL) at nest sites, which we would have anticipated to be females in nest defense, whereupon cloacal palpation were determined to be males. Caution must be exercised in assuming the gender of an alligator or other crocodilians in the field based solely on size or location.

We acknowledge Craig Sagrera and Velma Stelly for assistance with obtaining the viscera on the alligator harvested, and thank Steven G. Platt for helpful discussion about these findings.

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***CROCODYLUS ACUTUS* (American Crocodile). FRUGIVORY.** Because crocodilians are generally assumed to be obligate carnivores (Neill. 1971. The Last of the Ruling Reptiles: Alligators, Crocodiles, and Their Kin. Columbia Univ. Press, New York. 486 pp.), frugivory among this group has been under-reported and received little attention in comparison to other reptiles (Platt et al. 2013. J. Zool. 291:87–99). On 6 June 2010, two of us (CCR, VR) captured a large adult male *Crocodylus acutus* (total length = 336 cm) in Ambergris Lake, near San Pedro Town on Ambergris Cay, Belize (17.906764°N, 87.976528°W; datum WGS84). Ambergris Lake is a shallow, man-made lake fringed by mangrove swamp. Local authorities deemed the crocodile a threat to public safety after it attacked and consumed several household pets, and requested the animal be translocated to an area remote from San Pedro. The crocodile died the following day (7 June 2010) while being restrained for translocation. A necropsy performed later that day was inconclusive, but death likely resulted from fatal acidosis, which occasionally occurs when large crocodiles are restrained (Seymour et al. 1987. *In* Webb et al. [eds.], Wildlife Management: Crocodile and Alligators, pp. 253–257. Surrey Beatty & Sons, Chipping Norton, NSW). An examination of the esophagus and stomach during the necropsy revealed one Mango (*Mangifera indica*; Anacardiaceae; Fig. 1) and three Sea Almond (*Terminalia catappa*; Combretaceae) seeds, in addition to the remains of domestic dogs (*Canis lupus familiaris*), chickens (*Gallus* sp.; probably fed by tourists), a mass of unidentified vegetation, and 11 stones of various sizes.

To our knowledge, this is the first reported occurrence of *M. indica* or *T. catappa* seeds among the gastric contents of *C. acutus*

Fig. 1. Mango (*Mangifera indica*) seed found among the gastric contents of an adult male *Crocodylus acutus* collected near San Pedro Town, Ambergris Cay, Belize.

or any other crocodilian (Platt et al. *op. cit.*). In a recent review of frugivory among the Crocodylia, Platt et al. (*op. cit.*) found 34 families and 46 genera of plants represented among fruits and seeds reportedly consumed by crocodilians. The inclusion of *M. indica* and *T. catappa* increases this total to 36 families and 48 genera. The fruits of *M. indica* and *T. catappa* are classified as drupes, and fleshy fruits (aggregate, berry, and drupe) comprise the bulk (52.1%) of reported frugivory among the Crocodylia (Platt et al. *op. cit.*). Our findings in Belize complement previous observations of frugivory in *C. acutus*, which is known to consume fruits of *Rhizophora mangle* (Platt et al., *op. cit.*) and *Brysonima crassifolia* (Platt et al. 2013. J. Herpetol. 47:1–10); unidentified seeds have also been recovered from fecal samples (Casas-Andreu and Quiroz 2003. Anales del Instituto de Biologia, Universidad Nacional Autonoma de Mexico, Serie Zoologica 74:35–42).

Because gastric contents analyses reveal only the composition of the diet and not the foraging mode (DeVault and Rhodes. 2002. Acta Theriol. 47:185–192), it is possible the seeds we recovered from the stomach of *C. acutus* resulted from behaviors other than deliberate consumption of fruits as food. Crocodilians may ingest seeds accidentally during prey capture (Diefenbach 1979. Copeia 1979:162–163), floating seeds could be mistaken for swimming prey (Webb and Manolis 1989. Crocodiles of Australia. Reed Books Pty., Ltd., French Forest. 160 pp.), or hard seeds might be consumed as gastroliths (Platt et al. 2002. Herpetol. J. 12:81–84). Seeds found among stomach contents could also result from secondary ingestion, i.e., the acquisition of items contained in the gut of primary prey (Cott 1961. Trans. Zool. Soc. London 29:211–357). However, secondary ingestion can probably be ruled out in our case because the co-occurring prey (dogs and chickens) are incapable of consuming the large intact fruits or seeds of Mango and Sea Almond.

Given these caveats, there is no doubt that some fruit consumption is attributable to accidental or secondary ingestion; however, there are no *a priori* reasons to assume that fruits are not deliberately eaten by crocodilians as food. Despite early reports to the contrary (Coulson and Hernandez 1983. Alligator Metabolism: Studies on Chemical Reactions *in vivo*. Pergamon Press, New York. 182 pp.), crocodilians are capable of digesting carbohydrates, plant-based proteins, and vegetable fats (Coulson et al. 1987. Biochem. Physiol. 87A:449–459; Staton et al. 1990. J. Nutrit. 120:775–785), strongly suggesting that nutritional benefits accrue from frugivory (Platt et al., *op. cit.*). Our observations of frugivory by *C. acutus* in Belize add to the growing body of evidence suggesting crocodilians should be considered "occasional frugivores" (*sensu* Willson 1993. Oikos 67:159–176), i.e., generalist predators that complement an otherwise carnivorous diet with fruit, which is consumed infrequently but not always in small quantities (Platt et al., *op. cit.*). Whether or not crocodilians play any role as aquatic seed dispersal agents has yet to be determined, and this topic is a worthwhile avenue for future investigation (Platt et al., *op. cit.*).

We thank Josh Buettner and the residents of San Pablo Village, San Pedro, Belize for assisting with the capture and necropsy of this crocodile. Carts Belize provided logistical support, and Tamara Sniffin photographed the seeds. Lewis Medlock brought several important references to our attention. Support for this project was provided by the Rufford Small Grants Foundation and the American Crocodile Education Sanctuary (ACES). Research and collection permits were issued to CCR by the Belize Forest Department. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

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***PALEOSUCHUS PALPEBROSUS* (Cuvier's Smooth-fronted Caiman). HABITAT USE.** *Paleosuchus palpebrosus* occurs along the Orinoco and Amazon River drainages and the Atlantic Coast drainage that lies between these two rivers in Colombia, Ecuador, Peru, western Bolivia, Venezuela, Brazil, French Guiana, Guiana, and Surinam (Magnusson and Campos 2010. *In* Manolis and Stevenson [eds.], Crocodiles. Status Survey and Conservation Action Plan, 3rd ed., pp. 40–42. Crocodile Specialist Group, Darwin, Australia; Rueda-Almonacid et al. 2007. Las Tortugas y los Cocodrilianos de los Países del Trópico. Serie de Guías Tropicales de Campo No. 6. Conservation International, Bogotá, Colombia. 538 pp.). In Brazil this species is also found in the Paraguay, Paraná and São Francisco Basins (Magnusson and Campos 2010, *op.cit.;* Rueda-Almonacid et al. 2007, *op. cit.*), with small populations occupying the upper Paraguay River drainage in Paraguay (Medem 1958. Field. Zool. 39:227–247; Scott et al. 1990. Vida Silvestre Neotropical 2:43–51). *Paleosuchus palpebrosus* is found in shallow muddy streams along a dry forest area at high elevations (620 m), as in small lakes and dams in the lower altitude areas along the Poti River. This generalist occurs in a wide variety of aquatic habitats, including flooded forests, quiet stretches of large rivers and around rapids in Central Amazonia (Magnusson 1985. Amazonia 9:193–204; Magnusson and Campos 2010, *op. cit.*), palm swamps, and streams lined by gallery forests in Venezuela and in headwater rivers and streams of ridges with waterfalls around the Pantanal (Campos et al. 1995. Herpetol. J. 5:321–322; Campos et al. 2010. Amphibia-Reptilia 31:439–442).

Considered one of the least known New World crocodilian species (Magnusson and Campos 2010, *op. cit.*), ecological data

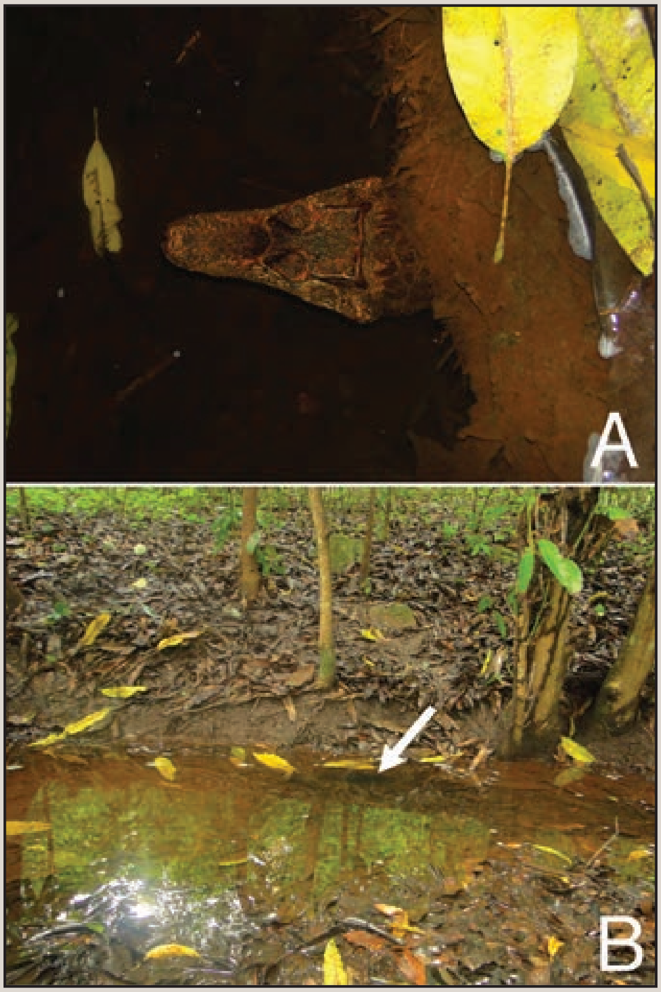

Fig. 1. A) Dorsal view of *Paleosuchus palpebrosus* leaving the underwater shelter; B) view of the burrow utilized by *P. palpebrosus* at the Serra das Almas Reserve, in the municipality of Crateús, Ceará State, Brazil.

for *P. palpebrosus* in Brazil are restricted to the Central Amazonia and Pantanal ecosystems (Campos and Sanaiotti 2006. Herpetol. Rev. 37:81; Campos et al. 1995, *op. cit.*; Campos et al. 2010, *op. cit.*; Magnusson 1985, *op. cit.*; Magnusson et al. 1987. J. Herpetol. 21:85–95). Very little information exists regarding the populations within the Caatinga. Herein we provide ecological data on *P. palpebrosus* habitat use within the Caatinga of semi-arid northeastern Brazil.

The following observations were made at the Reserva Particular de Patrimônio Natural (RPPN), Serra das Almas (05.082720°S, 40.550253°W, SAD 69; 619 m elev.), a Private Protected Area in the municipality of Crateús, state of Ceará. The Reserve encompasses ca. 5646 ha with several different plant communities, from the carrasco and seasonal deciduous forest (dry forest) at higher altitudes (ca. 600–700 m), to the Caatinga (*sensu stricto*) in lower elevations (Lima et al. 2009. Acta Bot. Bras. 23:756–763).

During the dry season (August–December) in the years 2008 and 2009, *P. palpebrosus* individuals were seen walking along trails ca. 5 km away from water, likely searching for available pond habitats. Paolilla and Gorzula (1985. Herpetol. Rev. 16:27) reported extensive terrestrial movements by *P. palpebrosus* searching for ephemeral ponds in Venezuela; Campos et al. (1995, *op. cit.*) found lower densities of *P. palpebrosus* in the streams at Serra do Amolar when the streams in the area were very dry, suggesting the possibility of migrations of those individuals.

On 10 April of 2011, during a nocturnal survey at RPPN Serra das Almas, we found a *P. palpebrosus* inside an underwater burrow (entrance = 58 cm wide; depth = 1.25 m; height = 30 cm) in a bank of a small stream (Fig. 1), with only the head protruding from the burrow entrance below the water's surface. As we attempted to capture it, the individual retreated into the burrow and remained within it for as long 1 hour and 20 minutes, only coming out to breathe and then retreating into the shelter. During the next two consecutive days we found the same individual using this burrow, eluding our capture. This species has been reported to occupy deep burrows in dried out swamps and also in underwater burrows in the river banks (Medem 1958, *op. cit.*), similar to the habitats we observed at the Serra das Almas reserve.

One of us (CGA) visited this same area in 2002 and observed this same burrow occupied by an individual *P. palpebrosus.* Unfortunately, we cannot affirm that is the same individual in our most recent observations. However, it is apparent that this shelter has been utilized by caimans over the last decade. Rueda-Almonacid et al. (2007, *op. cit.*) attest that *P. palpebrosus* is a territorial species inhabiting the same places for a very long time, and that occupancy is related to food availability at a given site. The stream where *P. palpebrosus* was found at Serra das Almas is located in a rich and preserved ecosystem, possessing a wide variety of prey. No other individuals of this species were seen in the area.

We thank Associação Caatinga for logistic support and for authorization to conduct field work at the RPPN Serra das Almas, and Zilca Campos for valuable comments on the early versions of the manuscript.

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SQUAMATA — LIZARDS

***ACANTHOSAURA ARMATA* (Peninsular Horned Tree Lizard). REPRODUCTION.** *Acanthosaura armata* is distributed through Southern Thailand, south through Peninsular Malaysia to Singapore and Sumatra and is also known from the Andaman Islands (Grismer 2011. Amphibians and Reptiles of the Seribuat Archipelago (Peninsular Malaysia), Edition Chimaira, Frankfurt am Main. 239 pp.). In this note we report additional information on reproduction of *A. armata* from a histological examination of gonadal material.

A sample of 23 *A. armata* from West Malaysia collected from 2002 to 2005, 2008, 2009, and 2012 by LLG and deposited in the herpetology collection of La Sierra University, Riverside, California, USA was examined. The sample consisted of nine adult males (mean SVL = 109.3 mm ± 10.4 SD, range = 98–134 mm), nine adult females (mean SVL = 115.1 mm ± 6.4. SD, range = 104–123 mm), two juvenile males (mean SVL = 92.0 ± 7.1 SD, range = 87–97 mm) and three juvenile females (mean SVL = 86.3 mm ± 14.6 SD, range = 70–98 mm). *Acanthosaura armata* were collected in West (Peninsular) Malaysia (by state): Johor (N = 3), Kedah (N = 1), Pahang (N = 11), Perlis (N = 2), Terengganu (N = 6).

Table 1. Monthly stages in the ovarian cycle of nine adult female *Acanthosaura armata* from West Malaysia.

Month	N	Quiescent	Yolk depositon	Enlarged follicles > 5 mm	Oviductal eggs
June	4	2	2	0	0
July	2	2	0	0	0
September	3	3	0	2	1

A cut was made in the lower abdominal cavity and the left testis or ovary was removed, embedded in paraffin, cut into 5 µm sections and stained with Harris hematoxylin followed by eosin counterstain. Enlarged follicles (> 5 mm) or oviductal eggs were Quantified. Histology slides were deposited in the herpetology collection of La Sierra University (LSUHC).

Two stages were noted in the testicular cycle: 1) recrudescent, there is a proliferation of germinal cells in the seminiferous tubules for the next period of spermiogenesis; primary or secondary spermatocytes predominate; 2) spermiogenesis, seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids. The smallest reproductively active male (spermiogenesis) measured 98 mm SVL (LSUHC 9093) and was collected in June. Three adult males, each from June, July, and August were undergoing spermiogenesis. Two juvenile males exhibited recrudescence. They were collected in February (LSUHC 10602, SVL = 87 mm) and July (LSUHC 4731, SVL = 97 mm). It is not known when they would have joined the breeding population.

Four stages were noted in the ovarian cycle of *A. armata* (Table 1): 1) quiescent, no yolk deposition; 2) yolk deposition, vitellgenic yolk granules in the ooplasm); 3) enlarged follicles > 5 mm; 4) oviductal eggs. Mean clutch size (N = 3) was 8.0 ± 1.0, range = 7–9); 7 oviductal eggs in LSUHC 9386; 8 enlarged follicles (> 5 mm) in LSUHC 9405; 9 enlarged follicles (> 5 mm) in LSUHC 9389. The smallest reproductively active female (LSUHC 9405) was collected in September and contained 8 enlarged (> 5 mm) follicles and measured 104 mm SVL. There was no evidence that *A. armata* produces multiple clutches (oviductal eggs and concurrent yolk deposition), although this may reflect our small sample size. Cox et al. (1998. A Photographic Guide to Snakes and Other Reptiles of Thailand and South-east Asia. Asia Books Co. Ltd, Bangkok, Thailand, 144 pp.) reported that females of *A. armata* deposited clutches of 9–15 eggs. Also, there is a report of *A. armata* females depositing 10–12 eggs in Thailand (Taylor and Elbel 1958. Univ. Kansas Sci. Bull. 38:1033–1189). Our report here on clutches of 7 and 8 are new minimum clutch sizes for *A. armata*.

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***ACANTHOSAURA CARDAMOMENSIS.* REPRODUCTION.** *Acanthosaura cardamomensis* was recently described from eastern Thailand and western Cambodia by Wood et al. (2010. Zootaxa 2488:22–38). In this note we report the first information on reproduction in *A. cardamomensis.*

One female (SVL = 143 mm) collected in Pursat Province, Cambodia July 2009 and deposited in the herpetology collection of La Sierra University (LSUHC), Riverside County, California as LSUHC 9328 was examined.

A cut was made in the lower abdominal cavity and the left ovary was examined. The ovaries contained enlarged follicles (> 6 mm) which were quantified. The left ovary contained ten and the right ovary contained eleven, totaling a clutch of 21 eggs. This is the first egg clutch reported for *A. cardamomensis.*

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***ANOLIS CAROLINENSIS* (Green Anole). PREDATION.** On 14 August 2013 around 0730 h MCB was observing the birdfeeders and birdhouses at his residence (Harrison Co., Mississippi, USA; 30.387325°N, 89.021624°W, datum WGS84/NAD83) when he noticed a commotion near the potted plants on his front porch. An adult Carolina Wren (*Thryothorus ludovicianus*) was observed smacking and shaking something large and elongated. When the wren flew up to the nearby birdhouse it became apparent that it had a juvenile *Anolis carolinensis* in its beak which it quickly fed to its chicks. This behavior was observed for a second time at approximately 1130 h. A third anole was observed being fed to the chicks at 1619 h (Fig. 1). There were at least two exchanges of food missed while leaving the point of observation to retrieve and set up a camera, but were evidenced by long green tails protruding from the entrance hole of the birdhouse that were longer than the lizard in Fig. 1. Adult wrens were also seen bringing larger unidentifiable pieces of flesh assumed be the remains of a larger dismembered *A. carolinensis*. Similar behavior has been noted for vireos feeding on *A. carolinenis* (Sykes et al. 2007. Wilson J. Ornithol. 119:508–510). Additional observations were made on 15 August and 16 August of both whole lizards and parts being brought in by the adult wrens.

Lizards are identified in the diet of the Carolina Wren as far back as 1916 (Beal et al. 1916. Common Birds of the Southeastern United States in Relation to Agriculture. Farmers Bulletin 755, 40 pp.), but no species identifications were provided. Generally, predation of vertebrates by passerine birds is considered uncommon (Lopes et al. 2005. Lundiana 6:57–66). This observation is the first documented record of *A. carolinensis* being consumed by Carolina Wrens and judging by the frequency of captures

Fig. 1. Carolina Wren (*Thryothorus ludovicianus*) feeding its young a Green Anole (*Anolis carolinenis*).

noted here this wren species may be a significant predator of anoles at least during the bird's nesting season.

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***APHANIOTUS FUSCA* (Dusky Earless Agama). REPRODUCTION.** *Aphaniotus fusca* occurs in southern Thailand southward through Peninsular Malaysia to Sumatra and Borneo (Grismer 2011. Amphibians and Reptiles of the Seribuat Archipelago (Peninsular Malaysia) A Field Guide. Edition Chimaira, Frankfurt am Main. 239 pp.). The purpose of this note is to provide additional information on the reproductive cycle of *A. fusca* from Peninsular Malaysia from a histological examination of gonadal material.

A sample of 73 *A. fusca* from West Malaysia collected 2001 to 2006, 2008, 2011, 2012 by LLG and deposited in the herpetology collection of La Sierra University, California, USA (LSUHC) was examined. The sample consisted of 38 adult males (mean SVL = 61.1 mm ± 5.1 SD, range = 53–72 mm), 29 adult females (mean SVL = 58.1 mm ± 4.1 SD, range = 48–63 mm) and 6 juveniles (mean SVL = 39.2 mm ± 7.8 SD, range = 28–52 mm). *Aphaniotus fusca* were collected in West (Peninsular) Malaysia, including (by state): Johor (N = 30), Kedah (N = 2), Pahang (N = 37), Perak (N = 1), and Selangor (N = 2).

A cut was made in the lower abdominal cavity and the left testis or ovary was removed, embedded in paraffin, cut into 5 µm sections and stained with Harris hematoxylin followed by eosin counterstain. Enlarged follicles (> 4 mm) or oviductal eggs were counted. Histology slides were deposited in LSUHC.

Two stages were noted in the testicular cycle: 1) recrudescence, proliferation of germ cells in the seminiferous tubules prior to spermiogenesis; 2) spermiogenesis, seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids. The following monthly samples exhibited spermiogenesis: March (N = 6), July (N = 19), August (N = 8), September (N = 5). Testes of two other males from July exhibited recrudescence. The smallest reproductively active males (spermiogenesis) measured 53 mm SVL (LSUHC 10307–10309) and were collected in September and (LSUHC 6507) collected in July. Two males exhibiting recrudescence were from July (LSUHC 4558), SVL = 53 mm and (LSUHC 5548) SVL = 54 mm. Because these are close to the minimum size for male maturity, it is conceivable they would have joined the male breeding population shortly.

Five stages were present in the ovarian cycle (Table 1): 1) quiescent, no yolk deposition; 2) yolk deposition (vitellogenic granules in the ooplasm; 3) enlarged follicles > 4 mm; 4) oviductal eggs; 5) oviductal eggs with concurrent yolk deposition for a subsequent clutch. Mean clutch size (N = 24) was 1.04 ± 0.20 SD, range = 1–2. The large number of females with oviductal eggs and yolk deposition in progress is evidence *A. fusca* produces multiple clutches in the same year. The smallest reproductively active female (follicles > 4 mm) measured 48 mm SVL (LSUHC 4816) and was collected in July. *Aphaniotus fusca* has an ovarian cycle reminiscent of *Anolis* lizards (Goldberg et al. 2002. Pac. Sci. 56:163–168) with a prolonged breeding season and production of single eggs in succession.

Table 1. Monthly stages in the ovarian cycle of 29 adult female *Aphaniotus fusca* from West Malaysia.

Month	N	Quiescent	Yolk depositon	Enlarged follicles > 4 mm	Oviductal eggs	Oviductal eggs and yolk deposition
March	2	0	1	0	1	0
July	21	1	1	3	4	12
August	3	0	0	1	0	2
September	3	0	2	1	0	0

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***ASPIDOSCELIS DEPPII* (Black-bellied Racerunner). PREDATION BY TURKEY VULTURE.** *Aspidoscelis deppii* is widely distributed from Veracruz and Michoacan, Mexico, to Costa Rica (Köhler et al. 2006. The Amphibians and Reptiles of El Salvador, Krieger Publishing Company, Malabar, Florida. 238 pp.). Neotropical lizards are abundant and common prey to all classes of terrestrial vertebrates, and bird predation of lizards is well known.

The Turkey Vulture (*Carthartes aura*) is widely distributed from southern Canada south to South America and is present throughout the entire range of *A. deppii*, where it occupies a variety of open and forested habitats and feeds opportunistically on a wide range of wild and domestic carrion. While almost exclusively a scavenger, this species is known to rarely kill small animals or invertebrates (Kirk and Mossman 1998. *In* A. Poole [ed.], The Birds of North America Online. Cornell Lab of Ornithology, Ithaca; accessed 15 August 2013).

An adult Turkey Vulture was collected during avian control to minimize wildlife hazards at the Aeropuerto Internacional de El Salvador (ca. 50 km SE of San Salvador, 13.4408°N 89.0556°W; datum WGS84) on 10 July 2012 and subsequently cataloged (USNM 646876) in the Bird Division at the National Museum of Natural History (NMNH) in Washington, DC. Dissection during preparation of the bird as a museum specimen revealed a male *A. deppii* (ca. 56 mm SVL) in the stomach. It was cataloged at the NMNH in the Division of Amphibians and Reptiles (USNM 580989). Tissue samples were removed from both the lizard and the bird and deposited in the biorepository at the NMNH. To the best of our knowledge, this is the first documented record identifying *A. deppii* as a prey item of the Turkey Vulture.

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***ASPIDOSCELIS DEPPII* (Black-bellied Racerunner). PREDATION BY GREAT EGRETS.** *Aspidoscelis deppii*) is widely distributed from Veracruz and Michoacan, Mexico to Costa Rica (Köhler et al. 2006. The Amphibians and Reptiles of El Salvador. Krieger Publishing Co., Malabar, Florida. 238 pp.). Neotropical lizards are abundant and common prey to all classes of terrestrial vertebrates, and bird predation of lizards is well known.

The Great Egret (*Ardea alba*) is widely distributed across most tropical and warmer temperate regions of the world and is present throughout the range of *A. deppii*, where it forages opportunistically in a variety of wetland and upland habitats; preying mainly on fish, but also invertebrates, particularly crustaceans, amphibians, reptiles, birds, and small mammals (Mccrimmon, et al. 2011. *In* A. Poole [ed.], The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, accessed 14 August 2013).

Three adult Great Egrets were collected during avian control to minimize wildlife hazards at the Aeropuerto Internacional de El Salvador (ca. 50 km SE of San Salvador, 13.4408°N 089.0556°W; datum WGS84) from April to July 2012 and subsequently cataloged (USNM 646732, 646792, and 646957) in the Bird Division at the National Museum of Natural History (NMNH) in Washington, DC. Dissections during preparation of the 3 birds as museum specimens revealed a total of 13 *A. deppii*, four unidentified fish, and four unidentified grasshoppers in the stomachs, as follows: USNM 646732, four *A. deppii*, two fish, 3 grasshoppers; USNM 646792, one *A. deppii* and one grasshopper; USNM 646957, eight *A. deppii*, two fish. The *A. deppii* included three adults and ten juveniles, ranging in size from ca. 27 mm SVL to ca. 84mm SVL. Eleven of the 13 *A. deppii* were cataloged at the NMNH in the Division of Amphibians and Reptiles (USNM 580978–580988). Two juvenile specimens were discarded because they were too badly decomposed to save as museum specimens. Tissue samples were removed from all cataloged lizard and bird specimens and deposited in the biorepository at the NMNH. To the best of our knowledge, this is the first documented record identifying *A. deppii* as a prey item of the Great Egret.

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***ASPIDOSCELIS LAREDOENSIS* (Laredo Striped Whiptail) × *ASPIDOSCELIS GULARIS* (Texas Spotted Whiptail). MAXIMUM BODY SIZE.** *Aspidoscelis laredoensis* is a hybrid-derived parthenogenetic species (Bickham et al. 1976. Herpetologica 32:395–399; Dessauer and Cole 1989. *In* Dawley and Bogart [eds.], Evolution and Ecology of Unisexual Vertebrates, pp. 49–71. Bull. 466. New York State Museum, Albany, New York; McKinney et al. 1973. Herpetologica 29:361–366; Parker et al. 1989. *In* Dawley and Bogart [eds.], *op. cit.*, pp. 72–86; Wright et al. 1983. Herpetologica 39:410–416) that sustains its existence asexually through development of unreduced diploid eggs. However, there have been reports of sexual reproduction in the species resulting in hybrids from matings with males of *A. gularis* (Trauth et al. 2013a. Herpetol. Rev. 44[2]:314–316; Trauth et al. 2013b. Herpetol. Rev. 44[2]:316–318; Walker et al. 1989a. J. Herpetol. 23:119–130; Walker et al. 1989b. Copeia 1989:1059–1064; Walker et al. 2008. Herpetol. Rev. 39:340).

In this report we describe a preserved specimen (Fig. 1A–C) that is either an individual of *A. laredoensis* (2n = 46) or one of *A. laredoensis* × *A. gularis* (3n = 69) with the largest known body size, be it the one or the other. This lizard (originally catalogued as University of Arkansas Department of Zoology 7220 and recently re-catalogued as Arkansas State University Museum of Zoology 32421) was collected by JEC on 9 June 2004 as follows: Texas: Hidalgo County: 15 km SW of Mission, Bentsen Rio Grande Valley State Park (BRGVSP), site 1 deep within the forest a few m from the Rio Grande (26.159167°N, 98.3875°W, datum WGS84; 13.6 m elev.). We compared it with these specimens identified as

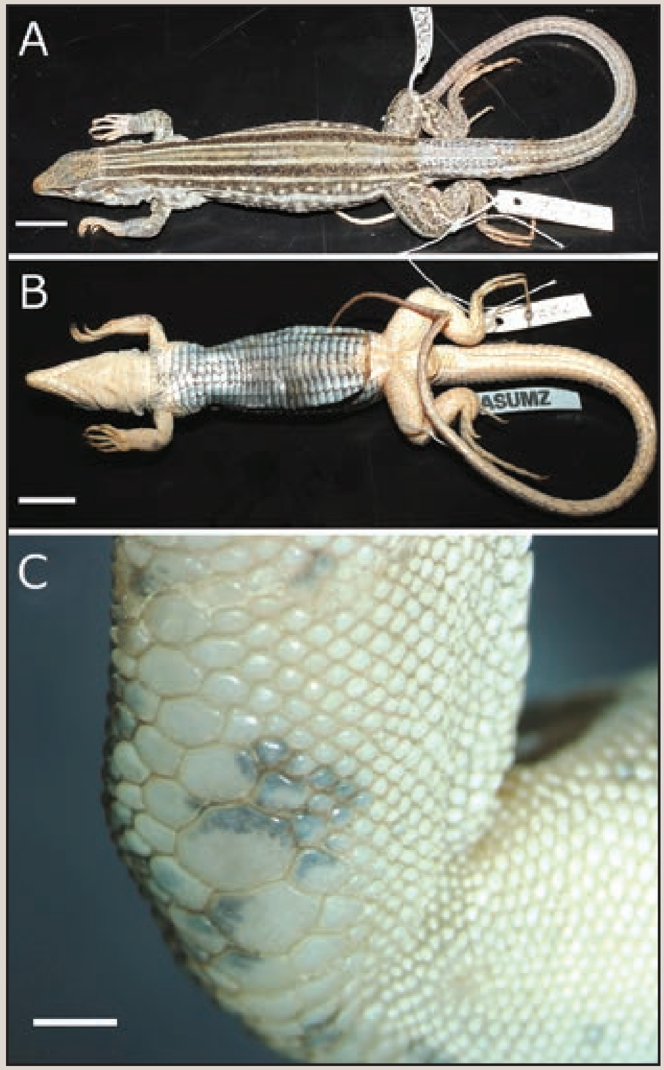

Fig. 1. Color pattern and morphological characteristics of a putative hybrid female specimen of *Aspidoscelis laredoensis* × *A. gularis.* A) Dorsal coloration and pattern of ASUMZ 32421; line = 10 mm. B) Ventral coloration of ASUMZ 32421; line = 10 mm. C) Postantebrachial scales of ASUMZ 32421; line = 1 mm.

A. laredoensis: from site 1 in BRGVSP [30 May 2003 (UADZ 7123–7126, N = 4)]; [31 May 2003 (UADZ 7128–7132, N = 5)]; [9 June 2004 (UADZ 7221–7222, N = 2)]; site 2 BRGVSP (26.169722°N, 98.381944°W, datum WGS84; 27.7 m elev.) [30 May 2003 (UADZ 7120-7122, N = 3)]; [10 June 2004 (UADZ 7223-7229, N = 7)]; [12 June 2004 (UADZ 7235–7236, N = 2)]. Only two specimens of *A. gularis* were collected, one from the site 1 origin of the hybrid [12 June 2004 (UADZ 7230, N = 1)], and one from site 2 in BRGVSP [12 June 2004 (UADZ 7234, N = 1)].

Paulissen (1999-2000. Herpetol. Nat. Hist. 7:41–57) reported that *A. laredoensis* (clonal complex A) is overwhelmingly the numerically dominant whiptail lizard species in BRGVSP (e.g., based on 707 different lizards captured during a six-year study and an estimate of 521–770 lizards/ha in 1996), whereas the gonochoristic species *A. gularis* is quite rare in the park (e.g., only 26 individuals captured over a period of four years). Our data for 2003 and 2004 collections in the park align with his observations on the relative abundance of these species. A consequence of the disproportionate numbers of lizards between these species in

BRGVSP is that there are many opportunities for hybridization given the number of potential encounters between males of *A. gularis* and females of *A. laredoensis*. Narrow roadways through the densely forested park result in concentrations of whiptails in the few corridors of suitable habitat, especially during periods in which the introduced bunchgrass species *Cenchrus ciliaris* is at peak growth. Our hypothesis that ASUMZ 32421 is a heterotic triploid hybrid female of *A. laredoensis* × *A. gularis* is supported by the preponderance of the evidence and comparison of it to genetically confirmed hybrids collected in BRGVSP by one of us (MAP) during the study of *A. laredoensis* in BRGVSP in the 1990s (Paulissen, *op. cit.*).

Large size is the most remarkable attribute of ASUMZ 32421. Prior to preservation it had a SVL of 96 mm, tail length of 302 mm, and body mass (BM) of 20.2 gm. For BRGVSP, Paulissen (*op. cit.*), reported a maximum SVL of 85 mm and BM of 17.4 g for *A. laredoensis*; the largest of our specimens of the species from the park has a SVL of 77 mm. Trauth et al. (2013a, *op. cit.*) reported a hybrid of *A. laredoensis* × *A. gularis*, a gynandromorph from Artesia Wells (28.281274°N, 99.285796°W; datum WGS84), La Salle Co., Texas, with a maximum SVL of 88 mm and BM of 14.0 g. Two morphological characters are also indicative of the hybrid origin of ASUMZ 32421. The postantebrachial scales (Fig. 1C) are closer in size to the enlarged scales of *A. gularis* than the moderately enlarged scales of *A. laredoensis*, and there are a lower number of granules around midbody (88) than within 16 individuals of *A. laredoensis* with a range of variation of 90–94. Three color pattern characters based on other specimens (Trauth et al. 2013a, *op. cit.*; Walker et al. 1989b, *op. cit.*) have also been shown to be indicative of a hybrid origin for the specimen: incomplete vertebral stripe (Fig. 1A); pink-red coloration on the throat region (Fig. 1B); and purple-blue coloration on the thoracic/abdomen (Fig. 1B). Based on internal examination by one of us (SET), ASUMZ 32421 has four enlarged yolked ovarian follicles on each side. They range from 4–8 mm in diameter. The ovaries also had several small immature follicles. The oviducts were partially enlarged and convoluted. No other gonadal tissue was observed on either side. It seems likely that this individual was capable of producing /ovipositing a clutch which would be contrary to findings of complete sterility for hybrids of other species (e.g., *A. tesselata* × *A. tigris* in Chaves Co., New Mexico; Taylor et al. 2001. Am. Mus. Novitat. 3345:1–65), as well as the combination discussed herein (Trauth et al. 2013b, *op. cit.*).

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***CHATOGEKKO AMAZONICUS*. PREDATION.** *Chatogekko amazonicus* is a very small lizard species (males 22 mm, females 24 mm SVL) (Gasc 1981. Rev. Ecol. [Terre et Vie] 35:273–325) inhabiting leaf litter in forests and is distributed in Brazil (Amazonas, Amapa, Para, Rondonia, Acre), southern Venezuela, southern Guyana, French Guiana, Surinam (Uetz [ed.] 2012. The Reptile Database. Online database available at: http://www.reptile-database.org, accessed 2 Feb 2013). Avila-Pires (1995. Zool. Verh. 299: 250) found an example of *Chatogekko amazonicus* in the stomach of the snake *Taeniophallus brevirostris*. Herein we report predation on *C. amazonicus* by a spider of the family Ctenidae.

Fig. 1. A juvenile *Chatogekko amazonicus* being preyed upon by a ctenid spider.

On 29 Jan 2013 at 1200 h, we found a juvenile *C. amazonicus* (14.73 mm SVL) preyed upon by a subadult ctenid spider (10. 61 mm from the anterior tip of the head to the posterior end of the abdomen) in leaf litter of dense forest in the area of Sustainable Development Project (PDS) Virola-jatoba, Anapu – Pará, Brazil (3.17407°S, 51.29803°W; datum WGS84). Few studies are available regarding prey-predator relationships between reptiles and arthropods. This is the first record of a known invertebrate predator for *C. amazonicus*. The lizard (LZA 422) was deposited in the herpetological collection of the Laboratório de Zoologia Universidade Federal do Pará, Campus de Altamira.

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***CNEMIDOPHORUS MURINUS MURINUS* (Laurent's Whiptail). MYIASIS.** On 12 January 2013, east of the Marazul Dive Resort, Sabana Westpunt, Curaçao (12.362547°N, 69.1533°W; approx. 41 m elev.), I observed and photographed an adult male *Cnemidophorus murinus murinus* exhibiting widespread symptoms of ectoparasitism by dipteran eggs (2–4 mm), yet the pathogenic species remains ambiguous. The individual was approximately 17 cm in SVL and 25 cm in total length. Cursory examination of the specimen from a safe distance showed it to be alive, ambulatory, but with obvious signs of tissue damage, impaired motor skills, and other physical stresses (Fig. 1). When approached, the lizard would make quick spasmodic movements displacing several adult dipterans. Intermittent and sequential stops by the lizard would result in the return of the flies. Some basic motor skills persisted in the individual but they appeared to be severely diminished. After capture and closer examination, all facial orifices, several skin folds, and various lacerations exhibited an extensive degree of infestation. This pathological condition is known as myiasis. The lizard exhibited an extensive degree of nasal, ocular, oral, tympanic, and cutaneous myiasis (Fig. 2). For this individual, the high levels of soft tissue damage and the clear signs of morbidity appeared to be reaching fatal stages.

FIG. 1. Laurent's Whiptail Lizard (*Cnemidophorus murinus murinus*) exhibiting myiasis.

FIG. 2. Detail of extensive nasal, ocular, oral, tympanic, and cutaneous myiasis in *Cnemidophorus m. murinus.*

Myiasis varies widely in pathology, often causing serious hemorrhages and deteriorates the overall host's health, frequently becoming fatal. Several genera of calliphorid flies can induce myiasis, including blowflies and screwworms. Maggot infestation is a frequent health concern of livestock and other mammalian hosts. Yet, observations of myiasis in reptiles are rare, and there is only limited information on taxonomic classification of its causative agents, however, some cases of reptilian myiasis have been described. For instance, in Italy, the Greek Tortoise (*Testudo graeca*) was parasitized by blowfly larvae of *Lucilia ampullaceal* (Principato and Cioffi 1996. Int. Congr. Entomol. 8:769). Additionally, an incident of myiasis was described in the Czech Republic involving Hermann's Tortoise (*T. hermanni*) attributed to the blowfly larvae of *Calliphora vicina* (Knotek et al. 2005. Act. Vet. Brno. 74:123–128). To our knowledge the observation reported herein represents the first record of fatal myiasis in *Cnemidophorus m. murinus.*

On Curaçao, myiasis is commonly seen in mammalian hosts, specifically among the ubiquitous and large populations of feral dogs and goats, and *Cochliomyia hominivorax* has been linked to the most documented cases on the island (Tannahill et al. 1980. J. Med. Entomol. 17:265–267). *Cochliomyia hominivorax* can lay up to 400 eggs on exposed wounds and the larvae possess noxious saliva, which stimulates infections, destroys integral tissues, and produces malodourous pus. This ectoparasite prefers to feed on living tissue rather than on carcasses or necrotic tissues. *Cochliomyia hominivorax* was eradicated from Curaçao in 1954 and again in 1977 by means of sterile male introductions (Tannahill et al., *op. cit.*). However, reintroductions have been documented on the island and this observation of myiasis may suggest its presence, yet for this incident the taxonomic classification of the causing agent remains unclear. This specific case also raises health concerns for the reptilian fauna of Curaçao. Presently, large populations of feral dogs and goats exist on the island, thereby providing an abundant reservoir for the larval stage of parasitic dipterans. The presence of an old tail injury on the whiptail lizard may have been the original oviposition site for myiasis in this instance. Accordingly, reptiles on Curaçao may be faced with a negative and potentially life-threatening effect associated with a wound.

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***EUTROPIS LONGICAUDATA* (Long-tailed Sun Skink). ENDOPARASITES.** *Eutropis longicaudata* (= *Mabuya longicaudata*) is known from parts of Thailand, Laos, Vietnam, China, Taiwan, and West-Malaysia (Manthey and Grossmann 1997. Amphibien & Reptilien Südostasiens. Natur und Tier – Verlag, Berlin. 512 pp.). The only endoparasite record for *E. longicaudata* that we are aware of is the pentastome, *Raillietiella frenatus*, reported from an *E. longicaudata* (as *Mabuya longicaudata*), collected in Taiwan (Ali et al. 1981. Syst. Parasitol. 3:193–207). The purpose of this note is to add to the endoparasite list for *E. longicaudata.*

A road-killed male *E. longicaudata* (SVL = 124 mm) was found on a tarred road in an agricultural area in Santzepu (23.4294°N, 120.4836°E, TWD97; elev. 66 m), Sheishan Dustrict, Chiayi County, Taiwan, R.O.C., on 27 June 2012, deposited in the herpetology collection of the Natural History Museum of Los Angeles County (LACM), California, USA as LACM 183389, and was examined for helminths.

The digestive tract was removed, opened, and examined under a dissecting microscope. Forty-one digenes were found in the small intestine and were regressively stained in hematoxylin, mounted in balsam on a glass slide, cover slipped, studied under a compound microscope, and identified as *Mesocoelium monas*. They were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, USA as *Mesocoelium monas* (USNPC 106399).

Mesocoelium monas is cosmopolitan in distribution and is known from a large number of hosts (Bursey et al. 2012. Comp. Parasitol. 79:75–132). Infection occurs with the ingestion of an infected snail or vegetation supporting cysts (Thomas 1965. J. Zool. 146:413–446). *Mesocoelium monas* and *Raillietiella frenatus* currently comprise the parasite list for *E. longicaudata*.

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GYMNOPHTHALMUS SPECIOSUS **(Golden Spectacled Tegu). PREDATION BY GREAT EGRET.** *Gymnophthalmus speciosus* is widely distributed from northeastern Guatemala and the Isthmus of Tehuantepec to Colombia, Venezuela, and Guyana (Köhler et al. 2006. The Amphibians and Reptiles of El Salvador. Krieger Publishing Co., Malabar, Florida. 238 pp.). Neotropical lizards are abundant and common prey to all classes of terrestrial vertebrates, and bird predation of lizards is well known.

The Great Egret (*Ardea alba*) is widely distributed across most tropical and warmer temperate regions of the world and is present throughout the range of *G. speciosus*, where it forages opportunistically in a variety of wetland and upland habitats; preying mainly on fish, but also invertebrates, particularly crustaceans, amphibians, reptiles, birds, and small mammals (McCrimmon et al. 2011. *In* A. Poole [ed.], The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, accessed 14 August 2013).

An adult Great Egret was collected during avian control to minimize wildlife hazards at the Aeropuerto Internacional de El Salvador (ca. 50 km SE of San Salvador, 13.4408°N 089.0556°W; datum WGS84) on 30 June 2012 and subsequently cataloged (USNM 646732) in the Bird Division at the National Museum of Natural History (NMNH) in Washington, DC. Dissection during preparation of the bird as a museum specimen revealed an adult *G. speciosus* (ca. 45 mm SVL) in the stomach. It was cataloged at the NMNH in the Division of Amphibians and Reptiles (USNM 580990). Tissue samples were removed from both the lizard and the bird and deposited in the biorepository at the NMNH. To the best of our knowledge, this is the first documented record identifying *G. speciosus* as a prey item of the Great Egret.

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HEMIDACTYLUS CRASPEDOTUS **(Frilly House Gecko). ENDOPARASITES.** *Hemidactylus craspedotus* ranges from southern Thailand, south of the Isthmus of Kra, through Peninsular Malaysia and Singapore to northern Borneo; it is a nocturnal, arboreal, cryptic species (Grismer 2011. Lizards of Peninsular Malaysia, Singapore and their Adjacent Archipelagos, Edition Chimaira, Frankfurt am Main. 728 pp.). There are, to our knowledge, no records of endoparasites for *H. craspedotus*. The purpose of this note is to establish the initial helminth list for *H. craspedotus* as part of an ongoing survey of lizard helminths from Southeast Asia.

A sample of eight *H. craspedotus* (mean SVL = 58.8 mm ± 3.1 SD, range = 54–63 mm) collected in West Malaysia 2002 to 2004, 2006 and 2010 by LLG and deposited in the herpetology collection of La Sierra University (LSUHC), Riverside, California was examined for helminths, including (by state): LSUHC 4754, 6330, 8230 Johor; LSUHC 5080, 5081, 9728 Kedah; LSUHC 5613 Perak; LSUHC 6316 Pahang.

The digestive tract was removed from a mid-ventral incision and the esophagus, stomach, small and large intestine were opened and their contents were examined for parasites utilizing a dissecting microscope. Eight nematodes were found. Each was placed in a drop of lactophenol on a glass microscope slide, cover slipped and studied under a compound microscope. Two species of Nematoda were identified: two female *Skrjabinelazia hemidactyli* were found in the lumen of the large intestine; six *Physocephalus* sp. (3rd stage larvae, most likely *P. sexalatus*) were found in cysts in the stomach wall. Prevalence (number infected/number examined × 100) = 25%, mean intensity (mean number infected individuals) = 3.0 ± 2.8 SD, range = 1–5. Voucher helminths were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, USA, as *Skrjabinelazia hemidactyli* (USNPC 107222; *Physocephalus* sp. (USNPC 107223).

Skrjabinelazia hemidactyli was described from *Hemidactylus brooki* from India by Shamim and Deshmukh (1982. Riv. Parassitol. 43:469–472). The host list includes three gekkonid species from Sri Lanka (Goldberg et al. 2011. Comp. Parasitol. 78:359–366).

Hemidactylus craspedotus represents a new host record for *S. hemidactyli*. West Malaysia is a new locality record. Lizards commonly serve as paratenic (transport hosts) for larvae of *Physocephalus* sp. No further development occurs and the larvae remain dormant until the lizard is eaten by a definitive host. Lizards acquire *Physocephalus* sp. by feeding on infected dung beetles (Anderson 2000. Nematode Parasites of Vertebrates: Their Development and Transmission. CABI Publishing, Oxon, UK. 650 pp.). *Hemidactylus craspedotus* represents a new host record for larvae of *Physocephalus* sp. West Malaysia is a new locality record.

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HEMIDACTYLUS PLATYURUS **(Flat-tailed House Gecko). PREDATION.** *Hemidactylus platyurus* is a moderate-sized (43–58 mm SVL) gecko with a widespread distribution in Southeast Asia and in the Philippines (Brown and Alcala 1978. Philippine Lizards of the family Gekkonidae. Silliman University Press. Dumaguete, Philippines. 146 pp.). This note reports the observed predation of *H. platyurus* by a dragonfly, *Anax* cf. *panybeus* (Odonata: Aeshnidae).

At 1330 h on 8 September 2013, JA observed a female *Anax* cf. *panybeus* (60 mm right hindwing length), clutching a still struggling *Hemidactylus platyurus*, land on a branch of a tamarind tree (*Tamarindus indica*) in Pueblo de Panay, Barangay Dinginan, Roxas City, Capiz Province, Panay Island, Philippines (11.548572°N, 122.727822°E, WGS84; elev. 112 m). The dragonfly utilized its anterior legs to hold on to its prey while simultaneously chewing the left eye of the gecko for ca. four minutes. To our knowledge, this is the first recorded incident of a dragonfly predating on a lizard in the Philippines. Photographic vouchers were deposited at the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC[IMG] 2.183a–c).

We thank R. J. Villanueva for identification of the dragonfly, Kelvin K. P. Lim for ZRC voucher numbers, and Cameron Siler for comments on this note.

Fig. 1. A female *Anax* cf. *panybeus* preying upon a *Hemidactylus platyurus* in Panay Island, Philippines.

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IGUANA DELICATISSIMA **(Lesser Antillean Iguana). MORTALITY.** The Lesser Antillean Iguana was originally found in the Lesser Antilles from Anguilla to Martinique, but is rapidly being lost from both large and small islands due to a range of factors (Breuil 2002. Patr. Natur. 54:1–339; Powell and Henderson 2005. Iguana 12:62–77). As populations continue to decline, life history information on the species remains very limited (Knapp 2007. Iguana 14:223–225; Pasachnik et al. 2006. Cat. Amer. Amphib. Rept. 811:1–14). The species is also found on St. Eustatius but in very low numbers (Fogarty et al. 2004. Iguana 11:139–146). During a population assessment for this species from May to December 2012, we collected data on the causes of mortality and endangerment by interviewing 53 local inhabitants and compiling all cases known to staff and volunteers of the National Parks Foundation of St. Eustatius during 2012 (Table 1). Dogs kept in island gardens in areas used by iguanas were the largest source of documented mortality on St. Eustatius. Of the 19 estate owners spoken to during our survey, 10 (52%) kept dogs. This source of mortality could be limited by reducing the number of dogs and cats kept, by restricting their movement to smaller sections of the estates' gardens, and/or by placing suitable shelter bushes in the yard so that the iguanas have access to effective refugia. Hunting, which is illegal and carries maximum penalties up to US $5000, was a minor problem, but remains unenforced in St. Eustatius. Aside from road-kill, which has been identified as problematic in Dominica (Knapp, *op. cit.*), entanglement and entrapment of iguanas in human materials and structures is documented here for the first time as a major endangerment to the species. This appears to be especially true of gravid females getting stuck in the harmonica wire fencing (7.6 cm mesh diam.), a material that is used extensively on the island. People should be encouraged to use standard livestock fencing rather than this harmful material. Abandoned cisterns are numerous on the island and prove to be quite dangerous to iguanas. These should be mapped and equipped with an iron rebar woven into wire mesh to allow for escape. Because of the small and declining iguana population present on the island and the fact that we certainly missed a large part of all mortality sources, our observations suggest that high mortality rates, ultimately ascribable to man, are a key factor limiting recovery of this critically endangered species on St. Eustatius.

Table 1. Overview of documented death or endangerment of iguanas in St. Eustatius, April–December 2012.

Source	Mortality	Rescue	Total
Dogs	10	1	11
Traffic	3	–	3
Cistern	1	4	5
Fencing	–	6	6
Hunting	2	–	2
Unknown	1	–	1
Total incidents			28

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IGUANA DELICATISSIMA **(Lesser Antillean Iguana). REPRODUCTION.** During an eight-month study on the St. Eustatius population of *Iguana delicatissima*, we covered more than 64 km

Table 1. Data on documented iguana nesting locations on St. Eustatius.

Site & Location	Altitude (m)	Site type	Site origin	Shading	Orientation of clearing	Available area (m^2)	Number of holes	Date of last digging	Principal threat
1 - S Quill slopes	206	gully ridge	natural	low	E-W	60	9	U*	trampling**
2 - W Quill slopes	124	trail head	semi-natural	medium	E-W	100	1	22 Nov 2012	overgrowth
3 - W Quill slopes	243	trail cut	semi-natural	medium	E-W	18	6	U	overgrowth
4 - W Quill slopes	243	trail clearing	semi-natural	medium	E-W	30	3	1 Jan 2013	overgrowth
5 - Estates	171	fenced garden	man-made	low	NA***	4	1	20 Nov 2012	dog
6 - Estates	200	fenced garden	man-made	high	NA	3	1	10 Nov 2012	cat

*(U) = unknown, **due to goats, *** (NA) = not applicable

of transects and trails, and interviewed more than 53 local island inhabitants to gain insight into reproduction of this critically endangered species (Knapp 2007. Iguana 14:223–225; Powell and Henderson 2005. Iguana 12:62–77). Notwithstanding considerable effort, we only documented six nest sites in use (Table 1). The largest (and only entirely natural) nest site was found was a barren patch of about 5 × 12 m on a ridge between two densely forested gullies on the lower southern flank of the Quill. The area was bare, well-drained, with mull gravel and sand, and had nine holes in all. A dry shell of a successfully hatched egg was found at the site. Overgrowth with shading, higher humidity, and soil compaction were the main threats to the remaining (semi-natural) sites, whereas domestic predators were the main threat to nests deposited in local estate gardens (Table 1). Iguanas were even found to make use of small and narrow forest clearings as long as these were oriented favorably with respect to the sun. Other animals that commonly dig burrows on St. Eustatius include the lizard *Ameiva erythrocephala* and land crab *Gecarcinus ruricola*. These species dig burrows largely for shelter and consequently select moister and more shaded sites. Their burrows also differ importantly in shape and size from iguana nest-related digging. Measurements of four entrances of iguana nesting cavities were as follows (heights/width in cm): site 3: 13/18, 14/15; site 4: 10/14, 14/18. *I. delicatissima* is known for its protracted nesting season but for St. Eustatius this was unknown. Our results show that on St. Eustatius nesting occurs minimally from November through January. Two natural nest sites documented for the period Jan–Aug 2008 by Nicole Esteban (with egg shells seen) on the wind-swept ridges of Gilboa Hill, were visited (by AOD and a National Parks intern) on 26 Nov 2012. Two hours of intensive searching of the area by two persons yielded no signs of any iguana nest-digging activity. Historical anecdotes that “formerly the people swam with iguanas at Venus Bay” suggested that this site was an important iguana locality at one time. However, a field visit to Venus Bay on 24 November 2012 did not yield evidence of any nesting activity. On several islands, female iguanas are forced to migrate (often) long distances to coastal beaches for nesting due to lack of suitable sites elsewhere (Bock and McCracken 1988. J. Herpetol. 22:316–322; Breuil 2002. Patrim. Nat. 54:1–339). Our results and observations suggest likewise that on St. Eustatius, the interaction of vegetation and geology also limit nest site availability to the iguana. Our results further indicate that the sites presently used are vulnerable to humans and their non-native pets, livestock, and invasive weeds (particularly the Mexican Creeper Vine, *Antigonon leptopus*). Mapping, artificial creation and adequate protection of nest sites are recommended as key necessities for recovery of this endangered species on St. Eustatius.

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LEIOLEPIS GUTTATA **(Spotted Butterfly Lizard). REPRODUCTION.** *Leiolepis guttata* is currently known from only Vietnam (Van Sang et al. 2009. Herpetofauna of Vietnam. Edition Chimaira, Frankfurt am Main. 768 pp.). In this note we report the first information on reproduction in *L. guttata*.

One female (SVL = 116 mm) collected at Bin Chau (105.83°N, 10.85°E), Bà Rja-Vung Tàu Province, Vietnam, in June 2009 and deposited in the herpetology collection of La Sierra University (LSUHC), Riverside, California (as LSUHC 9239) was examined.

A cut was made in the lower abdominal cavity and the ovaries were examined. A total of three oviductal eggs were present, two in the left oviduct and one in the right oviduct. This is the first egg clutch reported for *L. guttata*.

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LIOLAEMUS BELLII **(Dusky Lizard). PREDATION.** *Abrothrix andinus* is a small South American field mouse (Rodentia: Cricetidae) with a body length of 10–13 cm, tail length of 4–5 cm, and body mass of 18–31 g (Iriarte 2008. Mamíferos de Chile. Lynx Ediciones, Barcelona, España. 420 pp.). The species is widely distributed and can be found in Peru, Argentina, and Chile. In the Chilean Andes it has been documented from 2500 to 4500 m above sea level in five different regions (Chile's first-level administrative divisions): I to IV and in the Región Metropolitana (Iriarte 2008, *op. cit.*). The species is considered to be omnivorous. In a study conducted during March 2000 at la Quebrada de Cruzaderos (29.783°S, 70.000°W; 3470–3650 m elev.) in the cordillera Doña Ana, north-central Chile, 30 fresh feces (6 per individual, N = 5) were analyzed and the majority of the items consumed were seeds, plant fibers, and insects (López-Cortés et al. 2007. Rev. Chil. Hist. Nat. 80:3–12). In another study where dietary samples were analyzed from Farellones at 2300 m elev., in the Andes of central Chile (33.35°S, 70.333°W; 50 km E of Santiago), more than 83% of food items during summer were plant material (Bozinovic et al. 1990. Physiol. Zool. 63:1216–1231). The rest of the food items were insects. Silva (2005. Rev. Chil. Hist. Nat. 78:589–599) reviewed dietary information for 25 species of small mammals inhabiting Chile and published in 11 scientific articles; there were no records of consumption of non-insect animal matter by *A. andinus*. To the best of our knowledge there are no reports of *A. andinus* preying on or consuming any animal species other than insects (e.g., lizards). Here we report a case of *A. andinus* chasing, killing, and consuming part of a male individual of the lizard *Liolaemus bellii* (Figs. 1–2). The observation by ES-B took place near El Colorado, Chile (33.233°S, 70.266°W) on 12 January 2012 at 1600 h when an *A. andinus* chased the lizard for 7–8 minutes in a semi-open area (sandy, gravelly soil with stones, rocks, and boulders of many sizes, and shrub vegetation). The mouse chased the lizard and bit its tail and dorsum several times; the reptile offered some resistance to the attack, fighting back on numerous occasions and trying to bite the mouse (Fig. 1). After struggling for a few minutes and in an obvious attempt to escape, the lizard ran underneath a large rock, but remained visible. The mouse followed it and then held onto it with its mouth. The mouse continued to bite the lizard's dorsum, flipped it upside down, and then bit its throat and abdomen several times. At one point, the lizard escaped the grasp of the mouse and ran some 10–15 cm (still under the rock and visible), but suddenly stopped; it looked exhausted, its eyes were sunken, and it had injuries on the head and body (i.e., dorsum, limbs, abdomen, and tail). Then, the mouse approached the lizard, bit it and flipped it on its back, and began to bite the left side of the abdomen, close to the hind limb. The lizard fought back again several times, but the mouse bit it in various locations on the dorsum, flipped it over again, and continued biting the abdomen and consuming parts of the lizard (Fig. 2). The mouse was aware of ES-B's presence; several times it moved toward him or stared at him, at certain times even as it continued biting the lizard.

Fig. 1. *Liolaemus bellii* fighting back and trying to bite *Abrothrix andinus*.

Fig. 2. *Abrothrix andinus* consuming part of *Liolaemus bellii* after chasing and killing it.

This observation took place while we were conducting studies on the behavioral ecology of the lizards at our study site near El Colorado. Our studies required exhaustive visual searches for the 3 lizard species of the genus *Liolaemus* (*L. leopardinus*, *L. bellii*, and *L. nigroviridis*) found at the study site. The area around El Colorado is characterized by rocky outcrops, open expanses where *Berberis empetrifolia* and *Chuquiraga oppositifolia* are the predominant plant species, and shrubby slopes. We were not studying *A. andinus* nor its diet, thus we did not catch individuals nor analyze their feces. Although previous studies have not listed non-insect animal matter in the diet of *A. andinus*, we suggest that feeding on a lizard may be nutritionally adaptive (Reichman 1977. Ecology 58:454–457). Primary production is probably low in the area where we made this feeding observation. Thus, ingesting an item high in protein might be beneficial, considering nutritional constraints as part of optimal foraging theory (Pulliam 1975. Am. Nat. 109:765–768). This photographic record contributes to the knowledge of food habits of *A. andinus*, a species reported having insectivorous and omnivorous food habits. Our record also adds *A. andinus* as a predator on *L. bellii*, even though we believe predation by this mouse is probably quite rare.

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***PHRYNOSOMA ASIO* (Giant Horned Lizard). PREDATION.** This lizard has a wide distribution in southwestern Mexico, across the states of Colima, Michoacán, Guerrero, Oaxaca, and Chiapas to Guatemala (Reeve 1952. Univ. Kansas Sci. Bull. 34:817–960). Predation on horned lizards of the genus *Phrynosoma* by birds is well documented; examples include Greater Roadrunners (*Geococcyx californianus*, Sherbrooke 1990. Wilson Bull. 102:171–174), Loggerhead Shrikes (*Lanius ludovicianus*, Lemos-Espinal et al. 1998. Herpetol. Rev. 29:168), Burrowing Owls (*Athene cunicularia*, Marti 1974. Condor 76:45–61), Ferruginous Hawks (*Buteo regalis*, Cartron et al. 2004. Southwest. Nat. 49:270–276), and recently Chihuahuan Ravens (*Corvus cryptoleucus*, Murray and Lease 2013. Herpetol. Rev. 44:327). There is little documented information on the natural history of *P. asio*. Recent studies establish that reptiles are prey in the diet of Harris' Hawk (González-Acuña 2006. J. Raptor Res. 40: 164–168; Santander et al. 2011. Southwest. Nat. 56: 419–424), although are represented less frequently in comparison to other prey. Here I report on Harris' Hawk (*Parabuteo unicinctus*) as a newly documented natural predator for *P. asio*.

At 1125 h on 21 August 2010, at Nuevo Centro, La Huacana, Michoacán, México (18.44071°N, 102.00435°W, datum WGS 84; 205 m elev.), I observed at 10 m distance an adult Harris' Hawk in an open area feeding on half of a carcass of an adult specimen of *Phrynosoma asio* on the trunk of a tree from distance of ca. 10 m. The carcass was not fresh and the hawk was observed to feed from 5–10 minutes and then took flight. Future investigations would be of interest to determine if species of *Phrynosoma* are significant elements in the diet of Harris' Hawks.

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***PHYLLODACTYLUS MARTINI* (Dutch Leaf-toed Gecko). ENDOPARASITES.** *Phyllodactylus martini* is endemic to Curaçao and Bonaire, West Indies (van Buurt 2005. Field Guide to the Amphibians and Reptiles of Aruba, Curaçao. Edition Chimaira, Frankfurt am Main. 137 pp.). We know of no reports of helminths for *P. martini*. The purpose of this note is to establish the initial helminth list for *P. martini*.

A sample of 25 *P. martini* (mean SVL = 47.5 mm ± 5.6 SD, range = 33–55 mm) collected in Bonaire (12.16666°N, 68.28333°W; WGS84), The Netherlands Antilles, in February–March, 2001 by LJV and deposited in the Sam Noble Museum (OMNH), The University of Oklahoma, Norman, USA as OMNH 39506, 39542–39564, 39566 was examined for helminths.

The stomachs, small and large intestines were removed, opened, and examined under a dissecting scope. Only nematodes were found. They were removed, placed separately on microscope slides, cleared in a drop of lactophenol, cover slipped, and studied under a compound microscope. Found were two species of Nematoda, *Spauligodon oxkutzcabiensis* (in the large intestine), number of helminths = 193, prevalence; number infected/number examined × 100 = 72%, mean infection intensity = 10.7 ± 8.3 SD; acuariid gen. sp. (as cysts in the stomach wall), number = 7, prevalence = 12%, mean infection intensity = 2.3 ± 1.3 SD. Voucher helminths were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, USA as *Spauligodon oxkutzcabiensis* (USNPC 106477) and acuariid gen. sp. (USNPC 106478).

Spauligodon itzocanensis has been reported from lizards from Mexico and South America (Avila and Silva 2010. J. Venom. Anim. Toxins Trop. Dis. 16:543–572; Goldberg and Bursey 2009. Herpetol. Rev. 40:224; Goldberg and Bursey 2010. Herpetol. Rev. 41:84–85). Species of *Spauligodon* have direct life cycles; infection presumably occurs through ingesting eggs (Goldberg and Bursey 1992. J. Parasitol. 78:539–541). Members of the Acuariidae are parasites of the gizzard of terrestrial birds; insects are intermediate hosts (Anderson 2000. Nematode Parasites of Vertebrates: Their Development and Transmission. CABI Publishing, Oxon, U.K. 650 pp.). Their occurrence in lizards most likely results from eating infected insects. Lizards may serve as paratenic (transport) hosts as development does not occur beyond the larval stage. Records of acuariid nematodes in reptiles are listed in Avila and Silva (*op. cit.*) and Goldberg et al. (2007. Comp. Parasitol. 74:327–342). *Spauligodon oxkutzcabiensis* and acuariid gen. sp. comprise the initial helminth list for *P. martini*.

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***PLICA UMBRA* (Blue-Lipped Tree Lizard). SPINE AND TAIL ANOMALY.** There are no reports in the literature regarding spine and tail anomaly in *Plica umbra*. On 20 December 2011 at 2100 h, we found an adult male of *P. umbra* (INPA-H 30446; SVL: 57.37 mm; tail length: 64.81 mm; body mass in life: 10 g), in a mineral exploration area (0.72762°S, 60.17511°W; WGS 84), in the outskirts of the municipality of Presidente Figueiredo, state of Amazonas, Brazil. The specimen was vertically oriented on a tree trunk, about 1.5 m above the ground, in an upland forest fragment that was partially reforested after mining and exhibited a deeply affected spine as a result of an unknown anomaly, and spiraled tail (Fig. 1). We currently have no data on the frequency at which this anomaly occurs in *P. umbra* populations, but we are very impressed by the fact that the specimen reached adulthood, given its very limited ability to move.

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PHOTO BY VINÍCIUS T. DE CARVALHO

FIG. 1. Spine and tail anomaly in *Plica umbra* (Tropiduridae).

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***POLYCHRUS ACUTIROSTRIS* (Brazilian Bush Anole). PREDATION.** *Philodryas olfersii* is a diurnal and semi-arboreal snake widespread in South America (Peters and Orejas-Miranda 1970. U.S. Nat. Mus. Bull. 297:1–347; Vanzolini et al. 1980. Répteis das Caatingas. Academia Brasileira de Ciências, Rio de Janeiro. 161 pp.). Its diet includes a wide range of vertebrates, such as amphibians, reptiles, birds and mammals (Hartmann and Marques 2005. Amphibia-Reptilia 26:25–31; Rocha and Vrcibradic 1998. Ciência e Cultura 50:364–368; Sazima and Haddad 1992. *In* L. P. C. Morellato [Org.], História Natural da Serra do Japi: Ecologia e Preservação de uma Área Florestal no Sudeste do Brasil, pp. 212–236. UNICAMP/ FAPESP, Campinas; Vitt 1980. Pap. Avul. Zool. 34:87–98). Despite the variety of prey types reported for the diet of *P. olfersii*, to the best of our knowledge there are no records of predation by this snake on the lizard *Polychrus acutirostris*.

Fieldwork was undertaken at Sítio Pinheiros, in the foothills of the Chapada do Araripe municipality of Barbalha, Ceará state, Brazil. Observations were made on 01 September 2012 at 0900 h. The snake, an adult *Philodryas olfersii* (SVL = 774 mm, mass = 89 g) was first sighted in the ground near an artificial lake, striking an adult *Polychrus acutirostris* (SVL = 126 mm, mass = 20.05 g). The lizard was held in the snake's jaws after capture, being constricted with an anterior coil of the snake's body, while biting the snake. After 16 minutes, the lizard died and the snake started ingestion headfirst, and the process took 19 minutes. Both the lizard and the snake were collected, euthanized, fixed with 10% formalin and deposited at the Coleção Herpetológica da Universidade Regional do Cariri (URCA-H 3888, 3894, respectively).

According to Vitt (1980, *op. cit.*) the diet of *P. olfersii* is composed mainly of mammals and amphibians. Lizards are rarely preyed upon, with some recorded species being *Hemidactylus mabouia*, *Tropidurus torquatus*, microteiids (Thomas 1976. Unpublished Ph.D. Thesis, Texas A&M University. 338 pp.) and *Ameiva ameiva* (Vitt 1980, *op. cit.*). Few snake species (*Chironius multiventris*, *Rhinobothrium lentiginosum*, and *Siphlophis cervinus*) have been observed preying on *Polychrus marmoratus* (Martins and Oliveira 1999. Nat. Hist. 6:78–150). To the best of our knowledge, only avian predators have been reported as predators on *P. acutirostris* (França and Braz 2009. Biotemas 22:243–245; Vitt 1981. Herpetologica 37:53–63).

PHOTO BY OLIVEIRA, H.F. 2012.

Fig. 1. *Philodryas olfersii* and *Polychrus acutirostris* collected at Sítio Pinheiros municipality of Barbalha, Ceará.

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***SCELOPORUS SINIFERUS* (Long-tailed Spiny Lizard). DIET.** *Sceloporus siniferus* is distributed from the state of Guerrero, Mexico, along the Pacific coast to extreme western Guatemala (Smith 1939. Field Mus. Nat. Hist., Zool. Ser. 26:1–397). To date, very little is known about the ecology of *S. siniferus* (Lemos-Espinal et al. 2001. West. N. Am. Nat. 61:498–500), and information about its diet still remains unknown. Herein, we report a predation event of an individual *S. siniferus* feeding on a centipede (*Scolopendra* sp.) in a tropical deciduous forest of coastal Oaxaca.

On 26 May 2009, at 1407 h, an individual *S. siniferus* with a missing tail was observed on the ground holding a centipede. The event took place in a deciduous tropical forest in the Jardin Botánico de la Universidad del Mar (15.916663°N, 97.076748°W, datum WGS 84; elev. = 91 m), located ca. 6 km N of Puerto Escondido, San Pedro Mixtepec, Oaxaca. The lizard jumped onto the stem of a tree and paused for a few seconds to ingest the centipede (Fig. 1). Once the lizard had swallowed the prey entirely, it continued to climb higher on the tree due to our close proximity. Among lizards of the genus *Sceloporus*, centipedes have been reported to be common prey in the diet of *S. consobrinus* (Lahti and Leaché 2009. *In* Jones and Lovich [eds.], Lizards of

Fig. 1. An individual *Sceloporus siniferus* ingesting a centipede (*Scolopendra* sp.) in a tropical deciduous forest in southern coastal Oaxaca, Mexico.

the American Southwest, pp. 210–213. Rio Nuevo, Tucson, Arizona), *S. poinsettii* (Webb 2009. *In* Jones and Lovich [eds.], *op. cit.*, pp. 246–249); and less frequent in *S. torquatus* (Feria-Ortiz et al. 2001. J. Herpetol. 35:104–112), *S. magister*, and *S. undulatus* (Johnson 1966. Am. Midl. Nat. 76:504–509). Frequency of centipede consumption by *S. siniferus* remains to be investigated.

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SCELOPORUS TORQUATUS **(Central Plateau Torquate Lizard). AQUATIC ESCAPE BEHAVIOR.** Dropping from overhanging branches to water and then swimming across the surface or descending to the bottom is a common escape behavior observed in iguanids (*Iguana iguana* and *Ctenosaura* spp.) (Pianka and Vitt 2003. Lizards, Windows to the Evolution of Diversity. University of California Press, Berkeley, California. 333 pp.). Other terrestrial lizard species have been observed attempting to escape potential predators by swimming or submerging their bodies underwater, including *Aspidoscelis sexlineatus* (Dillon and Baldauf 1945. Copeia 1945:174; Trauth et al. 1996. Herpetol.Rev. 27:20), *Crotaphytus collaris* (Burt and Hoyle 1934. Trans. Kansas Acad. Sci. 37:193–216), *Scincella lateralis* (Akin and Towsend 1998. Herpetol. Rev. 19:43), *Sceloporus clarkii* (Zylstra and Weise 2010. Herpetol. Rev. 41:86), *Uma exsul* (Estrada-Rodriguez and Leyva-Pacheco 2007. Herpetol. Rev. 38:84–85), and *Gambelia wislizenii* (Medica 2010. Herpetol. Rev. 41:354–355). Herein, we report the escape-to-water behavior of *S. torquatus*, a typically saxicolous lizard.

On 16 November 2008, while conducting field work in Mesa Montoro, Aguascalientes, México (21.988250°N, 102.582304°W, datum WGS84; elev. 2371 m), at 1315 h we heard a noise in the leaf litter and then a splash in a nearby water source. By following the noise we found a male *S. torquatus* (SVL = 770 mm; 14 g) completely submerged in a seasonal pond (ca. 500 mm deep), as we approached, the lizard surfaced and remained at the edge of the pond (Fig. 1) until being captured. This behavior is rare in terrestrial and saxicolous lizards, particularly given the low temperature of the water at that time, which may represent a high energy cost behavior for the lizard.

Fig. 1. Adult *Sceloporus torquatus* at the edge of the pond before being captured at Mesa Montoro, Aguascalientes, México.

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SCELOPORUS UNDULATUS **(Eastern Fence Lizard). ENVENOMATION.** On 28 April 2012 at 1215 h, a male Eastern Fence Lizard was encountered and perceived to be basking in the sun on a plank of wood in a trailer park in Alabama's Geneva State Forest (31.14084°N, 86.18207°W; WGS 84). Upon further examination, we discovered that the lizard was dead, and had a broken pitviper fang protruding from its dorsum, proximal to the right hind limb (Fig. 1). Necrosis was apparent around the protruding fang, and is obvious in the preserved specimen, which we deposited (along with the fang) in the Auburn University Herpetological Collections (AUM 39668). It is our assumption that a Copperhead (*Agkistrodon contortrix*) was the probable predator of the lizard based on the habitat, geographic location, and fang size. We noticed a large plank of wood lying on the ground not far from where the lizard was discovered, and when lifted, we found a Copperhead coiled underneath. We did not verify if the Copperhead had a missing fang due to concern for the researchers' safety.

Sceloporus undulatus is a documented prey item of Copperheads (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Instituition Press, Washington, DC. 668 pp.). Research suggests that when pitvipers, including Copperheads, bite reptiles and amphibians, they hold onto their prey before consuming it (Ernst and Ernst 2003, *op. cit.*). Conversely, when they bite mammals such as rodents, they release their prey before seeking it out later using strike-induced chemosensory searching (SICS; Stiles et al. 2002. *In* Schuett et. al. [eds.], Biology of the Vipers, pp. 413–419. Eagle Mountain Publ., Eagle Mountain, Utah). We interpret this observation as evidence of a predatory attempt by a Copperhead on a fence lizard that failed when the snake's fang broke after the strike, and the snake was subsequently unable to hold onto its prey. Although pitvipers are

Fig. 1. Dead, recently envenomated *Sceloporus undulatus* shortly after its discovery. Arrow indicates fang which presumably belonged to a nearby *Agkistrodon contortrix*.

known to initiate SICS to find ectothermic prey after failed strike attempts (Stiles et al. 2002, *op. cit.*), they may not when a failed attempt results in a broken fang.

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***SCELOPORUS ZOSTEROMUS* (Baja Spiny Lizard). REPRODUCTION.** *Sceloporus zosteromus* is endemic to Baja California and ranges from Ensenada in the north to Cabo San Lucas in the south (Grismer 2002. Amphibians and Reptiles of Baja California, Including Its Pacific Islands and the Islands in the Sea of Cortés. University of California Press, Berkeley. 399 pp.). Anecdotal information on reproduction of *S. zosteromus* was presented by Bostic (1971. Trans. San Diego Soc. Nat. Hist. 16:237–264), Grismer (*op. cit.*), and Shaw (1952. Herpetologica 8:71–79). The purpose of this note is to add information on the reproductive cycle of *S. zosteromus* from a histological examination of museum specimens from Baja California, and Baja California Sur, Mexico.

A sample (N = 13) of *S. zosteromus* was examined, consisting of 4 males (mean SVL = 85.5 mm ± 5.4 SD, range = 79–90 mm), 6 females (mean SVL = 69.7 mm ± 6.7 SD, range = 61–77 mm) collected in the vicinity of Santiago (23.470°N, 109.720°W), Baja California Sur in August 1964 and 3 additional males (mean SVL = 99.0 mm ± 10.0 SD, range = 89–109 mm) collected near El Arco (28.0301°N, 113.4032°W), Baja California in April 1949 and deposited in the herpetology collection of the Natural History Museum of Los Angeles County, Los Angeles, California, USA as LACM 4539–4541, 17336, 17337, 17339, 17340, 17342, 17344, 17346, 17347, 96159, 128064. The left gonad was removed and embedded in paraffin. Histological sections were cut at 5 µm and stained by Harris' hematoxylin followed by eosin counterstain. Enlarged ovarian follicles (> 5 mm) or oviductal eggs were counted. No histology was performed on them. Histology slides were deposited in LACM.

All 7 males were undergoing sperm formation (spermiogenesis) in which the lumina of the seminiferous tubules were lined by clusters of sperm or metamorphosing spermatids. The smallest reproductively active male (spermiogenesis) measured 79 mm and was from August. All August females were reproductively active. Three stages were noted in the ovarian cycle: 1) yolk deposition, vitellogenic follicles (4 females); 2) enlarged follicles (> 5 mm) (2 females, eggs were damaged in 1 female, clutch could not be counted); 3) oviductal eggs (1 female). Mean clutch size (N = 2) was 6.0. The smallest reproductively active female measured 61 mm SVL (follicles > 5 mm).

Bostic (*op. cit.*) and Shaw (*op. cit.*) reported northern populations of *S. zosteromus* produced eggs in spring and summer. My data show males of *S. zosteromus* from the north are producing sperm in the spring and females from the south are reproducing in August. Further investigations are needed to ascertain when reproduction commences in the south and other possible latitudinal variation in the reproductive cycle of *S. zosteromus.*

I thank G. Pauly (LACM) for permission to examine *S. zosteromus.*

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***SPHENOMORPHUS PRAESIGNUS* (Blotched Forest Skink). REPRODUCTION.** *Sphenomorphus praesignus* ranges from southern Thailand southward to Pahang in Peninsular Malaysia (Grismer 2011. Lizards of Peninsular Malaysia, Singapore and their Adjacent Archipelagos. Edition Chimaira, Frankfurt am Main. 728 pp.). There is a report of gravid females at Pahang in June (Grismer, *op. cit.).* In this note we add information on the reproductive biology of *S. praesignus* from a histological examination of museum specimens.

A sample of ten *S. praesignus* from Peninsular Malaysia (by state): Pahang (6) and Perak (4), collected 2004, 2006, 2008, 2010, and deposited in the herpetology collection of La Sierra University (LSUHC), Riverside, California, USA, was examined. The sample consisted of two adult males (mean SVL = 101.0 mm ± 9.9 SD, range = 94–108 mm; two adult females (mean SVL = 111.00 mm ± 2.8 SD, range = 109–113 mm and six subadults (mean SVL = 49.3 ± 11.4 SD, range = 41–72 mm).

A cut was made in the lower abdominal cavity and the left testis or ovary was removed, embedded in paraffin, cut into 5 µm sections and stained with Harris hematoxylin followed by eosin counterstain. Enlarged follicles (> 4 mm) or oviductal eggs were counted. Histology slides were deposited in LSUHC.

The only stage present in the testicular cycle was spermiogenesis in which the seminiferous tubules are lined by clusters of sperm or metamorphosing spermatids. This condition was noted in one male each from June (LSUHC 9040) from Perak and August (LSUHC 8058) from Pahang. The only two adult *S. praesignus* females present, each contained oviductal eggs: eight oviductal eggs (LSUHC 10593) collected in April from Perak and seven oviductal eggs (LSUHC 9095) collected in June from Pahang. All subadults contained very small gonads indicating reproductive activity had not commenced.

Seven and eight oviductal eggs are the first clutches reported for *S. praesignus.* The duration of the *S. praesignus* reproductive cycle remains to be determined.

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***STENODACTYLUS STHENODACTYLUS* (Elegant Gecko). CESTODE ENDOPARASITES.** *Stenodactylus sthenodactylus* is widespread in northern and northeast Africa and the Middle East (Bar and Haimovitch 2011. A Field Guide to Reptiles and Amphibians of Israel. Pazbar 1989, Ltd., Herzliya, Israel. 245 pp.). To our knowledge, there are no reports of endoparasites in *S. sthenodactylus.* The purpose of this note is to report the presence of larval cestodes in *S. sthenodactylus.*

One male *S. sthenodactylus* (SVL = 48 mm) collected 4 April 1956 at En Hazeva, A'rava Valley Region (30.76794°N, 35.27850°E), Israel and deposited in the Tel Aviv University Museum (TAUM 2187), Tel Aviv, Israel was examined. The body cavity was opened and utilizing a dissecting microscope 18 whitish structures (each ca. 2 mm in length) were collected. Each was regressively stained in hematoxylin, mounted in balsam on a microscope slide, and studied with a compound microscope and identified as cestode larvae. Two forms were present: 1) a plerocercoid (i.e., a spindle-shaped, solid larva) possessing an exposed adult-appearing scolex and similar in appearance to previously reported larvae

Table 1. Monthly stages in the ovarian cycle of 16 *Stenodactylus sthenodactylus* from Israel. * = one April female with oviductal eggs exhibited concurrent yolk deposition for a subsequent clutch.

Month	N	Quiescent	Early yolk deposition	Follicles > 4 mm	Oviductal eggs	Corpus luteum and yolk deposition
January	1	1	0	0	0	0
February	1	1	0	0	0	0
April	8	1	0	3	3*	1
May	2	1	0	0	1	0
September	1	1	0	0	0	0
October	1	0	1	0	0	0
November	1	1	0	0	0	0
December	1	1	0	0	0	0

assigned to the Proteocephala; 2) a cysticercoid (i.e., a solid larva consisting of an anterior vesicle containing a non-invaginated scolex with a tail-like posterior region and similar in appearance to previously reported larvae assigned to the Cyclophyllidea (see Olsen 1974. Animal Parasites Their Life Cycles and Ecology. Dover Publications, Inc. New York. 562 pp.). Whether these forms represent infection by two different orders of Cestoda, or sequential stages in the development of an undescribed cestode will require further study. Because the larvae were found in the coelom, it would appear that *S. sthenodactylus* serves either as an intermediate host or a transport (paratenic) host and no further development would be expected from these larvae until they reached the definitive host (currently unknown). Voucher larvae were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, USA as plerocercoids USNPC (106872) and cysticercoids USNPC (106873). Larval cestodes are the first parasites reported for *S. sthenodactylus*.

We thank Shai Meiri (TAUM) for permission to examine *S. sthenodactylus*, Erez Maza (TAUM) for facilitating the loan, and the National Collections of Natural History at Tel Aviv University for providing the specimen utilized in this study.

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STENODACTYLUS STHENODACTYLUS **(Elegant Gecko). REPRODUCTION.** *Stenodactylus sthenodactylus* occurs across North Africa from Mauritania to Egypt, Israel, and Syria, south through Sudan to northwestern Kenya (Largen and Spawls 2010. The Amphibians and Reptiles of Ethiopia and Eritrea. Edition Chimaira. Frankfurt am Main. Germany. 693 pp.).

Anecdotal information on the reproduction of this species (clutch sizes of 1–2 eggs, spring egg deposition) is in Disi et al. (2001. Amphibians and Reptiles of the Hashemite Kingdom of Jordan, An Atlas and Field Guide. Edition Chimaira, Frankfurt am Main, Germany. 408 pp.); Schleich, et al. (1996. Amphibians and Reptiles of North Africa. Koeltz Scientific Publishers, Koenigstein, Germany. 630 pp.); Spawls et al. (2002. A Field Guide to the Reptiles of East Africa, Kenya, Tanzania, Uganda, Rwanda and Burundi. Academic Press, San Diego, California. 543 pp.) and Bar and Haimovitch. 2011 (A Field Guide to Reptiles and Amphibians of Israel. Pazbar Ltd, Herzilya, Israel. 245 pp.). In captivity mating begins in March (Rogner 1997. Lizards, Volume 1. Husbandry and Reproduction in the Vivarium, Geckoes, Flap-footed Lizards, Agamas, Chameleons, and Iguanas. Krieger Publishing Co., Malabar, Florida. 317 pp.). In this note I add information on *S. sthenodactylus* reproduction in Israel from a histological examination of gonadal material from museum specimens.

A sample of 30 *S. sthenodactylus* consisting of 14 adult males (mean SVL = 45.2 mm ± 3.3 SD, range = 40–51 mm) and 16 adult females (mean SVL = 48.9 mm ± 2.8 SD, range = 44–53 mm), collected between 1940–1976 in Israel and deposited in the Zoological Museum of Tel Aviv University, (TAUM), Tel Aviv, Israel was examined (by region): A'rava Valley (TAUM) 441, 443, 1852, 2187, 11398, 16612; Central Negev (TAUM) 435, 439, 440, 452, 455, 970, 971, 1000, 1012, 2157, 2182, 2183, 2594, 2989, 3008; Coastal Plain (TAUM) 4536; HaSharon (TAUM) 450, 451; Northern Negev (TAUM) 604, 1956, 445, 8970; Southern Negev (TAUM) 1771; Yehudah Mountains (TAUM) 13704.

A small slit was made in the left side of the abdomen and the left testis was removed from males and the left ovary was removed from females for histological examination. Enlarged ovarian follicles (> 4 mm) or oviductal eggs were counted *in situ*. No histology was performed on them. Removed gonads were embedded in paraffin, sections were cut at 5 µm and stained by Harris' hematoxylin followed by eosin counterstain. Histology slides were deposited in the National Collections of Natural History at Tel-Aviv University.

The only stage noted in the monthly testicular cycle was spermiogenesis (sperm formation) in which the seminiferous tubules are lined by clusters of sperm or metamorphosing spermatids. This condition was noted in males from January (N = 3), March (N = 1) and April (N = 10). The presence of January males undergoing spermiogenesis indicates *S. sthenodactylus* males begin reproduction in winter. The smallest reproductively active male (spermiogenesis in progress) measured 40 mm SVL (TAUM 8970) and was collected in March.

Five stages were noted in the ovarian cycle of *S. sthenodactylus* (Table 1): 1) quiescent (no yolk deposition); 2) early yolk deposition (vitellogenic granules in ooplasm); 3) enlarged ovarian follicles (> 4 mm); 4) oviductal eggs; 5) corpus luteum and yolk deposition for a subsequent clutch. Evidence is presented from two females indicating *S. sthenodactylus* produces multiple clutches in the same reproductive season: 1) TAUM 970 contained oviductal eggs and was undergoing concurrent yolk deposition for a subsequent egg clutch; 2) TAUM 440 contained a corpus luteum from a previous clutch while undergoing concurrent yolk deposition for a subsequent egg clutch. One female from October exhibited early yolk deposition (Table 1). It is not known if it would have completed yolk deposition next spring or if the follicle would have undergone atresia (see Goldberg 1973.

Herpetologica 29:284–289). Mean clutch size for seven females was an invariant 2.0. The smallest reproductively active female (2 enlarged follicles > 4 mm) measured 44 mm SVL (TAUM 3008) and was collected in April.

I thank Shai Meiri (TAUM) for permission to examine *S. sthenodactylus*, Erez Maza (TAUM) for facilitating the loan, and the National Collections of Natural History at Tel Aviv University for providing samples of *S. sthenodactylus* for this study.

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***TRACHYLEPIS VITTATA* (Bridled Mabuya). REPRODUCTION.** *Trachylepis vittata* is a viviparous species widely distributed in the Middle East (Bar and Haimovitch 2011. A Field Guide to Reptiles and Amphibians of Israel. Pazbar Ltd 1989, Herzilya, Israel. 246 pp.). There are anecdotal reports of clutch sizes, time of egg deposition, and parturition for *T. vittata* in Turkey (1–4 young) (Baran and Atatur 1998. Turkish Herpetofauna [Amphibians and Reptiles]. Ministry of Environment, Ankara. 214 pp.); Israel (3–8 young) born April to June (Bar and Haimovtich, *op. cit.*); Jordan (5–10 young) born in summer (Disi et al. 2001. Amphibians and Reptiles of the Hashemite Kingdom of Jordan. Edition Chimaira, Frankfurt am Main. 408 pp.); Cyprus (6 young) (Baier et al. 2009. The Amphibians and Reptiles of Cyprus. Edition Chimaira, Frankfurt am Main. 364 pp.); and Tunisia (6 young) (Schleich et al. 1996. Amphibians and Reptiles of North Africa. Koeltz Scientific Books, Koenigstein. 630 pp.). The purpose of this note is to add information on the reproductive cycle of *T. vittata* from Israel.

A sample of 27 *T. vittata* was examined consisting of 7 males (mean SVL = 66.9 mm ± 12.4 SD, range = 53–85 mm), 19 females (mean SVL = 75.7 mm ± 9.1 SD, range = 58–77 mm) and one juvenile female from March (SVL = 53 mm) collected 1954 to 2012 in Israel, by Region: HaGolan 7529, HaSharon 5905, 5782 HaShefala 4879, 6361, 6362, Hermon Mountain 7088, 7115, 7553, 13374, 13376, 13625, Karmel Ridge 13788, Lower Galil 2548, Northern Coastal Plain 1352, Northern Negev 4854, Shomeron 5927, 13070 Southern Coastal Plain TAUM 784, Upper Galil 1504, 1507, 2970, 6058, Yizreel Valley 785, 794, and deposited in the Zoological Museum of Tel Aviv University (TAUM), Tel Aviv, Israel. Two of the females were maintained in captivity until parturition and were not deposited in TAUM. One female collected in Shomeron Region on 22 May 2012, produced 3 neonates on 7 June 2012 (mean SVL = 33 mm ± 0.75 SD, range = 33–34 mm); the other female, collected in Upper Galil Region on 3 June 2012, produced 5 neonates on 26 June 2012 (mean SVL = 31 mm ± 1.0 SD, range = 30–33 mm).

A small slit was made in the left side of the abdomen in the remaining aforementioned specimens and the left testis was removed from males and the left ovary was removed from females for histological examination. Enlarged ovarian follicles (> 4 mm) or oviductal eggs were counted *in situ*. No histology was performed on them. Removed gonads were embedded in paraffin. Sections were cut at 5µm and stained by Harris' hematoxylin followed by eosin counterstain. Histology slides are deposited at TAUM.

Three stages were noted in the testicular cycle (Table 1): 1) regressed = post breeding (seminiferous tubules contain spermatogonia and Sertoli cells); 2) recrudescence (proliferation of germ cells in the seminiferous tubules for the next period of spermiogenesis; 3) spermiogenesis (seminiferous tubules lined by clusters of sperm or metamorphosing spermatids. The smallest reproductively active male (spermiogenesis) measured 54 mm SVL and was collected in March (TAUM 13788).

Table 1. Monthly stages in the testicular cycle of 7 adult *Trachylepis vittata* from Israel.

Month	N	Regressed	Recrudescence	Spermiogenesis
February	2	0	1	1
March	2	0	0	2
July	1	1	0	0
August	1	1	0	0
October	1	0	1	0

Table 2. Monthly stages in the ovarian cycle of 19 adult *Trachylepis vittata* from Israel.*1 oviductal female contained follicles with concurrent yolk deposition; **1 female contained developing embryos.

Month	N	Quiescent	Early yolk deposition	Enlarged follicles > 4 mm	Oviductal eggs
January	1	1	0	0	0
March	6	0	1	2	3*
April	4	1	1	1	1
May	5	0	2	1	2**
June	1	0	0	0	1
July	1	1	0	0	0
December	1	1	0	0	0

Four stages were noted in the ovarian cycle (Table 2); 1) quiescent (no yolk deposition); 2) early yolk deposition (vitellogenic granules in the cytoplasm); 3) enlarged follicles (> 4 mm); 4) oviductal eggs. The smallest reproductively active female (early yolk deposition) measured 58 mm SVL and was collected in May (TAUM 13376). One female collected in March (SVL = 53 mm) contained quiescent ovaries and was considered a subadult. Mean clutch size (N = 11) was 5.1 ± 1.4 SD, range = 3–8. One female from March (TAUM 6361) collected in March with oviductal eggs was undergoing concurrent yolk deposition for a subsequent clutch. This is evidence that *T. vittata* may produce multiple clutches in the same reproductive season.

We thank Shai Meiri (TAUM) for permission to examine *T. vittata* and the National Collections of Natural History at Tel Aviv University for providing samples of *T. vittata* for this study.

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***TROPIDURUS HISPIDUS* (Peters' Lava Lizard). PREDATION.** Lizards of the genus *Tropidurus* are the most conspicuous species within Neotropical lizard communities, inhabiting a wide variety of habitats (Vitt and Pianka 2004. Recerca 8:139–157). *Tropidurus hispidus* is widely distributed in the Caatinga (i.e., scrub-like vegetation) of northeastern Brazil (Rodrigues 1987. Arq. Zool., S. Paulo. 31:105–230). Few predators of *T. hispidus* have been reported, but include spiders (Viera et al. 2012. Biota Neotrop. 12:4) and tegu lizards (Silva et al. 2013. Herpetol. Notes. 6:51–53). Herein, we provide a case of predation of *T. hispidus* by an anuran.

On 20 March 2013 at 1132 h we observed a juvenile *T. hispidus* (36.74 mm SVL) being preyed upon under a rock (Fig. 1)

Fig. 1. A juvenile *Tropidurus hispidus* being predated upon by an adult *Leptodactylus troglotydes*.

by an adult Pernambuco White-lipped Frog (*Leptodactylus troglotydes*; 52.03 mm SVL) at Olho Dágua Comprido Ranch (Geosite Floresta Petrificada), Missão Velha municipality, Ceara state, northeastern Brazil. The observation lasted at least five minutes and the lizard was ingested tail first. The lizard and frog were collected, measured, fixed in 10% formalin and deposited at Coleção Herpetologica da Universidade Regional do Cariri (URCA-H 5499, 5441, respectively).

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***TROPIDURUS SEMITAENIATUS* (Calango de Lagedo). TAIL BIFURCATION.** The tails of lizards play an important role in locomotor performance, critical for balance (Ballinger 1973. Herpetologica 29:65–66). Since locomotion is directly related to several activities, such as foraging, mating, and escape from predators, tail condition might affect individual fitness (Garland and Losos 1994. *In* Wainwright and Reilly [eds.], Ecological Morphology: Integrative Organismal Biology, pp. 240–302. University of Chicago Press, Chicago, Illinois).

Lizards have an outstanding capability of repair of several tissues, including muscular, osteological, and neuronal, beyond the noteworthy ability to regenerate their broken tails (Alibardi 2010. Morphological and Cellular Aspects of Tail and Limb Regeneration in Lizards. Springer-Verlag, Berlin, Heidelberg. 109 pp.). Herein, we report a case of caudal bifurcation in *Tropidurus semitaeniatus*, a saxicolous lizard, endemic to the caatinga of northeastern Brazil.

On 11 June 2011 during field work investigating spatial ecology in *T. semitaeniatus* in Pentecoste municipality, Ceará state, Brazil (3.81833°S, 39.33722°W), we captured an adult female with a bifid tail (Fig. 1). The bifurcation point was positioned in the posterior region of the tail (42.0 mm from the cloaca) and the left tail branch (29.0 mm) was slightly longer than the right one (27.0 mm). Regenerated region of tail bifurcation was obvious due to the distinct color and shape of re-grown scales, which clearly diverged from patterns of the original portion of the tail.

Fig. 1. Adult female *Tropidurus semitaeniatus* with bifid tail.

Our field observations suggested that the locomotor behavior of this female tended to differ from the usual displacement pattern of its conspecifics, by presenting marked lateral oscillations with its tail. Since lizard tails serve as a balancing organ (Ballinger 1973, *op. cit.*), multiple tails may possibly impact the daily performance of the individual. However, in the case of this specific female, we made multiple recaptures (25 sightings over a 17-month time span), observing its growth and becoming gravid. Hence, our findings suggest that lizards with bifurcated tails can survive and reproduce despite their morphological abnormalities.

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***VANZOSAURA RUBRICAUDA* (Red-tailed Vanzosaur). BIFURCATION AND TRIFURCATION.** *Vanzosaura rubricauda* is a small microteiid lizard (Gymnophthalmidae) with a longitudinally striped body and brightly colored, red tail. It uses caudal autotomy as a means of predation avoidance; a strategy widely utilised by most lizards (Fitch 2003. J. Herpetol. 37:395–399; Pafilis et al. 2009. Evolution 63:1262–1278). Bifurcation is recognized as being the result of injury and not caused by deformity (Lynn 1950. Herpetologica 6:81–84). On occasion when the original tail is damaged during a predation event, but not completely severed, bifurcation, or more rarely trifurcation, can occur (Conzendey et al. 2013. Herpetol. Rev. 44:145–146; Gogliath et al. 2012. Herpetol. Rev. 43:129; Kumbar et al. 2011.

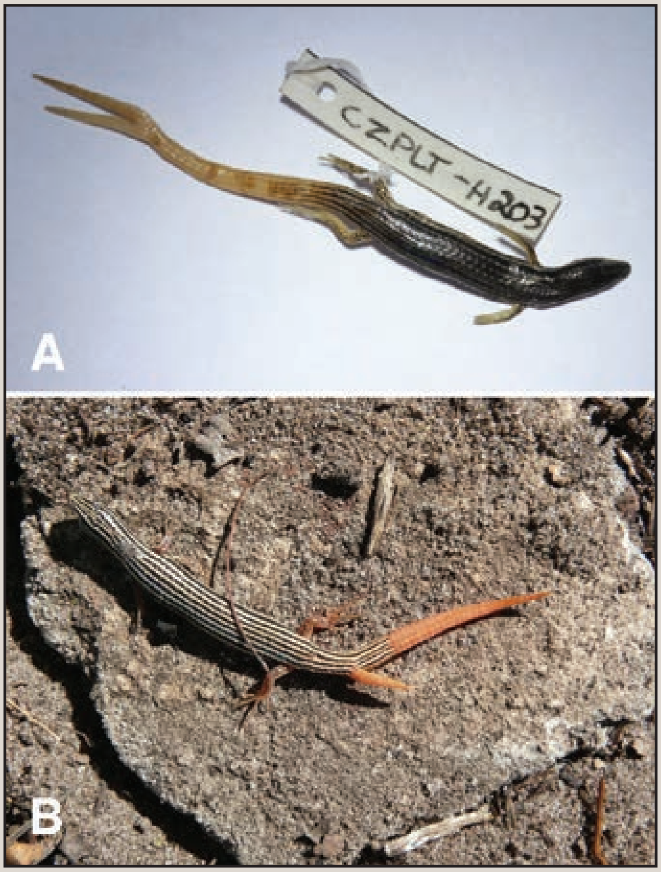

FIG. 1. *Vanzosaura rubricauda* with A) trifurcated tail and B) bifurcated tail.

Herpetol. Rev. 42:94; Tamar et al. 2013. Herpetol. Rev. 44:135–136; Tamar et al. 44:146). Adult *V. rubricauda* with abnormal tails were collected on 6 September 2011 and 2 May 2013 in pitfall trap lines at Reserva Natural Laguna Blanca, San Pedro Department, Paraguay (23.816194°S, 56.292833°W; 203 m elev.) and deposited in the Colección Zoológica de Para La Tierra as CZPLT 203 and CZPLT 472, respectively. CZPLT 203 (SVL = 31mm) had a tail trifurcated at the tip with three divisions measuring 12.5, 4.5, and 15 mm (ventral left to right; Fig. 1A). The short middle section is deflected ventrally and not visible dorsally. CZPLT 472 (SVL = 35.5 mm) shows a complete regenerated tail that is deflected (i.e., due to a putative predation attempt) laterally at the base (10.28 mm from the vent), presumably due to the damage caused during an attempted predation event. This injury resulted in the regeneration of a second red-colored tail measuring 7.5 mm at the site of the deflection (5.43 mm from the vent; Fig. 1B).

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SQUAMATA — SNAKES

***ANILIUS SCYTALE* (Red Pipesnake). PREDATION.** *Anilius scytale* is relatively common in the Amazon, in gallery forests of the northern Brazilian Cerrado and humid forests of the Caatinga region (Martins and Oliveira 1998. Herpetol. Nat. Hist. 6:78–150; França et al 2008. Copeia 2008:23–38). Here, we report predation of *A. scytale* by the elapid *Micrurus leminiscatus* in Nova Canaã, municipality of Porto Grande, Amapá state, Brazil.

On 25 October 2011 at ca. 1535 h, while conducting a herpetological survey in the rural establishment of Nova Canaã (0.70694445°N, 51.421111°W, datum WGS84; elev. = 132 m), we collected a road-killed adult *M. leminiscatus* (SVL = 706 mm) on the Northern Perimeter Highway, km 147. Dissection revealed a female *A. scytale* (SVL = 410 mm) in the stomach. *Micrurus leminiscatus* are known to prey on other coral-snakes (França and Araújo 2006. South Am. J. Herpetol. 1:25–36; Bernarde and Abe 2010. Biota Neotrop. 10:167–173), lizards, and gymnotiform fishes (Cunha and Nascimento 1982. Bol. Mus. Para. Emílio Goeldi 112:1–58). The *M. leminiscatus* specimen (CDLABZOO 087 – collection license Instrução Normativa IBAMA nº154) and its stomach contents were deposited in Laboratório de Zoologia, Campus Marco Zero, Universidade Federal do Amapá (UNIFAP).

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***BITIS ARIETANS* (Puff Adder). FORAGING BEHAVIOR.** Snakes that feed on birds exhibit a variety of strategies to catch avian prey. For example, actively-foraging snakes visit bird nests to feed on eggs, nestlings, and/or the adult birds themselves (Stake et al. 2005. J. Herpetol. 39:215–222; Staller et al. 2005. J. Wildl. Manage. 69:124–132). Additionally, some ambush-hunting snakes increase bird encounter rate by selecting foraging sites that are commonly visited by birds, such as water pools where birds come drink (Nilson et al. 1999. Amphibia-Reptilia 20:355–365), while others use caudal luring to deceive and attract birds to them (Andrade et al. 2010. S. Amer. J. Herpetol. 5:175–180; Fathinia et al. 2009. Russ. J. Herpetol. 16:134–138).

As part of an ongoing radiotelemetric study on *B. arietans* in the Dinokeng Game Reserve, Gauteng Province, South Africa, we observed a "sit-and-wait" behavioral tactic employed by a snake at a bird's nest. On 1 December 2012, we found an adult male in ambush at the nest of a ground-nesting bird of an unknown species. The snake was partially concealed under the vegetation surrounding the nest, which contained a single egg, and the snake's head was clearly aimed toward the center of the nest (Fig. 1). By

FIG. 1. *Bitis arietans* ambush foraging at the nest of a ground-nesting bird. The arrow points toward the head of the snake.

the next day the snake had moved to another location and the egg was still in the nest. We do not know whether the snake actually fed (we did not detect any obvious meal by looking at the snake), but our observation provides—to the best of our knowledge—a previously unreported foraging strategy used by a "sit-a-wait" snake predator to feed on birds.

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BOA CONSTRICTOR **(Boa Constrictor). DIET.** *Boa constrictor* is a widely-distributed, semi-arboreal ambush predator (Henderson et al. 2005. Herpetol. Nat. Hist. 3:15–17; Greene 1983. *In* D. H. Janzen [ed.], Costa Rica Natural History, pp. 380–382. Univ. Chicago Press, Illinois). It is a generalist in terms of diet, consuming birds, amphibians, mammals, and even other reptiles (Quick et al. 2005. J. Herpetol. 39:304–307; Pizzatto et al. 2009. Amphibia-Reptilia 30:533–544). There are reports of consumption of psittacid birds (e.g., *Ara severus*, *Aratinga pertinax arubensis*) by *B. constrictor* (Begotti and Filho 2012. Cotinga 34:106–107; Quick et al., *op. cit.*). Here, we increase the list of psittaciform prey of this snake with a predation record of a *Brotogeris chiriri* (Yellow-chevroned Parakeet).

On 18 April 2013, at 1157 h, we observed the capture of a *B. chiriri* by a *B. constrictor* on a tree (*Senna siamea*) 3 m above the ground in Campo Grande, Mato Grosso do Sul, Brazil (20.301418°S, 54.365219°W; datum WGS84). Immediately after the capture, the branch that was supporting the snake broke, making it fall together with the subdued bird. Once on the ground, the parakeet was killed by constriction and swallowed whole, starting from the head, in 7 min (Fig. 1).

Fig. 1. *Boa constrictor* preying on *Brotogeris chiriri* (Yellow-chevroned Parakeet) in Campo Grande, Mato Grosso do Sul, Brazil.

We thank João Paulo Barbosa for photographing the predation event, Ângela Sartori for botanical identification, and the Coordination for the Improvement of Higher Education Personnel (CAPES) for the Masters scholarship.

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BOA CONSTRICTOR **(Boa Constrictor). DIET.** *Boa constrictor* is a semi-arboreal snake with a generalist diet (Vanzolini et al. 1980. Répteis das Caatingas. Academia Brasileira de Ciências, Rio de Janeiro. 161 pp.). Herein we report the first known predation on *Tangara sayaca* (Sayaca Tanager) by *B. constrictor*. Predation events were recorded on 22 April 2009 and 22 February 2013 in the Campus do Pici, Fortaleza, Ceará, Brazil. In the first observed event, a young *B. constrictor* (SVL = 52.7 cm) was found having difficulty swallowing a half-eaten *T. sayaca*. This difficulty was probably due to the large size of the bird, which we measured after it was regurgitated (total length without legs [TLWL] = 11.27 cm, maximum width [MW] = 3.35 cm). In the second event, a young *B. constrictor* (SVL = 42 cm) killed a *T. sayaca* (TLWL = 11 cm, MW = 3.59 cm) and began to swallow it but the snake regurgitated the prey due to handling by onlookers.

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BOGERTOPHIS SUBOCULARIS **(Trans-Pecos Ratsnake). MAXIMUM MOVEMENT.** Little has been reported on the movement patterns of *Bogertophis subocularis* (Rhoads 2008. The Complete Suboc: A Comprehensive Guide to the Natural History, Care, and Breeding of the Trans-Pecos Ratsnake. ECO Herpetological Publishing and Distribution, Lansing, Michigan. 291 pp.; Sawyer and Baccus 1996. Southwest. Nat. 41:182–186). Herein we report on movement of a radio-tracked male *B. subocularis* over a 12-month time period on Indio Mountains Research Station (IMRS; centered on 30.75°N, 105.00°W; datum WGS84), Hudspeth Co., Texas, USA. The landscape at IMRS is composed of typical Chihuahuan Desert scrub. On 12 June 2010, the male *B. subocularis* (total length = 1300 mm; 327.1 g) traveled 1746 m (straight line distance) in one successive movement from one diurnal retreat site to another (13 June, 0730 h). This distance is significantly greater than the maximum distance (812 m) reported by Sawyer and Baccus (*op. cit.*), and also presents the first accurate movement patterns of *B. subocularis* in the wild, as those latter findings were based on translocated individuals. The single successive movement distance we report is comparable to or greater than that of *Coluber* (=*Masticophis*) *flagellum*, another large North American colubrid, known to travel great distances (Secor 1995. Herpetol. Monogr. 9:169–186; Johnson et al. 2007. Southeast. Nat. 6:111–124; Steen et al. 2007. Herpetol. Rev. 38:90). Movements of this scale have not been previously documented for *B. subocularis*.

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Fig. 1. Female *Cemophora coccinea coccinea* with 13 eggs oviposited on 5 June 2013, Hillsborough Co., Florida, USA.

CEMOPHORA COCCINEA COCCINEA (Florida Scarletsnake). REPRODUCTION. A *Cemophora coccinea coccinea* (total length = 750 mm) collected on 23 May 2013 from Cockroach Bay Road, Ruskin, Hillsborough Co., Florida, USA (27.6871°N, 82.5083°W; datum WGS 84), oviposited 13 apparently fertile eggs on 5 June (Fig. 1). This exceeds the largest reported clutch for the species of nine eggs (Herman 1983. Herpetol. Rev. 14:119). On 18 June, the total mass of the 13 adherent eggs was 38.2 g, the mean length was 23.7 mm (SD = 1.7, range = 20.6–26.4 mm, N = 12), and the mean width was 14.6 mm (SD = 1.0, range = 12.8–15.9 mm, N = 13). Most of these eggs were shorter and all were wider than 43 eggs of *Cemophora coccinea copei* from North Carolina, which were 25.7–44.8 mm long and 8.2–11.4 mm wide (Palmer and Braswell 1995. Reptiles of North Carolina. Univ. North Carolina Press, Chapel Hill. xiii + 412 pp.). The greater width of our eggs may have resulted from expansion during the 13 days since oviposition or the larger size of our female, which was 286 mm longer than the longest female with reproductive data from North Carolina (Palmer and Braswell, *op. cit.*). All of the eggs spoiled by 4 July.

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CHILOMENISCUS STRAMINEUS (Variable Sandsnake). REPRODUCTION. *Chilomeniscus stramineus* occurs in two disjunct populations, an eastern population ranging from southwestern Arizona, through Sonora, Mexico to northern Sinaloa, Mexico (Grismer 2002. Amphibians and Reptiles of Baja California Including its Pacific Islands and the Islands in the Sea of Cortés. Univ. Calif. Press. Berkeley. 399 pp.) and a western population restricted to Baja California (Grismer, *op. cit.*). Goldberg (1995. Great Basin Nat. 55:372–373) reported on reproduction in *C. stramineus* (as *C. cinctus*) from Arizona. Reproduction occurred mainly in spring with males undergoing spermiogenesis from March to June; two females from June exhibited yolk deposition. Clutch sizes of three and two were recorded from June and July, respectively. The purpose of this note is to present reproductive information for the Baja California population of *C. stramineus*.

A sample of 25 *C. stramineus* from Baja California, Mexico collected 1930–1984 and consisting of 11 adult males (mean SVL = 180.4 mm ± 22.3 SD, range = 147–220 mm), 8 adult females (mean SVL = 197.0 mm ± 18.6 SD, range = 178–237 mm) and 6 juveniles mean SVL = 115.3 mm ± 19.1 SD, range = 88–144 mm) were examined from the herpetology collections of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California and the San Diego Natural History Museum (SDNHM), San Diego, California, USA. The following *C. stramineus* were examined: Baja California: SDNHM 30371, 38663, 42054, 42737, 45973, 48150, 48151, 48152, 62226, 62227; Baja California Sur: LACM 51631, 107910, 138476, SDNHM 3829, 3830, 30372, 30373, 44384, 50173, 50174, 50175, 61289, 61291, 64488, 68734. The left testis was removed from males and the left ovary was removed from females. Enlarged follicles (> 3 mm) or oviductal eggs were counted. Gonads were embedded in paraffin, sectioned to 5 µm, and stained with hematoxylin followed by eosin counterstain. Histology slides were deposited at LACM or SDSNH.

Table 1. Monthly stages in the testicular cycle of 11 adult male *Chilomeniscus stramineus* from Baja California, Mexico.

Month	N	Regressed	Recrudescence	Spermiogenesis
April	1	0	0	1
May	5	0	0	5
July	3	1	0	2
December	2	0	1	1

Three stages were present in the monthly testicular cycle of *C. stramineus* (Table 1): 1) Regressed, seminiferous tubules mainly contain spermatogonia and Sertoli cells; 2) Recrudescence, renewal of germinal epithelium for the next period of sperm production has commenced, primary spermatocytes predominate, and 3) Spermiogenesis, lumina of seminiferous tubules lined by sperm or clusters of metamorphosing spermatids. May appeared to be the month of maximum sperm production. The smallest reproductively active male with spermiogenesis in progress measured 147 mm SVL (SDMNH 64488) and was collected in May. One female (SVL = 209 mm) from August (LACM 138476) contained one oviductal egg. The smallest reproductively active female (yolk deposition) measured 193 mm SVL (SDMNH 44384) and was collected in April. The timing of events in the reproductive cycle of *C. stramineus* were similar in the Arizona population (Goldberg, *op. cit.*) and Baja California. In both populations sperm and egg production occurred in spring.

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CHIRONIUS FOVEATUS (South American Sipo). DIET. The genus *Chironius* consists of slender terrestrial or semi-arboreal diurnal snakes, distributed from southern Central America to southern South America (Dixon et al. 1993. Monogr. Mus. Region. Sci. Nat. 13:1–279). *Chironius multiventris* is found in the Atlantic Forest region of eastern Brazil (Bahia to Santa Catarina) (Hollis 2006. Herpetologica 62:435–453) and feeds predominantly on anurans (Martins and Oliveira 1999. Herpetol. Nat.

Fig. 1. *Chironius foveatus* that consumed a *Drymophila squamata* (Scaled Antbird) captured in a mist-net in southeastern Brazil

Hist. 6:78–150; Hartmann et al. 2009. Pap. Avuls. Zool. 49:343–360).

On 27 April 1996, during a study of the bird community of the lowland forest of Serra dos Órgãos, municipality of Guapimirim, state of Rio de Janeiro, southeastern Brazil (22.5233°S, 43.0177°W, datum WGS84; elev. ca. 350 m), a *C. foveatus* was found attached to one of the mist-nets used to capture birds. The snake (> 1.5 m total length) had preyed upon a *Drymophila squamata* (Scaled Antbird; Passeriformes: Thamnophilidae) previously captured in the mist-net. The snake had swallowed the bird wrapped in the mist-net (Fig. 1). After removal of the bird, the snake was released near the site of capture. This episode represents a rare record of opportunistic predation of a small passerine by a primarily anurophagous snake species.

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COLUBER CONSTRICTOR **(North American Racer). EGG PREDATION.** *Solenopsis invicta* (Red Imported Fire Ants) have been implicated as predators of the eggs of many species of reptiles, including turtles, lizards, and snakes (Mount et al. 1981. J. Alabama Acad. Sci. 52:66–70; Diffie et al. 2010. J. Herpetol. 44:294–296). On 21 June 2012, a clutch of 11 snake eggs was discovered underneath a partially rotten pine log at the Solon Dixon Forestry Education Center in the Conecuh National Forest, Covington Co., Alabama, USA (31.13144°N, 86.68134°W; datum WGS84). Fire ants were observed moving in and out of small holes approximately 2 mm in diameter in nine of the eggs. The other two eggshells were also perforated with the same small holes, but the eggs themselves were hollow and their contents completely consumed. Two eggs had evidently been penetrated only recently, as embryos inside were still alive despite perforation of the eggshell by fire ants. These embryos were identifiable as *Coluber constrictor*, and their status indicates that fire ants were not merely scavenging rotten eggs but preying on viable, developing eggs. To my knowledge, this is the first reported instance of fire ants preying on the eggs of *C. constrictor* and is another indication that fire ants are capable of preying on the eggs of a wide range of species in natural situations.

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COLUBER CONSTRICTOR **(North American Racer). MORTALITY.** *Coluber constrictor* is a fast-moving diurnal snake that spends much of the spring and summer actively foraging aboveground (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Books. Washington, DC. 668 pp.). Conspicuous behavior and frequent activity by *C. constrictor* often bring them into contact with a wide range of predators including automobiles. Here we describe the first reported incidence of *C. constrictor* being struck and killed by a train.

On 21 April 2013, on the Savannah River Site, Aiken, Co., South Carolina, USA, an adult *C. constrictor* (SVL = 98 cm, 375 g) being tracked with radio-telemetry was found sliced in two pieces on the rail of a train track (Fig. 1). The snake had been tracked since July 2010 and had been observed to cross these tracks on at least four occasions. Approximately 2 cm of antenna from the implanted transmitter had been sheared off during the collision. It is curious that an animal so sensitive to vibrations (Hartline 1971. J. Exp. Biol. 54:349–371) could be struck by such a conspicuous vehicle. Train-induced snake mortality may be more common than assumed, as investigators typically do not "road cruise" rail lines as they do roads.

Fig. 1. Carcass of an adult *Coluber constrictor* struck and sliced in two by a train on 21 April 2013. The wire antenna of a radio transmitter can be seen protruding from the carcass.

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COLUBER **(=** ***MASTICOPHIS*****)** ***FLAGELLUM FLAGELLUM*** **(Eastern Coachwhip)** and ***PITUOPHIS MELANOLEUCUS MELANOLEUCUS*** **(Northern Pinesnake). DIET** and **PREDATION.**

Fig. 1. *Coluber* (= *Masticophis*) *f. flagellum* attempting predation on subadult *Pituophis m. melanoleucus*, Scotland Co., North Carolina, USA.

At 1117 h on 27 May 2013, in Scotland Co., North Carolina, USA (34.98913°N, 79.52348°W; datum WGS84), I encountered a telemetered adult male *Masticophis f. flagellum* (ca. 180 cm total length) attempting to predate a young male *Pituophis m. melanoleucus* (ca. 80 cm total length; Fig. 1). At my initial approach, the *M. flagellum* quickly dropped its prey and retreated several meters. The *P. melanoleucus* at that point was limp and nearly motionless, with mouth open and head coated in saliva and blood, and I initially believed it was dead. I retreated a short distance and waited for several min, after which the *P. melanoleucus* began to very slowly move away. The *M. flagellum* then approached it again, although aware of my presence. It seized the *P. melanoleucus* just behind the head, shook it vigorously, and began to drag it away. Possibly due to my presence, it released and re-seized the *P. melanoleucus* several times before finally abandoning it and retreating a considerable distance. The *P. melanoleucus* offered little resistance during this ordeal, and some thanatosis may have been involved. I eventually retrieved the *P. melanoleucus*, which fully recovered and was released back near the capture site five days later. To my knowledge, this represents the first report of *M. flagellum* and *P. melanoleucus* interacting as predator and prey. Several snake species have been reported as prey of *M. flagellum*, but these include few, if any, that are powerful constrictors (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Books, Washington, DC. 668 pp.). On multiple occasions I have observed *M. flagellum* and *P. melanoleucus* sharing both surface and subterranean refugia, including hibernacula. On at least two occasions I have observed the two species basking together with their bodies touching, but in neither instance was the *P. melanoleucus* small enough to serve as potential prey for the *M. flagellum*. The mutual tolerance I have observed repeatedly in these two species suggests that predator-prey interactions between them are infrequent.

The North Carolina Herpetological Society, Three Lakes Nature Center, and Wake Audubon supported fieldwork leading to this observation. Jamie M. Smith assisted in extracting still images from my video footage. The North Carolina Wildlife Resources Commission provided permits.

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Fig. 1. An adult *Corallus grenadensis* with a recently predated *Marmosa robinsoni* (Robinson's Mouse Opossum).

***CORALLUS GRENADENSIS* (Grenada Bank Treeboa). DIET.** Previously, 79 prey items recovered from *Corallus grenadensis* included 21 mammals, all of which were species (*Mus*, *Rattus*) introduced to the Grenada Bank sometime after the arrival of Europeans (Henderson and Pauers 2012. S. Am. J. Herpetol. 7:172–180). Here we report the first documentation of predation by *C. grenadensis* on *Marmosa robinsoni* (Robinson's Mouse Opossum), a species we assume to be native to Grenada. Near the town of St. David's (St. David Parish) on or about 23 March 2013 at approximately 2400 h, an adult *C. grenadensis* (SVL ca. 1.3 m) was found on the ground with 2–3 coils around an adult *M. robinsoni* (Fig. 1). A dog's presence caused the snake to relinquish its hold on the dead opossum; it is not known if the snake returned to the prey item and consumed it.

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***CROTALUS VIRIDIS VIRIDIS* (Prairie Rattlesnake). ECTOPARASITES.** More than 100 hard and soft tick species belonging to eight genera of the families Argasidae and Ixodidae have been collected from reptiles worldwide (Pietzsh et al. 2006. Exp. Appl. Acarol. 38:59–65). A total of 51 acari (mites and ticks) are parasites of Mexican amphibians and reptiles (Paredes-León et al.

Fig. 1. *Crotalus viridis* with acari in the anterior portion of eye and another one in the dorsum (arrows).

2008. Zootaxa 1904:1–166). The only record of soft ticks (Argasidae) on rattlesnakes in Mexico is a recent report of *Ornithodoros turicata* (Acari: Ixodida: Argasidae) on wild caught *Crotalus mitchellii* and *C. ruber* from Baja California (Gutsche and Mutschmann 2011. Herpetol. Rev. 42:287–288). Here we report the presence of a tick of the family Argasidae on a wild rattlesnake in Chihuahua.

On 19 May 2009, ca. 0800 h at Ejido San Pedro, Janos, Chihuahua, México (30.880034°N, 108.406044°W, datum WGS84; elev. 1402 m), one of us (EMR) encountered an adult *C. viridis* (total length ca. 700 mm) coiled on the ground. Subsequent examination of photographs deposited in the scientific collection of vertebrates in the Universidad Autónoma de Ciudad Juárez, Chihuahua (CHI-VER-189-08-06) revealed an ectoparasite in the anterior portion of the right eye and another one on the dorsum (Fig. 1). The parasites were identified as members of the family Argasidae based on the presence of a camerostome, a distinguising characteristic of the argasid ticks (Klompen and Oliver, Jr. 1993. Syst. Entomol. 18:313–331). These represents the first report of a member of the Argasidae associated with *C. viridis*, as well as the second record of an argasid tick on a snake in México (Gutsche and Mutschmann, *op. cit.*).

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***CROTALUS WILLARDI AMABILIS* (Del Nido Ridge-nosed Rattlesnake). MAXIMUM ELEVATION.** The maximum elevation for *Crotalus willardi* has been variously reported as 2743 m (Lowe et al. 1986. The Venomous Reptiles of Arizona. Arizona Game and Fish Department, Phoenix. 115 pp.), 2750 m (Campbell and Lamar 2004. The Venomous Reptiles of the Western Hemisphere. Comstock Publishing, Ithaca, New York. 870 pp.), or 2800 m (Ernst and Ernst 2012. Venomous Reptiles of the United States, Canada, and Northern Mexico, Volume 2. Johns Hopkins Univ. Press, Baltimore, Maryland. 391 pp.), although the sources of these elevational maxima were unspecified. *Crotalus w. amabilis*, a subspecies restricted to the Sierra del Nido in northwestern Mexico, has been recorded up to 2554 m elev. (Bryson and Lazcano 2002. Southwest. Nat. 47:310–311). On 30 August 2012, we observed a sub-adult *C. w. amabilis* basking under an oak tree (*Quercus* sp.) in Cañon del Alamo, Sierra del Nido, Chihuahua, Mexico (29.4833°N, 106.7166°W, datum: WGS 84) at an elevation of 2846 m. This exceeds the previously reported maximum elevation for *C. willardi* and also associates the record with a specific locality. A photographic voucher is catalogued at the University of Colorado Museum of Natural History (UCM AC 177).

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***LAMPROPELTIS ZONATA* (California Mountain Kingsnake). DIET.** *Lampropeltis zonata* ranges from Washington to northern Baja California, primarily in pine-oak forests, but also occurs in riparian woodland, chaparral, and coastal sage scrub, at

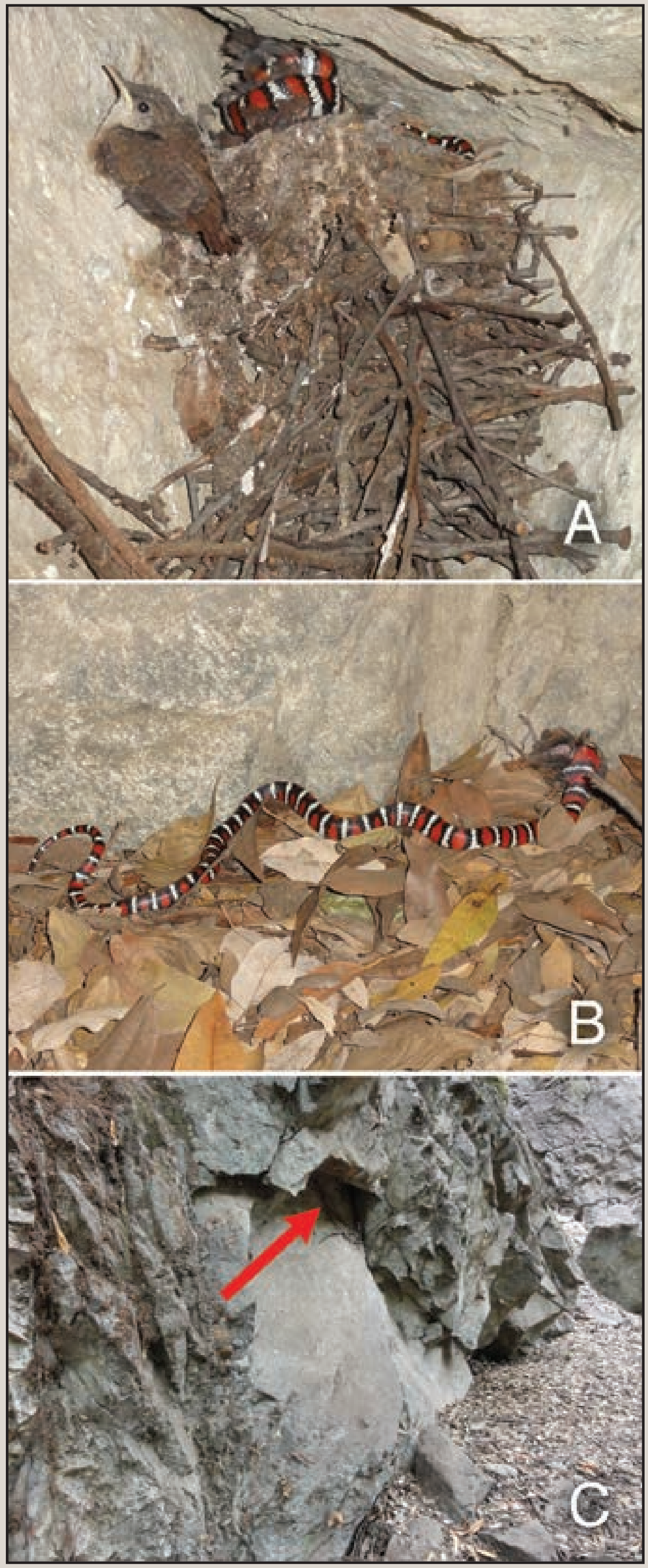

Fig. 1. *Catherpes mexicanus* (Canyon Wren) nest predation by *Lampropeltis zonata*, San Gabriel Mountains, California, USA. A) As first observed, the snake was actively constricting a nestling wren; a second nestling is perched at left margin of nest. B) Snake and prey on ground below nest, where ingestion resumed. C) Arrow indicates position of nest (hidden under rock overhang), 1.2 m above the base of the rock wall.

elevations from near sea level to >2700 m (Stebbins 2003. A Field Guide to Western Reptiles and Amphibians, 3rd ed. Houghton Mifflin Co., Boston, Massachusetts. 533 pp.). Prey items include lizards, squamate eggs, small mammals, and rarely, birds (summarized in Greene and Rodrigues-Robles 2003. Copeia 2003:308–314).

On 21 June 2013 at 1445 h, my attention was drawn to the unusual activity of three adult *Catherpes mexicanus* (Canyon Wrens) on the face of a steep rock wall adjacent to the Falls Trail of Monrovia Canyon, San Gabriel Mountains, Los Angeles Co., California, USA (34.18458°N, 117.98773°W, datum WGS 84; elev. 500 m). The birds were flying to and from a rock cavity in the rock wall. Upon closer inspection I observed a nest in this cavity 1.2 m above the canyon bottom. Within the nest was an adult *Lampropeltis zonata* coiled around a Canyon Wren nestling with two other nestlings visible. I observed the activity at intervals of 10–15 min and noticed that the adult wrens did not appear to be molesting the snake, but rather verifying that it was still there. After about 50 min, the snake dropped out of the nest onto the ground below and continued to feed on its meal, which was still only half consumed. The wren nestling was a rather large meal for the relative size of the snake (estimated at 75 cm total length). The following day I returned to the location and observed that the wren nest had actually contained two additional nestlings for a total of five, including the one previously consumed by the snake. On 09 June 2013, an associate of mine reported that he observed a *L. zonata* ascending the trunk of a large *Umbellularia californica* (California Bay Laurel) at about 1 m above the adjacent canyon floor. These observations extend those described previously for arboreal foraging and nestling bird predation by *L. zonata* (Cunningham 1955. Herpetologica 11:217–220; Goodman and Goodman 1976. Herpetologica 32:145–148; Petrides 1941. Yosemite Nat. Notes 20:36), and represent a first record of predation by this species on *C. mexicanus*.

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LEPTODEIRA ANNULATA **(Banded Cat-eyed Snake). DIET.** *Leptodeira annulata* has a wide geographic distribution from Mexico (ranging as far north as southern Tamaulipas and Sinaloa), through Central America and into South America as far south as Argentina and Paraguay (Dunn 1936. Proc. Nat. Acad. U.S.A. 22:689–698; Duellman 1958. Bull. Am. Mus. Nat. Hist. 114:5–152). It has generalist feeding habits, consuming frogs (including anuran eggs and tadpoles), lizards, and other snakes (Martins and Oliveira 1998. Herpetol. Nat. Hist. 6:78–150; Cantor and Pizzatto 2008. Herpetol. Rev. 39:462–463). On 14 February 2012, we dissected an adult female *L. annulata* collected from Dianápolis municipality (11.83268°S, 46.7962°W; datum SAD69), located in southeastern region of the Goiás State, Brazil. In its stomach we found two species of anurans, one not identified due to the advanced state of digestion (total length = 39.51 mm; 1.85 g), and a specimen of *Physalaemus cuvieri* (total length = 30.59 mm; 2.10 g). *Physalaemus cuvieri* is common frog found throughout Brazil, some regions of Argentina, eastern Paraguay, and Santa Cruz in Bolivia (Uetanabaro et. al. 2008. Field Guide to the Anurans of the Pantanal and Surrounding Cerrados. Editora UFMT and UFMS, Campo Grande. 129 pp.), with higher abundance in open habitats, such as cerrado and pasture lands. Despite the large distribution of *P. cuvieri*, this frog has not been previously reported in the diet of *L. annulata*.

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NERODIA RHOMBIFER **(Diamond-backed Watersnake). DIET.** The documented prey items of *Nerodia rhombifer* are moderately extensive (Gibbons and Dorcas 2004. North American Watersnakes: A Natural History. Univ. Oklahoma Press, Norman. 438 pp.) and six species of Ictaluridae (catfish), in four genera (*Ameiurus*, *Bagre*, *Ictalurus*, and *Pylodictis*) have previously been reported. Here we report the first record of an additional genus of catfish, *Noturus* (Madtom), as a prey item. We also provide photographic documentation of a tail-anchoring behavior previously described elsewhere (Gibbons and Dorcas, *op. cit.* and literature cited therein).

Copeland Creek, a tributary of the Trinity River, is a small stream seldom exceeding 50 cm in depth and varying from ~ 2–4 m in width, with clear running water, a moderate current, and a predominately sand and clay bottom. At 1447 h on 18 May 2013 in Copeland Creek in Polk Co, Texas, USA (30.57181°N, 94.89703°W, datum WGS84; elev. 23 m), we observed a *N. rhombifer* (total length = ~70 cm) submerged in the current and anchored with its tail coiled around a stick or root emerging from the side of the stream bed, while the head and perhaps the anterior quarter of its body was inserted into a hole in the side of the stream bed about 30 cm downstream (Fig. 1). It slowly worked its way

Fig. 1. *Nerodia rhombifer* as it appeared when it was first observed, with its tail anchored to an emergent root or stick in the current of the stream and its head and the anterior portion of the body inserted into a hole in the side of the stream.

Fig. 2. *Nerodia rhombifer* in the advanced stages of swallowing a *Noturus* sp. (Madtom) tail first.

deeper into the hole up to approximately half of its total length, over a period of about two minutes. When the snake emerged from the hole, it had a fish in its mouth, although it remained anchored and submerged. When the snake began moving away we briefly lifted it to the water surface on the frame of a dip net and identified the fish as a Madtom (*Noturus* sp.), ca. 90–100 mm. in total length. Afterwards, the snake swam ~10 m upstream and swallowed the fish tail first over ca. 10 min., with no apparent ill effects from the dorsal fin and pectoral fins spines of the Madtom (Fig. 2). This behavior is interesting because *N. rhombifer* typically swallow live fish rapidly (Clark 1949. J. Tennessee Acad. Sci. 24:244–261) and head first (Gibbons and Dorcas, *op. cit.* and literature cited therein).

Only two species of *Noturus* occur in the region, *N. nocturnus* (Freckled Madtom) and *N. gyrinus* (Tadpole Madtom) (Lee et al. 1980. Atlas of North American Freshwater Fishes. North Carolina St. Mus. Nat. Hist, Raleigh. 854 pp.). The fish consumed by the *N. rhombifer* was most consistent in character with *N. nocturnus.* We thank Kevin W. Conway (TCWC) for help with fish identification.

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NERODIA RHOMBIFER **(Diamond-backed Watersnake). DIET.** The diet of *Nerodia rhombifer* is composed principally of fishes (Kofron 1978. J. Herpetol. 12:543–554; Mushinsky et al. 1982. Ecology 63:1624–1629). Amphibians comprise a small percentage of the diet, and the only hylid identified as prey of *N. rhombifer* is *Hyla cinerea* (Gibbons and Dorcas 2004. North American Watersnakes A Natural History. Univ. Oklahoma Press, Norman. 438 pp.). Herein I provide an observation of *N. rhombifer* preying upon *Hyla chrysoscelis.*

At 1118 h, 14 May 2013 (sunny, 26°C), I hand-captured a *N. rhombifer* (approx. 1 m total length) in a seasonally-inundated wetland in Alexander Co., Illinois, USA. Upon palpation, the snake regurgitated an adult male *H. chrysoscelis* that had been swallowed backwards. The frog exhibited no sign of digestion suggesting recent capture by the snake.

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PANTHEROPHIS ALLEGHANIENSIS **(Eastern Ratsnake). DIET AND FORAGING BEHAVIOR.** *Pantherophis alleghaniensis* has been documented eating a wide range of birds and mammals (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Books. Washington D.C. 668 pp.). Advances in miniature infrared camera technology have provided novel insight regarding predation by ratsnakes on songbird nests (Thompson et al. 1999. The Auk 116:259–264). By contrast, circumstances surrounding predation of mammals by ratsnakes are largely unknown and thus our knowledge of predator-prey interactions between ratsnakes and mammals are based primarily on stomach content analyses. Here we describe first-hand accounts of ratsnakes preying on two mammal species by raiding their nests and consuming juveniles.

At 1452 h on 19 March 2013, on the Savannah River Site, Aiken, Co., South Carolina, USA, an adult female *P. alleghaniensis* (SVL = 100 cm, 368 g) being tracked with radio-telemetry was located coiled atop the burrow of a *Sylvilagus floridanus* (Eastern Cottontail; Fig. 1). After 5 min the snake uncoiled and partially entered the nest. From 1457 to 1535 h the snake could be seen writhing around, presumably constricting prey, while *S. floridanus* distress calls were heard from within the burrow. At 1535 h the snake emerged with a large bolus, moved 5 m, and began basking atop a brushpile. Inspection of the burrow revealed one deceased, partially swallowed and regurgitated *S. floridanus* nestling and one live, apparently unharmed *S. floridanus* nestling. The live nestling was presumably abandoned and was found the following day, nearly deceased, outside the nest entrance. A motion-activated game camera set up at the site revealed that both remaining nestlings were eaten by a *Procyon lotor* (Racoon) on 21 March 2013.

Fig. 1. *Pantherophis alleghaniensis* coiled atop the burrow of a *Sylvilagus floridanus* (Eastern Cottontail) containing three nestlings. The snake would enter the nest and consume one nestling, partially swallow and then regurgitate a second, and leave the third unharmed.

On 5 July 2013 another radio-tagged *P. alleghaniensis* (male, SVL = 131.4 cm, 980 g) at the same site was located approximately 15 m up a *Quercus latifolia* (Laurel Oak). At 1323 h, while attempting to determine the exact location of the snake, *Sciurus carolinensis* (Gray Squirrel) distress calls were heard. The observer (SRW) witnessed the *P. alleghaniensis* fall from the vicinity of a *S. carolinensis* drey, remaining coiled around a struggling *S. carolinensis* throughout the fall. Although views were obstructed, the *S. carolinensis* was assumed to be a juvenile based on its size. Immediately after the fall an adult *S. carolinensis* ran down the tree, approached to within 0.5 m of the struggling snake and retreated back up the tree after an estimated 10 sec of silent observation. For approximately 90 sec the captured *S. carolinensis* made distress calls and continued to struggle, after which it ceased all activity. The snake released the prey, reoriented itself, and then swallowed squirrel head first within 4 min. Although neither of the prey items are novel additions to the prey list of *P. alleghaniensis*, the observations do provide novel context regarding the foraging habits of this cryptic snake species. Systematic observations of mammal nests are required to determine whether ratsnakes are as important nest predators for mammals as they are for birds.

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PITUOPHIS CATENIFER SAYI **(Bullsnake). SCAVENGING.** Scavenging is an important, oft-overlooked foraging mode that serves as an integral pathway for energy transfer in terrestrial

Fig. 1. *Pituophis catenifer sayi* consuming a road-killed *Dipodomys compactus* (Gulf Coast Kangaroo Rat).

ecosystems (DeVault et al. 2003. Okios. 102:225–234; Selva and Fortuna 2007. Proc. R. Soc. B. 274:1101–1108). Though carrion was classically thought to be exploited by a narrow group of animals—the scavengers—multiple lines of evidence now support that scavenging is commonplace across a wide range of guilds, including snakes (DeVault and Krochmal 2002. Herpetologica 58:429–436).

On 12 May 2009 at 0837 h, a *Pituophis catenifer sayi* was observed consuming a road-killed *Dipodomys compactus* (Gulf Coast Kangaroo Rat), on a dirt road on the Kenedy Ranch, 19.2 km ESE of Sarita, Texas, USA and ~11 km due east of U.S. Hwy 77 (26.9319°N; 97.6178°W; datum WGS 84). The *D. compactus* was split open, had roadway gravel within its exposed coelom, and was partially flattened, indicating that it was indeed carrion and not killed by the snake (Fig. 1). Though neither the consumption of *D. compactus* nor the utilization of carrion has ever been reported for *P. c. sayi*, both are in line with the behavior and natural history of this species. Verification of scavenging is generally restricted to direct observation of the event, making documenting scavenging difficult (DeVault and Krochmal, *op. cit.*). We therefore encourage others to be vigilant for and report observations of scavenging in this and other snake lineages.

We thank Pamela R. Owen (University of Texas, Austin) for positively identifying the *D. compactus* and Travis J. LaDuc for helpful comments on a previous version of this note.

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***PYTHON RETICULATUS* (Reticulated Python). DIET.** Headlane and Greene (2011. Proc. Nat. Acad. Sci. USA 108:E1470–E1474) recorded snakes preying on 10 species of Old World monkeys, and a Siamang (*Hylobates syndactylus*). Non-human anthropoid apes have not been recorded as prey (Greene, pers. comm.). In 1986, during my employment with the Smithsonian Institution's National Zoological Park, I went to the Sepilok Orangutan Rehabilitation facility in Sabah, Eastern Borneo, to collect small mammals. This facility has for many years received both orphaned and injured Orangutans (*Pongo pygameus*) for rehabilitation and eventual release into the nearby forest. These orphaned animals ranged in age from a few months up to five + years of age. At the time I was working at the facility, there were two young *P. pygameus* that appeared to be about two years of age. Both of these apes were being kept in an outdoor, barred enclosure that had previously held Asian Sun Bears (*Helarctos malayanus*). The floor was concrete and the steel bars of the enclosure were roughly 10.6–12.7 cm apart.

One morning I was awakened at about 0630 h by the sound of staff screaming and yelling. When I arrived at the orang enclosures, I saw a large *Python reticulatus* measuring approximately 365–455 cm total length inside the enclosure that housed the two young orangs. There were two very distinct lumps about half way down the length of the python. It was obvious that the snake had been able to squeeze through the bars of the enclosure sometime during the night, attack and consume both of the orangs, each of which I estimated to weigh between 6.8 and 9.7 kg. The python was kept at the facility on exhibit.

I thank Harry W. Greene for suggesting that I write this contribution.

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***SISTRURUS CATENATUS TERGEMINUS* (Western Massasauga). REPRODUCTION.** *Sistrurus catenatus tergeminus* is on the Missouri Endangered Species list, with isolated populations only known from three disjunct locations in the northern part of the state (Johnson 2000. The Amphibians and Reptiles of Missouri, 2nd ed. Missouri Dept. of Conservation, Jefferson City. 400 pp.). Various literature reports suggest that mating for this species may occur in the late summer, autumn, or spring; however, Ernst (1992. Venomous Reptiles of North America. Smithsonian Institution Press, Washington D.C. 236 pp.) indicated that records of spring mating were, "… based upon conjecture or on observation of mating in captivity." After a two-year study of an Illinois population of *S. catenatus catenatus*, Jellen et al. (2007. J. Herpetol. 41:451–457) documented 128 instances of reproductive behavior; almost all were from July through September. However, they also observed one pair exhibiting "contact behavior" in April. We could find no published observations of copulation in the spring for this species. Herein we provide observations and data on spring mating behavior in a Missouri population of *S. catenatus tergeminus*.

On 30 April 2013 we were conducting our annual survey of the *S. catenatus* population at Squaw Creek National Wildlife Refuge, Holt Co., Missouri. We came across the first mating pair at 1058 h and discovered two additional pairs within the next 20

Table 1. Morphometric and environmental data associated with spring mating behavior of *Sistrurus catenatus tergeminus* in Missouri. Air temperature = 25.8°C, Relative Humidity = 52.7%, Wind speed = 4.1 m/s, recorded at 1058 h.

	Time Captured	SVL (cm)	Mass (g)	# Follicles	Soil Temp. (°C)
Pair 1 Male	1058	60.9	312	N/A	17.0
Pair 1 Female	1058	56.6	206	4	17.0
Pair 2 Male	1100	64.5	310	N/A	17.5
Pair 2 Female	1100	54.5	183	3	17.5
Pair 3 Male	1113	46.9	145	N/A	18.0
Pair 3 Female	1113	44.9	100	0	18.0

min. (Table 1). All three pairs were discovered within 50 m of one another in a microhabitat consisting of River Bulrush (*Scirpus fluviatilis*) with scattered small willows (*Salix* sp.) imbedded in 4.8 ha of recently burned lowland grassland. This microhabitat was adjacent to a north–south running dike and was a low area (i.e., saturated soils with some standing water) of approximately 0.62 ha. Pair one was copulating when discovered, and remained attached for at least 3 h. Pairs two and three were coiled together, with bodies and tails intertwined, but were not actually copulating at the time of capture.

The findings and conclusions in this note are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

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***STORERIA DEKAYI* (Dekay's Brownsnake). COLD TOLERANCE.** *Storeria dekayi* is a small, cold-adapted natricid snake of eastern North America. In the northern portion of the species' range, these snakes must hibernate at sites that are far enough below ground so that long-term exposure to lethal freezing temperatures is avoided. Failure to do so can result in mortality (Bailey 1948. Copeia 1948:215; Pisani 2009. J. Kansas Herpetol. 32:20–36). Most temperate zone reptiles, however, are able to survive brief periods of supercooling to –1 to –2°C (Vitt and Caldwell 2009. Herpetology. 3rd ed. Elsevier, Academic Press, Burlington, Massachusetts. xiv + 697 pp.). Gray (J. N. Amer. Herpetol., *in press*) recorded a surface body temperature (T_{sk}) of –0.2°C from *S. dekayi* at a site in northwestern Pennsylvania, USA, suggesting that they may have the ability to endure short-term exposure to subzero temperatures. Herein, I report further observations of subzero T_{sk} recorded from wild *S. dekayi* that imply this species may utilize supercooling to survive brief exposure to subzero temperatures.

At 0952 h on 1 April 2013 at a site in Erie Co., Pennsylvania, USA (42.09375°N 80.14180°W; datum WGS84), a male *S. dekayi* (SVL = 159 mm, total length = 210 mm; 2.3 g) was found beneath a thin wooden panel. The snake's surface body temperature (T_{sk}) was –0.6°C; air temperature (T_a) was –0.5°C. When initially picked up the snake was stiff and torpid, but managed to flatten its body dorsoventrally while making slow, swaying motions. This same individual was recaptured on 3 April, 4 April, and 6 April 2013 under the same cover object. The snake's T_{sk} on these dates was –4.2°C, –4.8°C, and –0.2°C respectively. When the *S. dekayi* was found on 4 April 2013 the T_a was –4.0°C and the cover object was frozen to the substrate. The snake was stiff and very lethargic when initially handled, but after ca. 1–2 minutes was able to right itself when placed on its back. In addition to the aforementioned snake, two additional male *S. dekayi* (SVL = 150 mm and 163 mm; 2 g and 2.7 g, respectively) were observed under separate cover objects at the site on 6 April. These snakes T_{sk}s were –1.0°C and –0.6°C respectively; T_a at the time was –2.5°C. Two of these *S. dekayi* were observed under the wooden panel on 8 April 2013 and appeared healthy.

The fact that the *S. dekayi* found at below zero temperatures were able to respond by moving when handled suggests that they were supercooled and not frozen, implying that *S. dekayi* may utilize supercooling to survive brief exposure to subzero temperatures. Such exposure may occur, as in this case, during brief overnight frosts in early spring when snakes are active above ground (Storey 1996. Braz. J. Med. Biol. Res. 29:1715–1733). At least one other natricine, *Thamnophis sirtalis* (Common Gartersnake), has been demonstrated to utilize a combination of supercooling and freeze tolerance (Costanzo et al 1988. Cryo-Letters 9:380–385; Storey 2006. Cryobiology 52:1–16), and is able to survive temperatures as low as –3.3°C for a period of 6 h (Churchill and Storey 1992. Can. J. Zool. 70:99–105). The ability to survive exposure to subzero temperatures may allow *S. dekayi* to have an extended annual activity season; however, it does not totally negate the risk of death from freezing or predation while immobile. As noted by Pough et al (2001. Herpetology. 2nd ed. Prentice-Hall, Upper Saddle River, New Jersey. xi + 612 pp.), freezing of a supercooled solution is an unpredictable event, and deaths may occur. For instance, snakes may die when the time of exposure surpasses a few hours, temperature drops much past –2°C, or equilibrium ice content is achieved (Storey, *op. cit.*). Two *S. dekayi* found at the site under the wooden panel on 9 March 2013 likely died as a result of prolonged exposure to freezing temperatures. Both snakes were in a coiled position and lacked any outward signs of predation.

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***THAMNOPHIS EQUES MEGALOPS* (Northern Mexican Gartersnake). MATERNAL TRANSMISSION OF ENDOPARASITES.** On 19 June 2009, we captured an adult female *Thamnophis eques megalops* at Bubbling Ponds Fish Hatchery (Yavapai County, Arizona, USA: 34.764946°N, 111.894014°W; datum NAD 83), that gave birth to 38 live young in captivity on 20 June 2009. The female and young were kept together for several hours while the neonates completed their first shed, and were weighed and processed. Nine of the neonates were then kept in captivity continuously for several months, housed communally in a 75-liter aquarium in a separate room at the animal care facility at Northern Arizona University. Water was provided ad libitum and bedding was Carefresh™ recycled cellulose (Absorption Corporation, Ferndale, Washington). On 1 July 2009, we noticed that one of the neonates (male; SVL = 181 mm, 3.8 g at birth) exhibited a small swelling on the right side at mid-body (Fig. 1A). This swelling had increased to 5–7 mm on 7 July, when we noticed a small drain site on the mass. When squeezed, the cranial end of an approximately 15-mm reddish nematode emerged from the hole and was removed intact with forceps (Fig. 1B). The nematode was preserved in 10% formalin and identified as a nematode, i.e. a filarial worm (*Macdonaldius* sp., Nemotoda, Spirurida, Filaroidea).

The neonates were each fed one to two wild-caught *Gambusia affinis* (Mosquitofish) from Bubbling Ponds Fish hatchery, on 2 July and 4 July, in a clean feeding tank separate from their housing quarters. An additional similar-sized *Macdonaldius* sp. nematode was removed from a second neonate *T. eques* (male SVL = 190, 3.8 g at birth) on 14 July 2009. No other snakes were infected, and new cysts did not develop in either previously-infected neonate. Neither neonate showed obvious signs of distress during infection, and both grew at rates comparable with their tankmates over the next few months.

Infection of wild gartersnakes (*Thamnophis* spp.) by helminths has been observed by Jimenez-Ruiz (2002. J. Parasitol.

PHOTO BY ERIKA NOWAK

PHOTO BY TOM GREENE

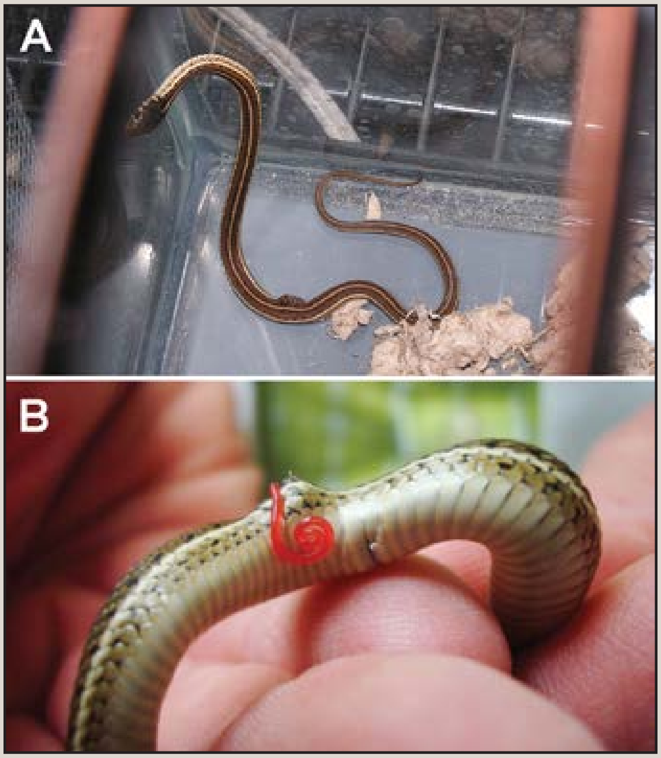

Fig. 1. A) A 10-day old captive-born *Thamnophis eques* with a mass on the mid-body, subsequently documented to contain a nematode (*Macdonaldius* sp.). B) The 15-mm live nematode (*Macdonaldius* sp.) removed from the neonate on 7 July 2009.

88:454–460). Similar lumps have been observed in wild adult *T. eques* at Bubbling Ponds Fish Hatchery and a *Macdonaldius* sp. was removed from an adult specimen in 2009. Neither of the neonates in our study had contact with adult snakes after the initial birthing period, and the first neonate exhibited an infection before being exposed to prey fish. Although it seems evident that the first neonate became infected via maternal transmission, the transmission mechanism remains unknown. Possible explanations include transmission by the mother during the birthing process or in the short time after birth (however, no nematodes were observed during this time, and the dam did not have external swellings characteristic of nematode infection). Alternatively, given that natricines are placental live-bearers (Blackburn and Lorenz 2003. J. Morphol. 256:171–204), it is possible that nematode oocytes could be transferred to developing embryos via the placenta in utero; this mode of infection has been observed in other vertebrates (reviewed by Anderson 1988. J. Parasitol. 74:30–45), including in live-bearing frogs (Rhabditiforms; Gagliardo et al. 2010. Herpetol. Rev. 41:52–58). It is possible that the second neonate became infected after feeding on prey fish.

This research was conducted under protocol #09-004 from the Northern Arizona University Institutional Animal Care and Use Committee. We thank NAU's Animal Care Annex staff for maintaining the neonates, and S. Shuster (Northern Arizona University) for identifying the nematode.

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THAMNOPHIS PROXIMUS ORARIUS **(Gulf Coast Ribbonsnake). REPRODUCTION.** *Thamnophis proximus orarius* is an ovoviviparous colubrid that forms mating aggregations and is presumed to mate in the spring. However, there are no detailed observations pertaining to the onset of mating activity in these snakes and we lack data about their reproductive biology (Werler and Dixon 2000. Texas Snakes: Identification, Distribution, and Natural History. Univ. Texas Press, Austin. 437 pp.).

At 1220 h on 20 January 2010, at the Edinburg Scenic Wetlands in Edinburg, Texas, USA (26.291944°N, 98.13507°W; datum WGS84), we observed an aggregation of *T. p. orarius* consisting of two females and four males that were engaged in courtship behavior (Fig. 1). The temperature was 25.5°C. The aggregation was observed on top of a pile of branches and other dry vegetation on the edge of a permanent body of water. Repeated observations of the snakes have been made at this site. Individuals remained at the den for several days and were at times observed retreating or exiting from the cavity formed by the vegetation. Males rubbed their chins along the dorsal side of the females and produced caudocephalic waves and tail searching behavior was also evident; both behaviors are characteristic of courtship in garter snakes (Phase II of courtship) as described by Perry-Richardson et al. (1990. J. Herpetol. 24:76–78). Prior to our observation, no reproductive behavior or mating aggregations for this species were known to have taken place in the winter. This is the earliest record of courtship for this subspecies. To our knowledge this is also the earliest report of courtship for a natricine snake in the USA and Canada. We were unable to determine whether the courtship behavior led to reproduction.

Fig. 1. An aggregation of *Thamnophis proximus orarius* engaged in courting behavior in the winter (20 January 2010) in Eidenburg, Texas, USA.

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