NATURE NOTES

Amphibia: Anura

***Incilius melanochlorus* and *Craugastor mimus*. Body gigantism.** Body gigantism is a term applied to individuals of the same species with a reported larger than regular body size along their geographic distribution or on islands (Angerbjörn, 1986; Case and Schwaner, 1993; Pafilis et al. 2009; Li et al., 2011). Although this condition has been reported in vertebrates, it is uncommon in frogs (Leclair and Laurin, 1996; Li et al., 2011). Leclair and Laurin (1996) proposed three possible causes to explain gigantism in frogs: delay in maturity, reduced predation risk, and prolonged larval period due to cold environments. Body gigantism due to reduced predation risk was observed in Mink Frogs (*Lithobates septentrionalis*) (Ranidae) in Canada, in the absence of predators like the Bullfrog (*L. catesbeianus*) (Schueler, 1975). This condition also has been observed on islands. For example, in China, Rice Frogs (*Fejervarya limnocharis*) (Dicroglossidae) found on islands are up to 3.9 mm longer than individuals found on the mainland, due to the reduced number of predator species (Li et al., 2011). Also in China, individuals of the Pond Frog (*Pelophylax nigromaculatus*) (Ranidae) are up to 16.19 mm longer than individuals found on the mainland; however, this condition is more related to reproductive effort (e.g., larger eggs) than to a reduced number of predators on islands (Wang et al., 2009).

On 23 October 2010, at 2030 h, we were conducting leaf-litter frog sampling in secondary tropical wet forest at Reserva Biológica Tirimbina (RBT) (10°24'5.73"N, 84°6'44.26"W;WGS 84; elev. 212 m), at Sarapiquí, Provincia de Heredia, Costa Rica, and captured a female *Incilius melanochlorus* (Bufonidae) and a female *Craugastor mimus* (Craugastoridae) with larger body sizes than previously reported (Table 1). The body size measurements reported herein are in standard length (length of the head plus body; see Savage, 2002). The body size for *I. melanochlorus* was 108 mm, and for *C. mimus* 72 mm. Two years later at RBT, on 16 October 2012 at 0900 h, BH captured a female *I. melanochlorus* with a body size of 115 mm. The body sizes for the two respective individuals of *I. melanochlorus* were 1.3 mm and 8.3 mm longer than those reported from throughout the species' distribution (Table 1, Fig. 1). The body size for *C. mimus* is 13 mm longer than that reported from throughout the distribution of this species (Table 1, Fig. 1). To our knowledge, this is the first report of body gigantism for a species with direct egg development (*C. mimus*). Although we have conducted surveys in the Sarapiquí region for several years, these are our first observations of gigantism in the anurans of this region.

Table 1. Observations on the body size of *Incilius melanochlorus* and *Craugastor mimus* at Reserva Biológica Tirimbina, Sarapiquí, Heredia, Costa Rica, and the body sizes reported for these species in different sources.

Species	AmphibiaWeb	INBio	Guyer and Donnelly (2004)	Savage (2002)	Observations
Incilius melanochlorus	Males: 73.6 mm Females: 106.7 mm	Males: 73.6 mm Females: 106.7 mm	100 mm	Males: 43–65 mm Females: 65–103 mm	Female: 108 mm Reserva Biológica Tirimbina, 7 October 2010
					Female: 115 mm Reserva Biológica Tirimbina, 23 October 2012
Craugastor mimus	Not reported	Males: 30 mm Females: 55 mm	Males: 38 mm Females: 59 mm	Males: 30–37mm Females: 45–58mm	Female: 72 mm Reserva Biológica Tirimbina, 21 October 2010

Body gigantism in these species might be explained by two main reasons: low predation risk and higher food availability due to forest isolation, and the influence of different land use types surrounding the Reserve. Secondary forest at RBT can act as an island surrounded by agave plantations for ornamentals, *Acacia* spp. trees introduced for forest regeneration and forestry, human settlements, and along paved and unpaved roads. This situation can deter or eliminate frog predators (e.g. snakes, Visco and Sherry, 2015) from this secondary forest. Additionally, the matrix surrounding RBT influences resource availability, increasing the abundance of arthropods in this forest fragment (Power, 1996). Therefore, if one considers forest fragments as islands surrounded by a low permeable matrix for frogs, as well as the findings related to gigantism in oceanic islands where frogs have been reported as significantly larger than on the mainland (Li et al., 2011; Rog et al., 2013), we believe that the larger body size reported here for *I. melanochlorus* and *C. mimus* might represent examples of insular gigantism in the context of forest fragmentation in tropical rainforests.

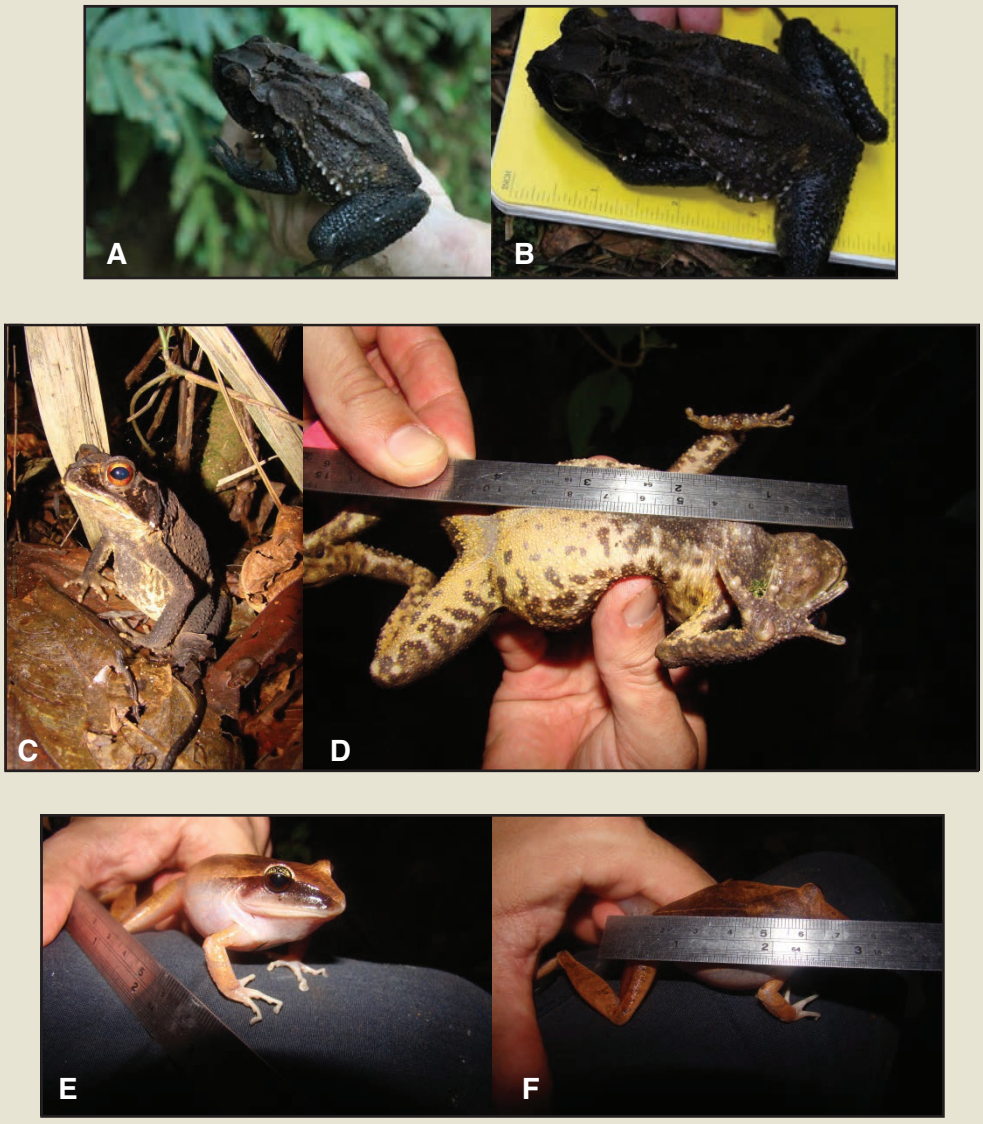

Fig. 1. Body gigantism observed in *Incilius melanochlorus* (A, B, C, D) and *Craugastor mimus* (E, F) at Reserva Biológica Tirimbina, Sarapiquí, Heredia, Costa Rica. © Eva Jacobs (A, B) and Branko Hilje (C, D, E, F)

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***Smilisca baudinii*. Cannibalism.** Cannibalism is defined as the killing and consumption of live conspecifics, and in amphibians this can be accomplished in different ways throughout their life stages. Larvae are known to eat eggs (Hamel, 2009) and other larvae (Infante and Rojas, 2006), and adults are known to eat eggs (Hamel, 2009), larvae, and post-metamorphic individuals (Pizzatto and Shine, 2008). This phenomenon is widespread among amphibians, taxonomically and biogeographically, and has been reported in at least 12 families of anurans, seven of the nine families of salamanders, and in one family of caecilians (Crump, 1992). Reports of cannibalism in anurans are more common in species of the families Ranidae (Stuart and Painter, 1993; Krupa, 2002; Cicek and Mermer, 2007) and Leptodactylidae (Nogueira de Carvalho and Pereira, 2005; Jorge and Freire, 2011) than in hylids (Grant and Halliday, 2011; Höbel, 2011), even though this family includes a greater number of anuran species (Frost, 2015).

Smilisca bauidinii is a hylid frog with a widespread distribution ranging from extreme, southern Texas, United States, southward to Costa Rica (Frost, 2015). Although a detailed study of the diet of *S. baudinii* has not been conducted, some anecdotal reports are available. Lee (2000) indicated that the diet of this species is composed of insects and spiders, and Frazier et al. (2010) report on the consumption of an individual of the lizard *Anolis* (*Norops*) *lemurinus*; however, we could find no information in the literature regarding cannibalism in this species.

On 7 October 2014 at 22:47 h, at La Esmeralda, Municipio de Santa Maria Chimalapa, in northeastern Oaxaca, Mexico (17°9'4.6"N, 94°47'4.9"W; elev. 112 m), in a pasture field with a natural pond we observed an adult *S. baudinii*, 42 mm in snout–vent length (SVL), perched on a leaf ca. 1 m from the ground with a small leg visible in its mouth (Fig. 1). We interrupted the event and extracted a post-metamorphic individual of the same species (14 mm SVL) from its mouth.

Most reports of cannibalism are occasional events, so it is difficult to estimate the negative effect of this behavior at the population level; however, since *S. baudinii* is one of the most abundant hylids in Mesoamerica and undergoes a prolonged breeding season (Duellman, 2001), it seems reasonable to think that this phenomenon is common in this species. The available data in anurans about the importance of conspecific predation on a species' diet suggest that it can vary geographically and seasonally, and might represent from a small percentage to 30% of the diet (Wells, 2007).

Fig. 1. An adult *Smilisca baudinii* eating a post-metamorphic individual of the same species at La Esmeralda, northeastern Oaxaca, Mexico. © Arístides García Vinalay

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***Triprion petasatus*. Longevity.** The Yucatecan Casquehead Treefrog, *Triprion petasatus*, is a nocturnal hylid that inhabits savannas and low dry and moist forests of the Yucatan Peninsula (Campbell, 1998; Lee, 2000). During the day, this species seeks shelter in tree holes and limestone rocks, as well as in the recesses of tree trunks and in rock crevices (Stuart, 1935; Köhler, 1997). These frogs plug the openings of their retreats with their casque-like heads, a behavior called "phragmosis," and are almost impossible to extract; the co-ossified dorsal head surface obviously helps reduce cutaneous water loss (Lee, 2000). In March of 1996, GK received a series of froglets of this species from a Czech breeder, which were raised to adults (Fig. 1) and kept in a terrarium (2.0 m length × 0.6 m width × 0.6 m height) equipped with branches, hollow bark tubes, and living plants (mostly *Scindapsus* and *Ficus pumila*). Most of these frogs reached an age of over 10 years and the last one died on 23 March 2015 at an age of 19 years, an apparent captive longevity record. This frog was preserved and added to the herpetology collection of Senckenberg Forschungsinstitut (SMF 99501).

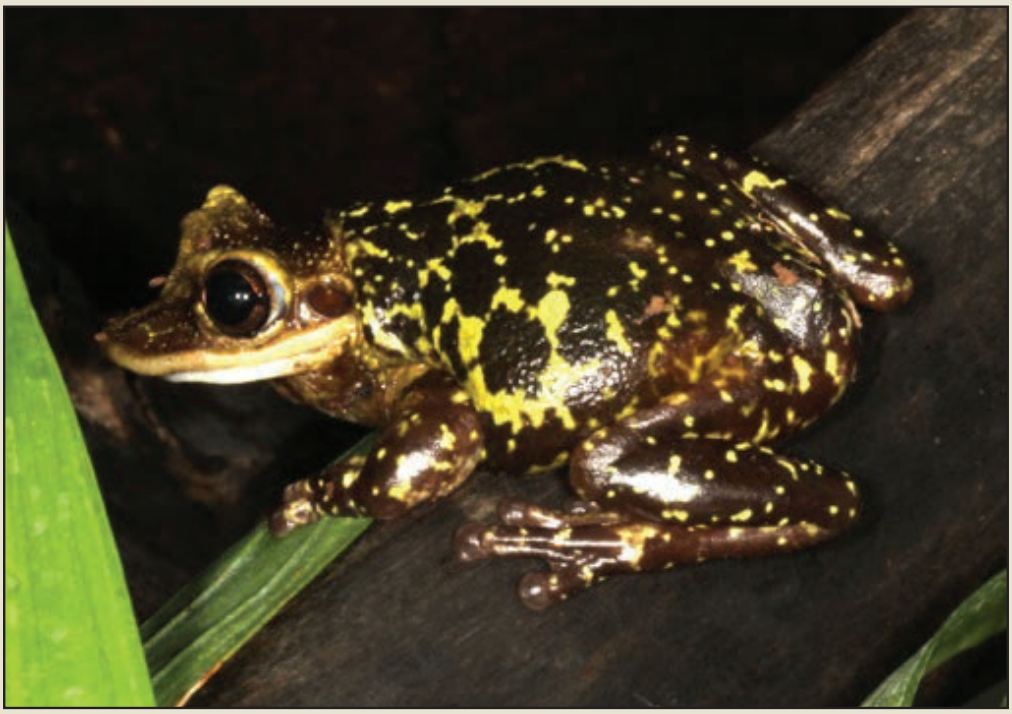

Fig. 1. A captive individual of *Triprion petasatus* at 16 years of age, photographed in August of 2012. © Gunther Köhler

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Amphibia: Anura / Reptilia: Squamata (lizards)

***Anolis* (*Norops*) *compressicauda* and *Craugastor berkenbuschii*. Predator-prey interaction.** Amphibians are considered relevant components of food webs in ecosystems, and are consumed by a large number of predators, including reptiles (Toledo et al., 2007). Among the different groups of reptiles, the consumption of amphibians is differential, because while snakes are the largest consumers of amphibians in some areas, lizards probably are the least significant predator group (Wells, 2007).

The few reported cases of lizard species preying on amphibians (frogs, in most cases), include lizards of the genera *Varanus* (Wager, 1965), *Basiliscus* (Fleet and Fitch, 1974), *Eulamprus* (Pyke and Miehs, 2001), *Tupinambis* (Murphy, 1997), *Sphaerodactylus*, *Ameiva* (Stewart and Woolbright, 1996, Thomas and Kessler, 1996), and *Ophisaurus* (Kuzmin, 1999). Cases of predominantly insectivorous lizard species preying on amphibians, like several species of anoles, are scarcer. Among the anoles reported as predators of frogs are *Anolis* (*Ctenotus*) *cristatellus* feeding on individuals of the genus *Eleutherodactylus* (Stewart and Woolbright, 1996, Thomas and Kessler, 1996), *Anolis* (*Deiroptyx*) *smallwoodi* feeding on a individual of *Osteopilus septentrionalis* (Fong and Blanco-Ojeda, 2002), *Anolis* (*Norops*) *uniformis* preying on a individual of *Craugastor* sp. (Cabrera-Guzmán and Reynoso, 2008), and *Anolis* (*Dactyloa*) *punctatus* feeding on an individual of an unidentified frog species (Vitt et al., 2003).

During fieldwork in southern Mexico, in the region of Uxpanapa, Veracruz, on 11 March 2014 at 13:15 h, (17°'09.0"N, 94°29'03.5"W; datum WGS 84; elev. 269 m), we observed a hatchling individual of *Craugastor berkenbuschii* being held by a male of *Anolis* (*Norops*) *compressicauda* (Fig. 1), in a fragment of tropical rainforest fragment near a stream. Both individuals were captured and transported to the laboratory. The frog was identified

Fig. 1. A male *Anolis* (*Norops*) *compressicauda* preys on a hatchling of *Craugastor berkenbuschii* in a rainforest of southern Mexico. © José Luis Aguilar López

according to the diagnostic morphological and coloration characters presented by Campbell and Savage (2000), and the lizard was identified according to the diagnostic morphological and scutellation characters presented by Smith and Kersters (1955). The latter specimen measured 49 mm in snout–vent length (SVL) and 56 mm in tail length (TL). The specimen was deposited in the collection of amphibians and reptiles at the Instituto de Ecología, A. C., in Xalapa, Veracruz (CARIE-0856).

This finding represents the first report of predator-prey interaction between these lizard and anuran species. Information on the natural history of both species is scarce. In ecological terms, predation of lizards on frogs could act to regulate their populations, but further studies are necessary to understand these interactions and their impact on frog populations (Wells, 2007). With regard to the importance of frogs in the diet of lizards, the available data suggest that it ranges from 1 to 40% of the diet of a given lizard species (Wells, 2007).

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Reptilia: Squamata (Lizards)

***Gerrhonotus ophiurus*. Reproduction.** *Gerrhonotus ophiurus* is a semiarboreal anguid lizard typically found in pine, pine-oak, and mesic montane forests at elevations from 500 to 2,800 m (Ramírez-Bautista et al., 2014) in central and southeastern San Luis Potosí, eastern Querétaro, northern Hidalgo, Tlaxcala, Puebla, and northern Veracruz, Mexico (Lemos-Espinal and Dixon, 2013). Relatively little information is available on the biology of most Mexican members of the genus *Gerrhonotus*, and herein we report data on egg-guarding behavior and clutch size in *G. ophiurus*.

During the course of a herpetofaunal survey on 19 June 2015, one of us (IRH) found an adult female *G. ophiurus* at Los Duraznos, Municipio de Jacala de Ledezma, Hidalgo (21°05'8.58"N, 99°05'51.16"W; WGS 84) in pine-oak forest at an elevation of 1,517 m. The individual, ca. 130 mm in snout–vent length (SVL), was found in a coiled position guarding her nest, which contained 11 eggs, of which two were covered with fungi. The nest, discovered next to a trail, was located in the ground and under a piece of wood. When approached, the female displayed egg-guarding behavior (Fig. 1).

Mendoza-Quijano and Schmidt Ballardo (1995) reported on a female *G. ophiurus* found under a rock with 10 eggs, in tropical deciduous forest in San Luis Potosí. Greene et al. (2006) subsequently presented an overview of parental behavior in anguid lizards, noting the defense of eggs and/or young among the ecological advantages of parental behavior, and reported on another female of *G. ophiurus* found under a rock with about 15 eggs in desert habitat in Puebla. To our knowledge, this note contains the first published photograph of egg-guarding behavior in this species.

Fig. 1. A female of *Gerrhonotus ophiurus* from Los Duraznos, Municipio de Jacala de Ledezma, Hidalgo, Mexico, guarding her nest. © Ferdinand Torres-Angeles

Acknowledgments.—This study was supported by the projects 191908–Diversidad Biológica del Estado de Hidalgo-3a Etapa, and CONABIO JM001. We thank the people of Los Duraznos for allowing us to conduct fieldwork in the area.

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***Phyllodactylus muralis*. Reproduction.** *Phyllodactylus muralis* is endemic to Oaxaca, Mexico, where it is known from tropical deciduous forest and dry forest at elevations from sea level to 1,300 m (Campbell, 2007). Dixon (1964) reported information on the reproduction of *P. muralis*, and found mature eggs in some females during all seasons and neonates in January, February, April, June, August and December, suggesting that reproduction probably occurs year round. Little information is available on the sizes at which geckos of the genus *Phyllodactylus* reproduce, and in this note I report this information for *P. muralis*.

I examined five adult females (mean snout–vent length [SVL] = 52.8 mm ± 2.4 SD, range = 50–56 mm), six adult males (mean SVL = 54.3 mm ± 2.2 SD, range = 52–58 mm) and two subadult females (each SVL = 43 mm) of *P. muralis* from Oaxaca, Mexico, in the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California. The adult females (LACM 130048, 130049, 130053), subadult females (LACM 130050, 130059), and adult males (LACM 130045–130047, 130051, 130061) were collected 26 km N of Cuicatlán (17.78333°N, 96.96667°W); the adult females (LACM 130035, 130042) and an adult male (LACM 130039) were from 13 km WNW of Tehuantepec (16.25665°N, 95.31850°W). All lizards were collected in June of 1979.

I removed the left gonad (except oviductal eggs) from each specimen and embedded it in paraffin, and then cut histological sections at 5 µm and stained them with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). I examined the slides to determine the stage of the testicular cycle or the presence of yolk deposition. I counted the oviductal eggs, but did not examine them histologically, and deposited the histology slides at LACM.

All five males exhibited spermiogenesis (seminiferous tubules are lined by sperm or clusters of metamorphosing spermatids). Four of five females contained oviductal eggs (mean clutch size = 1.8 ± 0.50 SD, range = 1–2). One female had quiescent ovaries (no yolk deposition) and may have been between egg clutches. Two smaller females, each 43 mm SVL, contained tiny inactive ovaries and I considered them as subadults. The sizes for reproductively

mature males and females for *P. muralis* presented herein are close to those given for the congener *P. lanei* from Jalisco, Mexico (52 mm SVL males, 49 mm SVL females) by Ramírez-Sandoval et al. (2006). Lee (1996) reported the SVL of adult *P. tuberculosus* from Yucatán as 55–65 mm. Additional specimens of *P. muralis* need to be examined to further elucidate the reproductive biology of this species.

Acknowledgments.—I thank Greg Pauly (LACM) for permission to examine specimens of *Phyllodactylus muralis*.

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***Phrynosoma orbiculare*. Aberrant (highly-reduced) cranial horn development.** The usually well-developed, bone-cored horns found in the genus *Phrynosoma* are one of the most important traits used in identifying and classifying horned lizards (Montanucci, 1987). Squamosal and other cranial and mandibular bones are considered as synapomorphic in the genus (Etheridge and de Queiroz, 1988; Frost and Etheridge, 1989; Powell et al., 2002). Many peculiarities of the genus, like morphological specializations (dorsoventrally compressed body, cranial horns, enlarged dorsal scales, and body fringe scales), life history traits (reproductive mode, fecundity), ecology (prey capture and rain-harvesting), and behavior (anti-predator defenses) have drawn researchers' attention (Pianka and Parker, 1975; Sherbrooke, 2003, 2013). The cranial horn structure among species in the genus is variable (Leaché and McGuire, 2006), including the horn structure between populations of this species (Moreno-Barajas et al., 2013).

According to the latest taxonomic review, *Phrynosoma* is comprised of 17 species with a distribution that extends from Canada to Guatemala, of which four, including *P. orbiculare* (Mountain Horned Lizard), are distributed along the Mexican Transvolcanic Belt (Nieto-Montes de Oca et al., 2014). *Phrynosoma orbiculare* inhabits pine and oak woodlands, bunch grassland, and some desert shrublands (Bryson et al., 2012; Moreno-Barajas et al., 2013). The taxonomic history of this species is complex. Based on a mitochondrial DNA analysis, Bryson et al. (2012) suggested that several distinct lineages are embedded within *P. orbiculare*, and that future studies should incorporate multilocus data to determine their distribution. In a morphological study, Morejo-Barajas et al. (2013) suggested that three of the former subspecies of *P. orbiculare* (*boucardi*, *orientale*, and *durangoensis*) should be considered as species.

Several anti-predatory strategies and traits have been recognized in most species of *Phrynosoma*: squirting a stream of distasteful blood, short runs with abrupt stops, general patterns of crypsis, body puffing to increase size and spininess, and sharp widespread horns as defensive weapons (Pianka and Parker, 1975; Sherbrooke, 2003). Bergmann and Berk (2012) considered the horns of *Phrynosoma* as a good model to test for allometry in the evolution of defensive adaptations. In fact, some of these traits and strategies (horns and spiny scales of many species)

have been considered as "death traps" for some whole-prey ingesting predators, such as snakes (Sherbrooke, 2003, 2008, 2013; Speed and Ruxton, 2005). Conspicuous horns and other traits apparently have played an important role in the evolution of anti-predator defenses and predator responses (Young et al., 2004: also see Agosta and Dunham, 2004, Brodie et al., 2004; Sherbrooke 2008, 2013; Sherbrooke and May, 2008).

Here we report the first record of clearly underdeveloped horns in an individual of *P. orbiculare*. On 10 April 2015, at Parque Nacional La Malinche, Tlaxcala, Mexico (19°14'40"N, 97°59'25"W), elev. 3,100 m (bunch grassland and pine forest), we captured an adult pregnant female *P. orbiculare* (snout–vent length = 85 mm; total length = 124 mm; 55 g) with aberrantly underdeveloped (dramatically length-reduced) parietal and squamosal horns (Fig. 1A). This individual, however, exhibited well-developed frontal (supercilliary) and central parietal horns (Fig. 1B). Using X-ray analysis we determined an apparent lack of underlying bone development, typical of horns in this species (Fig. 2), for the highly reduced squamosal and parietal horns of this individual (Fig. 1C, D). Although based on a single individual, the nature of this unusual morphological horn-structure, along with its genetic basis and developmental history, might have implications for understanding the role of horn structure in the evolution of anti-predator defenses and in the taxonomic designation of this previously unstudied population, as well as in the evolution of horn structure within the genus.

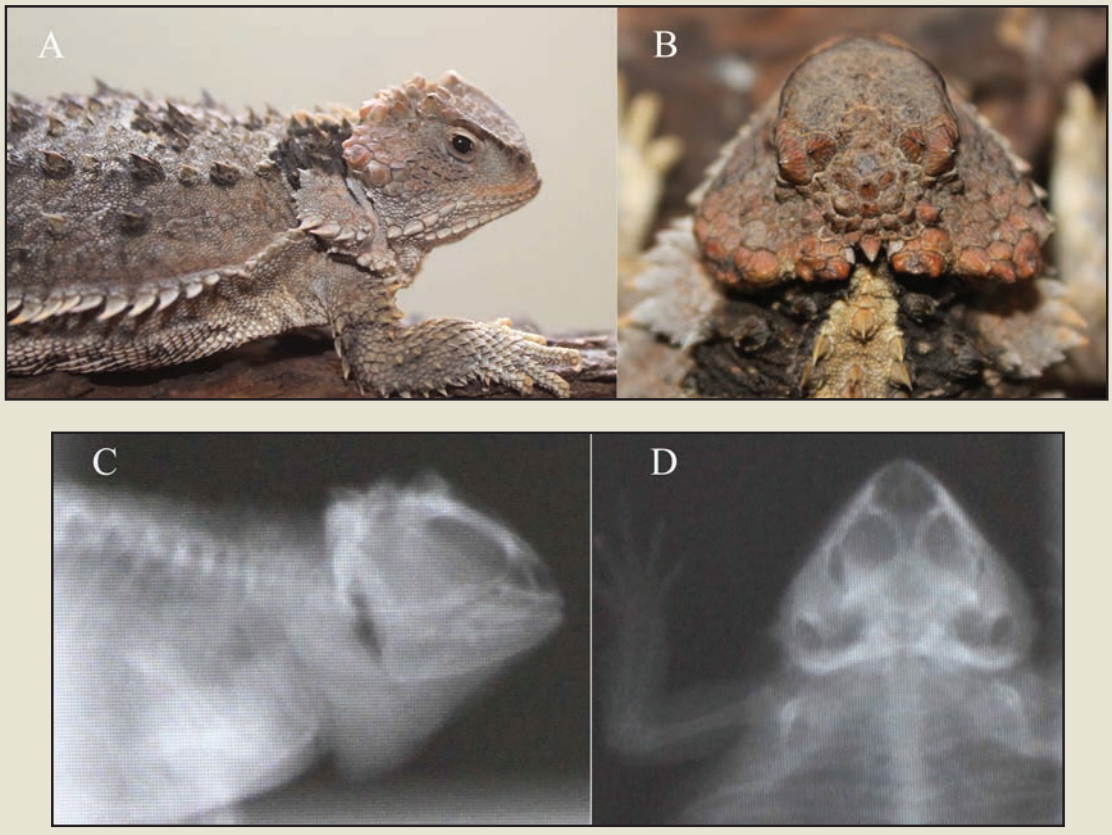

Fig. 1. An adult female *Phrynosoma orbiculare* with underdeveloped cranial horns. (A) lateral view, (B) dorsal view, (C) X-ray lateral view, and (D) X-ray dorsal view. © Aníbal Díaz de la Vega-Pérez

Leaché and McGuire (2006) proposed a phylogenetic taxonomy highlighting four clades, of which they considered *P. orbiculare* in the Tapaja clade (along with *P. ditmarsi*, *P. hernandesi*, and *P. douglasii*); compared with *P. orbiculare*, short or extremely reduced cranial horns are present in these other species. In addition, Moreno-Barajas et al. (2013) noted that different morphological characteristics, especially in snout and horn features, are present in populations of *P. orbiculare*.

Given the life history of members of the genus *Phrynosoma*, and the taxonomic significance of horn size and development within species in the genus, we consider it important to continue studying this population to explore if dramatically reduced horn size and development is a common trait of individuals in this population, if it is hereditary, and/or if it is an isolated case of morphological abnormality.

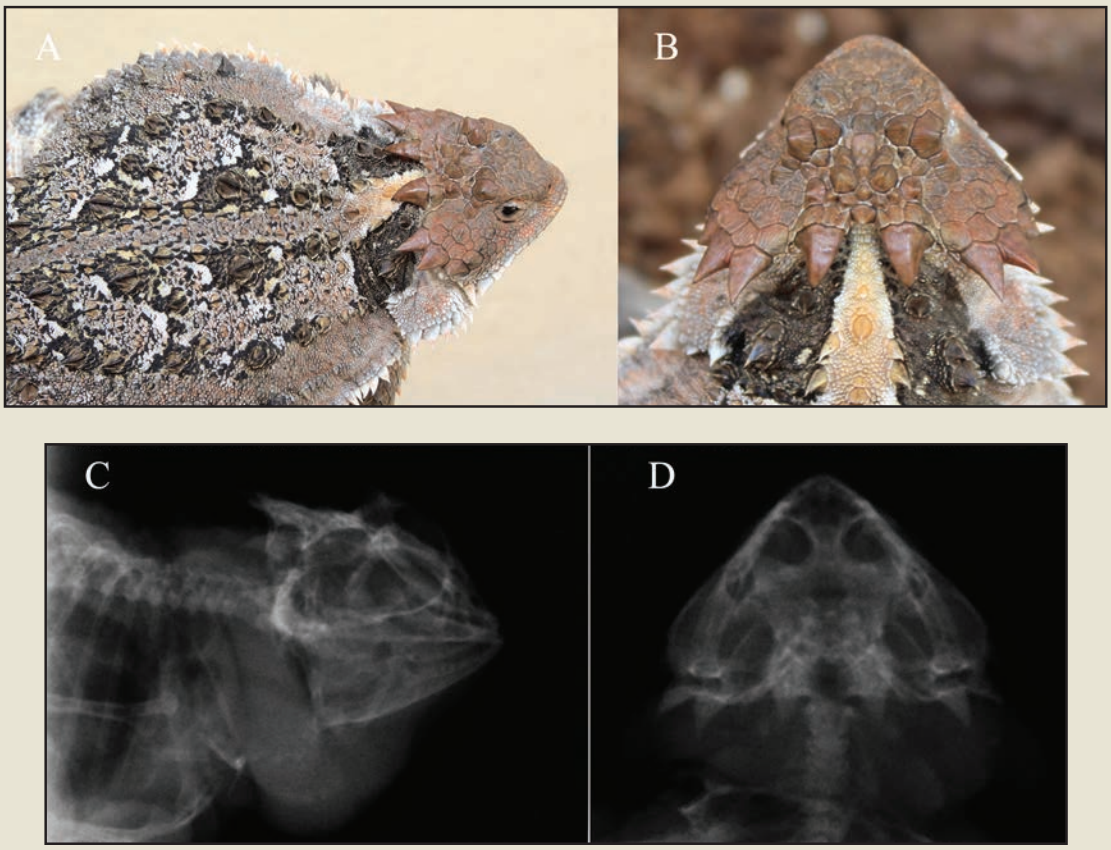

Fig. 2. An adult female *Phrynosoma orbiculare* with normally developed cranial horns, from the same population as the female in Fig. 1. (A) lateral view, (B) dorsal view, (C) X-ray lateral view, and (D) X-ray dorsal view.

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***Sphaerodactylus graptolaemus*. Habitat**. Most members of the genus *Sphaerodactylus* (Least Geckos) are terrestrial and commonly encountered during the day in moist coastal forests, under leaf litter, woody debris, and rocks (Meier and Noble, 1990; Schwartz and Henderson, 1991). The Costa Rica Least Gecko (*S. graptolaemus*) is a poorly known species with a largely coastal distribution in southwestern Costa Rica and western Panama, at elevations from sea level to 700 m (Köhler, 2008). The habits of this small secretive gecko have been described as scansorial (Savage, 2002). Empirical records describing the arboreal habitats exploited by this species, however, are scarce. The few accounts simply are anecdotal or deductive, based on observations of other sphaerodactyline geckos. Here we report the arboreal use of the Spiny Peach Palm (*Bactris gasipaes*) by *S. graptolaemus*.

At 1430 h on 10 January 2015, in the central region of Parque Nacional Manuel Antonio, Cantón de Aguirre, Provincia de Puntarenas, Costa Rica (9°23'9.294"N, 84°8'35.0772"W; WGS 84; elev. 15 m), we encountered an adult *S. graptolaemus* on a mature *B. gasipaes*. We found the individual ca. 2 m above the ground (Fig. 1A), moving easily among dense thorns (ca. 18 cm long) covering the trunk of the palm (Fig. 1B). The sharp thorns discouraged any attempt on our part to capture the gecko. The individual was on the palm prior to our arrival and remained there throughout our observations (> 5 min). This relatively brief instance suggests that *B. gasipaes* is used as suitable arboreal habitat for *S. graptolaemus*, and not as the endpoint of an evasive maneuver to seek protection among thorns once the individual was startled.

Fig. 1. (A) An adult *Sphaerodactylus graptolaemus* among dense spines, and (B) T. Crosse indicating the location of the gecko on *Bactris gasipaes*, approximately 2 m above the ground in Parque Nacional Manuel Antonio, Cantón de Aguirre, Provincia de Puntarenas, Costa Rica.
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Regarded as terrestrial, the exploitation of arboreal or semi-arboreal habitats by other *Sphaerodactylus* species has been well documented (Schwartz and Henderson, 1991; Savage, 2002). Nevertheless, published information specific to the scansorial habits of *S. graptolaemus* is rare. For example, only seven vouchered specimen records of *S. graptolaemus* are available on the online database www.VertNet.org, and of those only one record had field notes indicating arboreal activity. The specimen (UMMZ 174004), a female collected on 23 February 1970 from western Costa Rica, purportedly was found on a Coconut Palm (*Cocos nucifera*) (VertNet, 2015). *Cocos nucifera* is related to *B. gasipaes* (family Arecaceae), but lacks the widespread and elongated spines covering the trunk. These unpublished field notes apparently represent the documented extent of the arboreal habitats exploited by *S. graptolaemus*.

Despite this species' restricted range, scarcity in suitable habitat, and predilection for old growth forest, it currently is listed as Least Concern by the IUCN (Bonilla et al., 2013). This listing seemingly is founded on the notion that the species benefits from a range overlapping with protected areas in Costa Rica; in Panama, however, it does not. Alternatively, using an Environmental Vulnerability Score (EVS) to assess the conservation status of the herpetofauna in Panama and Costa Rica, *S. graptolaemus* was placed in the medium and high categories, with EVS scores of 12 in Panama (Jaramillo et al., 2010) and 14 in Costa Rica (Sasa et al., 2010). At the time of these two assessments (ca. 2010), the IUCN listed *S. graptolaemus* as Data Deficient. In a recent conservation reassessment of the Central American herpetofauna using EVS scores, Johnson et al. (2015) supported the placement

S. graptolaemus in the high category with an EVS score of 16. These major discrepancies between conservation evaluations for *S. graptolaemus* indicate a critical deficiency of basic biological information, which, if not remedied, will certainly be disadvantageous to the conservation outlook for this and other understudied species.

The dearth of empirical information regarding the ecological habits of *S. graptolaemus* renders this a noteworthy observation, and to the best of our knowledge this report is a new arboreal habitat record for this enigmatic gecko.

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Reptilia: Squamata (snakes)

***Bothriechis schlegelii*. Diet.** The Eyelash Palm-pitviper, *Bothriechis schlegelii*, is known to feed on a variety of small vertebrates, including frogs, lizards (especially anoles), birds (including hummingbirds), mammals (including a small marsupial), and in captivity an incident of cannibalism has been reported (see summary in Campbell and Lamar, 2004; Sorrell, 2009; Meza Ramos et al., 2010; McCranie, 2011; Barrio-Amorós, 2015). Cundall and Greene (2000) noted that viperids are capable of eating exceptionally large prey items relative to their body size. As an example, Lindley and Sorrell (2004) reported on a subadult female *B. schlegelii*, measuring 360 mm in

snout–vent length (SVL) and 423 mm in total length (TL), and weighing 19 g, having consumed a Turnip-tailed Gecko (*Thecadactylus rapicauda*) measuring 118 mm SVL and 125 mm TL and weighing 28 gr, resulting in a prey/predator ratio of 1.47.

Herein we report an incident of an adult *B. schlegelii* ingesting an extraordinarily large prey item relative to its length, a subadult *Holcosus undulatus* (Teiidae). The *B. schlegelii* was found and killed by a gardener at the Green Village Bed & Breakfast, ca. 10 km N of Tilarán, Provincia de Guanacaste, Costa Rica (10.5233831°N, 84.9698291°W; WGS 84), on 21 October 2014 at 1000 h. One of us (RM) recovered the body and froze it until 2 November 2014**,** when it was dissected. The *B. schlegelii* measured 56 cm TL (SVL not taken) and weighed 34 gr, and the *H. undulatus* measured 38 cm SVL and 47 cm in TL, and weighed 49 gr, resulting in a prey/predator ratio of 1.44.

In a study involving diel movement and predation activity patterns in *B. schlegelii*, Sorrell (2009) indicated that this species most often moves at night, can capture mobile prey from daytime perches, and consumes prey during the day and night. Further, he noted that *B. schlegelii* frequently will strike and successfully capture prey such as frogs and the lizard *Norops limifrons* (Dactyloidae) that approach a snake's ambush site. Sorrell (2009) also indicated *Ameiva festiva* (= *Holcosus festivus*) in the diet of *B. schlegelii*, but provided no explanation how this diurnal, terrestrial, fast-moving teiid that retreats down burrows or hides under logs and debris (Savage, 2002) might have been taken. *Holcosus undulatus* is similar in behavior, so the tactics used by *B. schlegelii* to capture these extremely active lizards remain a mystery. The size of the prey item ingested by the individual of *B. schlegelii* in this note is the second largest on record, after the 1.47 prey/predator ratio for an individual of *Thecadactylus* reported by Lindley and Sorrell (2004).

Fig. 1. An adult *Bothriechis schlegelii* with its massive prey, a subadult *Holcosus undulatus*. The individuals were not preserved. © Ray Morgan

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Drymobius margaritiferus. **Mating behavior.** The Speckled Racer, *Drymobius margaritiferus*, is a widespread colubrid with a broad distribution that on the Atlantic versant extends from extreme southern Texas, United States, to northern Colombia, and on the Pacific versant from southern Sonora to central Panama (McCranie, 2011). This species is known to occur in a variety of habitats, including savannas, but favors open areas along forest edges and clearings, riparian sites, areas of secondary growth, pastures, and roadsides (Dixon and Werler, 2000; Savage, 2002). Its elevational distribution extends from sea level to 2,000 m (Köhler, 2008; Wilson and Johnson, 2010). In Tamaulipas, Mexico, *D. margaritiferus* has been recorded from the Gómez Farías region and the Sierra de Tamaulipas in a variety of tropical habitats, both arid and humid, including lower cloud forest and pine-oak forest (Martin, 1958). Although this species is widely distributed, little is known about its natural history (Dixon and Werler, 2000). Herein we report an observation on the mating behavior of this species from the northern part of its distribution.

On 30 May 2015 at 1430 h, at the Centro Interpretativo Ecológico (CIE), Gómez Farías, Tamaulipas, Mexico (23.06599° N, 99.16864°W; WGS 84; elev. 360 m), Mario Alberto Álvarez Lara and Luis García Álvarez observed an aggregation of five adult individuals of *D. margaritiferus* next to a waterfall (Fig. 1). The snakes were intertwined, and one individual (presumably a female) looked larger than the others. Although the snakes were not observed copulating, apparently they were displaying courtship behavior. After ca. 20 min of exhibiting this behavior, the snakes dispersed in different directions. A few minutes later they reappeared near the location where they initially were observed and began to perform similar mating behavior, but this time while hiding under a large plant that obstructed the observer's view. This observation occurred near an artificial lake and a waterfall, where rocks and dense vegetation dominate the landscape. This disturbed area, which is surrounded by tropical deciduous forest, has become an attractive habitat for *D. margaritiferus* and other common snake species whose diet includes amphibian prey.

In Central America, Campbell (1998: 213) mentioned seeing a photograph taken at Biotopo Cerro Cahuí, in the department of El Petén, Guatemala, in which at least seven adult individuals of *D. margaritiferus*, one of the snakes considerably larger than the others, were intertwined. In Costa Rica, Solórzano (2004) reported that during the dry season (from December through April) in areas of the Valle Central, aggregations of up to 25 individuals of *D. margaritiferus* have been observed, possibly for reproduction. To our knowledge, this note represents the first published photograph of an apparent breeding aggregation of *D. margaritiferus*.

Fig. 1. Five individuals of the Speckled Racer (*Drymobius margaritiferus*) presumably displaying courtship behavior at Centro Interpretativo Ecológico, Gómez Farías, Tamaulipas, Mexico. © Mario Alberto Álvarez Lara

Acknowledgments.—A special thanks to Mario Alberto Álvarez Lara and Luis García Álvarez for their expertise documenting this rarely observed event in the wild. We also thank Javier Olivos Rivera for his assistance and logistical support to make this manuscript possible, and to the rest of the staff of Centro Interpretativo Ecológico (Secretaría de Desarrollo Urbano y Medio Ambiente-Gobierno del Estado de Tamaulipas) who continue to do an extraordinary job of environmental education in the region. Louis Porras provided important advice on the manuscript.

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***Imantodes cenchoa*. Coloration.** *Imantodes cenchoa* is an abundant Neotropical species that on the Atlantic versant ranges from Tamaulipas, Mexico, to Argentina, including Trinidad and Tobago, and on the Pacific versant from Oaxaca, Mexico, to Guatemala and from northwestern Costa Rica to Ecuador (McCranie, 2011). In Costa Rica, *I. cenchoa* is found in low and moderate elevations on both versants (Savage, 2002). This slender-bodied species primarily is arboreal and nocturnal, feeds mostly on sleeping lizards and frogs, and is known to reach a maximum total length (TL) of 130 cm (Solórzano, 2004).

On 9 January 2013 at 1945 h, at Sierpe de Osa, Provincia de Puntarenas, Costa Rica (8º52'N; 83º28' W; WGS 84; elev. ca. sea-level), RN observed an amelanistic *I. cenchoa* ca. 40 cm TL resting (inactive) on a leaf (Melastomataceae) at a height of 120 cm from the ground.

The individual was not collected, but its dorsal coloration consisted of ivory white blotches bordered by pure white on a pale pink ground color, and the iris was orange pink with a darker pupil (Fig. 1). To our knowledge, this is the first report of amelanism in this species.

Fig. 1. View (with insert of the head) of an amelanistic individual of *Imantodes cenchoa* found at Sierpe de Osa, Provincia de Puntarenas, Costa Rica. © Raby Núñez Escalante

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Porthidium nasutum. Diet. The Rainforest Hog-nosed Pit Viper (*Porthidium nasutum*) is a venomous snake with a distribution extending from northwestern Chiapas, Mexico, southward to northwestern Ecuador (Savage, 2002; Campbell and Lamar, 2004). This species inhabits tropical evergreen forest, tropical moist forest, and lower montane wet forest (Campbell and Lamar, 2004) at elevations from sea level to 1,500 m, with questionable records in Colombia to 1,880 m (Campbell and Lamar, 2004; Solórzano, 2004). In Mexico it has been reported from the Northern and Eastern Highlands regions of Chiapas, mostly in tropical evergreen forest (Johnson et al., *This issue*). Little information, however, is available on the natural history of this pitviper. Herein, we report a predation event by *P. nasutum* on the teiid *Holcosus hartwegi* in southeastern Mexico.

On 1 July 2013 at 1630 h, during a field trip to Estación Biológica Chajul in the Reserva de la Biósfera Montes Azules, Ejido Chajul, Municipio de Marqués de Comillas, Chiapas, Mexico (16.11118°N 90.94016°W; WGS 84; elev. 150 m) one of us (RPM) found an individual of *P. nasutum* in the process of ingesting a freshly killed Rainbow Whiptail Lizard (*H. hartwegi*), swallowing the head first (Fig. 1). After a short period of observing and photographing the event, RPM left the site to avoid further disturbance. The observation occurred in riparian vegetation surrounded by tropical evergreen forest. *Holcosus hartwegi* recently was elevated to species level, as previously it was regarded as a subspecies of *H. undulatus* (Meza-Lázaro and Nieto-Montes de Oca, 2015). *Porthidium nasutum* feeds mostly on frogs, lizards, and small mammals (Greene, 1997; Campbell, 1998; Savage, 2002). Juveniles have been reported to consume mainly frogs and lizards, and adults mostly mammals (Greene, 1997). More specifically, Michael and Patricia Fogden photographed the species feeding on the frog *Craugastor megacephalus* (Savage, 2002) and the lizard *Holcosus festivus* (Greene, 1997); other food items include *Norops* spp. and mice (Álvarez del Toro, 1983), the bird *Glyphorhynchus spiralus* (Greene, 1997), and the rodent *Heteromys desmarestianus* (Greene, 1997). In captivity, neonates have been reported to consume earthworms and later anoles (Picado, 1931); Porras et al. (1981) also noted that captive individuals fed on ranid frogs, anoles, mice, and observed cannibalism both in juveniles and adults. This note represents the first published report of *H. hartwegi* in the diet of *P. nasutum*.

Fig. 1. A young adult *Porthidium nasutum* feeding on an adult *Holcosus hartwegi* at Estación Biológica Chajul, Reserva de la Biósfera Montes Azules, Chiapas, Mexico. © Rafael Paredes-Montesinos

Acknowledgments.—A special thanks to Rubí Meza-Lázaro, who kindly provided EGP information regarding distribution of *Holcosus hartwegi* in the state of Chiapas. We also thank the Laboratorio de Ecología (Universidad Nacional Autónoma de México) and Natura y Ecosistemas Mexicanos A.C. for providing logistical support. Finally, a special thanks goes to Louis Porras for improving the quality of the manuscript.

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***Thamnophis proximus*. Reproduction.** The distribution of *Thamnophis proximus* extends from Wisconsin, Indiana and the Misissippi Valley to Colorado and New Mexico, in the United States, southward through Atlantic versant of Mexico and parts of Central America to northeastern Costa Rica, and on the Pacific versant from Oaxaca and the Isthmus of Tehuantepec in Mexico, and parts of Central America to central Costa Rica, at elevations from sea level to 2,438 m (Rossman, 1970; Rossman et al., 1996). Although the reproduction of *T. proximus* has been well studied in North America (Tinkle, 1957; Clark, 1974), information on the reproduction of this species in Mexico is limited to reports of mating in spring and parturition from mid-summer into fall, with 4–27 (usually 10–15) born (Lemos-Espinal and Smith, 2007; Lemos-Espinal and Dixon, 2013). In this note I report two litter sizes for *T. proximus* from Mexico.

I examined two female specimens of *T. proximus* from Mexico in the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California, United States. LACM 38183, collected 13 June 1967 at 3 km NW Tonalá, Chiapas (16.1000°N, 93.7500°W), contained 12 enlarged ovarian follicles (11 × 5 mm); LACM 121855, collected 21 June to 20 August, 1969 at Cuautlapan, Veracruz (18.8666°N, 97.0333°W), contained 10 embryos. Additional work is necessary before the reproduction of *T. proximus* in Mexico is better known, and comparisons can be made with the reproductive cycles of northern populations of this species.

Acknowledgments.—I thank Greg Pauly (LACM) for permission to examine specimens *T. proximus* in the collection.

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Amphibia: Anura

Family Leptodactylidae

***Leptodactylus fragilis* (Brocchi, 1877)**. MEXICO: OAXACA: Municipio de Villa de Tututepec de Melchor Ocampo, near Cerro La Encomienda (15.953072°N, -97.413270°W; WGS 84); elev. 5 m; 28 June 2015. Vicente Mata-Silva. A photograph of the frog is deposited in the University of Texas at El Paso Biodiversity Digital Collection (photo voucher UTEP G-2015.5). This individual represents a new municipality record that fills a gap between the closest reported localities ca. 50 km W in the vicinity of Atotonilco, Municipio de Jamiltepec, Oaxaca (Mata-Silva et al., 2010), and ca. 235 km E of several records in the vicinity of Tehuantepec, Oaxaca (Hartweg and Oliver, 1940; Duellman, 1960). The adult male *L. fragilis* was observed calling along with several conspecifics, near a puddle surrounded by coastal pastureland.

Acknowledgments.—Special thanks to Eduardo Mata Silva, Isabel Cortez Cristobal, and Zaida Mata Silva for their invaluable help and company. Arthur Harris kindly provided the photo voucher number.

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Family Ranidae

***Lithobates warszewitschii* (Schmidt, 1857)**. NICARAGUA: RIVAS: Municipio de Cárdenas, El Carmen (11.18612°N, 85.66894°W; WGS 84); elev. 150 m; 18 May 2015. José Gabriel Martínez-Fonseca and Marlon Francisco Chávez-Velásquez. We photographed a juvenile of this species (photo vouchered at The University of Texas at Arlington Collection of Vertebrates Digital Collection, UTADC 8536; Fig. 1.), which was active at night (2110 h) on leaf litter, ca. 50 cm from the shore of Río Ostayo in Tropical Dry Forest (Holdridge, 1967). This locality represents the first record of this species from the Pacific versant of Nicaragua, the first record for the department of Rivas, the first record from Tropical Dry Forest, and the westernmost record for this species, extending its distribution ca. 100 km W from its closest reported locality in Nicaragua and ca. 30 km NW of its closest reported locality in Costa Rica (Hillis and de Sá, 1988; Villa, 1990; Köhler, 2001; Savage, 2002).

Fig. 1. Juvenile *Lithobates warszewitschii* from El Carmen, Departamento Rivas, Nicaragua.
© José Gabriel Martínez-Fonseca

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Reptilia: Squamata (lizards)

Family Phrynosomatidae

***Phrynosoma modestum* Girard, 1852.** MEXICO: AGUASCALIENTES: Municipio Real de Asientos, ca. 1.8 airline km NNW of Real de Asientos (22.253031°N, 102.097306°W; WGS 84), elev. 2,172 m; 6 May 2015; Armando Cardona Arceo. A photo voucher of this individual is deposited at the San Diego Natural History Museum (SDSNH_HerpPC_05286), which represents the second record from the state of Aguascalientes. The closest reported locality for *Phrynosoma modestum* is ca. 10.7 airline km to the SSE, at 15.4 km SW Loreto, Zacatecas (= nr. Ciénega Grande, Aguascalientes; see McCranie and Wilson, 2001). Previously, the distribution of *P. modestum* in Aguascalientes was based on a specimen (UIMNH 43270) collected by P. S. Chrapliwy and K. Williams on 20 July 1958 (Chrapliwy et al., 1961). Despite several efforts by GEQD and RACM and other herpetologists in the state to locate this species (Sigala-Rodríguez and Greene, 2009), it had not been found again. The photo voucher reported herein reconfirms the presence of *P. modestum* in the state, after a hiatus of 57 years. The lizard was found active in xerophytic scrub, at 1600 h.

Acknowledgments.—We thank Bradford Hollingsworth for verifying the identification of the lizard in this note, and Christopher A. Phillips for providing information.

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***Sceloporus aurantius* Grummer and Bryson, Jr., 2014.** MEXICO: ZACATECAS: Municipio de Nochistlán de Mejía, ca. 9.2 km (airline) NW from Tlachichila (21.597895°N, -102.861660°W); elev. 2,570 m; 8 July 2014; Rubén Alonso Carbajal-Márquez and Gustavo Ernesto Quintero-Díaz. Photo vouchers of two individuals (male, female) are deposited at the San Diego Natural History Museum (SDSNH_HerpPC_ 05288 [female], 05289 [male]; Fig. 1). These lizards represent a new municipality record, extending the distribution ca. 21.8 km (airline) SW from closest known locality at Los Alisos, Sierra El Laurel, Calvillo, Aguascalientes (Grummer and Bryson, 2014). These vouchers also represent the maximum known elevation for this species; the previous highest recorded elevation (2,419 m) was for the holotype (Grummer and Bryson, 2014). The lizards were found in close proximity to one another, while basking in oak savanna.

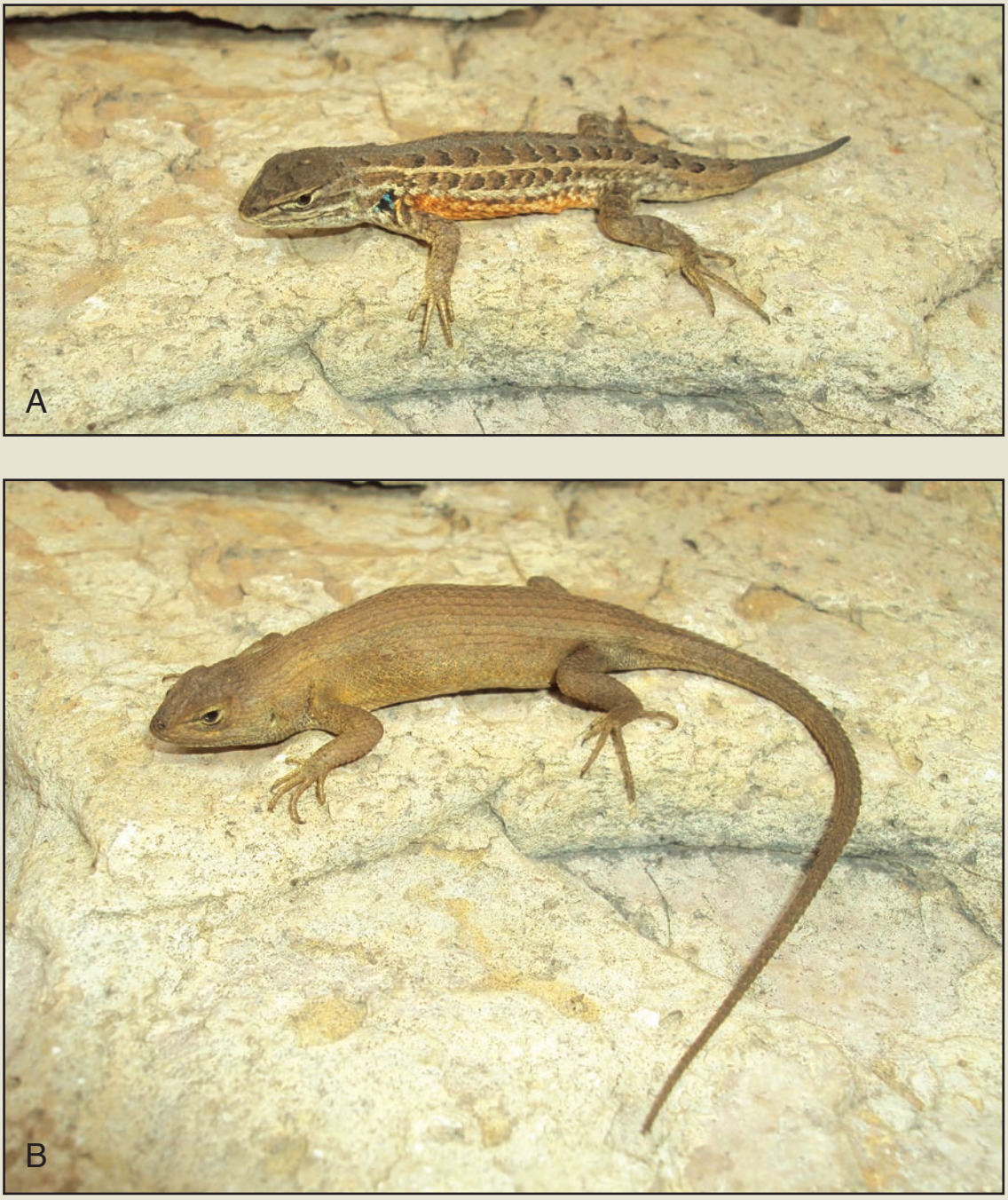

Fig. 1. Male (A) and female (B) *Sceloporus aurantius* observed in Municipio de Nochistlán de Mejía, Zacatecas, Mexico. © Rubén Alonso Carbajal-Márquez

Acknowledgments.—We thank Bradford Hollingsworth for verifying the identification of the lizards in this note.

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Reptilia: Squamata (snakes)

Family Colubridae

***Masticophis flagellum* (Shaw, 1802)**. MEXICO: HIDALGO: Municipio de Jacala de Ledezma, San Nicolás (20°57'29.29"N, 99°09'19.72"W; WGS 84); elev. 1,025 m; 19 April 2015; Ismael Reaño-Hernández. The individual (photo voucher UTEP G-2015.8; Fig. 1) was found crossing the road at 1235 h on a sunny day, in an area of the Mexican Plateau supporting submontane scrub near a large cultivated field (Ramírez-Bautista et al., 2014). The snake attempted escape by hiding in a hole at the base of a rock wall, which appeared to be its burrow. After recording data on the individual it was liberated in the same area, inasmuch as it was a large adult with an important ecological role to play. The individual, a large female with a total length of 2,200 mm, represents the first documented record for this species in the state of Hidalgo, although Lemos-Espinal and Smith (2015) indicated that they observed the species in the field at an unspecified locality(ies). This addition to the herpetofauna of Hidalgo raises the number of snake species in the state to 85, extrapolated from the figure provided in Ramírez-Bautista et al. (2014).

Fig. 1. Individual of *Masticophis flagellum* found near San Nicolás, Municipio de Jacala de Ledezma, Hidalgo, Mexico.
© Ismael Reaño-Hernández

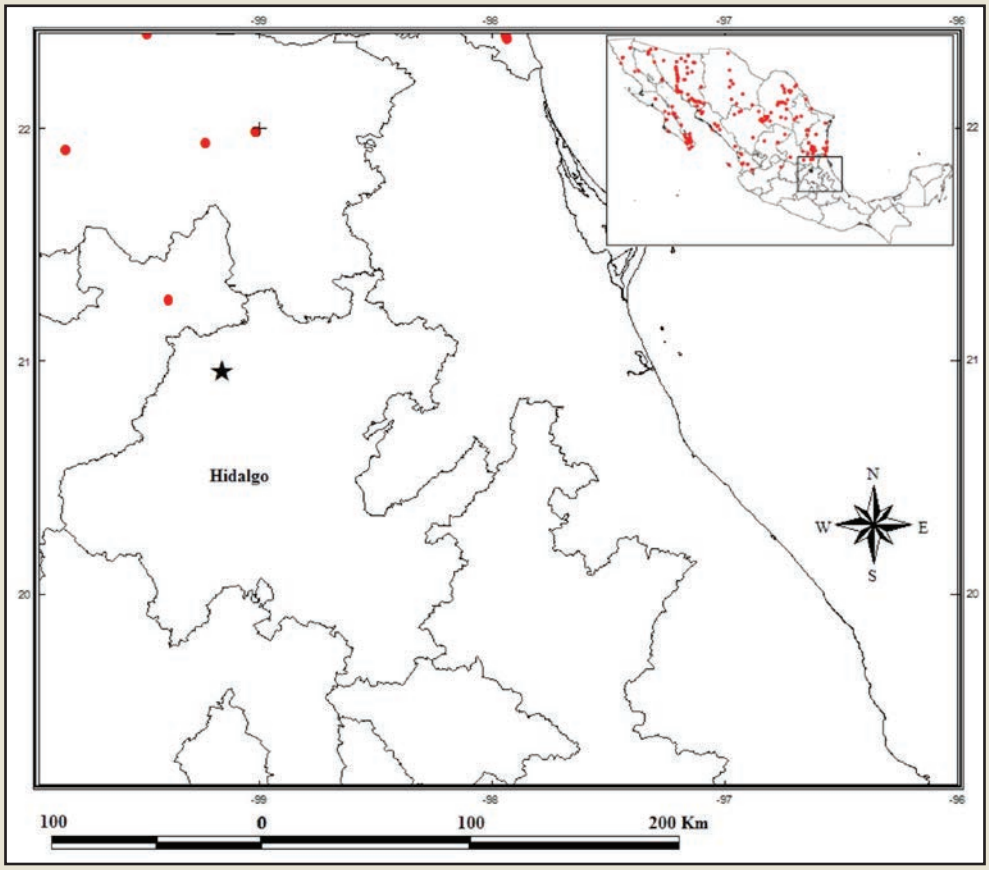

Fig. 2. Localities of *Masticophis flagellum* in Mexico (red dots in inset), and in the state of Hidalgo (black star).

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***Scolecophis atrocinctus* (Schlegel, 1837)**. NICARAGUA: CHONTALES: Municipio de Juigalpa, Reserva Natural Sierra Amerrisque, also referred to as the Serranía or Cordillera de Amerrisque (12.11236°N, 85.26086°W; WGS 84); elev. 805 m; 9 December 2011; Amaru Ruiz Alemán, Maynor Alejandro Fernández, Luis Moreno Salmerón, María Alejandra Rivera Amador, Julio Loza Molina, and Kiara Unieska Ruiz. We collected a male of this species (uncatalogued voucher deposited at Oficina de Fundación del Río, San Miguelito, Departamento de Río San Juan; Figs. 1A, B), found at 1035 h on a sunny morning coiled under a small and partially loose piece of bark on the basal portion of a tree (Fig. 1B), in Premontane Moist Forest (Holdridge, 1967). Although this coralsnake mimic is a secretive and semifossorial species, an individual was recorded as "climbing a small tree" (Savage, 2002: 686), and another was found at night "after falling approximately 2 m from a large tree" Solórzano (2004: 436). The specimen was found in a small patch of forest on the higher portion of the mountain, surrounded below by extensive cattle pastures (Fig. 1C). This locality represents the first departmental record for Chontales as well as the easternmost record of this species in Nicaragua, extending its known distribution ca. 55 km SE from its closest reported locality (Köhler, 2001; Wilson and Williams, 2002).

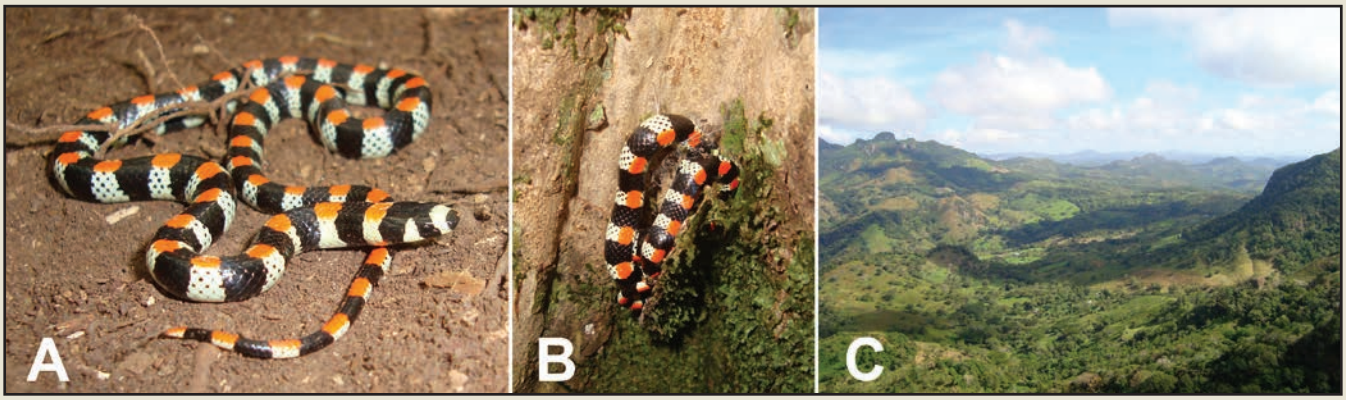

Fig. 1. A *Scolecophis atrocinctus* from the Reserva Natural Sierra Amerrisque, Departamento de Chontales, Nicaragua; (A) after the specimen was captured; (B) as it was found; and (C) a view of the area.

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Family Natricidae

***Thamnophis proximus* (Say, 1823).** MEXICO: OAXACA. Municipio de Villa de Tututepec de Melchor Ocampo, La Encomienda, 7 km SE of Río Grande (15.953072ºN, -97.413270ºW; WGS 84), elev. 5 m; 28 June 2015; Vicente Mata-Silva and Eduardo Mata-Silva. A photo voucher of this individual is deposited at the University of Texas at El Paso Biodiversity Digital Collection (UTEP G-2015.6). This voucher represents a new municipality record, and also fills a large gap in the significantly disjunct distribution of *T. proximus* on the pacific coast of Oaxaca, Mexico. Our locality is ca. 105 km ESE of a record ca. 16.7 km E of the border with Guerrero in Oaxaca (near San José Estancia Grande) (Liner and Dundee, 1969), and ca. 235 km W of the town of Tehuantepec (Rossman, 1963). We opted to use the town of Tehuantepec as our reference point for the specimens recorded from this area, as they all lack specific locality information and thus it is unclear whether "Tehuantepec" refers to the town or entire isthmian region. Rossman (1963) examined three specimens from the area, but also did not provide locality information; however, a point map in this publication roughly depicts the specimen localities, and all three appear to be near the town of Tehuantepec. The adult male *T. proximus* (Fig. 1) was found at ca. 2000 h, actively foraging at the edge of a puddle surrounded by coastal pastureland where *Leptodactylus melanonotus* and *L. fragilis* were observed and heard calling.

Fig. 1. An adult *Thamnophis proximus* (UTEP G-2015.6) from La Encomienda, Municipio de Villa de Tututepec de Melchor Ocampo, Oaxaca, Mexico.
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First record of *Norops humilis* from Nicaragua

At least 150 species of *Norops* are found in mainland Central and South America (formerly *Anolis*, see Nicholson et al., 2012). Within this diverse group, some species occupy broad ranges, whereas others are known only from a single locality (Köhler , 2008; Uetz and Hošek, 2014). The pursuit of understanding the distributions and relationships of these lizards sometimes leads to new discoveries that can alter previously accepted knowledge of such fauna. One example of these novel discoveries involves the geographic range of *N. humilis* (Peters, 1863). This species has undergone a dynamic taxonomic history, being altered on multiple occasions by differing hypotheses regarding the specific status of allied taxa. Previously encompassing the geographic ranges of three additional currently recognized species (*N. marsupialis, N. quaggulus,* and *N. uniformis*), the distribution of *N. humilis* traditionally was accepted to span the Canal Zone of Panama to eastern Mexico with localities on both the Pacific and Caribbean sides of the continental divide. *Norops uniformis* (Cope, 1885) formally was listed as a subspecies of *N. humilis* until Meyer and Wilson (1971) elevated it to full species rank, eliminating the northern extent of *N. humilis*'s range (eastern Mexico through western Honduras). An additional taxon, *Norops* (=*Anolis*) *ruthveni* (Stuart, 1935) was described from El Petén, Guatemala (Stuart 1935). Based on current species designations, any specimens of *N. ruthveni* in Guatemala now would be considered as *N. uniformis*, as there is no evidence to suggest that *N. ruthveni* warrants specific status. After the elevation of *N. uniformis*, the taxonomic status of *N. humilis* remained constant for over 30 years until Köhler et al. (2003) revealed that populations of *N. humilis* in eastern Honduras, Nicaragua, and northern Costa Rica actually formed a distinct species, *N. quaggulus* (Cope, 1885), and resurrected the name *N. quaggulus* (described from "the San Juan river, Nicaragua") for these northern populations, whereas populations restricted to southern Costa Rica and Panama retained the name *N. humilis*. This taxonomic division was supported by hemipenial morphology and mitochondrial DNA data, with external morphological features that were indicative of the two species. Subsequently, Köhler et al. (2006) characterized the range for *N. quaggulus* as including several localities on the Pacific versant in Nicaragua and Costa Rica where the species had been recorded. This study supported information indicating that *N. humilis* was restricted to Costa Rica and Panama, rendering all historic populations of *N. humilis* in eastern Honduras and Nicaragua, as well as several in northern Costa Rica, as *N. quaggulus* (Köhler et al., 2006). Most recently, *N. marsupialis* (Taylor, 1956), a former subspecies of *N. humilis* that occupies the Pacific versant of southern Costa Rica (Taylor, 1956) that has been treated as its own species for several years (Poe, 1998; Savage and Bolaños, 2009; Nicholson et al., 2012), formally was elevated to specific status (Köhler et al., 2015). Despite morphological similarities, *N. humilis* and *N. marsupialis* only are distantly related.

From 18 to 23 July 2007, Javier Sunyer, Iris Garbayo, and Armando Gómez collected four anoles believed to be *N. quaggulus* (three males [Senckenberg Museum, Frankfurt (SMF) 88065–66, 98283] and one female [SMF 88064]) in the proximity of Papaturro, along the Río Papaturro, at the Refugio de Vida Silvestre Los Guatuzos, Departamento de Río San Juan, Nicaragua (11.022778°N, 85.051389°W; elev. 40 m). All of the specimens were found during the day at ground level in a seasonally flooded secondary forest patch corresponding to Lowland Moist Forest (Holdridge, 1967), characterized by high mean annual temperatures (> 24°C) and rainfall (2,000–4,000 mm) with definitive wet and dry seasons. The region surrounding this patch of secondary forest was predominantly wetlands, but the forest itself was not flooded at the time of collection. In the Refugio de Vida Silvestre Los Guatuzos, a community of anoles typical of both Pacific and Caribbean localities are present, including *N. biporcatus*, *N. capito*, *N. carpenteri*, *N. cupreus*, *N. lemurinus*, *N. limifrons*, and *N. unilobatus* (J. Sunyer, pers. observ.).

In a recent study on the biogeography of the *N. humilis/N. quaggulus* clade (Phillips et al., 2015), a 1,457 bp section of mitochondrial DNA including the genes ND2, $tRNA^{Trp}$, $tRNA^{Ala}$, $tRNA^{Asn}$, $tRNA^{Cys}$, $tRNA^{Try}$, origin of light strand replication, and partial CO1, showed one of these individuals (SMF 98283, Fig. 1 Genbank # KJ954046) is assignable to a lineage of *N. humilis* whose range extends to northwestern Costa Rica. A nuclear marker (Internal Transcribed Spacer-1, ITS-1) also was sequenced (Genbank #KT180153). The ITS-1 sequence also aligned with *N. humilis* and not *N. quaggulus*, providing evidence using both mitochondrial and nuclear DNA to suggest that the sequenced individual was a specimen of *N. humilis*. Unfortunately, tissues from the other three individuals collected were not available to test if both species are present at this site. This clade incorporates a number of localities on the Pacific versant of northwestern Costa Rica, including Parque Nacional Rincón de la Vieja and Volcán Orosí in Parque Nacional Guanacaste. The specimen, along with other members of the same series (SMF 88064–66),

Fig. 1. Male *Norops humilis* collected near Papaturro, Refugio de Vida Silvestre Los Guatuzos, Departamento de Río San Juan, Nicaragua. © Javier Sunyer

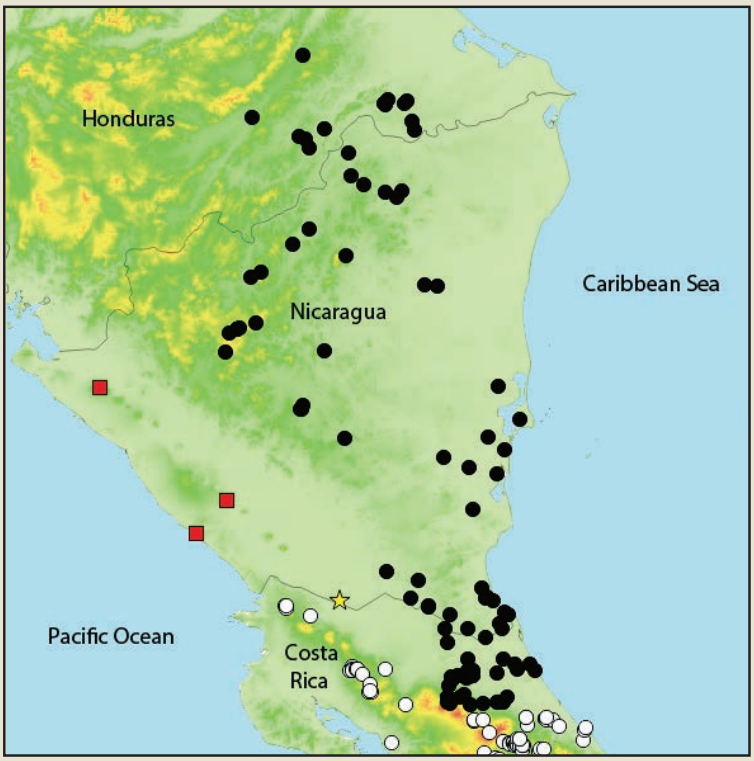

Fig. 2. The distribution of *Norops humilis* and *N. quaggulus* in Nicaragua, eastern Honduras and northern Costa Rica. Symbols denote a site or a relatively closely associated group of sites where specimens have been recorded. Black circles indicate *N. quaggulus* localities (many supported by genetic data; Phillips et al. 2015), white circles indicate *N. humilis* localities. The star indicates the new record of *N. humilis* in Nicaragua per this article. Squares mark sites where *N. quaggulus* has been recorded, but not verified through genetic analysis.

were examined at the Forschungsinstitut und Naturmuseum Senckenberg (SMF), Frankfurt a.M., Germany by Gunther Köhler. Despite the genetic distinction (7.1% from *N. quaggulus*; uncorrected-p, Phillips et al., 2015), all members of the series were identified as *N. quaggulus* based on hemipenial and other morphological characteristics. Regardless, our genetic data suggests that the specimen (SMF 98283) represents the first official record of *N. humilis* in Nicaragua since its taxonomic separation from *N. quaggulus*, and the northernmost record for the species. Phillips et al. (2015) collected both nuclear and mitochondrial data for a number of individuals throughout the range of *N. humilis* and *N. quaggulus*, and found no evidence of hybridization between the two species.

Additional sites for *N. quaggulus* have been recorded on the Pacific versant of Nicaragua (Fig. 2), but were not available for DNA sequencing. The position of these sites leads us to question whether they are actually *N. quaggulus* or potentially *N. humilis*.

Acknowledgments.—We are especially grateful to Gunther Köhler for examining all the cited specimens. Michael Barej, James McCranie, and Gunther Köhler provided helpful comments. We also thank Iris Garbayo and Armando Gómez for field assistance. Logistical support at the Estación Biológica de Papaturro was facilitated by the NGOs "Fundación Amigos del Río San Juan" and "Amigos de la Tierra-España." The molecular work essential for verifying this record was funded by NSF grant DEB 0949359 (KEN). The specimens were collected and exported under permit MARENA 006-008, issued to JS by the MARENA (Ministerio del Ambiente y los Recursos Naturales), Managua, Nicaragua, and are deposited at SMF.

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New herpetofaunal records for the state of Oaxaca, Mexico

The highest species diversity of amphibians and reptiles in Mexico has been recorded in the state of Oaxaca, in part because of its habitat heterogeneity. Casas-Andreu et al (2004) provided a comprehensive review of the state's herpetofauna, but since then many new species have been described, taxonomy continues to be in flux, and new records for the state have been reported (Ramírez-González et al., 2014). Recently, Parra-Olea et al. (2014) reported the number of amphibian species in the state as140, Flores-Villela and García-Vázquez (2014) noted the number of reptile species as 262, and Mata-Silva et al. (2015) indicated the total number herpetofaunal species as 442.

Importantly, many parts of Oaxaca remain poorly studied, including the Chimalapas region and the Papaloapan Basin within the Isthmus of Tehuantepec, and the Gulf coastal plain. In this note we provide information on new herpetofaunal records and range extensions for these areas of Oaxaca, and express all geographic coordinates in map datum WGS 84. We deposited all the specimens collected in the Museo de Zoología "Alfonso L. Herrera" (MZFC), Facultad de Ciencias de la Universidad Nacional Autónoma de México.

Amphibia: Anura
Family Craugastoridae

***Craugastor laticeps* (Duméril, 1853).** This species is found on the Atlantic slopes of Mexico, from southern Veracruz to Tabasco and Chiapas, southward to western Belize, Guatemala and northern Honduras, at elevations from 10 to 1,500 m (Santos-Barrera et al., 2004). In May of 1993 we collected seven specimens of this species (MZFC 13397–13403) and in May of 1995 an additional 11 specimens (MZFC 18825-18836, Fig. 2A) at Chalchijapa, Municipio de Santa María Chimalapa, Oaxaca (17.05416°, -94.65388°; elev. 731 m); we found all the frogs in leaf litter in tropical rainforest. Collectively, these specimens represent the first record of *Craugastor laticeps* from Oaxaca, and extend the range of the species ca. 139 km S of the nearest record at Volcán Pajapan, Veracruz (Savage, 1987) (Fig. 1).

Family Hylidae

***Duellmanohyla chamulae* (Duellman, 1961).** This species occurs at elevations above 1,600 m on the northern slopes of the central highlands of Chiapas, Mexico, from Jitotol to Soluschiapa (Santos-Barrera and Muñoz-Alonso, 2004). Aguilar-López et al. (2010) reported this species from 6 km SE of Paso del Moral, Veracruz, near the border with Oaxaca. On 9 May 1993, we obtained one juvenile specimen (MZFC 18667) from Chalchijapa, Municipio de Santa María Chimalapa, Oaxaca (17.05416°, -94.65388°; elev. 731 m); the frog was found in leaf litter in tropical rainforest. On 24 October 2013 at 12:55 h, we encountered another young individual (MZFC 28690, Fig. 2B), 23.7 mm in snout–vent length (SVL), along the edge of a stream in tropical rainforest at San Isidro Lachiguxe, Municipio de Santa María Guienagati, Oaxaca (16.87705°, -95.31266°; elev. 530 m), ca. 1,250 m from the town. These specimens represent the first records of this species from Oaxaca (Fig. 1), and extend the range ca. 18 km S (Chalchijapa record) and ca. 85 km SW (San Isidro Lachiguxe record) of Paso del Moral, Veracruz.

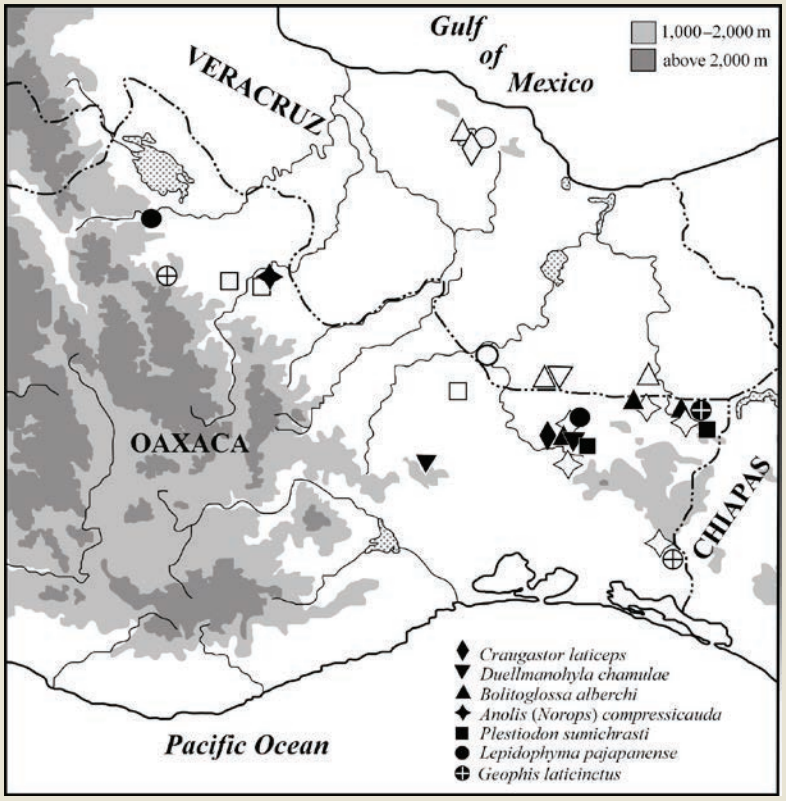

Fig. 1. Localities of new herpetofaunal records and range extensions for the state of Oaxaca. Closed symbols represent the new localities, and open symbols the existing nearby records for the corresponding species.

Amphibia: Caudata
Family Plethodontidae

***Bolitoglossa alberchi* García-Paris, Parra-Olea, Brame and Wake, 2002.** This Mexican species is known from the Sierra de los Tuxtlas in southern Veracruz, the Chimalapas area of extreme eastern Oaxaca, and the Caribbean slopes of western and central Chiapas. It generally inhabits areas below an elevation of 1,000 m (García-Paris et al., 2002; Parra-Olea and Wake, 2004). Although these authors referred to specimens of *Bolitoglossa alberchi* from the Chimalapas region, they did not provide a precise locality. On 24 May1995 we collected an adult male specimen of this species (MZFC 15655), measuring 46.96 mm SVL and 28.89 mm in tail length (TL), at Chalchijapa, Municipio de Santa María Chimalapa Oaxaca (17.07694°, -94.59916°; elev. 731 m); the salamander was found under a rock in tropical rainforest. We collected a second specimen in leaf litter on 27 January 1995 (MZFC15656, Fig. 2C), an adult female measuring 62.19 mm SVL and 62.47 mm TL, at San Isidro La Gringa (17.09494°, -94.11933°; elev. 90 m), a third specimen on 31 August 1995 found in moss at Chalchijapa (MZFC15654) (17.05416°, -94.65388°; elev. 731 m), and a fourth specimen (uncatalogued) on 20 October 2010 at La Fortaleza (17.31988°, -94.21666°; elev. 83 m; Fig. 2D); all of these localities are in Oaxaca. These records fill a gap on the distribution of this species, and represent the first records for the state of Oaxaca (Fig. 1).

Reptilia: Squamata (lizards)
Family Dactyloidae

***Anolis* (*Norops*) *compressicauda* Smith and Keaster, 1955.** This species is endemic to Mexico, where it has been recorded from southern Veracruz, western Chiapas, and the extreme northeastern Oaxaca at elevations from 500 to 1,200 m (Canseco-Márquez and Muñoz-Alonso, 2007). Juárez-López et al. (2006) also reported this species from the district of Tuxtepec, Oaxaca. On 5 December 2013, we found an adult individual of this species (MZFC 28673, Fig. 2E) at 15:00 h, at Ejido Playa Limón, Municipio de Santiago Jocotepec, Oaxaca (17.75797°, -96.02447°; elev. 772 m); the anole was found perched on a rock in tropical rainforest. We collected a second adult in leaf litter in secondary vegetation on 7 December 2013 at 13:00 h, at Nuevo Málzaga, Municipio de Santa María Jacatepec, Oaxaca (17.83258°, -96.02305°; elev. 180 m), and a third specimen in leaf litter in tropical rainforest at Plan de San Luis, Municipio de Santiago Jocotepec, Oaxaca, on 14 January 2014 at 11:00 h, (17.77266°, -95.93880°; elev. 100 m). These specimens are from the district of Choapam, Oaxaca, and represent new records for the Papaloapan Basin (Fig. 1).

Family Scincidae

***Plestiodon sumichrasti* (Cope, 1866).** This species is found from central Veracruz, Mexico, through Guatemala and into Honduras (Calderón-Mandujano et al., 2005). In Oaxaca, *Plestiodon sumichrasti* has been reported from Doce de Julio, 12 km W of Tolosa (= Donají) (Smith, 1992) and from San Cristóbal la Vega and Playa Limón (districts of Tuxtepec and Choapam, respectively) (Ramírez-González et al., 2014). In April and May of 1995 we encountered three individuals of this species (MZFC 18652, 18653, and 18661) at San Isidro la Gringa, Municipio de Santa María Chimalapa, Oaxaca (17.09494°, -94.11933°; elev. 91–198 m). We also found nine specimens (MZFC 18654–56, 18659–65) from May to August 1995, at Chalchijapa, Municipio de Santa María Chimalapa, Oaxaca (17.05416°, -94.65388°; elev. 365–762 m), all in in leaf litter in tropical rainforest. These specimens represent the southernmost records for this species in the state (Fig. 1).

Family Xantusiidae

***Lepidophyma pajapanense* (Werler, 1957).** This species has been reported only from Veracruz, from the Sierra de los Tuxtlas and from the vicinity of the Río Coatzacoalcos, near Jesus Carranza, on the Isthmus of Tehuantepec (Bezy and Camarillo-R., 2002). On 28 and 21August 1995, we obtained two specimens of this species (MZFC 18681, 18692) from the Chimalapas region (Chalchijapa), Oaxaca (17.05416, -94.65388; elev. 260–383 m), in tropical rainforest. On 17 January 2014 at 13:40 h, we also found an adult individual (MZFC 28674; SVL 71.95; Fig.

2F) at Santo Domingo del Río, toward Pajarito, Municipio de San Pedro Teutila, Oaxaca (18.01919°, -96.56147; elev. 342 m), in a rocky crevice in tropical rainforest. The nearest record for this species (KU 26913) is from 25–35 km SE of Jesus Carranza, Veracruz (17. 43134°, -95.03185°; elev. 76 m). Our specimens represent the first records for Oaxaca, and the record from Santo Domingo del Río extends the range of this species ca. 175 km NW from the one near Jesus Carranza (Fig. 1).

Reptilia Squamata (snakes)
Family Dipsadidae

***Geophis laticinctus* Smith and Williams, 1963.** This species is found in Mexico, from eastern Oaxaca through north-central Chiapas (Johnson, 1979). In Oaxaca, *Geophis laticinctus* has been reported from two localities: San Mateo Yetla (Smith and Holland, 1969) and Cerro Baúl (Campbell and Lamar, 2004). On 26 June 1995, we collected one specimen (MZFC 18820) while it was eating a coralsnake (*Micrurus elegans*) in tropical rainforest at San Isidro La Gringa, Municipio de Santa María Chimalapa, Oaxaca (17.09494°, -94.11933°, elev. 495 m). This specimen represents the third locality in Oaxaca from which this species has been recorded (Fig. 1).

Fig. 2. Photographs of specimens from Oaxaca: (A) *Craugastor laticeps* (MZFC 18832) from Chalchijapa, (B) *Duellmanohyla chamulae* (MZFC 28690) from San Isidro Lachiguxe, (C) *Bolitoglossa alberchi* (uncatalogued specimen) from La Fortaleza, (D) *Bolitoglossa alberchi* from Chalchijapa (MZFC 15655), (E) *Anolis compressicauda* (MZFC 28673) from Ejido Playa Limón, and (F) *Lepidophyma pajapanense* (MZFC 28674), from Santo Domingo.

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Additional distributional records for the state of Oaxaca, Mexico

The state of Oaxaca contains an exceptionally high amount of biodiversity, and for many years national and foreign researchers have been studying its herpetofauna. Casas-Andreu et al. (1996) provided the first list of amphibians and reptiles for the state, indicating a total of 359 species. Subsequently, Casas-Andreu et al. (2004) updated the list and reported 378 species, and Mata-Silva et al (2015) increased the number to 442 species.

The number of herpetofaunal species reported for Oaxaca continues to increase (Canseco-Márquez et al., *This issue*). Several areas of the state remain unexplored, and with further exploration the number of species in Oaxaca will keep rising as new species are described or reported as new for the state. Herein we provide a series of species accounts based on our fieldwork. We express all geographic coordinates in map datum WGS 84. We deposited photographic vouchers at The University of Texas at Arlington Digital Collection (UTADC), and preserved specimens in the Museo de Zoología, Facultad de Ciencias, UNAM (MZFC).

Amphibia: Anura
Family Eleutherodactylidae

***Eleutherodactylus syristes* (Hoyt, 1965).** This species is endemic to Oaxaca and known only from a few localities in the Sierra de Miahuatlán and Mixteca Alta (Santos-Barrera and Canseco-Márquez, 2004). On 12 August 2011 we observed one specimen (UTADC 8565) in cloud forest at San Francisco Coatlán, Municipio de San Francisco Coatlán, (16.16594°, -96.80613°; elev. 1,703 m). The nearest records for this species are localities in the municipality of Pluma Hidalgo (Caviedes-Solis, 2009). This voucher represents a municipality record, and fills a gap between records in Pluma Hidalgo and Mixteca Alta (Fig. 1A).

Family Hylidae

***Plectrohyla calthula* (Ustach, Mendelson, McDiarmid and Campbell, 2000).** This Oaxacan endemic was described from cloud forest at Totontepec (Ustach et al., 2000). Meik et al. (2005) reported an additional locality, W of Zacatepec at an elevation of 1,360 m. On 20 May 2010 we observed eight individuals of this species in a pond along the road from Santa María Alotepec to San Juan Cotzocón (17.10441°, -95.86116°; elev. 1,486 m), in an area of disturbed cloud forest. On 24 February 2011 we observed 10 more individuals at the same locality, of which we preserved one male (MZFC 26468) that measured 62.25 mm in snout–vent length (SVL). This specimen represents a new municipality record and the third known locality for this species in the Sierra Mixe (Fig. 1B).

Reptilia: Squamata (lizards)
Family Iguanidae

***Ctenosaura oaxacana* (Köhler and Hasbún, 2001).** This species is known from the Isthmus of Tehuantepec (Köhler, 2009) and one locality on the Pacific coast at Santa María Colotepec (Reynoso et al., 2011). On 18 August 2010 we observed three individuals (UTADC 8567) at Bahía de San Agustín, Municipio de Santa María Huatulco (15.68719°, -96.24096°; elev. 11 m); these individuals represent a new municipality record and fill a gap between the closest record in Santiago Astata to the E (Köhler, 2002), and the record provided by Reynoso et al. (2011) to the W (Fig. 1C).

Family: Dactyloidae

***Anolis* (*Norops*) *beckeri* (Boulenger, 1881).** The distribution of this species extends from southeastern Mexico to Nicaragua, and in Mexico includes a few and isolated localities in the states of Veracruz, Chiapas, Campeche, Yucatán, and Quintana Roó (Lieb, 2001, Köhler, 2010). On 9 July 2010 we collected one specimen (MZFC 28698) at Santa María Puxmetacán, Municipio de San Juan Cotzocón, in the Sierra Mixe, Oaxaca (17.31031°, -95.61133°;

elev. 311 m). This specimen represents a new record for the state, with the nearest localities at Los Tuxtlas (Vogt et al., 1997; Lieb, 2001) and Las Choapas (Aguilar-López et al., 2005) (Fig. 1D).

***Anolis* (*Norops*) *peucephilus* Köhler, Gómez Trejo Pérez, Petersen, and Méndez de la Cruz, 2014**. This species was described recently from the Sierra Madre del Sur, from the road to San Gabriel Mixtepec in pine-oak forest (Köhler et al., 2014). On 1 and 21 September 2011 we observed two individuals (UTADC 8568–69; an adult male, and a juvenile, respectively) in pine and pine-oak forest at San Francisco Coatlán, Municipio de San Pablo Coatlán (16.16643°, -96.80361°; elev. 1,670–1,676 m). These individuals represent the second known locality for this species, as well as a new municipality record (Fig. 1E).

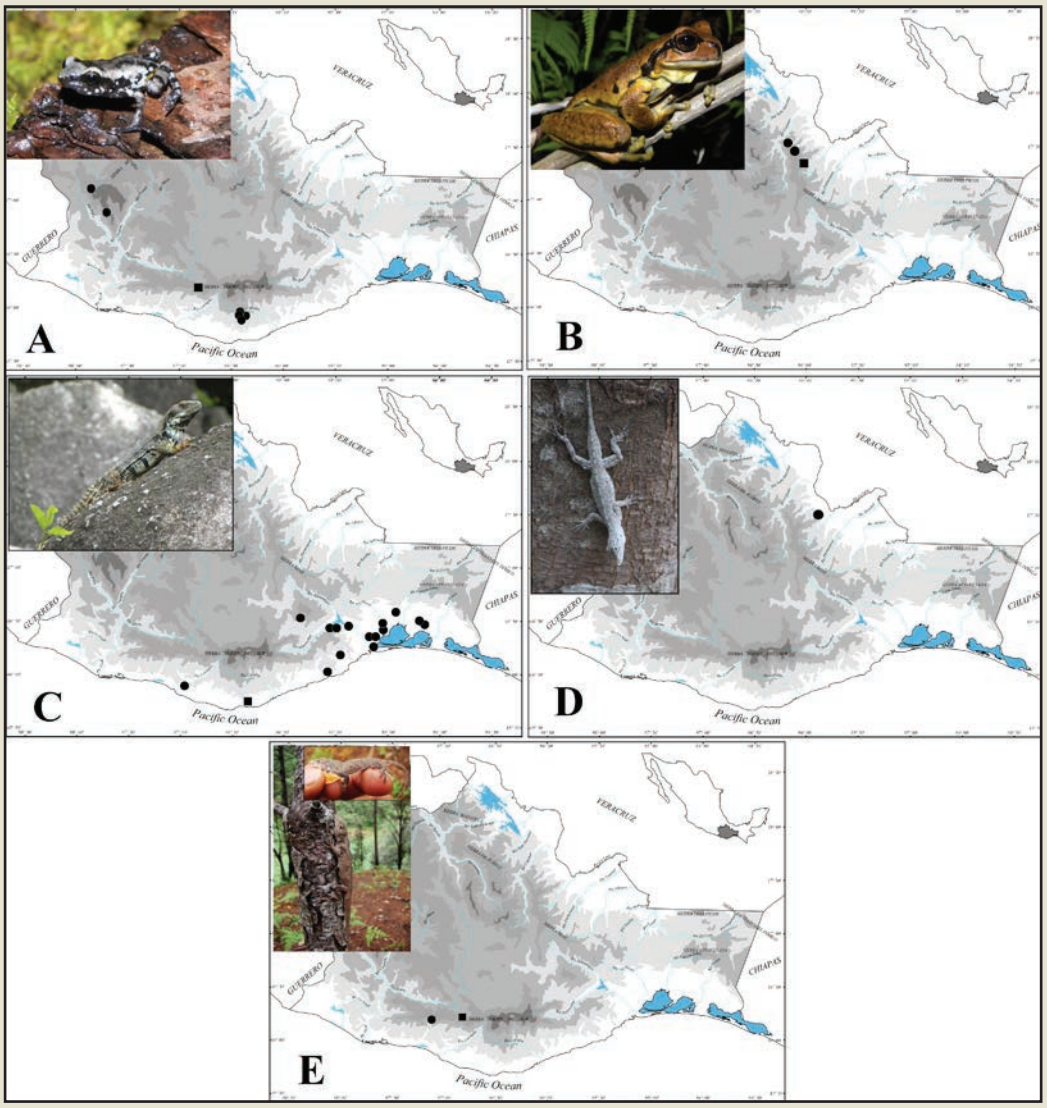

Fig. 1. Distribution of the species indicated in the text. Circles correspond to known localities and squares to the new records.
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Agkistrodon bilineatus Günther, 1863 (Squamata: Viperidae): confirmation of an inland locality for central Jalisco, Mexico

The Common Cantil, *Agkistrodon bilineatus*, is one of eight species in the viperid genus *Agkistrodon* (Porras et al., 2013; Burbrink and Guiher, 2015). Recently, Porras et al. (2013) discussed the taxonomic status of *A. bilineatus* (*sensu lato*) and elevated three former subspecies (*bilineatus*, *howardgloydi*, and *russeolus*) to species rank, and regarded the taxonomic status of a fourth (*lemosespinali*) as unresolved. Previously, Bryson and Mendoza-Quijano (2007) noted the only known specimen of *A. b. lemosespinali* as morphologically similar to the nominal subspecies *A. b. bilineatus*, but refrained from making a taxonomic change. We follow the taxonomy proposed by Porras et al. (2013), and below provide a brief introduction to the morphological characteristics and distribution of *A. bilineatus* (*sensu stricto*).

Agkistrodon bilineatus is a medium-sized pitviper with a robust body, and a recorded maximum total length of 1,380 mm (Lemos-Espinal and Smith, 2007). Gloyd and Conant (1990) provided a detailed morphological description of *A. bilineatus*, and compared this species with its congeners. Color pattern provides useful characteristics for diagnosing *A. bilineatus* from other taxa of *Agkistrodon* (Porras et al., 2013). For example, the coloration of the tail tip of young individuals of *A. bilineatus* typically is bright yellow (Gloyd and Conant, 1990; Lemos-Espinal and Smith, 2007). In contrast, the coloration of the tail tip in *A. howardgloydi* and *A. russeolus* is banded with gray and white (Gloyd and Conant, 1990; Porras et al., 2013). A yellow tail tip also is present in young individuals of *A. conanti*, *A. contortrix*, *A. laticinctus*, *A. piscivorus*, and *A. taylori*; however, *A. bilineatus* can be distinguished from these species by color pattern characters on the head.

The color pattern on the head of *A. bilineatus* consists of five white longitudinal stripes contrasting with a dark brown ground color (Porras et al., 2013). *Agkistrodon bilineatus* can be distinguished from *A. contortrix*, *A. laticinctus*, and *A. piscivorus* by the presence of a vertical white stripe on the rostral and mental scales, which is absent on the latter three species (Burbrink and Guiher, 2015). The upper facial stripe is relatively broad and white in *A. bilineatus*, whereas in *A. conanti* it is variable in width and pale in color, but not white (Burbrink and Guiher, 2015). The lower facial stripe of *A. bilineatus* is separated from the inferior margin of the supralabial scales by a dark intervening band, whereas in *A. taylori* the lower facial stripe reaches the inferior margin of the supralabials and lacks a dark intervening band (Porras et al., 2013). The dorsal ground color of adult *A. bilineatus* is dark brown to black, and if a pattern of crossbands is present often it is difficult to distinguish and sometimes consists of small white spots or streaks (Porras et al., 2013). The dorsal coloration of *A. bilineatus*, however, varies among individuals throughout its distribution (Gloyd and Conant, 1990; Porras et al., 2013).

The distribution of *A. bilineatus* is disjunct or fragmented throughout its extensive range (Porras et al., 2013). Along the Pacific versant of Mesoamerica, populations of *A. bilineatus* occur in tropical lowland areas at elevations from sea level to about 1,500 m (Campbell and Lamar, 2004; Porras et al., 2013). In continental Mexico, *A. bilineatus* has been recorded in southwestern Chihuahua and southern Sonora, and southward along all the coastal states to Chiapas (Campbell and Lamar, 2004; Porras et al., 2013). Insular records are available from Las Islas Marías (Isla María Grande, Isla San Juanito, and Isla María Magdalena) in the state of Nayarit (Casas-Andreu, 1992). Away from coastal areas, inland populations of *A. bilineatus* also have been recorded along the basins of the Río Balsas, in Morelos and Puebla, and the Río Grijalva, in Chiapas (Campbell and Lamar, 2004; Porras et al., 2013).

Interestingly, Cope (1865) and Günther (1885–1902) provided and inland record of *A. bilineatus* from the city of Guadalajara, which is located near the basin of Río Grande de Santiago in the state of Jalisco, but Zweifel (1959) refuted the validity of the locality. Nevertheless, the possibility of an inland population of *A. bilineatus* inhabiting the basin of the Río Grande de Santiago cannot be ruled out, an opinion shared by Campbell and Lamar (2004). The existence of such a population is likely given the species' broad distribution, as inland populations have been recorded from other basins, and warrants further investigation.

Consequently, in 2011 we conducted a herpetological survey to investigate the possible existence of an inland population of *A. bilineatus* inhabiting the basin of Río Grande de Santiago, and in one of the canyons encountered an individual of this species. We did not collect the snake because we lacked a collecting permit (*A. bilineatus* is considered an endangered species, and thus protected by Mexican law; SEMARNAT, 2010), so we photographed

the individual and deposited a photo voucher at the University of Texas at Arlington Collection of Vertebrates Digital Collection (UTADC). The information for the photo voucher is as follows:

Agkistrodon bilineatus Günther, 1863. MEXICO: JALISCO: Municipio de Zapopan, ca. 22 km (straight line) NNW of Guadalajara (20.941805°N, -103.413998°W; datum WGS 84; elev. 1,415 m); a juvenile (photo voucher UTADC-8540) observed on 9 April 2011 (Fig. 1). We found the individual in Huaxtla canyon along a rock wall parallel to a perennial stream, a tributary of Río Grande de Santiago. When we approached the snake, it was displaying caudal luring behavior (Fig. 1). The vegetation at this locality is an ecotone between tropical deciduous forest and oak forest (Rzedowski, 2006). This record extends the known distribution of *A. bilineatus* ca. 90 km (straight line) E of 0.8 km W Nayarit-Jalisco border on Mexican highway number 15 (Gloyd and Conant, 1990). This photo voucher also represents the first record of *A. bilineatus* for the Municipio de Zapopan, and the fifth for the state of Jalisco (Fig. 2).

Fig. 1. A juvenile of *Agkistrodon bilineatus* (UTADC-8540) displaying caudal luring behavior at Huaxtla canyon, Municipio de Zapopan, Jalisco, Mexico. © Iván Trinidad Ahumada-Carrillo

During late 19th and early 20th centuries, the German zoologist A. C. L. G. Günther authored the Reptilia and Batrachia section for the encyclopedia *Biologia Centrali-Americana* (Günther, 1885–1902), where he noted a record of *A. bilineatus* from "Guadalajara" and cited J. Xantus as the collector. The provenance of this specimen likely was in error, since Cope (1865) attributed the same specimen to a collection of specimens made by J. J. Major. Nearly a century later Zweifel (1959) investigated the origin of the material collected by J. J. Major in Mexico, and confirmed that several of the specimens were mislabeled as coming from the city of Guadalajara. Zweifel (1959) included the specimen of *A. bilineatus* recorded in Cope (1865) and Günther (1885–1902) as questionable for this locality. Subsequently, based on personal communication with Roger Conant, Smith (1987) indicated that *A. bilineatus* does not occur in Guadalajara but that the city might have been a shipping point or a collecting headquarters, and also did not accept a premise that the specimen in question originated in Nicaragua.

Regardless of the uncertainty of the provenance of the specimen of *A. bilineatus* from "Guadalajara" indicated in Cope (1865), Günther (1885–1902), Zweifel (1959), and Smith (1987), our photo voucher confirms the presence of this species ca. 22 km (straight line) NNW of the city of Guadalajara in the basin of the Río Grande de Santiago, Jalisco.

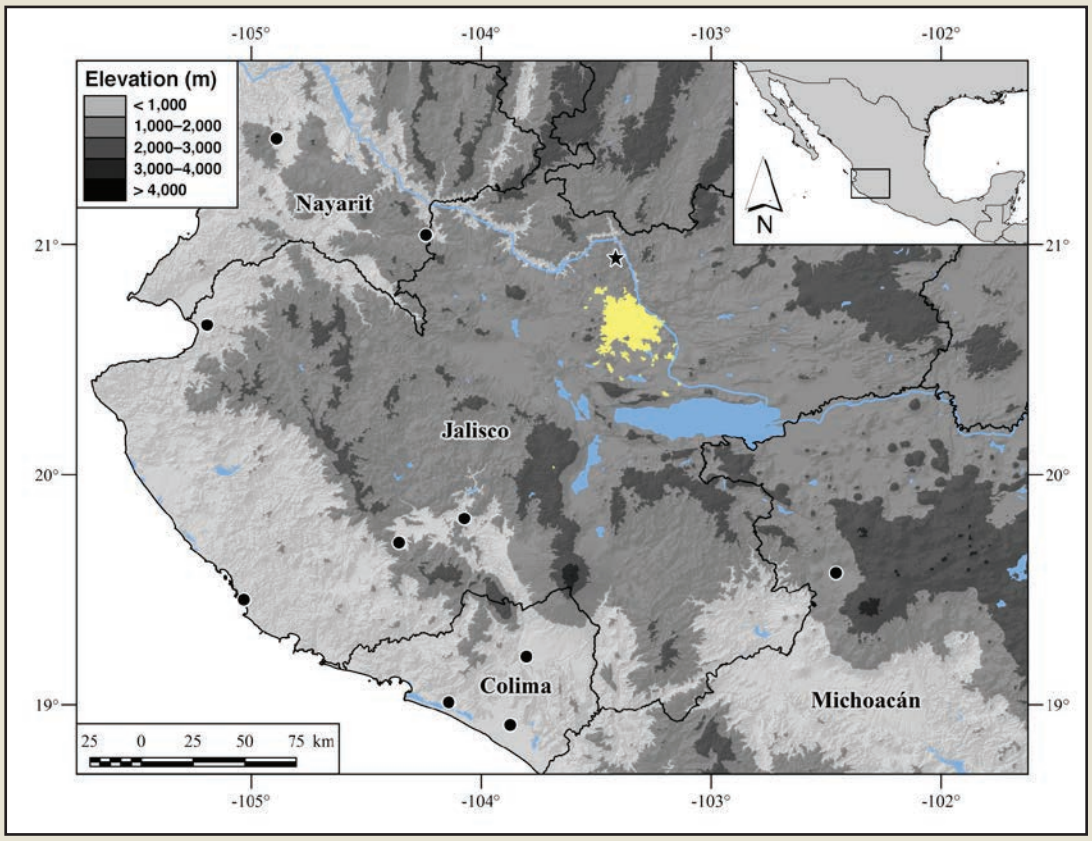

Fig. 2. Map depicting records of *Agkistrodon bilineatus* across mid-western Mexico. The black star represents the new inland record for Jalisco, and the black circles additional records for the species (Gloyd and Conant, 1990). The yellow polygon represents the urban area of the city of Guadalajara.

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Distribution notes and comments on the predation of the Mourning Gecko, *Lepidodactylus lugubris* (Duméril & Bibron, 1836), in Panama

Lepidodactylus lugubris occurs throughout much of Oceania and has been introduced into parts of Asia and North-, Central- and South America (Kraus, 2009). Smith and Grant (1961) first reported this species from Central America, from a specimen collected in the vicinity of Fort Clayton, Canal Zone, Panama, and since that time *L. lugubris* has been established in other parts of Mesoamerica and the New World (Jiménez and Abarca, 2015). Savage (2002) noted that this species occurs in several of the islands in the Bocas del Toro region of northwestern Panama, but did not provide specific information on specimens. A specimen of *L. lugubris* from this area was deposited at the United States National Museum (USNM 346894), however, collected in 1991 on Isla Colón, just north of the town of Bocas del Toro. The Institute for Tropical Studies and Conservation website (www.itec-edu.org/amphibians-reptiles-bocas-del-toro/; accessed 9 August 2015) also shows that *L. lugubris* occurs on Isla Bastimentos and on the Soropta Peninsula, but does not indicate if any specimens were preserved.

Numerous reports of attacks by arthropods on small vertebrates are available (McCormick and Polis, 1982). Small vertebrates such as gekkonid lizards are prey for a great variety of vertebrate and arthropod predators (Bauer, 1990), and apparently arthropods can cause significant mortality among some vertebrate populations (McCormick and Polis, 1982). In such instances, arachnids are the most frequently cited predators. Spiders are known to capture vertebrates, including mammals, birds, reptiles, and amphibians (Bauer, 1990; Menin et al., 2005; Foelix, 2011). As a group geckos are particularly vulnerable to attacks by arachnids, generally because of their small size (Russell and Bauer, 1986) and soft integument, and also because they are chiefly nocturnal, like these putative predators.

On 9 January 2015 at 1925 h, one of us (KRR) observed a subadult spider (*Cupennius coccineus*), member of a genus of wandering spiders commonly known as banana spiders, feeding on an adult *L. lugubris* (Fig. 1) at María Chiquita, Portobelo, Provincia de Colón, Panama (9.431940ºN, 79.725040ºW; datum WGS 84; elev. 84 m). The gecko was preserved and deposited in the Museo de Vertebrados de la Universidad de Panamá (MVUP-2145).

This is the second report of a species of spider preying on *L. lugubris* (La Rivers, 1948). The spider was holding its prey tightly, and force was applied for it to release the lizard.

Acknowledgments.—We thank Diomedes Quintero Arias for identifying the spider.

Fig. 1. A subadult female spider, *Cupennius coccineus*, feeding on an adult *Lepidodactylus lugubris* inside a home at María Chiquita, Portobelo, Provincia de Colón, Panama. © Ángel Sosa-Bartuano

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Predation event and a distributional record for *Atropoides occiduus* (Hoge, 1966)

The distribution of the Guatemalan Jumping Pitviper, *Atropoides occiduus*, extends from southeastern Chiapas, Mexico, to western El Salvador, including central and southern Guatemala (Campbell and Lamar, 2004). In Chiapas, several records are available from the Sierra Madre de Chiapas, including from Musté, near Mapastepec, and Cerro Ovando, near Escuintla; little information, however, has been reported on the natural history of this species (Campbell and Lamar, op. cit.).

On 29 May 2015 at 1200 h, during patrolling activities led by park ranger Jorge Luis González León at Reserva de la Biósfera El Triunfo (Zona Núcleo 5), Municipio de Villacorzo, Chiapas, Mexico (15.875319°N, 93.216044°W; elev. ca. 1,200 m.), we found an adult Black-tailed Cribo (*Drymarchon melanurus*) preying on an adult *A. occiduus* (Fig. 1). The event took place in cloud forest, along the side of a dirt trail bordered with abundant vegetation. When the *D. melanurus* became aware of our presence, it quickly retreated with the *A. occiduus* in its mouth, holding it by the neck. We took only two photographs, then left to avoid further disturbance to the predation event. A voucher photograph is deposited at the University of Texas at Arlington Collection of Vertebrates Digital Collection (UTADC-8557). To our knowledge, this is the first report of the Mesoamerican endemic genus *Atropoides* as prey for the widespread *D. melanurus*, an ophiophagus colubrid.

In addition to reporting this predation event, our observation also represents a distributional range extension for *A. occiduus* in Mexico, of ca. 60 km NW (airline distance) from the closest known locality at Musté, near Mapastepec, Chiapas (Campbell and Lamar, op. cit.).

Fig. 1. An adult *Drymarchon melanurus* subduing and starting to feed on an adult *Atropoides occiduus* at Reserva de la Biósfera El Triunfo, Municipio de Villacorzo, Chiapas, Mexico. © Jorge Luis González-León

Acknowledgments.—I thank the Comisión Nacional de Áreas Naturales Protegidas-Reserva de la Biósfera El Triunfo and Fondo de Conservación El Triunfo A.C. for logistical support. I am also indebted to Juan José Vázquez Martínez for helping compile the information for this note, and to Jorge Luis González León for his extraordinary efforts in patrolling, monitoring, and protecting, as a Guardaparque (park ranger), the rich and unique biodiversity this magnificent place harbors. Carl Franklin kindly provided the photo voucher number.

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Peripheral and elevational distribution, and a novel prey item for *Drymarchon melanurus* in Sonora, Mexico

The northernmost distribution of many tropical and subtropical amphibian and reptile species occurs in the Mexican state of Sonora (Enderson et al., 2010). There, *Drymarchon melanurus*, a species with a broad distribution (see Wallach, 2014) reaches its northwestern distributional limit. Herein we present peripheral and elevation distributional records, a novel prey item for the species, and a distinctive habitat for *D. melanurus* in Sonora.

MVZ = Museum of Vertebrate Zoology, University of California, Berkeley; UAZ-PSV = University of Arizona Photo Specimen Voucher, Museum of Natural History, University of Arizona, Tucson. All specimens/observations, including images and voucher information, are available online in the Madrean Archipelago Biodiversity (MABA) database (www.madrean.org).

Westernmost Record

MVZ 76497. MEXICO: SONORA: Municipio de Hermosillo, 35 mi (= 56.3 km) W of Hermosillo (by road), 28.839684°N, 111.423568°W; 17 April 1963; Ted Papenfuss. This specimen represents the westernmost record along the Pacific versant of the distribution of this species. In Sonora, *D. melanurus* is known mostly from riparian areas in foothills thornscrub and tropical deciduous forest (Schwalbe and Lowe, 2000). This locality, however, lies in an ecotone between the Plains of Sonora and Central Gulf Coast subdivisions of the Sonoran Desert. The Río Sonora drainage as far southwest as Hermosillo and westward onto the coastal plain of the Gulf of California was a dense, natural riparian corridor for tropical animals and plants in otherwise too xeric environments. The locality is near the present town of Miguel Alemán, in an extensive agricultural area known as La Costa de Hermosillo, suggesting that prior to the construction of reservoirs on the Río Sonora and associated agricultural and rural development, other species with tropical affinities also might have occurred west onto the coastal plain.

Peripheral Record and Prey Item

UAZ 57394-PSV. MEXICO: SONORA: Municipio de Hermosillo, 23 km (by air) NE of Hermosillo, 0.25 km (by air) W of Presa el Molinito, 29.21156°N, 110.72813°W; elev. 268 m; 7 September 2010 at 0700 h; Carlos Manuel Valdéz-Coronel. A large adult *D. melanurus* was observed eating a moderate-sized adult *Incilius alvarius* in the Río Sonora riparian vegetation corridor (Fig. 1). The vegetation along the adjacent slopes is foothills thornscrub. *Drymarchon melanurus* is known to feed on a wide variety of prey items, including fishes, frogs, toads, small turtles, lizards, snakes (including venomous forms), reptile eggs, birds, bird eggs, and mammals (Lemos-Espinal and Dixon, 2013); in neighboring Sinaloa, (Hardy and McDiarmid 1969) reported the prey items *Aspidoscelis costata*, *Ctenosaura pectinata*, *Masticophis mentovarius*, and *M. bilineatus*, *Sigmodon* sp. (rodent), and fish. To our knowledge, this is the first report of *I. alvarius* in the diet of this species.

Elevational Record for the Region

UAZ 57614-PSV. MEXICO: SONORA: Municipio de Ures, Sierra de Mazatán Arroyo el Yuguito (Cañada El Bachán), 29.10194°N, 110.19667°W; elev. 1,380 m; 1 July 2014; mesic oak woodland; S. Minter, T. Van Devender, R. Villa. This record (Fig. 2) is 30 m higher for this region of Mexico (Lemos-Espinal and Smith, 2007), although the elevational record for the species is 1,555 m (McCranie, 2011).

Most Northern and Eastern Record for the Region

UAZ 57634-PSV. MEXICO: SONORA: Municipio de Nácori Chico, El Carrizoso on Río Áros near its confluence with the Río Bavispe, 51.8 km (by air) NNE of Sahuaripa, 29.51583°N/109.15028°W; elev. 687 m; 31 July 2005; S. Jacobs, M. T. Bogan, and S. E. Carrillo-Percástegui. This voucher (Fig. 3) represents the most northern and eastern record along the Pacific versant of Mexico, ca. 30 km NNE of the nearest locality on the Río Aros at Vinatera. This species likely occurs farther north along the Río Bavispe, along with *Trachemys yaquia* (S. Jacobs, pers. comm.) and in relatively close proximity to the United States-Mexico border (< ca. 200 km/124 mi).

Habitat

UAZ 57399-PSV. MEXICO: SONORA: Municipio de La Colorada, 4 km W of Tecoripa on MX 16; 28º37'44"N, 109º59'43"W; elev. 428 m; 28 August 2008; T. Burkhardt. This voucher was found in a flat area in arid foothills thornscrub, with no apparent riparian corridor, a distinctive habitat for this species in Sonora.

Fig. 1. An adult *Drymarchon melanurus* feeding on an *Inciluis alvarius* in the Río Sonora riparian vegetation corridor. © Carlos Manuel Váldez Coronel

Fig. 2. An individual of *Drymarchon melanurus* from Sonora found at an elevation of 1,380 m, the highest reported elevation for this species in this area of Mexico. © Robert A. Villa

Fig. 3. An adult *Drymarchon melanurus* raising the anterior part of its body in a threatening posture. This individual represents the most northeastern record in the Pacific fork of the distribution of the species. © Sky Jacobs

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