NATURAL HISTORY NOTES

GYMNOPHIONA — CAECILIANS

***CAECILIA ABITAGUAE* (Abitagua Caecilian). ATTEMPTED CANNIBALISM.** *Caecilia abitaguae* is a large caecilian native to the eastern slope of the Andes in Ecuador (Taylor and Peters 1974. Univ. Kansas Sci. Bull. 50:333–346) and nothing is known about its feeding habits (O'Reilly 2000. *In* Schwenk [ed.], Feeding, Form, Function and Evolution in Tetrapod Vertebrates, pp. 149–166. Academic Press, New York). In this note I describe attempted predation involving two specimens of *C. abitaguae*. At 2130 h on 4 July 2013, I collected two caecilians intertwined with wooden supports for stairs on a trail that they appeared to be crossing. The larger individual was biting the smaller one. They were found on the Piha Trail at Wildsumaco Wildlife Sanctuary about 100 m downhill from the junction of the Piha and Mannakin Trails (0.6867°S, 77.5995°W, WGS84; 1415 m elev.). The larger specimen (QCAZ 56884) was 592 mm total length (mass not determined), with a lighter blue head and 151 annuli, and exhibited bite wounds located dorsally at 40 mm and 83 mm posterior to the snout (Fig. 1). The smaller individual (QCAS 56883) was 365 mm total length (183 g) and had 152 annuli. This specimen had a large bite mark 32 mm posterior to the snout and an open wound 95 mm posterior to the snout (Fig. 1) and was bleeding profusely when captured. Both were put in separate damp cloth bags over night and, unexpectedly, were alive and not bleeding the following morning. Few vertebrates and no caecilians have been reported in the diets of caecilians (O'Reilly 2000, *op. cit.*). Given the amount of blood present, I think that it is unlikely this was some sort of social interaction such as courtship or agonistic behaviors.

FIG. 1. Two *Caecilia abitaguae* collected 4 July 2013 at Wildsumaco Wildlife Sanctuary in eastern Napo Province, Ecuador. The specimen on the left (QCAZ 56884) was biting the specimen on the right (QCAZ 56883) when caught. Arrows indicate bite marks that were bleeding at the time of capture.

James and Bonnie Olson and Jonas Nilsson graciously provided access to Wildsumaco Wildlife Sanctuary. Santiago R. Ron provided collaborative support.

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CAUDATA — SALAMANDERS

***CRYPTOBRANCHUS ALLEGANIENSIS ALLEGANIENSIS* (Eastern Hellbender). REPRODUCTIVE BEHAVIOR AND HABITAT.** *Cryptobranchus alleganiensis alleganiensis* occurs across the southeastern United States (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, DC. 587 pp.). During the breeding season males excavate and actively guard nest sites under large rocks (Smith 1907. Biol. Bull. 13:5–9). Nest guarding and egg deposition have been observed in Georgia during early fall, however, few accounts exists which document breeding behavior of multiple individuals at single nest rocks in the field (Jensen et al. 2008. Amphibians and Reptiles of Georgia. University of Georgia Press, Athens, Georgia. 575 pp.). The purpose of this note is to add information on the reproductive behavior and nest site selection from field observations for this cryptic species.

Between 1100–1145 h on 5 September 2014, five adult Eastern Hellbender individuals (gravid female ~40 cm total length, den master ~38 cm total length, small male ~30 cm total length, small female ~34 cm total length, larger male ~34 cm total length), were observed at a nest rock in a first order tributary of the Toccoa River within the Chattahoochee National Forest, Union Co., Georgia, USA (precise location withheld due to conservation concerns) and recorded with a Canon Powershot D10 underwater video camera (Table 1). Approximate total length and sex was determined by visual inspection and presence or absence of cloacal swelling. The nest rock was situated in a bedrock main channel pool directly below a riffle, measured ~1.75 m (length) by 64 cm (width) at 54 cm water depth, with 3 confirmed entrances, 2 downstream entrances (entrance 1 = 12 cm, entrance 2 = 8 cm, length respectively) and one side entrance (entrance 3 = 10 cm length). We measured the nest rock and obtained ~150 cm^2 of gravel from entrance 1 one hour after behavioral observation to measure gravel and cobble-sized bed substrate of the nest rock using a Wildco® gravelometer following standard pebble count methods. Gravel size within entrance 1 consisted primarily of fine to medium sized gravel, range = 5.6–11 mm, mean = 14.5 mm, while cumulative gravel distribution ranged from 2.5 to 47.5, mean = 20 mm.

In summary, the den master repeatedly defended several nest rock entrances, repeatedly bit an incoming gravid female, and presumably drove out the smaller male. The observation of females attempting repeated entry into unguarded entrances suggest females may selectively choose to enter unguarded entrances to avoid den master antagonistic behavior (biting) in

Table 1. Behavioral observations for 5 adult *Cryptobranchus alleganiensis alleganiensis* documented at nest rock. Abbreviations are as follows: entrance 1 (ent. 1), entrance 2 (ent. 2), and entrance 3 (ent.3). F = female, M = male.

Lapsed Time	Den Master M (~38 cm TL)	Large F (~40 cm TL)	Small M (~30 cm TL)	Small F (~34 cm TL)	Large M (~34 cm TL)
0:00	First observed protruding head, ent 1				
2:30		Approached ent 1			
3:35	Bit Large M on nose				
4:00			Entered ent 2		
4:05	Retreated into ent 1		Forced out of ent 1		
4:50		Attempted entry, ent 3		Attempted entry, ent 3	
7:32	Protruded head, ent 2	Moves up nest rock edge			Appears below ent 3
8:22	Retreated into ent 1; protruded head, ent 2	Drifts ~1 m downstream of nest rock			
9:48	Retreated into ent 2		Completes entry, ent 1		
10:12	Protruded head, ent 2; retreated into ent 2	Rests under downstream boulder (5 min)			
12:45	Protruded head, ent 2			Probed edge of nest rock; entry ent 3	
13:51	Bit Large F on neck	Probes right side of nest rock; approaches ent 2			
14:46	Retreated into ent 2	Approaches and enters ent 1			
15:12					Approaches and enters ent 1

nest rocks with multiple entrances. Observations of "breeding congregations" at nesting sites are rarely reported due to the cryptic behavior of these salamanders, making the observation of multiple males and females entering a single nest rock valuable for future behavioral studies.

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***DICAMPTODON TENEBROSUS* (Coastal Giant Salamander). DIET.** The diet of larval *Dicamptodon tenebrosus* is comprised predominantly of invertebrates (Cudmore and Bury 2014. Am. Midl. Nat. 172:191–199). Amphibians are also a known secondary diet component in some populations of larval *Dicamptodon*. For example, *Ascaphus montanus* (Rocky Mountain Tailed Frog) tadpoles have been documented in the diet of *Dicamptodon aterrimus* (Idaho Giant Salamander) larvae in Idaho (Metter 1963. Copeia 1963:435–436). In California, we have observed *D. tenebrosus* larvae consuming *Ascaphus truei* (Coastal Tailed Frog) tadpoles (RMB, unpubl. obs). Although it is suspected that larval *D. tenebrosus* may also feed on *A. truei* embryos, no records exist documenting this behavior (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington DC. 587 pp., Dodd 2013. Frogs of the United States and Canada. Johns Hopkins University Press, Baltimore, Maryland. 1032 pp.). Here, we augment the dietary data of *D. tenebrosus* with an observation of ingested *A. truei* embryos.

At 1250 h on 8 September 2015, we captured a larval *D. tenebrosus* (SVL = 69.5 mm; 15.6 g) as part of a mark-recapture project in a fourth order stream on managed timberlands within Tectah Creek, a tributary to the Klamath River, in Humboldt Co., California, USA (41.2630°N, 123.9659°W, WGS84; 352 m elev.). The larva was anesthetized in a 250 ml solution of 0.2% tricaine methanesulfonate in preparation for marking. The animal's stomach was noticeably distended prior to marking although the contents were not discernible, but while marking the ventral side of the larva it regurgitated some of its stomach contents (Fig. 1A). Eighteen *A. truei* embryos were counted. Nine were fully intact, seven of which were approximately stage

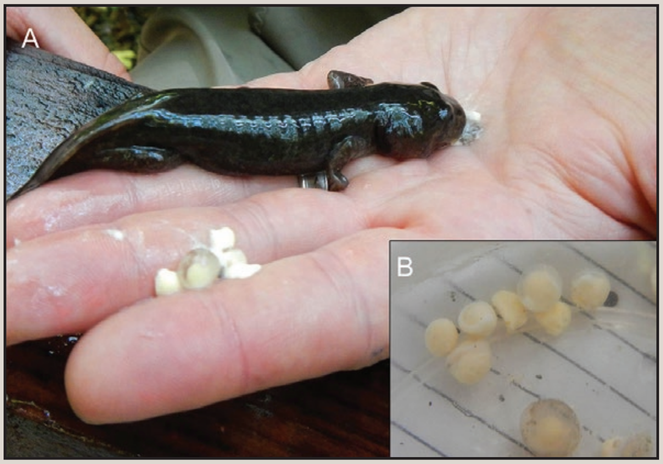

FIG. 1. A) Larval *Dicamptodon tenebrosus* regurgitating *Ascaphus truei* embryos, Klamath River watershed, Humboldt Co., California. B) Close-up of several regurgitated *Ascaphus truei* embryos.

18 (Brown 1989. J. Zool. 217:525–537). The remaining embryos were either less developed or partially digested and could not be staged (Fig. 1B). Further examination of the *D. tenebrosus* revealed ≥ 4 embryos still within the larva's gut, indicating the predation of at least half an *A. truei* nest based on documented average clutch sizes of ~35 eggs in northwestern California (Karraker et al. 2006. Northwest. Nat. 87:87–97). This finding represents the first known record of larval *D. tenebrosus* predation upon *A. truei* embryos.

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***EURYCEA SOSORUM* (Barton Springs Salamander). PREDATION AND DIET.** *Eurycea sosorum* is a permanently aquatic, paedomorphic salamander endemic to the Barton Springs segment of the Edwards Aquifer in Texas, USA. This endangered species uses interstices in cobble substrate for foraging and refuge from predators, which include birds, fish, and, potentially, conspecifics. Prey includes amphipods, gastropods, ostracods, copepods, chironomids, mayfly larvae, riffle beetles, oligochaetes, planarians, and leeches.

FIG. 1. *Procambarus clarkii* eating *Eurycea sosorum*, Eliza Spring, Austin, Texas, USA.

FIG. 2. *Eurycea sosorum* with regurgitated *Procambarus clarkii*, Eliza Spring, Austin, Texas, USA.

The Red Swamp Crayfish (*Procambarus clarkii*) is a highly invasive species known to feed on aquatic invertebrates, fish, and larval amphibians (Gherardi et al. 2000. Aquat. Sci. 62:179–193). Here, we document predation of *E. sosorum* by *P. clarkii*, and conversely, predation of *P. clarkii* by *E. sosorum*. On 17 June 2008, while conducting a monthly census at Eliza Spring, Zilker Park, Travis Co., Texas, USA (precise locality withheld due to conservation concerns), we observed and photographed a *P. clarkii* eating an *E. sosorum* (Fig. 1). Neither the salamander nor the crayfish were collected. During another survey at Eliza Spring on 12 February 2015, an individual *E. sosorum* regurgitated a small *P. clarkii* shortly after capture (Fig. 2). These observations document a bidirectional predator-prey relationship between *E. sosorum* and *P. clarkii*.

This work was conducted under Federal Fish and Wildlife Permit No. TE833851-4 and Texas Parks and Wildlife Scientific Research Permit No. SPR-0113-006.

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***EURYCEA WATERLOOENSIS* (Austin Blind Salamander). PREDATION.** *Eurycea waterlooensis* is a permanently aquatic plethodontid salamander endemic to the Barton Springs segment of the Edwards Aquifer, Texas, USA. Very little is known about the natural history of this subterranean species because it is rarely observed at the surface. Nearly all of the individuals that have been observed in the wild are hatchlings or small juveniles that were likely flushed from the aquifer accidentally during periods of high discharge. Here, we document the first record of predation on this species.

On 12 November 2014, we collected 15 Green Sunfish (*Lepomis cyanellus*) and one bass (*Micropterus* sp.) from Old Mill Spring, Zilker Park, Travis Co., Texas, USA (precise locality withheld due to conservation concerns) as part of ongoing habitat management for the federally endangered *E. waterlooensis* by the City of Austin. Following collection, fish were euthanized and dissected for gut content examination. A hatchling *E. waterlooensis* was found in the stomach contents of one of the green sunfish. Both were preserved and deposited in the University of Texas' Biodiversity Collections (formerly the Texas Natural History Collections; fish, TNHC 58574; salamander, TNHC 92953).

We thank Dee Ann Chamberlain (City of Austin) for confirming species identification of the salamander; Adam Cohen, Melissa Casarez (Biodiversity Collections, UT Austin), and Stephen Davis (City of Austin) for assistance with fieldwork; and Travis J. LaDuc and Adam Cohen (Biodiversity Collections, UT Austin) for specimen curation. This work was conducted under Federal Fish and Wildlife Permit No. TE833851-4 and Texas Parks and Wildlife Scientific Research Permit No. SPR-0113-006.

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***GYRINOPHILUS PORPHYRITICUS* (Spring Salamander). DEFENSIVE BEHAVIOR.** Although *Nerodia sipedon* (Common Watersnake) and *Thamnophis sirtalis* (Common Gartersnake) are known predators of *Gyrinophilus porphyriticus* (Uhler et al. 1939. *In* Transactions of the Fourth North American Wildlife Conference, pp. 605–622. Washington, DC), little is known about the defensive behavior of *G. porphyriticus* or its interspecific interactions beyond predation. On 20 October 2013, I encountered a large *G. porphyriticus* being approached by a *T. sirtalis*, presumably in advance of a predation attempt. This interaction occurred along the base of a sandstone bluff near the upper terminus of Little Stony Gorge in Scott Co., Virginia, USA (36.8710°N, 82.4617°W; WGS84). Upon noticing the snake, the *G. porphyriticus* assumed an aggressive posture (facing the snake, trunk slightly raised) and lunged at the *T. sirtalis*, biting it across the upper jaw region (Fig. 1). The salamander remained in this position, affixed to the snake's upper jaw and face, for approximately 80 min. before the two animals fell down into a deep, undercut hole at the base of the aforementioned cliff and out of sight. During this observation (from approximately 1800–1920 h), the snake repeatedly tried to free itself while the *G. porphyriticus* braced against nearby rocks and vegetation. Additional photos and video of the encounter were recorded and have been accessioned as digital vouchers into the University of Virginia's College at Wise's Herpetological Collection (UVWHC 2013-15–17).

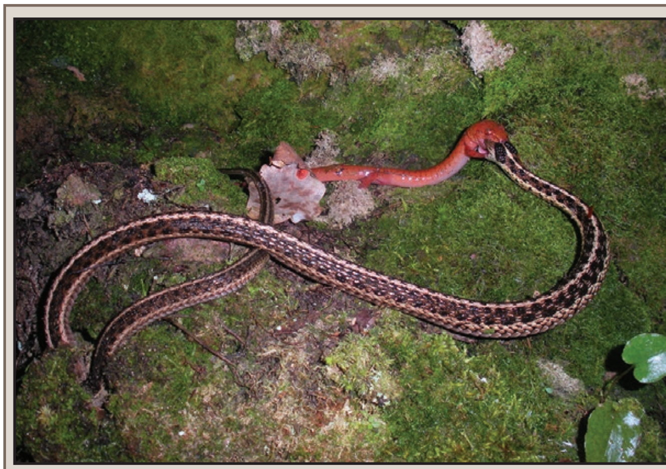

Fig. 1. *Gyrinophilus porphyriticus* engaging in apparent defensive behavior against possible predation by *Thamnophis sirtalis*.

Interestingly, this is not the first or only record of this type of interaction between these two species. An unpublished video account of a nearly identical interaction between *G. porphyriticus* and *T. sirtalis* was found on YouTube (https://www.youtube.com/watch?v=RFRNT7tQZ9w; 17 Nov 2015) following the original observation reported above. The online recording reportedly took place on Mt. Craig in Yancey Co., North Carolina, USA (35.7774°N, 82.2616°W; WGS84) and is dated 2 July 2009, showing a similar instance in which *G. porphyriticus* has bitten down upon the upper jaw and face of a *T. sirtalis*. A final outcome was not observed for this observation, as the observer reported removing the salamander, which had died, allowing the *T. sirtalis* to consume it. As with the 2013 observation reported above, it is likely that the salamander had become stuck on the snake's teeth after the initial lunging and biting behavior.

It is likely that the behavior reported here is defensive in nature, given the established role of *T. sirtalis* as a predator of *G. porphyriticus*. These observations also suggest that the behavioral interactions between these two species are more complex than has been previously assumed and that aggressive defensive responses involving physical contact from salamanders towards potential predators may be relatively commonplace, in addition to known mechanisms used by salamanders to avoid predation such as tail autotomy, skin secretions, and cryptic/aposematic coloration.

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***PSEUDOTRITON RUBER* (Northern Red Salamander). SCOLIOSIS.** Morphological abnormalities in amphibians are caused by a variety of factors, such as chemical pollutants, UV radiation, and parasites (Blaustein and Johnson 2003. Front. Ecol. Environ. 1:87–94). Scoliosis is a skeletal deformity that causes kinking of the spine, and has been documented in only a small number of plethodontid salamander species in nature (Marvin 1995. Herpetol. Rev. 26:30; Ryan 1998. Herpetol. Rev. 29:163; Peterson et al. 1999. Herpetol. Rev. 30:222). *Pseudotriton ruber* is a moderately sized salamander found throughout much of eastern North America that prefers cold, clear streams, springs, and seepages as habitat (Conant and Collins 1998. Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Co., Boston, Massachusetts. 616 pp.). Herein, I report a specimen of *P. ruber* that exhibited severe scoliosis in an isolated population at the northern geographic extreme of its distribution. To my knowledge, this represents the first documentation of such a natural deformity for the genus *Pseudotriton*.

At 1151 h on 21 November 2015, while conducting fieldwork as part of a larger ecological study, I captured an adult specimen of *P. ruber* (8.0 g; SVL = 71 mm; total length = 119 mm) in a spring in Chemung Co., New York, USA (42.16702°N, 76.82051°W; WGS84) that exhibited scoliosis. Due to a lack of marked external morphological differences between males and females of this species, I was unable to determine the sex. The metamorphosed specimens from this population for which I took measurements (N=14) have a size range of 48–74 mm SVL and 84–135 mm total length. The habitat is surrounded primarily by woodlands, but is also adjacent to a residential neighborhood and cultivated fields.

The specimen's spinal kinking is evident in four places, three of which are anterior and one posterior to the vent (Fig. 1). These fixed kinks did not appear to hinder its survival, as it is near the upper limit of the size range of other specimens from this area

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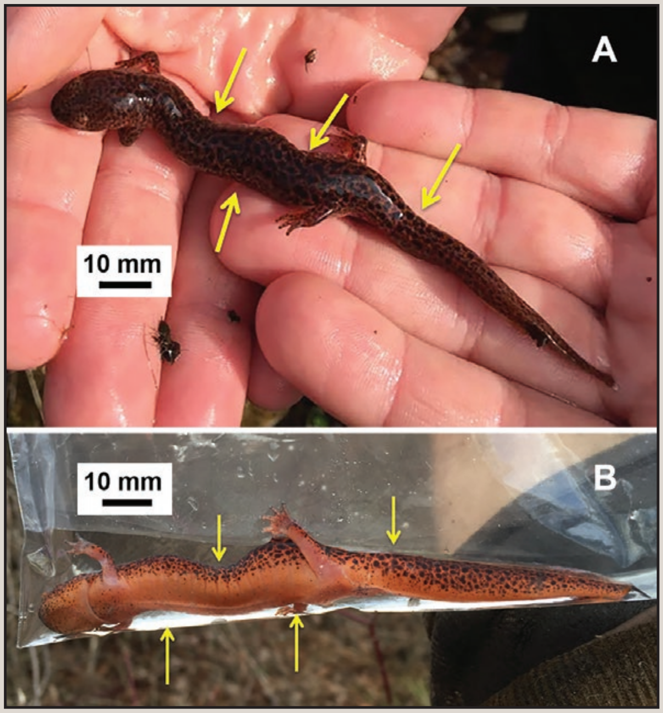

FIG. 1. The specimen of *Pseudotriton ruber* that exhibited scoliosis. Arrows indicate kinks. A) Dorsal view; B) Ventral view.

and thus is probably an older specimen. Likewise, Marvin (1995, *op. cit.)* reported recapturing an adult specimen of *Plethodon glutinosus* approximately a year after its initial capture, indicating that scoliosis may not adversely affect the survival of salamanders. On other surveys occurring about once a month since May 2015, no other metamorphosed (N = ~25) or larval (N = ~60) specimens exhibited scoliosis.

Perpiñán et al. (2010. J. Wildl. Dis. 46:579–584) found that scoliosis in *Ambystoma tigrinum* was associated with encysted trematodes of the genus *Clinostomum*. The occasional use of the spring and its vicinity by cattle may expose this *Pseudotriton* population to such a parasite. Additionally, although approximately 25 other metamorphosed specimens have been found on previous occasions, and the species is quite numerous at this site, it is possible that the isolated nature of this population has led to low genetic diversity and inbreeding, which may contribute to this instance of scoliosis. Likewise, it is possible that chemical runoff from nearby agriculture or residential areas uphill and upstream from the site may have influenced this abnormality.

I am grateful to the landowners for granting access to their property, to Ben Haines-Eitzen and Sean McHugh for assistance with fieldwork, and to Kraig Adler and Crystal Kelehear for critiquing drafts of this note.

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ANURA — FROGS AND TOADS

***HYPSIBOAS SEMILINEATUS*. LEUCISM.** Leucism is characterized by a lack of melanin in the skin, resulting in the partial or total absence of pigmentation, but the eyes retain normal pigmentation (Bechtel 1995. Reptile and Amphibian Variants: Colors, Patterns, and Scales. Krieger Publishing Company, Malabar, Florida. 206 pp.). In Brazil, records of anomalies in the color patterns are

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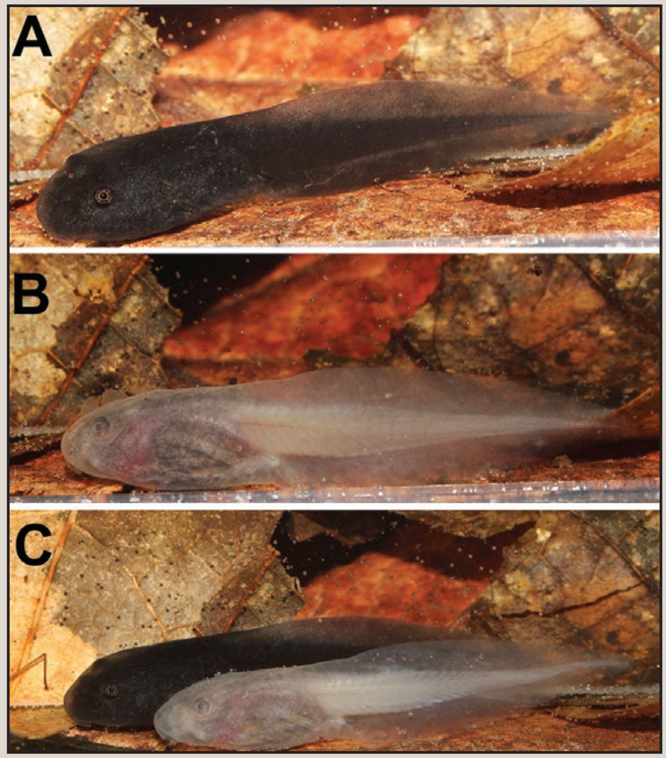

FIG. 1. Tadpoles of *Hypsiboas semilineatus*: A) normal; B) leucistic; C) both.

scattered throughout the literature but most often refer to albinism (e.g., Toledo et al. 2011. Herpetol. Notes. 4:145–146). *Hypsiboas semilineatus* is a medium-sized hylid frog that occurs in the Brazil coastal region from Alagoas to Santa Catarina (Frost 2015. http://research.amnh.org/vz/herpetology/amphibia/Amphibia/Anura/Hylidae/Hylinae/Hypsiboas/Hypsiboas-semilineatus; 18 Aug 2015). At 1930 h on 5 August 2015 we found a school of *H. semilineatus* tadpoles in an Atlantic Forest stream located at Itamarajú, Bahia (16.968567°S, 39.567365°W; WGS 84). Among the tadpoles (between 60 and 90 individuals), we recorded ca.15 leucistic individuals at Gosner Stage 32 (Fig. 1). Studies suggest that *H. semilineatus* tadpoles are distasteful to some predators and that their black color may have an aposematic function (Heursel and Haddad 1999. Ethol. Ecol. Evol. 11:339–348). Although albino tadpoles have already been reported for *H. semilineatus* (Santos et al. 2010. Herpetol. Rev. 41:474), this is the first record of leucistic tadpoles for the species.

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***FROSTIUS PERNAMBUCENSIS* (Frost's Toad). PARENTAL CARE.** Parental care consists of a series of behaviors exhibited by parents towards their offspring, in order to assure their survival (Santos and Amorim 2006. Iheringia Ser. Zool. 96:491–494). In anurans, parental care can be optional (Martins et al. 1998. Amphibia-Reptilia 19:65–73), maternal, paternal, alloparental, or biparental (Duellman and Trueb 1994. Biology of Amphibians. John Hopkins University Press, Baltimore, Maryland. 670 pp.). Parental care of eggs or aquatic tadpoles, especially among

Fig. 1. *Frostius pernambucensis* male with eggs in a phytotelma (hollow tree) on 2 June 2015, Parque Estadual de Dois Irmãos, Recife, Pernambuco, Brazil.

Brazilian species has already been recorded for some species (Martins 2001. Herpetol. J. 11:29–32; Castro et al. 2013. Herpetol. Notes 6:267–269; Cassio et al 2014. Bol. Mus. Biol. Mello Leitão. 34:63–74), but not for the genus *Frostius.*

Frostius pernambucensis is a member of the Bufonidae, belonging to a genus that is endemic to the Atlantic Forest of northeastern Brazil, occurring only in the states of Paraíba (Pimenta and Caramaschi 2007. Zootaxa 1508:61–68), Pernambuco (Bokermann 1962. Neotropica 8:42–44), Alagoas (Peixoto and Freire 1998. Herpetol. Rev. 29:172) and Bahia (Juncá and Freitas 2001. Herpetol. Rev. 32:270–271). In general, little is known about the natural history of this taxon, which currently has only two known species. Male *F. pernambucensis* vocalize perched on tree and shrub branches (Juncá et al. 2012. Acta Herpetol. 7:189–201). Bokermann (1962. Neotropica 8:42–44) mentioned that *F. pernambucensis* reproduce in bromeliads, characterizing the species as bromeligenous. In addition, Cruz and Peixoto (1982. Rev. Bras. Biol. 43:627–629) described tadpoles grown in captivity from a spawn consisting of a single egg strand, found in phytotelmata of a terrestrial Bromeliaceae.

During our studies of frog behavioral ecology, two *F. pernambucensis* were observed (the first with SVL = 2.61 cm; 1.5 g, and the second with SVL = 3.1 cm; 2 g) close to newly hatched eggs and larvae in a hollow tree or phytotelma (cavity filled with water: ca. 9 cm diameter and ca. 6 cm deep) at ca. 29 cm above the soil. Observation was conducted within the Atlantic Forest of Parque Estadual de Dois Irmãos (8.0027°S, 34.9427°W; WGS84), Recife, Pernambuco, Brazil, with about 2 daily hours of observation, between 2–21 June 2015, during mornings and evenings. The first male was observed watching the eggs over the period of 2–8 June 2015, with a total of 14 hours of observation, and the second male over the period on 11–19 June 2015, with a total of 18 hours of observation. Each spawn consisted of two strands containing 29 and 38 eggs, respectively. Adult males (identified by the evident vocal sacs) were observed guarding their spawn within a phytotelma of a tree (Fig. 1) or around the pool, while perched on the trunk. However, adult males spent most of the time within the phytotelma, diving and moving inside the water at times, taking the egg strands to the side of the water body bottom or to the water surface, ascending to breathe afterwards. After larvae hatched, males were also observed guarding tadpoles, staying in the oviposition site for a maximum of two days, guarding the newly hatched larvae. Phytotelmata used by frogs for offspring care in tree holes has already been documented in the literature (Willis and Ryan 2012. Herpetol. Rev. 43:321). Based on our observations, we suggest that *F. pernambucensis* may exhibit male parental care of eggs and tadpoles. However, further natural history studies on these Neotropical frogs are needed to confirm our observations were not due to mere chance.

Images and videos are deposited in the Coleção Herpetologica e Paleoherpetologica of the Universidade Federal Rural of Pernambuco.

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***ITAPOTIHYLA LANGSDORFFII* (Perereca Castanhola; Ocellated Treefrog). HEAD ABNORMALITY.** Many reports of morphological abnormalities in amphibians have been documented in the literature (Wagner et al. 2014. Ecol. Indic. 45:394–401). *Itapotihyla langsdorffii* is a treefrog endemic to the Atlantic Forest with a wide distribution in Brazil, and also occurs in isolated populations in Argentina and Paraguay. On 1 November 2015, we collected a malformed adult *I. langsdorffii* (SVL = 112 mm) near a permanent pond inside the Reserva Biológica Augusto Ruschi (Rebio), Santa Teresa, Espírito Santo, southeastern Brazil (19.9103°S, 40.5502°W, WGS 84; 650 m elev.). The individual had a severely distorted lower jaw, which did not meet the margins of the upper jaw (Fig. 1A, B). The maxilla is disjunct and the

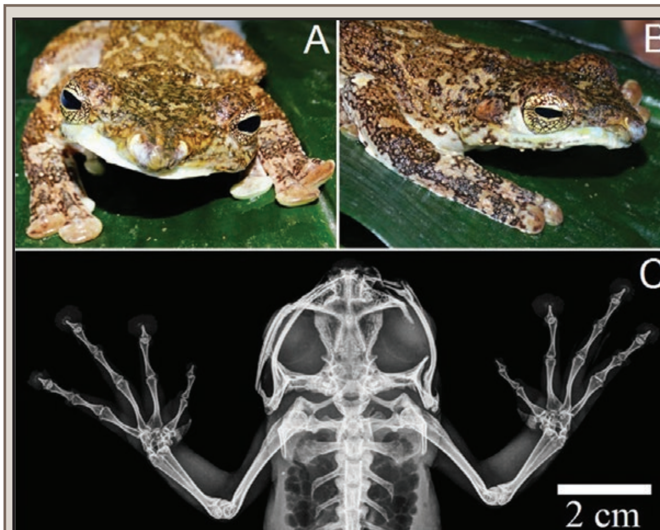

FIG. 1. An adult *Itapotihyla langsdorffii* with morphological abnormality. A) Frontal and (B) lateral view of the individual. C) Radiography of the skull. Scale bar = 2 cm.

quadratojugal is absent on the right side of the upper jaw (Fig. 1C). The dentary is distorted on the lower jaw (Fig. 1C). Although the individual was found inside of a conservation area, the malformation may be due to pesticides and chemical fertilizers used in adjacent agricultural areas. This is plausible because there are agricultural lands around the Rebio with crops of banana and coffee, where the use of pesticides and fertilizers is a common practice. In addition, recently we reported a malformation in another species (*Pipa carvalhoi*) near the locality where we found the present individual (Mônico et al. 2016. Herpetol. Rev. 47:115). This is the first record of malformation for *I. langsdorffii*. The specimen (MBML 8585) was deposited in the Zoological Collection of Museu de Biologia Mello Leitão, Brazil.

We thank Instituto Chico Mendes de Conservação da Biodiversidade for the sampling permit (n° 49.871-1) and Hospital Madre Regina Protmann for radiography of the specimen. ATM and RBF thank Coordenação de Aperfeiçoamento Pessoal de Nível Superior for scholarships. RBG Clemente-Carvalho is grateful to the Universidade Vila Velha (44/2014), and Fundação de Amparo a Pesquisa do Espírito Santo (0611/2015) for sponsoring the research of the Laboratório de Ecologia de Anfíbios e Répteis.

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***LEPTODACTYLUS FUSCUS* (Whistling Frog). NEW VOCALIZATION.** To investigate the calling behavior of *Leptodactylus fuscus*, playbacks were used in the field to examine the frequency and duration of response vocalizations from male frogs at the União Biological Reserve in the State of Rio de Janiero, Brazil (22.4239°S, 42.04383°W; WSG84) in January 2013. The whistling frog is well known for its distinctive rising whistle advertisement calls related to mating behavior and courtship (Heyer and Reid 2003. An. Acad. Bras. Ciênc. 75:39–54). We located several individual frogs over a two-day period. The volume of the playback recording was set to a maximum level (~100 db) to mimic a very large frog in order to observe how individual frogs in the chorus would respond. Surprisingly, the response was not a whistle but rather a series of quiet trills. To determine whether the trills were elicited by the recording, we counted the number of trills before and in-between playbacks (Fig. 1). From these data, it appears that the number of trills dramatically increases when the playback is on (shaded region) and decreases when the playback is off.

We computed sonograms of both the trills and the playback whistles using Raven Pro and show the pattern distinction between these vocalizations (Fig. 2). The trill can be seen as a double band between 16.4–16.6 seconds and the whistle between 16.0–16.2 seconds. We measured the calls of one individual and obtained the following results: calls consisted of a series of pulses (from 5–9) with an average duration of 0.14 sec (SD = 0.03), average low frequency of 564.2 Hz (SD = 43.2), average high frequency of 1403.2 Hz (SD = 54.5) and average peak frequency of 1033.6

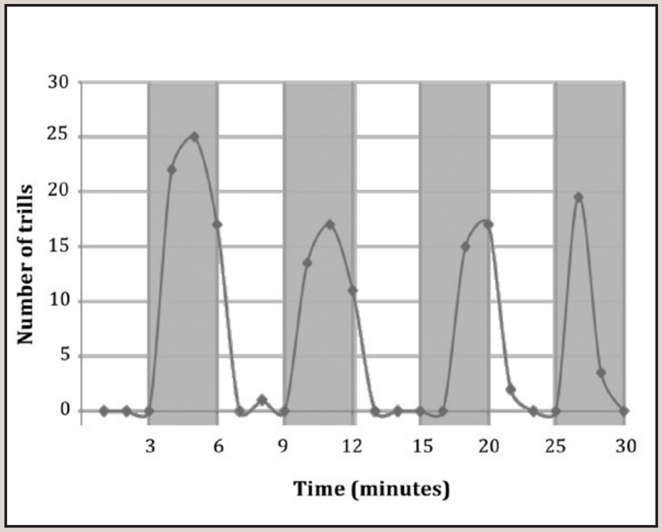

FIG. 1. Number of trills during playbacks (shaded) and between playbacks (not shaded). Prior to the playbacks the number of trills observed in an individual frog was 0.

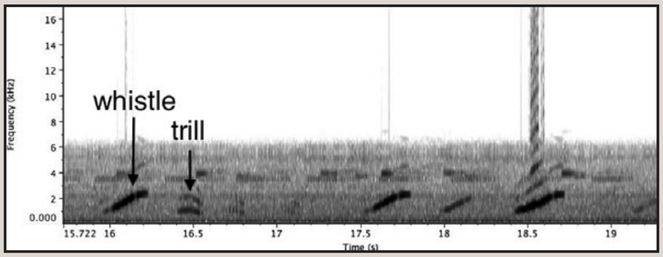

FIG. 2. The sonogram above illustrates the patterned distinction between the whistle and trill.

Hz. The pattern of trill vocalizations does not match documentation of other known *L. fuscus* advertisement or distress calls (Hodl and Gollmann 1986. Amphibia-Reptilia 7:11–21; Toledo et al. 2009. S. Am. J. Herpetol. 4:25–42), suggesting that this trill is an undocumented vocalization. Given that this vocalization was elicited by a close proximity playback, this may be a graded response of *L. fuscus* intended to minimize the potential cost of aggressive encounters between males.

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***LEPTODACTYLUS LATRANS* (Creole Frog). ENDOPARASITES.** Fourteen species of the genus *Leptodactylus* are known to occur in Argentina (Vaira et al. 2012. Cuad. Herpetol. 26:131–159). In Argentina, *Leptodactylus latrans* is distributed in Buenos Aires, Córdoba, Chaco, Corrientes, Entre Ríos, Formosa, La Pampa, Mendoza, Misiones, Neuquén, Río Negro, Santa Fe, San Juan and San Luis provinces (Zaracho et al. 2011. Guía de Campo para la Identificación de los Anfibios de la Provincia de Corrientes, Argentina. Fundación Miguel Lillo/ Universidad Nacional del Nordeste. 181 pp.). The previous summary of nematode parasites in amphibians from Argentina (González and Hamann 2015. Zootaxa 3980:451–476) includes the following for *L. latrans*: *Rhabdias mucronata*, *Falcaustra mascula*, *Aplectana fusiforme*, and

Microfilaria tamborinii. In this paper we present a record of a new nematode parasite in *L. latrans* from Argentina.

Five *L. latrans* (two males: SVL = 92 and 111 mm; two females: SVL = 83 and 98 mm; one juvenile SVL = 71 mm) were collected in April 2014 from La Majadita (30.6867°S, 67.5039°W, WGS84; 952 m elev.), Valle Fértil Department, Province of San Juan, Argentina. They were deposited in the Herpetology Collection Universidad Nacional de San Juan (UNSJ 1754–1758). The body cavity was opened by a mid-ventral incision and the digestive tract was removed. The esophagus, stomach, and intestines were longitudinally slit and the contents were examined for helminths using a dissecting microscope. The only helminths found were 97 nematodes in the large intestines. The prevalence of infection was 100% with a mean intensity of 19.4 ± SD 4.7 (range = 15–26) nematodes per frog. They were cleared in a drop of lactophenol, placed on a glass slide, coverslipped, studied under a dissecting microscope and identified as *Falcaustra sanjuanensis*. They were deposited in the Helminthological Collection, Fundación Miguel Lillo as *F. sanjuanensis* (CH-N-FML 07582, 07583).

Falcaustra sanjuanensis was described from the anuran *Odontophrynus* cf. *barrioi* (González et al. 2013. Acta. Parasitol. 58:119–125) and *Lithobates catesbeianaus* (González and Hamann 2015, *op. cit.*). The specimens of *F. sanjuanensis* identified herein possess the characteristics diagnosis of the species, especially the unpaired papilla anterior to the anus located on a protuberance. *Falcaustra sanjuanensis* in *L. latrans* is a new host record.

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***LITORIA INFRAFRENATA* (White-lipped Tree Frog). DIET.** *Litoria infrafrenata* is one of the largest (SVL to 140 mm) hylid frogs in the world and is native to northeastern Australia, New Guinea, and surrounding islands (Tyler 1998. Australian Frogs. A Natural History. Cornell University Press, Ithaca, New York, 192 pp.). At ca. 1900 h on 9 February 2016, DL captured an adult *L. infrafrenata* (SVL = 111.2 mm) in a palm tree in Lafu Village, New Ireland, Papua New Guinea (2.99150°S, 151.30721°E; WGS 84). Upon inspection we noticed a lizard's tail protruding from the frog's mouth (Fig. 1A). At 2200 h the tail was still apparent and the frog appeared to be in distress. At this point we slowly and gently extracted the lizard via the frog's mouth. It became apparent that the lizard had bitten down on the frog's tongue prior to being swallowed (or during the process) and its jaws were still firmly locked on the tongue, despite the fact that the lizard was now dead (Fig. 1B). The frog's tongue was bleeding and a good portion of it had been swallowed into its own stomach with the attached prey item. After removing the lizard from the frog's tongue the damaged tongue lolled from the frog's mouth and hung loosely to one side (Fig. 1C). Several minutes later we released the frog with its tongue still extruded. We do not know whether the frog made a full recovery; presumably the tongue may have suffered significant damage during its time inside the frog's gastrointestinal tract.

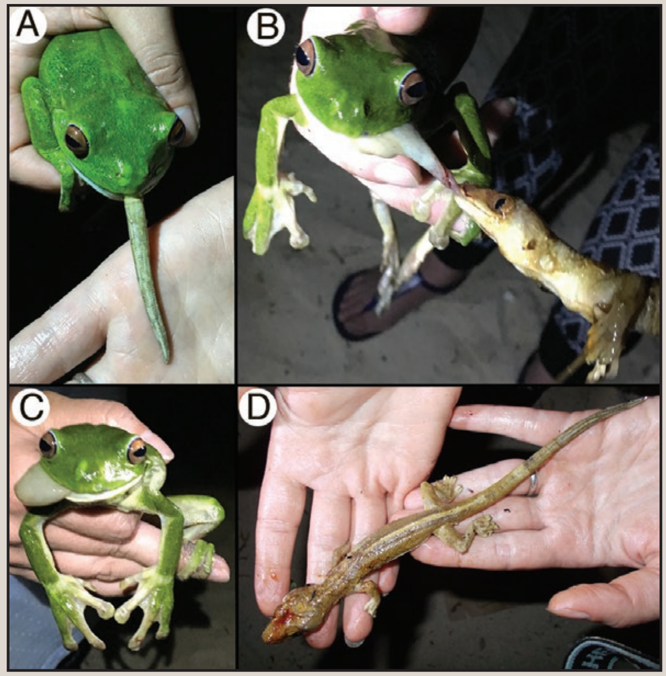

Fig. 1. A) *Litoria infrafrenata* with the tail of the ingested *Gekko vittatus* protruding from its mouth. B) *L. infrafrenata* with the ingested *G. vittatus* attached to its tongue. C) The damaged tongue of *L. infrafrenata* lolling from its mouth. D) The ingested *G. vittatus* in its entirety.

We identified the lizard as a large (SVL = 99.6 mm, total length = 204.7 mm) male *Gekko vittatus* (Melanesian Ghost Gecko; Fig. 1D). *Gekko vittatus* is distributed across northern New Guinea and surrounding islands through to the Torres and Bank Islands of Vanuatu (Zug 2013. Reptiles and Amphibians of the Pacific Islands. A Comprehensive Guide. University of California Press, Berkeley, California, 306 pp.). They are nocturnal, arboreal, and possess a prehensile tail. Very little is known about the ecology of *G. vittatus*; one study revealed that they are the primary prey item of the Barn Owl (*Tyto alba*) in the Torres Islands, Vanuatu (Ineich et al. 2012. New Zeal. J. Zool. 39:179–185). To our knowledge, this is the first account of a *G. vittatus* in the diet of *L. infrafrenata*.

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***NYCTIBATRACHUS JOG* (Jog's Night Frog). PREDATION.** Postmetamorphic anurans are an important component in the diet of many vertebrate species, particularly snakes (Toledo et al. 2007. J. Zool. 271:170–177); despite this few reports exist from India. On 22 June 2015, we were studying breeding behavior of *Nyctibatrachus* species in Kathalekan, Uttara Kannada, Karnataka, India (14.27°N, 74.74°E, WGS 84; 572 m elev.). This site is comprised of a freshwater swamp dominated by *Myristica fatua* with several first and second order streams (Gururaja 2010. Zootaxa 2642:45–52). At 2135 h we encountered an adult male *N. jog* perched on a tree about four feet from the ground. The male was

Fig. 1. Injured adult male *Nyctibatrachus jog*, with missing limb, guarding eggs.

Fig. 2. *Nyctibatrachus jog* being ingested by *Amphiesma beddomei*.

missing a portion of its right hind limb below the knee joint (Fig. 1). The wound was fresh and the skin was torn on the thigh. The male was guarding a clutch of 32 eggs. We looked around to see what might have caused this and noticed an adult *Amphiesma beddomei* (Beddome's Keelback or Nilgiri Keelback) among leaf litter, ingesting another *N. jog*. The frog appeared to be a male as well, based on the presence of a nuptial pad on the first finger. The snake was about 600 mm long from head to tail. The snake was ingesting *N. jog* from the vent and its head and left hand were visible when we saw the snake (Fig. 2). The frog was completely ingested in 150 seconds from when we first saw it and the snake rested for about 120 seconds before moving. It stopped occasionally and flicked its tongue before we moved away. We suspect the snake to have pulled the leg off the injured frog. The snake is endemic to the Western Ghats and is known to feed on frogs and occasionally on toads (Whitaker and Captain 2004. Snakes of India: The Field Guide. Chennai, India, Draco Books. 385 pp.). Diurnal in habit, *A. beddomei* is terrestrial, found commonly among leaf litter near streams, and present up to an elevation of 2100 m.

The genus *Nyctibatrachus* is endemic to the Western Ghats and contains 28 extant species (Gururaja et al. 2015. Zootaxa 3796:33–61). Among *Nyctibatrachus* species *N. jog*, *N. petraeus*, *N. humayuni*, and *N. danieli* deposit eggs on leaves or other vegetation overhanging water. Adult male *N. jog* vocalize from vegetation overhanging water and show parental care behavior by guarding their eggs. Species like *N. jog* may face increased predation pressure because they are perched on vegetation, vocalize alone (not in a chorus), and they also spend extended periods of time guarding their eggs. These behaviors are likely to render the frog more visible or audible to predators. Detailed studies on predator avoidance strategies by frogs while breeding and exhibiting parental care are required for a robust understanding of ecosystem dynamics and frogs like *N. jog* are good candidates for such studies.

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***PSEUDACRIS CRUCIFER* (Spring Peeper). NATURAL ENSNAREMENT.** Anthropogenic debris in the environment can become a major hazard for organisms, and can result in entanglement or entrapment and lead to the organism's death (Laist 1997. *In* Coe and Rogers [eds.], Marine Debris-Sources, Impacts and Solutions, pp. 99–139. Springer-Verlag, New York). However, to my knowledge entrapment or ensnarement by natural objects has not been reported. At 2145 h on 17 May 2015 I observed a *Pseudacris crucifer* ensnared by naturally occurring grasses near the edge of a small pond at Mountain Lake Biological Station, Giles Co., Virginia, USA (37.3740°N, 80.5210°W; WGS84). The adult frog (unknown sex) was ensnared by several thin pieces of grass around the proximal portion of the tibiofibula of its left leg. The skin on the middle portion of the leg had been peeled upwards, exposing the underlying musculature and bone. At the time the frog was observed, the tarsus and foot were atrophied and no longer functioning, suggesting the frog was originally ensnared at the distal portion of the tibiofibula. In general, the frog was emaciated and dehydrated, but alive. Based on the weather conditions at the station during the previous week, the frog was likely ensnared for 1–3 days. The frog was freed from the grass for a more thorough evaluation and euthanized.

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***TRACHYCEPHALUS MESOPHAEUS* (Porto Alegre Golden-eyed Tree Frog). DIET.** *Trachycephalus mesophaeus* is a common frog endemic to the Atlantic Forest, from the states of Bahia to Rio Grande do Sul, Brazil (Frost 2015. Amphibian Species of the World: an Online Reference. Version 6.0. http://research.amnh.org/vz/herpetology/amphibia; accessed 15 Apr 2015. American Museum of Natural History, New York). We analyzed the diet of *T. mesophaeus* from Atlantic Forest in southeastern Brazil. We hand-collected seven male (mean SVL ± SE = 76.05 ± 3.73 mm), nine female (mean SVL ± SE = 82.03 ± 2.73 mm), and 20 juvenile (mean SVL ± SE = 16.09 ± 0.31 mm) *T. mesophaeus* between August 2002 and July 2004 in the Estação Biológica de Santa Lúcia (19.9657°S, 40.5408°W, WGS 84; 689 m elev.), Santa Teresa, Espírito Santo, Brazil. We dissected the specimens and analyzed their stomach contents under a stereomicroscope. Nineteen individuals had empty stomachs, of which two were males, one was a female and 16 were juveniles. Coleoptera and Blattodea were the most numerous and frequent prey items, but Orthoptera was the most important in respect to prey weight (Table 1). Apparently *T. mesophaeus* has a diet composed of a variety of invertebrates and thus seems to have an opportunistic feeding strategy as has been reported for other congeneric species (Cisneros-Heredia 2007. Herpetozoa. 20:92–94; Loebmann 2013. Herpetol. Notes. 6:275–276). To our knowledge, this is the first study on the diet of *T. mesophaeus*. The specimens are housed at the Zoological Collection of Museu de Biologia Mello Leitão, Espirito Santo, Brazil.

Table 1. Prey consumed by *Trachycephalus mesophaeus* (N = 17) in the Estação Biológica de Santa Lucia, municipality of Santa Teresa, Espírito Santo, Brazil. N = number; W = weight; F = frequency of prey. Relative percentages of each prey type in parentheses.

Prey	N (%)	W (%)	F (%)
Blattodea	5 (25)	63.9 (21.6)	5 (29.4)
Chilopoda	1 (5)	2.7 (0.9)	1 (5.9)
Coleoptera	8 (40)	11.9 (4)	5 (29.4)
Formicidae	1 (5)	32.5 (11)	1 (5.9)
Macrophyte	1 (5)	0.6 (0.2)	1 (5.9)
Oligochaeta	2 (10)	24.3 (8.2)	2 (11.8)
Orthoptera	2 (10)	160.5 (54.1)	2 (11.8)
Total	20 (100)	296.4 (100)	17 (100)

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TESTUDINES — TURTLES

***CHELONIA MYDAS* (Eastern Pacific Green Sea Turtle). DIET.** *Chelonia mydas* is considered the most carnivorous of all Green Sea turtle subpopulations worldwide (Bjorndal 1997. *In* Lutz and Musick [eds.], The Biology of Sea Turtles, pp. 199–231. CRC Press, Boca Raton, Florida). Novel diet items have been reported, including *Ptilosarcus undulatus* (Sea Pen) (Seminoff et al. 2002. Copeia 2002:266–268); *Pleuroncodes planipes* (Pelagic Red Crabs) (Lopez-Mendilaharsu et al. 2005. Aquat. Conserv. Mar. Freshw. Ecosyst. 15:259–269); tunicates and crustaceans (Amorocho and Reina 2007. Endang. Species Res. 3:43–51); hydrozoans, scyphozoans, nematodes, annelids, mollusks (Carrion-Cortez et al. 2010. J. Mar. Biol. Assoc. U.K. 90[5]:1005–1013); the anemone *Palythoa ignota* (Rodriguez-Baron et al 2011 Herpetol. Rev. 42:416); and squids and octopus (Riosmena-Rodrigeuz and Lara-Uc 2015. Herpetol. Rev. 46:617).

It has been suggested that such dietary diversity is a response to the energy requirements of these animals in the early life stages, facilitating nutritional (e.g., protein) gains for development and maturation (Bjorndal 1985. Copeia 1985[3]:736–751) and optimizing digestion time (Amorocho and Reina 2008. J. Exp. Mar. Biol. Ecol. 360:117–124). It has also been noted that *C. mydas* diet is influenced by resource availability (Balazs 1980. NOAA Tech. Memo. NOAA-TM-NMFS-SWFS-7; Garnett et al. 1985. Wildl. Res. 12:103–112) and that diet selection is linked to the composition and capacity of the hind-gut microflora, which may change as turtles grow and/or occupy different habitats (Bjorndal 1980. Mar. Biol. 56:147–154).

During two field trips in 2015 we collected food samples from the esophagi of 49 *C. mydas* (body mass 43.73 ± 18.46 kg), and straight carapace length [68.25 ± 11.97 cm] captured at Ojo de Liebre Lagoon (28.14333°N, 114.55917°W), Baja California Sur, Mexico. The sea urchin (probably Red Sea Urchin (*Mesocentrotus franciscanus*)) was present in 23 of the total samples, and it comprised 42% of the total volume. Turtle mean body condition index (BCI) was 1.56 (range = 1.25–2.06), similar to the values reported for previous studies (Koch et al. 2007. Mar. Biol. 153[1]:35–46; Seminoff et al. 2003. J. Mar. Biol. Assoc. U.K. 83:1355–1362), which indicates that the animals were in good nutritional status and had the capacity for a favorable reproductive performance (Bjorndal et al. 2000. Ecol. Appl. 10:269–282). To our knowledge, this is the first report of targeted sea urchin consumption by *C. mydas*. The fact that sea urchin occurred in a substantial number (47%) of turtles suggests that the Echinoidea is a food resource for these turtles at Ojo de Liebre Lagoon, and that they have the capacity to assimilate nutrients from this species (Bjorndal 1990. Bull. Mar. Sci. 47[2]:567–570).

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***CHRYSEMYS PICTA* (Painted Turtle). EXTREME WEATHER EVENT.** During June 2005 we buried Tidbit temperature loggers (Onset, Pocasset, Massachusetts, USA) adjacent to freshly deposited Painted Turtle nests at average egg/hatchling depth (10 cm) on the Crescent Lake National Wildlife Refuge (CLNWR) in Garden Co., Nebraska, USA. We returned on 2 April 2006 to excavate the nests, and retrieve data from nine loggers from intact nests. The resulting temperature profiles demonstrated a precipitous drop in nest temperatures late on 3 August 2005 (Fig. 1) at a time when turtle eggs were near or just hatching.

Our nest excavation data showed that 105 of 248 eggs (42.3% from 23 nests) had not hatched before winter in 2005 and were not viable in April 2006. This mortality rate was not unusual compared to 42.4% for eggs laid in 2002, 28.8% for 2003, 60.5% for 2005, and 15.5% for 2007 (overall mean = 37.9%). Unfortunately, because the embryos in dead eggs were not staged, we could not attribute their mortality directly to the chilling event.

Nevertheless, these observations stimulated us to examine weather records for August 2005 from the NOAA automated recording station located less than 100 m from the center of the main turtle nesting area. At 1600 h on 3 August air temperature was 30.6°C, with 36% relative humidity (RH), and 18 km/h north winds. At 1700 h, air temperature had dropped to 25.6°C, RH 53%, and wind 39 km/h from the NNE. Shortly after 1700 h, a short-lived but intense local convective storm overtook the Refuge. By 1800 h the storm had passed and air temperature was 19.4°C, with RH of 100% and 29 km/h NNE winds. According to the Refuge Narrative for 2005, that storm "produced hail in excess of 1.5 inches [3.8 cm] in diameter …. shredding chest-high cattails …. down to just over knee height. Damage to refuge facilities was estimated to be several thousand dollars and included broken windshields, damaged siding and window casings, broken windows on the residences and shop, torn window screens and other minor damage" (Marlin French, pers. comm., CLNWR annual narrative). Melted precipitation from the event was 1.02" (2.6 cm) based on the automated NOAA tipping bucket station, and 1.41" (3.6 cm) based on the manual bucket gauge.

These data lead us to hypothesize that the rapid cooling and flooding of the sandy soil down to at least nest depth on 3 August 2005 resulted in a substantial drop in nest temperature (to at least as low as 16.3°C in one monitored nest), and potentially increased nest mortality that summer due to the > 10°C drop in nest temperature in less than an hour. Given that temperature fluctuations are known to produce oxidative stress in animal cells (Constantini 2014. Oxidative Stress and Hormesis in Evolutionary Ecology and Physiology: A Marriage between Mechanistic and Evolutionary Approaches. Springer, Heidelberg, Germany), increased mortality might be expected.

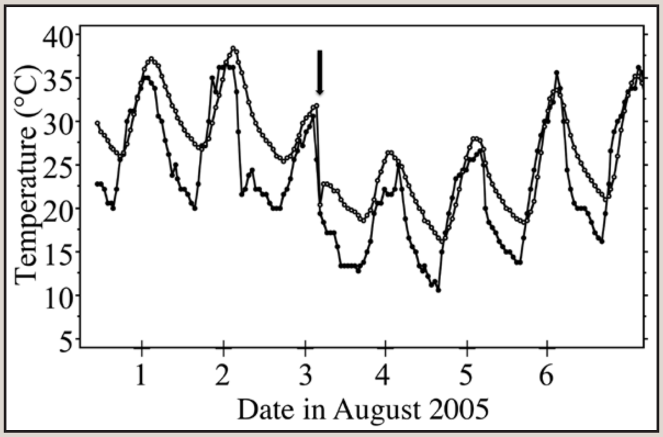

Fig. 1. Hourly temperature profile of air temperature (solid dots; lower line) and a representative Painted Turtle (*Chrysemys picta*) nest (open dots) from 1–6 August 2005 demonstrating the effect of a hailstorm that occurred just after 1700 h on 3 August (arrow; note unusually steep decline in nest temperature compared to other evenings). Daily hash marks (1–6) indicate noon temperature on that day. Depth of logger = 10 cm. Nest temperature drop was at least 11.50°C between 1700 and 1800 h (since loggers only recorded on the hour). Temperature drops for that hour for three other profiles from openly exposed nests were 11.81, 10.22, and 9.57°C; drops for five nests protected by trees or buildings were only 2.39, 3.41, 4.12, 4.67, and 5.51°C.

While admittedly speculative, this is the first report of the possible negative impact of a major hailstorm on turtle nest survivorship for any turtle species. Had this storm occurred during July, the primary window for temperature-dependent sex determination in this species (Janzen 1994. Ecology 75:1593–1599), it might also have had an effect on the sex ratio of the entire cohort.

Although interesting in its own right, given that extreme weather events are likely to increase under the predicted climate change scenario (IPCC 2014), such storms may represent yet another event capable of adverse impacts on survivorship and sex ratios in turtles (Schwanz and Janzen 2008. Physiol. Biochem. Zool. 81:826–834; Pike 2014. Global Change Biol. 20:7–15; Lolavar and Wyneken 2015. Endangered Species Res. 28:235–247; Refsnider and Janzen 2015. J. Hered. 2015:1–10; Santidrian Tomillo et al. 2015. Global Change Biol. 21:2980–2988). Laboratory studies on the effects of rapid cooling on turtle embryo mortality would be informative.

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***EMYDOIDEA BLANDINGII* (Blanding's Turtle). AGGRESSIVE BEHAVIOR.** Aggressive behavior while basking has been observed in several species of emydid turtles under natural settings, such as *Actinemys marmorata* (Pacific Pond Turtle; Bury and Wolfheim 1973. BioScience 23:659–652), *Chrysemys picta picta* (Eastern Painted Turtle; Lovich 1988. Herpetologica 44:197–202), *Trachemys scripta* (Pond Slider), *Pseudemys concina* (River Cooter), *Graptemys pseudogeographica* (False Map Turtle), and *G. ouachitensis* (Ouachita Map Turtle; Lindeman 1999. J. Herpetol. 33:214–219). Here I report the first, to my knowledge, documented observation of conspecific aggression during basking in *E. blandingii*.

Observations were made as part of a larger study taking place in proximity to the Muldrew Barrens Conservation Reserve located in central Ontario, Canada (44.90°N, 79.40°W; WGS 84). At approximately 1105 h on 7 May 2015, an adult male *Emydoidea blandingii* (hereafter referred to as BNTU1) was observed from approximately 20 m away, basking on the end of a floating log close to shore within an open wetland. Five adult *Chrysemys picta marginata* (Midland Painted Turtle) were also observed basking on the same log. At approximately 1110 h, another adult male *E. blandingii* (hereafter referred to as BNTU2) surfaced within two meters of the log and approached the left flank of BNTU1. BNTU2 then began to bite at BNTU1's left flank around the medial portion of both the fore and hind legs. BNTU1 grew agitated and began to shift position, and at approximately 1111 h entered the water from the side of the log opposite to BNTU2's position and submerged. After approximately 30 seconds BNTU2 climbed onto the log, positioned itself in BNTU1s original location, and began basking with neck and limbs outstretched. At approximately 1113 h, BNTU1 surfaced beside the log close to BNTU2 and began to bite at BNTU2's right flank around the medial portion of both the fore and hind legs. BNTU2 immediately began to bite back at BNTU1. After approximately 30 seconds BNTU2 entered the water directly adjacent to BNTU1, with both individuals submerging immediately. During this entire interaction, all five *C. p. marginata* appeared to watch both *E. blandingii* but otherwise remained undisturbed. I approached at approximately 1118 h and observed both individuals approximately two meters away from the log and one metre below the surface of the water, interlocked and producing a steady stream of bubbles. Upon closer inspection, one of the individuals was mounted on top of the other individual, with both forelegs hooked under the anterior carapace margin. By repeatedly extending and retracting both forelegs, the mounting individual used its plastron to repeatedly strike the carapace of the mounted individual, producing an audible clacking sound. Throughout this interaction, the mounted individual remained retracted in its shell. This behavior ceased after roughly ten seconds once both individuals had noticed me, with the mounting individual releasing its grasp. As both turtles remained out of sight between 1113 h and 1118 h, it is not known which of the two individuals was mounted on the other. Biting has not been observed in *E. blandingii* male-female courtship (Baker and Gillingham 1983. Herpetologica 39:166–173), suggesting that this behavior may be reserved for bouts of aggression. Shell clapping, a behavior occasionally reported during courtship in some turtle species (Liu et al. 2013. Chelon. Conserv. Biol. 12:84-100) has not, to the best of my knowledge, been published for *E. blandingii* in either a reproductive or non-reproductive context. While short periods of homosexual mounting (< 60 seconds) has been reported in *E. blandingii* (Baker and Gillingham 1983, *op. cit.*), the combination of biting and forceful shell clapping is indicative of an aggressive male-male interaction. Therefore, it is possible that this can be attributed to some form of hierarchy or dominance relationship, an explanation that has been proposed in other instances of same-sex mounting in chelonian species (Rodrigues and Liu 2016. J. Ethol. 34:133–137). Measurements of both male *E. blandingii* were taken; one individual had a maximum straight-line carapace length = 24.0 cm and mass = 1800 g, while the other individual had a maximum straight-line carapace length = 26.3 cm and mass = 2200 g. Both individuals were confirmed as males by two independent observers through the evaluation of secondary sexual traits (plastron concavity, tail length, and maximum carapace length). This observation serves as a contribution to the social interactions of *E. blandingii*.

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***ERETMOCHELYS IMBRICATA* (Hawksbill Seaturtle). FISHING GEAR MORTALITY.** Mortality from fishing gear constitutes one of the largest threats to sea turtle populations today (Lewison and Crowder 2007. Conserv. Biol. 21:79–86). Here I document a case of *Eretmochelys imbricata* drowned from a single segment of monofilament fishing line anchored to the seafloor. I made this observation at 1500 h on 9 October 2011 while scuba diving underneath the Frederiksted Pier in Frederiksted, St. Croix, US Virgin Islands. Both ends of the fishing line were stuck in a rock crevice, creating a loop of fishing line that was suspended vertically in the water column. The subadult turtle apparently swam through the loop, causing its right front flipper to become entangled in the line, preventing the turtle from surfacing to breathe. Drowning was the likely cause of death, although the turtle was already deceased when encountered. The turtle was not emaciated nor did it have external wounds or tumors and appeared otherwise healthy.

Although turtles often become entangled in derelict fishing gear such as nets (Gilman et al. 2010. Fish and Fisheries 11:57–88), this observation is interesting because a single relatively small segment of fishing line (approximately 6 feet total length) caused mortality. The Frederiksted pier is a popular spot for recreational fishing and a fisher on the pier presumably discarded the fishing line. *E imbricata* and *Chelonia mydas* (Green Seaturtle) are both frequently seen in the area, creating the potential for interactions between people and these endangered species. This observation helps to stress the importance of keeping such areas free of debris and providing adequate receptacles for disposal of garbage because even small pieces of fishing line can be a source of morality to sea turtles.

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***GOPHERUS POLYPHEMUS* (Gopher Tortoise). SIZE.** The record-sized (to date) *Gopherus polyphemus* was documented In March 2007 in Lee Co., Florida, USA. The fatally injured male had a post-mortem weight of 12.2 kg and a straight-line carapace length of 41.6 cm (Ashton and Ebenhack 2008. Herpetol. Rev. 39:214). Here we describe a larger *G. polyphemus* captured just west of LaBelle, Hendry Co., Florida (26.70117°N, 81.55745°W; WGS 84) at 1308 h on 14 March 2016 during a relocation project permitted by the Florida Fish and Wildlife Conservation Commission (FFWCC). Based on having a flat plastron, and skirting of the carapace outer scutes, we identified it as a female (Fig. 1). The straight-line

FIG. 1. Plastron of record-size *Gopherus polyphemus* from Hendry Co., Florida.

carapace length, measured using Haglof Mantax Blue 50-cm calipers, was 42.5 cm. The weight, recorded using an UltraSport V2-30 digital scale, was 14.50 kg. The *G. polyphemus* was relocated to a FFWCC permitted long-term recipient site.

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***INDOTESTUDO ELONGATA* (Elongated Tortoise). MAXIMUM BODY SIZE.** Maximum body size is relevant from evolutionary and ecological perspectives, and knowledge of upper asymptotic size is a necessary prerequisite for understanding patterns of growth (Platt and Rainwater 2015. Herpetol. Rev. 46:31–33 and references therein). *Indotestudo elongata* is a medium-sized tortoise occurring from Nepal and northeastern India, east through Bangladesh, Myanmar, Thailand, Laos, Cambodia, and Vietnam, and south into Peninsular Malaysia (Ernst and Barbour 1989. Turtles of the World. Smithsonian Institution Press, Washington, D.C. 313 pp.). Despite this extensive geographic distribution, the natural history of *I. elongata* remains poorly studied. We here report a new record for maximum carapace length (CL) in *I. elongata*.

PHOTO BY KHIN MYO MYO

FIG. 1. Carapace and plastron of a record-sized *Indotestudo elongata* () photographed at an encampment near Nankathu Cave, Rakhine State, Myanmar. The tortoise was eaten by villagers after being harvested in the adjacent Rakhine Yoma Elephant Sanctuary.

On 23 May 2010, one of us (KMM) obtained the carapace and plastron of a female (concavity absent on plastron) *I. elongata* (Fig. 1) from villagers living near Nankathu Cave (17.86056°N; 94.94898°E; India-Bangladesh Datum) on the eastern boundary of the Rakhine Yoma Elephant Sanctuary (RYES) in Rakhine State, Myanmar. The tortoise was reportedly found near the village inside the eastern boundary of RYES and harvested for domestic consumption about one month prior to our visit. The habitat in this area is characterized by steep, rugged terrain with scattered evergreen and deciduous trees growing amidst dense bamboo (*Melocanna baccifera*) brakes (Platt et al. 2010. Chelon. Conserv. Biol. 9:114–119). Mast fruiting of *M. baccifera*, followed by widespread culm dieback occurred during 2007–2009 (Platt et al. 2010. Bamboo Sci. Cult. 23:1–12) and most standing bamboo was dead at the time of our visit.

Villagers used a machete-like knife to extract the meat of the tortoise by separating the carapace from the plastron, damaging the plastral bridge in the process. Annuli on both the plastron and carapace exhibited considerable wear, but we nonetheless were able to count 22 annuli on the fourth right pleural scute of the carapace. We used tree calipers to measure (to nearest 1.0 mm) straight-line CL, maximum carapace width (CW), and midline plastral length (PL; from base of anal notch) of the shell. CL, CW, and PL measured 310, 210, and 245 mm, respectively. The CL of our specimen exceeds the previously published maximum CL of *I. elongata* (CL = 275 mm; Ernst and Barbour, *op. cit.*; Smith 1931. The Fauna of British India, including Ceylon and Burma. Vol. 1. Loricata and Testudines. Taylor and Francis, London. 185 pp.) by 35 mm.

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KINOSTERNON SCORPIOIDES **(Scorpion Mud Turtle). DIET.** *Kinosternon scorpioides* is a Neotropical turtle that occupies low elevations from Mexico south to northern Argentina, Bolivia, and northern Peru (Ernst and Barbour 1989. Turtles of the World. Smithsonian Institution Press, Washington, D.C. 313 pp.). This turtle is omnivorous, eating fish, amphibians, snails, insects, algae, and other plants (Vanzolini et al. 1980. Répteis das Caatingas. Academia Brasileira de Ciências. 161 pp.).

On 3 April 2016 at 1230 h, we observed a subadult *K. scorpioides* (116 mm carapace length) preying on an adult horsehair worm (Nematomorpha, Gordioidea), in a small body of water in Parque Nacional Serra do Pardo, Alatamira, Pará, Brazil (5.6560278°S, 52.708°W; WGS 84). Little is known about prey-predator relationships between reptiles and the Nematomorpha. In this case, we do not know if the Nematomorph was an accidental or unusual food item or is a routine prey for the turtles. This is apparently the first record of predation of a nematomorph worm for *K. scorpioides* in Amazonia.

The specimen (LZA 1281) was deposited in the herpetological collection of the Laboratório de Zoologia Universidade Federal do Pará, Campus de Altamira. Fieldwork was conducted under the auspices of SISBIO authorization 51921-2016.

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MALACLEMYS TERRAPIN LITTORALIS **(Texas Diamond-backed Terrapin). BASKING BEHAVIOR.** Basking *Malaclemys terrapin* have been documented floating at the surface of the water and on or just below the saltmarsh mud surface (Brennessel 2006. Diamonds in the Marsh. University Press of New England, Lebannon, New Hampshire. 219 pp.; Harden et al. 2007. J. North Carolina Acad. Sci. 123:154–162). On 18 March 2014, we observed an adult male *M. t. littoralis* exhibiting a basking behavior apparently not previously documented in the literature. The male terrapin was captured as part of ongoing terrapin research in West Galveston Bay, Texas. The *M. t. littoralis* was encountered in a dense stand of 60–80 cm tall *Spartina alterniflora* in Galveston, Texas, USA (29.25938°N, 94.90401°W; WGS 84). Upon initial observation, the *M. t. littoralis* was sitting at an angle atop the grass with its anterior skyward (Fig. 1). It appeared to have pushed down on and then climbed up the dense *S. alterniflora* to reach unobstructed sunlight. The recorded carapace temperature was 23.3°C. At the time of capture (1210 h), air temperature above the grass was 22.5°C, and 22.0°C at ground level. In contrast, the soil surface temperature was 17.3°C. Air temperature had increased throughout the morning, from a low of 18.2°C when the survey began at 0912 h. This behavior may represent a mechanism by which terrapins inhabiting heavily vegetated wetlands can actively thermoregulate by manipulation of the relative shading provided by marsh plants.

All air temperatures were measured, with the thermometer shaded and out of the wind, using a Kestrel 3000. Carapace and soil surface temperature were measured using a Metris Instruments infrared laser thermometer (model TN400L1). Data were collected under TPWD Scientific Research Permit SPR-0504-383.

Fig. 1. *Malaclemys terrapin littoralis* climbing *Spartina alterniflora* towards sunlight.

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PODOCNEMIS EXPANSA **(Giant South American River Turtle). PREDATION.** River turtles often nest on a fine sand beach adjacent to Lago da Amazonas in the Bosque da Ciência of the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil, close to the Center for the Study of Amazonian Turtles (3.099439°S, 59.984217°W). In addition, some nests are transplanted from unprotected areas along the borders of the lake and reburied on this sand beach. Hatchlings of *Podocnemis expansa* from one nest with 55 eggs were noted to have emerged by 0900 h on 3 November 2015; 50 eggs hatched and 20 of the hatchlings had emerged and dispersed into the lake. Before the other 30 could emerge from the nest, a Black Agouti (*Dasyprocta fuliginosa*) dug open the nest (depth 22 cm) and ate parts of 12 of the 30 recently hatched turtles (Fig. 1). The 18 remaining hatchlings were unharmed and also dispersed into the lake. This is the first record of an Agouti, which are normally vegetarians, preying on recently hatched turtles in the nest. Most predators of turtle hatchlings eat the entire hatchling in one gulp but this Agouti took bites out of various parts of several turtles. Possibly this may be due to the fact that this rodent is accustomed to eating seeds which do not move after being bitten, so when a hatchling moved away, it then

Fig. 1. Predated *Podocnemis expansa* hatchlings; notice three partially eaten hatchlings in the photo; the one in the lower left side shows how the Agouti ate the internal contents and left the remainder of the turtle.

took a bite out of a different one. The teeth of Agoutis are very sharp, being one of the only animals able to chew through the hard seed case of Brazil nuts. The hatchlings may have been located by auditory cues, given that hatchlings vocalize as they are pipping and leaving the nest (Ferrara et al. 2014. Herpetologica 70:149–156).

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***PODOCNEMIS SEXTUBERCULATA* (Six-tubercled Amazon River Turtle). KYPHOSIS.** Although kyphosis has been reportred in many turtle genera in Cryptodira, it is reported less frequently in pleurodires. Kyphosis is a dorsoventral curvature of the axial skeleton, with accentuated posterior apical apex, producing "hump" arching of the carapace (Brinkman et al. 2013. Morphology and Evolution of Turtles. Springer Netherlands, New York. 577 pp.). This spinal deformity was previously reported for one pleurodire species in the Podocnemididae, *Podocnemis erythrocephala* (Bernhard et al 2012. Herpetol. Rev 43:639). On 29 August 2014, we captured a kyphotic *P. sextuberculata* male (CL = 207 mm, PL = 175 mm, mass =1050 g) in Jacaré Lake (1.343333°S, 56.828333°W; WGS84), in the Trombetas River Basin. Jacaré Lake is part of the Trombetas River Biological Reserve (1.25°S, 56.83333°W, WGS84), in Oriximiná, Pará State, Brazil, a protected area controlled by the Brazilian federal government.

The turtle was photographed, measured, and released at the point of capture. Although RCV and his students have been studying this species in the area since 1989, this is the only kyphotic turtle reported in over 10,000 turtles examined in this family in the Trombetas Basin . It is apparently the first record for a kyphotic *P. sextuberculata*.

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***PSEUDEMYS CONCINNA CONCINNA* (Eastern River Cooter). TRAP AGGREGATION AND LEECH CLUSTER.** *Pseudemys concinna concinna* is a large, herbivorous, freshwater emydid turtle of the southeastern and southcentral United States (Ernst and Lovich 2009. Turtles of the United States and Canada. 2nd ed. Johns Hopkins University Press, Baltimore, Maryland. 827 pp.). Many reports have indicated that this species occurs in low abundance relative to other emydid turtles (Lindeman 1997. Chelon. Conserv. Biol.2:378–383; Ilegn et al. 2014. Chelon. Conserv. Biol.13:1–8; Lindeman 2015. Proc. Oklahoma Acad. Sci. 94:1–9; Riedle et al. 2015. Herpetol. Conserv. Biol. 10:695–702) and are less easily sampled using baited hoopnet traps (McCoy et al. 2007; Southeast. Nat. 6:191–203; Lindeman 2014. Herpetol. Rev. 45:597–600). Herein, we report on the trapping abundance of this species during 10 sampling years of hoopnet trapping from a single creek in northeastern Arkansas and highlight an unusually large single-trap aggregation of turtles in 2014. In addition, we document the attachment of a leech cluster in this species..

During a mark-recapture investigation of Alligator Snapping Turtles (*Macrochelys temminckii*) in Salado Creek, Independence Co., Arkansas, USA (35.68837°N, 91.55942°W, WGS 84; elev. 69.5 m) that spanned from 1995–2001 and then from 2011–2015, we recorded other turtle species (e.g., primarily *Apalone spinifera*, *Graptemys pseudogeographica kohnii*, and *Pseudemys c. concinna*) captured in traps. We employed standard three-ring hoop nets baited with fish parts during this study. In Table 1, we summarize the trapping data for *P. c. concinna* captured during the 10 years of trapping. We found a relative abundance of 0.18 *P. c. concinna* per trap night and 0.53 *P. c. concinna* per trap.

On 18 July 2014, we captured an unusually large number of adult *P. c. concinna* (2 males; 7 females) in a single trap. No other species of turtles was trapped with them. The second largest number of *P. c. concinna* trapped in a single trap was 4 turtles captured on 8 May 1998. *Pseudemys concinna* is well known to aggregate in relatively large numbers, especially at favorable basking sites (Kornilev et al. 2010. Chelon. Conserv. Biol. 9:196–204). Basking logs, however, are uncommon at the particular trap site location on Salado Creek that yielded this large social aggregation; therefore, it remains unclear as to why the 9 turtles entered this single trap.

One of the females (SCL = 233 mm; PL = 217; body mass = 1.02 kg) trapped on 18 July 2014 exhibited a leech cluster beneath the nuchal region of the carapace (Fig. 1). The leech species,

Table 1. Yearly summary of trapping data for *Pseudemys c. concinna* in Salado Creek, Independence Co., Arkansas, USA.

Year	Total number of trap nights	Total number of traps containing *P. c. concinna* trapped	Total number *P. c. concinna* trapped
1995	28	3	5
1996	190	29	45
1997	56	2	6
1998	43	5	9
2001	14	0	0
2011	39	0	0
2012	8	0	0
2013	12	1	3
2014	13	1	9
2015	13	0	0
Total	416	41	77

Fig. 1. Adult female *Pseudemys concinna concinna* with attachment cluster of *Placobdella parasitica.*

Placobdella parasitica (Smooth Turtle Leech), is a common opportunistic blood-feeder on many aquatic turtles of North America (Moser 1995. Texas J. Sci. 47:71–74; Moser et al. 2005. Comp. Parasitol. 72:17–21), and only once has a clustering attachment by this leech been documented on *P. c. concinna* (Moser et al. 2013. Bull. Peabody Mus. Nat. Hist. 54:255–262). Our observation provides further evidence of clustering attachment by *P. parasitica* on this turtle species.

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***TERRAPENE CAROLINA* (Eastern Box Turtle). WINTER MORTALITY.** Risk for box turtle death during hibernation is not well determined, but it is an important metric for population survival because this species rebounds very slowly from losses (Hall et al.1999. Biol. Conserv. 88:165–172).

Those who have commented on box turtle winterkill indicate that few turtles generally die during most winters (Ernst et al. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, DC. 578 pp.; Dodd 2001. North American Box Turtles, A Natural History. University of Oklahoma Press, Norman, Oklahoma. 231 pp.; Cook 2004. Appl. Herpetol. 1:197–228), a view which agrees with 22 years in our 23-year chronicle.

In our study (e.g., Seibert and Belzer 2013. Rept. Amphib. Conserv. Nat. Hist. 20:53–74) we have been monitoring (since 1993), via radiotelemetry, a population composed of displaced adult, and headstarted *Terrapene carolina* in NW Pennsylvania, USA. Previous papers have detailed aspects of health in these turtles, our study habitat, location, and our methods. Here we report a mortality event that occurred in the record-breaking cold winter of 2013–2014.

Terrapene carolina often hibernates in places with little groundcover (Madden 1975 Unpubl. PhD dissertation, City University of New York, New York. 217 pp.). Unlike box turtles in more southern climes (Ernst et al., *op. cit.*), individuals in NW Pennsylvania consistently remain underground and do not change hibernacula during the winter. Our turtles use many different types of substrate (sedge fields, leaf-filled depressions, hardpan, stony subsoil, root-ridden soil, old tree-root pits, etc.) for hibernating, some of which limit the depth of cover that the turtles are able to achieve, but with no noticeable detriment to their winter survival.

Allard (1935. Sci. Mthly. 41:325–338) reported a high rate of death (3 of about 30 turtles) in a population near Washington, DC during the winter of 1932–1933. A 10% mortality rate would constitute a major population event. Allard ascribed disease or poor condition among his turtles as a primary contributor to the die-off. For the 20 years that preceded 2013 in our population, seven of those winters produced low mortality (2% of the population during five of the winters; 1% during two winters); 13 of the winters induced no deaths. Then, in the winter of 2013–2014, southern extensions of the polar vortex brought record-breaking

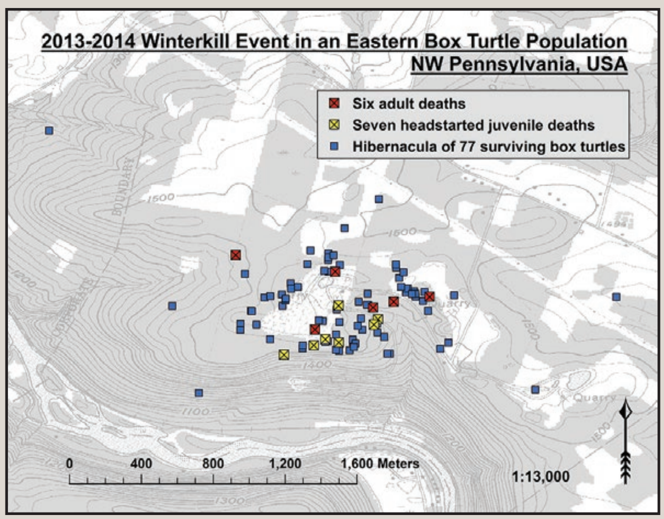

Fig. 1. Distribution of 13 box turtle deaths following a winter with sudden and severe (-25°C) record-breaking cold temperatures coupled with a lack of snow cover.

cold spells to NW Pennsylvania. We anticipated no increased incidence of winterkill from this cold onslaught because many of our turtles had successfully survived previous severely cold winters (e.g., winter of 1993–1994). However, the spring of 2014 revealed that over 14% (13 turtles) of our 90 telemetered turtles had died during the winter.

Our population comprises about equal proportions of juvenile and adult turtles. Forty-six percent (six animals) of the dead turtles were adult; 54% (seven animals) were juvenile headstarts. All seven of the juvenile deaths were turtles that were outdoors for their first winter, five other first-year juveniles survived, and several older turtles (including a few that had survived 13 or more previous winters) were among the dead. The deaths were not localized to a particular region of our study site (Fig. 1). Note that some of the turtles that died had hibernated in close proximity to individuals that survived (blue markers).

All but one of the dead turtles were discovered underground in their hibernacula and none were marred by predators. Most of the dead turtles had successfully reached adequate soil depths (15–25 cm). This winterkill event, which far surpassed winter mortality rates in previous decades of this study, made us wonder if an unknown pathogen may have compromised turtles before cold weather arrived in January 2014.

When the polar vortex and record-breaking cold snaps returned for the winter of 2014–2015, we feared there would be more winter death. However, the winter of 2014–2015 produced no observed winterkill. A notable difference between the winters of 2013–2014 and 2014–2015 was the amount of snow cover when the severe low temperatures occurred. In 2015, the first severe cold period arrived on 8 January when there was already more than 11 cm of snow on the ground. However, in 2014, the first severe low temperatures arrived 7 January immediately after a warm spell that had eliminated all snow cover from the ground. Another notable difference was that the first low temperature in 2015 (-18°C on 8 January) was not quite as severe as the 2014 first low (-25°C on 7 January) which had also occurred with a very sudden drop of more than 30°C within 24 h.

Because our population had no winterkill during the very cold winter of 2014–2015, and zero deaths during the ensuing (2015) activity season, we presume that our initial speculation on pathogenic involvement in the 2013–2014 winter die-off was probably incorrect; rather, the die-off appears to have been caused by the severe cold and perhaps concurrent lack of insulating snow cover. Karen Kosheba (pers. comm.) pointed out that the 2013–2014 winter was also exceptional in that its severe cold snaps were interspersed with warming episodes that enabled meltwater and water from rainy periods to penetrate deeply. Ensuing freezing periods caused small, localized cryoseisms that may have imposed unusual underground stresses (Hermes-Lima and Zenteno-Savin 2002. Comp. Biochem. Physiol. Part C: Toxicol. Pharm. 133:537–556; Layne and Kennedy 2002. J. Therm. Biol. 27:167–173), for the wintering turtles that year.

Long-term studies documenting winterkill events in Eastern Box Turtles are needed; thus the data in this report can contribute to a reference baseline. Unusually severe climatic conditions and not pathogens seem to be the most important factor resulting in higher mortality during the winter of 2013–2014 for our population. Such elevated mortality would have to be very rare for this species if an affected deme were to eventually recover from the loss (Currylow et al. 2011. Amer. Midl. Nat. 165:143–149).

A special research permit issued in 1993 by the Pennsylvania Fish and Boat Commission enables this open-ended field study. We thank J. Basinger for encouraging us to report this winterkill event.

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***TERRAPENE CAROLINA* (Eastern Box Turtle). YELLOW JACKET ATTACK.** On 29 August 1976 in Whitley Co., Kentucky, USA, I observed a male box turtle moving its head about in response to a single buzzing Eastern Yellow Jacket, *Vespula maculifrons*. The wasp appeared to be attacking the head of the turtle, buzzing and moving in close proximity to the head (Fig. 1) and then out and back again. The turtle did not retract its head but kept it out in response to the wasp. After 3–4 min, the turtle turned and crawled away with the wasp still buzzing about his head. The significance of the attack is unclear. The turtle may have disturbed the wasp near a subterranean nest. Movement away from the insect would seem to be the adaptive response to avoid potential injury to the head. There was no indication that the yellow jacket stung the turtle, but was possible. A literature review revealed no reports of bees or yellow jackets attacking turtles.

Fig. 1. The yellow jacket, *Vespula maculifrons* in flight in front of and attacking the head of a *Terrapene carolina.*

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***TRACHEMYS SCRIPTA* (Pond Slider). LONG DISTANCE MOVEMENT.** On 3 May 2013, we captured a male *Trachemys scripta* (carapace length = 207 mm, mass = 1167 g) in a hoop net at an established trap site in Horse Creek, Hardin Co., Tennessee, USA (35.11688°N, 88.15681°W; WGS84), and released it at the capture site. We recaptured this individual on 18 June 2013, 2.74 km downstream in a hoop net in Pickens Branch (35.12427°N, 88.17067°W; WGS84) at another established trap site less than 50 m from where Pickens Branch enters Horse Creek. Distances were measured using Google Earth. We captured this turtle a third time on 22 July 2015 at the Pickens Branch site.

At ca. 1000 h on 21 July 2015, we captured a male *T. scripta* (carapace length = 182 mm, mass = 796 g) in a hoop net at the Horse Creek site and released it at the capture site. We recaptured this individual at ca. 1000 h on 23 July 2015 2.74 km downstream in a hoop net at the Pickens Branch site. This turtle also moved

2.74 km downstream, an average of 1.34 km per day over a two-day period.

From 27 April 2012 until 23 July 2015, we conducted seven sampling sessions of one to three days each, at five established trap sites in Horse Creek (three sites) and Pickens Branch (two sites). We captured a total of 103 individual *T. scripta* and made 45 recaptures. Of the 45 recaptures, only the two described above made long distance movements.

An average daily movement of ca. 240 m was reported for *T. scripta* from an urban canal (Ryan et al. 2008. Urban Ecosyst. 11:213–225). Likewise, an average movement of *T. scripta* from Reelfoot Lake, Tennessee, was 212.9 m/d (Jaeger and Cobb 2012. Chelon. Conserv. Biol. 11:59–67). These authors did observe several daily movements > 600 m (Jaeger and Cobb 2012, *op. cit.*). These two reports are from a canal and natural lake, respectively; however, turtle movements in small streams are generally poorly known (Plummer et al. 1997. Chelon. Conserv. Biol. 2:514–520).

A female *T. scripta* reportedly made a long distance movement of 1.65 km downstream in the North Oconee River over ca. 24-h period (Sterrett and Crain 2014. Herpetol. Rev. 45:321). Our observations corroborate the finding of Sterrett and Crain (2014, *op. cit.*) that *T. scripta* in small streams do make long distance, downstream movements. We do not know the frequencies or purposes of such movements.

We thank the Ron and Linda Pickard, and Kevin Skoffic for access to and lodging at Horse Creek Wildlife Sanctuary and Animal Rescue. We thank Freed-Hardeman University for financial support. We thank members of the Vertebrate Ecology and Conservation Team at FHU for assistance in the field. This study was conducted under the authority of Tennessee Wildlife Resources Agency permit 1494.

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Fig. 1. *Alligator mississippiensis* investigating an adult wild pig (*Sus scrofa*) in Aiken, South Carolina.

Fig. 2. *Alligator mississippiensis* scavenging an adult wild pig (*Sus scrofa*) in Aiken, South Carolina.

CROCODYLIA — CROCODILIANS

***ALLIGATOR MISSISSIPPIENSIS* (American Alligator). DIET.** *Alligator mississippiensis* is widely distributed in the southeastern U.S. and is considered an apex predator. However, variability in alligator feeding behavior and diet has been observed throughout the range due to geographic variation in food availability (Gabrey 2010. Herpetol. Conserv. Biol. 5:241–250). Although typically thought of as carnivorous hunters, alligators also will scavenge carrion opportunistically in aquatic and terrestrial habitats, although such behavior has rarely been observed in nature (see Shoop and Ruckdeschel 1990. Am Midl Nat. 124: 407–412; Elsey et al. 2004. Southeast. Nat. 3:381–390; Folk et al. 2014. Southeast. Nat. 13:64–79). Here we report two observations of adult *A. mississippiensis* scavenging adult *Sus scrofa* (wild pig) on the Savannah River Site (SRS), Aiken, South Carolina, USA.

The first observation occurred at 1745 h on 30 July 2014 approximately 100 m from Pond C on the SRS (33.276456°N, 81.552416°W; WGS84), when an adult alligator was observed near a *S. scrofa* carcass that had been killed approximately three days prior as part of an unrelated study. The alligator was situated within approximately 1 m of the posterior end of the carcass, much of which was already scavenged (Fig. 1). Although no interaction with the carcass was documented while observers were at the carcass site, the *A. mississippiensis* was investigating the carcass and may have scavenged prior to or after our presence. The second event occurred at 0446 h on 8 July 2015 at Risher Pond on the SRS (33.16623°N, 81.70524°W; NAD83). An adult *A. mississippiensis* was documented scavenging an adult female *S. scrofa* via remote infrared camera (Reconyx®, Holmen, Wisconsin, USA). The wild pig carcass and camera were placed as part of a study to document wildlife, particularly *Canis latrans* (Coyote), use of wild pig carrion. This bait station was within 15 m of a pond, which apparently facilitated alligator presence near this food resource. Camera images documented the alligator approaching the carcass from the direction of the pond and seizing the carcass by the back of the head/neck region, then adjusting its position to hold the entire head within its jaws before dragging the carcass out of frame back in the direction of the water body (Fig. 2).

Although documentation of *A. mississippiensis* scavenging events are rare, alligators have been reported to scavenge *Caretta caretta* (Loggerhead Sea Turtle) (Nifong et al. 2011. 42:511–513), and *S. scrofa* carcasses (Bangs 2014. Master's Thesis, Louisiana State University, Baton Rouge) in the southern portion of their range. The previously recorded scavenging of *S. scrofa* occurred nine days after carcass placement, whereas both of our observations occurred within 72 h of carcass availability. To our knowledge, our observations are the first documentation of *A. mississippiensis* scavenging a *S. scrofa* in the north-central portion of its range, highlighting the opportunistic feeding behavior of alligators throughout their distribution in the southeastern U.S. Scavenging is known to be a widespread and efficient foraging strategy, especially for large predators, because of the reduced energy expenditure associated with consuming carrion compared to active hunting of prey (DeVault et al. 2003. Oikos 102:225–234; Beasley et al. 2012. Oikos 121:1021–1026). Thus, it is not surprising that *A. mississippiensis* may opportunistically take advantage of carrion food resources, and we suspect scavenging behavior by alligators may be more common than reported in the literature.

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***CROCODYLUS MORELETII* (Morelet's Crocodile). MOVEMENT.** *Crocodylus moreletii* inhabits freshwater wetlands throughout much of the Atlantic lowlands of Mexico, Guatemala, and Belize (Groombridge 1987. *In* Webb et al. [eds.], Wildlife Management: Crocodiles and Alligators, pp. 9–21. Surrey Beatty & Sons, Pty. Ltd, Sydney), and can usually be found in close proximity of lakes, rivers, or lagoons. There are also reports that these crocodiles may occasionally venture long distances over dry land (Alvarez del Toro 1974. Los Crocodylia de Mexico—Estudio Comparativo. Instituto de Recursos Naturales Renovables, Mexico City, Mexico. 70 pp.). However, no further information was provided, and little information is available on the movement patterns of *C. moreletii* within the tropical Mayan jungle, where there are no rivers, and *aguadas* (temporary lakes maintained by rainfall) are the only source of water within the area. We herein report a long distance movement of a juvenile *C. moreletii* in Calakmul Biosphere Reserve, located in the southern part of the Yucatan Peninsula, México.

On 5 July 2015, we captured a juvenile *C. moreletii* (SVL = 49.0 cm; total length = 97.0 cm; 2.4 kg), while surveying an aguada (18.30788°N, 89.85730°W; WGS 84). After capture and measurement procedures, the crocodile was marked by removal of a vertical tail scute. All procedures were performed on site and once finished the animal was released. Twenty-six days later, on 31 July 2015 while surveying a different aguada (18.31186°N, 89.85614°W; WGS84), we encountered and captured the same crocodile. As there is no water connection between the two aguadas, the juvenile crocodile ventured into the forest and traveled a minimum distance of 469 m (distance in straight line between the two locations). Other juveniles might have also moved between those two locations, because when we returned to the original capture site on 5 August 2015, the number of individuals observed decreased significantly between both dates (15 crocodiles on 5 July 2015 and only one crocodile on 5 August 2015). This migration might increase the risk of mortality, because on land, juvenile crocodilians are more exposed to higher predation risk, as large predators such as the Puma (*Puma concolor*) and Jaguar (*Panthera onca*) occur in the area and are known to prey upon crocodilians (Alvarez del Toro 1974, *op. cit.*; Da Silveira et al. 2010. J. Herpetol. 44:418–424). In Calakmul, we encountered the remains (part of the ribcage and tailbones) of a juvenile *C. moreletii* near a pile of bones of the Red Brocket Deer (*Mazama americana*) near the margins of the first aguada (about 3 m inside the forest).

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***CROCODYLUS MORELETII* (Morelet's Crocodile). DIET AND FEEDING BEHAVIOR.** Although some reports on the diet of *Crocodylus moreletii* are available (e.g., Platt et al. 2002. Herpetol. J. 12:81–84; Platt et al. 2006. Herpetol. J. 16:281–290; Platt et al. 2007. Southwest. Nat. 52:310–317), these studies were restricted to riverine systems. Little information is available on the diet of this species within the tropical Mayan jungle, where there are no rivers, and *aguadas* (temporary lakes sustained by rainfall) are the only source of water in a large area. Also, crocodilians are mainly nocturnal hunters, so field observations on species taken are scarce. This report provides a record of multiple opportunistic prey captures and continuous dive-resurface behavior associated with feeding in an adult male *C. moreletii*. It also presents previously unknown prey items for *C. moreletii*.

Observations were made in an aguada (18.40337ºN, 89.48710ºW; WGS 84), next to Hormiguero Camp on Calakmul Biosphere Reserve (CBR), Campeche, México. The aguada has a circular shape (diameter 39.0 ± 1.7 m; water depth 60.0 ± 20 cm), and nearly 80% of it is covered by aquatic vegetation. On 19 July 2015 at 0633 h, the resident crocodile (estimated SVL = 120 cm), surfaced in an area of open water (diameter 3.5 m) at about 6 m from nearest margin with an adult Whitenosed Coati (*Nasua narica*) in its jaws (estimated head–body length = 45.0–65.0 cm). At 0636 h the crocodile submerged with its prey, and 2 min later (0638 h) reemerged without the coati. During the next 28 minutes, the crocodile exhibited a continuous dive-resurface behavior (without the mammal prey), and was able to capture and consume three juvenile Common Moorhens (*Gallinula chloropus*) that were near the open water area. Then, at 0704 h, the crocodile resurfaced at the same location holding the *N. narica* within its jaws, and displayed a violent behavior swinging the prey from side to side and splashing it against the water (Fig. 1), for about five seconds, every two to three minutes, until 0734 h, when it submerged and exhibited again a continuous dive-resurface behavior (without the mammal prey) for about 70 minutes. Then, at 0850 h the crocodile re-emerged with the coati (now completely disfigured) and started to consume it for nearly 15 minutes. For the next four hours, the crocodile was observed basking, with its head and back above water in the same location, and after that was not seen again for the entire day.

This report provides first record of *C. moreletii* preying upon White-nosed Coati and Common Moorhens. It also describes, for

Fig. 1. Morelet's Crocodile (*Crocodylus moreletii*) preying on a White-nosed Coati (*Nasua narica*) in Calakmul Biosphere Reserve, México.

the first time, feeding behavior and multiple opportunistic prey capture by *C. moreletii*, highlighting the need for additional field observations of foraging crocodiles to complement traditional dietary studies based on the analysis of stomach contents, where in general, large prey items are underrepresented.

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SQUAMATA — LIZARDS

***AMEIVA AMEIVA* (Giant Ameiva). PREDATION.** *Ameiva ameiva* is one of the most widely distributed Neotropical lizards, occurring from the Caribbean Islands and Costa Rica to southern Brazil, northern Argentina, and the eastern Andes in South America (Vitt and Colli 1994. Can. J. Zool. 72:1986–2008). Despite its broad distribution, few data exist on the predators of *A. ameiva* (Martins and Oliveira 1998. Herpetol. Nat. Hist. 6:78–150; Pinho 2010. Herpetol. Rev. 41:72–72; Laurindo 2010. Herpetol. Ver. 41:237–238). Here we report an observation of predation on *A. ameiva* by a *Boa constrictor*.

At 1018 h on 22 Marçh 2015 at Sítio Pedra Preta, located in the municipality of Farias Brito (6.465508°S, 39.312460°W, WGS 84; elev. 315 m), Ceará state, Brazil, we observed a juvenile male *Boa constrictor* (SVL = 535.04 mm, TL = 59.91 mm, mass = 84 g) in a bush near the ground, preying on an adult male *A. ameiva* (SVL= 130.01 mm, TL= 223.72 mm, mass = 64 g). The snake attacked the lizard with a lateral bite to the neck, immediately constricting its coils around the lizard's body. The lizard used its clawed hind limbs in an attempt to free itself but was unsuccessful. The predation event lasted about 11 minutes until the lizard died and the snake began ingestion headfirst, a process that took 8 minutes. The snake was collected, euthanized, and the stomach dissected. Both the snake and the lizard were fixed with 10% formalin, preserved in 70% alcohol, and deposited at the Coleção Herpetológica da Universidade Regional do Cariri (URCA-H 10646, 10945, respectively).

Boa constrictor is a large-bodied dietary generalist that consumes a wide taxonomic diversity of prey including invertebrates, fish, lizards, birds, and mammals (Quick et al. 2005. J. Herpetol. 39:304–307). Despite this variety, to the best of our knowledge there are no records of *B. constrictor* predation on *A. ameiva*.

PHOTO BY H. F. OLIVEIRA

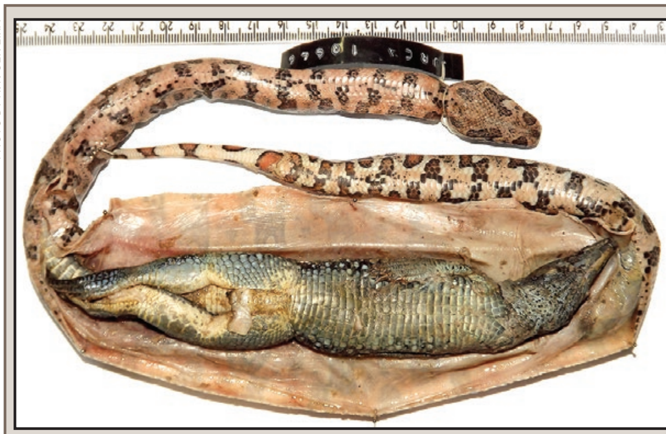

FIG. 1. Adult *Ameiva ameiva* being constricted by a juvenile *Boa constrictor*, Sítio Pedra Preta, municipality of Farias Brito, Ceará.

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***AMEIVA AMEIVA* (Giant Ameiva). PREDATION.** *Ameiva ameiva* is widely distributed across the Neotropical region from Panama and the Caribbean Islands to northern Argentina, east of the Andes (Vanzolini et al. 1980. Répteis das Caatingas. Academia Brasileira de Ciências, Rio de Janeiro, Brazil. 161 pp.; Peters and Donoso-Barros 1986. Catalogue of the Neotropical Squamata. Part II Lizards and Amphisbaenians. Bulletin 297, Smithsonian Institution, US National Museum, Washington, DC. 293 pp.). Here we report predation or scavenging of *A. ameiva* by a ghost crab, *Ocypode quadrata*, in southeastern Brazil.

In September 2013, RLT observed an Atlantic Ghost Crab (*Ocypode quadrata*) feeding on a young *A. ameiva* at the restinga (sandy coastal plain ecosystem) of Barra do Sahy, municipality of Aracruz, Espírito Santo state, southeastern Brazil (19.874642°S, 40.088787°W, WGS84; 14 m elev.) (Fig. 1). *Ocypode quadrata* occurs on sandy beaches from Florida, USA, to Rio Grande do Sul, Brazil (Melo 1996. Manual de Identificação dos Brachyura (Caranguejos e Siris) do Litoral Brasileiro. Plêiade, São Paulo. 604 pp.), and feeds mainly on dead and live marine animals. Predation of reptile hatchlings, juveniles, and adults by *O. quadrata* has been reported; for example, on the turtle *Malaclemys terrapin* (Arndt 1991. Florida Sci. 54:215–217; Muldoon and Burke 2012. Can. J. Zool. 90:651–662), on the lizard *Basiliscus vittatus* (Flaherty and Friers 2014. Southeast. Nat. 13:57–58), and on the lizard *Ameiva quadrilineata* (Hirth 1963. Ecol. Monogr. 33:83–112). The Atlantic Ghost Crab is extremely fast, and is able to run towards prey at burst speeds of 1.7–2.4 m/s (Hafemann and Hubbard 1969. J. Exp. Zool. 170:25–31). However, we cannot be

FIG. 1. Consumption of *Ameiva ameiva* by the Atlantic Ghost Crab (*Ocypode quadrata*).

certain if the crab actually captured and killed the lizard or was just scavenging it.

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***ANOLIS JACARE* (Little Andean Chameleon). REPRODUCTION.** *Anolis jacare* is a small lizard inhabiting wet montane forests in the Andes of Venezuela and northeastern Colombia, at elevations between 1400 and 2200 m (La Marca 1985. Herpetol. Rev. 26:44; Ugueto et al. 2007. Zootaxa 1501:28). Its ecology is little known, and it is reported to be difficult to observe, inhabiting primarily the crown of trees and their branches, but also the trunks (Williams et al. 1970. Breviora 353:1–15). To our knowledge, mating has not been reported in the species. Here, we describe a mating event for *A. jacare* from Venezuela.

At 1140 h on 29 May 2013, a pair of *A. jacare* were found copulating on an introduced tree species (*Acer* sp.) 12 cm above the ground, within secondary forest at the Ecological Interpretation Trail of the Forestry Engineering Faculty of the University of the Andes, close to Milla River, N Merida City, Venezuela (8.624167°N, 71.155556°W; WGS84) (Fig 1). Mating behavior was observed until 1150 h. The mating pair was first observed from a distance of 5 m and then a distance of 30 cm. The animals never changed their position (i.e., male head up, female head down), and stayed motionless after the human encounter (Fig. 1). We assume that this was a natural position not induced by escape, given our distance at the initial sighting. The observation corresponded to the first rainy period of the year, within the bimodal (or "tetra-seasonal") local climate regime (i.e., two rainy and two dry or less rainy yearly periods (Santiago-Paredes and La Marca 2007. Herpetotropicos 3:8).

To compare our observation with published information, we studied preserved specimens at the herpetological collection of the Laboratory of Biogeography of the University of Los Andes at Merida (ULABG). Conspecific adult females ULABG 1560 and 3765, collected in the city of Merida in May and January, in the rainy and dry seasons respectively, each carried two eggs of different sizes (maximum lengths, in mm, 16.40, 9.50 and 14.33, 6.20, respectively); adult female ULABG 3795, collected during the rainy season of June in La Joya, near Merida, laid an egg in captivity (length 15.0 mm) and revealed no other egg upon dissection (suggesting it was already laid). Adult female ULABG 6819, captured during the rainy month of August from the same place as our observation, carried no eggs. Egg production in some *Anolis* species, for example in *Anolis nebulosus* and *A. aeneus*, occurs primarily during the wet season (Ramírez-Bautista and Vitt 1997. Herpetologica 53:423–431; Stamps and Crews 1976. Copeia 1976:467–476). Our observations are not conclusive on the reproductive season for *Anolis jacare*, but re-open the question as to whether *A. jacare* is capable of maintaining continuous reproduction even when annual precipitation amounts are relatively low, as has been proposed by Rubio-Rocha et al. (2011. Caldasia 33:100) for *Anolis* living under bimodal precipitation regimes.

Fig. 1. Mating *Anolis jacare* on a tree (*Acer* sp.) from Venezuela.

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***ARISTELLIGER LAR* (Spotted Caribbean Gecko). COMMUNAL RETREAT BEHAVIOR.** *Aristelliger lar* is a large, nocturnal, and semi-arboreal sphaerodactylid gecko endemic to Hispaniola (Schwartz and Henderson 1991. Amphibians and Reptiles of the West Indies. University of Florida Press, Gainesville, Florida. 363 pp.) and is considered near threatened (www.iucnredlist.org; accessed 29 May 2015). Communal nesting has been reported in *A. lar*, and in its congeners, *A. barbouri* and *A. praesignis* (Hecht 1952. Evolution 6:112–124; Graves and Duvall 1995. Herpetol. Monogr. 9:102–119; Schwartz and Henderson 1991, *op. cit.*); however, little is known about behavior associated with communal nests or communal retreat sites. Here we report communal daytime retreat behavior in *A. lar*.

Observations took place at 1143 h on 15 March 2015 in transitional, semi-deciduous forest near Juan Esteban, Barahona, Dominican Republic (18.154986°N, 71.069662°W; WGS 84). At least five individuals occupied a long and narrow space formed between two conjoined, parallel branches of a *Ficus* sp. (Fig.

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Fig. 1. An aggregation of both adult and juvenile *Aristelliger lar* in a tree cavity.

1). Based on coloration, pattern, and size, the individuals were identified as two adults, one subadult (exposing the right black scapular ocellus), and two juveniles (with more marked dorsal patterning). Larger and medium-sized individuals occupied the central portion of the cavity while juveniles were at the narrower edges. All individuals were peering through the opening of the cavity with pupils contracted. The position of the subadult was inverted in relation to the rest of the individuals. The cavity was approximately 6 m above ground and in a shaded area. Similar behavior was observed on other trees in the area. As the tree cavity was high off the ground, inspection of the inside was impossible without significant human intrusion. For these reasons, we are unable to confirm whether this was only a retreat, or a communal oviposition site.

Communal retreats have been reported in a variety of gekkotans, including *Coleonyx variegatus* (Greenberg 1943. Physiol. Zool. 16:110–122), *Hoplodactylus duvaucelii* (Barry *et al.* 2014. Herpetologica 70:395–406), *Christinus marmoratus*, *Underwoodisaurus milii* (Kearney et al. 2001. Herpetologica 57:411–422), and *Lepidodactylus lugubris* (Hanley *et al.* 1994. Evol. Ecol. 8:438–454). There are several hypotheses attempting to explain the evolution of communal egg-laying in lizards, including female selection of males rather than oviposition site, sociality (e.g., natal homing), a reduced predator encounter probability and a predation dilution effect, low availability of high quality habitat for shelter or oviposition, reduced maternal energetic cost, and increased egg insulation (Rand 1967. Herpetologica 23:227–230; Graves and Duvall 1995. Herpetol. Monogr. 9:102–119; Radder and Shine 2007. J. Anim. Ecol. 76:881–887; Doody et al. 2009. Q. Rev. Biol. 84:229–252; Mouton 2011. Afr. J. Herpetol. 60:155–170). Most sphaerodactylid geckos, including *Aristelliger*, lay single egg clutches (Gamble et al. 2008. J. Biogeogr. 35:88–108). In addition, communal nesting sites have been reported in other sphaerodactylid geckos, including both arboreal and terrestrial species (e.g., Oda 2004. Acta Amaz. 34:331–332; Regalado 2006. Herpetol. Rev. 37:13–20; Bernstein et al. 2016. IRCF Reptl. Amphib. 23:40–43). Therefore, it is highly likely that *A. lar* exploits these microhabitats for communal egg-laying as well.

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***ASPIDOSCELIS EXSANGUIS* (Chihuahuan Spotted Whiptail). MAXIMUM BODY SIZE.** *Aspidoscelis exsanguis* (Lowe, 1956) is a highly successful hybrid-derived triploid species (Good and Wright 1984. Experientia 40:10121014; Dessauer and Cole 1989. *In* Dawley and Bogart [eds.], Evolution and Ecology of Unisexual Vertebrates, pp. 4971. Bull. 466. New York State Museum, Albany, New York) based on its extensive distribution area and local abundance in Arizona, New Mexico, and Texas in the southwestern United States and Chihuahua and Sonora in northern México (Dessauer and Cole, *op. cit.*). Chihuahuan Spotted Whiptails normally reproduce by obligate parthenogenetic development of unreduced triploid eggs. However, rarely it mates with the gonochoristic species *A. inornata* (Neaves 1971. Breviora 381:1–25; Taylor et al. 1989. J. Herpetol. 23:202205) and *A. sexlineata* (Walker et al. 2006. Herpetol. Rev. 37:344–345), resulting in tetraploid hybrids. Nevertheless, heterosis in large body size has not been realized in these hybrids (Neaves, *op. cit.*, Taylor et al., *op. cit.*, Walker et al., *op. cit.*). Examples of maximum body sizes published for cloned individuals of *A. exsanguis* for New Mexico include 93 mm SVL from Catron Co. (Taylor and Caraveo 2003. Southwest. Nat. 48:685692) and 98 mm SVL from Chaves Co. (Taylor et al. 2002. Amer. Mus. Novitat. 3345:164). The largest among a total of all 411 specimens of the species examined by H. L. Taylor (pers. comm.) were two individuals of 100 mm SVL, including Regis University 72030 from Cochise Co., Arizona, and American Museum of Natural History 126808 from Eddy Co., New Mexico. The largest among >100 specimens examined by JMW from northwestern Chihuahua State, México, was a gravid female of 94 mm SVL from a site at WGS84 31.160417°N, 103.576472°W (Laboratorio de Ecología de la Unidad de Biotecnología y Prototipos, LEUBIPRO 12538).

On 17 June 2010, JEC collected a specimen of *A. exsanguis* from Santa Rosa Lake State Park, near the boat ramp in the day use area (35.031111°N, 104.6825°W, WGS84; elev. 1453 m), Guadalupe Co., north-central New Mexico, with the largest body size for the species based on a voucher among >250 specimens we have personally examined from the USA. The specimen bears the catalog number UADZ 8646 (Fig. 1) in the herpetological collection of the University of Arkansas Department of Zoology. Prior to preservation, the specimen measured 107 mm in SVL and had a body mass of 29.4 g. Part of the total mass of the lizard had been lost near the body owing to tail autotomy (Fig. 1). Additional observations pertaining to the external anatomy of the specimen include the following: length of head = 35 mm; length of unregenerated basal part of the tail = 36 mm; and regenerated part of the tail distal to the 16th caudal scale whorl = 19 mm (Fig. 1). Thus, survival of the lizard long enough for the record body size to be documented could be attributed in part to autotomy of the tail during a recent incident. Based on the exceptionally large size of the specimen and stage of ontogeny of the dorsal color pattern (i.e., including altered remnants of the lateral, dorsolateral, and paravertebral pairs of primary stripes, a partial secondary vertebral stripe, and a profusion of spots covering the body, hind limbs, and base of tail (Fig. 1), we hypothesize that the lizard was in its 5th or 6th activity cycle when collected in 2010, based on a study of ontogeny in the species by Walker and Lemos-Espinal 2015 (Herpetol. Rev 46:251–252). If so, the lizard would be exceptional, perspective for which is provided by the study by Bateman et al. (*op. cit.*) who reported third year recapture of only four of 995 hatchlings of *A. exsanguis* in New Mexico. Unusual internal structures possibly relating to advanced age and indicating possible senescence of this lizard of record size included postcoelomic fat bodies of maximum size in June well after they would be expected to have regressed as energy was diverted to clutch development. Although structures discernible as ovaries were present in UADZ 8646, there was no evidence of clutch development, lack of which likely accounted for persistence of the large fat bodies well into the activity cycle. In comparison to the specimen in question, two "normal" individuals of *A. exsanguis* (UADZ 8641, 85 mm SVL; 8642, 91 mm SVL) also collected 17 June 2010 at a second site in Santa Rosa Lake State Park (WGS84 35.02528°N, 104.67889°W, elev. WAAS 1484 ± 8 m) had small fat bodies together with oviductal eggs.

We thank the New Mexico Department of Game and Fish and New Mexico State Parks for permit 1850 granted to JEC to collect

lizards in the state in 2010. We also acknowledge the response by H. L. Taylor pertaining to our request for information on *A. exsanguis*. We are grateful to J. A. Lemos-Espinal and H. M. Smith for the opportunity to examine specimens of *A. exsanguis* from Chihuahua in the LEUBIPRO collection.

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***ASPIDOSCELIS NEOMEXICANA* (New Mexico Whiptail). AQUATIC BEHAVIOR.** Habitat for a guild of whiptail lizards, including three parthenogenetic species (triploid *Aspidoscelis exsanguis*, Chihuahuan Spotted Whiptail; diploid *A. neomexicana*, New Mexico Whiptail; and diploid *A. tesselata*, Common Checkered Whiptail), one gonochoristic species (*A. sexlineata viridis*; Prairie Racerunner), and hybrids (*A. neomexicana* x *A. sexlineata viridis*), in the South Recreation Area (SRA) bordering Conchas Lake, San Miguel Co., New Mexico, USA (Manning et al. 2005. Amer. Mus. Novitat. 3492:156), is in part determined by the fluctuating lake levels. For example, by 2013 Conchas Lake had receded to the lowest level since 1940 because of a prolonged drought together with ongoing regulated water usage. This exposed a large swath along the south side of the lake bordering the SRA (35.377283°N, 104.194399°W, WGS84; ~1292 m elev.) to becoming a temporary terrestrial area suitable for habitation by whiptail lizards from adjacent habitat. Retention of residual moisture in the exposed swath of lake-bed situated between the rocky high-water shoreline and sandy/gravelly/rocky low-water margin of the lake also allowed for an exceptionally lush growth of well-spaced vegetation in 2010, and a cornucopia of potential food items for lizards. Several visits to the SRA in 2009–2012 by JEC revealed that searches of the exposed lake-bed component of habitat greatly increased the number of whiptail lizards observed.

On 20 June 2010, JEC witnessed a remarkable hithertofore undocumented example of aquatic behavior by an adult of *A. neomexicana*. Initially, four adult individuals of this species were simultaneously observed within a few feet of the edge of the lake bordering the SRA as they foraged, and located and consumed prey. These lizards appeared to remain unaffected by human observation until they were closely approached and stalked for capture. Later that day in the same general area an adult of *A. neomexicana* was observed to enter the lake and swim, first through vegetation, then in open water to about 2 m from the shoreline at a depth of 30 cm, where it climbed a partly submerged upright plant (ca. 30 cm high) and consumed an unidentified lepidopteran larva. This could not be categorized as escape behavior given the distance between observer and lizard when it was initially observed. Also, it could not be determined by JEC whether the lizard located the prey item from the shore by sight, olfaction, or serendipity. Subsequently, the lizard climbed down the plant, entered the water, and swam obliquely to the shoreline rather than straight to it. The lizard (catalogued as University of Arkansas Department of Zoology 8672) was captured alive before it emerged from the lake.

We were inspired to offer these observations on *A. neomexicana* after reading the publication by Nevárez de los Reyes et al. (2015. Herpetol. Rev. 46:86) pertaining to aquatic escape behavior in a juvenile *Cophosaurus texanus* (Greater Earless Lizard), and a review of examples of lizard escape behaviors by either swimming or submerging to avoid perceived predation. Included was a record of only one species of whiptail lizard pertaining to aquatic behavior, namely *A. sexlineata* (i.e., Dillon and Baldauf 1945. Copeia 1945:174; Trauth et al. 1996. Herpetol. Rev. 27:20). We also describe an example of retreat behavior through water by a different individual of *A. neomexicana* (on or about 20 June 2010) than the preceding account at the SRA at Conchas Lake. As JEC walked the shoreline searching for whiptail lizards, a flushed adult New Mexico Whiptail retreated through the waterlogged vegetation and then climbed on a cable just above the water. Aside from the novel behaviors recorded herein for *A. neomexicana* at Conchas Lake, of greater significance was the observation that whiptail lizards readily exploited previously inundated areas when they became available as also observed for triploid parthenogenetic *A. neotesselata* near temporary ponds on the south side of the Arkansas River in La Junta, Otero County, Colorado (Walker et al. 2012. Herpetol. Conserv. Biol. 7:227248). Furthermore, this report verified that exploitable habitat for some individuals of *A. neomexicana* in the SRA did not end at the edge of Conchas Lake in 2010.

Collection of whiptail lizards at Conchas Lake was conducted under authorization number 1850 issued by the New Mexico Department of Game and Fish, and a research permit issued for Conchas Lake State Park for MayAugust 2010 by the New Mexico Department of Energy, Minerals, and Natural Resources.

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***CELESTUS ENNEAGRAMMUS* (Huaxteca Lesser Galliwasp). REPRODUCTION.** *Celestus enneagrammus* is a moderate-sized lizard (SVL ca. 80.0 mm) known only from small areas in the Mexican states of Oaxaca, Veracruz, and Puebla (Campbell and Camarillo 1994. Herpetologica 50:193–209; González-Ramírez et al. 2014. Check List 10:679–681). Canseco et al (2004. Herpetol. Rev. 35:266–267) reported that in the region of the Cañada, located northwest of the state of Oaxaca, México, *C. enneagrammus* gives birth to 3–7 young in June. However, the authors did not provide data related to the mother or the offspring. To our knowledge this is the only existing data on reproduction in this species. The purpose of our note is report data on reproduction in *C. enneagrammus*.

On 13 September 2014, on the side of the road leading to La Cascada (19.2640°N, 97.1742°W, WSG 84; 2090 m elev.), Municipality of Chilchotla, Puebla, we collected four specimens of *C. enneagrammus* (two juveniles and two adult females). The surrounding vegetation was pine-oak forest. The four specimens were captured under rocks. The two females were transported to the Museum of Zoology of the FES Zaragoza, UNAM, where they were kept separately in plastic boxes (30.0 × 20 × 10 cm). On 22 September one female (SVL = 80.47 mm, tail length = 38.88, mass unknown) gave birth to seven live young. The SVL, tail length, and mass of the young (mean ± 1 SE with range in parentheses) were 30.79 ± 0.36 (29.01–32.05) mm, 38.34 ± 0.74 (36.55–41.57) mm, 0.44 ± 0.01 (0.40–0.51) g, respectively. After parturition, the female weighed 5.50 g. The other female (SVL = 77.09 mm, mass = 7.96, tail length = 48.03 mm, partly regenerated) gave birth to four offspring on 8 October. The SVL and mass of the newborns were 30.66 ± 0.44 (29.35–31.21) and 0.42 ± 0.00 (0.41–0.44), respectively (tail length not recorded). The two juveniles collected in the field had regenerated tails and were similar in size to neonates born in captivity. The size data for these lizards were SVL

= 29.86 and 31.79 mm, mass = 0.40 and 0.44 g, and tail length = 21.67 and 19.48 mm. The litter sizes of the two females of *C. enneagrammus* from Chilchotla are within of the range reported for this species in the northwest of the state of Oaxaca. Nevertheless, the birth of our neonates appears to occur about three months later than that recorded by Canseco et al (*op. cit.*). The specimens were deposited in the herpetological collection of the FES Zaragoza, UNAM. The newborns were released at the location of capture.

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***CNEMIDOPHORUS LEMNISCATUS* (Rainbow Whiptail). ABUNDANCE AND HABITATS IN FLORIDA.** Burt (1931. Bull. U.S. Natl. Mus. 154:1286) applied the name *Cnemidophorus lemniscatus* to lizards in mainland and insular areas of Central and South America. However, studies by McCrystal and Dixon (1987. J. Herpetol. 21:245254), Cole and Dessauer (1993. Amer. Mus. Novitat. 3081:130), Markezich et al. (1997. Amer. Mus. Novitat. 3207:160), and McCranie and Hedges (2013. Zootaxa 3722:301316) included descriptions of either new gonochoristic or new parthenogenetic species mistakenly included in *C. lemniscatus* by Burt (*op. cit.*). Recent taxonomic changes recommended by McCranie and Hedges (*op. cit.*) led us to reconsider the status of descendants of lizards introduced to Florida in the 1960s which were recently identified as gonochoristic *C. lemniscatus* by Butterfield et al. (2009. Southeast. Nat. 8:4554). Based on diagnostic characters of scutellation, we excluded the nearest naturally occurring species in the complex, newly recognized by McCranie and Hedges (*op. cit.*), as possible sources of the introduced species. These exclusions included *C. ruatanus* (e.g., based on specimens from Carribean islands and Honduras) and *C. duellmani* (e.g., based on specimens from Darién Province, Panama). Thus, we retained the name *C. lemniscatus* for use in this note which helps to clarify the abundance, based on counts of lizards, and types of habitats utilized by the species in Florida. Here we describe the abundance and adaptability of C. lemnicatus in Florida.

The following accounts are based on site surveys conducted by BH on 25 March 2015 in Miami-Dade Co.; care was taken not to count a lizard more than once. Site 1: At NW 39th and 38th Terrace, Virginia Gardens, Florida 33166: beginning at ~1100 h; ~26°C; partly cloudy; two *C. lemniscatus* observed in bushes in a lawn of one home in a residential neighborhood. Site 2: At NW 37th Ave. and 75th St., Hialeah, Florida 33013: beginning at ~1130 h; ~27°C; partly cloudy; ~20 *C. lemniscatus* observed in a grassy area with trees and open spaces, scattered tires, retreats under blocks of concrete surrounding commercial buildings; two lizards were also observed in vegetation near railroad tracks. We consider the area surrounding the railroad to be safe from destructive activities that could extirpate the species in the foreseeable future. Site 3: At E 21st St. and E 11th Ave., Hialeah, Florida 33013: beginning at ~1200 h; ~28°C; sunny; ~30 *C. lemniscatus* observed in grassy areas around lawns and sidewalks. Site 4: At E 16th St. and 8th Ave., Hialeah, Florida 33010: beginning at ~1230 h: ~29°C; sunny, ~35 *C. lemniscatus* observed in grassy areas around lawns and sidewalks.

We emphasize that presence of numerous colorful males observed on 25 March 2015 by BH at sites 24 indicated that a gonochoristic (i.e., *C. lemniscatus*) rather than an all-female parthenogenetic species (e.g., *C. cryptus* or *C. pseudolemniscatus*) in the complex has become established in Florida. Use of genetic methods (e.g., McCranie and Hedges, *op. cit.*) would be appropriate to help clarify geographic sources of the introduced species. The numbers of *C. lemniscatus* observed by BH at sites 24 add the first quantitative evidence of the abundance and adaptability of this Florida adventive in an urban setting of habitats created by human activities, and of its likely long-term presence in the Florida herpetofauna. In fact, the population of *C. lemniscatus* in Florida utilizes relatively stable habitats resulting from human activities not unlike those reported for the species within its natural range in South America (e.g., Serena 1985. J. Biogeog.12:4956).

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***COLOBOSAURA MODESTA* (Bahia Colobosaura). PREDATION.** Observations of leptodactylid frogs preying upon snakes and lizards are common, including those consumed by *Leptodactylus labyrinthicus* (Fonseca et al. 2012. Herpetol. Notes 5:167–168; Toledo and Morais 2013. Herpetol. Rev. 44:522). *Colobosaura modesta* (Reinhardt and Lütken, 1862) is a small to medium-sized gymnophthalmid lizard distributed across northern, eastern, and central Brazil (snout–vent length: 40–150 mm) (Pellegrino et al. 2001. Zool. J. Linn. Soc. 144:543–557; Freire et al. 2012. Check List 5:970–972). Here we document the predation of a *C. modesta* by a *L. chaquensis* in southeastern Brazil.

Specimens of *L. chaquensis* (N = 167) were necropsied for a survey of helminths of amphibians from a transitional area between the Cerrado and the Atlantic Rain Forest in Reserva Particular do Patrimônio Natural - Foz do Rio Aguapeí, northwest São Paulo State, Brazil (21. 054722°S, 51.724444°W, WGS 84; 266 m elev.). In the stomach of a male *L. chaquensis* (SVL = 68 mm) we found an adult *C. modesta* (SVL = 38 mm; TL = 9.5 mm). Based on our dissections, predation on *C. modesta* by *L. chaquensis* may be a rare event, as only one of 167 specimens examined contained this food item.

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***CROTAPHYTUS BICINCTORES* (Great Basin Collared Lizard). MAXIMUM ELEVATION.** *Crotaphytus bicinctores* ranges widely throughout the Mojave, Sonoran, and Great Basin deserts of the western USA, where it occurs principally in upland, rocky habitats. The elevational range is from sea level to ca. 2290 m (Stebbins 2003. A Field Guide to Western Reptiles and Amphibians, 3rd ed. Houghton Mifflin Co., Boston, Massachusetts. 533 pp.; Ryan 2009 *In* Jones and Lovich [eds.], Lizards of the American Southwest, pp. 100–103. Rio Nuevo Publishers, Tucson, Arizona). On

22 May 2005, BA and RS observed and photographed an adult *C. bicinctores* (LACM PC 1881–1883) in the upper Silver Creek drainage on the southwestern slopes of the White Mountains, Inyo Co., California, USA (37.393333°N, 118.206438°W; WGS 84), at an elevation of 2715 m. This exceeds the previously published maximum elevation by 425 m.

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***CTENOSAURA SIMILIS* (Black Iguana). DIET.** *Ctenosaura similis* inhabits low and moderate elevations from Veracruz and Oaxaca, Mexico southward to Panamá (Lee 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Cornell University Press, Ithaca, New York). The species is primarily vegetarian, and is considered an important seed disperser (Traveset 1990. Am. Midl. Nat. 123:402–404), but occasionally it becomes an opportunistic predator, feeding on a variety of invertebrates (e.g., insects and spiders), and vertebrates such as bats (e.g., *Eumops* sp.), rodents (e.g., *Oryzomys*, *Sigmodon*, and *Scotinomys*), frogs, small birds, and lizards (e.g., *Cnemidophorus*, *Sceloporus*, and *Mabuya unimarginata*), including small specimens of its own species (Fitch et al. 1971. Southwest. Nat. 15:398–399; Henderson 1973. J. Herpetol. 7:27–33; Fitch and Hackforth-Jones 1983. *In* Janzen [ed.], Costa Rican Natural History, pp. 394–396. University of Chicago Press, Chicago, Illinois). Here we report an observation of *C. similis* preying upon a *Basiliscus vittatus* in the Yucatan of Mexico.

At 1015 h on 26 April 2015, in Payo Obispo Zoo (18.52°N, 88.30°W, NAD27 Mexico; 17 m elev.), located in Chetumal, while entering crocodile pens for cleaning, PMBG observed a non-captive adult female *C. similis* preying upon a non-captive adult female *Basiliscus vittatus* (Striped Basilisk) (Fig. 1). The event lasted about 17 min from capture to swallowing. This observation is the first predation record by *C. similis* on a large lizard such as *B. vittatus*.

PHOTO BY PABLO M. BEUTELSPACHER-GARCÍA

Fig. 1. An adult female *Ctenosaura similis* preying on an adult female *Basiliscus vittatus* at Payo Obispo Zoo in Chetumal, México.

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***ENYALIUS IHERINGII* (Ihering's Fat-headed Anole). DIET.** *Enyalius* are semi-arboreal lizards endemic to Brazilian forests, where they are diurnal generalist predators of terrestrial arthropods (Zamprogno et al. 2001. Braz. J. Biol. 61:91–94; Van Sluys et al. 2004. Braz. J. Biol. 64:353–356; Barreto-Lima et al. 2013. Salamandra 49:177–185). *Enyalius iheringii* occurs in southeastern Brazil, in the Atlantic Forest biome (Jackson 1978. Arq. Zool. 30:1–79). Fragmented data on the ecology of the species are available (Rautenberg and Laps 2010. Iheringia S. Zool. 100:287–290; Migliore et al. 2014. Herpetol. Notes 7:273–276). Herein, we report an observation of *E. iheringi* feeding on caterpillars in an arboreal substrate.

We observed the feeding behavior of *E. iheringii* in the Atlantic Forest biome, in a private propriety, near the "Estrada dos Justos" road in Juquitiba municipality (23.9723°S, 47.0233°W, WGS84; 723 m elev.), São Paulo state, in southeast Brazil. At 1100 h on 16 November 2014, an adult female of *E. iheringii* was observed on a tree trunk (1.5 m off the ground), preying on a larva of *Dirphia* sp. (Lepidoptera: Saturniidae) (Fig. 1). The lizard was motionless and quite cryptic against its background. After a few

Fig. 1. A) Larva of *Dirphia* sp. (Lepidoptera) showing the pointy bristles along the body; B). *Enyalius iheringii* adult female preying upon a larval *Dirphia* sp. on a tree trunk in the Atlantic Forest biome, Juquitiba municipality, São Paulo, Brazil.

minutes the lizard jumped from the trunk to the ground and dropped the larva, regurgitating half of it. Then, a second larva of *Dirphia* sp. was regurgitated but was quickly swallowed again, after which the lizard moved to nearby vegetation and inflated its throat region in a display, before it escaped. The first larva was preserved in 70% alcohol, and identified later in the Laboratório Especial de Coleções Zoológicas do Instituto Butantan.

Enyalius are predators of arthropods of leaf litter or soil (Van Sluys et al. 2004, *op. cit.*; Barreto-Lima and Sousa 2011. Herpetol. Bull. 118:1–9). For the first time, our observation confirms the assumptions that arboreal substrates may also be important for foraging in *Enyalius* spp. (Zamprogno et al. 2001, *op. cit.*; Barreto-Lima et al. 2013, *op. cit.*). Insect larvae are an important item in the diets of some *Enyalius* spp. (Vitt et al. 1996. Herpetol. Nat. Hist. 4:77–82; Van Sluys et al. 2004. *op. cit.*; Barreto-Lima and Sousa 2011. *op. cit.*). Although Lepidoptera larvae were the most important item (Dorigo et al. 2014. Braz. J. Biol. 74:199–204; Sturaro and Silva 2010. J. Nat. Hist. 44:1225–1238) or the second most important item (Teixeira et al. 2005. J. Herpetol. 39:504–509; Rautemberg and Laps 2011, *op. cit.*) in the diets of *Enyalius* spp., no study has identified any larva species of Lepidoptera.

Larvae of *Dirphia* Hübner 1819 (Lepidoptera, Saturniidae) are considered secondary pests, but can be important due to their high reproductive capacity in *Eucalyptus* spp. and adaptation to many species of Myrtaceae (Pereira et al. 2008. Braz. Arch. Biol. Technol. 51:369–372). On the other hand, little is known on the action of the toxins of *Dirphia* larvae (Lunardelli et al. 2006. Inflamm. Res. 55:129–35); their bristles cause light burns in the skin in humans (Cardoso and Junior 2005. An. Bras. Dermatol. 80:573–578), and inflammatory action in rats (Lunardelli et al. 2006, *op. cit.*). However, *Dirphia* sp. does not seem be particularly harmful to *E. iheringii*.

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***GYMNODACTYLUS DARWINII* (Darwin's Gecko). PREDATION.** *Gymnodactylus darwinii* is endemic to the Atlantic Rain Forest in Brazil and occurs from the state of Rio Grande do Norte to the state of São Paulo, inhabiting several types of habitats, such as lowland forests near sea level, rainforests, and occasionally found at forest edges, as well as anthropogenically disturbed environments (Hatano et al. 2001. Rev. Brasil. Biol. 61:287–294; Almeida-Gomes et al. 2012. Biotemas 25:203–206). This lizard has a small body (maximum snout–vent length = 59.1 mm) and is mostly nocturnal, sheltering in crevices and under tree bark during the day (Pellegrino et al. 2005. Biol. J. Linn. Soc. 85:13–26; Almeida-Gomes et al. 2012, *op. cit.*).

The Black Tufted-ear Marmoset (*Callithrix penicillata*) is an endemic Brazilian primate that consumes plant reproductive parts and animals such as insects, anurans, and lizards (Passamani and Rylands 2000. Primates 41:27–38; Cicchi et al. 2010. Herpetol. Rev. 41:64; Rocha-Santos and Barbier 2013. Herpetol. Rev. 44:650–699). This species ranges from the state of Maranhão to the state of Minas Gerais (Rylands and Mendes 2008. The IUCN Red List of Threatened Species. Version 2015.2. www.iucnredlist.org). This primate is an exotic species that currently occurs in high abundance and can severely affect the native fauna in many municipalities of the Rio de Janeiro state.

Fig. 1. An adult *Callithrix penicillata* preying on *Gymnodactylus darwinii* in Três Rios municipality, Rio de Janeiro State, Brazil.

Here, we report a specimen of *C. penicillata* preying upon an adult *G. darwinii* in the Environmental Protection Area of Morro da Torre (22.0706°S, 43.1234°W, SIRGAS2000; elev. 500 m), Três Rios municipality, Rio de Janeiro State, southeastern Brazil. At 0922 h on 24 June 2015, an adult *C. penicillata* was observed eating an adult *G. darwinii* in a tree 3 m above ground. While holding the lizard by its abdomen, the marmoset bit its head, and after consuming the head, ate the tail, forelimbs, and abdomen (Fig. 1). Ingestion lasted approximately 10 min. We did not observe discovery and capture of the gecko. This is the first published record of a Black Tufted-ear Marmoset preying upon a Darwin's Gecko.

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***HEMIDACTYLUS FRENATUS* (Common House Gecko). PREDATION.** Spiders have been recorded as predators of geckos on occasion (Diniz 2011. Herpetol. Notes 4:357–358; Vyas 2012. Bugs R All 19:24). *Hemidactylus frenatus* is commonly found in human settlements and is distributed (naturally or via introduction) in tropical Asia, Central America, southeastern USA, and

FIG. 1. Spider (*Heteropoda* sp.) feeding on an immature egg of *Hemidactylus frenatus.*

Australia (Rödder er al. 2005. N. West J. Zool. 4:236–246; Barton 2015. North. Territ. Nat. 26:44–55). Herein, we report the first observation from Sri Lanka of a *H. frenatus* being preyed upon by a *Heteropoda* spider.

The observation was made at 0514 h on 21 August 2015 during dry weather, in Kiriella-Matuwagala village, Ratnapura District, Sri Lanka (6.7542°N, 80.2849°E, WGS84; 33 m elev.). The site is surrounded by rubber and tea plantations. The spider gripped the adult female gecko on the front with its chelicera and with the aid of the palpus. The spider fed on the gecko for 14 hours and 18 minutes. By 1932 h the body of the gecko was totally consumed, along with its immature eggs (Fig. 1).

We thank Sean Yap for identifying the spider.

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***LAMPROPHOLIS DELICATA* (Delicate Skink). MORTALITY.** The eugongyline lygosomine scincid *Lampropholis delicata* is a small (mature adult total length ~110 mm) diurnal arthropod feeder, widespread and often abundant in eastern mainland Australia, particularly the coastal plain and Great Dividing Range (Cogger 2014. Reptiles and Amphibians of Australia [7th edt.]. CSIRO Publishing, Collingwood, Victoria, Australia. xxx + 1033 pp.), including in anthropogenic habitats. Although primarily terrestrial, *L. delicata* is a capable climber, often observed active on vertical surfaces such as rough brick or concrete walls, shade cloth, unfinished wood such as paling fences, and rough-barked trees (DCM and TJA, pers. obs.). Despite widespread distribution and frequent local abundance, there are few published records of mortality. This note documents 'natural hazard' mortality of *L. delicata* in native woodland habitat.

At ~1300 h on 12 January 1984 on a clear sunny day, TJA observed several adult *Lampropholis delicata* active on the dark-colored ~40 cm diameter barkless trunk of a fallen Eucalyptus tree at the edge of remnant open dry sclerophyll woodland (DSW) on a hillside northwest of Khancoban, Tumbarumba Shire, in the western foothills of the Snowy Mountains, south-eastern New South Wales, Australia (36.2°S, 148.1°E, ca. 300 m elev.). The skinks were moving in and out of several holes with openings in the sides and top of the log, excavated and abandoned by larvae of an undetermined species of longicorn beetle (Coleoptera: Cerambycidae). Closer inspection revealed 2 mature adult (both SVL ~40 mm, tail ~70 mm) *L. delicata* with complete original tails, evidently freshly dead, trapped together in the north-facing ~6 mm diameter opening of one of the holes near the top of the log, one on the outside of the log with the head inserted in the hole, the other on the inside of the log with the snout out. The *L. delicata* on the outside had inserted its head beneath the lower jaw of the subject in the hole, but had then apparently rotated its head sinistral through ~90° so that the posterior angle of the right jaw was caught behind the mandibular arch of the subject above which had tilted its head slightly sinistral; mature adult *L. delicata* have heads with maximum width ~5.8–5.9 mm (TJA, pers. obs.) but are moderately depressed, sufficient to allow simultaneous occupation and movement of two heads in the cavity, but not if one were rotated through 90°. Both *L. delicata* were warm and limp, with no evidence of *rigor mortis*, desiccation, decay, or injury, and no ants had been attracted to the carcasses, suggesting mortality had occurred very recently, likely earlier in the day. The subjects were removed and examined, then discarded. Initial entrapment was not observed, however it was likely one *L. delicata* was foraging on the log and attempted to gain ingress to the hole, perhaps simultaneous with attempted egress of the subject inside the log, both becoming locked together in the opening as described, were unable or unwilling to move backwards and extricate themselves, and ultimately succumbed to the effects of overheating from solar exposure, dehydration, or combination of both. Adult male *L. delicata* are highly territorial and aggressive physical interactions in captivity are frequent (DCM, pers. obs.), and this behavior might provide an alternative explanation for initial entrapment with subsequent mortality due to the foregoing factors, however the subjects were not sexed, and aggressive interaction was considered unlikely given the relative positions of the subjects, hence entrapment was attributed to misadventure. These were the only *L. delicata* found trapped, although several others were observed active on the log, and the species was common in the wider region. The log was very dark in color and would have heated rapidly in the sun, which may have been one attraction for the *L. delicata* observed active on it. Habitat comprised an extensive cleared pasture area with short grazed tussock grass species (Poaceae) and small herbs at the edge of a DSW remnant up to ~20 m height dominated by several *Eucalyptus* spp. (Myrtaceae) with small areas of shallow eucalypt litter, on dark loam/clay soil.

Our observation is the first report of mortality to *L. delicata* due to entrapment in a larval cerambycid beetle hole. Such cases may be rare; the only similar case located was a report of mortality to an adult female *Plestiodon fasciatus* (as *Eumeces fasciatus*), found freshly dead, trapped at the level of the hindlimbs as it attempted to exit the opening of one of several tunnels of unidentified beetle larvae in a decayed log, adjacent to an abandoned beaver dam in Oconee National Forest, Greene Co., Georgia, USA, that likely succumbed "as an indirect result of overexposure" (Lochmiller 1982. Herpetol. Rev. 13:46).

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***LAUDAKIA TUBERCULATA* (Kashmir Rock Agama). MORPHOLOGICAL ANOMALY.** *Laudakia tuberculata*, a rock agamid, occurs in Afghanistan, North Pakistan, India, China, and Nepal. In India, it is widely distributed in the states of Jammu and Kashmir, Himachal Pradesh and Uttarakhand in Western Himalaya and neighboring states of Uttar Pradesh and Punjab. In Uttarakhand, the species occurs between 150 and 3600 m elevation (Bahuguna 2008. Russ. J. Herpetol. 15:207–211). The species inhabits holes, crevices, and rocky structures near streams and around human habitations, and has been shown to hibernate in the crevices during winter. In the western Himalaya, *L. tuberculata* can be spotted basking on the rocks and also on the thatches of houses and shops near human habitation. The species is diurnal and during breeding season lays eggs inside the crevices of rocks and shops. Here, we describe a morphological anomaly (tail bifurcation) in an individual of *L. tuberculata* from Uttarakhand, India.

At 1306 h on 26 June 2015, during one of our visits to Kedarnath Wildlife Sanctuary in Uttarakhand (30.561065°N, 79.12971°E; 1380 m elev.), we observed an individual with a morphological anomaly, basking on a rock. The individual had a bifid tail, starting from about 75% of the tail length. Tail bifurcation in the species has previously been reported by Chandra and Mukherjee from Himachal Pradesh (1980. J. Bombay Nat. Hist. Soc. 77:343). Bifid tails either develop during the regeneration process that follows autotomy or occur because of genetic and environmental factors (Martins et al. 2013. Herpetol. Notes 6:369–371). We did not observe the bifid tail to pose any difficulties to the habit of the lizard.

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***OLIGOSOMA OTAGENSE* (Otago Skink), *OLIGOSOMA GRANDE* (Grand Skink). PREDATION.** *O. otagense* and *O. grande* are endemic to Otago, New Zealand and remain in about 8% of their former range. They are two of New Zealand's rarest reptiles and both are presently classified as Nationally Endangered (Hitchmough et al. 2013. Conservation Status of New Zealand Reptiles, 2012. New Zealand Threat Classification Series 2. Department of Conservation, Wellington). They often coexist, sharing habitat which is mostly rocky outcrops surrounded by tussock grassland. Both feed upon a wide variety of insects and fleshy fruits. Both skinks are viviparous and, unless visibly pregnant, they are difficult to sex without handling. Adult SVLs are ca. 105–130 mm *O. otagense* and ca. 82–115 mm *O. grande*.

Aggressive encounters between *O. otagense* and *O. grande* have been observed in the wild. An adult female Otago Skink was observed running across a rock outcrop holding a juvenile Grand Skink in its jaws; the Grand Skink appeared to be dead (Marshall 2000. Unpublished MSc thesis, University of Otago, Dunedin, New Zealand). A translocated adult Otago Skink (SVL ca. 125 mm) was observed consuming a juvenile conspecific (SVL ca. 70 mm) within 2 h of their release into a translocation site (Bogisch et al. 2015, ms. submitted). Our note reports a sustained attack and subsequent kill of a Grand Skink by an Otago Skink in the wild which, for the first time, has been observed and recorded photographically. It is also notable that the kill was made by a juvenile Otago skink (SVL ca. 80 mm, ca. 2 years old).

Between 1019 h and 1034 h on 12 February 2015 at Macraes Flat, Otago (45.4552°S, 170.4227°E, WGS84; 524 m elev.) a juvenile Otago Skink was observed attacking and killing a newborn Grand Skink (SVL ca. 40 mm). At the start of the attack, a third skink, an adult Grand Skink (SVL ca. 85 mm), came within 10 cm of the attack. It retreated slowly to a rock plate approximately 2 m away after nine minutes, remaining in line of sight of the other two skinks for the entire period. The attacking Otago Skink changed its hold frequently on the Grand Skink while pulling it out backwards, with repeated tugging movements, from a shallow hollow on top of the rock into the open. At 1031 h the prey Grand Skink briefly became free, only to be recaptured within 1–2 seconds. At this point the Grand Skink dropped its tail. The Otago Skink's response was to remain motionless with the Grand Skink firmly compressed in its jaws (positioned across the Grand Skink's body, midway between the fore and hind legs) until the detached tail stopped moving. The Otago Skink adjusted its hold once more and at 1033 h the Grand Skink seemed lifeless (Fig. 1). A last photograph was taken at 1034 h before the Otago Skink disappeared over a rock, out of view, with the dead Grand Skink in its jaws.

Fig. 1. A juvenile *Oligosoma otagense* with its prey, an *Oligosoma grande*.

During the 15-min attack I was approximately 3 m away and photographed the attack using a Canon EOS 50D DSLR camera with a zoom EF 70-300 mm lens. 82 photographs were taken. Both Otago and Grand skinks were formerly classified as Nationally Critical and have been under active conservation management by the Department of Conservation for 20 years.

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***OPLURUS CUVIERI* (Madagascan Spiny-tailed Iguana). DIET.** *Oplurus cuvieri* is an oplurid lizard found in western Madagascar. It feeds primarily on invertebrates, including ants, birds, and small mammals, but it has a flexible diet and often consumes nutritious plant parts such as fruits and flowers (Randriamahazo and Mori 2012. Curr. Herpetol. 31:8–13; Mosa and Rakotozafy 2013. Herpetol. Notes 6:459–461; Ito 2013. Herpetol. Rev. 44:678). Here I present an observation of an individual *O. cuvieri* attempting to prey upon a Rhnioceros Chameleon, *Furcifer rhinoceratus.*

During a field survey on 12 February 2015, at 1635 h, a male *O. cuvieri* was found in a dry deciduous forest of Ankarafantsika

National Park (16.3181°S, 46.8096°E; WGS84). It was perched on a tree, holding the head of a small male *F. rhinoceratus* in its mouth. The *O. cuvieri* swung its head side to side and slammed the captured *F. rhinoceratus*, which was still alive at this time, into the tree trunk. Upon being photographed, the *O. cuvieri* hid in a tree-hollow, and the *F. rhinoceratus* was dropped in there, now dead, as I captured the *Oplurus*. The snout–vent length (SVL), mass, and head width of *O. cuvieri* were 160 mm, 118 g, and 30 mm, respectively. The SVL and mass of the *F. rhinoceratus* were 100.8 mm and 19.4 g, respectively. Its head width was not measured because it was crushed. The *F. rhinoceratus* was deposited at Université d'Antananarivo (UADBA, specimen number M15173) and *O. cuvieri* was released at the site of capture. To my knowledge, this is the first report of a predation attempt by *O. cuvieri* on a lizard.

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***PHRYNOSOMA CORNUTUM* (Texas Horned Lizard). MORTALITY.** *Phrynosoma cornutum* has declined throughout much of its native range (Donaldson et al. 1994. Texas J. Sci. 46:97–113). Unnatural causes of mortality of *P. cornutum* include road kills and entrapment in mesh wire (Montgomery and Mackessy 2003. Southwest. Nat. 48:111–118; Lahti and O´Donnell 2008. Herpetol. Rev. 39:89). Herein, we report two novel causes of mortality in *P. cornutum* associated with anthropogenic materials.

At 0915 h on 18 June 2011, we found a dead adult (ca. SVL ≥ 68 mm) *P. cornutum* entangled in a discarded plastic grate in an illegal dump site in Ciudad Juárez, Chihuahua, México (31.586342°N, 106.466428°W, WGS84; elev. 1211 m). The head was protruding out from one hole in the grate, and the lower extremities were absent. It seems that the lizard attempted to escape by climbing the grate and got caught in one hole and was unable to release itself.

Near the same site at 0930 h, we found a live adult (SVL ≥ 68 mm) *P. cornutum* inside a tire. We decided to invest one hour (survey 1) searching for lizards inside the tires in an area ca. 0.8 ha. We found a total of eight dead lizards (Fig. 1) and one live lizard. The mean SVL was 67.22 mm ± 20.68 SD (N = 9). Because of these findings we started a second survey (survey 2) for lizards inside the tires in a 1-ha plot between 6 August 2011 and 26 August 2012. Survey 2 included a total of 28 days, with each survey spanning two hours per day (0900–1100 h). We recorded 11 individual *P. cornutum* (eight dead and three alive) associated with the inside of the tires.

PHOTO BY DANIEL AGUIRRE

Fig. 1. A dead Texas Horned Lizard, *Phrynosoma cornutum*, in a tire.

Between the two surveys a total of 20 *P. cornutum* were encountered in the tires, including 16 adults (mean SVL = 84.12 mm) and four juveniles (mean SVL = 48.75 mm). Lizards were considered adults at SVL ≥ 68 mm (Ballinger 1974. Herpetologica. 30:321–327). We suspect that the lizards climb the tires searching for refuge from the sun exposure, but experienced mortality as a result of these attempts. *Phrynosoma cornutum* are known to climb up to 2 m into low shrubs and trees to avoid elevated ground temperatures (Whitford and Bryant 1979. Ecology 60:686–694). Thus, the tires may have served as an ecological trap. Although the critical thermal maximum for *P. cornutum* is between 46.8–48°C (Lynne and Hutchinson 1970. Copeia 1970:219–229) and the select temperature T_{sel} is 38.5°C (Lara-Reséndiz et al. 2014. Rev. Mex. Biod. 86:275–278), the lizard is apparently not able to survive at higher temperatures. Although the mean temperature inside the tires was 39.5°C, the range was between 32°C and 50°C (N = 16).

Predation was the leading cause of death of *P. cornutum* (N = 23) followed by anthropogenic factors (N = 5) in a nine-year study (2003–2011) in Oklahoma (Wolf et al. 2013. Herpetologica 69:265–281). There appear to be no major threats listed for this species in Mexico (Hammerson 2007. The IUCN Red List of Threatened Species. www.iucnredlist.org). However, our observations have demonstrated mortality related to discarded tires, which could lead to local population declines.

A total of 26 photo vouchers are deposited at the Colección Científica de Vertebrados, Universidad Autónoma de Ciudad Juárez.

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***PHYMATURUS PAYUNIAE*. BLOOD PARASITE.** Reptiles are commonly infected with blood parasites (Telford 1993. Syst. Parasitol. 25:109–117; Mihalca et al. 2008. Parasitol. Res. 102:1081–1083; Pereira et al. 2010. Parasite 17:307–318; Cook et al. 2010. J. Parasitol. 96:1168–1172). However, their prevalence and intensity remains poorly known, despite the adverse effects of parasitism on the host, including on population growth and regulation (Holmes 1995. Wildl. Res. 22:11–19; Hudson et al. 1998. Science 282:2256–2258), spatial distribution (van Riper et al. 1986. Ecol. Monogr. 56:327–344), reproductive success (Schall 1996. Adv. Parasitol. 37:255– 333; Pacejka et al. 1998. Ecology 795:1797–1806), and sexual selection (Hamilton and Zuk 1982. Science 218:384–387).

One group of parasites infecting blood cells of lizards as a definitive host is the genus *Schellackia* (Lankesterellidae, Apicomplexa) (Lainson et al. 2003. Mem. I. Oswaldo Cruz 98:1067–1070;

Table 1. Values of leukocyte counts and morphological traits obtained for the five *Phymaturus payuniae* (ID) captured at La Payunia Reserve. Values include: number of white blood cells (WBC), percentages of basophils (B), eosinophils (E), azurophils (A), heterophils (H), lymphocytes (L), and monocytes (M), the heterophil/lymphocyte ratio (H/L), weight in g (W); snout–vent length in mm (SVL); sex (S) as female (F) and male (M); and age class (AC) as adult (AD) and sub adult (SA). * Parasitized individual.

ID	WBC	B	E	A	H	L	M	H/L	W	S	SVL	AC
1	47	0.0	10.9	2.7	15.5	63.6	7.3	0.2	24	M	87	AD
2	72	0.0	4.9	4.1	28.7	59.0	3.3	0.5	31	F	85	AD
3	38	6.5	7.5	6.5	29.0	42.1	8.4	0.7	24	M	87	AD
4*	74	0.8	6.8	6.8	45.8	38.1	1.7	1.2	23	M	86	SA
5	42	1.5	15.8	3.8	32.3	42.1	4.5	0.8	21	M	85	SA

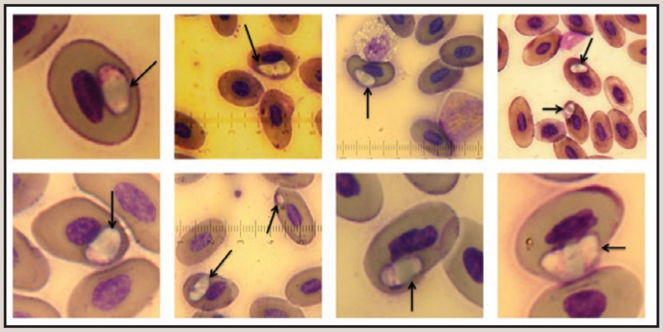

Fig. 1. Tinción 15-stained blood smear from a *Phymaturus payuniae* infected with a blood parasite. Some erythrocytes contain sporozoites marked by arrows, that can be found anywhere in the host cells. The morphology of this blood stage is characteristic of the genus *Schellackia*.

Amo et al. 2005. Parasitol. Res. 96:378–381). *Phymaturus payuniae* is endemic to La Payunia State Reserve, northern Patagonia, in Malargüe, Mendoza, Argentina. The most abundant populations are located at Payún Liso Volcano (Abdala et al. 2012. Cuad. Herpetol. 26:215–302). Castro et al. (2013) reported nematode parasites in the digestive tract of *Phymaturus* cf. *palluma* while analyzing this species' diet. However, no blood parasites affecting any species of *Phymaturus* have been discovered. Here we describe the first blood parasite known in *Phymaturus payuniae*.

Blood samples were taken from caudal vein using sterile needles (23G). Each smear was analyzed under 1,000x microscope magnification with oil immersion to find blood parasites *sensu* Merino (1999. Etologuía 17:21–30). Leukocyte counts were also conducted following D'Amico (2010. J. Wildl. Dis. 46:644–648) and heterophil to lymphocyte ratios (H/L) as a physiologic index of stress were obtained. The parasite was identified as an unknown *Schellackia* sp. and the intensity was 1.3% (26/2000 cells infected erythrocytes) (Fig. 1). The parasite was identified as *Schellackia* due to its location displayed in erythrocytes and the presence of large retractile bodies that match with the characteristics of this genus. Compared to the other lizards caught, the infected individual showed higher counts of white blood cells, azurophils, and heterophils and a lower count of lymphocytes (Table 1). As a consequence of higher heterophils and lower lymphocytes, the H/L ratio was also higher in the infected individual (Table 1).

In the phrynosomatid lizard *Sceloporus occidentalis*, malarial virulence has negative hematological and physiological effects on the hosts that could be detrimental for the species (Schall 1990. Parasitology 100: Suppl:S35–52). Reports of blood parasites in lizards include mostly agamids, geckos and iguanids for a broad range of habitats (i.e. arboreal, saxicolous and ground--dwelling species). *Schellackia* haemococcidios seem to be cosmopolitan parasites since they have been reported for lizards in several sites worldwide, including North America, Central America, Europe, Australia and Asia (Jordan and Friend 1971. J. Protozool. 18:485–487; Telford 1993. Syst. Parasitol. 25:109–117; Bonorris and Ball 2007. J. Eukaryot. Microbiol. 2:31–34; Desser 2007. J. Eukaryot. Microbiol. 44:162–167; Godfrey et al. 2007. Parasitol. Res. 100:107–109; Halla et al. 2014. Parasitol. Res. DOI: 10.1007/s00436-014-4149-5). Thus, haemococcidio may represent a concern for conservation management worldwide, especially if it affects health parameters of threatened fauna like *Phymaturus*. However, ours is the first record for this parasite in northern Patagonia, Argentina and is also the first report of the presence of intracellular parasites in the genus *Phymaturus*.

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***PLESTIODON SKILTONIANUS INTERPARIETALIS* (Coronado Skink). AVIAN PREDATION.** Western Bluebirds (*Sialia mexicana*) are known to feed primarily on insects and small fruits, such as berries. They nest in tree hollows and backyard nestboxes, allowing for easy observation (Wetmore 1964. Song and Garden Birds of North America. National Geographic Society, Washington, D.C. 398 pp.). It has been noted that fledgling Western Bluebirds assist adult birds in feeding nestlings (Dickinson et al. 1996. Behav. Ecol. 7:168–177).

On 16 June 2013, we were observing a family of Western Bluebirds interacting around a nestbox in Poway, California, USA (32.968°N, 117.048°W; datum WGS84). The family consisted of two adult birds, two fledglings, and three nestlings. At 1142 h and 1143 h, respectively, the two adult bluebirds each brought one *Plestiodon skiltonianus interparietalis* to the nestbox to feed to the nestlings. On 19 June 2013, at 1441 h, one of the fledgling bluebirds was observed bringing a juvenile *P. s. interparietalis* to the nestbox (Fig. 1). This observation was cataloged as a photo voucher at the San Diego Natural History Museum (SDSNH HerpPC 05222). In addition, on 16 June 2013 at 1215 h, one of the adult bluebirds also brought a juvenile *P. gilberti rubricaudatus* (Western Red-tailed Skink) to the nestbox. The bright pink tail of the skink distinguished it from *P. s. interparietalis*; however, we were unable to photograph the event.

Fig. 1 A juvenile Western Bluebird (*Sialia mexicana*) carrying a Coronado Skink (*Plestiodon skiltonianus interparietalis*) to a backyard nestbox to feed its siblings.

To our knowledge, only a single record exists of vertebrate prey, a Western Fence Lizard (*Sceloporus occidentalis*), in the diet of the Western Bluebird (Stern 2007 J. Ornithol. 119:128–129). Eastern Bluebirds (*Sialia sialis*) have been documented feeding on reptiles and other vertebrates (Braman and Pogue 2005. Wilson Bull. 117:100–101), but observations of this behavior in the Western Bluebird remain rare, making our observations notable.

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***PSYCHOSAURA AGMOSTICHA*. DRINKING BEHAVIOR.** Water is acquired by amphibians and reptiles through food, metabolism, skin, or direct ingestion. Reptiles have developed several morphological, physiological and behavioral adaptations for obtaining water. The way in which reptiles obtain fresh water through direct ingestion varies among species (Zug et al. 2001. Herpetology: An Introductory Biology of Amphibians and Reptiles. Academic Press, Orlando, Florida. 630 pp.; Montuelle et al. 2008. Comp. Biochem. Physiol. 150:S74–S92). *Psychosaura agmosticha* (Mabuyidae) is a diurnal species, usually found among dry cactuses, fallen logs, on the ground, or in association with bromeliads in the states of Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, and Sergipe, northeastern Brazil, mainly in different formations in the Caatinga biome and in the Atlantic Forest in the state of Bahia (Rodrigues 2000. Pap. Avul. Zool. 41:313–328; Dias and Rocha 2013. Check List 9:607–609; Magalhães Junior et al. 2015. Biotemas. 27:217–222).

Here we describe drinking behavior in this species. Observations were carried out on a rocky outcrop in a Caatinga area in Sítio Cacimbas, municipality of Itapetim (7.4049°S, 37.1872°W, WGS 84; 647 m elev.), Pajeú region, Pernambuco, northeastern Brazil. On 19 and 30 May, and 24 Jun 2015, at 0427 h, 1150 h and 0858 h, respectively, with low intensity rainfall on all three occasions, three different *P. agmosticha* individuals were observed ingesting water from *Encholirium spectabile* leaves. As the rain began and water droplets accumulated in bromeliad leaf surfaces, lizards moved to the upper portions of the leaves and drank the water. Lizards covered ca. 1.2 m over ca. 130 s, while horizontally moving their heads from side to side, sometimes positioning their snouts almost perpendicularly to the leaves. At this time, we noticed the movement of the tongue, in direct contact with the leaves surface and carrying water droplets into the mouth.

Air temperature and humidity during the observations were 26.8°C and 72% on the first day, 28.7°C and 60% in the second day, and 28°C and 57% on the third, while substrate temperature and humidity were 26.7°C and 71% on the first day, 26.6°C and 53% on the second day, and 24.1°C on the third day.

It is likely that rainwater drinking in *P. agmosticha* enhances its chances of getting water in an environment where this resource is scarce. Precipitation in the Caatingas is low, and the relief features cause rapid drainage (e.g., due to inclination, direct sunlight and low vegetation) are factors that reduce the availability of free water (Vitt 1995. Occ. Pap. Oklahoma Mus. Nat. Hist. 1:1–29), On three occasions, under similar weather conditions, the behavior of drinking water accumulated in bromeliads was observed in these lizards. In turn, these plants seem to act as rainwater collection and provision points for organisms associated with them.

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***SCINCELLA LATERALIS* (Little Brown Skink). ATTEMPTED PREDATION.** Fishing spiders (Pisauridae) are a globally distributed family of typically ground-hunting spiders found in riparian zones and on the surface of freshwater streams and lakes. Direct captures of vertebrates by pisaurids have been observed in several species of fishes and amphibians (McCormick 1982. Biol. Rev. 57:29–58). *Dolomedes vittatus* typically inhabits small stream and creek beds with riparian zones well-shaded by tall vegetation (Carico 1973. Bull. Mus. Comp. Zool. 144:435–488). The venom of *Dolomedes* fishing spiders contains potent neurotoxins, capable of killing small fishes and inhibiting neural activity in rats (Li et al. 2014. Toxicon 83:35–42). Although we could find no observations in the literature of Pisauridae attacking squamate reptiles, *D. tenebronus* has been observed scavenging a dead snake (*Adelphicos quadrivirgatus*) from another spider's web situated above a stream in Mexico (Lazcano et al. 2005. Herpetol. Rev. 36:186). Here, we report the first known observation of *D. vittatus* preying on a squamate and of a pisaurid attempting predation and feeding upon a scincid.

At 1820 h on 27 May 2015, an adult female *Dolomedes vittatus* was observed to attack, capture, and envenomate an adult *Scincella lateralis*. As the skink ran in front of the stationary spider it was attacked and held for approximately 15 sec. Our approach appeared to facilitate the escape of the skink by startling

FIG. 1. *Dolomedes vittatus* feeding on the autotomized tail of *Scincella lateralis.*

the spider, during which time the skink autotomized its tail and broke free from the spider's grasp. The skink ran over the side of a nearby stream embankment, fell into the water and was not seen again. The spider retained the autotomized tail, carried it one meter from the point of attack, and began to feed upon it (Fig. 1). This event was observed at the Auburn University Mary Olive Thomas Demonstration Forest in Lee Co., Alabama, USA (32.58463°N, 85.41756°W, WGS84; 205 m elev.). The attempted predation occurred < 1 m from a small stream on sandy substrate, at a site with little understory vegetation in complete shade of hardwood-dominated forest. In addition to a wide variety of vertebrate predators, *Scincella lateralis* is also known to be preyed upon by wolf spiders (Lycosidae) (Hampton et al. 2004. Herpetol. Rev. 35:269–270).

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SPHENOMORPHUS INDICUS **(Indian Forest Skink). PREDATION.** *Sphenomorphus indicus* is a medium-sized (SVL could reach 125 mm in adults) viviparous skink species inhabiting southeast Asia, and produces 6–13 young in late spring (Zhao et al. 1999. Fauna Sinica, Reptilia Vol. 2, Squamata, Lacertilia. Science Press, Beijing, China. 394 pp.). *Takydromus kuehnei* (Kuhne's Grass Lizard) is a small lacertid lizard with a slender and elegant body shape (SVL ~ 40–56 mm). The species is thought to prey on invertebrates such as Orthoptera nymphs, small moths, and small spiders (Lue et al. 1999. A Field Guide to the Amphibians and Reptiles of Taiwan. Society for Wildlife and Nature, Taipei, Taiwan. 343 pp.), and is not expected to prey on vertebrate food items. Here we report the first recorded incidence of *T. kuehnei* preying upon *S. indicus.*

At 0955 h on 28 June 2015, HCC was walking along Xin-Tien Hiking Trail, Tan-Zi District, Taichung City, Taiwan (21.21440°N, 120.73795°E; elev. 288 m), when he witnessed a female *T. kuehnei* prey upon a *S. indicus* hatchling. The environment was the edge of secondary lowland hardwood forest, with moderate human disturbance and some garden plants along the trail. HCC was first attracted by the sound when the *T. kuehnei* was chasing the *S. indicus* in the grass. After both lizards disappeared into the grass, the *T. kuehnei* showed up again with the skink in its mouth (Fig. 1). The hatchling skink had lost two-thirds of its original tail and was motionless during the observation, apparently completely subdued by the predator. After being disturbed by the other hikers, the *T. kuehnei* brought its prey into deeper vegetation before the skink was swallowed.

FIG. 1. A spent female Kuhne's Grass Lizard (*Takydromus kuehnei*) preying upon a hatchling Indian Forest Skink (*Sphenomorphus indicus*).

Our observation provides the first published record of *T. kuehnei* preying upon *S. indicus.* Lack of lateral courtship spots indicated that the *T. kuehnei* in this observation was a female, which had just laid her eggs (based on the stretch marks on her side), but was still actively being courted (based on the bite marks on the posterior dorsal side which are produced by males during copulation). The abundance of *S. indicus* young in this breeding season may have provided unusual prey items for the hungry female *T. kuehnei* after their own exhausting reproductive investment.

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TILIQUA ADELAIDENSIS **(Pygmy Bluetongue Lizard). TERRITORIAL DEFENSE AND FIGHTING.** *Tiliqua adelaidensis* is an endangered, scincid lizard restricted to a few remnant fragments of native grassland in South Australia. On 2 December 2013, an adult individual was discovered dead on the surface, twisted into an "S" shape, apparently the result of a snapped vertebral column (Fig. 1). The dead lizard was lying immediately adjacent to a burrow occupied by another conspecific. *Tiliqua adelaidensis* are unable to dig burrows themselves, but spend most of their lives in burrows dug by lycosid or mygalomorph spiders. Burrows deeper than 20 cm are preferred and can be a limited resource in their grassland habitat (Souter et al. 2007. Biol. Conserv. 135:33–45). Occupied burrows are aggressively defended by both sexes, against model lizards (Fenner and Bull 2011. J. Zool. 283:45–51). Male lizards encountering each other out of their burrows during the mating season, fight by biting on to each other and wrestling on the ground (pers. obs.), but no actual fights over burrow ownership have previously been observed. During mating, males bite on to females by the neck, resulting in scale damage. Similar damages are occasionally

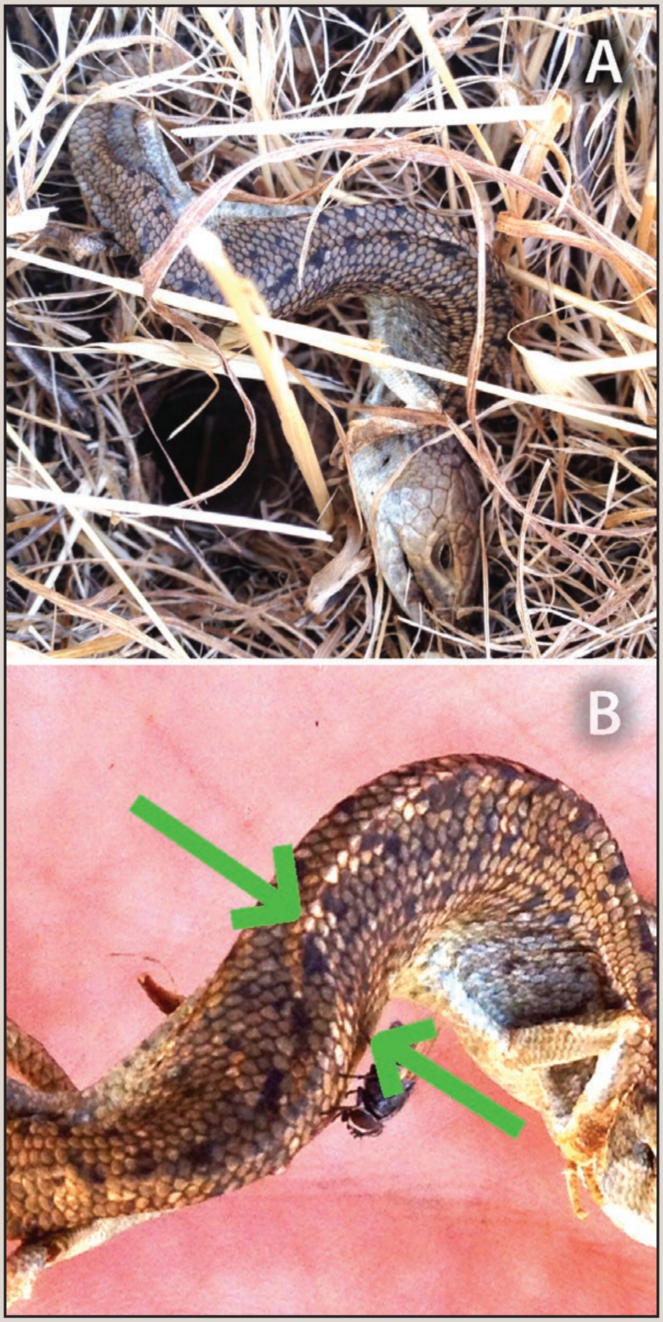

Fig. 1. A) Dead *Tiliqua adelaidensis* found next to the entrance of an inhabited burrow. B) Lizard back, showing the snapped and separated vertebrae (green arrows).

found on the head, neck, and body of males, presumably from fighting with other lizards. We could not deduce the sex of either the dead lizard (too dry) or the resident of the burrow (could not be lured out). Because the dead lizard was whole, without bite marks or parts being eaten, we consider predation or spider attack (Ebrahimi and Bull 2012. Trans. Roy. Soc. S. Aust. 136:45–49) as unlikely causes of death. The contorted body suggested that a natural death was unlikely. Although we found no scale damage to confirm it, we instead propose that the immediate proximity to an occupied burrow strongly suggests death resulting from intra-specific aggression, with the resident conspecific attacking a potential rival for burrow ownership.

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***TROPIDURUS HISPIDUS* (Peter's Lava Lizard). ECTOPARASITE.** Lizards of the genus *Tropidurus* are the most conspicuous species within Neotropical lizard communities, and inhabit a wide variety of habitats (Vitt and Pianka 2004. Recerca 8:139–157). *Tropidurus hispidus* is widely distributed in the Caatinga (= scrub-like vegetation) of northeastern Brazil (Rodrigues 1987. Arq. Zool. St. Paul 31:105–230). Here we report the first occurrence of a tick, *Amblyomma rotundatum* (Acari: Ixodidae), parasitizing a *T. hispidus*.

At 2113 h on 21 January 2015, during herpetological surveys in areas of the Aiuaba Ecological Station in the municipality of Aiuaba (6.60181°S, 40.1246°W; WGS 84), Ceará, Brazil, a specimen of *T. hispidus* (snout–vent length: 77.30 mm, mass: 15 g), was found being parasitized by an adult tick, which was attached to the neck of the lizard (Fig. 1). The lizard was collected and euthanized with sodium thiopental solution, and the ectoparasite removed by hand. The specimens were preserved in 70% ethyl alcohol, identified, and subsequently deposited into the Herpetological Collection of the Regional University of Cariri (URCA; Register number: 10.417) and Parasitological URCA Collection (Register number: 4.023). *Amblyomma rotundatum* is a parthenogenetic tick (Aragon 1912. Mem. Inst. Oswaldo Cruz. 4:96–119; Oba and Schumaker 1983. Mem. Inst. Butantan 47–48:195–204) commonly associated with species of reptiles and amphibians (Durden and Knapp 2005. Med. Vet. Entomol. 193:326–328; Pontes el al. 2009. Zoologia 262:328–333; Guglielmone and Nava 2010. Zootaxa 2541:27–49). It is known to parasitize the lizards *Ameiva ameiva* (Onofrio 2007. Revisaodo Genero *Amblyomma* Koch 1884 (Acari: Icodidae) no Brasil. Universidadae Federal do Rio de Janeiro. 80 pp.) and *Tropidurus torquatus* (Viana et al. 2012. Rev. Bras. Parasitol. 21:319–322). Ours is the first record of an *A. rotundatum* parasitizing a *T. hispidus*.

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Fig. 1. *Amblyomma rotundatum* parasitizing *Tropidurus hispidus*.

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SQUAMATA — SNAKES

***AGKISTRODON CONTORTRIX* (Copperhead). TUNNEL-BLOCKING BEHAVIOR.** Tunnel-blocking—the defensive act of a fossorial animal sealing the passage of its burrow using loose physical materials or portions of its own body—is a passive alternative to aggressive and potentially costly encounters with predators (Ebrahimi et al. 2015. Trans. Royal Soc. South Australia 139:145–151), or with conspecifics vying for resources (e.g., shelter, mates; Berry 1986. Herpetologica 42:113–125). *Gopherus agasizii* (Desert Tortoise) block their burrows from competing males with the lateral surface of the carapace (Berry, *op. cit.*). Various lizard species achieve blockage using soil, armored head scales (Ebrahimi et al., *op. cit.*), and even autotomized tail segments (Shine 2006. Copeia 2006:103–115). In snakes, Sexton and Bramble (1993. Amphibia-Reptilia 15:9–20) observed male *Thamnophis sirtalis* (Common Gartersnake) elevating the anterior parts of their bodies at the entrances of hibernacula to potentially block competing males and egressing females. Here, we describe two instances of tunnel-blocking behavior exhibited by an individual male *Agkistrodon contortrix*.

At approximately 0900 h on 21 October 2015, we radio-tracked a non-gravid female *A. contortrix* to a lowland mixed forest stand within Bankhead National Forest (Lawrence Co.), Alabama, USA (34.311585°N, 87.341750°W; WGS 84). The female was not visible on the surface; instead, we discovered a male *A. contortrix* (SVL ca. 80 cm) coiled and pressed tightly into the entrance of an abandoned mammal burrow. Based on previous encounters and photographic comparisons, this male had formed a pair with our telemetered female since 29 September 2015. The male was presenting two non-overlapping body coils towards the exterior of the burrow, with its head hidden inside of one coil and facing towards the burrow's interior (Fig. 1A). Upon tactile stimulation, the male turned his head to investigate us with one eye, but made no further advance. To confirm the location of our female, we removed the male using a snake hook. He was passive throughout the extraction, but resisted the process by keeping his body rigid and exerting some outward pressure on the uneven burrow walls. After removal, it was apparent that the male had conformed to the internal dimensions of a widened tunnel entranceway—with a maximum width and height of 17.5 cm and 6.0 cm, respectively— that angled sideways and rapidly narrowed to a passage with a maximum width and height of 4.2 cm and 3.0 cm, respectively. Further inspection of the inner tunnel revealed our telemetered female *A. contortrix* (Fig. 1B).

In the next two weeks, the female was tracked several times without a visible male escort. On 9 November, she returned to the original burrow. We inserted a flexible, fiber-optic borescope (Model MSPS-100IV; Moritex Corp., Saishama, Japan) into the burrow to confirm her condition and catalogue any subterranean behaviors. At 60 cm inside the tunnel, we identified the posterior section of the previously described male *A. contortrix*. Almost immediately, he began to move further down the tunnel. When we attempted to maneuver the borescope around the male, he contracted his body with a concertina motion that

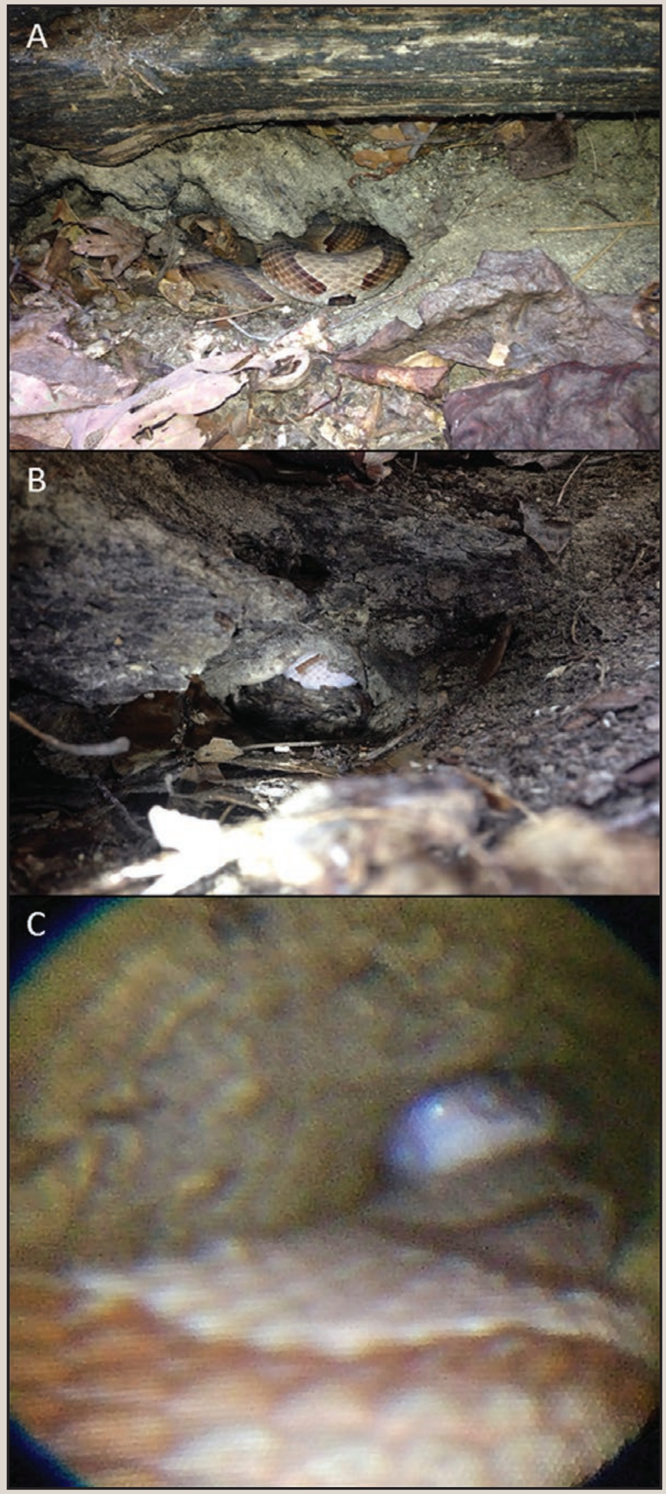

FIG. 1. Mate-guarding through tunnel-blocking behavior in *Agkistrodon contortrix*. A) The rigid coil of the male snake seals the entranceway to a narrow mammal burrow. B) After extracting the male, the guarded female is just visible inside the narrow tunnel opening. C) The same male snake in the same tunnel on a later occasion, actively blocking a borescope by pressing its body against the walls in a concertina motion.

filled the empty space in front of the borescope and momentarily blocked our field of view. In ca. 1 min, the male relaxed his body enough to reorient his head and investigate the borescope with several tongue flicks (Fig. 1C). We pushed the borescope past the male and glimpsed our telemetered female retreating >1 m down the tunnel; the male followed shortly after.

The tunnel-associated behaviors exhibited by this individual *A. contortrix* are rarely observed in snakes, and have not been documented in this species. Male *A. contortrix* regularly induce male-male combat and mate-guarding behaviors to maximize fitness gains and limit bodily injury (Gloyd and Conant 1990. Snakes of the *Agkistrodon* Complex: A Monographic Review. Society for the Study of Amphibians and Reptiles, Oxford, Ohio. 614 pp). Based on these two isolated incidents, and the fact that our female was never found unguarded at this location, bodily tunnel-blocking in *A. contortrix* could be an effective and low-cost method of guarding receptive females from male competitors, and potentially from certain fossorial predators (e.g., *Lampropeltis* spp.). Although the apparent rarity of such observations in snakes calls into question the function and efficacy of this behavior, our use of a borescope demonstrated the repeatable nature of bodily tunnel-blocking as an ophidian mate-guarding strategy.

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***AGKISTRODON PISCIVORUS CONANTI* (Florida Cottonmouth). DIET.** *Agkistrodon piscivorus* is a generalist predator that feeds on a variety of prey, including snakes (Gloyd and Conant 1990. Snakes of the *Agkistrodon* Complex: A Monographic Review. Society for the Study of Amphibians and Reptiles, Oxford, Ohio. 614 pp.; Lillywhite et al. 2002. Herpetol. Rev. 33:259–260; Hill and Beaupre 2008. Copeia 2008:105–114). *Cemophora coccinea* (Scarletsnake) is not known as one of the 26 species of snakes consumed by *A. piscivorus* (Ernst and Ernst 2011. Venomous Reptiles of the United States, Canada, and Northern Mexico: Volume 1. Johns Hopkins University Press, Baltimore, Maryland. 193 pp.). On 16 June 2015, at 2210 h, we found a dead-on-road *A. piscivorus* (total length [TL] = 51.0 cm) in Everglades National Park on Main Park Road, 1.88 km S Pa-hay-okee, Miami-Dade Co., Florida, USA (25.414085°N, 80.78183146°W, WGS84; elev. 3 m). The snake had been killed by a vehicle and some internal organs were exposed. Visible stomach contents included a small (TL ca. 15 cm) *C. coccinea*. Photographic vouchers of the *A. piscivorus* (UF-Herpetology 177194) and *C. coccinea* (UF-Herpetology 177195) were deposited in the Division of Herpetology, Florida Museum of Natural History, University of Florida. Despite the fact that these species are sympatric over large areas of the southeastern United States, this is the first known documented predation of *C. coccinea* by *A. piscivorus*.

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***AMPHIESMA STOLATUM* (Buff-striped Keelback). DIET.** The genus *Amphiesma* includes widely distributed taxa of Old World natricines (Guo et al. 2014. Zootaxa 3873:425–440). *Amphiesma stolatum* occurs in Sri Lanka and is distributed throughout the country up to 1800 m elevation. These snakes have diverse diets. Here we report the first instance of predation by *A. stolatum* on *Sphaerotheca breviceps* (Indian Burrowing Frog).

On 12 January 2012, at 2230 h, during a herpetological survey of Mihintale Sanctuary, North Central Province, Sri Lanka, we discovered an adult *A. stolatum* (total length ca. 50 cm) preying on a *S. breviceps* at the edge of the seasonal pond (Fig. 1). It was a cool and humid day, after several consecutive days of heavy rain. The frog was making a soft call and was trying to escape by pushing against the snake's head and snout with both forearms and hind limbs. The snake took approximately 15 min to completely swallow the frog.

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Fig.1 *Amphiesma stolatum* preying upon a *Sphaerotheca breviceps* in Mihintale, Sri Lanka

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***ATRACTUS TORQUATUS* (Neckband Ground Snake). PREDATION.** Snakes are important dietary components of many vertebrates, such as birds, mammals, and reptiles (Fraga et al. 2013. Guide to the Snakes of Manaus-Central Amazonia. Editora Inpa, Manaus, Amazonas, Brazil. 303 pp.). However, invertebrates feeding on snakes are rarely reported in the literature. At 1720 h on 9 March 2013, we found a *Theraphosa blondi* (Goliath Spider; ca. 20 cm diameter with extended legs) feeding on a juvenile male of the dipsadid snake *Atractus torquatus* (total length = 24.5 cm) in a tropical rainforest reserve in Manaus, central Amazonia (Amazonas, Brazil; 2,978367°S, 59,94315°W; WGS 84). The spider showed a behavior common in the genus *Therophosa*: it carried the snake to be eaten in a sheltering tunnel at ground level (Brunet 1996. Spiderwatch. Reed Books, Melbourne, Australia. 176 pp.). However, during an attempt by the observer to grab both snake and spider, the spider dropped the snake on the ground outside the shelter and escaped into the tunnel. The snake is deposited in the herpetological session of the zoological collections of Instituto Nacional de Pesquisas da Amazônia, Manaus (voucher number INPA-H 34252).

The genus *Theraphosa* contains the largest spiders in the world. They are able to feed on a wide variety of animals, such as crickets, beetles, amphibians, reptiles, and mammals (Brunet, *op. cit.*). Juvenile *A. torquatus* can defend themselves by escaping through the leaf litter or musking (Martins and Oliveira 1998. Herpetol. Nat. Hist. 6:78–150). However, younger individuals are probably more vulnerable to predators than adults due to their small size.

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***ATRACTUS TRILINEATUS* (Three-lined Ground Snake). PREDATION.** *Atractus trilineatus* is a colubrid snake in the subfamily Dipsadinae, distributed through northern South America as well as the islands of Trinidad and Tobago. This fossorial species is a habitat generalist, known to occur in forests, savannas, and urban environments. Previously documented cases of predation on *A. trilineatus* include ophiophagy by *Erythrolamprus aesculapii* and *Micrurus circinalis* (Murphy 1997. Amphibians and Reptiles of Trinidad and Tobago. Krieger Publishing Co., Malabar, Florida. 304 pp.) as well as by the land crab *Eudaniela garmani* (Maitland 2003. J Crustacean Biol. 23:241–246). Here we report an instance of *A. trilineatus* predation by a *Pygocentrus nattereri* (Red-bellied Piranha).

On 23 August 2013, we were conducting biodiversity surveys at Turtle Mountain Camp in Iwokrama, Guyana. While fishing at approximately 1400 h along the edge of Turtle Pond (04.73795°N, 058.71145°W; WGS 84), adjacent to a section of seasonally flooded forest, a *P. nattereri* measuring 17.4 cm and weighing 81 g was caught by hook and collected. Among the stomach contents were multiple sections of an *A. trilineatus* (Fig. 1). The minimum length of the snake (sum of available fragments) was 103.7 mm. A small segment of the body was collected and stored in ethanol as a tissue sample. The remaining portion of the snake was collected and deposited in the Smithsonian Natural Museum of Natural History (Museum number: USNM 588636, Field ID: BPN3567).

We thank Iwokrama International Center for field and logistical support. This observation was made while conducting fieldwork for Operation Wallacea LTD. Permission to conduct scientific research was granted by the Minister of Amerindian Affairs, Honorable Pauline Sukai. The research Permit # 102113 BR031 was issued by the Guyana Environmental Protection Agency.

Fig. 1. Sections of *Atractus trilineatus* found in the stomach of a *Pygocentrus nattereri* (Red-bellied Piranha) in Guyana.

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***CACOPHIS SQUAMULOSUS* (Golden-crown Snake). DIET/MORTALITY.** The impact of invasive *Rhinella marina* (Cane Toad) on naïve predators has been well documented for a range of species. In several predators, these interactions have resulted in significant impacts at the population level (Doody et al .2009. Anim. Conserv. 12:46–53; Ujvari and Madsen 2009. Herpetol. Conserv. Biol. 4:248–251; Griffiths and McKay. 2007. Wildl.Res. 34:609–615; Price-Rees et al. 2010. Wild. Res. 37:166–173; Ujvari et al. 2011. Austral. Ecol. 36:126–130; Oakwood 2000. Aust. J. Zool. 48:79–90). Anecdotal observations suggest that a range of other predators are affected by lethal toxic ingestion but appear to have little to no population level impacts. However, the details of how species interact with toads on an individual level appears to be rarely documented (Fearn 2003. Herpetol. Rev. 34:253–254). The absence of such observations makes it difficult to understand why some predator species are vulnerable to toads and why some individual animals persist despite the overall population declines (Doody et al. 2014. Herpetol. Rev. 46:96–97; Llewelyn et al. 2013. Austral. Ecol. 39:190–197). Here, we present the first published observation of lethal toxic ingestion in *Cacophis squamulosus*, an elapid from Queensland, Australia. This observation is considered important due to the long-term occupation of toads from the range of *C. squamulosus* as well as the presence of myobatrachid frogs in the diet of the species (Shine 1980. Copeia 1980:831–838).

On 27 April 2012, an adult *C. squamulosus* (SVL ca. 470 mm) was found dead near Hail Creek Coal Mine in Queensland (21.490833°S, 148.364176°E, WGS84). The snake was found in medium length grass in an open area of bush. Upon closer inspection, a large food bolus was observed midway down the length of the body of the snake (Fig. 1). Dissection confirmed that the prey item was a sub-adult *R. marina* (Fig. 1). No other food items were identified in the stomach of the snake.

It has been well documented that the arrival of *R. marina* to an ecosystem is associated with an increased frequency of finding dead predators (Doody et al. 2009. Anim. Conserv. 12:46–53). Despite this, observations of dead predators from areas where *R. marina* has been long established appears to be comparatively rare (Fearn, *op. cit.*). This observation is limited to a single fatal interaction between *C. squamulosus* and a sub-adult toad. Unfortunately the specific details of the interaction are unknown and the only conclusions that can be reached from our observation is that *C. squamulosus* occasionally interacts with toads

PHOTOGRAPH BY DAVID STEER

Fig. 1. *Cacophis squamulosus* that apparently died after having ingested an invasive *Rhinella marina* (Cane Toad) at Hail Creek Coal Mine, Queensland.

and that the outcome may be lethal toxic ingestion. Currently *C. squamulosus* is not listed as a threatened species and an absence of targeted surveys makes it difficult to determine if the arrival of toads resulted in population level changes in the species. We do note that two sympatric species of elapid (*Denisonia maculata* and *Hemiaspis damelii*) appear to have undergone historic declines which in part, have been attributed to toads (Richardson 2006. Queensland Brigalow Belt Reptile Recovery Plan 2008–2012, Report to the Department of the Environment, Water, Heritage and the Arts, Canberra WWF-Australia, Brisbane). Our observation confirms that toads do present a potential risk to *C. squamulosus*. Additional observations will confirm whether this observation is an isolated event or if toads present an ongoing risk to the species.

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***CROTALUS HORRIDUS* (Timber Rattlesnake). REPRODUCTIVE / COMBAT BEHAVIOR.** Male-male combat behavior has been described for many snake species and is even thought to contribute toward the evolution of sexual size dimorphism within these species (Shine 1978. Oecologia 33:269–277; Shine 1994. Copeia 1994:326–346). Typically, combat events are "ritualized"—following a set of behaviors that identify dominance, but rarely result in direct injury. Male-male combat rituals can be most extreme for species within the Viperidae, and the specific behaviors that are part of this "combat dance" are explained by Carpenter et al. (1976. Copeia 1976:764–780). The most widely accepted hypothesis for influencing combat between male snakes is competition for females (Hersek et al. 1992. J. Herpetol. 26:105–107; Shine 2003. Proc R. Soc. B. 270:995–1004). However, other than losing an opportunity to mate with a female, there may be more detrimental consequences to engaging in combat and losing to another male. Herein we describe an injury suffered by a male during combat.

While radio-tracking a male *C. horridus* (hereafter referred to as Male #1; SVL = 938 cm; tail length = 81 cm; 727 g) on 17 July 2015 in Centre Co., Pennsylvania, USA, we found Male #1 in combat with another male (hereafter referred to as Male #2; SVL = 1030 cm; tail length = 69 cm; 1000 g) at 1246 h. To our knowledge the closest female was another radio-tagged rattlesnake 171 m away; however, an unmarked female may have been closer and gone unnoticed. Upon location, Male #1 had his head and upper portion of his body in a vertical position while Male #2 was on his back. As Male #2 righted himself and began to rise up, Male #1 pushed his upper body against the upper body of Male #2 slamming him into a nearby log. After both snakes righted themselves, they began traveling southeast together while pushing their lower bodies against one another. Male #1 persisted in keeping his head and upper body in a vertical position. Male #2 attempted to hold his head and upper third of his body in the air; however, he was unable to meet the vertical level of Male #1 with multiple failed attempts to swing his head around Male #1's elevated body (referred to as "topping" by Carpenter et al., *op. cit.*). After traveling ca. 3 m, Male #1 was able to push his lower body against Male #2 forcing him onto his back. Male #2 managed to right himself and after both males travelled ca. 5 m, Male #1 once again was able to force Male #2 onto his back. Male #2 remained on his back with his ventral side and elevated head facing Male #1; thought to be a submissive posture (Carpenter et al., *op. cit.*). Interestingly, it was the smaller male (Male #1) that was successful in this combat. At this point, Male #1 moved ca. 10 m away from Male #2 in the northeast direction where he coiled and kept his head pointed toward Male #2. After ca. 5 min, Male #1 uncoiled and began moving northeast away from Male #2. After ca. 5 more min, Male #2 righted himself and began moving south. Despite moving normally during the beginning of the combat event, it was at this time we noticed that Male #2 was experiencing difficulty moving the upper half of his body. Based on the snake's prior movements during the combat event, we concluded that this injury must have occurred at the end of the combat ritual. However, it is also possible that Male #2 could have injured himself prior to the combat event, and worsened that injury during the combat event. We captured Male #2 and brought him back to the laboratory at Penn State University. In the lab, we observed that Male #2 appeared to have difficulty moving his body to the right and moving his entire body forward; the snake continued to move to the left and backwards. We made the assumption that the snake must have suffered tissue or nerve damage on the right lateral side which limited the snake's control over those muscles and movements associated with those muscles. We kept the male in the lab for 10 days, after which we noted no improvement in his movements and the snake was released back into the field at the exact location where we captured him. We were unable to assess whether Male #2 would be able to recover from his injuries or how this would affect his ability to defend himself or capture prey. To our knowledge, this is the first reported account of a male rattlesnake sustaining an injury during combat behavior.

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***CROTALUS POLYSTICTUS* (Mexican Lance-headed Rattlesnake). DIET.** Here we report three prey items consumed by *Crotalus polystictus* from near Tapalpa, Jalisco, México (ca. 2150 m elev.). Two *C. polystictus* were captured on 14 October 2007. An adult female (SVL = 463 mm; tail length = 28 mm; 88 g; 72 g following regurgitation) was induced to regurgitate a partially digested rodent that had been swallowed head first. Hair samples were removed from the rodent and subsequent microscopic analysis revealed the rodent to have been a *Sigmodon* sp. (Cotton Rat) or *Oryzomys* sp. (Rice Rat). We also collected a fecal sample from this snake which contained a single unidentified reptile scale. An adult male *C. polystictus* (SVL = 824 mm; tail length = 57 mm; 469 g) defecated following capture. Feces contained hair and teeth from a *Pappogeomys bulleri* (Buller's Pocket Gopher). Although data are limited, *C. polystictus* from near Tapalpa apparently attain larger adult size (Armstrong and Murphy 1979. The Natural History of Mexican Rattlesnakes. Univ. Kansas Mus. Nat. Hist. Spec. Publ. No. 5, Lawrence. 88 pp.; pers. obs.) than do *C. polystictus* in the state of México (Meik et al. 2012. Biol. J. Linn. Soc. 106:633–640). Information on the diet of *C. polystictus* outside of the state of México is scarce; however, the apparent difference in body size might correlate with the sizes of available rodent prey species. Both rodent taxa consumed by snakes from near Tapalpa are larger than are *Microtus mexicanus* (Mexican Voles), the most commonly consumed prey species of *C. polystictus* in the state of México (Meik et al., *op. cit.*).

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***CROTALUS RAVUS* (Mexican Pygmy Rattlesnake). DIET.** *Crotalus ravus* is a small rattlesnake endemic to central México inhabiting mid to high elevations in a wide array of habitats, from xeric vegetation to pine and fir forests. Little is known about the biology of this species. Regarding its diet, reports include: arthropods (orthopterans and hemipterans), anurans (a single report of an unidentified species), reptiles (mostly lizards of the genus *Sceloporus* but also scincids, anguids, and snakes) and rodents. (Klauber 1972. Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind. 2nd ed. University of California Press, Berkeley, California. 1533 pp.; Campbell and Armstrong 1979. Herpetologica 35:304–317; Mendoza-Quijano et al. 2008. Herpetol. Rev. 39:353–354; Solano-Zavaleta et al. 2008. Herpetol. Rev. 39:469). The only available data on the identity of rodent species included in the diet of *C. ravus* refers to *Microtus mexicanus* and *Mus musculus* (Sánchez-Herrera 1980. Herpetofauna de Tlaxcala. Fac. de Ciencias, UNAM, México. 155 pp.).

On 14 September 2014, about one hour before dusk, we found an adult *C. ravus* coming out from a trailside embankment in pine-oak forest in Cerro Piedra Larga, municipality of San Carlos Yautepec, Oaxaca, México (16.551778°N, 95.812639°W, WGS 84; 2040 m elev.). Shortly after collection, the snake regurgitated two mice, one of them in an advanced state of digestion, the other fresh enough as to allow its determination as a young *Peromyscus mexicanus*. The two mice measured 70 and 31 mm in body length (exclusive of tail). This observation extends our knowledge about the specific diet of this rattlesnake. Photographic vouchers are deposited in the Museo de las Ciencias Biológicas Enrique Beltrán, Facultad de Estudios Superiores Iztacala, UNAM (MCBFESIR-288, 289). We thank Montserrat Cruz Lira for her assistance with identifying the mice. We also thank Mirna Garcia Castillo and Aldo López Velázquez for help with fieldwork. Ernesto Recuero was supported by a DGAPA-UNAM postdoctoral fellowship. Funding for the trip was provided by PAPIIT-UNAM IN209914 to GP-O.

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***DIADOPHIS PUNCTATUS PUNCTATUS* (Southern Ring-necked Snake). PREDATION.** Here I present the first record of *Buteo lineatus* (Red-shouldered Hawk) predation on a *Diadophis p. punctatus*. At ca. 1100 h on 12 February 2013, I observed a *B. lineatus* eating a katydid in Corkscrew Swamp Sanctuary (26.2730°N, 81.6079°W; WGS 84), Collier Co., Florida, USA. The hawk was in a Pond Cypress tree on the edge of a small prairie bordered on one side by a cypress swamp and by pine woodland on the other. Immediately upon consuming the katydid, the hawk flew to the ground ca. 1.5 m from an elevated boardwalk to grab an adult *D. punctatus*. It then flew with the snake in its talons to a branch 3 m high ca. 10 m from the boardwalk. The hawk stretched and otherwise manipulated the struggling snake (Fig. 1) before consuming the still-moving snake. Although snakes are a well-known component of *B. lineatus* diet (Clark 1987. A Field Guide to the Hawks of North America. Houghton Mifflin Co. Boston, Massachusetts. 198 pp.), I found only one literature reference to Red-shouldered Hawks eating Ring-neck Snakes (Fisher 1893. Hawks and Owls of the United States in their Relation to Agriculture. U.S. Dept. Agric., Div. Ornith. Mamm. Bull. 3). That specimen was from Canton, New York (taken 26 Oct 1888) and would be a *D. p. edwardsii* (Northern Ring-necked Snake), while the snake reported on here is a *D. p. punctatus* (USNM Herp Image 2847 a–c). Based on evidence presented by Fontanella et al. (2008. Mol. Phylogenet. Evol. 46:1049–1070), *D. p. edwardsii* and *D. p. punctatus* are likely different species.

Fig. 1. *Buteo lineatus* (Red-shouldered Hawk) subduing a *Diadophis p. punctatus* (USNM Herp Image 2847b).

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***ERYTHROLAMPRUS EPINEPHELUS* (Golden-bellied Snakelet). DIET.** *Erythrolamprus epinephelus* is a small snake in the family Dipsadidae with a trans-Andean distribution from Panama to Peru with an elevational distribution from 1100 to 2926 m (La Marca and Soriano 2004. Reptiles de Los Andes de Venezuela. Fundación Polar, Conservación Internacional, CODEPRE-ULA, Fundacite-Mérida, BIOGEOS, Mérida, Venezuela. 173 pp.; Dixon 1983. *In* Rhodin and Miyata [eds.], Systematics of the Latin American snake, *Liophis epinephelus* (Serpentes: Colubridae), pp. 132–149. Mus. Comp. Zool., Harvard Univ., Cambridge, Massachusetts). It has diurnal and terrestrial habits with preference for high Andean forests and open areas such as pastures, shrublands, and fields (Sexton and Heatwole 1965. Caribbean J Sci. 5:39–43). It has been documented that *E. epinephelus* tolerates a wide variety of anuran toxins (Michaud and Dixon 1989. Herpetol. Rev. 20:39–41) such as those of juvenile *Rhinella marina* (Sexton and Heatwole, *op. cit.*) and *Phyllobates terribilis* (Myers et al. 1978. Bull. Am. Mus. Nat. Hist. 161: 307–365). Despite a wide distribution, knowledge of its feeding habits is limited.

An adult female *E. spinephelus* (Fig. 1) was captured at 1400 h on 01 August 2015 at the Almorzadero paramo complex in the department of Santander, Colombia (6.975906°N, 72.838861°W, WGS 84; 3400 m elev.). The snake was found passively thermoregulating at the edge of a fringe of shrubs in a paramo life area and appeared to have recently consumed prey. After capture, the serpent regurgitated three recently-consumed *Pristimantis anolirex* (two adults [SVLs = 26.66, 25.28 mm], one juvenile

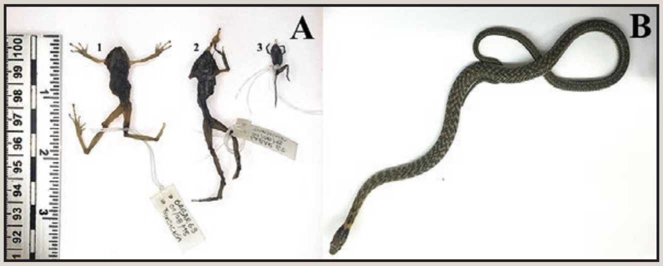

Fig. 1. *Erythrolamprus epinephelus* that had consumed three *Pristimantis anolirex* in the eastern Andes of Colombia.

[SVL = 12.56 mm]), a nocturnal frog species that is distributed in the highlands of the northeastern Colombian Andes. Additional information about the diet was obtained by keeping the *E. spinephelus* in captivity and offering it an individual of *Dendropsophus labialis*, a common species in the area. The individual was consumed immediately by the *E. spinephelus*, and may represent another potential species in the snake's diet.

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***ERYTHROLAMPRUS MILIARIS* (Cobra D'água; Military Ground Snake). DIET.** *Erythrolamprus miliaris* is a diurnal and nocturnal snake associated with permanent water bodies across South America. During a diurnal survey on 25 February 2015, EHK observed an adult *E. miliaris* preying upon an adult cycloramphid frog *Thoropa miliaris* inside a pitcher plant (Bromeliaceae). The observation took place at a rocky outcrop in the municipality of Santa Maria de Jetibá, Espírito Santo state, southeastern Brazil (40.918611°W, 20.177222°S, WGS84; elev. 916 m). The snake bit the frog's head while the frog tried to pull itself out of the snake's mouth. Once disturbed by our presence, the snake fled with the frog in its mouth. To our knowledge, this is the first report of predation on *T. miliaris* by *E. miliaris*. Additionally, this is likely the first report of this snake using bromeliads on rocky outcrops.

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***ERYTHROLAMPRUS MILIARIS* (Cobra D'água; Military Ground Snake). DIET.** *Erythrolamprus miliaris* is a mid-sized colubrid snake with both diurnal and nocturnal, terrestrial and aquatic habits. It is known to feed on anurans, invertebrates, salamanders, and lizards (Lima and Colombo 2008. Rev. Bras. Zoociênc. 10:73–76). Possible predation of *Leptodactylus latrans* egg foam by *E. miliaris* has been reported (Lingnau and Di-Bernardo 2006. Biociências 14:223–224), but the authors did not describe the process of egg predation. On 17 September 2015, we observed

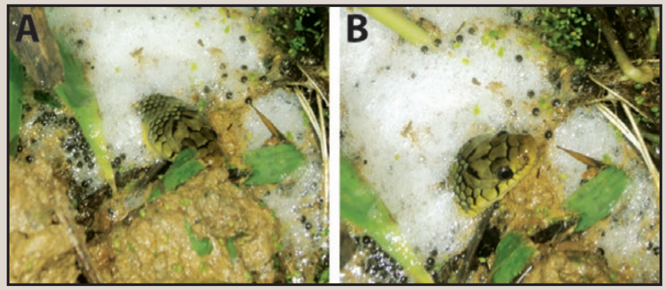

Fig. 1. *Erythrolamprus miliaris* in *Leptodactylus latrans* foam nest. A) Snake scouring the nest foam; B) snake ingesting the eggs.

predation of *L. latrans* eggs by *E. miliaris* for approximately 30 mins. The eggs were in a pond in Campestre, Castelo, Espírito Santo, Brazil (20.502167°S, 41.151639°W, datum WGS84; 496 m elev.). While feeding, the snake remained totally submerged under the foam nest and was observed scouring (Fig. 1A) and ingesting portions of the submerged part of the nest (Fig. 1B). The snake did not attempt to feed on individuals of *Dendropsophus branneri* that were less than 30 cm away.

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***HEBIUS LEUCOMYSTAX* (White-lipped Keelback). DIET and FORAGING BEHAVIOR.** Terrestrial and arboreal amphibian eggs are potential prey to larvae of ground beetles, ephydrid and phorid fly maggots (Menin and Giaretta 2003. J. Zool. 261:239–243; Carvalho et al. 2012. Herpetol. Notes 5:319–322), phalangids, crickets (Hayes 1983. Biotopica 15:74–76), and snakes (Duellman and Trueb 1994. Biology of Amphibians. Johns Hopkins University Press, Baltimore, Maryland. 244 pp.; Warkentin 2000. Anim. Behav. 60:503–510). *Hebius leucomystax* is distributed in Vietnam, Laos, Cambodia, and Thailand (Pauwels et al. 2015. Russ. J. Herpetol. 22:136–138) and prefers habitats near streams in mountain evergreen forest. At 2330 h on 2 September 2015, in Kim Hoa community (17.466667°N, 106.25°E; elev. 700 m) Bo Trach district, Quang Binh Province, Vietnam, we observed an adult female *H. leucomystax* (total length = 418 mm) eating eggs of *Polypedates megacephalus* (Hong Kong Whipping Frog or Spot-legged Tree Frog; Fig. 1). The eggs were in a foam nest (length = 14 cm, width = 8 cm) built on reeds 130 cm above a temporary pool along a forest road. The snake was above the nest and was dipping its head into the foam and eating the contents. Nearby, on the branches of a bush, we found another *H. leucomystax*, probably also attracted to the *P. megacephalus* breeding activity. Identification of nest was determined by the presence of adult *P. megacephalus* near the nest and by larvae hatching from eggs that were not consumed.

Hebius leucomystax is known to eat frogs and other small animals (Thompson 2008. First Contact in the Greater Mekong: New Species Discoveries. WWF Greater Mekong Programme, Hanoi. 38 pp.), but our observation represents the first documentation of frog egg predation by this species. *Polypedates megacephalus* is a medium-sized rhacophorid frog common in both in natural

Fig. 1. *Hebius leucomystax* eating the eggs of *Polypedates megacephalus* in the secondary forest in Quang Binh Province, Vietnam.

and man-made landscapes in northern and central Vietnam. The eating of eggs by the common green bottle fly, (*Lucilia* sp.) was recorded for a closely related species, *P. leucomystax* (Yorke 1983. J. Herpetol. 17:235–241), but eating of eggs of rhacophorid frogs by snakes is noted here for the first time.

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***HYPSIGLENA CHLOROPHAEA* (Desert Nightsnake). REPRODUCTION / MATING.** This paper reports the first published observations of mating in *Hypsiglena chlorophaea* (formerly *H. torquata*). The first observation was made on 04 June 2008, atop a southeast-facing rock outcrop on the north side of the Columbia River, Washington State, USA (Skamania Co.: 45.7206°N, 121.6403°W, WGS 84; 32 m elev.). Habitat at this site consists of steep, open hills with exposed rock outcrops. Parent geology is basalt; vegetation consists of small, scrubby oak trees (*Quercus garryana*), stands of Poison-oak (*Toxicodendron diversilobum*), and scattered clumps of parsley (*Lomatium* sp.). At approximately 1630 h, I found two adult *H. chlorophaea* in copulation. The snakes were beneath rocks, approximately 35 cm below the soil surface, on a soil substrate that was slightly moist and cool to the touch. Both snakes were ≥ 360 mm SVL, but neither was measured. The female of the pair appeared to have recently shed. Upon being discovered, the two disengaged and crawled away. Weather conditions at the time of the observation were as follows: air temperature approximately 18.3°C, light but variable south/southwest breeze, and 50% cloud cover. The second observation was made on 01 May 2009, atop a northeast-facing rock outcrop on the south side of the Columbia River, Oregon (Wasco Co.: 45.6011°N, 121.1828°W, WGS 84; 36 m elev.) in habitat similar to that described above. At approximately 1500 h, I found two adult *H. chlorophaea* (male SVL = 395 mm, total length = 475 mm; female SVL = 538 mm, total length = 618 mm) in copulation, coiled together in a ball. The snakes were beneath a rock, on soil. Shortly after being exposed, the two disengaged and began to crawl away. Weather conditions at the time of the observation were as follows: air temperature approximately 23.9°C, light breeze, and 100% cloud cover.

The timing of these observations agrees with the findings of Weaver (2010. J. Herpetol. 44:148–152), who reported that male *H. chlorophaea* from central Washington State possessed enlarged testes from May–August, and that the follicles of female *H. chlorophaea* were largest in May. Diller and Wallace (1986. Southwest. Nat. 31:55–64), found that mature male *H. chlorophaea* in southwestern Idaho had spermatozoa in the ductus deferens from April–September, and mature females had yolked ova from 14 May–5 June. These data suggest that the general pattern for female *H. chlorophaea* in the northwest is to mate during or prior to June, and to deposit eggs in June and July. More support for such a pattern is provided by the fact that I have found unhatched eggs of *H. chlorophaea* in this area (Skamania Co., Washington) during July.

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***IMANTODES CENCHOA* (Blunt-headed Tree Snake). DIET.** *Imantodes cenchoa* is a widespread species that occurs from northeastern Mexico to Argentina and Paraguay; it is primarily arboreal, and nocturnal or crepuscular in habit (Lee 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press, Ithaca, New York. 500 pp.). The preferred prey items of *I. cenchoa* are lizards in the genus *Anolis*, but they are known to feed on other lizards, reptile eggs, and amphibian species as well (Lee 1996, *op. cit.*). Within the genus *Anolis*, eleven species have been recorded from the diet of *I. cenchoa*: *Anolis capito, A. chrysolepis, A. frenatus, A. fuscoauratus, A. lemurinus, A. mariarum, A. ortonii, A. petersii, A. punctatus, A. rodriguezii*, and *A. uniformis* (Campbell 1998. Amphibians and Reptiles of Northern Guatemala, the Yucatán, and Belize. University of Oklahoma Press, Norman. 400 pp.; Gutierrez-C. and Arredondo-S. 2005. Herpetol. Rev. 36:324; García-Padilla and Luna-Alcántara 2011. Herpetol. Rev. 42:99–100; Ray et al. 2011. Herpetol. Rev. 42:100; de Sousa et al. 2014. Zoologia 31:8–19). Here, we report the twelfth species of *Anolis* from the diet of *I. cenchoa*.

At 2045 h on 24 August 2015, we observed a sub-adult *I. cenchoa* (sex unknown) consuming a juvenile *Anolis barkeri* next to a tributary stream of the Río Pedregal, in the northern foothills of Cerro Las Flores, Municipality of Huimanguillo, Tabasco, México (17.3852°N, 93.6420°W, WGS84; 290 m elev.). The snake was found

Fig. 1. Subadult *Imantodes cenchoa* consuming a juvenile *Anolis barkeri* in Tabasco, México.

motionless on an herbaceous plant roughly 50 cm away from the flowing stream, and was beginning to swallow the already-dead *A. barkeri* head first (Fig. 1). The snake was dangling the *A. barkeri* about 30 cm off the ground, and did not resume swallowing its prey before we moved on. Later that night, we caught three adult *A. barkeri* upstream, along with a large adult *I. cenchoa* in a nearby stream, suggesting that healthy populations of both species exist in this area. This is the first documented instance of *I. cenchoa* preying on *A. barkeri*, as well as the first reported observation of predation, by any animal, on this lizard species.

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***LEPTODEIRA RHOMBIFERA*. DIET.** *Leptodeira rhombifera* was formerly considered a subspecies of the wide-ranging *L. annulata*, but its distribution now is known to include low to moderate elevations from Guatemala to central Panama (McCranie 2011. The Snakes of Honduras: Systematics, Distribution, and Conservation. SSAR Contributions to Herpetology, Vol. 26. Ithaca, New York. 714 pp.). This species preys on anurans and their eggs, and occasionally on lizards (McCranie, *op. cit.*; Savage 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas. University of Chicago Press, Illinois. 1053 pp.). On 19 August 2015, at 2141 h, we found an adult *L. rhombifera* (total length ca. 800 mm) predating a live *Rhamdia laticauda* (Filespine Chulín) beside the River Juan Ladron in the community of Agalteca, Municipio de Cedros, department of Francisco Morazán, Honduras (14.42275°N, 87.24595°W; datum WGS85). The snake was found eating the fish head first with almost a third of the body inside the snake's mouth (Fig. 1). Wright and Wright (1957. Handbook of Snakes of the United States and Canada. Comstock Publishing Associates, Ithaca, New York. Vol 2, xviii + 1105 pp.), list *Leptodeira* as feeding on fishes, salamanders, anurans, birds, and mammals. Abarca (2014. Mesoam, Herpetol. 1:288–289) reports consumption of a dead fish (*Rhamdia* sp.) by *L. rhombifera*. We provide a second observation of this species feeding upon a fish (live), suggesting that this species may have a broader diet than was previously thought and can take advantage of alternative prey items when anurans are scarce.

Fig. 1. *Leptodeira rhombifera* preying on a *Rhamdia laticauda* (Filespine Chulín) in the community of Agalteca, Municipio de Cedros, department of Francisco Morazán, Honduras.

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***LEPTODEIRA RHOMBIFERA* (Common Cat-eyed Snake). NEONATE DIET/SCAVENGING.** In comparison to many species of snakes in temperate climates, the biology of even common tropical snake taxa is poorly known. This lack of information is particularly true of neonates and juveniles, which are cryptic, seasonally active, and less often observed and collected. *Leptodeira rhombifera* is a common, medium-sized, wide-ranging species of dipsadine snake belonging to a taxonomically unresolved species complex occurring from Mexico to Argentina (Kohler 2008. Reptiles of Central America. Herpeton, Verlag Elke Kohler, Offenbach. 400 pp.). This taxon feeds primarily on frogs and lizards (Solorzano 2004. Serpientes de Costa Rica. INBio, Santo Domingo de Heredia. 791 pp.), but will take a variety of other foods (Murphy 1997. Amphibians and Reptiles of Trinidad and Tobago. Krieger Publishing Co., Malabar, Florida. xiii + 245 pp.).

At ca. 1930 h on 19 October 2014, during a heavy rainstorm, two neonate *L. rhombifera* (each ca. 17.0 cm. total length) were observed on Hwy. 2, just north of the mouth of the Rio Oria, southeastern Los Santos Province, Panama (7.43707°N, 80.13663°W, and 7.43771°N, 80.13708°W, WGS84; elev. ca. 20 m). Both snakes were attempting to feed on very small, crushed, hylid frogs that had been killed by passing cars. A third neonate *L. rhombifera*, with a conspicuous stomach bulge, was found just south of the above sites (7.43575°N, 80.13520°W), and it is assumed that the bulge was also a small frog. Numerous anurans, both alive and freshly killed, were evident on the road surface. The two frogs being scavenged were estimated to be approximately 15–20 mm total length, but accurate sizes and specific identities could not be determined due to the damaged condition of the crushed bodies.

This is apparently only the second report of this common snake species utilizing scavenging for food acquisition (Mora 1999. Herpetol. Rev. 30:102; DeVault and Krochmal 2002. Herpetologica 58:429–436). It is significant that the snakes reported in this note were neonates, a life stage about which little is known, except in captivity. Although feeding on dead prey by neonates and juveniles is well known to herpetoculturists, scavenging by wild neonates may be more common than previously reported, and significance to neonate and juvenile cohort survival may be underestimated.

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OXYBELIS AENEUS **(Brown Vinesnake). DIET.** *Oxybelis aeneus* is widely distributed from Arizona, through Mexico and Central America to Argentina (Savage 2002. The Amphibians and Reptiles of Costa Rica: a Herpetofauna between Two Continents, between Two Seas. University of Chicago Press. Illinois. 934 pp.). It is primarily diurnal and arboreal species, and inhabits in a wide variety of heterogeneous habitats of the Neotropics (Henderson 1974. Herpetologica 30:19–24; García 2008. Stud. Neotrop. Fauna Environ. 43:107–115). Available information on diet suggest that *O. aeneus* is a generalist predator, feeding mainly on lizards (e.g., De Almeida et al. 2009. Bol. Mus. Biol. Mello Leitão 25:83–86; Grand and Lewis 2010. Acta Herpetol. 5:19–22; Mesquita et al. 2012. Anim. Biol. 62:289–299), some insects, small mammals, and birds (Keiser 1967. A Monographic Study of the Neotropical Vine Snake, *Oxybelis aeneus* [Wagler]. Unpubl. Ph.D. dissertation. Louisiana St. Univ., Baton Rouge, Louisiana). Here we provide an additional record of the food habits of *O. aeneus* in a Pacific coastal ecosystem.

On 28 October 2015, during diurnal lizard surveys at El Salado Estuary, Puerto Vallarta, México (20.66292°N, 105.24350°W, WGS84; elev. < 4 m), we observed an adult *O. aeneus* on a tree branch 2 m above ground level grasping a *Sceloporus melanorhinus* (Pastel Tree Lizard). This is the first verified record of *S. melanorhinus* as prey of *O. aeneus*.

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PANTHEROPHIS SPILOIDES **(Gray Ratsnake). DIET.** *Pantherophis spiloides* is a common species throughout Alabama that feeds primarily on mammals and birds. Juveniles are known to feed on frogs, and known prey items include *Hyla* species (Ernst and Ernst 2003. Snakes of the United States and Canada. Smithsonian Institution Press, Washington, DC. 668 pp.). On 22 October 2015, at 1320 h, a juvenile *P. spiloides* was observed consuming an adult *Hyla femoralis* (Pine Woods Treefrog; Fig. 1) in Bullock Co., Alabama, USA (32.02977°N, 85.455272°W; WGS84). The snake had captured the frog approximately 1.7 m high in a *Morella cerifera* (Wax Myrtle). This observation is the first record of *H. femoralis* being consumed by *P. spiloides*.

Fig. 1. Predation of *Hyla femoralis* by juvenile *Pantherophis spiloides*, Bullock Co., Alabama.

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PHILODRYAS PATAGONIENSIS **(Patagonian Green Racer). DIET.** *Philodryas patagoniensis* is a medium-size terrestrial snake that inhabits open areas (Marques et al. 2012. Herpetol. Notes 5:315–317). It has a wide geographic distribution in Bolivia, Paraguay, Argentina, Uruguay, and Brazil (Hartmann and Marques 2005. Amphibia-Reptilia 26:25–31). It is an opportunistic diurnal species that feeds on small mammals, reptiles, anurans, and birds (Lopez et al. 2003. Herpetol. Rev. 34:71–72; Franca and Araujo 2007. Braz. J. Biol. 67:33–40; López and Giarudo 2008. J. Herpetol. 42:474–480). In summer 2014, we received a dead adult female *P. patagoniensis*, (SVL = 91.4 cm; tail length = 20.5 cm) from Condomínio Estância Zaúna (23.396083°S, 51.835916°W, WGS84; 468 m elev.), a settlement in the municipality of Maringá, Paraná state, Brazil. We dissected the specimen and recorded two *Serinus canaria* (Domestic Canary; SVLs = 10.1 and 9.6 cm; Fig. 1), an exotic bird, commonly kept as a pet. The birds had been kept in a cage. The snake entered, ingested the

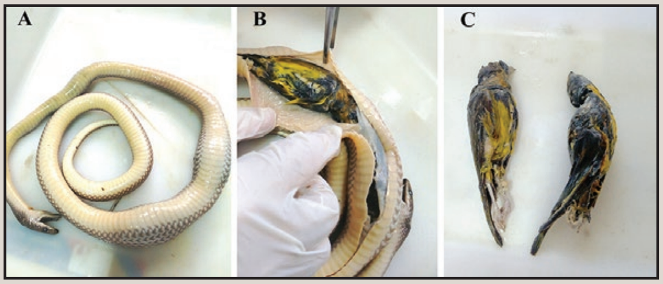

Fig. 1. A) *Philodryas patagoniensis* with two lumps in its stomach; B) dissected specimen; C) two *Serinus canaria* (Domestic Canary) removed from the snake's stomach.

birds, and was subsequently killed. Despite the generalist diet *P. patagoniensis*, birds are not common in the diet of this species. This is the first record of *P. patagoniensis* feeding on Domestic Canaries in an urban environment.

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***PITUOPHIS RUTHVENI* (Louisiana Pinesnake). REPRODUCTION / BREEDING PHENOLOGY.** Determining the reproductive phenology of snakes is important since it marks a time period where snakes are particularly vulnerable to predation (Greene 1997. Snakes: The Evolution of Mystery in Nature. University of California Press, Berkeley. 351 pp.). In addition, knowledge of reproductive phenology may help captive breeding programs specify appropriate times to pair snakes for reproduction. *Pituophis ruthveni* is a large-bodied constrictor endemic to western Louisiana and eastern Texas, USA. Recent surveys suggest that the species has declined and is now restricted to seven isolated populations (Rudolph et al. 2006. Southeast. Nat. 5:463–472). The species is currently a Candidate Species for listing under the Endangered Species Act. Very little is known about *P. ruthveni* reproduction in the wild. To our knowledge, copulation has not been witnessed, nor has a nest been documented. Here we present data on multiple adult *P. ruthveni* captured either concurrently, or within nine days of each other (hereafter co-occurrences). Data were taken from a historical records database containing all published and reported *P. ruthveni* capture data. All captures were via box trap/drift fence arrays (Burgdorf et al. 2005. Herpetol. Rev. 36:421–424) during surveys for *P. ruthveni* from 1994 to 2015. Traps were typically checked once a week from mid-March to mid-October.

Overall, we detected 10 co-occurrences out of 132 trap captured *P. ruthveni*. Eight of these co-occurrences consisted of a female captured concurrently with or prior to males. These eight co-occurrences all occurred between 12 April and 6 June (Table 1). The remaining two co-occurrences consisted of two females captured on the same day in late June, and a male that was captured six days prior to a female in early June. Males have

Table 1. Capture dates and days between captures for *Pituophis ruthveni* that were captured in the same trap either on the same date or within nine days of a female.

Snake ID#	Sex	Capture Date	Duration (days)
100	F	4/12/1995	
101	M	4/18/1995	6
118	F	5/10/1996	
119	M	5/10/1996	0
141	F	6/6/2000	
140	M	6/6/2000	0
181	F	4/19/2004	
182	M	4/28/2004	9
219	F	5/27/2012	
209	M	5/27/2012	
201	M	5/27/2012	0
220	F	5/25/2012	
221	M	5/30/2012	5
202	F	6/3/2013	
231	M	6/3/2013	0
202	F	4/22/2015	
239	M	4/30/2015	8

never been captured in the same trap less than nine days apart. For instances where the initial snake was removed from the trap multiple days before the subsequent snake, it is possible that the subsequent snake was actually captured by the trap soon after the initial snake was removed.

Presumably, in the eight cases of interest, male snakes followed receptive female snakes into the traps, via a chemical trail (Ford 1986. *In* Duvall et al. [eds.], Chemical Signals in Vertebrates 4; Ecology, Evolution, and Comparative Biology, pp. 261–278. Plenum Press, New York); however, the persistence of a chemical trail is unknown for *P. ruthveni*. These co-occurrences suggest that mating occurs from approximately mid-April to early June in the wild. In captivity, *P. ruthveni* exhibit a range in mean gestation period of 33.0–64.3 days (N = 18, mean = 50.1, SE = 2.1) and a range in mean incubation period of 60.2–86.5 days (N = 20, mean = 72.4, SE = 1.6) (J. Pierce, unpubl. data). Based on these reproductive parameters and our estimated mating season, egg laying would occur from mid-May to early August, and hatching would occur from late July to mid-October.

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***SIPHLOPHIS COMPRESSUS* (Tropical Flat Snake). DEFENSIVE BEHAVIOR.** Snakes occupy a wide variety of habitat, where they are exposed to many different kinds of predators (Greene 1988. *In* Gans and Huey [eds], Biology of the Reptilia, Volume 16, Ecology B: Defense and Life History, pp. 1–152. Alan R. Liss Inc., New

FIG. 1. *Siphlophis compressus* exhibiting head-hiding behavior at Michelin Ecologica Reserve, Bahia state, northeastern Brazil.

York), and, as a result, several defensive behaviors are presented by snakes. *Siphlophis compressus* is a semi-arboreal species found in forested areas of the Amazon in Brazil, Colombia, Ecuador, French Guyana, Peru, and Trinidad and Tobago, as well as in the Atlantic Forest of eastern and northeastern Brazil (Gaiarsa et al. 2013. Pap. Avul. Zool. 53[19]:261–283). Defensive behavior of *S. compressus* was observed on 31 July 2015 at 2030 h in Atlantic forest at Michelin Ecological Reserve – MER (13.81667°S, 39.13333°W; SAD69), Igrapíuna municipality, Bahia state, northeastern Brazil. At the moment of encounter the snake was in leaf litter, and when we approached, the snake expand its head into a triangular shape. The snake kept this position for several minutes, and then hid the head under its body (Fig. 1). Head triangulation is common in arboreal snakes, and has been described for *S. compressus* (Martins et al. 2008. South Am. J. Herpetol. 3:58–67). The head-hiding posture, in which the head is concealed under one or more parts of the body, leaving it less vulnerable to predator attack (Greene, *op. cit.*), has not been previously reported for *S. compressus*.

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***SPILOTES PULLATUS* (Caninana). DEFENSIVE BEHAVIOR.** *Spilotes pullatus* is a large, diurnal, and primarily arboreal snake that is widespread in the Neotropics (Vanzolini et al. 1980. Répteis da Caatinga. Academia Brasileira de Ciências, Rio de Janeiro, Brazil. 196 pp.). Its defensive repertoire includes inflating the neck laterally, raising the anterior part of the body, thrashing its tail on the ground, striking towards the potential predator, and cloacal discharge (Rossman and Williams 1966. Proc. Louisiana Acad. Sci. 29:152–156; Cunha and Nascimento 1978. Offdios da Amazonia X - As cobras da região leste do Pará. Publ. Avul. Mus. Par. Emilio Goeldi 31:1–218; Sazima and Haddad 1992. *In* Morellato [ed.], História Natural da Serra do Japi: Ecologia e Preservação de uma Área Florestal no Sudeste do Brasil, pp. 212–261. Ed. Campinas, Unicamp/FAPESP; Marques and Sazima 2004. *In* Marques and Duleba [eds.], Estacão Juréia-Itatins: Ambiente Físico, Flora e Fauna, pp. 257–277. Holos, Ribeirão Preto). Rossman and Williams (*op. cit.*) call attention to throat inflating, but no mention is made of sound production. Here we present a field observation of *S. pullatus* emitting sound during its varied defensive display.

Our observation was made in the private reserve Projeto Dacnis in Ubatuba (23.463550°S, 45.130833°W, WGS 84; 31 m elev.), southeastern Brazil, on 15 April 2015 at 0730 h. A female *S. pullatus* (total length =185 cm) was found on the ground at the edge of a lowland Atlantic Forest trail. As we approached, she displayed a varied and escalating defensive repertoire. First, she thrashed her tail against forest litter, which produced a characteristic sound. Then she raised the anterior 30% of her body and inflated her throat, drawing air into her lungs and emitting a short hiss as she exhaled, mouth half open (Fig. 1). Additionally, she charged toward us several times. The hissing sound was recorded and later analyzed with the aid of a rough sonogram (Fig. 2). The frequency range of the hissing sound is about 1,000–9,500 Hz and the fundamental frequency is at about 500 Hz.

FIG. 1. Female *Spilotes pullatus* emitting a defensive hissing sound with half-open mouth.

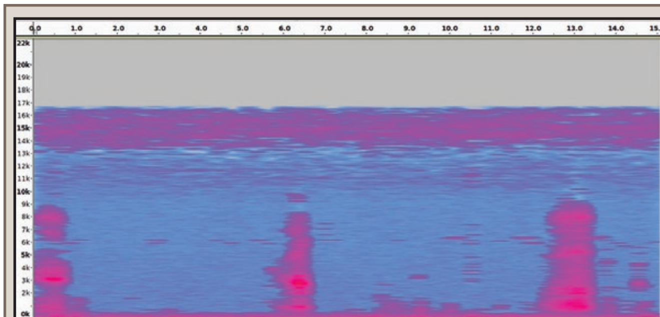

FIG. 2. Sonogram of three hisses in sequence. Vertical scale indicates frequency in KHz, horizontal scale indicates time (sec). Note that highest frequency of hiss is about 10 KHz.

To the best of our knowledge, this is the first published record of *S. pullatus* emitting a hissing sound in defense. The half-open mouth is very characteristic and seemingly not recorded for this snake previously. The frequency range and the fundamental frequency of the hissing produced by *S. pullatus* are comparable to the hissing sounds produced by the large temperate colubrid *Pituophis melanoleucus* (Pinesnake; Young et al. 1995. J. Exp. Zool. 273:472–481).

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***STEGONOTUS BATJANENSIS* (Northern Moluccan Ground Snake). DIET.** *Stegonotus batjanensis* is a nocturnal colubrid inhabiting the Moluccas of eastern Indonesia, where it is known from islands in the vicinity of Halmahera and Ambon. Very little is known of its ecology (de Lang 2013. The Snakes of the Moluccas [Maluku], Indonesia. Edition Chimaira, Frankfurt am Main. 417

Fig. 1. *Stegonotus batjanensis* consuming a reptile egg.

pp.). Lizards are the only reported prey item (Setiadi and Hamidi 2006. Jenis-jenis Herpetofauna di pulau Halmahera. Depok and Museum Zoologicum Bogoriense, Cibinong. 41 pp.). Herein we report an additional diet item, reptile eggs.

On the night of 27 January 2014, near the village of Gita, Halmahera (0.398518°N, 127.62330°E, WGS84; 7 m elev.), while walking on a small trail bordering mixed plantation, secondary rainforest, and mangrove habitats, we surprised a *S. batjanensis* in the act of consuming an egg. The snake (total length = 60 cm) was on the ground in rainforest, and the egg in its mouth was ovoid (length ca. 3.0 cm) and reptilian, as indicated by its leathery whitish shell. Although the snake reacted to our presence by moving a small distance away, it successfully completed its consumption of the egg. No other eggs were obvious in the vicinity.

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THAMNOPHIS ELEGANS VAGRANS **(Wandering Gartersnake). PREDATION.** The avian predators of *Thamnophis elegans vagrans* are well documented (Rossman et al. 1996. The Garter Snakes: Evolution and Ecology. University of Oklahoma Press, Norman. 332 pp.; Sparkman et al. 2013. Am. Midl. Nat. 170:66–85) but do not include *Meleagris gallopavo* (Wild Turkey). The range of *M. gallopavo* extends across the eastern U.S. to the Great Plains and into the southwest, with introduced populations now established in most western states, including Nevada (Floyd et al. 2007. Atlas of Breeding Birds of Nevada. University of Nevada Press, Reno, Nevada. 531 pp.). *Meleagris gallopavo* is large (up to 7.4 kg) and omnivorous, feeding mainly on plant material and invertebrates, but it may also take small vertebrates, including reptiles and amphibians (Dickson 1992. The Wild Turkey: Biology and Management. Stackpole Books, Mechanicsburg, Pennsylvania. 463 pp.). At 0715 h on 6 September 2012, an adult *M. gallopavo* was observed with a small snake in its mouth near the main entrance of Great Basin National Park, White Pine Co., Nevada, USA (39.010224°N, 114.207557°W; WGS84; 2005 m elev.). When the bird was approached, it dropped the snake, which was found dead and identified as *T. e. vagrans* (total length ca. 50.0 cm; Fig. 1). To the best of our knowledge, this is the first report of *T. e. vagrans* predation by *M. gallopavo*.

Fig. 1. *Thamnophis elegans vagrans* mortality from Great Basin National Park, Nevada, USA. Mortality caused by *Meleagris gallopavo* (Wild Turkey).

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THRASOPS JACKSONII **(Black Tree Snake). PREDATION.** Nonhuman primates are generally thought to be averse to snakes. Some prosimians, New and Old World monkeys, and apes have been reported to approach and confront snakes, emit alarm and/or fear vocalizations, avoid them, behave aggressively toward them, or ignore them (Mineka and Cook 1988. *In* Zentall and Galef [eds.], Social Learning, pp. 51–73. Erlbaum, Hillsdale, New Jersey; Murphy et al. 2014. Herpetol. Rev. 45:723–728). However, tarsiers (Gursky 2002. Fol. Primat. 73:60–62), Capuchin Monkeys (Boinski 1988. Am. J. Primat. 14:177–179), and Golden Lion Tamarins (Kleiman et al. 1986. *In* Benirschke [ed.], Primates: The Road to Self-Sustaining Populations, pp. 959–979. Springer-Verlag, New York) have been reported to eat snakes. Remains of a shed skin of a venomous snake have been found in chimpanzee feces (McGrew et al. 1978. Carnivore 1:41–45), but the chimpanzee may have just eaten the skin without contact with the live snake. Indeed, McGrew states that there are no reports of chimpanzees eating reptiles (McGrew 2015. Afr. Prim. 10:41–52), and we cannot find a report of any ape eating a snake.

On 3 December 2007, we trekked *Pan troglodytes schweinfurthii* (Eastern Chimpanzees) in the Cyamudongo bloc of the Nyungwe National Park, Rwanda. The chimpanzees were being habituated for ecotourism. We began our walk at 0615 h, heard loud chimpanzee vocalizations at about 0700 h, and made visual contact with an adult male and an adult or subadult female chimpanzee at about 0715 h. They were feeding in a *Ficus aycomorous* tree (location: 2.5511833°S, 28.9967167°E; WGS 84). We could hear other chimpanzees in the area; the group was reported to have 28 members.

We stopped approximately 15 m from the base of the tree in which the apes were feeding; none of the tree's branches extended out to the point where we stood. At our feet were the remains of a 1–1.5 m long *Thrasops jacksonii* (Fig. 1), which is non-venomous and preys primarily on chameleons (E. Fischer, pers. comm.). The anterior third of the snake appeared intact (although we could not see its head), but the skin and almost all of the flesh had been removed from the posterior two-thirds of the snake (Fig. 1). The spine and ribs of the snake appeared intact and "picked clean." There were no flies on the snake's body and there was no odor when we first saw the snake; flies began to aggregate on the body within 15 min, and a strong smell of decay was evident within 30 min.

The guide suggested that the chimpanzee(s) had killed and eaten the snake just before we arrived. We will never know but

PHOTO BY BENJAMIN BECK

Fig. 1. Remains of a *Thrasops jacksonii* that is inferred to have been killed and partially consumed by a *Pan troglodytes* (Chimpanzee) in the Cyamudongo bloc of Nyungwe National Park, Rwanda.

this explanation is highly plausible. First, the vocalizations we heard as we approached are characteristic of a chimpanzee predation event, although they can also be heard from aroused chimpanzees in other situations. Second, the lack of odor and flies suggests that the snake had been killed recently and chimpanzees were in the immediate area. Third, it is doubtful that a carnivore would have so cleanly eaten the flesh from the bones, and a raptorial bird would probably have flown off with the snake and consumed it from an elevated perch.

We recognize that the evidence for this chimpanzee predation event is circumstantial, but chimpanzee predation on a snake would be highly significant. As noted above, we can find no reports of wild or captive apes killing and eating a snake. Because this chimpanzee group lives in a small (6 km^{2}) isolated forest remnant, they may suffer nutritional deficiencies and thus be willing to take a risk to acquire meat. The snake's body was intact, but chimpanzees usually tear apart vertebrate prey and share pieces with other members of the group. This would suggest that only one individual may have learned to kill and eat snakes and could be the starting point for a group-specific behavior or tradition.

Oreste Ndayisaba was our guide on the day of these observations. Eberhard Fischer of Koblenz University identified the snake from a photograph. Gordon Burghardt and James Murphy reviewed the manuscript. We were affiliated with the Great Ape Trust in Des Moines, Iowa when these observations were made.

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***TRIMERESURUS FUCATUS* (*POPEIA FUCATA*) (Siamese Peninsula Pit Viper). DIET.** *Trimeresurus fucatus* is a relatively small (to 868 mm total length) arboreal pit viper that occurs in mid-hills to montane forests and is distributed through Myanmar, Thailand, and Peninsular Malaysia (Das 2012. A Naturalist's Guide to the Snakes of Southeast Asia. John Beaufoy Publishing, Oxford, England. 160 pp.). The natural history of *T. fucatus* is not well-studied, and the diet is thought to consist of small mammals and birds (Chan-ard et al. 2015. A Field Guide to the Reptiles of Thailand. Oxford University Press, New York. 314 pp.), although no specific information is available on diet.

On 3 December 2015 at 2130 h on Jalan Air Terjun (Air Terjun Road), Fraser's Hill, Pahang, West Malaysia (3.7203°N, 101.7246°E, WGS84; 1084 m elev.), an adult female *T. fucatus* (SVL ca. 600 mm) was observed on the paved road ingesting another snake

PHOTO BY A. DEVAN-SONG

Fig. 1. *Trimeresurus fucatus* consuming a *Rhabdophis chrysargos*, with ventral scales of the prey visible.

PHOTO BY M. LOW

Fig. 2. Regurgitated *Rhabdophis chrysargos* carcass.

(Fig. 1). The prey was swallowed head first, with only its tail visible (Fig. 1). Upon removal to vegetation adjacent to the road, the *T. fucatus* proceeded to regurgitate the prey item, allowing positive identification as a *Rhabdophis chrysargos* (Speckle-bellied Keelback; Natricidae, SVL ca. 400 mm; Fig. 2). The dead *R. chrysargos* had sustained tissue damage on the dorsum, presumably from the *T. fucatus* bite. To our knowledge, this note represents the first report of ophiophagy observed in *T. fucatus*.

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***TRIMERESURUS INSULARIS* (White-lipped Island Pit Viper). FORAGING BEHAVIOR AND DIET.** *Trimeresurus insularis* is a small to medium-sized pit viper native to Indonesia. It is a crepuscular and nocturnal hunter with a reported diet of frogs, lizards, small birds, and mammals (Ruud de Lang 2011.The Snakes of the Lesser Sunda Islands. Andreas S. Brahm, Frankfurt, Germany. 359 pp). Typical foraging behavior observed over four years of field work in the region by SBR and JAM includes perching along stream banks, poised to strike towards the water's edge in areas populated with aquatic anurans; perching in vegetation immediately adjacent to limestone rock walls and tree buttresses with their heads oriented towards the wall faces in areas with climbing lizards; perching near to the ground suspended from vegetation; and actively hunting 5–15 m off of the ground in the canopy. In this note we report a novel prey item.

On 20 July 2013, at 2255 h, an adult *T. insularis* (SVL = 43.5 cm, tail length = 12.5 cm, 46.18 g) was captured in the forest surrounding Ilwaki, Wetar Selaten, Maluku Barat Daya, Provinsi Maluku, Indonesia (07.92481°S, 126.40734°E; WGS84). The individual was found ca. 30 cm above the ground, coiled in vegetation. During preparation of the specimen, we noticed a substantial bolus that proved to be a decomposing and rancid-smelling *Cylindrophis boulengeri* (Boulenger's Pipe Snake). This represents the first documented account of a *T. insularis* feeding on a snake. This observation is also of particular note because *C. boulengeri* is a fossorial snake that occurs only on the islands of Wetar, Babar, and Timor. The species is relatively uncommon, with only 10 specimens known prior to our expedition (four additional specimens were collected by our team).

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***XENOCHROPHIS FLAVIPUNCTATUS* (Yellow-spotted Keelback Watersnake). DIET.** *Xenochrophis flavipunctatus* is a semiaquatic snake that is distributed in Southern China, Taiwan and the Indochinese Peninsula (Vogel and David 2012. Zootaxa 3473:1–60). A nocturnal species, *X. flavipunctatus* is known to prey on fish and frogs (Das 2013. A Naturalist's Guide to the Snakes of Southeast Asia. John Beaufoy Publishing, Oxford, UK. 127 pp.). Here, we report observations of *X. flavipunctatus* predation on aquatic eggs of *Microhyla heymonsi* and arboreal eggs of *Chiromantis hansenae*. To our knowledge, this is the first report of a *Xenochrophis* species or any other old-world Natricine snake consuming frog eggs. Furthermore, this is also the first report of *Microhyla* and *Chiromantis* eggs being preyed upon by a snake.

Field observations were conducted in seasonal ponds at the Sakaerat Environmental Research Station in northeastern Thailand (14.5°N, 101.916°E; WGS84) in 2012 and 2014. On 12 July 2012, a *X. flavipunctatus* was observed consuming a *M. heymonsi* egg mass starting at 0550 h and lasting approximately 5 min. Less than a quarter of the egg mass was consumed before the individual moved away, possibly due to presence of the observer. *Microhyla heymonsi* is an aquatic-breeding chorus frog found in East and Southeast Asia (Baker and Lim 2008. Wild Animals of Singapore. Draco & Nature Society, Singapore. 66 pp.). Eggs of *M. heymonsi* are laid in a clutch that is spread out as a single layer of film on the pond surface and are often anchored by emergent vegetation.

On 16 September 2012, two separate events of *X. flavipunctatus* predation of *C. hansenae* egg masses were recorded at 0033 and 0435 h using time-lapse cameras (Brinno GardenWatchCam, photographs taken at 10-sec intervals). On 7 October 2014, a third predation event of *C. hansenae* eggs was observed directly at 2315 h. *Chiromantis hansenae* is an arboreal-breeding treefrog found in Thailand and parts of Cambodia (Taylor 1962. Univ. Kansas Sci. Bull. 43:267–599; Aowphol et al. 2013. Zootaxa 3702:101–123). Eggs of *C. hansenae* are deposited in a hemispherical gelatinous mass attached to vegetation or other substrates overhanging water and female frogs provide parental care in the form of egg attendance (Poo and Bickford 2013. Ethology 119:671–679). In all three observations, *C. hansenae* egg masses were attached to grass blades and were positioned 15–30 cm above pond surface. Female *C. hansenae* adults were either away from egg masses (one case in 2012) or left immediately (two other cases) when *X. flavipunctatus* individuals approached. *Xenochrophis flavipunctatus* approached *C. hansenae* egg masses by balancing on emergent grass blades or extending their body from the water, and egg masses were consumed as a whole. After predation events occurred, *X. flavipunctatus* remained around the vicinity for approximately 10 min before moving away.

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