NATURE NOTES

Amphibia: Anura

***Incilius luetkenii*, *Smilisca sordida*, and *Lithobates forreri*. Predation by birds**. Predation on adult anurans by tropical birds has been recorded on numerous occasions, where birds of various families (e.g., Accipitridae, Striigidae, Momotidae, Turdidae) have preyed on anurans of different families (e.g., Centrolenidae, Dendrobatidae, Hylidae, Leptodactylidae, Rhinophrynidae; Hayes, 1983; Master 1999; Toledo et al., 2007; Acosta and Morún, 2014; Ramírez-Fernández and Solís-DelValle, 2014). The majority of these events are opportunistic and associated with diet-generalist or invertebrate- and vertebrate-predator bird species (Toledo et al., 2007; Amézquita et al., 2013; Paluh et al., 2015). Here, we present information on the predation of *Incilius luetkenii* (Bufonidae), *Smilisca sordida* (Hylidae), and *Lithobates forreri* (Ranidae) by birds in Costa Rica.

On 26 May 2013, at Área de Conservación Guanacaste, Sector Santa Rosa, Provincia de Guanacaste, Costa Rica (10°50'N, 85°37'W; WGS 84; elev. 298 m), we observed a Roadside Hawk (*Buteo* [*Rupornis*] *magnirostris*) feeding on an individual of *Incilius luetkenii*. The hawk was standing on the ground pecking and eating a dead *I. luetkenii* along the edge of gravel road in Tropical Dry Forest, but once it was startled flew across the road without the toad and perched on a tree approximately 5 m from the ground. We cannot determine if the hawk captured the toad or found it dead (the toad remains appeared fresh), but either of these behaviors was likely because the previous evening breeding aggregations involving *I. luetkenii* had occurred in the area. Although frogs and toads are important dietary items for this hawk (Haverschmidt, 1972; Beltzer, 1990), this observation is the first to report *I. luetkenii* in the diet of *B. magnirostris*. We failed to find published reports of *I. luetkenii* as prey for other bird species, but its explosive breeding behavior could make this toad easy prey for diet-generalist bird species (Toledo et al., 2007) throughout its distribution, which extends from southern Mexico to Costa Rica and primarily in dry forest and open areas (Savage, 2002).

On 30 August 2014, at Reserva Biológica La Tirimbina, Provincia de Heredia, Costa Rica (10°25'N, 84°07'W; WGS 84; elev. 150 m), we observed a female Fasciated Antshrike (*Cymbilaimus lineatus*) feeding on a *Smilisca sordida* (Fig. 1). The antshrike pecked at the treefrog, which was perched on a leaf of a terrestrial bromeliad until it fell to the ground; the bird then continued pecking at the frog until it stopped moving. At that point the antshrike ripped off and ate the limbs of the frog, starting with the legs, and swallowed the limbless body using two lateral head movements. The diet of *C. lineatus* consists primarily of arthropods, but also includes vertebrates such as lizards and small frogs (Zimmer and Isler, 2003). To our knowledge, this is the first report of *S. sordida* in the diet of this

Fig. 1. A female Fasciated Antshrike (*Cymbilaimus lineatus*) feeding on a *Smilisca sordida* (note the white vocal sacs) at Reserva Biológica La Tirimbina, Provincia de Heredia, Costa Rica. © Emmanuel Rojas

species. *Smilisca sordida* is an abundant treefrog found at low and moderate elevations extending from northeastern Honduras to west-central Panama; previously this species was reported in the diet of an owl (Acosta-Chaves and Granados, 2015).

On 19 May 2011, we observed a Great Kiskadee (*Pitangus sulfuratus*) feeding on an individual of *Lithobates forreri* at Monteverde, Provincia de Puntarenas, Costa Rica (10°18'N 84°48'W; WGS 84; elev. 1,470 m). The kiskadee hovered along the edge of a small lagoon and captured the frog from the water, and perched on a nearby tree. It then beat the frog onto a branch, and pressed it continuously with its beak before swallowing it while using several lateral head movements. The diet of the Great Kiskadee consists mostly of arthropods and fruits, but also includes vertebrates such as fishes, frogs, lizards, snakes, and nestling birds (Fitzpatrick, 2004). To the best of our knowledge, this is the first report of *L. forreri* in the diet of *P. sulfuratus*. We failed to find published reports of *L. forreri* in the diet of other bird species, although this could be likely (e.g., in egrets or herons) owing to the abundance of this ranid at low and mid elevations on the Pacific versant from southern Sonora, Mexico, to northwestern Costa Rica (Savage, 2002).

These three observations on the predation of common anurans by birds are indicative of the lack of available natural history information for many species (Acosta and Morún, 2014). Identifying which species prey on amphibians and under what circumstances provides baseline information for our understanding of ecological interactions within ecosystems (Sandoval et al., 2008), and thus we encourage the publication of these types of observations.

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Amphibia: Caudata

***Ambystoma rosaceum*. Antipredator posture.** The Tarahumara Salamander, *Ambystoma rosaceum*, is a medium-sized species known to reach a snout–vent length of 85 mm and a total length of 157 mm. This salamander is endemic to Mexico, where it inhabits pine, pine-oak and fir forests, as well as grassland in the Sierra Madre Occidental, at elevations from 1,000 to 3,110 m; its distribution extends from northeastern Sonora to western Aguascalientes, including Chihuahua, Durango, Jalisco, Nayarit, Sinaloan and Zacatecas (Lemos-Espinal et al., 2013; Carbajal-Márquez et al., 2015). This species is listed as Least Concern (LC) by the IUCN (Shaffer et al., 2008), and as under special protection (Pr) by Norma Oficial Mexicana (NOM-059-SEMARNAT-2010; Diario Oficial de la Federación, 2010).

Adult terrestrial members of the Ambystomatidae come into contact with numerous predators, and in response to these pressures certain species have developed elaborate antipredator mechanisms. Brodie (1977) noted that several members of *Ambystoma* have developed a granular gland distribution similar to that found in the Old World genus *Salamandra*, in which some species exhibit defensive postures associated with their glandular distributions. Further, he indicated that paratoid glands are present in *A. gracile*, *A. maculatum*, and *A. talpoideum*, and that these species exhibit a head-down defensive posture similar to that seen in *Salamandra*. Although paratoid glands are present in *A. rosaceum* (Anderson, 1961), the defensive posture of *A. rosaceum* has not been described (Brodie, 1977).

On 18 June 2014, we found a single inactive individual of *A. rosaceum* beneath a rock in a rocky outcrop surrounded by patches of oak forest and grassland at Mesa Montoro, Municipio San José de Gracia, Aguascalientes, Mexico (22.00211°N, 102.57049°W; WGS84; elev. 2,405 m). When one of us (RACM) flipped the rock, the salamander responded to the contact by elevating the rear portion of its body with the hind limbs, arching the tail to almost form a coil, and then lashed the tail forcibly toward the stimulus. Subsequently, we positioned the individual to take photographs, and when we touched the head it exhibited a head-down defensive posture, as described by Brodie (1977), but without emitting a glandular secretion from the paratoids (Fig. 1). This note, therefore, represents the first description of the antipredator posture in *A. rosaceum*.

Fig. 1. Antipredator posture shown by *Ambystoma rosaceum* at Mesa Montoro, Municipio San José de Gracia, Aguascalientes, Mexico. © Carolina Chávez-Floriano

Acknowledgments.—Bradford Hollingsworth verified the identification of the specimen, and voucher photographs were deposited in the San Diego Natural History Museum (SDSNH_HerpPC_05256; SDSNH_HerpPC_05257). We collected the specimen under permit SEMARNAT- SGPA/DGVS/05143/14.

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Reptilia: Squamata (lizards)

Abronia deppii. **Reproduction.** *Abronia deppii* is an arboreal anguid that inhabits oak and pine-oak forests in central Mexico, at elevations from ca. 1,850 to 2,600 m (Flores-Villela and Sánchez-H., 2003). This lizard is known only from mountain ranges north of the Balsas Basin, with records from eastern Michoacán, Morelos, México, and northern Guerrero (Flores-Villela and Sánchez-H., 2003; Centenero-Alcalá et al., 2009). The biology of most members of this genus remains poorly documented, and here we report an incident of captive breeding and the clutch size in this species, along with a description of the neonates.

On 5 September 2012 and 5 July 2014, respectively, an adult male and an adult female of *A. deppii* were collected at an elevation of 2,540 m in oak forest, in the vicinity of Huitzilac, Municipio de Huitzilac, Morelos (19.03°N, -99.27°W; WGS 84). The animals were maintained separately in indoor enclosures in México D.F., until 14 August 2014, when at ca. 1600 h the female was introduced into the male's terrarium. Within 10 min the male approached the female and initiated copulation, and the lizards copulated for about 18 h. Subsequently, the female was maintained indoors in a 90 × 75 × 45 cm terrarium furnished with epiphytes and leaf litter, and was fed on a diet of crickets, mealworms, and grasshoppers. On sunny days, the female basked in sunlight when it reached her terrarium. At 1400 h on 28 February 2015, 198 days post-copulation, the female gave birth to her first neonate; two additional neonates (one stillborn) were born about 1 h later. The female then was moved to a smaller terrarium for closer observation. The following day, 1 March 2015, three more neonates (two stillborn) were found in the smaller

terrarium. All six neonates were weighed and measured within one week after birth: 0.7–1.0 (0.82) g; 32.8–35.6 (34.23) mm snout–vent length; and 66.2–70.3 (67.96) mm total length. The color pattern showed little variation among the six neonates. The dorsal surface of the head was silvery gray, with fine black speckling and narrow dark edges present on the otherwise pale scales. The lower temporal scales, rear supralabial scales, dorsal surface of the body, and tail were silvery white. Six black, sometimes indistinct, strongly V-shaped dorsal bands were present between the nape and the vent, of which many were interrupted at the body midline. The tail was patterned with 10–11 black bands, and each limb with 3–4 dark gray bands. The venter was dirty white. The three stillborn neonates were deposited at the Museo de Zoologia "Alfonso L. Herrera," Facultad de Ciencias, Universidad Nacional Autónoma de México, México, D. F., Mexico (MZFC 29069–29071).

Clutch sizes of 1–18 have been reported for 11 *Abronia* species: *A. aurita*, 12 (Campbell and Frost, 1993); *A. campbelli*, 4–12 (Brodie and Savage, 1993); *A. fimbriata*, four (Campbell and Frost, 1993); *A. graminea*, 2–12 (Werler, 1951; Langner, 2007); *A. lythrochila*, 1–18 (Smith and Álvarez del Toro, 1962; Álvarez del Toro 1972, 1982; Langner, 2014); *A. martindelcampoi*, 2–6 (Flores-Villela and Sánchez-H., 2003); *A. meledona*, 12–16 (Campbell and Brodie, 1999); *A. mixteca*, seven (Schmidt-Ballardo and Mendoza-Quijano, 1999); *A. oaxacae*, one (Smith and Williams, 1963); *A. smithi*, 3–4 (Álvarez del Toro, 1972); and *A. taeniata*, 4–10 (Martin, 1955; Solano-Zavaleta et al., 2007, Dixon and Lemos-Espinal, 2010). Thus, the clutch size for the female *A. deppii* reported herein is not unusual. The pattern dimorphism between the crisply marked, banded *A. deppii* neonates (Figs. 1A, B) and the more unicolored adult parents (Figs. 1C, D) is mirrored in the closely related *A. aurita*, *A. graminea*, and *A. mixteca* (op. cit.) Our observations also agree with all the available data that *Abronia* are livebearers, breed in the summer/fall, and give birth in the spring (Campbell and Frost, 1993; Wagner, 2010). More than one-half of the 28 described species of *Abronia*, however, lack any published data on their reproductive biology. We encourage the hobbyist and zoo communities to become more active in publishing details of captive reproduction, neonate coloration, and behavior in this enigmatic group.

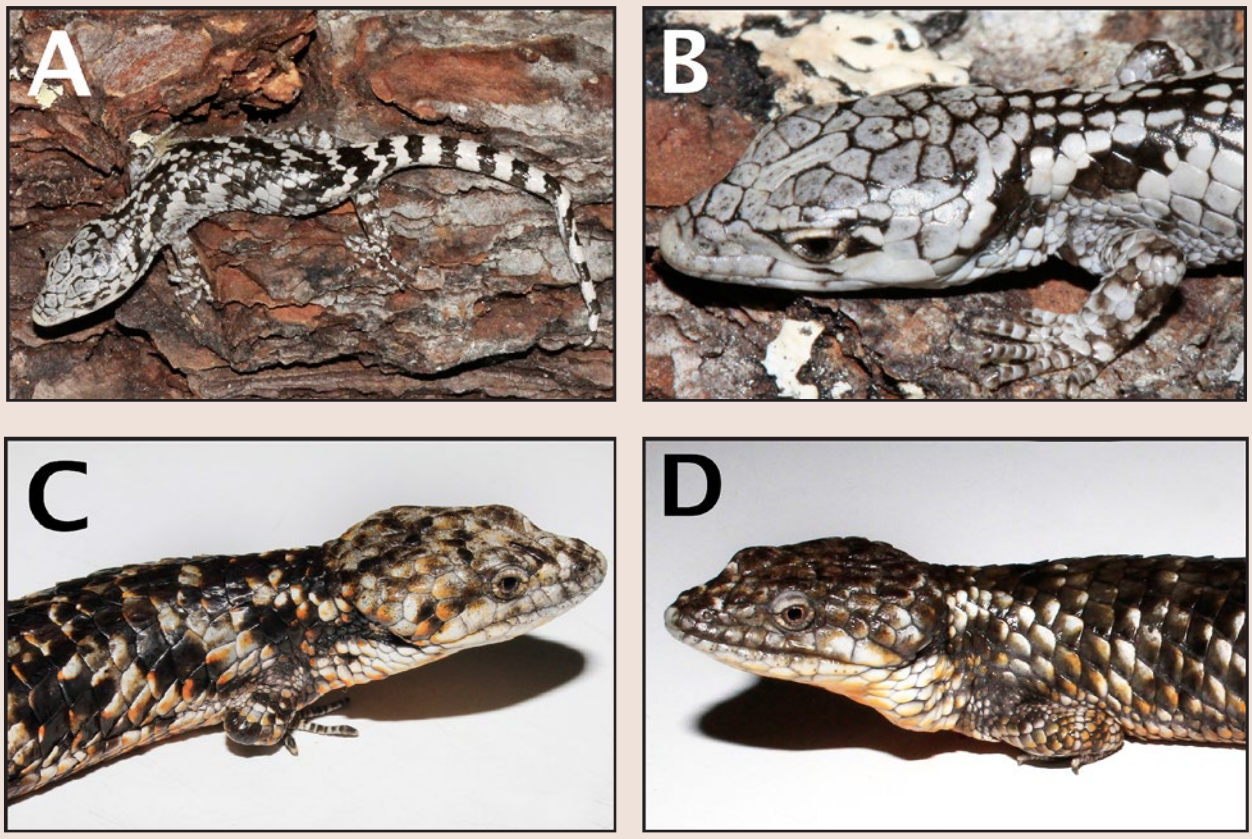

Fig. 1. Dorsal habitus (A), and close-up (B) of different live *A. deppii* neonates, along with female (C) and male (D) parents. © Israel Solano-Zavaleta.

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***Gonatodes albogularis*. Communal egg laying.** The genus *Gonatodes*, in the family Sphaerodactylidae, is composed of 31 species of mostly diurnal and scansorial geckos with a wide distribution in the Neotropics (Uetz and Hošek, 2015). The distribution of *G. albogularis* extends from southern Mexico to northern South America, including adjacent islands, and also in Cuba, Hispaniola, Jamaica, and the Cayman Islands (Schwartz and Henderson, 1991; Savage, 2002); based on human activities, this species was introduced in Florida, United States (for an overview, see Meshaka, 2004), and presumably was introduced in Belize (Lee, 2000); Forrero-Medina et al. (2006) also indicated *G. albogularis* as a recent arrival to the San Andrés, Providencia, and Santa Catalina archipelago.

Gonatodes albogularis is an inhabitant of primary humid or dry lowland forests, but also occurs in disturbed areas (Savage, 2002). Fitch (1973) reported colonies of 10–40 individuals in large trees, especially *Ficus*, and noted that adult males are territorial and maintain their spacing by using aggressive displays that involve movements of the tail and jerky motions of the body. The coloration of the head in males is orange or red, the body is gray brown to black with blue lateral spots, the supralabials are white with conspicuous blue lines, and the tail tip is white; the coloration of females and juveniles is more cryptic (Fitch, 1973; Savage, 2002).

Reproductive activity in *G. albogularis* apparently is influenced by food availability (Savage, 2002). Females produce multiple clutches, each consisting of a single egg (Lee, 2000). During a 13-month study conducted at Ancón, Panama (in the Panama Canal Zone), Sexton and Turner (1971) determined the reproductive cycle of *G. albogularis* based on the number of eggs laid at communal nesting sites; they counted 238 eggs in 29 samples from seven sites. Since the publication of that study communal nesting behavior in *G. albogularis* has gone unreported, so the purpose of this note is to provide information on a communal nest found on the Atlantic versant of Costa Rica.

On 2 February 2014, at 1350 h, in lowland secondary forest in the Gandoca-Manzanillo National Wildlife Refuge, Cantón de Talamanca, Provincia de Limón, Costa Rica (9.6347°N, 82.6465°W; WGS84; elev. 40 m), I found a communal nest of *G. albogularis* located on the base of a large *Ficus* sp., in a mossy "pouch" (ca. 8 cm long and 5 cm wide) approximately 1 m above the ground (Fig. 1 A, B). I estimated the number of eggs in the nest at 15 (I did not obtain the exact number so as not to damage the nest), in addition to several empty eggshells. The color, size, and texture of the eggs were nearly identical. For three days I also observed several individuals (males, females) of *G. albogularis* in the vicinity of the nest.

Fig. 1. (A) Close-up of a communal nest with the eggs of *Gonatodes albogularis*, and (B) location at the base of the large *Ficus* sp. where the nest was found. © Daniel Jablonski

On the Atlantic slope of Costa Rica, where there is no marked dry season, females of *G. albogularis* produce eggs throughout the year but with some decrease in December and January, and lay them one at a time from alternate ovaries (Fitch, 1973; Savage, 2002). Vitt et al. (1997) reported communal nesting (or multi-maternal nesting

behavior) in another species in this genus, *G. humeralis*, after encountering more than 50 eggs of that species in a single nest, along with the eggs of four other lizard species. Oda (2004) reported lower numbers of eggs in communal nests of *G. humeralis* in different habitats. More than 800 eggs, however, have been found in communal nests of other lizard species (see Magnusson and Lima, 1984). Communal nesting has been reported in 255 lizard taxa, and is a much more common behavior than previously thought (for a review, see Doody et al., 2009). In principle, two hypotheses explaining communal nesting can be recognized (Radder and Shine, 2007; Doody et al., 2009), probably in various combinations depending on the different taxa. In the Gekkota, because females generally lay one or two eggs this behavior could provide an effective protection with suitable conditions (temperature, humidity) for their development. At any rate, it is important to report similar observations in all lizard species to develop a general understanding of the diversity this behavior among reptiles.

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***Thecadactylus rapicauda*. Preying on large insects.** The Northern Turnip-tailed Gecko (*Thecadactylus rapicauda*) is a widespread Neotropical species with a distribution extending from southern Mexico to South America north of the Amazon, and also includes the Lesser Antilles (Russell and Bauer, 2002; Bergmann and Russell, 2007). Long considered a monotypic species, in a systematic and biogeographic study using morphological, morphometric, and molecular data, Bergmann and Russell (2007) found robust support for a distinctive southwestern Amazonian clade and described it as a new species. Subsequently, Köhler and Vesely (2011) described another species of *Thecadactylus* from the Caribbean island of Saint Martin, based on its distinctive color pattern. Additional species might be found in other Caribbean islands (G. Rivas, pers. comm.).

Vitt and Zani (1997) provided a detailed study of *T. rapicauda* from eastern and western Amazonian sites, and reported the diet of individuals from the eastern site as consisting primarily of arthropods (orthopterans, beetles, and spiders), and those from the western site (which now likely constitutes *T. solimonensis*) as feeding mostly on cockroaches. These authors also reported *T. rapicauda* as consuming relatively large prey items (up to 42 mm). Herein we report three attempts by *T. rapicauda* at consuming large invertebrate prey.

On 13 March 2015, at 2050 h, we observed a subadult female *T. rapicauda* preying on a leaf mantis (*Choeradodis* sp.; Mantidae) at Playa Nicuesa Rainforest Lodge, Golfito, Provincia de Puntarenas, Costa Rica (8°38'9.51"N, 83°13'1.37"W; WGS84). Artificial lights at the lodge attracted the mantis, and the gecko captured the insect by the head with its mandibles and beat it against a wall several times to subdue it (Fig. 1A, B, C). After ca. 1 h, a larger male *T. rapicauda* curiously approached the female, and both lizards established visual communication and performed tail waving. The male *T. rapicauda* left the scene once the mantis stopped moving, and because of the close and non-violent encounter between the lizards the male appeared to be offering the female encouragement or support. Because the prey item was large (ca.73 mm), it took the female ca. 3 h to tear off the mantis' head. As the female gecko ingested the head, the body of the mantis fell to the ground; an American Cockroach (*Periplaneta americana*) then consumed the soft body parts of the carcass (Fig. 1D).

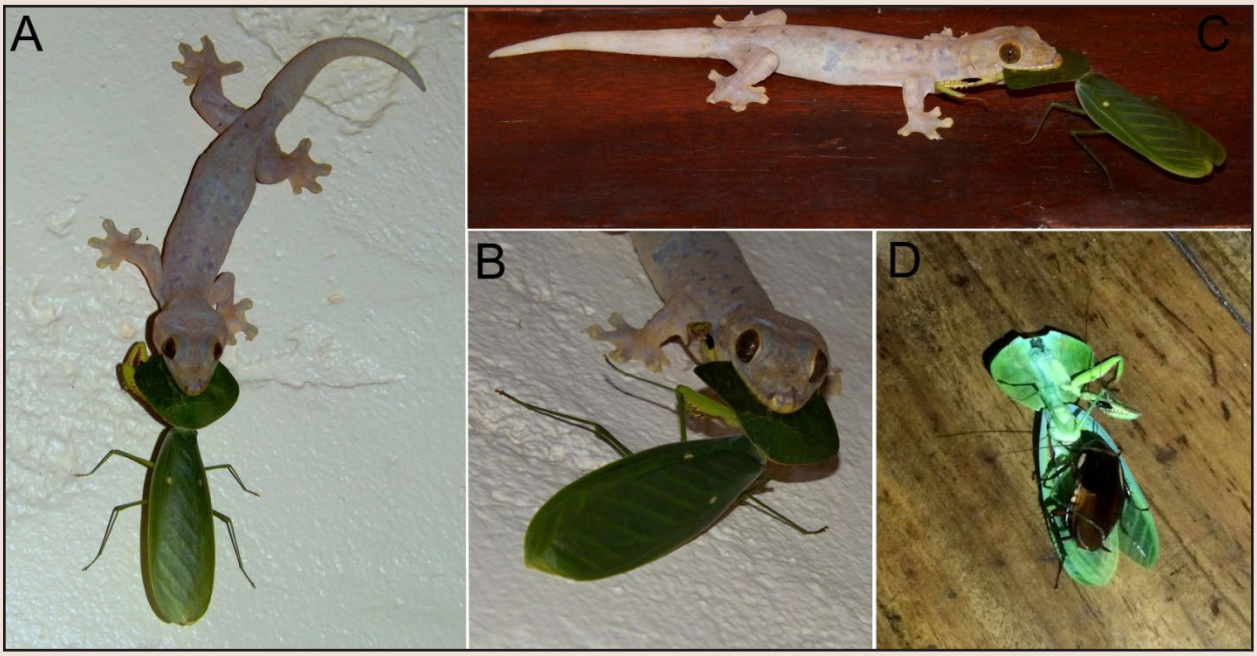

Fig.1. (A, B) A Northern Turnip-tailed Gecko (*Thecadactylus rapicauda*) attacks and subdues a leaf mantis (*Choeradodis* sp.), and (C) two hours after subduing its prey. (D) An American Cockroach (*Periplaneta americana*) later consumes the headless carcass of the mantis. © Víctor Acosta-Chaves (A, B, C) and Natalia Solís-Miranda (D)

Vitt and Zani (1997) reported a mantis (Mantidae) in the diet of *T. rapicauda* (the eastern Amazonian site), but did not identify the species. The unusual prey size and broad exoskeleton of the mantis reported herein likely caused the gecko to abandon the carcass. An alternative hypothesis might be that a large mantis is considered a risk or provides competition, and should be removed from the area, owing to the apparent anti-predatory or social behavior of tail waving shown by both geckos (Bohóquez-Alonso et al., 2010). A video clip of two Tokay Geckos (*Gecko gecko*) tail waving and helping one another fight off a predatory attempt by a colubrid snake (*Chrysopelea* sp.) suggests a similar behavior (YouTube, 2013).

On two other occasions, adults of *T. rapicauda* were observed foraging on moths attracted by artificial lights. On 24 February 2014, an adult female *T. rapicauda* grabbed a Fig Sphinx Moth (*Pachylia ficus*; Sphingidae) by the thorax at Esquinas Rainforest Lodge near La Gamba, Provincia de Puntarenas (8°42'3.55"N, 83°12'1.64"W; WGS84), at ca. 2200 h (Fig. 2A, B). On a second occasion, 25 January 2015, an apparent adult male *T. rapicauda* grabbed a hawk moth (*Manduca* sp.; Sphingidae) at the aforementioned Playa Nicuesa Rainforest Lodge, at ca. 2100 h (Fig. 2C). In both observations, the gecko struggled with the corresponding moth for nearly 1 h, as the prey item desperately flapped its wings and lost countless scales. In both events, the gecko began to swallow the oversized prey item and held the head and thorax in its mouth for about an additional hour. No remains of the moths were found the following day.

Fig. 2. (A, B) A Turnip-tailed Gecko (*Thecadactylus rapicauda*) preying on a Fig Sphinx Moth (*Pachylia. ficus*), and another individual preying on a Hawk Moth (*Manduca* sp.). © Cesar Barrio-Amorós (A, B) and Natalia Solís-Miranda (C)

The mantis in the first observation represented about 40% of the total length of the gecko, and the moths in the second and third observations represented about 45% of the total length. In conclusion, our observations document some of the largest prey items recorded for *T. rapicauda*; the observations also provide information on a little known aspect of this species' foraging behavior.

Acknowledgments.—We thank Rolando Ramírez Campos and Marcela Sánchez for identifying the mantis and moths, respectively, and the Playa Nicuesa Rainforest Lodge and Esquinas Rainforest Lodge (especially Catalina Torres) for use of their facilities, which allowed us to make the observations. We also thank Louis Porras for his valuable comments on this manuscript.

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Reptilia: Squamata (snakes)

***Bothrops asper*. Arboreal behavior.** *Bothrops asper* is a generalist snake species with a broad distribution that extends, on the Atlantic versant, from Tamaulipas, Mexico, southward through Central America and onto northern Colombia, northern Venezuela, and Trinidad, and on the Pacific versant in Chiapas, Mexico, and Guatemala, and from northwestern Costa Rica to northern Peru (Campbell and Lamar, 2004). Juveniles of *B. asper* tend to be more arboreal, but with growth become more terrestrial (Scott, 1983; Guyer and Donnely, 2005; Sasa et al., 2009). Campbell (1998) indicated that juveniles often climb up to the top of fallen logs or tangles of vines, and that occasionally he had encountered individuals ranging from small to about 2 m in length above the forest floor. Sasa et al. (2009) noted that subadult *B. asper* have been found resting on branches 1.3 m above the ground, and adults are highly terrestrial and sometimes found in tree roots or fallen logs at a height generally below 1 m (Fig. 1.). Mole and

Fig. 1. A young adult *Bothrops asper* in ambush posture shortly after midnight, coiled on the root of a large tree (*Ficus* sp.) at Sector San Cristóbal, Área de Conservación Guanacaste, Costa Rica. © Kristyn Dion

Ulrich (1894) reported that *B. asper* (as *B. atrox*) in Trinidad ascends small bushes ca. 5' (1.5 m) from the ground; Green (1997: 46) shows a photograph of an adult *B. asper* resting on the crotch of a tree, but the height was not provided; Sasa et al. (2009) reported finding a shed skin of an individual at a height of 2.1 m; in a study involving 13 individuals of *B. asper* at La Selva Biological Station, Costa Rica, Wasko and Sasa (2010) reported a maximum height of 2.1 m for a snake perched on the exposed roots of a fallen tree, but found no animals in trees or on tree branches; Baumgardner and Ray et al. (2011) reported finding an individual of *B. asper* in Panama at a height of 2 m in a cluster of understory trees; and McCranie (2011) noted that juveniles and adults of *B. asper* often are found on the ground, but also will climb vegetation to at least 3 m above the ground.

On 4 April 2013, at 2341 h, we observed a young adult female *B. asper* (1.32 m total length) in Tropical Rainforest at sector Quebrada González, Parque Nacional Braulio Carrillo, Provincia de Heredia, Costa Rica (10°09'21.5"N, 83°56'38.3"W; WGS84), elev. 485 m. The snake was moving along some branches in the understory of trees at a height of 2.32 m above the ground (Fig. 2). The individual crawled slowly through the trees, but stopped when trying to reach the branch of a nearby tree. At that point the snake became aware of our presence, and we captured it so it could be sexed and measured.

Figure 2 represents the first published photograph of *B. asper* moving along branches in the understory of trees. One possibility for this behavior is that the snake might have been searching for such prey as arboreal frogs, a part of the snake's diet (Sasa et al., 2009). Although adult *B. asper* mainly consume rodents, this species can change its diet when rodents are scarce, which was the case at La Selva Biological Station, Costa Rica, where the lack of rodents caused the snakes to use swamp habitat to exploit amphibians as a primary food source (Wasko and Sasa, 2010). Another possibility for the arboreal behavior shown by this individual, however, is that it might have been using the vegetation to disperse, as *B. asper* typically is an ambush predator (Solórzano, 2004; Sasa et al., 2009).

Fig. 2. A young adult female *Bothrops asper* moving along branches in the understory of trees next to a trail at Parque Nacional Braulio Carrillo, Provincia de Heredia, Costa Rica. © Allan Artavia León

Acknowledgments.—The authors thank Kristyn Dion for kindly allowing us to use her photograph of *Bothrops asper* in this note.

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Oxybelis fulgidus. **Diet.** The Green Vinesnake, *Oxybelis fulgidus*, is a widespread opistoglyphous colubrid with a distribution that ranges from southern Mexico and throughout much of Central America, and east of the Andes in South America to Bolivia and Argentina (Savage, 2002). This diurnal and mostly arboreal species generally is considered an ambush predator, but also is known to forage for prey (Henderson and Binder, 1980; Martins and Oliveira, 1998). Its diet consists primarily of lizards and birds, but also includes frogs and small mammals (Henderson and Binder, 1980; Campbell, 1998).

Compared to other species in its genus, the increased head and body size of *O. fulgidus* can accommodate larger prey items (Henderson and Binder, 1980). Thus, this species has been reported to consume several species of small to moderate-sized birds, including *Dendrocincla homochroa* (Furnaiidae), *Elaenia* sp. (Tyraniidae), *Monassa nigrifrons* (Bucconidae), *Pipra* sp., (Pipridae), and *Thraupis episcopus* and *Volatinia* sp. (Thraupidae) (Martins and Oliveira, 1998; Leenders and Watkins-Colwell, 2003; Rodrigues et al., 2005; Endo et al., 2007).

On 21 April 2015, at ca. 0830 h, a worker at Mawamba Lodge, Tortuguero, Cantón Pococí, Provincia de Limón, Costa Rica (10°32'45N", -83°30'16";W; WGS 84) found an individual of *O. fulgidus*, ca. 1.75 m in total length, about 5 m above the ground in a palm tree and starting to consume a Clay-colored Thrush (*Turdus grayi*; Turdidae) it had subdued. One of us (FS) photographed the event, and continued observing the ingestion process for about 15 min. This note represents the first time that *T. grayi* has been reported in the diet of *O. fulgidus.*

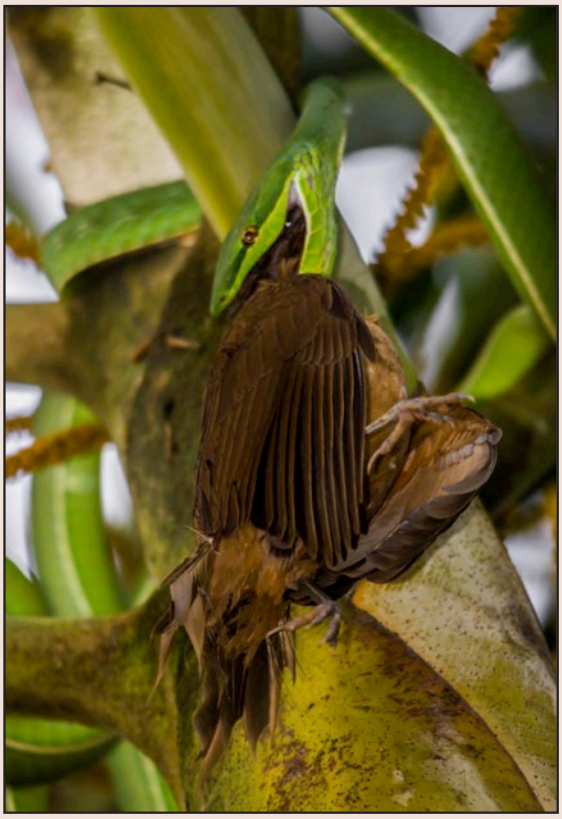

Fig. 1. An adult *Oxybelis fulgidus* starting to consume a *Turdus grayi* in the gardens of Mawamba Lodge, Tortuguero, Cantón Pococí, Provincia de Limón, Costa Rica.

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***Tantilla armillata*. Predation by a Central American Bark Scorpion (*Centruroides edwardsii*)**. Snakes of genus *Tantilla* (Colubridae) are known to prey on arthropods such as centipedes and millipedes; however, scant information is available on the natural history of most species, such as other prey items consumed and their predators, primarily because of their secretive semi-fossorial habits (Solórzano, 2004; Wilson and Mata-Silva, 2014). The Black-necked Crowned Snake (*Tantilla armillata*) is a relatively uncommon species with a distribution extending from Guatemala to northwestern and central Costa Rica at elevations from near sea level to 1,435 m. (Savage, 2002; Solórzano, 2004; McCranie, 2011); the distribution of this species, however, perhaps extends into western Panama (see Knight et al., 2012). In this note, we present a previously unreported predation event in nature on *T. armillata* by a widespread species of scorpion in the Costa Rican dry forest.

On 9 December 2014, at 2246 h, one of us (DV) found an adult Central American Bark Scorpion (*Centruroides edwardsii* [Scorpiones: Buthidae]) ingesting a small snake. The scorpion had consumed a significant portion of snake's body, starting with the head, but the identification of the snake was possible because of the location where it was found, its size, and a dark brown dorsal coloration consisting of lateral yellow stripes (Savage, 2002; Solórzano, 2004) (Fig.1). The observation occurred at the Organization for Tropical Studies Station, located in Parque Nacional Palo Verde, Cantón de Bagaces, Provincia de Guanacaste, Costa Rica (10°20'41.51"N, 85°20'20.05"W; WGS84).

Centruroides edwardsii is a member of the *C. margaritatus* "complex," for which reported prey items consist of insects such as crickets and cockroaches (Velázquez-Ramos, 2005); to the best of our knowledge, this is the first snake documented as a prey item for *C. edwardsii* in Costa Rica. Also, a predatory event in nature involving *C.*

edwardsii and *T. armillata* has not been reported in the literature. Interestingly, snakes of the tribe Sonorini (composed of about a dozen genera of small North American colubrine snakes), including the Northern Scorpion-eater (*Stenorrhina freminvillei*) and some members of *Tantilla*, often prey on species of *Centruroides* (Solórzano and Greene, 2012; Wilson and Mata-Silva, 2014). Solórzano and Greene (2012) found relatively small scorpions in the stomach contents of *S. freminvillei*, which suggests that preying on adult scorpions might be a risky proposition for a small snake. More field observations and detailed studies are necessary, however, to improve our understanding of predator-prey interactions between scorpions and sonorine snakes.

Acknowledgments.—We thank to Sergio Padilla, Stuart Longhorn, Alejandro Solórzano, Mahmood Sasa, and Louis Porras for their suggestions and comments, which helped improve this note.

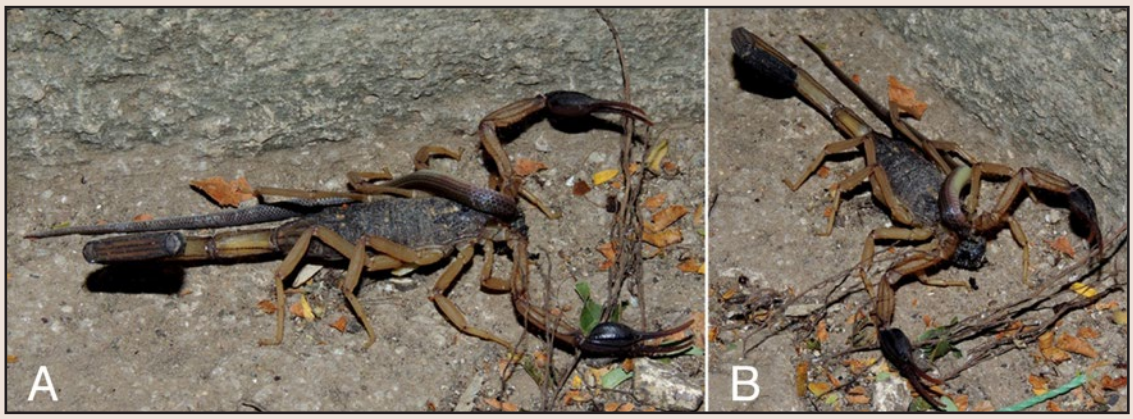

Fig.1. Different angles showing a *Centruroides edwardsii* ingesting a *Tantilla armillata*. (A) Lateral view, and (B) frontal view. © David Villalobos

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Reptilia: Testudines

Kinosternon leucostomum. **Sexual Dimorphism.** Numerous turtle species are sexually dimorphic, although morphological differences between the sexes are variable among the species. Most of the described sexual differences refer to body size, and the patterns of sexual size dimorphism (SSD) are related to habitat type and male mating strategy (Berry and Shine, 1980). Male fights are less frequent in some aquatic species, and males often forcibly inseminate females (Berry and Shine, 1980). Ceballos and Iverson (2014) noted that most kinosternid taxa (15 of 24) exhibit male-biased SSD. The widely distributed *Kinosternon scorpioides* has been shown to vary geographically in size, as in certain areas males or females can be larger or show no sexual dimorphism (Mota Rodrigues and Borges-Nojosa, 2013). In most kinosternids, however, SSD increases with body size, including in *K. leucostomum* (Ceballos and Iverson, 2014). This species was placed in the genus *Cryptochelys* by Iverson et al. (2013), but Spinks et al (2014) provided evidence that *Cryptochelys* (*sensu* Iverson et al. 2013) is not monophyletic and suggested rejecting the name. In Costa Rica, where *K. leucostomum* is relatively uncommon, Acuña Mesén (1998) noted carapace length and tail length differences between the sexes, as well as the absence of patches of cornified tubercles in the hind legs of males.

In September and November of 2002, and July of 2003, during herpetofaunal surveys at Rancho Mastatal wildlife refuge, a private environmental learning center and lodge located in Puriscal, Provincia de San José, Costa Rica, we found a population of *K. leucostomum* in a small pond (84º22'40"N, 09º40'40"W; elev. 260 m). The total area of the refuge is about 90 ha, and lies within Tropical Wet Forest (Holdridge, 1967).

We captured 18 turtles (eight males, seven females, one juvenile) by hand, weighed and measured all individuals, and noted their color pattern. In addition to the well known sexually-dimorphic characteristics reported for this species, including the shape of the plastron (concave in males, convex in females) and a longer and broader tail and a strongly hooked upper jaw in males (Ernst and Barbour, 1989; Acuña Mesén, 1998; Lee, 2000; Stafford and Meyer, 2000; Savage, 2002), we also found the color pattern of the head and jaws to be sexually dimorphic (Fig. 1). In males, a strong pattern of dark brown to black stripes on a yellow ground color was present on the jaws, and the sides and lower part of the neck are mottled with yellow spots on a dark brown to black ground color. This color pattern was absent in females, as only a few small black spots on a yellow ground color were present on the lower portion of the neck. All of the adult males and females we examined exhibited these respective patterns.

The average curved carapace length (CCL) of the adult turtles (n = 15) was 139.0 ± 9.74 cm, and their average weight was 260.6 ± 41.57 g. Males were significantly longer in CCL than females (Mann-Whitney $U = 7$, $p = 0.015$). Nonetheless, the largest female (144.0 cm) and the smallest male (120.0 cm) also were consistent with the color pattern differences described above, which appear to be related to sex and not age or size. A similar color pattern on the head and neck was reported as a sexually dimorphic characteristic for *K. scorpioides* in Costa Rica (Acuña Mesén and Cruz Márquez, 1993). We found no significant differences in carapace height and width, and total weight, between males and females. We collected two individuals and deposited them in the Museo de Zoología at the Universidad de Costa Rica (male UCR 17368, female UCR 17369).

Sexual dimorphism has important scientific and management implications, as sexual selection is associated with reproductive success and hence the survival and conservation of species. Knowledge of a species' reproductive biology is an essential component in understanding its life history strategy, as well as for its management and conservation (Hamann et al., 2010). As an example, the clutch size of *K. leucostomum* consists of one or two relatively large eggs, which differs considerably from the clutch size of around six eggs deposited by *K. scorpiodes* (Iverson, 2010). Consequently, the sexually dimorphic characteristics described here for *K. leucostomum* could have important implications for this species' captive management, especially at a time when several turtle populations throughout the world have been declining at an alarming rate (Castañeda and Mora, 2010). More research is

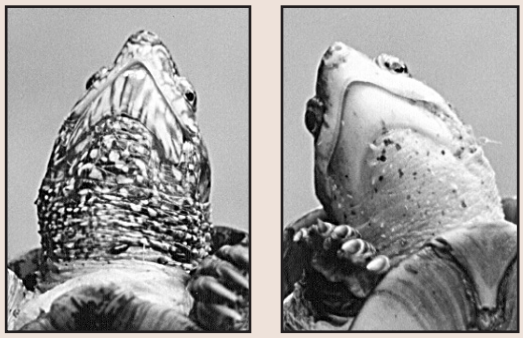

Fig. 1. Throat and neck coloration in a male (left) and a female (right) *Kinosternon leucostomum*.
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necessary to acquire and achieve the basic biological knowledge needed to understand and protect freshwater turtles in Costa Rica and elsewhere.

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Reptilia: Squamata (snakes)

Family Colubridae

***Mastigodryas melanolomus* (Cope, 1868)**. MEXICO: QUINTANA ROO: Municipio de Cozumel, San Miguel de Cozumel (20.488428°N, -86.941653°W; WGS84) elev. 7 m; 11 July 2007; Jorge Armín Escalante-Pasos. The individual (a subadult) was found crawling at 1300 h on a trail of the Unidad Académica and the Universidad de Quintana Roo; the trail cuts through an area of tropical dry forest. We deposited a photograph of the snake at the University of Texas at Arlington Collection of Vertebrates Digital Collection (UTADC-8483). This individual represents a new record for Isla Cozumel, with the closest published locality ca. 20.56 km to the NW in the vicinity of Playa del Carmen, on the coast of Quintana Roo.

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Family Viperidae

***Atropoides nummifer* (Rüppell, 1845)**. MEXICO: OAXACA: Municipio de San Ildefonso Villa Alta, Agencia de San Juan Yetzecovi (17.374167°N -96.110189°W; WGS84); elev. 1,692 m; 14 April 2015; Ciro Rodríguez-Pérez. Municipio de Santiago Camotlán, Yajoni (17.494608°N -96.214714° W; WGS84); elev. 1,208 m; 10 August 2012; Ciro Rodríguez-Pérez. Photographs of both specimens are deposited at the University of Texas at El Paso Digital Collection (Photo vouchers UTEP G-2015.1 and UTEP G-2015.2, respectively). These two specimens represent new municipality records, with the closest known locality ca. 67 km and 86 km to the SE, respectively, in the vicinity of San Lucas Camotlán (USNM-123709; www.vertnet.org; accessed 4 May 2015). The specimen from Yetzecovi is an adult found coiled inactive one the side of a trail in cloud forest containing a mixture of secondary vegetation, and the specimen from Yajoni was found dead on a trail in cloud forest.

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Family Viperidae

Bothriechis bicolor **(Bocourt, 1868)**. MEXICO: CHIAPAS: Municipio La Concordia, near Cerro Cebú (15.80963°N, -93.06576°W; WGS84); elev. 1,570 m; 26 April 2015; Marcos Meneses-Millán and Antonio Ramírez-Velázquez. We found three individuals of *Bothriechis bicolor* at 0430 h in tropical cloud forest, ca. 3 m above the ground in a tree (Fig. 1). Two of the snakes were next to one other (see white arrow in Fig. 1), with the third individual ca. 1 m away. Presumably, these individuals were displaying reproductive behavior. We deposited a photograph of the snakes at the University of Texas at El Paso Digital Collection (Photo voucher UTEP G-2015.4). These individuals represent a new municipality record, with the closest known locality ca. 65 km to the SE (airline distance) in the vicinity of Cerro Ovando, municipio de Escuintla, Chiapas, Mexico (Campbell and Lamar, 2004).

Fig. 1. Three individuals of *Bothriechis bicolor* found near Cerro Cebú, Municipio La Concordia, Chiapas, Mexico.
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Family Viperidae

***Crotalus culminatus* (Klauber, 1952)**. MEXICO: ESTADO DE MÉXICO: Municipio de Malinalco, Ciudad de Malinalco (18.92511°N, -99.51848°W; WGS84); elev. 1,734 m; 16 May 2015; Zabdiel A. Peralta-Fonseca. This adult specimen was found coiled on a trail 2 m from a stream in tropical deciduous forest. A photograph of the snake is deposited at the University of Texas at El Paso Digital Collection (Photo voucher UTEP G-2015.3). This individual represents the first record for the state, with the closest known locality ca. 25 km to the N (airline distance) in the vicinity of Xochicalco, Morelos (USNM-110610; www.vertnet.org; accessed 18 May 2015).

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New records and distributional range extensions for amphibians and reptiles from Tamaulipas, Mexico

The herpetofaunal richness of Tamaulipas probably is the least known of the states in northern Mexico. In the last decade, however, knowledge of the herpetofauna of Tamaulipas has increased with the description of new species (Bryson and Graham, 2010; Campbell et al., 2014), new distributional records for the state, and several distributional range extensions (Farr et al., 2007, 2009, 2013; Flores-Benabib and Flores-Villela, 2008; García-Padilla and Farr, 2010; García-Padilla and Villegas-Ruiz, 2010; Terán-Juárez and García-Padilla, 2014). Nonetheless, distributional data for many species are scarce, and significant distributional gaps likely remain within the state. In this note we report new distributional information for 20 herpetofaunal species (one anuran, two turtles, seven lizards, and 10 snakes), including three new records for the state. The following accounts are based on independent and collaborative fieldwork by the authors, photographs made available for our use, and from specimens examined in the newly formed Colección de Anfibios y Reptiles del Instituto Tecnológico de Ciudad Victoria (CAR-ITCV). We reviewed the published literature to determine new state and municipality records, as well as distributional range extensions. We determined the coordinates for each locality by using a GPS device (datum WGS84), obtained elevations from a digital elevation model (Continuo de Elevaciones Mexicano 3.0) with a grid size of 15 m (INEGI, 2013), and express all the distances between records in air km. Finally, we deposited photographic vouchers at The University of Texas at Arlington Digital Collection (UTADC).

Amphibia: Anura
Family Eleutherodactylidae

***Eleutherodactylus longipes* (Baird, 1859).** MIQUIHUANA: Ejido La Marcela (23.736558°N -99.819058°W), elev. 2,496 m; 26 August 2009; Elí García-Padilla, Gustavo Arnaud-Franco, and Marcio Martins; UTADC-8516. VICTORIA: 500 m N of Pino Solo, Ejido Sierra Madre (23.631253°N, -99.245035°W), elev. 1,548 m; 21 October 2014; Sergio A. Terán-Juárez, Francisco E. Leyto-Delgado, and Ernesto A. García-Cárdenas; CAR-ITCV 201,202. Cueva El Tullidor, Ejido Alta Cumbres (23.606399°N, -99.205705°W), elev. 1,278 m; 29 November 2014; Sergio A. Terán-Juárez, Francisco E. Leyto-Delgado, and Ernesto A. García-Cárdenas; CAR-ITCV 212, 213. Inside a cave at Cañón de la Peregrina (23.776853°N, -99.208410°W), elev. 393 m; 28 March 2015; Francisco E. Leyto-Delgado,

Sergio A. Terán-Juárez, Carlos A. Flores-Torres, and Ernesto A. García-Cárdenas; CAR-ITCV 228. The above specimens and the photo voucher represent records for the corresponding municipalities, and range extensions of ca. 43 km SW, 31 km SE, 36 km SE, and 24 km SE, respectively, from the nearest locality, El Chihue (23°52'N, 99°25'W, see Farr et al., 2007) to the northwest of Ciudad Victoria (Martin, 1958). Moreover, CAR-ITCV 228 and UTADC-8516 represent the lowest and highest elevational extremes (390–2,503 m) reported for this species (Stuart, et al., 2008).

Reptilia: Testudines
Family Kinosternidae

Kinosternon integrum **(Le Conte, 1854).** VICTORIA: Ejido 7 de Noviembre (23.685328ºN, -99.199898ºW), elev. 455 m; 21 November 2014; Francisco E. Leyto-Delgado and Víctor M. Pérez-Hernández; UTADC-8513. This photo voucher represents a new municipality record, and a range extension of ca. 17 km NE of the Río Chihue, located to the northeast of the municipality of Jaumave (Iverson and Berry, 1979). This voucher is the only record we are aware of from the eastern portion of the Sierra Madre Oriental, and represents the northernmost locality in eastern Mexico (Legler and Vogt, 2013). The turtle is an adult male found in a slow flowing stream with temporary ponds, in an area consisting of mixed tropical forest and riparian vegetation.

Family Staurotypidae

Staurotypus triporcatus **(Wiegmann, 1828).** OCAMPO: 2.4 km NE of Ocampo, in Las Albercas watering place (22.851156ºN, -99.313225ºW), elev. 336 m; 10 September 2012; Fernando Eligio; UTADC-8506. In a stream, 1.8 km SE of Ocampo (22.839736ºN, -99.318209ºW), elev. 340 m; Fernando Eligio; 19 October 2013; UTADC-8507. These photo vouchers represent a new record for the state, and the northernmost localities for this species. The northern distributional limit for *Staurotypus triporcatus* has been reported as central Veracruz (Legler and Vogt, 2013), ca. 524 km to the south of the records presented here. The presence of *S. triporcatus* in Tamaulipas likely is the result of an introduction, due to the large gap in the distribution of this species. The habitat of this turtle in Ocampo includes shallow, slow moving streams, the same characteristics found in the natural habitat of this species (Legler and Vogt, 2013). In the locality of Las Albercas, this species cohabits with *Trachemys ornata* (McCranie et al., 2013). Although suitable habitat is present at Ocampo, we are unaware if *S. triporcatus* has been established in this area. Additional studies are necessary to evaluate the status of this species in the state, as well as its interactions with other species.

Reptilia: Squamata (lizards)
Family Anguidae

Abronia taeniata **(Wiegmann, 1828).** JAUMAVE: ca. 500 m NNW of Montecarlo (23.272434ºN, -99.239229ºW), elev. 1,606 m; 1 July 2014; Leccinum J. García Morales; UTADC-8511. This photo voucher represents a new municipality record, and a range extension of 19.7 km N of the closest known locality, Rancho del Cielo in the municipality of Gómez Farías (Martin, 1958). This record also represents the northernmost locality for this species (Martin, 1958), as well as for the genus (Campbell and Frost, 1993). UTADC-8511 is a photograph of a juvenile found in cloud forest, on the leaves of a bush (*Salvia* sp.) at a height of 80 cm. A second individual (photo voucher UTADC-8500) from the municipality of Gómez Farías was found 1.5 km SE of Joya de Manantiales (23.005646ºN, -99.269156ºW) on 11 October 2005, and represents the southernmost record for this species in the state, with a range extension of 9.5 km to the SE of Rancho Viejo (= Alta Cima) (Martin, 1958).

Gerrhonotus infernalis **Baird, 1859.** GONZÁLEZ: Rancho La Sauceda (23.106221ºN, -98.336229ºW), elev. 753 m; June 2003; Gilberto Herrera-Patiño; CAR-ITCV 108. This specimen represents a new municipality record, and a range extension of 61 km S from the only known locality for this species in the Sierra de Tamaulipas, ca. 14 km SW of Soto La Marina on the "old" Highway 70 (Farr et al., 2009). The specimen is an adult male found in tropical deciduous forest. The boundaries of the municipalities of Aldama and Casas are 400 and 600 m from this locality, respectively, and thus the presence of this species in tropical deciduous forest at these municipalities can be anticipated.

Family: Dactyloidae

***Anolis carolinensis* Voigt, 1832.** VALLE HERMOSO: Ciudad de Valle Hermoso (25.678787ºN, -97.824717ºW), elev. 18 m; 3 May 2015; Víctor M. Pérez-Hernández; UTADC-8527 and UTA DC-8528. The photo vouchers of this individual are the first to confirm the occurrence of this species in the state (see Conant and Collins, 1991), and represent a range extension of ca. 50 km to the SW from the closest known locality in Cameron County, Texas, United States (Dixon, 2000). The lizard was photographed in a courtyard, where the species has been known to occur for at least 10 years (V. Pérez-Hernández, pers. comm.). Additional individuals have been observed in the city of Matamoros.

***Norops sagrei* Duméril & Bibron, 1837.** ALTAMIRA: Ciudad de Altamira (22.395905ºN, -97.935582ºW), elev. 12 m; 13 December 2015; Francisco E. Leyto-Delgado; CAR-ITCV 215. MADERO: Ciudad de Madero (22.251861ºN, -97.854339ºW), elev. 21 m; 9 May 2015; Sergio A. Terán-Juárez; CAR-ITCV 231. These specimens represent new records for the state, and a range extension of 580 km to the NW from the closest known locality we are aware of in Mexico, ca. 1 km N of Minatitlán, Veracruz (Zamora-Abrego et al., 2006). *Norops sagrei* is an invasive species that has received little attention in Mexico. Currently, stable populations are known to occur in several southern states in the country, including Quintana Roo, Campeche, Tabasco (Lee, 1996), and Veracruz (Vogt et al., 1997; Zamora-Abrego et al., 2006). Additionally, museum records include specimens from the states of Chiapas (Muñoz-Alonso and March, 2003; Escobar-Ocampo et al., 2006) and Yucatán (Gómez-Escamilla, 2004). Thus, Tamaulipas is the seventh state from which the presence of this lizard has been confirmed, and Altamira is the northernmost locality for this species in Mexico. Numerous individuals have been observed in abandoned lots and gardens in the urban areas of these municipalities, as well as in the municipality of Tampico. Interviewees indicated that this species first was observed in this region about four years ago.

***Norops sericeus* Hallowell, 1856.** GONZÁLEZ: Cerro Pedregoso (23.098443ºN, -98.353414ºW), elev. 760 m; December 2003; Gilberto Herrera-Patiño; CAR-ITCV 97. VICTORIA: Cañón de la Peregrina (23.773005ºN, -99.250433ºW), elev. 454 m; 28 March 2014; Sergio A. Terán-Juárez, Francisco E. Leyto-Delgado, and Ernesto A. García-Cárdenas; CAR-ITCV 174. These specimens represent new records for each municipality, although the one for the municipality of Victoria confirms a visual report from Cañón del Novillo (Terán-Juárez, 2006). CAR-ITCV 174 was collected in a riparian habitat, and represents a range extension of 63 km to the SW of the northernmost locality, ca. 13 km SE Padilla (Martin, 1958; Lee, 1983). CAR-ITCV 97 was found in pine-oak forest, and this specimen extends the distributional range ca. 14 km to the SE of Acuña, in the Sierra de Tamaulipas (Martin, 1958).

Family Phrynosomatidae

***Sceloporus parvus* Smith, 1934.** JAUMAVE: Ejido La Asunción (= La Chona) (23.742135ºN, -99.330929ºW), elev. 1,698 m; 5 May 2014; Víctor M. Pérez-Hernández, Francisco E. Leyto-Delgado, Aldair A. Morales-García, Alejandro A. Pedraza-Méndez, José G. Reyna-Cabrera, and Víctor E. Rodríguez-Maldonado; UTADC-8508. This photo voucher represents a new municipality record, and a range extension of ca. 63 km to the N of La Joya de Salas (Martin, 1958). The individual was observed in pine forest.

Family Xantusidae

***Lepidophyma micropholis* Walker, 1955.** GÓMEZ FARÍAS: Cueva del Tigre (23.038056°N -99.162519°W), elev. 317 m; 12 August 2010; Elí García-Padilla; UTADC-8515. This photo voucher represents a new municipality record, with a range extension of 45 km to the N from the closest known locality at Gruta de Quintero, in the municipality of Mante (Bezy and Camarillo, 2002). Moreover, this record represents the northernmost locality for this species (Bezy and Camarillo, 2002). The individual was found inactive in a hole inside a cave, in tropical deciduous forest.

Reptilia: Squamata (snakes)

Family Boidae

***Boa imperator* Linnaeus, 1758.** GONZÁLEZ: 5.5 km SE of González, on Hwy 80 (22.793056ºN, -98.394294ºW), elev. 87 m; 24 July 2013; Sergio A. Terán-Juárez; CAR-ITCV 169 (head only). The occurrence of this species in Tamaulipas is widely accepted, although its distribution has not been documented in detail in the state. Records have been published from Soto La Marina, Jaumave (Farr et al., 2007), as well as from Gómez Farías (Martin, 1958). In addition, the species is known from the municipalities of Aldama, Altamira, Llera, Nuevo Morelos, and Xicoténcatl (Flores-Villela, 1998; Lazcano, 1999).

Family Colubridae

***Lampropeltis mexicana* (Garman, 1884).** BUSTAMANTE: 3 km W of Bustamante (23.432631ºN, -99.790961ºW), elev. 1,981 m; 4 September 2014; Sergio I. Yobal-Gallardo; UTADC-8512. This photo voucher represents a new municipality record, and a range extension of ca. 16 km to the SW of the closest known locality in Miquihuana (Loveridge, 1924). This record is only the third for the state; to date this species has been reported from xerophytic valleys and canyons in the municipalities of Jaumave, Miquihuana and Bustamante.

***Oxybelis aeneus* (Wagler, 1824).** VICTORIA: Cañón del Novillo (23.696932ºN, -99.195178ºW), elev. 399 m; 27 April 2004; Miguel A. Terán-Juárez; UTADC-8509. El Huizachal (23.593297ºN, -99.242550ºW), elev. 907 m; 31 May 2014; Aldair A. Morales-García, Francisco E. Leyto-Delgado, Sergio A. Terán-Juárez, and Ernesto A. García-Cárdenas; UTADC-8510. These photo vouchers represent the first records to confirm the occurrence of this species in this municipality, as the original voucher specimen presumably is lost (Farr et al., 2013). UTADC-8510 represents the northernmost record for Tamaulipas, and a range extension of ca. 65 km to the N of Pano Ayuctle (= El Azteca), in the municipality of Gómez Farías (Martin, 1958). The two localities reported for the municipality of Casas by Farr et al. (2013) actually are in the municipality of Soto La Marina; each of these localities is ca. 7 km from the border with the municipality of Casas.

Family Dipsadidae

***Rhadinaea gaigeae* Bailey, 1937.** CASAS: Rancho San Miguel (23.176910ºN, -98.333565ºW), elev. 900 m; November 2004; Gilberto Herrera-Patiño; CAR-ITCV 107. VICTORIA: ca. 400 m S of Pino Solo, on a dirt road (23.623864ºN, -99.244352ºW), elev. 1,606 m; 22 November 2014; Ernesto A. García-Cárdenas, Francisco E. Leyto-Delgado, and Sergio A. Terán-Juárez; CAR-ITCV 208. CAR-ITCV 107 represents a new record for the municipality of Casas. CAR-ITCV 208 is the first museum record that confirms the occurrence of this species from the municipality of Victoria (the voucher specimen presumably is lost; Farr et al., 2013); it also represents the northernmost record for this species in Tamaulipas, and a range extension of 54 km to the N from the closest known locality, at ca. 4 km N of Rancho del Cielo (Martin, 1958).

Family Elapidae

***Micrurus tamaulipensis* Lavin-Murcio and Dixon, 2004.** CASAS: Ejido Eduardo Benavides (23.155298ºN, -98.345111ºW), elev. 829 m; July 2004; Gilberto Herrera-Patiño; CAR-ITCV 103. Ejido Eduardo Benavides (23.155833ºN, -98.344722ºW), elev. 835 m; July 2008; Erick Rodríguez; CAR-ITCV 190. These two specimens represent a new municipality record, and a range extension of ca. 5 km to the N from the closest known locality, at Rancho La Sauceda in the municipality of González (Lavin-Murcio and Dixon, 2004). Previously, this species was known only from Hacienda Acuña, in the municipality of Llera, and from Rancho La Sauceda, in the municipality of González (Lavin-Murcio and Dixon, 2004). This note represents the third municipality record for this species in Tamaulipas; we are aware of an additional individual found in the municipality of Casas, at Rancho San Miguel (23.176910ºN, -98.333565ºW), ca. 2.5 km NE of Ejido Eduardo Benavides (G. Herrera-Patiño, unpublished). CAR-ITCV 103 was killed by local people and CAR-ITCV 190 was found dead on a dirt road.

Family Typhlopidae

***Indotyphlops braminus* (Daudin, 1803).** OCAMPO: 2.3 km SE of Ejido Canoas (22.895057ºN, -99.360819ºW), elev. 397 m; 25 October 2013; Sergio A. Terán-Juárez; CAR-ITCV 163. This specimen represents a new municipality record, and a range extension of ca. 43 km to the NW of the only known locality in Tamaulipas, Hwy 85, ca. 4 km S of Ciudad Mante (Farr et al., 2013). The snake was found active at night on the side of a dirt road, which passed through fields of sugarcane interspersed with remnants patches of tropical deciduous forest.

Family Viperidae

***Crotalus molossus* (Gloyd, 1936).** JAUMAVE: Carabanchel (23.3225°N -99.2780°W), elev. 2,003 m; 23 May 2010; Jean Louis Lacaille-Muzquiz and Arnulfo Moreno-Valdez; UTADC-8501. This photo voucher represents a new municipality record, and the first confirmed record from El Cielo Biosphere Reserve (Sierra de Guatemala) (Farr et al., 2013). The closest known locality is 31.5 km to the W, at 7 km N of Palmillas, in the municipality of Palmillas (Burchfield et al., 1982). The specimen was found in dry oak-pine forest, coiled and basking on the side of a dirt road.

***Crotalus totonacus* Gloyd and Kauffeld, 1940.** VICTORIA: ca. 1 km W of Rancho El Tejocote (La Reja) (23.689446°N, -99.282907°W), elev. 1,341 m; 21 March 2010; Leccinum J. García-Morales; UTADC-8505. Cañón de la Peregrina (23.7708°N, -99.2605°W), elev. 492 m; 4 November 2012; Arnulfo Moreno-Valdez; UTADC-8502. GONZÁLEZ: Cerro del Bernal (22.755278°N, -98.578611°W), elev. 280 m; 7 January 2009; Jean Louis Lacaille-Muzquiz; UTADC-8503. These photo vouchers represent new municipality records; UTADC-8505 and UTADC-8502 represent a range extension of ca. 80 km from the closest known locality at Gómez Farías (Martin, 1958), and UTADC-8503 represents a range extension of ca. 70 km from the closest known locality near Rancho Nuevo, Aldama (USNM-209855; www.vertnet.org; accessed 19 May 2015).

***Crotalus lepidus* Kennicott, 1861.** GÜEMEZ: Las Chinas (23.864440°N, -99.452432°W), elev. 2,610 m; 11 November 2005; Leccinum J. García-Morales; UTADC-8504. This photo voucher represents a new municipality record, and a range extension of ca. 88 km to the N from the closest known locality at Rancho del Cielo (Martin, 1958). The rattlesnake was photographed early in the morning, while it was sunning on a rock in oak forest (*Quercus mexicana*).

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Records for the Mourning Gecko (*Lepidodactylus lugubris*) and its expansion in Costa Rica

The Mourning Gecko, *Lepidodactylus lugubris*, a native of south Asia and the Pacific islands, has been introduced in many parts of the world through urbanization and human activities, as have other geckos primarily of the genus *Hemidactylus* (Savage, 2002; Köhler, 2003; Bauer et al., 2007). The spread of *L. lugubris* likely has been facilitated by its parthenogenetic reproductive strategy, as well as by the high resistance of its eggs to desiccation and salt-water spray (Cuellar and Kluge, 1972; Brown and Duffy, 1992; Hanley et al., 1994; Sierra et al., 2012). These traits make *L. lugubris* an ideal disperser, and this species has had a long presence in the Americas; its introduction has been attributed to the abundance of cargo ships crossing the Pacific Ocean, especially after the opening of the Panama Canal, and also as a consequence of repeated colonization events from different sources at numerous localities (Smith and Grant, 1961; Ineich, 1999; Daza et al., 2012). In the New World, *L. lugubris* primarily has been introduced into coastal areas of Mexico, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, the Galapagos Islands, Peru, Chile, Venezuela, Suriname, and Guadeloupe (Villa, 1993; Sengoku, 1998; Savage, 2002; Bauer et al., 2007; Guerreiro and Graterol, 2011; Lorvelec et al., 2011; Daza et al., 2012; Uetz, 2013).

The herpetofauna of Costa Rica has been well documented (Savage, 2002; Sasa et al., 2010), and six species of non-native lizards (*Ctenonotus cristatellus*, *L. lugubris*, *Norops sagrei*, *Hemidactylus frenatus*, *H. garnotii*, and *H. mabouia*) have been introduced into the country (Bolaños et al., 2011). To date, no concerted effort has been made to document the expansion of these nonnative species, and by understanding their distribution and rate of expansion it may be possible to begin addressing their impacts on native species. With regard to *L. lugubris*, only a general idea of its distribution in Costa Rica is available due to the few records in the country, the dispersal of this information, and the lack of a monitoring program for introduced geckos. Consequently, the distribution of this invasive species remains unclear, and the purpose of this note is to conduct a review of all available records of *L. lugubris* from two national zoological museums (Universidad de Costa Rica, Universidad Nacional), literature reports, collections linked to the Global Biodiversity Information Facility (GBIF, 2013), and published and unpublished records to obtain their geographic coordinates and generate a new locality map using R version 3.1.3 (R Development Core Team, 2015) with the package ggplot2 (Wickham, 2009). This information will help better understand the extent of invasion of *L. lugubris* in Costa Rica, and provide new information for future studies with introduced geckos.

Herein we provide information on 11 localities reported for *L. lugubris* in Costa Rica (Table 1). The oldest known records for *L. lugubris* on the Pacific versant date to 1981, from specimens collected by D. C. Robinson and his students (UCR 8068–8069) near the port of Golfito on the Península de Osa. From 1992 to 2012, *L. lugubris* was recorded from the lowlands of the Pacific central and south of the country, from near Sierpe (UCR 11545), Quepos (UCR 13042–13043), Rincón de Osa (GBIF ID 207868071) (GBIF, 2013), and Pavón (UNA 596), in the Provincia de Puntarenas; three of these localities were reported by Savage (2002). In 2013, this species again was found in Golfito, as a specimen (UNA 629) was collected in a papaya tree located close to a mangrove. In 2011 this species was recorded in the northwestern part of the country, as a specimen was found foraging in a lodge near Parque Nacional Rincón de la Vieja, Provincia de Guanacaste (Abarca et al., 2012). The first record of *L. lugubris* from the Caribbean versant dates to 2005, from an unpublished photograph of an individual lying on a plant leaf in a restaurant at La Fortuna, San Carlos, Provincia de Alejuela (Fig. 1). Specimens from two additional localities were collected in 2008, and reported by Abarca et al. (2009); both localities were in close proximity to one another (< 3 km), in the southern coastal area of the Reserva Silvestre Gandoca-Manzanillo, Talamanca, Provincia de Limón. The most recent record of *L. lugubris* from the Caribbean versant was found in 2013, at La Virgen, Sarapiquí, Provincia de Heredia (Jiménez and Abarca, 2014). All of the recorded localities to date are from low elevations (0–700 m; Table 1). The geographic coordinates obtained from the records allowed us to generate an updated locality map for *L. lugubris* in Costa Rica (Fig. 2).

Lepidodactylus lugubris likely occurs at many other localities in Costa Rica, as this species is an ecological generalist that tolerates human modified environments. We suggest that the Valle Central is an area where this gecko likely will be found, owing to the constant flow of shipping cargo from the port of Golfito to the country's largest metropolitan area. One reason this species might be overlooked is that many biologists typically do not focus on urban species, and thus we encourage researchers to determine the potential distribution of *L. lugubris* and conduct intensive monitoring to improve our knowledge of the expanding distribution of this invasive gecko in the country.

Several studies have shown that direct (predation of juveniles) and indirect (competition, stress induced) interactions with more aggressive and larger introduced geckos (*Hemidactylus* spp.) can reduce the population density, expansion, and establishment of *L. lugubris* (Petren et al., 1993; Brown et al., 2002). This scenario, therefore, can become a limiting factor for the expansion and establishment of *L. lugubris* in Costa Rica (e.g., aggressive interaction with *H. frenatus*), but further research is required to achieve a robust conclusion.

Table 1. Known localities for *Lepidodactylus lugubris* based on specimens or sightings with photographs. Numbers correspond to those on map (Fig. 2). Locations are in decimal degrees. Date refers to when specimens were collected or vouchered.

Number	Location	Province	Voucher	Elevation (m)	Date	Reference
1	8.648ºN, 83.175ºW	Puntarenas	UCR 8068–8069	100	1981	Savage (2002)
2	8.694ºN, 83.555ºW	Puntarenas	UCR 11545	400	1992	Savage (2002)
3	9.446ºN, 84.179ºW	Puntarenas	UCR 13042–13043	0	1997	Savage (2002)
4	8.715ºN, 83.485ºW	Puntarenas	GBIF ID 207868071	100	2008	Unpublished
5	8.395º N, 83.135ºW	Puntarenas	UNA 596	0	2012	Unpublished
6	8.644º N, 83.180ºW	Puntarenas	UNA 629	0	2013	Unpublished
7	10.755ºN, 85.351ºW	Guanacaste	UCR 21395	700	2011	Abarca et al. (2012)
8	9.643º N, 82.686ºW	Limón	UCR 20512	0	2008	Abarca et al. (2009)
9	9.638ºN, 82.704ºW	Limón	UCR 20511	0	2008	Abarca et al. (2009)
10	10.416ºN, 85.124ºW	Heredia	UCR 22042-22043	200	2013	Jiménez and Abarca (2014)
11	10.470ºN, 84.648ºW	Alajuela	Photo by Les Catchick	300	2005	This work

Fig. 1. An individual of *Lepidodactylus lugubris* photographed in 2005 at La Fortuna, San Carlos, Provincia de Alajuela, Costa Rica. © Les Catchick

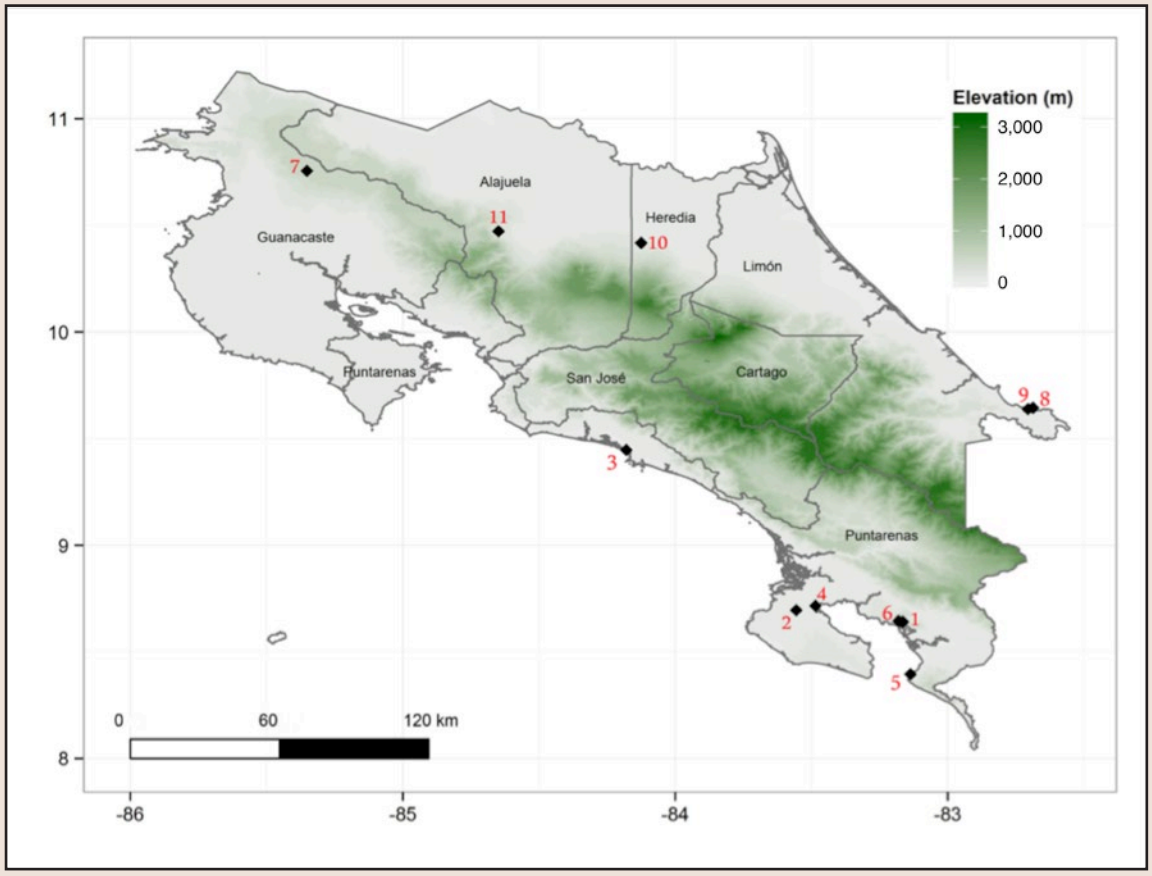

Fig. 2. Locality map indicating localities of *Lepidodactylus lugubris* based on all known sightings and museum specimens. Numbers correspond to those in Table 1.

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New locality and elevational record for the snake *Sibon anthracops* (Cope, 1868) in Honduras

The Neotropical snake genus *Sibon* Fitzinger, 1826 is composed of a group of specialized snail and slug-eating snakes found in various habitats across Mexico and Central America, and South America (Savage 2002; McCranie, 2011; Lewis et al., 2013). Sixteen species are recognized (Lewis et al., 2013; Wallach et al., 2014), of which seven occur in Honduras (McCranie, 2011, 2015; Solis et al., 2014). *Sibon anthracops* is one of the most widely distributed snakes in this genus, occurring at low and moderate elevations (near sea level–1,300 m) from southeastern Guatemala and El Salvador to southwestern Panama, on the Pacific versant, and on the Atlantic versant in southeastern Guatemala, north-central Honduras, and western Nicaragua (Hidalgo, 1979; Savage, 2002; McCranie, 2011; Wallach et al., 2014; Dwyer, 2015). This species was listed by the IUCN as Least Concern (LC) because of its relatively widespread geographical distribution (Köhler et al., 2013).

In Honduras, *S. anthracops* is an uncommon species, known from only four specimens (2 males, 4 females) from the north-central (Departamento de Yoro) and south-central (Departamento de Francisco Morazán) parts of the country, at elevations from 200 m to 1,000 m in the Lowland Arid Forest and Premontane Dry Forest formations (McCranie, 2011). Using an environmental vulnerability measure, McCranie (2011) assessed this species in Honduras with a medium vulnerability score (EVS 13).

During the months of November 2013 and March–April 2014, our fieldwork in southern Honduras produced several distributional records of amphibians and reptiles (Espinal et al., 2014). On 28 of October 2014, we collected an adult male (total length = 48.7cm) *S. anthracops* in the village El Ojo de Agua (13°25'37.6"N; 86°54'51.6"W; WGS 84; elev. 1,398 m). The specimen (UNAH-5694; Fig.1), was found at 1000 h inside a piece of PVC hose in a bush in the yard of a house, and represents a new departmental record, with the closest locality in the Departamento de Francisco Morazán (McCranie, 2011; Fig. 2). This snake also represents an elevational record for the species, with the previous highest-recorded elevation as 1,300 m (Campbell and Vannini, 1989). This record also adds a new species to the herpetofauna of the Choluteca eco-region.

Fig. 1. Specimen of *Sibon anthracops* (UNAH-5694) in life, collected at El Ojo de Agua, San Marcos de Colón, Choluteca.

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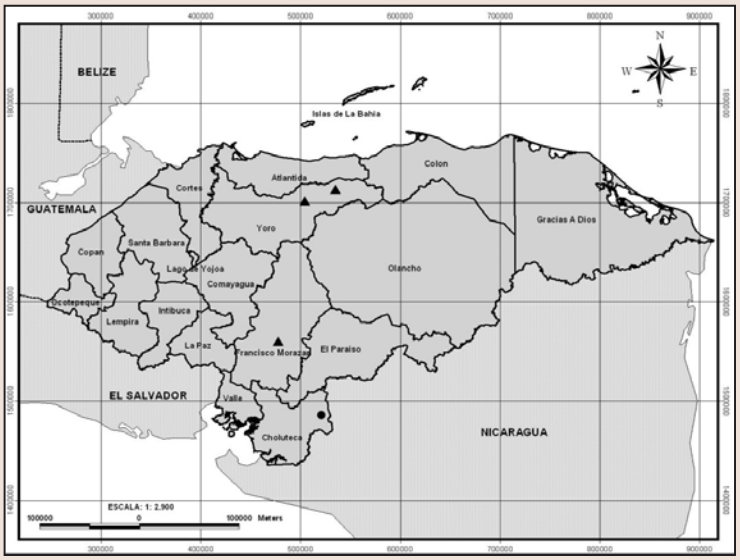

Fig. 2. Map of Honduras showing previously recorded locations (triangles) and new locality (circle) reported herein for *Sibon anthracops.*

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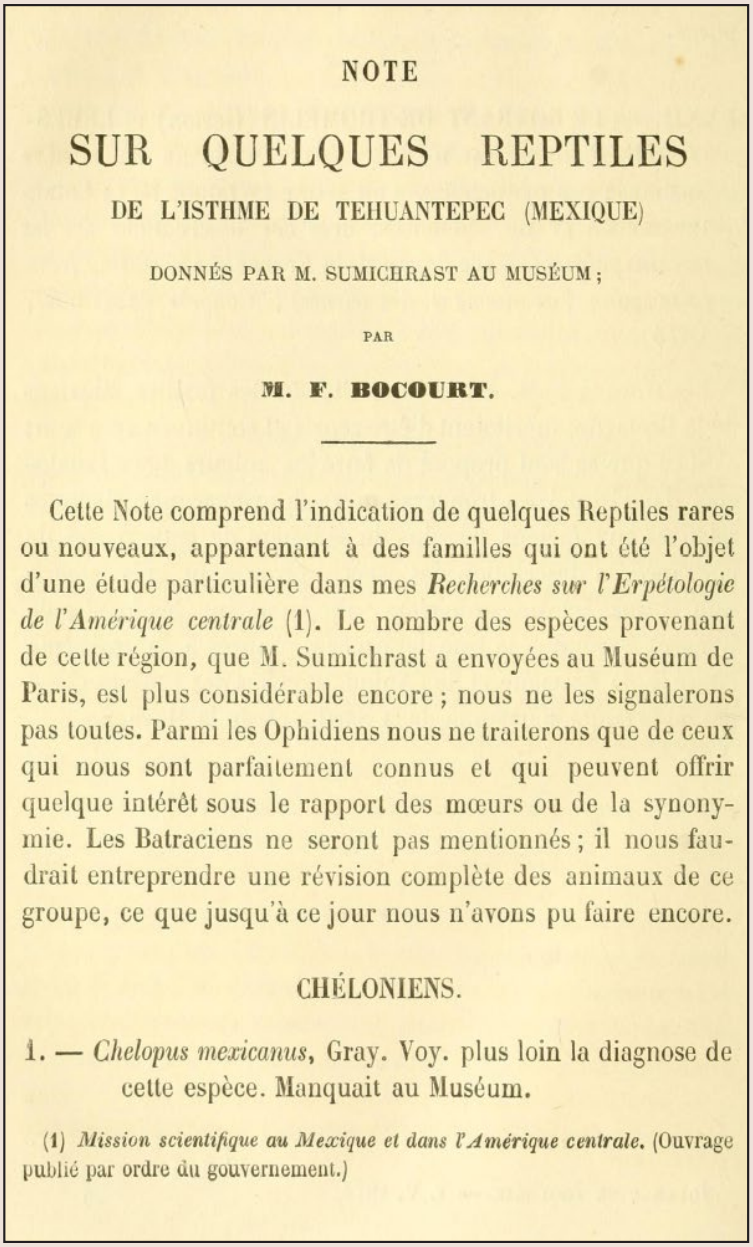
On the occurrence of *Caiman crocodilus* in Oaxaca, Mexico: a misunderstanding for over 140 years

The Spectacled Caiman, *Caiman crocodilus*, is widely distributed from southern Mexico and across Central America to northern South America and the Amazon basin (Velasco and Ayarzagüena, 2010). This species exhibits considerable morphological variation through its range, motivating research into its taxonomy and distribution (Medem, 1981, 1983; Busack and Pandya, 2001; Venegas-Anaya et al., 2008). In a mitochondrial DNA (mtDNA) analysis of 45 individuals from across most of the range of *C. crocodilus*, Venegas-Anaya et al. (2008) provided evidence to recognize different lineages from geographic areas comprising the ranges of the putative subspecies: Mesoamerica and northern South America (*chiapasius* and *fuscus*); and other areas of South America (*crocodilus*); samples from the Río Apaporis (*apaporiensis*), however, were not included in their analysis. Herein, we present a brief review of a possible misunderstanding pertaining to the occurrence of *C. crocodilus* in the state of Oaxaca, Mexico.

Crocodilian taxonomy started with the publication of Systema Naturae, when from 1758 to 1766 Carolus Linnaeus proposed a system of classification for all living creatures. The first described crocodilian was *Lacerta* (*Caiman*) *crocodilus*, although this name collectively included the Nile Crocodile (*Crocodylus niloticus*; see Brazaitis and Watkins-Colwell, 2011). In 1868, Edward D. Cope described *Caiman crocodilus fuscus* from a single specimen collected by Schulte Buckow from the Río Magdalena, Colombia, and deposited at the Academy of Natural Sciences of Philadelphia (ANSP 9720; Cope, 1868).

From 1868 to 1882, Francois Sumichrast made important herpetological field collections in Mexico, in the states of Puebla, Veracruz, Chiapas, and particularly in Oaxaca (Casas-Andreu, 1996; Flores-Villela et al., 2003). From the numerous specimens he collected, M. F. Bocourt wrote *Note sur quelques reptiles de l'Isthme de Tehuantepec (Mexique) donnés par M. Sumichrast au museum* (Note on some reptiles of the Isthmus of Tehuantepec [Mexico] given by Mr. Sumichrast to museum; Fig. 1). In this paper, Bocourt described *Alligator chiapasius* (later *Caiman crocodilus chiapasius*), based on five specimens deposited by Sumichrast at the Muséum National d'Histoire Naturelle, Paris (Bocourt, 1876). Currently, only four specimens are housed in the herpetological collection of the museum (MNHN), as syntypes: MNHN 0.7836, female; MNHN 0.7837, juvenile in alcohol; MNHN 0.6623; and MNHN 1191.4486. The type locality from the museum voucher for all the syntypes is Tehuantepec, Oaxaca (www.mnhn.fr/fr/collections/ensembles-collections/vertebres). Additionally, two specimens are maintained in the Museum of Comparative Zoology at Harvard University (MCZ), received from F. Sumichrast in 1882, with a type locality of Tapana, Tehuantepec (www.mczbase.mcz.harvard.edu/). Bocourt, however, did not examine the two specimens in the MCZ collection. Although the information of the type locality is imprecise, the species (*C. crocodilus*) has been considered part of the herpetological diversity of the state of Oaxaca (e.g., Smith and Smith, 1977; Casas-Andreu et al., 1996, 2004; Mata-Silva et al., 2015).

Considering this historical background, we suggest some reasons why the occurrence of *C. crocodilus* in Oaxaca might have been assigned erroneously. First, the incorrect assignation of the type locality is based on the title of Bocourt's paper. Although Bocourt described some reptiles from the Isthmus of Tehuantepec, he specified that five "alligators" (*C. crocodilus*) were collected in the Valle de Tonala, Chiapas, Mexico (Fig. 2). Sumichrast died of cholera in Oaxaca, and although other naturalist explorations later were conducted across the Isthmus of Tehuantepec and the Pacific coast of Oaxaca, none reported the presence of *C. crocodilus*. In 1902, Hans Friedrich Gadow collected a series of amphibians and reptiles from San Mateo del Mar, Oaxaca, possibly the nearest expedition to the type locality assigned to *C. crocodilus* (*chiapasius*), but only recorded the occurrence of the American Crocodile (*Crocodylus acutus*; Gadow, 1908). Second, to our knowledge, no other confirmed records of *C. crocodilus* are available for Oaxaca. To date, all reports and studies of *C. crocodilus* in Mexico are from within the political boundary of Chiapas (Fig. 3).



NOTE

SUR QUELQUES REPTILES

DE L'ISTHME DE TEHUANTEPEC (MEXIQUE)

DONNÉS PAR M. SUMICHRAST AU MUSÉUM;

PAR

M. F. BOCOURT.

Cette Note comprend l'indication de quelques Reptiles rares ou nouveaux, appartenant à des familles qui ont été l'objet d'une étude particulière dans mes *Recherches sur l'Erpétologie de l'Amérique centrale* (1). Le nombre des espèces provenant de cette région, que M. Sumichrast a envoyées au Muséum de Paris, est plus considérable encore; nous ne les signalerons pas toutes. Parmi les Ophidiens nous ne traiterons que de ceux qui nous sont parfaitement connus et qui peuvent offrir quelque intérêt sous le rapport des mœurs ou de la synonymie. Les Batraciens ne seront pas mentionnés; il nous faudrait entreprendre une révision complète des animaux de ce groupe, ce que jusqu'à ce jour nous n'avons pu faire encore.

CHÉLONIENS.

1. — *Chelopus mexicanus*, Gray. Voy. plus loin la diagnose de cette espèce. Manquait au Muséum.

(1) *Mission scientifique au Mexique et dans l'Amérique centrale.* (Ouvrage publié par ordre du gouvernement.)

Fig. 1. Original paper by M. F. Bocourt published in 1876 in the Journal de Zoologie, in which *Alligator chiapasius* (later *Caiman crocodilus chiapasius*) was described.

Les cinq alligators en peaux, que l'on doit aux soins de M. Sumichrast, proviennent de la vallée de Tonala, province de Chiapas. Ces animaux offrent par leur provenance un intérêt de géographie zoologique très-intéressant, et doivent être considérés comme appartenant à une nouvelle variété de l'*All.* (*Jacare*) *punctulatus*.

Fig. 2. Description of the type locality reported by M. F. Bocourt for *Caiman crocodilus chiapasius*.

As a consequence, in September of 2012 we conducted nocturnal surveys in freshwater lagoons in the vicinity of San Pedro Tapanatepec and Chahuites, both in Oaxaca and located 7–12 km from the Chiapas border. We searched for *C. crocodilus* at night (2100–0500 h) using a spotlight, and covered a distance of 20 km. Despite the limited number of surveys (n = 4), we did not observe and/or capture any *C. crocodilus* in these bodies of water (Fig. 3). Additionally, we conducted interviews with local landowners who stated that they have not observed "caimans" (*C. crocodilus*) at these sites, and they described a longirostrine crocodilian "lagarto real" found in coastal habitats; thus, we assumed the occurrence of "crocodiles" (*C. acutus*) in coastal aquatic environments. The information we received demonstrated that the landowners were well aware of the differences between the species.

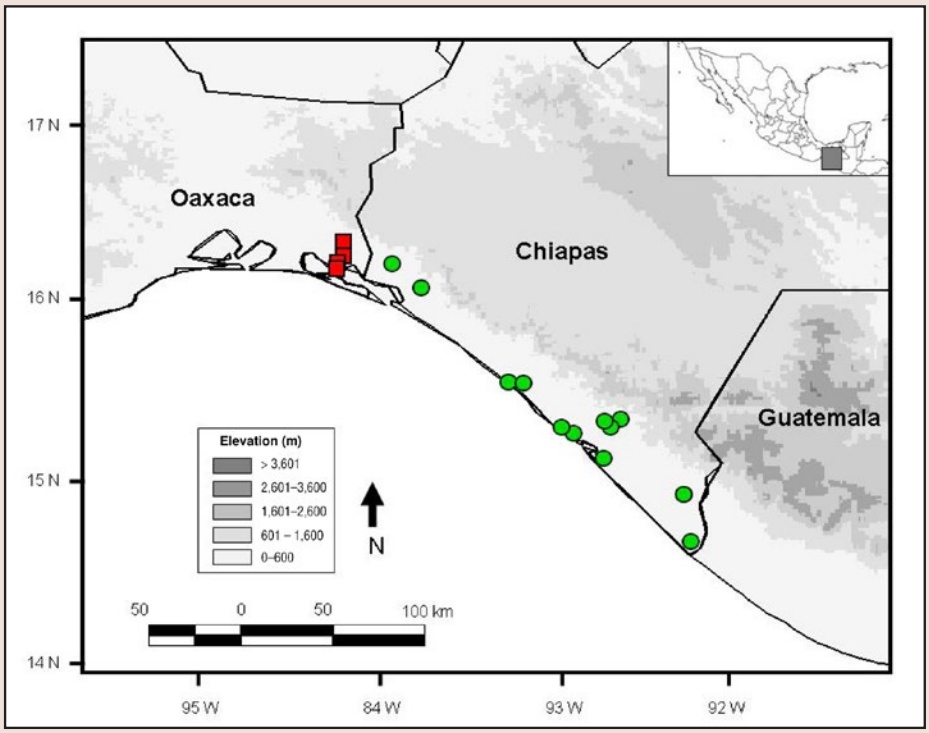


Fig. 3. Recorded localities for *Caiman crocodilus* in Chiapas (green circles) and survey-sites in Oaxaca (red squares).

The type-locality of *C. crocodilus* (*chiapasius*) is in the Isthmus of Tehuantepec (Smith and Smith, 1977). This region is considered a geographical barrier for a variety of faunal groups, including birds, mammals, and butterflies (Peterson et al., 1999; García-Moreno et al., 2004; Barber and Klicka, 2010), and thus this region may play a role as an environmental barrier to the dispersal of semi-aquatic species. Future work should evaluate the abiotic parameters involved with this geographical barrier and its effect on reptile distribution.

In summary, based on the available information and our nocturnal surveys, we consider that the distribution of *C. crocodilus* in Mexico is restricted to the lowlands of the state of Chiapas. Future initiatives should focus on systematic surveys to address the possible occurrence of *C. crocodilus* in Oaxaca, and further analyses should evaluate the intrinsic or extrinsic factors constraining the distribution of *C. crocodilus* in Mexico.

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