Amphibia: Anura

Combat behavior in captive male Coronated Treefrogs, *Anotheca spinosa* (Anura: Hylidae)

The monotypic genus *Anotheca* is represented by the species *A. spinosa*, commonly known as the Coronated (or Crowned) Treefrog, because of the bony spines that form and protrude from the skull of the adult frog, making it an unmistakable and easily identifiable species throughout its range. Adult males and females of this large nocturnal treefrog measure 59–69 and 58–80 mm in snout–vent length, respectively, and their characteristic coloration is a brown dorsum and venter, with irregular black blotches encircled with white (Duellman, 1970; Savage, 2002). This Mesoamerican species has been recorded in Mexico, Honduras, Costa Rica, and Panama, and inhabits forests at elevations from 95 to 2,068 m (Savage, 2002) where it occupies phytotelma such as bromeliads, water filled tree hollows, and bamboo internodes (Taylor, 1954; Duellman, 1970; Jungfer, 1996; Köhler 2011). Reproduction often takes place in such microhabitats, as the eggs and tadpoles are deposited in these water filled hollows, where they are provided with nutritive food eggs by the parent female (Taylor, 1954; Jungfer, 1996; Fenolio, 1997; Savage, 2002; Köhler, 2011).

Considering these habits, *A. spinosa* is difficult to observe in the wild (Köhler, 2011); significant detailed observations have been undertaken with captive individuals, particularly regarding this species' breeding biology and parental care of the larvae (Jungfer, 1996; Savage, 2002; Fenolio, 2010; Brenes et.al, 2013). Recently, Brenes et.al (2013) described reproductive behavior in wild individuals in Costa Rica, which largely correlated with the captive observations of Jungfer (1996). Little information is available on how this species interacts with conspecifics, and particularly how sexually mature males behave toward one another. Brenes et.al (2013) reported at least three males of *A. spinosa* calling competitively in the same area, but did not observe any physical interaction. Published accounts of this species also have not theorized as to the function of the protruding bony spines on the skull of the adult frog.

We housed four unsexed immature individuals of *A. spinosa* communally in a glass vivarium measuring 60 cm L × 45 cm W × 45 cm H, and maintained them under the conditions detailed by Junfger (1996). We provided the frogs with several artificial phytotelma, consisting of water-filled plastic containers with protruding cork bark. Initially we observed individuals residing within the water of the artificial hollows for much of the time, or resting on the protruding cork bark close to the water level. Over the next six months, as the individuals matured, occasionally we noted small scratch-like abrasions on the dorsum of the frogs; we observed no abnormal behavior, and attributed the abrasions to the frogs' maneuvering through the cork bark and branches of their enclosure during periods of activity. Occasionally we heard vocalizations, often coinciding with more than one individual occupying the same artificial phytotelma, confirming the presence of male individuals within the group.

On 19 May 2015 at 1135 h, we observed combat behavior between two male *A. spinosa* and filmed the event using a GoPro camera and tripod positioned unobtrusively within the vivarium. This particular event consisted of two individuals occupying the same artificial phytotelma and vocalizing in near unison; subsequently the vocalizations ceased, followed by combat behavior. Each of the frogs appeared to be pushing the other from the artificial phytotelma, using head to head combat and their bony cranial projections in an attempt to flip or achieve leverage over the other; occasionally, they locked their bony projections, and used their hind limbs to push against the insides of the plastic container to apply force against the competitor (Fig. 1). The combat process was physically intense and rest stages consisted of exaggerated buccal pumping, which interspaced periods of fervent activity; we also observed short periods of axillary amplexus that lasted 10–15 s. The competing frogs repeatedly pushed one another, and once removed from the container they immediately returned and reengaged in the behavior. After approximately 10 min the two separated, with one, the presumptive victor, remaining in the original container and the other retreating.

Fig. 1. A pair of male *Anotheca spinosa* expressing combat behavior within artificial phytotelma. Note the abrasions on the dorsum on the individual on the left, a typical result of this behavior. © Adam W. Bland

Immediately following this observation we examined all four individuals; as previously noted, small superficial abrasions were present on the dorsum of the two individuals engaged in this behavior. Since no signs of significant physical injury were evident, we assumed that previous abrasions likely resulted from this behavior during nocturnal activity. We identified all four individuals as males by the presence of nuptial pads. We then housed the now subadult male frogs in pairs in an effort to minimize interaction, and placed multiple artificial phytotelma in each vivarium. Subsequently, we observed a second bout of combat between one of the two pairs, with the same results as the first observation, which led us to house each of the frogs individually.

Following our observations, one might assume that mature male *A. spinosa* in breeding condition can be intolerant of conspecific males, and display aggressive combat behavior by using their characteristic bony cranial projections against opposing individuals. Our observations suggest that this activity might be a territorial response to defend their chosen phytotelma against rival males, an important requirement for successful reproduction in this species. We are not aware if the observed combat and assumed territorial behaviors occur in both sexes, as all individuals in this account were males. This behavior has not been noted in captive collections housing reproductive adult pairs in a single enclosure maintained under similar conditions (M. Mandica and L. Phillips, pers. comm.), suggesting that this behavior is exhibited only between males.

The lack of available information on *A. spinosa* regarding conspecific behavioral interactions and no examples of combat behavior in this species led to the assumption that the individual housing of frogs was not considered necessary. We did not maintain the frogs in a way to induce this behavior, and once combat was observed they were separated. The captive environment might have contributed toward the expression of this behavior because of increased interaction among individuals, a situation that might not occur frequently in nature. Although we suggest that combat behavior is representative of this species, similar observations of wild individuals are necessary to confirm our assumption.

Territoriality between or among male individuals leading to aggressive physical interactions has been noted in many Neotropical anuran species, including members of the Dendrobatidae (Duellman, 1966), Bufonidae (Crump, 1988), Centrolenidae (Duellman and Savitzky, 1976), Hylidae (Martins et.al, 1998), and Strabomantidae (Askmentins, 2011). This observation represents newly observed behavior in *A. spinosa*, and offers insights as to the function of the bony cranial projections that are characteristic of this species. Our observations might help improve husbandry practices for this species within zoological collections, and also provide a better understanding of the behavior of this unusual and uncommon species in the wild.

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Sarcohyla robertsorum **(Taylor, 1940). Reproduction.** Robert's Treefrog, *Sarcohyla* (*Plectrohyla*) *robertsorum*, is a Mexican endemic with a distribution in pine and fir forests and montane meadows in the Sierra Madre Oriental and extreme northern Puebla, eastern Hidalgo, and adjacent Tlaxcala (Duellman, 2001). The natural history of *S. robertsorum* remains poorly known, but this species has been collected in streams and flooded grassland in pine-oak forest at elevations from 2, 000 to 3,050 m (Duellman, 2001; Santos-Barrera and Canseco-Márquez, 2004). After Taylor (1940) described this species from Parque Nacional El Chico (PNCH), Hidalgo, Mexico, a few records of *S. robertsorum* were found in the immediate area, as well as in the surrounding region. Rabb and Mosimann (1955) reported on three adult specimens and provided a morphological description of 17 tadpoles from PNCH. Subsequently, Duellman (1964) reported on tadpoles of this species from a stream in pine forest located 3.3 km N and 8.5 km SE of Zacualtipán, Hidalgo, and also noted observing this species in PNCH from 1960 to 1962. Santos-Barrera and Canseco-Márquez (2004) noted that surveys conducted within the species' range in 2001 resulted in collecting only a single specimen. Caviedes-Solis et al. (2015) presented the most recent record of *S. robertsorum*, from 2 km NE (by road) of Zoquizoquipan, Hidalgo.

Because of the restricted distribution of *S. robertsorum* and the scarcity of records, our current knowledge on the status of populations and information on the natural history of this species remains limited. Duellman (1964) reported females at PNHC with eggs in the oviduct in June of 1960 and 1962, and Lang (1995) reported four females (exact locality not provided) with oviductal eggs, which measured 2.74 mm in diameter. Herein we report on a clutch of eggs recently found in a female *S. robertsorum*.

During a herpetofaunal survey, on 26 May 2015 at 2230 h an adult female *S. robertsorum* (CIB-4530; Fig. 1) was collected 1.5 km NE of Zoquizoquipan, Municipio de Metztitlán, Hidalgo (20°39'41.89"N, 98°42'22.86"W; datum WGS 84; elev. 2,051 m). The individual was found along the edge of a spring located in a fragment of oak forest surrounded by pastures. The ambient temperature and humidity were 17°C and 80%, respectively. We measured the snout–vent length (SVL) of the specimen, and since the individual was found to contain eggs we measured their diameter with a digital caliper (to nearest 0.01 mm), and determined the mass of the body and eggs with an analytical balance (to nearest 0.0001 g). The specimen is housed in the scientific collection of amphibian and reptiles at the Centro de Investigaciones Biológicas (CIB) in the Universidad Autónoma del Estado de Hidalgo.

Fig. 1. An adult female *Sarcohyla robertsorum* (CIB-4530) from 1.5 km NE of Zoquizoquipan, Municipio de Metztitlán, Hidalgo, Mexico. © Raquel Hernández-Austria

The SVL of the female was 48.8 mm, and its body mass was 10.45 g. The female contained 116 eggs in the ovaries, with an egg mass of 6.72 g and a mean diameter of 2.59 ± 0.40 (range 1.07–3.73). These data are similar to those reported by Lang (1995). This information is important because it adds to our knowledge of the natural history of *S. robertsorum* and thus might help with its conservation, as has occurred with other amphibian species (Stuart et al., 2004).

Along the stream, *S. robertsorum* occurs in sympatry with *S. charadricola* and *Rheohyla miotympanum*, which indicates the importance of conserving such remnant patches of oak forest. A conservation strategy for this type of vegetation is necessary for protecting these species, because over time their population numbers have been reduced dramatically. Consequently, by discovering new populations and estimating their densities, we might better understand their distributional and ecological requirements and thus propose strategic conservation plans for these species.

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Smilisca baudinii. **Diet.** The distribution of the Mesoamerican Treefrog, *Smilisca baudinii*, extends from extreme southern Texas, United States, to extreme southern Costa Rica (Savage, 2002; Frost, 2015). This species is one of the most abundant and conspicuous hylids in Mesoamerica, and large numbers are known to gather at breeding congregations (Duellman, 1970; 2001); for example, Gadow (1908) estimated 45,000 individuals at a breeding site in Veracruz, Mexico. Little information is available on its diet, which is unusual for such an abundant species.

On 22 July 2016, at Pajaritos, Municipio de Tecuala, Marismas Nacionales de Nayarit (22.415019°N, -105.519950°W; WGS 84; elev. 6 m) we found an individual of *S. baudinii* dead on the road (Fig. 1). We examined its stomach contents and found a partially digested fire ant (*Solenopsis* sp; Fig. 2).

Fig.1. A *Smilisca baudinii* found dead on a road at Municipio El Tecuala, Nayarit, Mexico. The stomach contained a fire ant (*Solenopsis* sp.).
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Fig. 2. A fire ant (*Solenopsis* sp.) found in the stomach of a *Smilisca baudinii*. © Jesús A. Loc-Barragán

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***Smilisca fodiens.* Malformation.** The distribution of *Smilisca fodiens* extends from south-central Arizona, in the United States, southward through western Sonora and the coastal regions of Sinaloa and the foothills of the Pacific slopes of the Sierra Madre Occidental in Nayarit and southward on the Mexican Plateau in Jalisco, as well as in Michoacán (Duellman, 2001).

Cases of deformities in amphibians have been perceived as a major environmental problem (Ouellet et al., 1997), and debate continues as to the causes of deformities in wild populations (Johnson et al., 2003). Still, deformities are considered a great impact on the decline of amphibian populations and might result from various causes, but the majority can be linked to environmental damage (Blaustein and Johnson, 2003).

In Mexico, a few studies on these amphibian abnormalities or malformations have been published, including in two species of *Ambystoma* (Caudata) by Cruz-Pérez et al. (2009) and Robles-Mendoza et al. (2009), respectively, as well as in the ranid, *Lithobates neovolcanicus* (Barragán-Ramírez and Navarrete-Heredia, 2011), and the hylid, *Hyla picata* (Aguillón-Gutiérrez and Ramírez-Bautista, 2015).

On 25 July 2016 at 0915 h, in the Municipio de Tecuala, Nayarit, Mexico (22.407375°N,105.460310°; WGS 84; elev. 9 m), I observed an adult male *S. fodiens* (total length 41 mm) with a malformation in it's mouth. The frog was in a temporary pond located in an area of low thorn forest that had been disturbed by agricultural activity.

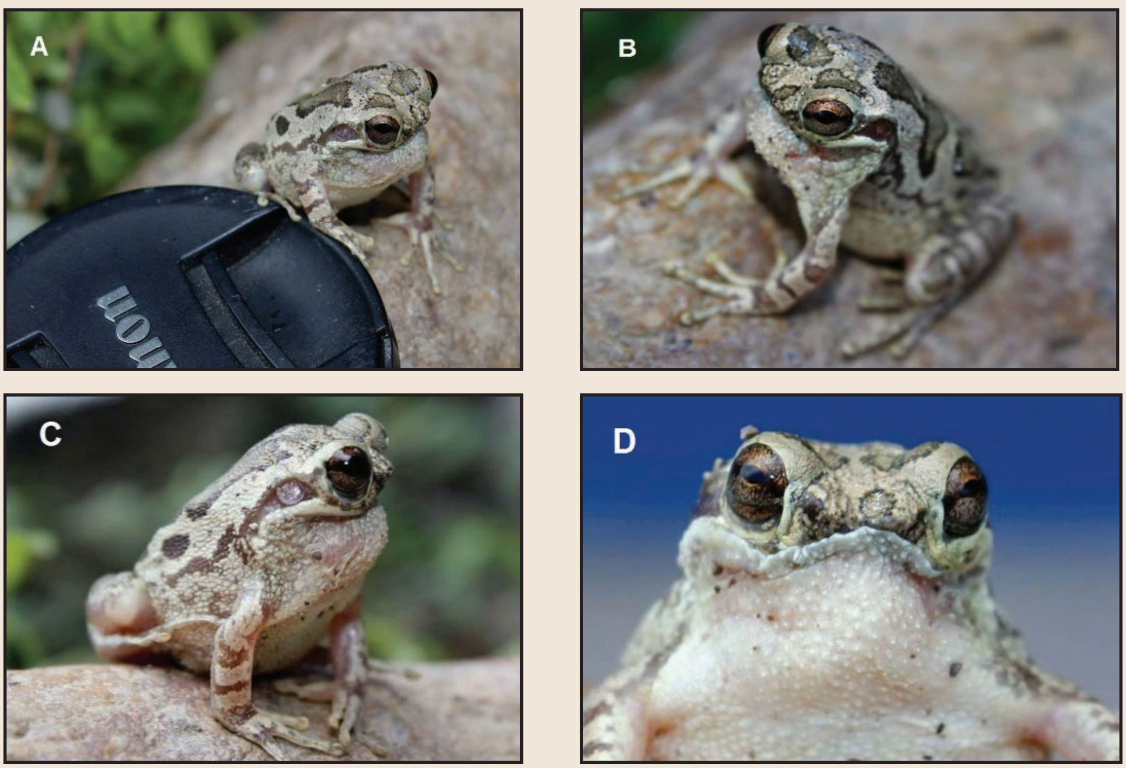

Fig. 1. A *Smilisca fodiens* found in Municipio de Tecuala, Nayarit, Mexico. (A, B, C) Angle and side views and (D) frontal view showing the mouth deformity. © Jesús A. Loc-Barragán

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***Smilisca phaeota* (Cope, 1862). Colonization.** Changes in distribution or community composition of herpetofauna and bird communities in tropical forests have been documented in recent years, including examples in Costa Rica; in most the cases, these changes have been attributed to climate change (Pounds et al. 1999; Bickford et al. 2010; Gilson and Cossel, Jr., 2012; Hille and Cossel, Jr., 2012; Sandoval et al., 2016). Here we present a well-documented record of colonization in a montane cloud forest ecotone during a relatively short time by the Central American Cross-banded Treefrog (*Smilisca phaeota*) in Costa Rica, increasing its upper known distribution for the Valle de Orosi, Cartago.

On 4 June 2016, during a visit to the Estación Biológica Río Macho (EBRM), Provincia de Cartago, Costa Rica, we detected several calling males (at least 10 individuals) of *S. phaeota* in open areas near the EBRM entrance, and near aquaculture ponds for Rainbow Trout (09.766990°N, 083.861458°W; map datum WGS 84; elev. ca. 1,575 m). In addition to the calling males, we also observed an amplectic pair (Fig. 1) in a temporary pool, and the following day noted eggs in the same locale. Previously, *S. phaeota* was not reported on a checklist of ERBM herpetofauna compiled from January 2012 to January 2013 (Acosta-Chaves et al., 2015), and the species was not encountered during frequents visits to ERBM by VJAC from 2007 to 2013. We observed Taylor's Leopard Frogs (*Lithobates taylori*) in the same temporal ponds, which historically also were breeding sites for Meadow Treefrogs (*Isthmohyla pseudopuma*) and Green Climbing Toads (*Incilius coniferus*) (Acosta-Chaves et al., 2015).

Fig. 1. An amplectic pair of *Smilisca phaeota* in a temporal pond near the entrance to Estación Biológica Río Macho, Provincia de Cartago, Costa Rica. © Víctor Acosta-Chaves

Smilisca phaeota is a widespread and often abundant species, especially in disturbed areas (Savage, 2002; Solís et al., 2008). Savage (2002) reported its elevational distribution as from 2 to 1,116 m, but Solís et al. (2008) increased the known elevation in Costa Rica to 1,600 m. This treefrog is easy to recognize because of its color pattern (presence of a dark mask) and production of a loud and distinctive advertisement call (Savage, 2002), which minimize the likelihood of non-detection or misidentification during surveys. Consequently, the lack of detection of an easily recognizable species, despite extensive sampling, leads us to believe it colonized the area during the last three years.

While climate change might best explain the elevational range expansion from lower to higher elevations (Pounds et al., 1999; Bickford et al., 2010), we cannot discount the possible synergy of other factors involved with the colonization of *S. phaeota* at ERBM, including niche availability resulting from possible local declines of other hylids (e.g., *Ishtmohyla* spp.) that previously inhabited the area (Savage, 2002; Acosta-Chaves et al., 2015), or even the accidental transportation of individuals. In any case the colonization of new amphibian species, driven by climate change or not, can result in competition, changes in community composition, and eventually the extirpation or extinction of species (Bickford et al., 2010). Our report exemplifies the importance of creating biological inventories for specific areas, and conducting biological monitoring to understand how biological communities change across time. Unfortunately, sponsoring institutions have not maintained the trails and facilities at ERBM, thereby making several of the sites studied by Acosta-Chaves et al. (2015) inaccessible. We encourage collaboration to re-establish access and function at ERBM, to facilitate conducting future research on possible changes in the composition of the herpetofauna at the station and adjacent areas.

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Reptilia: Squamata (lizards)

First records of nocturnal activity in two diurnal anole species (Squamata: Dactyloidae) from Mexico

Urbanization is a process that drastically transforms the environment, and creates new habitats with elements and different dynamics that some species can leverage (McKinney, 2006; Shochat et al., 2006; Perry et al., 2008). Artificial light is a factor associated with urbanization that affects animals (Zozaya et al., 2015), as insects attracted to a light source at night present a source of available food for reptiles (Perry et al., 2008). For this reason, in some places light pollution has caused diurnal lizards adapted to living in urban areas to change their behavioral activities (Perry et al., 2008; Powell, 2015). Such is the case for some species of the genus *Anolis* (*Norops*), which have been observed to modify their diurnal activity period to include nocturnal hours (Schwartz and Henderson, 1991; Meshaka et al., 2004; Perry et al., 2008; Powell, 2015).

In this note we chose to maintain use of the genus *Anolis* based on the arguments of Poe (2013), although Nicholson et al. (2014) and Johnson et al. (2015) presented a different opinion. In Mexico, certain species of *Anolis* (*A. cristatellus*, *A. lemurinus*, *A. nebulosus*, *A. quercorum*, *A. rodriguezii*, *A. sagrei*, *A. sericeus*, and *A. tropidonotus*) have been reported to inhabit urban or disturbed areas (Lee, 2000; Canseco-Márquez and Gutiérrez-Mayén, 2010, Köhler and Vesely, 2010). Nocturnal activity for these species in urban areas of Mexico has not been reported, and here we report this behavior for two species.

On 12 July 2014 we observed a female *A. sagrei* (Fig. 1A) foraging on a wall at 2328 h at Calderitas, Chetumal, Quintana Roo (18°33'32"N; 88°15'03"W; WGS 84) elev. 8 m; air temperature 24°C. On 4 October 2014 we found a male *A. sagrei* (Fig. 1B) foraging on a chain-link fence at 2145 h at Chetumal, Quintana Roo (18°30'34"N; 88°18'38"W; WGS 84) elev. 9 m; air temperature 28°C. On 14 August 2015 we found an adult female *A. sericeus* (Fig. 3) foraging on a brush under a lamp at 0047 h at Estación de Biología Los Tuxtlas, near San Andrés Tuxtla, Veracruz (18°35'05.87"N; 95°04'26.34"W; WGS 84); elev. 400 m; air temperature 25°C.

Fig. 1. (A) A female *Anolis* (*Norops*) *sagrei* foraging at night near a light fixture at Calderitas, Quintana Roo, Mexico. (B) An active male *A. sagrei* at Chetumal, Quintana Roo, Mexico. © Luis M. Badillo-Saldaña

We collected the last two specimens to analyze their stomach contents. The specimens of *A. sagrei* and *A. sericeus* are housed with the numbers CIB-4588 and CIB-4967, respectively, in the herpetological collection of the Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo.

The stomach of specimen CIB-4588 contained lepidopterans, dipterous, and a nocturnal lizard (*Hemidactylus frenatus*), and the stomach of CIB-4967 contained dipterous. These data show that by extending their activity period during nocturnal hours, individuals fed on prey attracted by nocturnal lights. In natural areas without artificial light we found individuals of *A. sagrei* and *A. sericeus* sleeping soon after sunset (between 1900 and 2000 h).

Garber (1978) used the term "night-light niche" for new habitats created by the presence of artificial lights. In diurnal lizards, behavioral observations associated with the "night-light niche" have been reported more often for *Anolis* in tropical environments, perhaps because the ecological (foraging mode) and physiological characteristics (optimal body temperatures) typical of this group allow them to exploit available resources depending on the ambient temperature (Medina et al., 2016). Our observations, therefore, might have resulted from the conditions of the ambient temperature and the niche nightlight, because this behavior (foraging) and the environmental temperature were within of the optimal temperature suggested for this genus (Medina et al., 2016). In addition to our data, published records from other parts of world show that species of *Anolis* are capable of exploiting artificial lights to secure food, as the lights attract nocturnal insects and small vertebrates. The behavior shown for these two species of *Anolis* presents information on the capacity of this genus to exploit new resources in the urban areas.

Fig. 2. An adult female *Anolis* (*Norops*) *sericeus* eating a dipterous under an artificial light at Estación de Biología Los Tuxtlas, near San Andrés Tuxtla, Veracruz, Mexico. © Luis M. Badillo-Saldaña

Acknowledgments.—We thank Diego Juárez-Escamilla and the Solis-Badillo family for logistical support and fieldwork. Specimens were collected under scientific permit number SGPA/DGVS/02419/2013 issued by SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales).

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***Aspidoscelis tigris* (Baird and Girard, 1852). Opportunistic water acquisition.** Water acquisition represents a significant challenge for most inhabitants of arid environments, and consequently animals have adopted physiological, morphological, and ethological strategies to survive in those unstable conditions. Lizards and snakes acquire water mostly by drinking or from water contained in their food (Pianka and Vitt, 2003). Water collection has been reported for a number of squamates (Nielsen et al., 2016; Mata-Silva et al., 2014, and references therein).

Herein, we report of an observation of water consumption by the Tiger Whiptail, *Aspidoscelis tigris*, in Baja California, Mexico. This lizard is distributed from Oregon and Idaho through California, Nevada, Utah, Arizona, extreme western Colorado and New Mexico, in the United Sates; and in Mexico in Baja California, Baja California Sur, Sonora, and Sinaloa (Sullivan, 2009). The species also occurs on many islands in the Sea of Cortés (Murphy and Ottley, 1984), and has been reported at an elevational range that extends from near sea level to 3,000 m (Wilson and Johnson, 2010).

Fig. 1. An adult Tiger Whiptail (*Aspidoscelis tigris*) drinking polluted water from a drainage pipe in the vicinity of El Huerfanito, Municipio de Ensenada, Baja California, Mexico. © Elí García-Padilla

On 4 May 2009 at 1045 h, one of us (EGP) observed an adult *A. tigris* drinking polluted water from a drainage pipe (Fig.1). This observation took place in the vicinity of El Huerfanito, Municipio de Ensenada, Baja California, Mexico (30.115101°N, 114.619477°W; WGS 84; elev. 3 m). The lizard drank water for ca. 0.5 min, using tongue-flicking movements. The consumed water contained residuals of food, and was polluted with detergent used for washing dishes. We assume that lizards, especially those living in arid regions, will obtain water from artificial sources when it can be easily accessed. Opportunistic water acquisition within this genus has also been reported for *A. guttata* (Mata-González et al., 2016). To the best of our knowledge, this report represents the first observation of water drinking behavior in *A. tigris*.

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Ctenosaura pectinata **(Wiegmann, 1834). Bifurcated tail.** Caudal autotomy in lizards can be defined as the ability to shed the tail as a response to attempted predation (Bateman and Fleming, 2009). This phenomenon occurs due to the fracture of caudal vertebrae at distinct regions called fracture planes (Ananjeva and Danov, 1991; Zug, 1993; Bateman and Fleming, 2009). Following a caudal autotomy event, one of the most important steps is regeneration of the lost tail (Clause and Capaldi, 2006; Alibardi, 2010). In some natural cases the fracture of caudal vertebrae can be incomplete, and as consequence another tail might grow, resulting in two (bifurcation) or more (supernumerary) tails (Alibardi, 2010; Gogliath et al., 2012; Dudek and Ekner-Grzyb, 2014; Pelegrin and Muniz Leão, 2016). Caudal autotomy as defensive mechanism occurs in such reptile groups as tuataras, lizards, and snakes (Bateman and Fleming, 2009). Surprisingly, however, little information on caudal autotomy is available for members of the family Iguanidae (e.g., Etheridge and de Queiroz, 1988; Alberts et al., 2004). Here, we report a case of bifurcation in the tail of an insular individual of the Western Spiny-tailed Iguana, *Ctenosaura pectinata*.

In March of 2002, at Parque Nacional Isla Isabel, located 28 km off the coast of Nayarit, Mexico (21°50'33"N, 105°53'08"W; datum WGS 84; elev. 6 m), we observed and photographed an adult female *C. pectinata* (snout–vent length ≤ 30 cm; specimen not captured) with a bifurcated tail (Fig. 1A). One of the regenerated tails (ventral tail) was slightly shorter than the other, but similar in thickness (Fig. 1B). The tail of the individual was bifurcated at an acute angle, just past the medial region. In certain cases the tail of some lizards does not detach, resulting in incomplete caudal autotomy and leading to a regenerated tail with two or more tips (Dudek and Ekner-Grzyb, 2014; Pelegrin and Muniz Leão, 2016). To our knowledge, this is the first report of a tail abnormality in *C. pectinata*, a species endemic to Mexico. The distribution of this species is along the Pacific coast of Mexico from southern Sinaloa to Chiapas, including Isla Isabel, Las Islas Marías, and some inland states in the Balsas Basin, at elevations from sea level to 2,000 m (Hollingsworth, 2004; Ramírez-Bautista and Hernández-Ibarra, 2004; Köhler, 2008). We were unable to determine if the tail loss was caused by a predatory attempt or by an intraspecific encounter.

Fig. 1. (A) A female *Ctenosaura pectinata* photographed basking on a rock wall at Parque Nacional Isla Isabel, Nayarit, Mexico, and (B) a close-up of the tail. © Fabio Germán Cupul-Magaña

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Gonatodes albogularis. **Predation by a Brown Vinesnake (*Oxybelis aeneus*).** *Gonatodes albogularis* is the most wide-ranging species in its genus, with a distribution extending from southern Mexico to northern South America, including several adjacent islands, as well as in Cuba, Grand Cayman, Hispaniola, and Jamaica; it also has been introduced into southern Florida (Schwartz and Henderson, 1991) and presumably in Belize (Lee, 2000). Typically, it can be seen perched about a meter above the ground on the walls of wooden houses and buildings, where it seeks refuge in crevices when alarmed; it also inhabits the bark trees, even in semi-urban areas (Stafford and Meyer, 2000). Natural predators of this species include birds, larger lizards, mammals, and snakes (Fitch, 1973; Bello, 2000; Sosa-Bartuano and Lau, 2016).

The distribution of the Brown Vinesnake, *Oxybelis aeneus* is one of the widest among Neotropical snakes, as it ranges from southern Arizona, in the United States, and Tamaulipas, Mexico, southward throughout Central America and most of South America to at least central Bolivia and southeastern Brazil, and perhaps Paraguay and northern Argentina (Keiser 1974; Solórzano, 2004). Adults are long (to about 1.70 m) and extremely slender, with a pointed snout (Savage, 2002). This species is equipped with enlarged rear fangs and a moderate venom, and their bite is known to cause swelling and blisters (Crimmins, 1937). *Oxybelis aeneus* also appears to ambush its prey, rather than actively forage (Campbell, 1998), and feeds on a variety of vertebrates such as insects, fishes, amphibians, lizards, small rodents, arboreal mammals, and birds, fish (Henderson, 1982; Campbell, 1998; Savage, 2002; Hetherington, 2006; Natera-Mumaw et al., 2015). Studies indicate, however, that *O. aeneus* has a dietary preference for lizards, especially anoles (Keiser, 1967; Henderson, 1982; Wilson and Cruz-Díaz, 1993; Lee, 1996; Savage, 2002). Lizards reported in its diet include *Basiliscus plumifrons*, *B. vitattus*, *Cnemidophorus lemniscatus*, *Gymnopthtalmus speciosus, Iguana iguana, Norops bourgeaei*, *N. rodriguezi*, *N. uniformis*, and *Sceloporus melanorhinus* (Smith and Grant, 1958; Lee, 1996; Green, 1997; Campbell, 1998; Savage, 2002; Diener, 2007; Grant and Lewis, 2010; López-de la Cruz et al., 2016). Carr (1966) and Blanco-Torres and Renjifo (2014) show photos of *O. aeneus* preying on an anole and a *Gonatodes vittatus*, respectively.

In March of 2002 at 1300 h, ASB observed an *O. aeneus* preying on a male *G. albogularis* at Llano Largo, Corregimiento de Guadalupe, Distrito de La Chorrera, Provincia de Panamá Oeste, Panama (8.844089°N, 79.801025°W; WGS 84); elev. 76 m. The snake had captured the gecko in the yard of a home, and was holding it by the middle of the body. The event was witnessed for about 10 min, as the snake did not leave the site and the gecko remained motionless. ASB did not observe the snake swallowing the gecko, however, and the event was not documented with specimens or photographs.

On May 26 2015 at 1500 h, JDT observed and photographed an *O. aeneus* preying on an adult male *G. albogularis* (Fig. 1) at Cerro Ancón, Corregimiento de Ancón, Ciudad de Panamá (8.957222°N, 79.549444°W) elev. ~100 m. The snake held the struggling gecko in its mouth for about 15 min until the lizard stopped moving, and then retreated into the forest; the swallowing process was not observed. Herein we are report the first records of predation by *O. aeneus* on *G. albogularis*.

Fig. 1. An *Oxybelis aeneus* preying on an adult male *Gonatodes albogularis* at Cerro Ancón, Corregimiento de Ancón, Ciudad de Panamá, Panama. © Juan Di Trani

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***Hemidactylus frenatus*. Predation.** Many arthropods are capable of preying on vertebrates, because some species are larger than the juveniles and even adults of many vertebrate species. Some arthropod species use venom, webs, or specialized trophic structures to capture, subdue, and feed on larger prey. Some arthropods and vertebrates also are involved in "cross predation," in which arthropods sequentially are the prey and predator of the same species of vertebrate. The predation of vertebrates by arthropods, including reptiles, has been well documented (McCormick and Polis, 1982; Carbajal-Márquez et al., 2013). With scorpions, members of the families Buthidae (*Centruroides edwardsii*, *Parabuthus villosus*, *Tityus metuendus*), Caraboctonidae (*Hadrurus arizonensis*, *H. hirsutus*, *H. spadix*), Hormuridae (*Opisthacantus elatus*), Vaejovidae (*Smeringurus mesaensis*, *Vaejovis* sp.), and Scorpionidae (*Opistophthalmus carinatus*) are known to prey on geckos (*Coleonyx* sp., *Hemidactylus mabouia*, *Pachydactylus capensis*, *Palmatogecko rangei*), other lizards (*Aspidocelis* sp., *A. tigris*, *Basiliscus basiliscus*, *Dipsosaurus dorsalis*, *Podarcis hispanicus*, *Sceloporus graciosus*, *S. occidentalis*, *Trachylepis striata*, *Urosaurus ornatus*, *Uta stansburiana*, and *Xantusia vigilis*) and snakes (*Nerodia sipedon*, *Rena humilis*, and *Tantilla armillata*) (Hardy, 1947; Anderson, 1956; Banta, 1957; Stahnke, 1966; Lamoral, 1971; McCormick and Polis, 1982; Castilla, 1995; De Albuquerque, 2012; Acosta-Chaves and Villalobos-Chaves, 2015; Elizondo et al. , 2016). In particular, a member of the genus *Centruroides* has been reported to prey on the snake *T. armillata* (Acosta-Chaves and Villalobos-Chaves, 2015).

On 27 September 2014 at ca. 2100 h, a *C. elegans* was found consuming a juvenile *H. frenatus* in an abandoned house (Fig. 1) at San Patricio-Melaque, Municipio de Cihuatlán, Jalisco, Mexico (19.225355 °N, -104.707627 °W; datum WGS 84; elev. = 11 m). Records are available for species of *Hemidactylus* being preyed upon by arthropods, including *H. mabouia* by a Ctenid spider, a scorpion (*Tityus metuendus*), and a Lycosid spider (Lanschi and Barbosa-Ferreira, 2012; De Albuquerque, 2012; Andrade-Koski et al., 2013), *H. platyurus* by the dragonfly *Anax* cf. *panybeus* (Sy and Alaban, 2014), and *H. frenatus* by the spiders *Heteropoda* sp. and *Heteropoda venatoria* (Purkayastha and Hossain-Sourav, 2011; Priyadarshana and Wijewardana, 2016). To our knowledge, this is the first report of *H. frenatus* being preyed upon by *C. elegans*. This note shows that this introduced gecko can be a food source for a native species.

Fig. 1. A juvenile *Hemidactylus frenatus* preyed upon by a *Centruroides elegans* in San Patricio-Melaque, Municipio de Cihuatlán, Jalisco, Mexico. © Marco Antonio Domínguez-De la Riva

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***Norops sericeus* (Hallowell, 1856). Kyphosis and scoliosis**. Malformations in the vertebral spine of reptiles can be caused by genetic defects, environmental conditions, or metabolic bone diseases (Frye, 1991). These malformations are common in several species of lizards and snakes, and a few chelonians and crocodilians (Frye, 1991). In lizards, reports of malformations in wild populations have been reported more frequently in species of the family Phrynosomatidae (Mitchell and Georgel, 2005; Chávez-Cisneros and Lazcano, 2012; Perez-Delgadillo et al., 2015; Valdez-Villavicencio et al., 2016), followed by the Liolaemidae (Frutos, 2006; Feltrin et al., 2009; Ávila et al., 2013), Agamidae (Norval et al., 2010), Iguanidae (Owens and Knapp, 2007) and Lacertidae (Barrio-Garín, et al., 2011). We are unaware of published reports for these types of malformations (kyphosis or scoliosis) in species of the genus *Norops*.

Norops sericeus is a small and slender member of the family Dactyloidae, with adult males averaging about 46 mm and adult females 41 mm in snout–vent length (Lee, 1996). In Mexico, this species ranges from Tamaulipas southward to the Yucatan Peninsula on the Atlantic versant, and Oaxaca on the Pacific versant; in the Yucatan Peninsula its distribution is pan-peninsular, as this species prefers open habitats such as savannas, forest edges, and areas disturbed by human activity, but penetrates forest habitats along roadsides (Lee, 1996)

On 16 June 2010, JAOM found an adult female *N. sericeus* in the Jardín Botánico Xkaanzajil at the Centro de Bachillerato Tecnológico Agropecuario (CBTA No. 13 Ext. Acanceh), Municipio de Acanceh, Yucatán (20°49'20.57"N, 89°28'11.01"W; elev. 15 m). A vertical curvature of the spine (kyphosis) was evident in the thoracic region of the lizard, as well as a curvature on the base of the tail (scoliosis; Fig. 1). The individual was found active at 1100 h on a tree trunk 80 cm above the ground, in a combination of tropical deciduous forest and secondary vegetation. The individual also lacked the right eye, but this condition and the malformations appeared to have little effect on its locomotion. To show the degree of the curvature on the spine of the lizard JAOM gently held it for one photograph, then immediately released it.

Fig. 1. Different views of the adult female *Norops sericeus* with kyphosis and scoliosis. © Javier A. Ortiz-Medina

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***Phrynosoma braconnieri* Duméril & Bocourt, 1870. Behavior.** Horned lizards of the genus *Phrynosoma* exhibit a variety of defensive behaviors, including ocular blood-squirting, fleeing, body bloating, hissing, opening of the mouth, charging, biting, dorsal-shielding, horn-threating, kicking, tail wiggling, and staying immobile on their backs (Winton, 1917; Parker, 1971; Sherbrooke, 1991).

The Short-tailed Horned Lizard, *Phrynosoma braconnieri*, is found in xeric scrub, and oak and pine-oak forests in the Mexican states of Guerrero, Oaxaca, and Puebla (Zamudio and Parra-Olea, 2000; Jiménez-Arcos et al., 2014). This species and its congeners, *P. sherbrookei* and *P. taurus*, have been assigned to the Brevicauda clade, characterized by the presence of a short tail and distributed in central Mexico (Nieto-Montes de Oca et al., 2014).

On 30 April 2016 at ca. 1600 h, we captured an individual of *P. braconnieri* on the dirt road to San Jerónimo Zoyatitlanapa, 2 km E of Cacaloapan, Municipio de Tepanco de López, Puebla, Mexico (18.576351°N, 97.60297°W; WGS 84; elev. 1,960 m). We spotted the lizard while it was crossing the road, and it remained motionless when we approached. The vegetation at the locality is xeric scrub with an abundance of *Yucca* sp. (izotal). When captured, the lizard produced a series of irregularly-timed clicking sounds, accompanied by movement of the gular region. We recorded this behavior on video (accessible at: https:/youtu.be/UDmV7r6DjB8) and noted that the lizard only produced the sound when held, and that its production was more persistent the closer the camera was to the individual. Subsequently, we released the lizard at the site of capture. To our knowledge, this is the first time that the production of a clicking sound has been reported in response to stress in *Phrynosoma*.

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***Plestiodon bilineatus*. Reproduction.** The Two-lined Short-nosed Skink, *Plestiodon bilineatus*, is Mexican endemic known to reach a snout–vent length (SVL) of 60 mm, which inhabits pine-oak forest in the Sierra Madre Occidental in the states of Chihuahua, Durango, Jalisco, Nayarit, and Zacatecas at elevations from 1,250 to 2,232 m (Canseco-Márquez et al., 2007; Lemos-Espinal and Smith, 2009; Feria-Ortiz et al. 2011). Little information is available on the reproduction of this skink. Feria-Ortiz et al. (2007) reported the litter size of three females of *P. brevirostris*, a closely related species. The first (SVL = 62 mm, tail length [TL] = 50.4 mm, body mass = 2.74 g [post parturition]), gave birth to four live offspring with a mean SVL of 26.25 ± 0.12 mm, TL 25.25 ± 012 mm and body mass 0.303 ± 001 g; the second (SVL = 65 mm, TL = 37 mm, body mass = 3.24 g [post parturition]) gave birth to four neonates (mean SVL = 26.87 ± 0.34 mm, TL = 24.75 ± 0. 13 mm, body mass = 0.291 ± 005 g); and the third (SVL = 59 mm, TL = 132.2 mm, body mass = 3.5 g [post parturition]) gave birth two neonates (mean SVL = 25.0 ± 0.12 mm, TL = 25.0 ± 0.15 mm). Ramírez-Bautista et al. (2010) reported litter sizes of 2–5 neonates from populations of *P. brevirostris* (SVL = 9.6 mm, TL = 8.3 mm) in the Valle de México. Canseco-Márquez and Gutiérrez-Mayén (2010) found a pregnant female *P. brevirostris* with nine vitellogenic follicles at San Pedro Jocotipac, Oaxaca, and another female from San Juan Tepeuxilia, Oaxaca, gave birth six neonates. Additionally, Legler and Webb (1960) reported a *P. bilineatus* (SVL = 56 mm, TL = 57 mm) from Samachique, Chihuahua, which was giving birth to young when collected on 11 or 12 July 1958, but did not provide the litter size. Herein we provide information on the litter size of an individual of *P. bilineatus* from Zacatecas.

On 19 June 2016 at Los Fortines, Valparaiso, Zacatecas, Mexico (22.900500° N, -103.753278° W; WGS 84; elev. 2,540 m) JABA found a pregnant female *P. bilineatus* (SVL = 71 mm, TL = 90 mm, body mass = 4. 53 g [post parturition]) in pine-oak forest (Fig. 1). The *P. bilineatus* gave birth to seven neonates in captivity on 21 June 2016. The data for the neonates is as follows: mean SVL = 25.2 ± 1.11 mm, TL = 34.8 ± 2.19 mm, and body mass = 0.26 ± 0.02 g. To our knowledge, this is the largest reported litter size for this species.

Fig. 1. A post parturition *Plestiodon bilineatus* from Los Fortines, Valparaiso, Zacatecas, Mexico.

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***Sceloporus minor*. Endoparasites.** *Sceloporus minor*, a species endemic to eastern Mexico, is found in primary and secondary pine-oak forest, oak forest, and in areas of dry scrubland with xerophytic vegetation at elevations from 1,700 to 3,000 m. This species is distributed from northern Zacatecas to eastern Aguascalientes, northern Nuevo León, southwestern Tamaulipas and south to central San Luis Potosí, northern Guanajuato, southern Querétaro and north-central Hidalgo (Wiens et al., 1999; Mendoza-Quijano et al., 2007). In the state of Hidalgo, *S. minor* has been reported in the municipalities of Agua Blanca de Inturbide, Eloxochitlán, Jacala de Ledezma, Metztitlán, San Agustin Metzquititlán, and Zimapán (Ramírez-Bautista et al., 2014). A single record of endoparasites in *S. minor* has been published, for the nematode *Spauligodon lamothei* (Monks et al., 2008); in this note we report the second record of helminths for this species.

We examined two gravid females of *S. minor* (CIB-CH 1338 and 1339) collected in 2006 at Puerto del Ángel, Municipio de Zimapán (20.73972°N; -99.38083°W). We made a lateral incision through the body wall, removed the digestive tract, opened the esophagus, stomach, small and large intestines longitudinally, and searched for helminths using a dissecting microscope. We cleared nematodes in lactophenol, and placed them on a coverslipped microscope slide. We found two species of Nematoda in both lizards, *Skrjabinoptera phrynosoma* and *Spauligodon* *giganticus*, and deposited the voucher helminths in the Colección Nacional de Helmintos (CNHE), Universidad Nacional Autónoma de México as *S. phrynosoma* (CNHE 10146), and *Sp. giganticus* (CNHE 10147).

Skrjabinoptera phrynosoma is a parasite heteroxeny of different species of lizards in Mexico of the genera *Aspidoscelis*, *Phrynosoma*, *Sceloporus*, *Uma*, and *Uta*. In Hidalgo, it was reported in *S. spinosus* from the municipality of Actopan (Falcón-Ordaz et al., 2015; Paredes-León et al., 2008). This species of nematode is a common stomach worm of lizards; its transmission reveals unusual adaptation for survival in arid conditions, using an ant as intermediate host (Anderson, 2000). A pair of different-sized spicules is present in male *S. phrynosoma*, with the right larger than the left; the caudal region contains 22 papillae, of which eight are stalked, thick, and equidistant from each other, and 14 sessiles. *Sp. giganticus* is a nematode monoxeny parasite of the intestine of *Lepidophyma*, *Petosaurus*, and *Sceloporus* in Mexico. In Hidalgo, it was reported in *Lepidophyma gaigeae* from Durango, in the municipality of Zimapán (Goldberg et al., 2002). We identified *Sp. giganticus* from two gravid females that are characterized by a length of 7 and 6.8 mm and a maximum width 0.81 and 0.82 mm, respectively, with vulva situated 0.630 mm from the cephalic end. The thread-like part of tail contains 10 small spines, the eggs are oblong and slightly flattened on one side, 0.135 mm long × 0.032 mm wide, with a knob on one end; both nematodes of *S. minor* are new host records and new localities for Hidalgo and Mexico.

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***Xenosaurus mendozai* Nieto-Montes de Oca, García-Vázquez, Zúñiga-Vega and Schmidt-Ballardo, 2013. Reproduction.** The genus *Xenosaurus* Peters, 1861, with a distribution in Mexico and Guatemala (Wilson et al., 2010), is composed of 12 species (Woolrich-Piña and Smith, 2012; Nieto-Montes de Oca et al., 2013), of which *X. mendozai* is the most recently described. This species occurs in the Sierra Madre Oriental, and has been recorded from Tilaco and Acatitlán de Zaragoza, in the Municipio Landa de Matamoros, Querétaro, and Pinalito, in Municipio de Jacala, Hidalgo (Nieto-Montes de Oca et al., 2013).

Zamora-Abrego (2004) and Zamora-Abrego et al. (2007) provided general information on the reproductive biology of *Xenosaurus*, including asynchronous reproduction between males and females: annual and fall reproduction for males, and biannual and winter reproduction for females, with mating occurring in October and November. Females ovulate in winter, and embryonic development begins in February and March and extends until August, when birthing occurs; the litter size was reported as from 1 to 4 neonates, with a mean of 2.1 (Zamora-Abrego, 2004).

In 2015, during herpetofaunal surveys conducted in the municipality of Jacala de Ledezma, Hidalgo (21°0'19"N; 99°10'19"W, datum WGS 84), we identified two localities for *X. mendozai*—José Maria Morelos and El Pinalito (Zamora-Abrego, 2004). In the latter locality, on 19 June 2015 we collected a pregnant adult female of *X. mendozai* (Fig. 1) at an elevation of 1,600 m. The female measured 108 mm in snout–vent length (SVL) mm, 108 mm in total length (TL), and its body mass was 25.8 g (two days before parturition). The lizard was maintained in captivity under similar conditions to the natural habitat, in a 60-liter (15.8 gal.) terrarium with a substrate of leaf litter and rocks with crevices; the terrarium was maintained in the shade. After 80 days (7 September 2015), the female gave birth to four neonates (Fig. 2). After parturition, the body mass of the female was 17.0 g, suggesting a loss of body mass of 65.9%.

We observed an interesting behavior, as when we attempted to capture and examine the neonates they scurried beneath the mother, and she covered them with her body. Such parental behavior has been noted for other species in this genus (Lemos-Espinal et al., 2012).

Fig. 1. A female *Xenosaurus mendozai* from El Pinalito, Municipio de Jacala de Ledezma, Hidalgo, Mexico, prior to parturition. © Ismael Reaño-Hernández

Fig. 2. A female *Xenosaurus mendozai* with her neonates, four days after parturition. © Ismael Reaño-Hernández

The color pattern of the neonates was similar to that of the mother, but they were more vividly marked, especially in the nuchal area, as well as in the transverse bands and tail rings. The mean SVL of the four neonates was 48.5 ± 2.36 (45–50 mm), the mean TL was 92.5 ± 2.63 (90–95 mm), and the body mass of each of the four neonates was 2 g.

The mean litter size of this female was similar to that of specimens from Querétaro (Zamora-Abrego et al., 2007) and to other species in the genus (*X. newmanorum*, *X. phalaroanthereon*, *X. platyceps*, and *X. rectocollaris*; Table 1).

Table 1. Mean snout–vent length (SVL), mean litter size, and habitat of species of *Xenosaurus* with a similar number of neonates per litter as *X. mendozai.*

Species	SVL (mm)	Litter Size	Habitat	Source
Xenosaurus mendozai	108	4	Oak-pine forest	This study
Xenosaurus mendozai	101.2	2.1	Oak forest	Zamora-Abrego et al., 2004
Xenosaurus newmanorum	114.9	2.6	Tropical evergreen forest	Lemos-Espinal et al., 2003
Xenosaurus phalaroanthereon	125.0	2	Oak forest	Lemos-Espinal et al., 2012
Xenosaurus phalaroanthereon	110.3	2.3	Oak-pine forest	Nieto-Montes de Oca et al., 2001; Zamora-Abrego et al., 2007
Xenosaurus platyceps	109.5	2.7	Oak forest and liquidámbar	Lemos-Espinal et al., 1997
Xenosaurus rectocollaris	88.9	2.6	Opuntia, yucca, oaks	Lemos-Espinal et al., 2000; Lemos-Espinal et al., 2012

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Reptilia: Squamata (snakes)

***Agkistrodon bilineatus* Günther, 1863. Diet.** The Common Cantil (*Agkistrodon bilineatus*) occurs along the Pacific coast of Mexico, from Sonora to Chiapas, including the canyons west of the Sierras, southwestern Chihuahua, the Santiago Basin, the Tepalcatepec Valley, the Balsas Basin, the Grijalva Basin, and inland as far Morelos and central Jalisco, and outside of Mexico its distribution continues to southern Guatemala and western El Salvador, as well as western Honduras (Porras et al., 2013; Arenas-Monroy and Ahumada-Carrillo, 2015). In the wild, this species has been reported to feed on a variety of food items, including arthropods, fishes, amphibians, squamates, and mammals, but records of stomach contents are relatively few (Alvarez del Toro, 1982; Gloyd and Conant, 1990 [and references therein]; García and Ceballos, 1994; Ramírez-Bautista, 1994; Köhler, 2008; Alvarado-Díaz and Suazo-Ortuño, 2006; Lemos-Espinal and Smith, 2007; Luna-Reyes and Suárez-Velásquez, 2008; Rorabaugh and

Lemos-Espinal, 2016). Captive individuals also have been reported to feed on fishes, anurans, birds (including small chickens), and various types of snakes and rodents (Gloyd and Conant, 1990). Solórzano et al. (1999) reported Black Iguanas (*Ctenosaura similis*) in the diet of the closely related *A. howardgloydi* from Costa Rica.

On 2 September 2015 at 1710h, at Amapa, Municipio de Santiago Ixcuintla, Marisma Nacionales de Nayarit, Mexico (21.795502° N, -105.275057° W; WGS 84; elev. 11 m), JLB found an adult *A. bilineatus* ingesting a subadult Western Spiny-tailed Iguana (*C. pectinata*) in tropical deciduous forest (Fig. 1). To our knowledge this is the first report of *A. bilineatus* preying on *C. pectinata*.

Fig. 1. An adult *Agkistrodon bilineatus* feeding on a subadult *Ctenosaura pectinata*, at Amapa, Nayarit, Mexico.
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Notes on the use of aquatic habitats by the Terciopelo, *Bothrops asper*, in Lower Central America

Snakes in Neotropical areas remain drastically understudied and observed habits often go unpublished, even for the most common species. *Bothrops asper* is a large, abundant pitviper with a broad geographic distribution that extends from Tamaulipas, Mexico, southward throughout Central America and northern South America to Venezuela and perhaps Trinidad, on the Atlantic versant, and on the Pacific versant with a disjunct population in southern Mexico and Guatemala, and thence from northwestern Costa Rica to northern Peru (Campbell and Lamar, 2004). In Mesoamerica *B. asper* typically inhabits lowland areas (near sea level to 1,300 m), but in South America it has been reported to occur at elevations up to 2,640 m (Campbell and Lamar, 2004).

Bothrops asper is found in a variety of habitats but primarily inhabits tropical rainforest or tropical evergreen forest, including the edges of savannas; in drier areas, however, its distribution mostly is restricted to the proximity of rivers or other bodies of water (Campbell and Lamar, 2004). Although primarily a terrestrial species, juveniles, subadults, and adults have been found perched on various types of vegetation, at heights up to 3 m above the ground (see Scott, 1983; Greene, 1997; Campbell, 1998; Guyer and Donnely, 2005; Sasa et al., 2009; McCranie 2011; Baumgartner and Ray, 2011; Vega-Coto et al., 2015). This species is known to consume a variety of prey items (Savage, 2002; Solórzano, 2004), and has been reported to enter wet areas in search of anurans (Wasko and Sasa, 2010). *Bothrops asper* also has been found coiled on the ground during heavy downpours, to frequently cross or swim rapidly down streams, including those with strong currents, and to remain partially submerged in shallow backwater areas of rivers and streams (McCranie, 2011). In this note we report additional observations on the use of aquatic habitats by *B. asper* in Lower Central America.

While conducting visual herpetofaunal surveys, on the evening of 24 May 2006, JMR and H. Ross found a young adult *B. asper* resting in a characteristic coiled position, with the head on top of the body, in the middle of a shallow tributary of the Río María that flows through Altos del María, Provincia de Panamá Oeste, Republic of Panama (8.6425°N, 80.0339°W; elev. 850; Ray, 2009). Once disturbed, the snake raised its head (Fig. 1) and slowly crawled away and coiled on a rock along the edge of the stream. That night JMR and H. Ross found another *B. asper*, among rocks in the slow-moving and shallow waterway of the Río María.

In early 2009 (exact date not recorded) at ca. 1000 h, while walking on a trail to La MICA Biological Station JMR found a large adult *B. asper* floating in shallow water in the Río Barrigón, La Barrigón, Provincia de Coclé, Republic of Panama (8.6283°N, 80.5826°W; elev. 390 m). Apparently, her presence startled the snake into the water, where it was floating, but as she approached it swam into deeper water.

Fig. 1. A young adult *Bothrops asper* in the middle of a shallow stream in Altos del María, Provincia de Panamá Oeste Province, Republic of Panama. The snake was found in a characteristic coiled position, but when disturbed it raised its head.
© Julie M. Ray

Fig. 2. Habitat in La Barrigón, Provincia de Coclé, Republic of Panama, where an adult *Bothrops asper* was found resting in shallow water. The snake was resting in the area where the water begins to turn a greenish color. © Julie M. Ray

On 23 June 2015, GPH observed two adult *B. asper* (Fig. 3) swimming in the Río Pataste, Distrito de Cutris, Cantón de San Carlos, Provincia de Alajuela, Costa Rica (10.7199°N, 84.9946°W; elev. ca. 656 m. GPH is not aware if the snake entered the river from one of the banks, or if it fell from the bridge or the overhanging vegetation.

Because *B. asper* is an abundant species responsible for more human snakebites than any other species throughout its range (Gutiérrez, 2014), it is important to document aspects of its natural history. As a diet and habitat generalist, this species can be found active during the day or night in various types of habitats, including disturbed areas. In this note we provide additional observations on the use of aquatic habitats by *B. asper*, which might prove beneficial for preventing snakebite for people who work, pass through, or otherwise utilize these areas.

Telemetry studies and the publication of natural history observations are important to better understand where and how certain Neotropical snake species spend their time.

Fig. 3. An adult *Bothrops asper* swimming in the Río Pataste, Provincia de Alajuela, Costa Rica. © Greivin Pérez Huertas

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***Crotalus aquilus* Klauber, 1952. Arboreality.** The Querétaro Dusky Rattlesnake, *Crotalus aquilus*, is a small pitviper distributed throughout the southern portion of the Mexican Plateau, in the states of Veracruz, San Luis Potosí, Hidalgo, Querétaro, Guanajuato, Michoacán, and Jalisco (Campbell and Lamar, 2004, and references therein). This species has been found in open grassy and rocky habitats, pine-oak forest, open karstic areas, grassy montane meadows, and stony mesquite-grassland, at elevations from 1,600 to 3,110 m (Campbell and Lamar, 2004). Limited natural history information on this species has appeared in Armstrong and Murphy (1979), Correa-Sánchez and Rivera-Velázques (2007), and Heimes (2016).

On 1 July 2016 at 1150 h, one of us (GJHE) observed an adult *C. aquilus* in Sierra de Álvarez, Municipio de Zaragoza, San Luis Potosí, Mexico (21.978309°N, 100.569036°W; WGS 84; elev. ca 2,160 m). The rattlesnake was encountered in ambush posture on the vertical trunk of an oak tree (facing upward), ca. 1.5 m above the ground (Fig. 1). Lichens growing on the bark of the tree presumably allowed the snake to remain concealed from potential prey and predators. Our observation indicates that

Fig. 1. An adult *Crotalus aquilus* displaying arboreal behavior on the vertical trunk of an oak tree, in the Sierra de Álvarez, Municipio de Zaragoza, San Luis Potosí, Mexico. © Gerson Josué Herrera-Enríquez

although *C. aquilus* is considered a terrestrial species, occasionally it can display arboreal behavior when structural characteristics of the habitat are appropriate, such as in other species of rattlesnakes (García-Padilla et al., 2016; Loc-Barragán et al., 2016, and references therein). The vegetation in the area is characterized by montane pine-oak forest. Additionally, individuals of *Dryophytes arenicolor*, *D. eximius*, and *Sceloporus grammicus* were observed in the same habitat, which might represent potential prey for *C. aquilus*. Herein we report the first observation of arboreal behavior in *C. aquilus*.

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***Crotalus estebanensis*. Activity and thermoregulation.** Thermoregulatory studies in reptiles are abundant, primarily for lizards (Gans and Pough, 1982; Hertz et al., 1993), but few studies are available for snakes, especially Mexican pitvipers. *Crotalus estebanensis* is an endemic rattlesnake found on Isla San Esteban, in the Gulf of California, Baja California, Mexico (Grismer, 1999a, b). This species is not protected by Mexican law (SEMARNAT, 2010), and is classified as Least Concern by IUCN (see Frost, 2007). The reasons for this classification primarily were because humans do not inhabit the island, and the species is not known to be at risk from the introduction of invasive species, or from hurricanes or other natural disasters. *Crotalus estebanensis* inhabits xerophilic thorn scrub surrounded by rocky hills, is active from early March to early October, has been observed foraging during the day in April and May, might be entirely nocturnal during the warmest months of the year, and gives birth in summer and shows minimal activity during the winter (Grismer, 2002).

Here we report information on the thermal characteristics of *C. estebanensis* for the first time. In September 2005 we captured and released (permit SGPA/DGVS/01993/08) five *C. estebanensis* (four males, one female) and recorded our data. Immediately upon capture, we noted the time, and using a Miller & Weber quick reading thermometer recorded the body temperature (*Tb*) via the cloaca, the substrate temperature (*Ts*) where snakes were observed, and the air temperature (*Ta*) 2 cm above the location where the snakes were found. We present our results in Table 1. We collected the snakes from 1800 to 2045 h. The mean *Tb* was 32.2 ± 1.5° C, both the *Ts* and *Ta* were 31.3 ± 1.4° C. Both of the environmental temperatures showed a statistically significant positive relationship with *Tb* ($r^2 = 0.96$; $P < 0.005$). Our results show that *C. estebanensis* appears to avoid high daytime temperatures, follows a crepuscular–nocturnal activity pattern, and can be considered a thermoconforming species in autumn.

Crotalus catalinensis, another endemic insular rattlesnake, maintains lower temperatures than those we recorded for *C. estebanensis* (*n* = 5, mean *Tb* = 29.9° C; Avila-Villegas, 2005), despite displaying similar activity patterns to those of *C. estebanensis*. Based on these observations, we found it necessary to determine the thermal ecology, seasonal activity patterns, and physiological thermal requirements (e.g. Hertz et al. 1993; Blouin-Demers and Weatherhead, 2001) for *C. estebanensis*, to provide the critical information necessary to determine its conservation status, as well as to accurately assess the potential impacts of global climate change on this species.

Table 1. Temperature data for *Crotalus estebanensis* collected on Isla San Esteban, Baja California, Mexico. Field body temperature = *Tb*; air temperature = *Ta*; and substrate temperature = *Ts*.

Date	Time of Collection	Sex	Location	*Tb* (°C)	*Ta* (°C)	*Ts* (°C)
6 September 2005	1800 h	M	Bush	34	33	33
8 September 2005	1925 h	M	Cactus	33.8	32.8	32.8
9 September 2005	1930 h	M	Ground	31	30	30
9 September 2005	2010 h	F	Ground	31	31	31
9 September 2005	2045 h	M	Ground	31	30	30
$\bar{x}$ ± 1 SD				32.1 ± 1.5	31.3 ± 1.4	31.3 ± 1.4

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***Crotalus polystictus*. Diet.** The diet of *Crotalus polystictus* is not well documented from throughout its entire range. Prey items in the literature include arthropods, lizards, birds, pigmy mice and shrews (*Baiomys* and Soricidae), mice (*Peromyscus* and *Reithrodontomys*), voles (*Microtus mexicanus*) and larger mammals (*Pappogeomys bulleri, Sigmodon* or *Oryzomys*, *Rattus*, *Sylvilagus*, and Sciuridae) (Vázquez-Díaz and Quintero-Díaz 2005; Meik et al. 2012; Mociño-Deloya and Setser 2016), but most have been identified to the genus level.

On 16 October 2008 at 1200 h, GEQD found a male *C. polystictus* (snout–vent length [SVL] = 710 mm, tail length [TL] = 54 mm, body mass = 306 g) dead on the road at Mesa Montoro, Municipio de San José de Gracia, Aguascalientes, Mexico (22.003422°N, 102.569005°W; WGS 84; elev. 2,372 m). Upon dissection, we found a partially digested *Thomomys umbrinus* (Southern Pocket Gopher) in the stomach contents, which represents the first record of *T. umbrinus* in the diet of *C. polystictus*. On 8 June 2014 at 1615 h, RACM found another male *C. polystictus* (SVL = 596 mm, TL = 63 mm; body mass = 154 g) at Mesa el Huarache, Calvillo, Aguascalientes (21.883933°N, 102.850426°W; WGS 84; elev. 2,380) under a rock. A fecal sample was collected, and an analysis revealed defecated hair and bones from a *Baiomys taylori* (Northern Pigmy Mouse). The rattlesnake was released. This sample represents the first record of *C. polystictus* consuming *B. taylori*.

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***Crotalus ravus*. Diet.** The Mexican Pygmy Rattlesnake, *Crotalus ravus*, is an endemic species that typically inhabits grasslands and oak forests in the Central Plateau and the Trans-Mexican Volcanic Belt (Campbell and Lamar, 2004). This species is known to feed on small mammals (e.g., *Mus musculus*, *Microtus mexicanus*, and *Peromyscus mexicanus*), snakes (*Storeria storeiroides*), lizards (e.g., *Barisia imbricata*, *Eumeces* sp., *Mabuya* sp., *Sceloporus grammicus*, *S. megalepidurus*), and insects (*Stenopelmatus* sp.) (Klauber, 1972; Campbell and Armstrong, 1979; Sánchez-Herrera, 1980; Mendoza-Hernández et al., 2004; Mendoza-Quijano et al., 2008; Calzada-Arciniega et al., 2016). Here we report two predation events (on 29 and 31 May 2016 at 1630 and 1520 h, respectively) of *C. ravus* feeding on *Sceloporus aeneus* at Parque Nacional La Malinche (PNLM), Tlaxcala, Mexico (Fig. 1). Both snakes were males (total length [TL] = 31 cm, body mass = 17.2 g, and TL = 33 cm, body mass = 21.9 g, respectively) that fed on two male lizards (snout–vent length [SVL] = 52 mm, TL = 115 mm, body mass = 4.4 g, and SLV = 53 mm, TL = 73 mm, body mass = 4.4 g, respectively). These events occurred in induced grassland surrounded by cornfields, at an elevation of 2,570 m. In both cases, the mass proportion of the prey was 20% of the body mass of the predator. Based on four snakes collected at PNLM, Sánchez-Herrera (1980) reported *C. ravus* feeding on crickets, *S. grammicus*, *M. musculus*, and *M. mexicanus*. Our observations suggest that the diet of *C. ravus* includes different lizard species. We believe that *C. ravus* preys opportunistically on different lizard species, but at PLNM it might primarily feed on *S. aeneus* because both species occur at similar elevations (2,400–3,100 m) and occupy the same microhabitat.

Fig. 1. A *Crotalus ravus* preying on a *Sceloporus aeneus* at Parque Nacional La Malinche, Tlaxcala, Mexico.
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Notes on the diet of the Mexican Dusky Rattlesnake, *Crotalus triseriatus* (Viperidae)

Reptiles play an important role in ecosystems as predators, prey, and seed dispersers, as well as indicators of environmental quality (Böhm et al., 2013). Descriptive studies are important for the development of biological theory and conservation strategies (Greene, 1994). Data on the diet of a species can help understand its functional morphology (Pleguezuelos et al., 2007), reproductive strategies (Shine and Madsen, 1997), habitat use and distribution patterns (Klauber, 1972), as well as its evolutionary divergence in feeding ecology (Rodríguez-Robles et al., 1999; Ávila-Villegas et al., 2007). Rattlesnakes of the genus *Crotalus* comprise the most-studied group of snakes (Beaman and Hayes, 2008). Studies of the Mexican Dusky Rattlesnake, *Crotalus triseriatus*, include phylogeography (Bryson et al., 2011), phylogenetics (Bryson et al., 2014), and diet (Davis and Smith, 1953; Uribe-Peña et al., 1999; Mociño-Deloya and Setser, 2009; Mociño-Deloya et al., 2014; Domínguez-Guerrero and Fernández-Badillo, 2016). This rattlesnake is a small species endemic to Mexico (Campbell and Lamar, 2004). Its distribution extends along the highlands of the Trans-Mexican Volcanic Belt, from west-central Veracruz westward through parts of Puebla, Tlaxcala, México, Morelos, and extreme northern Guerrero to western Michoacán and Jalisco, at elevations from 2,500 to 4,572 m (Flores-Villela and Hernández-García, 1989, 2006; Campbell and Lamar, 2004). Although some information is available on the feeding habits of this species, many data are anecdotal or based on on what today are different taxa. Here we examined the dietary habits of *C. triseriatus*, based on the identification of prey items from feces.

From February to November of 2007, we conducted fieldwork in Magdalena Petlatalco, Delegación Magdalena Contreras, Sierra del Ajusco, México, Distrito Federal (19º13'15.5"N, 99º17'8.2"W, WGS 84; elev. 3,500 m). The climate in this area is temperate semihumid (Cw) (García, 1973). The vegetation is represented by pine forest (*Pinus hartwegii*) and zacatonal (*Festuca amplissima*, *F. hephaestophila*, and *Muhlenbergia quadridentada*) (Álvarez del Castillo, 1989). We obtained natural fecal samples from 41 individuals of *C. triseriatus* held captive for this purpose; we released the snakes after gathering the data. We preserved all feces in alcohol (70%), and identified the prey using a dissecting microscope. We identified reptile remains using the greatest resolution possible, by comparing scale characters with those of local species. We identified mammals based on microscopic examination of hair (Arita and Aranda, 1987) by comparison with resident species, and identified arthropods to Order level (McGavin, 2002). We tested ontogenetic shift in diet by comparing the snout–vent length (SVL) of snakes that consumed lizards with those that ate mammals, using a Mann-Whitney *U*-test. We computed the statistics using XLSTAT Version 2014.3.02 software (Addinsoft, 2014), accepted significance at $P < 0.05$, and present means as ± standard deviation (SD).

Of the 41 individuals, 19 (46.34%) were adults, 11 (26.82%) were juveniles, and 11 (26.82%) were neonates. We obtained 41 fecal samples, of which 33 (80.48%) contained identifiable prey; seven snakes (17.07%) contained unidentifiable materials, and one individual (2.43%) contained plant material. Of the 33 fecal samples with identifiable material, 14 (15.7%) contained mammals, 18 (20.2%) contained lizards or snakes, one (1.12%) contained a bird, and 21 (6.92%) contained arthropods. The identification of birds was not possible beyond Class, because of the decomposed condition of the remains. Many species of rattlesnakes show ontogenetic dietary shifts when young individuals that often feed on ectothermic prey (reptiles and arthropods) increasingly consume mammals as they grow (Klauber, 1972); this pattern was evident in our data from *C. triseriatus*. We found a significant statistical difference in SVL between snakes that consumed ectotherms and those that ate mammals ($U = 30$; $P = 0.008$, Fig. 1). The SVL of snakes that consumed endotherms was 392.32 ± 62.48, whereas the SVL of individuals that consumed ectotherms was 255.37 ± 70.36.

According to our data and published information, *C. triseriatus* is a generalist predator that consumes a highly diverse diet. This rattlesnake is known to feed on insects, centipedes, amphibians, lizards, snakes, and small rodents (Davis and Smith, 1953; Uribe-Peña et al., 1999; Mociño-Deloya et al., 2014; Domínguez-Guerrero and Fernández-Badillo, 2016); evidence of cannibalism also is available (Mociño-Deloya and Setser, 2009). In addition, this species likely forages during the day, when lizards are active, and at dusk or night when most rodents (e.g., *Peromyscus melanotis*, Álvarez-Catañeda, 2005) are active (Mociño-Deloya et al., 2014). Vipers generally undergo a dietary ontogenetic shift from ectothermic to endothermic prey (Taylor, 2001; Ávila-Villegas et al., 2007), which likely is a plesiomorphic character in the Viperidae (Martins et al., 2002). Certain species, however, do not follow this ontogenetic shift in prey preference (e.g., *C. pricei*, Prival et al., 2002). In *C. triseriatus* we identified a change between ectothermic (reptiles and arthropods) to endothermic prey (mammals). Nevertheless, the role of invertebrates in the diet of *C. triseriatus* is unclear, because it was difficult to determine if arthropod exoskeletons found in feces represent insects eaten by the snakes, or from their insectivorous lizard prey. We found other prey remains together with arthropod exoskeletons, suggesting that the latter scenario is more likely.

Table 1. Prey consumed by *Crotalus triseriatus*. Numbers in brackets indicate percent and totals by major taxonomic groups (Arthropoda, Aves, Mammalia, Squamata).

Prey Taxon	Total Percent	Number
Arthropoda	[62.92]	56
Hymenoptera	16.0	7
Orthoptera	8.0	2
Coleoptera	64.0	43
Hemiptera	8.0	2
Diptera	4.0	2
Aves	[1.12]	1
Unidentified bird	2.0	1
Mammalia	[15.7]	14
Sorex saussurei	[26.0]	10
Peromyscus melanotis	13.4	2
Cryptotis alticola	13.4	2
Squamata	[20.2]	18
Thamnophis scalaris	0.50	1
Sceloporus anahuacus	94.5	17
Totals	**100**	**89**

Fig. 1. Percentage of endotherm (mammals and birds) and ectotherms (reptiles and arthropods) consumed by *Crotalus triseriatus*.

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***Masticophis fuliginosus* (Cope, 1895). Diet**. The Baja California Coachwhip, *Masticophis fuliginosus*, has been reported to feed on small mammals, birds, small snakes, and lizards (Grismer, 2002). Grismer (2002) identified three species of lizards as prey items: *Sceloporus grandaevus*, *Dipsosaurus dorsalis*, and *Aspidoscelis hyperythra*. Additional prey species include *Sonora semiannulata* (Cliff, 1954), *Crotalus enyo* (García-Padilla et al., 2011), *Aspidoscelis tigris* (Rodríguez-Robles and Galina-Tessaro, 2005), *A. maxima* (Van Denburgh, 1922), *A. ceralbensis* (Walker et al., 1966), and *Amphispiza bilineata* (Black-throated Sparrow; Ward and Clark, 1988). Here, we report three additional prey species, *Callisaurus draconoides*, *Sceloporus zosteromus*, and *Uta stansburiana*, documented by palpating stomach contents or *in situ* photography of live individuals.

On 18 May 2009 at 1230 h, a subadult *M. fuliginosus* was seen and photographed eating a subadult *S. zosteromus* (SDSNH HerpPC 5314) at 7 km N of San Bartolo, Baja California Sur, Mexico (23.757145°N, 109.916563°W; elev. 551 m) by Daniela López-Acosta (Fig. 1). The snake was inside a burrow, with only its head and the prey item on the surface.

On 16 November 2015 at 700 h, an adult *M. fuliginosus* was seen and photographed eating a *C. draconoides* (SDSNH HerpPC 5311-5313) in La Paz, Baja California Sur, Mexico (24.115772°N, 110.327423°W; elev. 15 m) by Abelino Cota (Fig. 2). The snake was observed in the open and had bitten the lizard at midbody and folded the animal into its mouth, with the head and hindlimbs protruding.

On 21 November 2015, a subadult male *M. fuliginosus* (snout–vent length [SVL] = 635 mm, tail length = 246 mm, body mass = 76.0 g; SDSNH HerpPC 5337) was caught in a box trap as part of a herpetofaunal survey in the Sierra Las Cacachilas, Baja California Sur, Mexico (24.06073°N, 110.05983°W; elev. 428 m) by the authors (Fig. 3). The snake regurgitated an adult male *Uta stansburiana* (SVL = 63 mm, tail length = 110 mm, body mass = 9.4 g; SDSNH HerpPC 5338).

Fig. 1. A *Masticophis fuliginosus* inside a hole with just its head visible, while biting a subadult *Sceloporus zosteromus* (SDSNH HerpPC 5314) on 18 May 2009 at 7 km N of San Bartolo, Baja California Sur, Mexico.
© Daniela López-Acosta

Fig. 2. A *Masticophis fuliginosus* eating at *Callisaurus draconoides* (SDSNH HerpPC 5311) on 16 November 2015 at La Paz, Baja California Sur, Mexico.
© Abelino Cota-Castro

Fig. 3. (A) A *Masticophis fuliginosus* (SDSNH HerpPC 5337-533 8) collected 21 November 2015 at Sierra Las Cacachilas, Baja California Sur, Mexico, showing its engorged midbody; and (B) a palpated *Uta stansburiana*. © Bradford. D. Hollingsworth

Acknowledgments.—We thank Abelino Cota-Castro from the Centro de Investigaciones del Biológicas Noroeste and Daniela López-Acosta for sharing their photos. We also thank Abelino Cota-Castro and Franco Cota-Castro for field assistance with the Sierra Las Cacachilas surveys, and Christy Walton for her support through the International Community Foundation Candeo Fund. Our fieldwork in the Sierra Las Cacachilas was conducted under a collecting permit issued to Patricia Galina-Tessaro by SEMARNAT (10838/14).

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***Mastigodryas cliftoni.* Diet**. Clifton's Lizard-eater (*Mastigodryas cliftoni*), a species endemic to Mexico, is found along the Pacific slope of the Sierra Madre Occidental in southeastern Sonora and southwestern Chihuahua south through eastern Sinaloa, western Durango, Nayarit, Southwestern Zacatecas, and west-central Jalisco, at elevations from 375 to 2,500 m (Lemos-Espinal et al., 2015; Heimes, 2016; Rorabaugh and Lemos-Espinal, 2016). Little information is available on the natural history of this species, although Rorabaugh and Lemos-Espinal(2016) indicated that it appears to be diurnal and occurs on the ground and the branches of shrubs and trees, and like other members of its genus its diet likely consists of lizards small snakes, birds, and small mammals. They also noted that its diet and reproduction have not been investigated.

On 20 June 2016at 1017h, at Santa Teresa, Municipio del Nayar, Sierra Madre Occidental de Nayarit, Mexico (22.228344°N, -104.696400° W; WGS 84; elev. 1,977 m) we found an adult individual *M. cliftoni* (total length 1,120 mm) in pine-oak forest, dead on the road from Mesa del Nayar to Santa Teresa. The stomach contents revealed a partially digested Madrean Alligator Lizard, *Elgaria kingii* (Fig. 1). To our knowledge, this is the first report of this lizard in the diet of *M. cliftoni*.

Fig. 1. A *Mastigodryas cliftoni* found dead on the road from Mesa del Nayar to Santa Teresa, Nayarit, Mexico. The stomach contained an *Elgaria kingii*. © Emanuel Miramontes-Medina

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***Trimorphodon biscutatus*. Diet, prey size and accidental mortality (*Ctenosaura pectinata*)**. The Western Lyresnake, *Trimorphodon biscutatus*, is a medium-sized, arboreal and terrestrial, and nocturnal species that occurs in tropical deciduous forest and evergreen tropical forest (García and Ceballos, 1994). The distribution of this snake extends along the Pacific versant from the southwestern United States to northwestern Costa Rica (Devitt et al., 2008). The diet of this species includes amphibians, small lizards, birds, and mammals, including bats; this opisto-glyphic snake uses venom and/or constriction to subdue its prey (Scott and McDiarmid, 1984; Savage, 2002). Jones (1988) studied the influence of prey size on the feeding behavior of *T. biscutatus* and the consumption of large prey. Ramírez-Bautista and Uribe (1992) reported an unsuccessful attempt by this species in Chamela, Jalisco, to ingest a large prey item, a *Ctenosaura pectinata*, which resulted in the death of the snake. Here we present another observation of an individual of *T. biscitatus* dying after being unable to regurgitate a *C. pectinata*.

On 1 September 2012 at 1729 h, we observed an adult male *T. biscutatus* feeding on a juvenile female Western Spiny-tailed Iguana, *C. pectinata*, at Parque Nacional Grutas de Cacahuamilpa, Guerrero, Mexico (18°40'12"N, 99°29’24"W; WGS 84; elev 1,220 m; Fig. 1) in tropical deciduous forest. The snake was longer (1,210 mm total length) than the iguana (360 mm snout–vent length), and the iguana apparently died as a result of constriction. The snake had swallowed ca. <10% of the *C. pectinata* head first when we encountered it, and we observed the event at a distance of about 4 m. The swallowing process continued for 45 min, at which time the snake had swallowed about 40% of the iguana. At that point, the spines of the iguana appear to have ruptured the esophagus and stomach of the snake, and the head of the iguana extended 15 cm from the snake’s neck, and the snake died.

The relative size of the prey item larger than that reported for *T. biscutatus* by Ramírez-Bautista and Uribe (1992), and is among the largest reported for this species (Jones, 1988). We deposited photo vouchers of the snake and prey item at the national collection of amphibians and reptiles of the Universidad Nacional Autónoma de México (UNAM; IBH-RF 319).

Fig. 1. A Western Lyresnake (*Trimorphodon biscutatus*) swallowing a juvenile Western Spiny-tailed Iguana (*Ctenosaura pectinata*) at Parque Nacional Grutas de Cacahuamilpa, Guerrero, Mexico. © Ignacio Beltrán

Acknowledgments.—We thank CONANP and Parque Nacional Grutas de Cacahuamilpa for the accommodation and facilities granted during our stay. We also thank personnel from Monitoreo de Vida Silvestre for field assistance. The collection permit number was SEMARNAT FAUT 074.

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Reptilia: Testudines

Feeding Behavior in *Rhinoclemmys pulcherrima* (Gray, 1855) at Parque Nacional Carara, Costa Rica

Species interactions are essential for ecosystems to function. Many species are interrelated in several ways, which implies that some require the presence of others to subsist. Tropical ecosystems are complex communities in relation to the number of interactions one species might maintain and the role they play. Species roles might change over time, however, and we need to conserve as many species as possible, including the seemingly less significant ones (Pearson, 2011).

One of the notable features of Neotropical forests is the presence of large leaf-cutter ant nests (*Atta* spp.). These ants construct communal nests characterized by hundreds of thousands or even millions of workers (Stevens, 1983), thereby creating bottom-up gaps in the forest. They excavate organic soils and store matter in their underground chambers to grow a fungus for feeding (Stevens, 1983), and these rich soils promote plant growth. Ant workers carry soil and debris from inside the nests and accumulate the material on the outside as piles of loose soil.

Leaf-cutter ants collect large quantities of fresh leaves every day, and carry them to their nest chambers. Species of *Atta* alone are estimated to cut from 12 to 17% of the entire leaf production in some Neotropical forests (Cherrett, 1989). Inside the nest, the plant material is degraded by a mutualistic fungus that the ants use for food. Waste material from fungal decomposition and other materials such as debris, dead ants, and soil particles are carried out from the nest to disposal areas located inside or outside the nest (Ballari and Farji-Brener, 2006).

The Ornate- or Painted Wood Turtle, or Red Turtle, *Rinoclemmys pulcherrima*, is a small species in which males reach a carapace length of 159 mm and females of 200 mm. The shell is not distinctively domed, supposedly a characteristic of terrestrial species; the shells of many aquatic taxa, however, are similarly or higher domed (McLaughlin and Stayton, 2016). The population in southern Nicaragua and northwestern Costa Rica, formerly regarded as the subspecies *manni*, is among the world's most beautiful turtles, as its carapace, head, neck, and forelimbs usually are marked with bright red, orange, and/or yellow stripes, spots, and ocelli (Savage, 2002; Fritz and Havas 2007). The southern distributional limit of *R. pulcherrima* is in the vicinity of Parque Nacional Carara in Costa Rica (Savage, 2002).

Rhinoclemmys pulcherrima occurs in aquatic and terrestrial environments within deciduous and semi-deciduous forests, especially in moist situations and primarily in gallery forest (Beisser et al., 2004). The species mostly is active during the day, but during the dry season individuals can be seen early in the morning or in the evening. In Costa Rica, this species is found in Lowland Dry and Pacific Moist Forests, and Premontane Forest (Savage 2002).

Although *R. pulcherrima* is omnivorous (Ernst and Barbour, 1989; Acuña Mesén, 1993), it seems to prefer feeding on plants (Ernst, 1981). In nature or in captivity this turtle has been noted to feed in or out of water, primarily on guavas, oranges, wildflowers, herbs, earthworms, insects, and fishes, although in captivity it also accepts cabbage, cilantro, and lettuce, and readily accepts ground meat, bananas, and papayas; juveniles prefer to feed on tender leaves and small insects, but after a few weeks accept the same diet as the adults (Acuña-Mesén, 1993). Merchán (2003) indicated, however, that captive adults and juveniles did not accept larval or adult insects.

On 10 August 2016, I observed an individual of *R. pulcherrima* feeding along the universal trail at Parque Nacional Carara, Provincia de Puntarenas, Costa Rica (9°44'50"N, 84°37'40"W; WGS 84). The park is located in the Central Pacific region of the country, within Tropical Moist Forest (Holdridge, 1967), and constitutes a transitional area between dry forest to the north and the wet forest to the south. At 0700 h I saw the turtle moving on a dumping mound of a leaf-cutter ant nest, using both forelimbs to remove soil and apparently searching for food items (Fig. 1). At first glance it appeared as if the turtle might be capturing earthworms or something similar, but upon closer examination these items happened to be small roots approximately 4–8 cm long and < 0.9 mm in diameter. Plenty of these roots were available, and the turtle was consuming them avidly. I observed the turtle for 15 min, and during this time it advanced 60 cm and left a trail of about 30 cm wide. The soil was loose, but the turtle compacted it as it moved so the searched area was about 8 cm deep. During five 1 min periods, I counted the number of successful feeding bouts. I then collected five samples of soil, two handfuls each (ca. 300 g; Table 1) to count the root sections and search for the presence of earthworms and other invertebrates.

I returned at 1200 h, and again at 1700 h, but the turtle was not at the nest. During the following eight days I visited the site at 0700 h and 1700 h, but the turtle did not return. The ants, however, remained active and kept dumping soil at the base of the tree where it was accumulating, much as it was when I observed the turtle there (Fig. 1).

The mass of the average soil sample was 280 g ± 17.08 g, *n* = 5 (Table 1). The average root mass per sample was 2.52 g ± 041 g. The number of successful bites/min was 15.2 ± 1.95. I found two earthworms and one small snail in the five soil samples.

Feeding behavior is a key component for the survival of any species, and successful feeding allows for a higher reproductive output. The loose soil at leaf-cutter ant nests apparently is a highly useful feeding ground for *R. pulcherrima*. This soil is filled with root pieces, with many more growing inside the dumping areas. I am unaware of other vertebrates feeding on these roots. Leaf-cutter ants avoid contact with their waste because it harbors microorganisms that are dangerous to the ants and their symbiotic fungus (Ballari and Farji-Brener, 2006). This situation might explain the non-generalized use of this soil by other animals.

Fig. 1. A male *Rhinoclemmys pulcherrima* feeding on small roots at the base of the dumping area of a leaf-cutter ant nest at Parque Nacional Carara, Provincia de Puntarenas, Costa Rica. © José M. Mora

Table 1. Mean and Standard Deviation (SD) for soil samples from the dumping area of a leaf-cutter ant nest, and their contents of root mass (g) and root length (cm), and the feeding bouts per minute of a male Rhinoclemmys pulcherrima at Parque Nacional Carara, Provincia de Puntarenas, Costa Rica. *n* = 5 in all cases.

Variable	Mean	SD
Soil (g)	280	17.08
Roots (g)	2.52	0.41
Roots (cm)	134	12.71
Root diameter	< 0.9 mm	*
Feeding bouts/min	15.2	1.95

*root diameters were 0.9 mm or less in all samples measured.

Acknowledgments.—I conducted these observations during a Vertebrate Ecology course by Icomvis, Universidad Nacional (UNA), Costa Rica. I am grateful for the logistic and financial support received from UNA. Louis W. Porras provided valuable comments and suggestions that improved the manuscript.

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DISTRIBUTION NOTES

Amphibia: Anura

Family Centrolenidae

***Cochranella granulosa* (Taylor, 1949).** NICARAGUA: RIVAS: Reserva de Biósfera Isla de Ometepe, Parque Nacional Volcán Maderas, comunidad de San Pedro, caño La Fuente (11.44248°N, 85.50109°W; WGS 84); elev. 1,015 m; 27 August 2012; Silvia Juliana Robleto-Hernández. A photo voucher of this individual is deposited at The University of Texas at Arlington Digital Collection (UTADC-8715; Fig. 1A). The frog was found at night vocalizing on top of a *Piper jacquemontianum* leaf, ca. 2.5 m above a stream in primary Lowland Moist Forest (Holdridge, 1967; Savage, 2002). We also observed several egg masses of this species on top of leafs of *Ficus tonduzii*, *Psychotria panamensis*, *Miconia* sp., *Geonoma interrupta*, *Hedyosmum bonplandianum*, and Cyclanthaceae. On October of 2012, August of 2013, and September of 2015, SJRH also observed vocalizing males and egg masses of this species at caño La Fuente, at elevations from 630 to 1,015 m.

In Nicaragua, *C. granulosa* previously was known only from the north and central parts of the country, and the Volcán Maderas locality represents the southernmost record in the country, the first record on the Pacific versant, and the first record for the department of Rivas, extending the distribution of this species ca. 100 km SW from its closest Nicaraguan locality at Santo Domingo, Departamento Chontales (Köhler, 2001; Sunyer et al., 2014; HerpetoNicas, 2015).

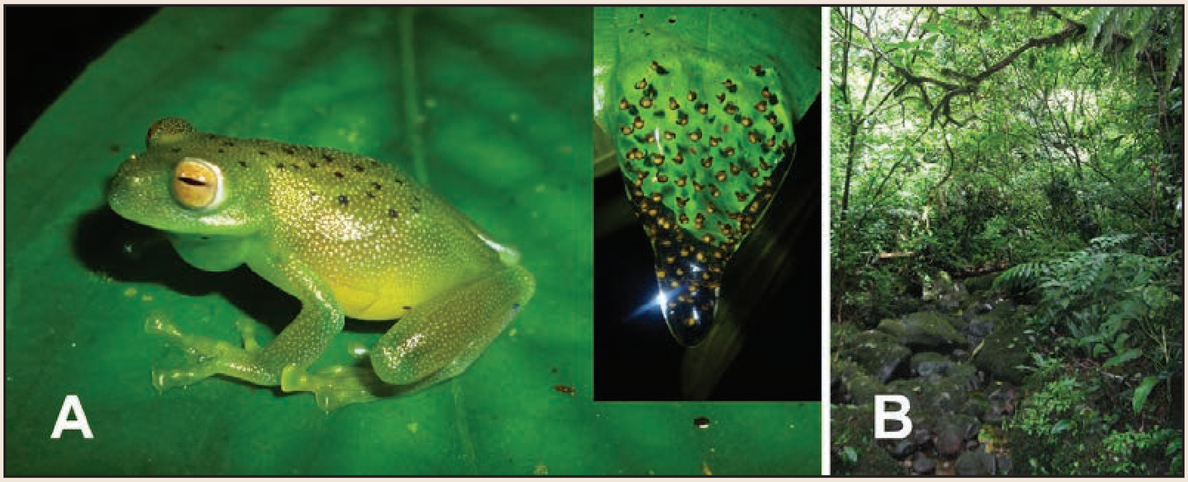

Fig. 1. (A) A calling male and an egg mass (inset); and (B) the habitat of *Cochranella granulosa* from Parque Nacional Volcán Maderas, Reserva de Biósfera Isla de Ometepe, Departamento de Rivas, Nicaragua. © Silvia Juliana Robleto-Hernández

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***Teratohyla spinosa* (Taylor, 1949).** NICARAGUA: RIVAS: Reserva de Biósfera Isla de Ometepe, Parque Nacional Volcán Maderas, comunidad de San Pedro, caño La Fuente (11.44271°N, 85.49922°W; WGS 84); elev. 950 m; 18 September 2012; Silvia Juliana Robleto-Hernández. A photo voucher of this individual is deposited at The University of Texas at Arlington Digital Collection (UTADC-8714; Fig. 1A). The frog was found at night on top of a *Hedyosmum bonplandianum* leaf, ca. 1.5 m above a stream in primary Lowland Moist Forest (Holdridge, 1967; Savage, 2002). We also observed an egg mass on the underside on another leaf. On October of 2012, August of 2013, and September of 2015, SJRH also observed vocalizing males and egg masses of this species at caño La Fuente, at elevations from 630 to 950 m.

Fig. 1. (A) An adult individual, and an egg mass (inset); and (B) the habitat of *Teratohyla spinosa* from Parque Nacional Volcán Maderas, Reserva de Biósfera Isla de Ometepe, Departamento de Rivas, Nicaragua. © Silvia Juliana Robleto-Hernández

This locality represents the first record of *T. spinosa* for the department of Rivas, the westernmost record for this species in the country, and the first record on the Pacific versant of Nicaragua. This species has been poorly documented in Nicaragua, and the Volcán Maderas locality extends the distribution of this species ca. 135 km NW and 320 km SW from its closest localities at Refugio Bartola (Departamento Río San Juan) and Kama Pih (Departamento Atlántico Norte), respectively (Sunyer and Köhler, 2007; Sunyer et al., 2009; Travers et al., 2011).

Acknowledgments.— We thank Fabio Díaz Santos for botanical identifications, and Carl J. Franklin for providing the photo voucher number. SJRH thanks Rebeca Benavente, Gualberto Ruiz, Mauricio Hernández, and Deyring Morales for unconditional support. The authors are members of the Amphibian Specialist Group of Nicaragua.

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Family Craugastoridae

***Craugastor pygmaeus* (Taylor, 1937).** MEXICO: NAYARIT: Municipio de El Nayar, Ejido San Rafael (21.798136°N, -104.910038°W; WG S84); elev. 80 m; 15 June 2015; Jesús A. Loc-Barragán. The frog was active at 1412 h, on wet leaves near a temporary pond. A photo voucher was deposited at The University of Texas at Arlington Digital Collection (UTADC- 8685; Fig. 1B). This specimen represents a new municipality record and a range extension of ca. 43.1 km NE (airline distance) of a locality at 5 km NE of San Blas (CAS-95663) (Ahumada-Carrillo et al., 2013).

A second individual was found in Municipio de Xalisco, Sierra San Juan, Rancho La Noria, 9 km W Tepic (21.483017°N, -104.998002°W; WGS 84); elev. 1,555 m; 24 October 2015; Jesús A. Loc-Barragán. The frog was found at 1243 h under wet fallen leaves near a temporary pond in oak forest at 1243 h. A photo voucher was deposited at The University of Texas at Arlington Digital Collection (UTADC 8686; Fig. 1, C). This individual represents a new municipality record and a range extension of ca. 19.2 km (airline) NE from the closest known locality at 2.46 km E of Santa Cruz de Miramar, San Blas (Ahumada-Carrillo et al., 2013).

Finally, a third individual was found in Municipio de Huajicori, Ejido el Muerto (22.695601°N, -105.254649°W; WGS 84); elev.180 m; 6 December 2015; Jesús A. Loc-Barragán. The frog was found under a rock along the bank of a river. A photo voucher was deposited at The University of Texas at Arlington Digital Collection (UTADC 8687; Fig. 1, D). This specimen represents a new municipality record and a range extension of ca. 103 km SE (airline distance) from the closest known locality at ca. 6.3 Km NE of Concordia, Sinaloa (CAS 175697-716) (Ahumada-Carrillo et al. 2013).

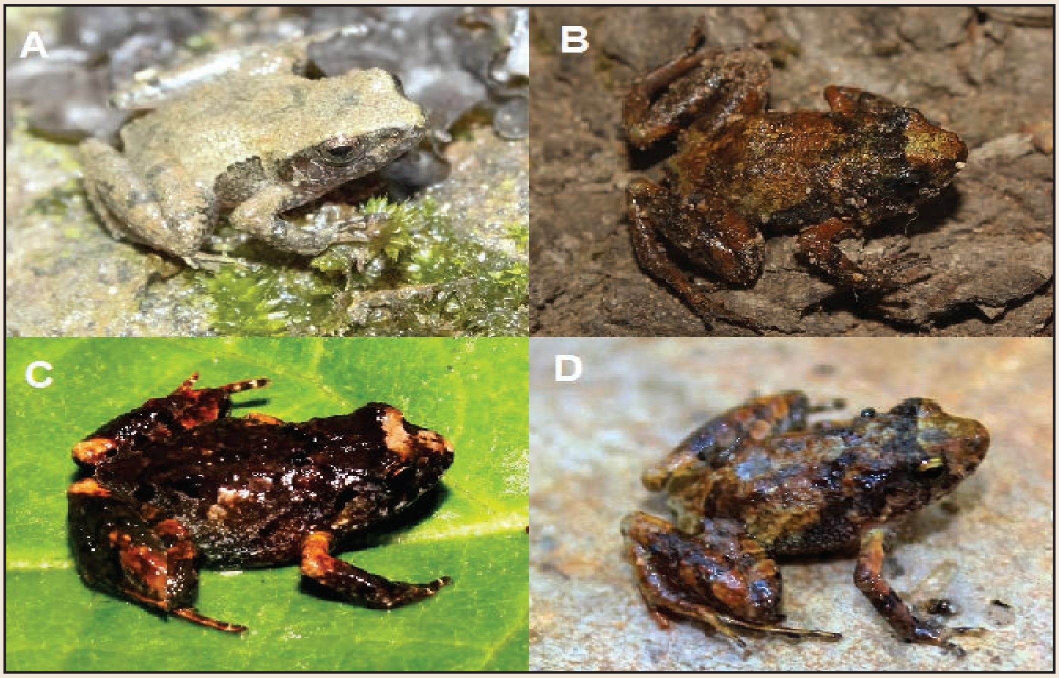

Fig 1. New municipality records for *Craugastor pygmaeus*. (A) Municipio de Santiago de Compostela, Sierra de Vallejo (UTADC 8684); (B) Municipio de El Nayar, Ejido San Rafael (UTADC 8685); (C) Municipio de Xalisco, Sierra San Juan, Rancho la Noria (UTADC 8686); and (D) Municipio de Huajicori, Sierra el Muerto (UTADC 8687).

Acknowledgments.—We thank Carl J. Franklin for providing the photo voucher numbers.

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Family Eleutherodactylidae

Eleutherodactylus verrucipes **(Cope, 1885).** MEXICO: NUEVO LEÓN. Municipio de Galeana, near Galeana (24°49'31.66"N, -100° 4'38.52"W; WGS 84), elev. ca. 1,790 m; 23 September 2008; Michael Price, Travis L. Fisher, and Elí García-Padilla. The individual was found under a rock in pine-oak forest. A photograph of the frog is deposited in the University of Texas at El Paso Vertebrate Digital Collection (Photo Voucher UTEP G-2016.24). This voucher (Fig. 1) represents the first record for Nuevo León, with the closest reported locality ca. 170 km to the SSE near El Llano de las Azuas, 15 km S of Palmillas on the road to San Vicente, in the vicinity of Palmillas, Tamaulipas, Mexico (Farr et al., 2007).

Fig. 1. An *Eleutherodactylus verrucipes* (UTEP G-2016.24) found near Galeana, Municipio de Galeana, Nuevo León, Mexico.
© Elí García-Padilla

Acknowledgments.—A special thanks to Arthur Harris for kindly providing the photo voucher number.

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Family Hylidae

***Dryophytes eximius* (Baird, 1854).** MEXICO: NAYARIT: Municipio de Tecuala, Tecuala (22.401860°N, 105.460767°W; WGS 84); elev. 12 m. On 25 June 2016 at 2213 h, JALB found a *Hyla eximia* vocalizing in a temporary pond. The specimen was deposited in the Colección de Vertebrados at the Museo de Zoología, Unidad Académica de Agricultura, Universidad Autónoma de Nayarit (MZUAN AR 189). This individual represents a new municipality record and a range extension of ca. 97.8 km (airline) NE of the closest known locality, SE of San Blas, Nayarit, based on a specimen collected by S. A. Greer in 1964 and deposited in the CAS collection (HERP-CAS-4033; GBIF, 2016).

Fig 1. A *Hyla eximia* (MZUAN AR 189) collected in Tecuala, Municipio de Tecuala, Nayarit, Mexico.
© Jesús A. Loc-Barragán

Acknowledgments.—Our fieldwork was conducted under a collecting permit issued to Fausto R. Méndez-de la Cruz by SEMARNAT OFICIO NÚM. (SGPA/DGVS/ 01629 116), with an extension to GAWP.

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Trachycephalus typhonius **(Linnaeus, 1758).** MEXICO: SAN LUIS POTOSÍ. Municipio de Tamasopo, (21.926419°N -99.395992°W; WGS 84), elev. 60 m; 21 June 2016; Juan Cruzado-Cortés. The individual was found active at 2240 h, on the wall of a house. A photograph is deposited at the University of Texas of El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.6). This voucher represents a new municipality record and a range extension of ca. 21 km (airline distance) S from the nearest locality in the state, at ca. 32 km NW of Ciudad Valles, Municipio de Ciudad Valles (Lemos-Espinal and Dixon, 2013). The surrounding habitat is characterized by secondary vegetation and tropical deciduous forest.

Fig. 1. A *Trachycephalus typhonius* (UTEP G-2016.6) from Tamasopo, Municipio de Tamasopo, San Luis Potosí, Mexico. © Juan Cruzado-Cortés

Acknowledgments.—A special thanks to Magdalena Salinas-Rodríguez (www.sierra-madre-oriental.blogspot.mx/) for field assistance, and to the Naturalista-CONABIO website (www.conabio.inaturalist.org), where this observation originally was uploaded. Arthur Harris kindly provided the photo voucher number.

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Family Scaphiopodidae

***Scaphiopus couchii* Baird, 1854.** MEXICO: NAYARIT: Municipio de Tecuala, between Tecuala and Playa Novillero (22.399224°N, 105.479598°W; WGS 84; elev. 11 m); 23 July 2016; Jesús A. Loc-Barragán. A juvenile (Fig. 1) was found on the road at 2053 h. The specimen is deposited in the Colección de Vertebrados, at the Museo de Zoología, Unidad Académica de Agricultura, Universidad Autónoma de Nayarit (MZUAN AR 195). This specimen represents a new municipality record and a range extension of ca. 16 km W (airline distance) from the closest known locality in Acaponeta, Nayarit (USNM-47860, 47861, 47862, 47864, collected by Nelson and Goldman, 26 June 1897; GBIF, 2016).

Fig 1. A *Scaphiopus couchii* (MZUAN AR 195) found on the road between Tecuala and Playa Novillero, Municipio de Tecuala, Nayarit, Mexico. © Jesús A. Loc-Barragán

Acknowledgments.—Our fieldwork was conducted under a collecting permit issued to Fausto R. Mendez-de la Cruz by SEMARNAT OFICIO NÚM. (SGPA/DGVS/ 01629 116).

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Amphibia: Gymnophiona

Family Dermophiidae

***Dermophis parviceps* (Dunn, 1924).** PANAMA: PROVINCIA DE COCLÉ: El Valle de Antón (8°36'3.08"N, 80° 6'41.70"W; WGS 84; elev. 603 m) *Dermophis parviceps* is one of 11 caecilians recorded in Panama (Savage and Wake, 2001). This uncommon species primarily is subterranean, and consequently its behavior, ecology, and distribution remain poorly documented (Savage, 2002). In Panama, this species has been recorded in the province of Bocas del Toro (in the northwestern) and the province of Colón (in the north-central) parts of the country (Köhler, 2011), and thus its presence has been assumed to be restricted to the Atlantic coast between these two regions (Wake and Savage, 1972; IUCN, 2015), which lie about 250 km apart. Until now, however, *D. parviceps* has not been recorded as far south as El Valle de Antón.

On 6 June 2016 at 2230 h, we observed an adult *D. parviceps* in El Valle de Antón. The individual, with a snout–vent length of 26 cm and a body mass of 9 g, was found in a drainage ditch next to a flowerbed in a residential area. Whereas this species previously has been observed in forested areas (IUCN, 2015), its occurrence in a residential setting suggests that *D. parviceps* might have some degree of tolerance to mild anthropogenic disturbance.

El Valle de Antón is a region where numerous amphibian species occur, including the Critically Endangered *Atelopus zeteki* (Richards and Knowles, 2007); two other caecilians (*Caecilia volcani* and *Oscaecilia ochrocephala*) also have been documented from this area (Taylor 1969; Köhler, 2011). Although the amphibian chytrid fungus, *Batrachochytrium dendrobatidis*, has had a heavy impact on the amphibian community in this region (Gagliardo et al. 2008), little information is available on the susceptibility of caecilians to this pathogen and further investigation of the chytrid dynamics in this cryptic group is necessary.

Fig. 1. An adult *Dermophis parviceps* from El Valle de Antón, Provincia de Coclé, Panama. © Gonçalo M. Rosa

Acknowledgments.—We are grateful to Roberto Ibáñez for confirming the species identification, and Jamie Voyles, Corinne Richards-Zawacki and Erica Bree Rosenblum for their useful comments that significantly improved the manuscript. This study was supported by the National Science Foundation, DEB (1551488 to Jaimie Voyles) and REU Programs.

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Reptilia: Squamata (lizards)

Family Anguidae

***Celestus rozellae* (Smith, 1942).** MEXICO: VERACRUZ: Municipio de Uxpanapa, near Rodríguez Cano (17°12'32.6"N, 94°31'17.5"W; datum WGS 84; elev. 208 m); 17 May 2013 at 1226 h. A specimen of *Celestus rozellae* was collected in a patch of tropical rainforest surrounded by cattle pastures (Fig. 1A), and deposited in the Colección de Anfibios y Reptiles del Instituto de Ecología A.C. (catalog number CARIE-1178; Fig. 1B).

The specimen measured 73 mm in snout–vent length, and 80 mm in tail length. Pertinent scutellation characters include 22 lamellae on the 4th toe, the frontal scale is in contact with the supraocular, and 77 transverse rows of dorsal scales. Its coloration in life was coppery brown on the dorsum with pale vertical bars on the neck and sides of the body, the venter was green with a distinct metallic sheen, and the ventral portion of the tail was brown. All of these characteristics agree with the diagnosis for this species provided by Campbell (1998) and Köhler (2008).

The finding of *C. rozellae* at the above locality represents the first record of this species for the state of Veracruz, Mexico, and increases the number of reptile species in the state to 201 (see Flores-Villela and García-Vázquez, 2014). The specimen also represents a distributional extension of 44.3 km to the NW of the closest known locality at San Isidro La Gringa (MZFC-18427), Municipio de Santa María Chimalapa, Oaxaca (Fig. 2).

The occurrence of *C. rozellae* in a patch of tropical forest surrounded by cattle pastures suggests that this species is capable of surviving in modified habitats, but perhaps only where fragments of the original vegetation remain. Previously, the presence of this species had not been documented from highly modified environments, such as cattle pastures, and Sunyer et al. (2013) noted that this species is not very tolerant of forest disturbance. Accordingly, it is necessary to further evaluate the ability of this species to adapt to disturbed environments.

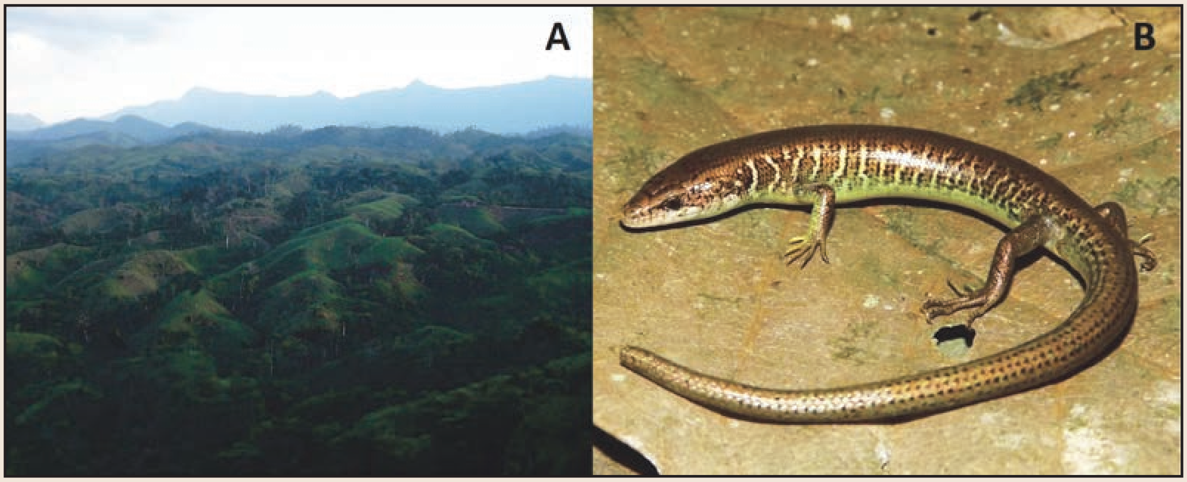

Fig. 1. (A) A panoramic view of the vegetation and land use in Uxpanapa, Veracruz; and (B) the specimen of *Celestus rozellae* (CARIE-1178) in life. © José Luis Aguilar López

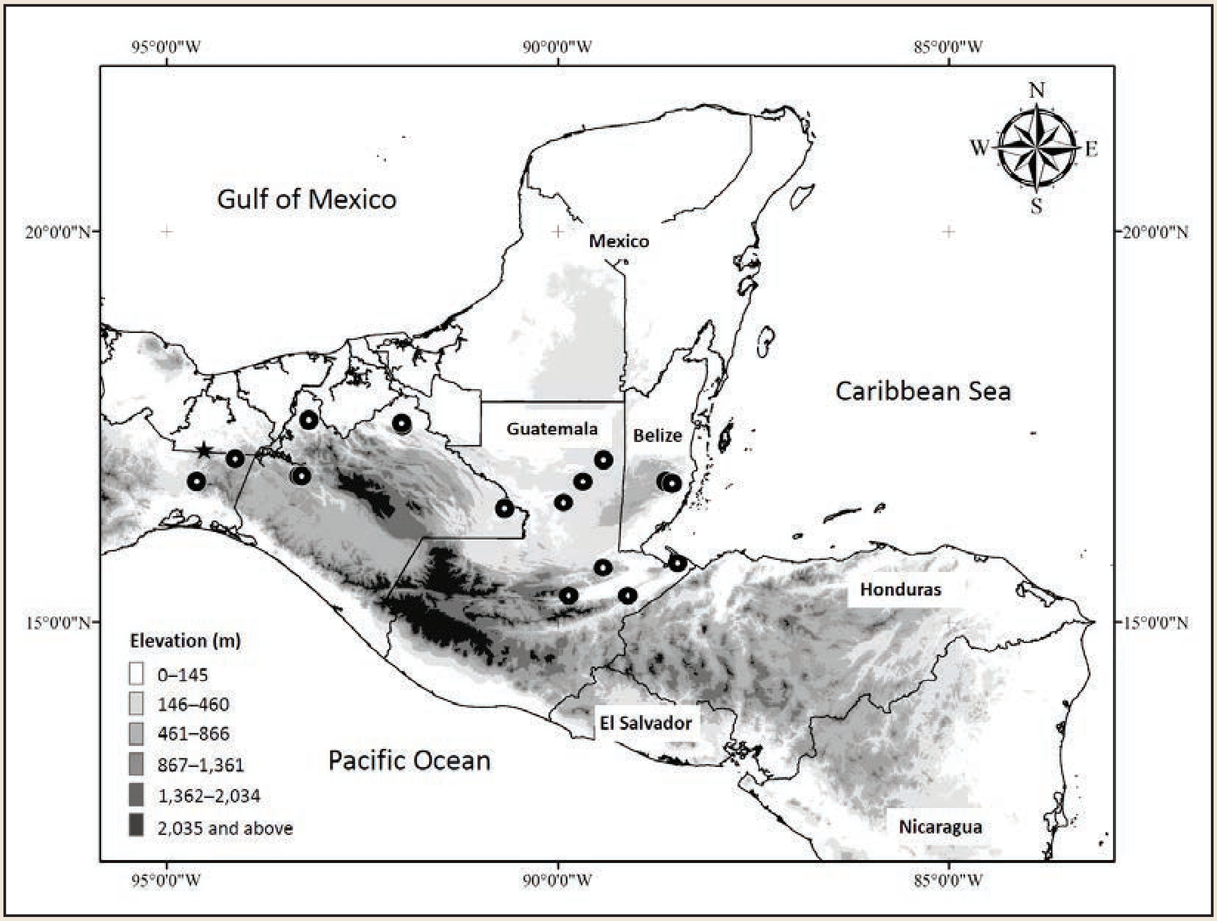

Fig. 2. Previous recorded localities (black circles) and the new locality of *Celestus rozellae* in the Uxpanapa region of Veracruz, Mexico (black star).

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Family Helodermatidae

***Heloderma horridum* (Weigmann, 1829).** MEXICO: NAYARIT: Municipio de Tecuala, Ejido Novillero, Marismas Nacionales de Nayarit (22.313504°N, 105.665873°W; WGS 84; elev. 3 m; 18 June 2015; Jesús A. Loc-Barrgán and Guillermo A. Woolrich-Piña. The lizard was found dead on the road (Fig. 1) in an area of dry thorn forest. A photo voucher of this individual was deposited at The University of Texas at Arlington Digital Collection (UTADC-8690). This voucher represents a new municipality record located ca. 34.3 km SW (airline distance) of the closest reported locality at International highway 15, Municipio de Acaponeta, where Theodore J. Papenfuss collected a specimen (MVZ 66199) in 1956 (VertNet, 2016).

A second individual, a juvenile, was found in Municipio de Santiago Ixcuintla, Ejido Palmar de Cuautla, Marismas Nacionales de Nayarit (22.269955°N, 105.656471°W; WGS 84; elev. 4 m; 29 June 2016; Jesús A. Loc-Barragán, Juan Pablo Ramírez-Silva, and Guillermo A. Woolrich-Piña. The lizard had drowned in a pond used for shrimp farming, and was deposited in the Colección de Vertebrados, at the Museo de Zoología, Unidad Académica de Agricultura, Universidad Autónoma de Nayarit (MZUAN AR 312). This specimen also represents a new municipality record, located ca. 5 km S (airline distance) of the voucher from Ejido Novillero reported herein.

Fig 1. A Mexican Beaded Lizard (*Heloderma horridum*; UTADC-8690), found dead on the road at Municipio de Tecuala, Ejido Novillero, Marismas Nacionales de Nayarit, Mexico. © Jesus A. Loc Barragán

Acknowledgments.—We thank Carl J. Franklin for providing the photo voucher number. The collecting permit was issued to Fausto R. Méndez-de la Cruz by SEMARNAT (OFICIO NÚM. SGPA/DGVS/ 01629 116) with an extension to GAWP.

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Family Iguanidae

***Ctenosaura pectinata* (Wiegmann, 1834).** MEXICO: OAXACA. Municipio de Santa Catarina, near Santa María Yolotepec (16.257362°N, -97.167083°W; WGS 84), elev. 1,746 m; 14 June 2016; Vicente Mata-Silva, Elí García-Padilla, Dominic L. DeSantis, and Larry D. Wilson. A photograph of this specimen is deposited in the University of Texas at El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.25). The individual (Fig. 1) was found dead on the road at 1420 h, in an area consisting of pine-oak forest. This individual represents a municipality record, with the closest reported locality ca. 34 km to the S in the vicinity of Las Negras, Municipio de San Pedro Mixtepec (Zarza et al., 2016), in the Planicie Costera del Pacífico physiographic region (Mata-Silva et al, 2015).

Fig. 1. A *Ctenosaura pectinata* (UTEP G-2016.25) from near Santa María Yolotepec, Municipio de Santa Catarina Juquila, Oaxaca, Mexico. © Vicente Mata-Silva

Acknowledgments.—A special thanks to Eduardo Mata-Silva for his invaluable help in the field, the Bolán-Mata family for their hospitality and great company, and to Eugenia Zarza and Victor Hugo Reynoso for providing information on the geographic distribution of *C. pectinata*. Arthur Harris kindly provided the photo voucher number.

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Ctenosaura pectinata **(Wiegmann, 1834).** MEXICO: OAXACA. Municipio de Santa María Ayoquezco de Aldama, Santa María Ayoquezco de Aldama (16.691024°N, -96.847327°W; WGS 84), elev. 1,460 m; 23 June 2016; Vicente Mata-Silva and Arturo Rocha. A photograph of this specimen is deposited in the University of Texas at El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.17). The individual was observed at 1450 h, basking on a rock pile in an empty lot within the town. This individual (Fig. 1) represents a municipality record, and the first record of this species for the Valles Centrales physiographic region (Mata-Silva et al., 2015), with the closest reported locality ca. 10.9 km to the SSW in the vicinity of El Vado, Municipio de La Compañía (Zarza et al., 2016).

Fig. 1. A *Ctenosaura pectinata* (UTEP G-2016.17) from Santa María Ayoquezco de Aldama, Municipio de Santa María Ayoquezco de Aldama, Oaxaca, Mexico. © Vicente Mata-Silva

Acknowledgments.—A special thanks to Eduardo Mata-Silva for his invaluable help in the field, the Bolán-Mata family for their hospitality and great company, and to Eugenia Zarza and Victor Hugo Reynoso for providing information on the geographic distribution of *C. pectinata*. Arthur Harris kindly provided the photo voucher number.

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Family Teiidae

***Aspidoscelis deppii* (Wiegmann, 1834).** MEXICO: OAXACA. Municipio de San Martín Lachilá, San Martín Lachilá (16.617852°N -96.855969°W; WGS 84), elev. 1,439 m; 23 June 2016; Vicente Mata-Silva and Arturo Rocha. A photograph of this specimen is deposited in the University of Texas at El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.18). This individual (Fig. 1) represents a municipality record, and presumably the first record of *A. deppii* for the Valles Centrales physiographic region (Mata-Silva et al., 2015), with the closest reported locality ca. 59 km to the E in the vicinity of San Pedro Totolapan (UIMNH 35995–36005; locality listed as "Totolapam" in Duellman and Wellman, 1960). The lizard was found active at ca. 1515 h, along the edge of a stream with remnants of riparian vegetation. Although our individual was found at a higher elevation than previously reported for this species (1,200 m; Wilson and Johnson, 2010), a record from San José Lachiguiri is available (USNM 135625.6280762; Vert.Net, 2016); the elevation at the center of the town is ca. 1,697 m, so this specimen represents the highest known elevation for this species.

Fig. 1. An adult *Aspidoscelis deppii* (UTEP G-2016.18) from San Martín Lachilá, Municipio de San Martín Lachilá, Oaxaca, Mexico.
© Vicente Mata-Silva

Acknowledgments.—A special thanks to Eduardo Mata-Silva for his invaluable help in the field, and the Bolán-Mata family for their hospitality and great company. Arthur Harris kindly provided the photo voucher number.

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Reptilia: Squamata (snakes)

Family Colubridae

***Phrynonax poecilonotus* (Günther, 1858).** MEXICO: QUINTANA ROO: Municipio de Othón P. Blanco, ca. 14.2 km (airline distance) N of Chetumal (18.624590°N, -88.263205°W; WGS 84); elev. 15 m; 12 June 2016; Rubén Alonso Carbajal-Márquez and Christian M. García-Balderas. The snake was found dead on a road in tropical forest. The specimen, a subadult male (snout–vent length = 935 mm, total length = 133 mm), was deposited in the herpetological collection of El Colegio de la Frontera Sur (reptile collection number QNR.RE.034.0697), (ECO-CH-H-3724). This specimen represents a new municipality record, and extends the known distribution ca. 127.6 km (airline distance) E of the nearest locality at Becán Campeche (UWZH-20502) (Lee 1996).

Acknowledgments.—The collecting permit (SGPA/DGVS/1629/16) was issued by SEMARNAT to Fausto R. Méndez-de la Cruz (Instituto de Biología, UNAM), with an extension to JRCV.

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Third known specimen and first locality record in Oaxaca, Mexico, for *Tantilla sertula* Wilson and Campbell, 2000 (Squamata: Colubridae)

Wilson and Campbell (2000) described the Garland Centipede Snake, *Tantilla sertula*, a member of the *Tantilla calamarina* group (Wilson and Mata-Silva, 2015), on the basis of a single juvenile female specimen (University of Texas at Arlington [UTA] R-38145) from “0.8 km NNE of the junction of Mexico highway 200 on the road to La Unión (17°59’N, 101°49’W), Guerrero, México,” at an “approximate elevation of slightly above 150 m” (Wilson and Campbell, 2000: 821). Canseco-Márquez et al. (2007), in a paper describing *T. ceboruca*, reported a second specimen of *T. sertula* from Guerrero (Museo de Zoología, Facultad de Ciencias, UNAM [MZFC] 3169) from 2.5 km W Puerto Marquéz. These authors did not indicate an elevation for this specimen, but Puerto Marquéz (or Puerto Marqués) is a coastal community near Acapulco, so the locality likely is close to sea level (Ramírez-Bautista et al., 2014). They also did not provide the sex of the specimen, but based on the ventral and subcaudal counts it likely is a male. The holotype of *T. sertula* is a female with 161 ventrals and 30 subcaudals. Fewer ventrals and more subcaudals typically are present in male *Tantilla* (Wilson and Mata-Silva, 2014, 2015), so the number of ventrals (153) and subcaudals (37) fit this pattern.

On 26 June 2016 at 1430 h, we found a third specimen of *Tantilla sertula* (CIB-4990), which represents the first record for the state of Oaxaca (Mata-Silva et al., 2015). The snake (Fig. 1) came from Cerro del Rey, Municipio de Santa Catarina Juquila (16.039749°N, -97.400837°W; WGS 84), at an elevation of 487 m. This locality is about

4.8 km NE of the center of the community of Río Grande, in turn located ca. 7.3 km N of the shore of the Pacific Ocean. Cerro del Rey is in the lower foothills of the Sierra Madre del Sur. We found the snake moving across leaf litter on a trail through tropical semideciduous forest (Figs. 2, 3), on a north-facing slope of the mountain, on a cloudy day with an ambient temperature of 28.3°C and humidity of 89%. Cerro del Rey is located ca. 275 km ESE of the second reported locality (2.5 km W Puerto Marquéz, Guerrero; Canseco-Márquez et al., 2007).

The specimen is a juvenile of undetermined sex, with a total length (TL) of 94 mm and tail length (T) of 14 mm; the relative tail length is 0.149. The snake is similar in size to the holotype of the species (TL = 99 mm, T = 12 mm). The scutellation of this specimen agrees with that of the holotype (Wilson and Campbell, 2000) and the second reported specimen (Canseco-Márquez et al., 2007), except for the number of ventrals and subcaudals (151 and 36, respectively) and the number of supralabial scales (6 on both sides of the head, due to the fusion of supralabials 5 and 6; Fig. 4). The color pattern of the Oaxacan specimen essentially agrees with that of the two other known specimens, especially by the presence of a narrow, dark middorsal stripe that occupies the middle of the middorsal scale row and becomes less prominent posteriorly, no dark lateral stripe, and a head pattern "consisting of a spatulate dark anterior extension of the middorsal dark stripe occupying the dorsum of the head, flanked by pale narrow, longitudinal stripes broadly separated from pale postparietal spots; and uniformly dark brown supralabials" (Wilson and Campbell, 2000: 821). About four or five middorsal scales posterior to the parietals, the dark middorsal stripe narrows to a series of disjunct longitudinal dashes that continue to the end of the tail. The dorsum of the head is dark brown and flanked anteriorly by a pair of narrow cream markings that fuse on the anterior two-thirds of the internasals, and extend posteriorly across the lateral prefrontals and the supraoculars on the anterolateral corner of the parietals. These laterally placed pale markings are separated from a pair of cream postparietal markings that grade into the pale brown dorsal ground color of the body by a distance more or less equivalent to most of the length of the parietal scales. The venter is pale gray anteriorly and grades to pale pink on the posterior two-thirds of the body and back, to pale gray on the ventral portion of the tail. The specimen is deposited in the herpetological collection of the Centro de Investigaciones Biológicas of the Universidad Autónoma del Estado de Hidalgo.

Mexico is inhabited by 30 species of *Tantilla*, of which 17 are endemic to the country (Wilson and Mata-Silva, 2015). Of these endemic species, the distributions of 11 are limited to single states (Wilson and Mata-Silva, 2015). The greatest number of Mexican species of *Tantilla* occurs in Oaxaca (11), of which five are endemic to the state (*T. briggsi*, *T. flavilineata*, *T. oaxacae*, *T. striata*, and *T. triseriata*; Wilson and Mata-Silva, 2015). Conversely, five species of *Tantilla* are found in Guerrero, of which only two are endemic to the state (*T. coronadoi* and *T. sertula*; Wilson and Mata-Silva, 2015). Previously, only two species of *Tantilla* (*T. bocourti* and *T. deppei*) were shared between Guerrero and Oaxaca, but here we report that *T. sertula* no longer is endemic to Guerrero; it also represents the third species common to these two southern Mexican states. *Tantilla sertula* now is known known to occur along the coastal plain and the lower flanks of the Sierra Madre del Sur from southwestern Guerrero to southwestern Oaxaca, at elevations from near sea level to 487 m.

Fig. 1. A juvenile *Tantilla sertula* (CIB-4990) from Cerro del Rey, Municipio de Santa Catarina Juquila, Oaxaca, Mexico, elev. 487 m. © Vicente Mata-Silva

Fig. 2. Tropical semideciduous forest on the north slope of Cerro del Rey, Municipio de Santa Catarina Juquila, Oaxaca, Mexico. © Vicente Mata-Silva

Fig. 3. Interior of forest where the specimen of *Tantilla sertula* was collected. © Vicente Mata-Silva

Fig. 4. Head of the juvenile specimen of *Tantilla sertula* (CIB-4990). © Vicente Mata-Silva

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Family Dipsadidae

***Coniophanes bipunctatus* (Günther, 1858).** MEXICO: YUCATÁN. Municipio de Hunucmá, 6.3 km SE Sisal (21°7'5.19"N, 89°59'50.32"W; WGS 84), elev. 3 m; 29 June 2016; Pedro E. Nahuat-Cervera and Daniel Cabrera-Cen. Two individuals of *Coniophanes bipunctatus* (Fig. 1) were found at ca. 2330 h, active on the road from Hunucmá to Sisal, with the adjacent vegetation consisting of lowland flood forest. A photograph of each snake is deposited at the University of Texas at El Paso Biodiversity Digital Collection (Photo Vouchers UTEP G-2016.22 and G-2016.23). These vouchers represent a new municipality record, and fill the gap between the two known localities from the state of Yucatán, ca. 40.3 km to the NE at "13.9 km E Celestún" and ca. 64.3 km to the WSW at "19.5 km E Chicxulub Puerto" (both airline distances) (Lee, 1996).

Fig. 1. Dorsal and ventral views of the first (A, C) and second (B, D) individuals (UTEP G-2016.22 and G-2016.23, respectively) of *Coniophanes bipunctatus* from 6.3 km SE of Sisal, Municipio de Hunucmá, Yucatán, Mexico.
© Rizieri Avilés-Novelo (A), and Pedro E. Nahuat-Cervera (B, C, D).

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***Coniophanes imperialis* (Baird and Girard, 1859).** MEXICO: NUEVO LEÓN. Municipio de Linares, Linares (24.85343°N -99.57498°W; WGS 84), elev. 360 m; 9 June 2016; Juan Pablo González-Botello. A photograph of this specimen is deposited in the University of Texas at El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.14). This individual (Fig. 1) represents the first record of *C. imperialis* from the state of Nuevo León, with the closest reported locality ca. 202 km SE in the Reserva de La Biósfera El Cielo, in the vicinity of Gómez Farías, Tamaulipas, Mexico (Martin, 1958).

The individual was found at noon in an area designated for growing native trees, next to an abandoned orchard of orange trees that was cleared with heavy machinery the week before. Thus, we believe the snake formerly lived in the abandoned orchard, and sought refuge where it was observed. The primary species of plants in that area include *Acacia farnesiana*, *A. rigidula*, *Caesalpinia mexicana*, *Celtis laevigata*, *C. pallida*, *Dyospiros palmeri*, *Ebenopsis ebano*, *Havardia pallens*, *Leucaena leucocephala*, *Mimosa malacophylla*, *Opuntia engelmannii*, and *Rhandia rhagocarpa*.

Fig. 1. An adult *Coniophanes imperialis* (UTEP G-2016.14) from Linares, Municipio de Linares, Nuevo León, Mexico.
© Juan Pablo González-Botello

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Family Viperidae

***Bothrops asper* (Garman, 1884).** NICARAGUA: RIVAS: Municipio de Cárdenas, Comarca Santa Ana, Finca Guadalupe (11.18311°N, 85.66648°W; WGS 84); elev. 170 m; 14 June 2016; José Gabriel Martínez-Fonseca and Kei Yasuda. A photo voucher of this individual is deposited at The University of Texas at Arlington Digital Collection (UTADC-8683; Fig. 1.). The viper, ca. 1.2 m in total length, was found active moving along a trail at night (1935 h) during a heavy rain, ca. 25 m from a tributary of the Río Ostayo that empties into Lago de Nicaragua (also known as Cocibolca). This area corresponds to Lowland Tropical Dry Forest (Holdridge, 1967; Savage, 2002), and contains several mature riparian forest patches. This locality represents the westernmost record for this species in Nicaragua, and extends its distribution ca. 37 km to the W from its closest Nicaraguan locality (Sunyer et al., 2014), leaving a gap of under 15 km from the Pacific Ocean.

Fig. 1. A *Bothrops asper* from Finca Guadalupe, Departamento de Rivas, Nicaragua. © José Gabriel Martínez-Fonseca

Acknowledgments.—We thank Carl J. Franklin for providing the photo voucher number.

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***Crotalus ornatus* Hallowell, 1854.** MEXICO: NUEVO LEÓN. Municipio de Mina, Boca de Potrerillos (26.043689°N, -100.645939°W; WGS 84), elev. 691 m; 11 October 2010; Gerson Josue Herrera-Enríquez. A photograph of this specimen is deposited in the University of Texas at El Paso Biodiversity Digital Collection (Photo Voucher UTEP G-2016.15). This voucher (Fig. 1) represents the second record for the state and a municipality record for Mina, with the closest known locality ca. 80 km to the S in the vicinity of Cañón de Casa Blanca, Municipio de García, Nuevo León (Nevárez-de los Reyes et al., 2016). The snake was found at 0756 h, crawling on a dry, sandy riverbed.

Fig. 1. An adult *Crotalus ornatus* (UTEP G-2016.5) from Boca de Potrerillos, Municipio de Mina, Nuevo León, Mexico.
© Gerson Josué Herrera-Enríquez

Acknowledgments.—A special thanks to CEPROTAM A.C., for allowing us to use the information reported herein. Arthur Harris kindly provided the photo voucher number.

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***Porthidium nasutum* (Bocourt, 1868)**. NICARAGUA: BOACO: Municipio de Camoapa, southern slope of Cerro Masigüe, Finca Santa Elena (12.53579°N, 85.35665°W; WGS 84); elev. 550 m; 12 August 2016; Lenin Alexander Obando. A photo voucher of this individual is deposited at The University of Texas at Arlington Digital Collection (UTADC-8706; Fig. 1.). The viper was found active at 0800 h, in a one-year-old shade coffee plantation in Lowland Moist Forest (Holdridge, 1967; Savage, 2002). This locality represents a new record for the department of Boaco. In Nicaragua, this relatively common species has been recorded from the following departments: Atlántico Norte, Atlántico Sur, Chontales, Jinotega, Matagalpa, and Río San Juan (Villa 1984; Köhler, 2001; Travers et al. 2011; Sunyer et al. 2014).

Fig. 1. A *Porthidium nasutum* from Finca Santa Elena, Departamento de Boaco, Nicaragua. © Lenin Alexander Obando

Acknowledgments.—We thank Carl J. Franklin for providing the photo voucher number.

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Three noteworthy herpetofaunal records from Belize

From 16 to 29 January 2016, we conducted fieldwork in the Belizean districts of Belize, Stann Creek, and Toledo. We encountered one individual of the Blue-spotted Mexican Treefrog, *Smilisca cyanosticta*, one of the White-lipped Frog, *Leptodactylus fragilis*, and two of the Black-striped Snake, *Coniophanes imperialis*, each outside of its previously known range. We captured the individuals and identified them with the aid of a magnifying glass, and by consulting the relevant literature (Lee, 2000; Köhler, 2003, 2011). Subsequently, we photographed the individuals and released them at their respective sites of capture. We deposited the photographs (Fig. 1) in the digital collection of the University of Texas at Arlington (UTADC), and elaborate on each of the records and their relevance below.

Amphibia: Anura

Family Hylidae

***Smilisca cyanosticta* (Smith, 1953).** BELIZE: STANN CREEK: Constituency of Stann Creek West, eastern Cockscomb Basin Wildlife Sanctuary, 6.1 km E of Kendal (16.79114°N, 88.43877°W; WGS 84); elev. 115 m; 23 January 2016; Brittney A. White, Carlos J. Pavón Vázquez. At ca. 0045 h, an adult individual (UTADC-8659; Fig. 1A) was observed ca. 70 cm above the ground on a broad leaf, near a stream in tropical evergreen forest. The distribution of the species in Belize has been poorly documented (Meyer and Farneti Foster, 1996). The present record is located ca. 20 km E (straight line) from the closest known locality in the western Cockscomb Basin, Stann Creek, Belize (Lee, 1996). This individual constitutes the second known locality for the District of Stann Creek, the fifth for Belize, and the easternmost for the species (Lee, 1996; Duellman, 2001). Other species of amphibians and reptiles found at the site were *Craugastor sabrinus*, *Rana* (*Lithobates*) *brownorum*, and *Anolis* (*Norops*) *lemurinus*.

Family Leptodactylidae

***Leptodactylus fragilis* (Brocchi, 1877).** BELIZE: TOLEDO: Constituency of Toledo West, Lubaantun Ruins (16.28165°N, 88.95966°W; WGS 84); elev. 51 m; 20 January 2016; Alexis S. Harrison, Inbar P. Maayan, Carlos J. Pavón-Vázquez, Brittney A. White. An adult individual (UTADC-8658; Fig. 1B) was found among the ruins of a Mayan building at ca. 2000 h. Induced grassland surrounded the ruins, but tropical evergreen forest is found nearby. The present record is the southernmost for the species in Belize, with the closest known locality 14 mi NE of Golden Stream, Toledo, Belize (Lee, 1996), 42.2 km ENE (straight line) from ours. Other species of amphibians and reptiles found at the site were *Incilius valliceps*, *Eleutherodactylus leprus*, *A. lemurinus*, *A. rodriguezii*, *Coleonyx elegans*, and *Scincella cherriei*.

Reptilia: Squamata

Family Dipsadidae

***Coniophanes imperialis* (Baird and Girard, 1859).** BELIZE: BELIZE: Constituency of Belize Rural South, Ambergris Caye, 4.5 km S of San Pedro (17.88662°N, 87.98469° W; WGS 84); elev. 14 m; 29 January 2016; Carlos J. Pavón-Vázquez. An adult individual (UTADC-8656; Fig. 1C) was found active in leaf litter at ca. 1820 h, in chit palm-pine forest. BELIZE: BELIZE: Constituency of Belize Rural South, Ambergris Caye, San Pedro (17.909829°N, 87.972223°W; WGS 84); elev. 6 m; 29 January 2016; Alexis S. Harrison, Inbar P. Maayan, Carlos J. Pavón-Vázquez. An adult snake (UTADC-8657; Fig. 1D) with an incomplete tail was seen active on a dirt road in disturbed tropical semi-evergreen forest at ca. 2240 h. Robby Deans observed an individual of this species in Ambergris Caye on 28 November 2014, and uploaded a photograph, with obscured coordinates, to the iNaturalist online project. The present work, however, represents the first published records of *C. imperialis* from Ambergris Caye. The closest record to either of those presented here is from near Maskall, Belize, mainland Belize (Lee, 1996), ca. 36 km ESE (straight line) from our records. Other species of amphibians and reptiles found in San Pedro and vicinity were *Scinax staufferi*, *Smilisca baudinii*, *Basiliscus vittatus*, and *A. sagrei*, and *Ctenosaura similis*.

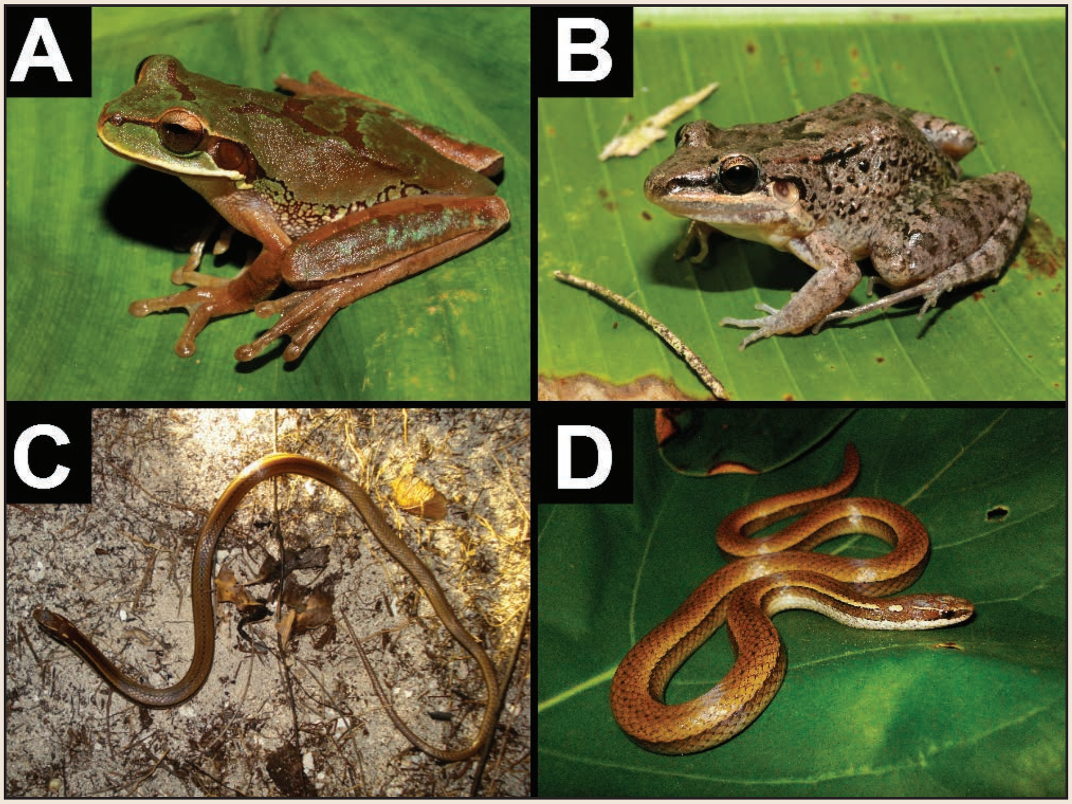

Fig. 1. Individuals of amphibians and reptiles from Belize reported here. (A) *Smilisca cyanosticta* from eastern Cockscomb Basin Wildlife Sanctuary, 6.1 km E of Kendal, Constituency of Stann Creek West, Stann Creek (UTADC-8659); (B) *Leptodactylus fragilis* from Lubaantun Ruins, Constituency of Toledo West, Toledo (UTADC-8658); and (C) *Coniophanes imperialis* from 4.5 km S of San Pedro (UTADC-8656) and (D) from San Pedro (UTADC-8657), Ambergris Caye, Constituency of Belize Rural South, Belize. © Brittney A. White (A, B) and Carlos J. Pavón Vázquez (C, D)

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Order Testudines

Family: Dermatemydidae

***Dermatemys mawii* Gray, 1847.** MEXICO: QUINTANA ROO: Municipio de Othón P. Blanco, Laguna Guerrero (18°44'5.63"N; 88°12'49.31"W), elev. 0 m; 3 October 2004; Humberto Bahena-Basave. This adult turtle (UTEP G-2016.19; Fig.1) was found while conducting manatee surveys in the lagoon. Two more turtles, an adult and a young individual (UTEP G-2016.20; Fig. 2), were found in Laguna San Felipe, Municipio de Bacalar (18°46'42.02"N; 88°28'47.98"W), elev. 0 m; 17 January 2006; Pablo M. Beutelspacher-García. Photographs of these individuals are deposited at the University of Texas at El Paso Biodiversity Digital Collection. The voucher from Laguna Guerrero (Fig. 1) represents the northernmost municipality record for Othón P. Blanco, considering that 13 specimens previously were reported from ca. 110 km SW in the Río Hondo (border between Mexico and Belize): one at 6 km NE La Unión (Bahena-Basave, 1995), and 12 at La Unión (González-Porter et al., 2013). The voucher from Laguna San Felipe (Fig. 2) represents the first municipality record for Bacalar. These two localities extend the range ca. 34 km NE and 35 km NW, respectively, from the closest known localities near Santa Elena in Corozal District, Belize: Río Hondo and Four Mile Lagoon (Moll, 1986), and according to geographic distribution maps proposed by Lee (1996), and González-Porter et al. (2013), they represent the northernmost records on the eastern portion of the Yucatan Peninsula.

Fig. 1. An adult *Dermatemys mawii* (UTEP G-2016.19), collected during a manatee census at Laguna Guerrero, Quintana Roo, Mexico. © Humberto Bahena-Basave

Fig. 2. An adult and a young *Dermatemys mawii* (UTEP G-2016.20) from Laguna San Felipe, Quintana Roo, Mexico.
© J. Rogelio Cedeño-Vázquez

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Reptilia: Emydidae

***Terrapene nelsoni* Stejneger, 1925.** MEXICO: NAYARIT: Municipio de La Yesca, Sierra de la Yesca, Rancho el Saucillo (21.567563°N, 104.184137°W; WGS 84); elev. 1,786 m; 31 August 2015; Jesús A. Loc-Barragán and Ivan C. Popoca-Espinosa. The turtle (Fig. 1.) was found active in the morning, in pine-oak forest. Photo vouchers of this individual (UTADC-8696, 8697) are deposited in The University of Texas at Arlington Digital Collection. This specimen represents a new municipality record, and a range extension of ca. 141 km SE (airline distance) from La Mesa de Pedro Pablo, Acaponeta (KU 92624, 92625, 92629, 179169, 211191, 211192, 211193, 92626, 92627, 92628, 92630, 92631, collected on 4 July 1987; USNM 149706.6294178, 149707.6294179, 149708.629418, 149709.6294181, 149710.6294182, 149711.6294183, collected on 1 July 1973 and 46252.6190013, collected on 4 August 1897; GBIF, 2016).

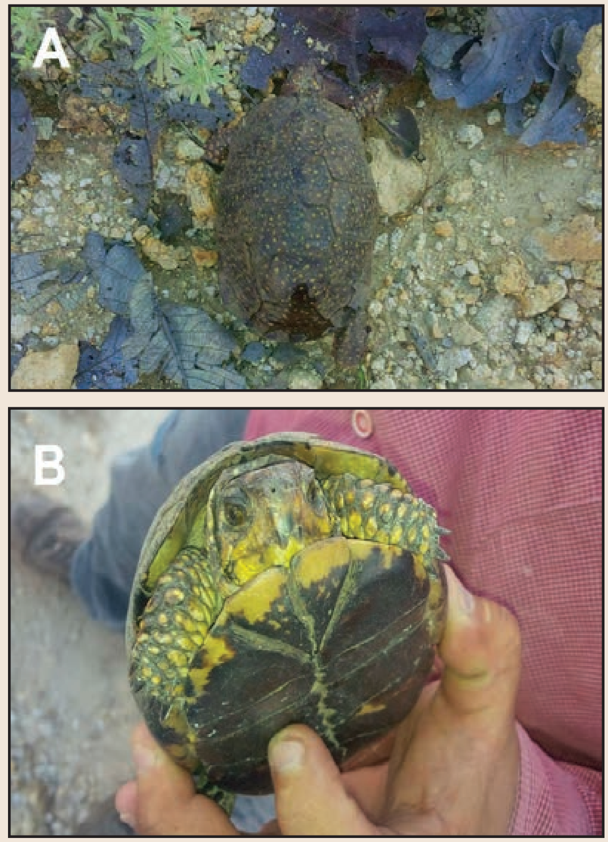

Fig. 1. Dorsal and frontal views of a Spotted Box Turtle, *Terrapene nelsoni* (UTADC-8696, UTADC-8697, A and B, respectively) from Rancho El Saucillo, Municipio de La Yesca, Nayarit, Mexico.

© Iván C. Popoca-Espinosa

Acknowledgments.—We thank Carl J. Franklin for providing the photo voucher numbers.

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Family: Geoemydidae

***Rhinoclemmys pulcherrima* (Gray, 1855).** MEXICO: NAYARIT: Municipio de Tecuala, 1.5 km SE of Paso Hondo (22.389478°N, 105.549098°W; WGS 84); elev. 5 m; 16 August 2015; Jesús A. Loc-Barragán and Jesús A. López-Solís. The turtle, an adult male, was found walking on road on a cloudy day, after a slight rain. A photo voucher (UTADC-8701) of this individual (Fig. 1) is deposited at The University of Texas at Arlington Digital Collection. This voucher represents a new municipality record and the fifth record for the state, and a range extension of ca. 24 km W (airline distance) of the closest known locality in Municipio de Acaponeta on federal highway 200 (16.3 mi S of La Concha, Sinaloa [MVZ 65542]; collected by William J. Hamilton III on 29 December 1955; VertNet, 2016).

Fig 1. A Painted Wood Turtle (*Rhinoclemmys pulcherrima*; UTADA-8701) from 1.5 km SE of Paso Hondo, Municipio de Tecuala, Nayarit, Mexico. © Jesús A. Loc-Barragán.

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Family Kinosternidae

***Kinosternon integrum* LeConte, 1854.** MEXICO: NAYARIT: Municipio de la Yesca, Valle de Huajimic (21.678718°N, -104.316096°W; WGS 84); elev. 1,127 m; 28 March 2016; Jesús A. Loc-Barragán, Ernesto Caravantes-Estrada, Christian E. Hernández-Franco, Juan P. Ramírez-Silva, and Guillermo A. Woolrich-Piña. The adult turtle (Fig. 1) was found dead on the road, and was deposited in the Colección de Vertebrados, at the Museo de Zoología, Unidad Académica de Agricultura, Universidad Autónoma de Nayarit (MZUAN AR 313). The specimen represents a new municipality record and a range extension of ca. 44 km NE (airline distance) from the closest reported locality at Laguna de Santa María del Oro, Municipio de Santa María del Oro, where A. D. Greer collected three individuals (CAS-HERP 95814, 95815, 95816) on 26 June 1964 (EncicloVida, 2016).

Fig. 1. Dorsal and ventral views of the Mexican Mud Turtle (*Kinosternon integrum*) from Valle de Huajimic, Municipio de la Yesca, Nayarit, Mexico. © Jesús A. Loc-Barragán.

Acknowledgments.—The collecting permit was issued to Fausto R. Mendez-de la Cruz by SEMARNAT (OFICIO NÚM. SGPA/DGVS/ 01629 116) with an extension to GAWP.

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MISCELLANEOUS NOTES

Charadrahyla altipotens (Anura: Hylidae), a Critically Endangered treefrog rediscovered in Oaxaca, Mexico

Duellman (1968) described *Hyla altipotens* based on seven individuals collected in 1966 from 33–37 km N of San Gabriel Mixtepec on the Pacific slope of the Sierra Madre del Sur, Oaxaca, Mexico. Subsequently, Duellman (2001) reported new localities for this species from the Santa Maria Jalatengo region of the same mountain range in Oaxaca, from ca. 60 km ESE of the type locality. Faivovich et al. (2005) placed all of the species in the *Hyla taeniopus* group known at that time in the genus *Charadrahyla*.

Charadrahyla altipotens is considered a species under special protection by the Mexican government (NOM-059 SEMARNAT-2010), and as Critically Endangered (Possibly Extinct; A2ace) by the IUCN (Santos-Barrera and Canseco-Márquez, 2004; Stuart et al., 2008). Wilson et al. (2013) assessed it an Environmental Vulnerability Score of 12 (in the medium category), largely as a result of its reproductive mode. Importantly, Santos-Barrera and Canseco-Márquez (2004) indicated that this species apparently was in serious decline, as it had not been recorded since the 1960s, but several specimens actually were collected in 1970 (VertNet, 2016). Herein, we report on three individuals of *C. altipotens* that were encountered recently, from three new localities. We deposited photographs of these individuals (see below) in the digital herpetological collection of the Museo de Zoología, Facultad de Estudios Superiores Zaragoza, Universidad Nacional Autónoma de México (MZFZ), and the specimens collected were deposited in the herpetological collection of the Museo de Zoología, Facultad de Ciencias, Universidad Nacional Autónoma de México (MZFC).

On 26 August 2011, ANMO collected an adult male *C. altipotens* (Fig. 1A; MZFC-30628) perched on a branch about 1.6 m above the ground along a creek in pine forest, on the road between Candelaria Loxicha and San Miguel Suchixtepec, Municipio de San Pedro el Alto, Oaxaca (16.0333N, -96.5114W; datum WGS 84; elev. 1,740 m).

On 6 October 2014, MDL found an adult female *C. altipotens* (MZFZ IMG017) soon after it was hit by a vehicle, but still alive, on a road through pine forest, at 10.9 km NE of Santa Maria Jalatengo, Municipio de San Pedro el Alto, Oaxaca (16.03843N, -96.50471W; datum WGS 84; elev. 1,849).

On 13 April 2016 at 1307 h, during a field trip to Tierra Blanca Loxicha, Municipio de San Agustín Loxicha, Oaxaca (15.9697N, -96.5734W; datum WGS 84; elev. 1,680), CLBA found an adult female *C. altipotens* (Fig. 1C, D) in pine-oak forest, resting near a low waterfall along a narrow creek. The pool at the base of the waterfall harbored numerous large tadpoles, perhaps of this species (Fig. 1B). The individual was photographed (photo vouchers MZFZ IMG014–16) and released. The frog, however, appeared lethargic and thin.

Observations on color pattern and secondary sexual characters

The color pattern and secondary sexual characters noted for the adult male (MZFC-30628) are as follows: dorsum uniform green, with transverse bars absent on arms and legs; narrow, pale yellow line extends posteriorly from snout and along canthus rostralis, continuing along upper border of the eye; lips white with black margin; flanks cream with small, irregular green and black spots; nuptial excrescences dark gray; loreal and temporal regions with small, black spicules, possibly indicating reproductive activity; and small, dark spicules also notable on knees, outer surface of shank, heels, tarsi, and feet. The last character was not indicated in the original description of *Hyla altipotens* or later (Duellman, 1968, 2001).

The dorsum of the adult female that was released was green when the individual was captured (Fig. 1C), and contained small, scattered, gold and black spots. After the frog was handled for photographs, the dorsal ground color changed from green to tan (Fig. 1D), and the flanks turned cream with medium-sized, irregular black spots, and the transverse bands on the forearms, thighs, and shanks became more pronounced. The dorsum of the second female (MZFZ IMG017) was uniform green, and transverse bars were absent on the limbs.

Fig. 1. *Charadrahyla altipotens* in life: (A) adult male (MZFZ-30628) from the road between Candelaria Loxicha and San Miguel Suchixtepec, Municipio de San Pedro el Alto, Oaxaca; (B) tadpoles (MZFZ IMG014), possibly of *C. altipotens*, found at Tierra Blanca Loxicha, Municipio de San Agustín Loxicha, Oaxaca; (C) adult female from previous locality when first seen (MZFZ IMG015), and (D) the same individual after handling for photographs, showing the color change (MZFZ IMG016).
© Uri O. García-Vásquez (A) and César L. Barrio-Amorós (B–D)

Conservation status

After recently observing *Charadrahyla altipotens* in three different localities, as well as hundreds of tadpoles similar to those described by Duellman (1970), which were not examined in detail and thus we can not positively assign them to this species), we hold a level of optimism about the future of this species. Nonetheless, because of its limited known distribution (Fig. 2), the disappearance of fragments of cloud forest in Oaxaca, and because the range of this species does not include any protected areas (Stuart et al., 2008), we believe that its conservation status should remain as Critically Endangered (CR A2ace) by IUCN, and we propose that its status should be raised to the threatened category (Amenazadas [A]) by the Mexican government (NOM-059 SEMARNAT-2010). Additional fieldwork and more data are necessary to learn more about possible threats (e.g., habitat destruction, vulnerability to emergent diseases) to adequately monitor the newly discovered populations.

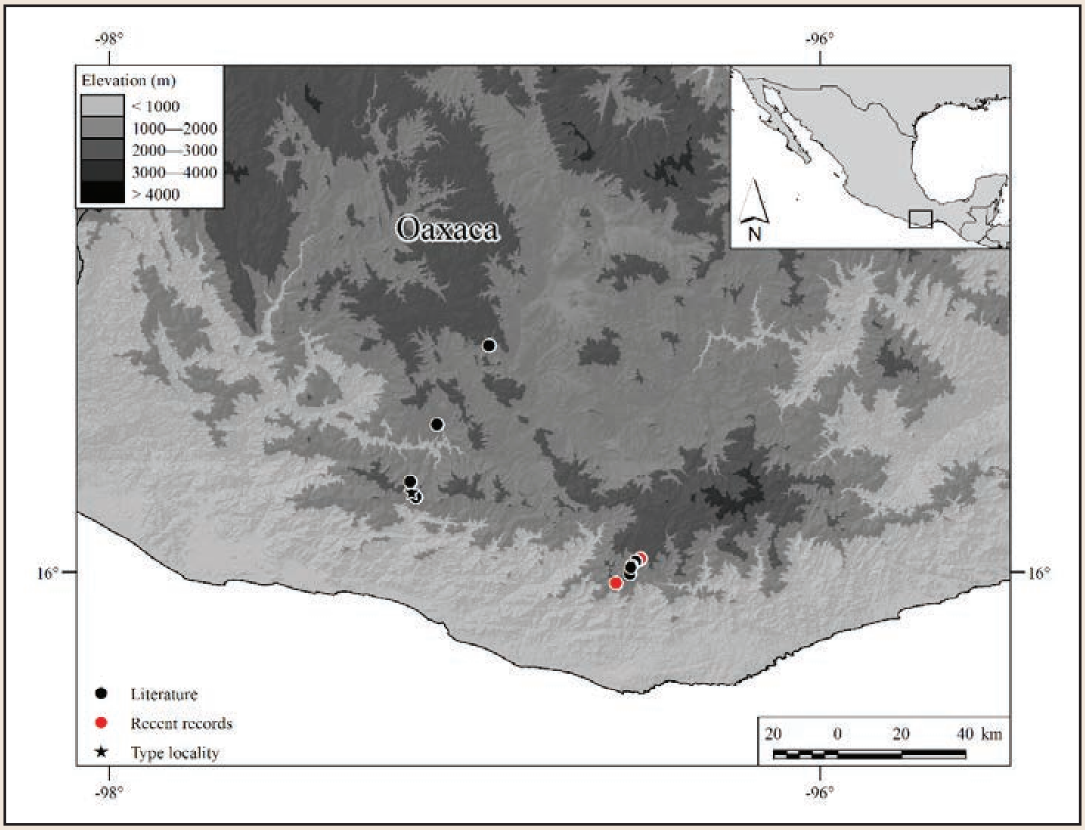

Fig. 2. Known distribution of *Charadrahyla altipotens*, including the most recent records.

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Rediscovery of the Critically Endangered treefrog *Charadrahyla trux* in the Sierra Madre del Sur of Guerrero, Mexico

Charadrahyla trux (Adler and Dennis, 1972) is a rare hylid frog with a distribution restricted to the higher portions of the Sierra Madre del Sur in central Guerrero, Mexico (Duellman, 2001). Adler and Dennis (1972) described the species based on nine specimens collected in December of 1969. The specimens were collected on the slopes and immediate vicinity of Cerro Teotepec in central Guerrero, at elevations from 1,760–2,120 m, between the town of El Paraíso, on the Río Atoyac, and El Asoleadero, an abandoned logging camp near Carrizal de Bravo. Subsequently, seven additional specimens were collected in December of 1972 (J. Campbell, pers. comm.). This species therefore, is known from 16 specimens (with a positive identification) and has not been seen since 1972 (GBIF, 2016).

Previous to this work, numerous researchers sampled the region from where *C. trux* was known to occur without finding the species (Lips et al., 2004; Caviedes-Solis et al., 2014). Lips et al. (2004) listed *C. trux* as potentially extirpated from the only area where it was known. In their evaluation of the species status for IUCN, Santos-Barrera and Canseco-Márquez (2004) assessed this species as Critically Endangered and Possibly Extinct. This status presumably was based on the assessment of Lips et al. (2004), in addition to the paucity of recent records for the species at the Museo de Zoología, Universidad Nacional Autónoma de México. Lamoreux et al. (2015) also listed *C. trux* as possibly extinct, based on the information from IUCN.

On 16 July 2016, we were sampling for direct-developing frogs of the genus *Eleutherodactylus* (subgenus *Syrrhophus*) and stream-breeding hylids on the windward slopes of Cerro Teotepec, Guerrero, between the settlement of Puerto del Gallo and the town of El Paraíso. We sampled the transect by car from 0900 h (on 15 July) until 0700 h (on 16 July), stopping approximately every 1,500 m to listen for vocalizing amphibians. Previously, we downloaded the known stream-breeding hylid collecting localities from GBIF (2016), as well as from the literature (Adler, 1965; Adler and Dennis, 1972; Duellman, 2001). We mapped each of these localities in Google Earth, and downloaded the KMZ file to our cellular phones. We stopped at each stream to listen for vocalizations, and where possible walked upstream from the highway to escape the sound of water crossing under or over the road. We searched the larger and permanent streams more thoroughly. We collected and photographed all animals, and deposited the images at the University of Texas at Arlington Digital Photo Voucher Collection (UTADC).

On 16 July 2016 at 0130 h, we discovered an adult male *C. trux* (UTADC 8670–8672; Fig. 1) perched on a mossy rock above a large, permanent stream, ca. 500 m east of the settlement of Nueva Dehli, Municipio de Atoyac de Álvarez, Guerrero (17.423689°, -100.192541°; datum WGS 85); elev. 1,450 m; (Fig. 2). This locality is 4.9 km S (airline distance) from the Type Locality of *C. trux.* Jonathan Campbell verified the identification of the frog. The individual was inactive and not vocalizing when it was found. The discovery of this frog prompted a thorough search of the immediate area, along approximately 120 m of the bank. No other individuals were located, and the only anurans found vocalizing along the stream were *Exerodonta sumichrasti* and an undescribed species of *Eleutherodactylus* (subgenus *Syrrhophus*).

Fig. 1. An adult male *Charadrahyla trux* (UTADC 8670–8672) from 500 m E of Nueva Dehli, Atoyac de Álvarez, Guerrero.
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Around noon on 16 July 2016 we revisited the stream in search of *C. trux*, specifically for tadpoles and metamorphs. In a large pool about 110 m above the rock where the adult *C. trux* was discovered (Fig. 3), we found approximately 150 tadpoles (Fig. 4) that we tentatively identified as *C. trux*. We compared photos of these tadpoles with those of *Charadrahyla nephila* Mendelson and Campbell, 1999 and *Charadrahyla altipotens* Duellman, 1968. The overall size, shape, and coloration of the tadpoles in the pool were similar, and we believe they were *C. trux*. Further, William Duellman also considered that the tadpoles likely were those of *C. trux.*

Importantly, all known specimens of *C. trux* had been collected in December, at the beginning of the dry season, and sampling for the above mentioned studies was conducted in June and July, during the heavier portion of the rainy season. Our specimen represents the first individual of *C. trux* found during the rainy season.

Our results confirm the continued existence of *C. trux* in the area from where it originally was described. Whereas a single specimen is insufficient to speculate as to the health of the population, hundreds of tadpoles apparently of this species suggest that it continues to reproduce in this stream. We did not notice any major habitat destruction or disturbance in the area where the frog was discovered. Minutes before encountering the frog we observed a Jaguar (*Panthera onca*) on the road. While irrelevant to the frog, this observation is indicative of the health of the habitat, as large predators like *P. onca* typically are the first animals to be extirpated with human disturbance (Cuervo-Robayo and Monroy-Vilchis, 2012). The highway near the type locality of *C. trux* is being paved, and the construction process is causing major siltation in some streams below the road. Further sampling should be conducted in the area to determine the true conservation status of *C. trux.*

Fig. 2. Locality where an adult male *Charadrahyla trux* (UTADC 8670–8672) was discovered at 500 m E of Nueva Dehli, Atoyac de Álvarez, Guerrero.
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Fig. 3. Locality where presumed tadpoles of *Charadrahyla trux* were observed near Nueva Dehli, Atoyac de Álvarez, Guerrero. © Christoph I. Grünwald

Fig. 4. Two tadpoles, presumably of *Charadrahyla trux*, photographed near Nueva Dehli, Atoyac de Alvarez, Guerrero.
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Acknowledgments.—Fieldwork was conducted under permit FAUT-0243, issued to Uri O. García-Vázquez by the Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT). We especially thank Dr. Adrián Nieto-Montes de Oca and the team at MZFC for their generous and unfaltering support to further an understanding of the Mexican herpetofauna. Biodiversa A.C. and Herpetological Conservation International provided funding for our fieldwork. Additional support for our fieldwork was provided by a grant from the Dirección General de Apoyo al Personal Académico, Universidad Nacional Autónoma de México (PAPIIT-IN 221016) to U. García-Vázquez.

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A new locality for the Nicaraguan highland endemic *Oedipina nica* (Caudata: Plethodontidae), with comments on its distribution and conservation

Worm salamanders (Caudata: Plethodontidae: *Oedipina*) are among the most poorly known and critically threatened amphibians in Central America. Few museum specimens exist for many species, largely as a result of their fossorial lifestyle (Sunyer et al., 2010). The 37 recognized species of *Oedipina* are distributed throughout Central- and South America (AmphibiaWeb, 2016), with four species known to occur in Nicaragua (Sunyer, 2014): *O. collaris*, *O. cyclocauda*, *O. koehleri*, and *O. nica*.

Oedipina nica is a Nicaraguan endemic known from only a few highland localities in the north-central part of the country, at elevations from 1,360 to 1,660 m (Sunyer et al., 2010). This species was described based on specimens from three isolated natural reserves in the department of Jinotega (Fig. 1): Cerro Kilambe, Cerro Datanlí-El Diablo, and Cerro Peñas Blancas. A fourth locality straddling the border of the departments of Jinotega and Matagalpa, Cerro El Arenal, was reported a year later, extending the known range approximately 12.5 km to the south (Sunyer et al., 2011). Herein, we report the fifth known locality and lowest known elevation for *O. nica*.

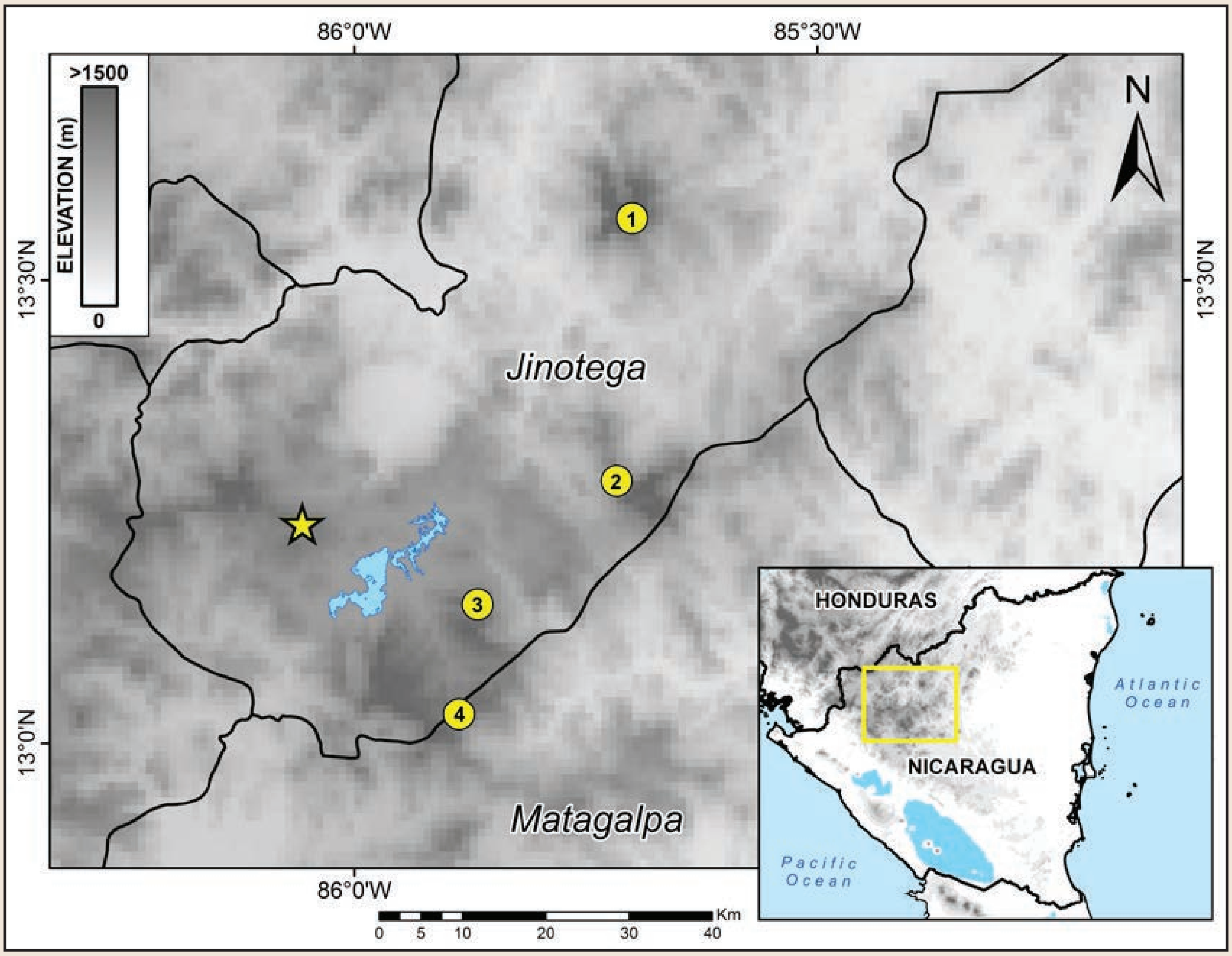

Fig. 1: Known localities of *Oedipina nica.* Circles correspond to previously reported localities numbered as follows: 1 = Cerro Kilambe; 2 = Cerro Peñas Blancas; 3 = Cerro Datanlí-El Diablo; and 4 = Cerro El Arenal. The star represents the new locality, Reserva Silvestre Privada El Jaguar, reported in this paper. The blue area in the main map represents Lago de Apanás.

SPECIMEN COLLECTION AND IDENTIFICATION

On the night of 27 May 2016, we collected a single specimen of *Oedipina nica* (CM 158768; Figs. 2, 3) during a herpetofaunal inventory of Reserva Silvestre Privada El Jaguar (near San Rafael del Norte), Departamento de Jinotega, Nicaragua (13°14'15.9"N, 086°03'22.0"W; datum WGS 84; elev. 1,291 m; Fig. 1) under rotting wood in Lower Montane Wet Forest. The location and elevational data were recorded using a Garmin GPSMAP 62stc. The specimen was collected following the standard protocols and deposited in the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, United States.

Fig. 2: *Oedipina nica* (CM 158768) from Reserva Silvestre Privada El Jaguar, Departamento de Jinotega, Nicaragua, in life.
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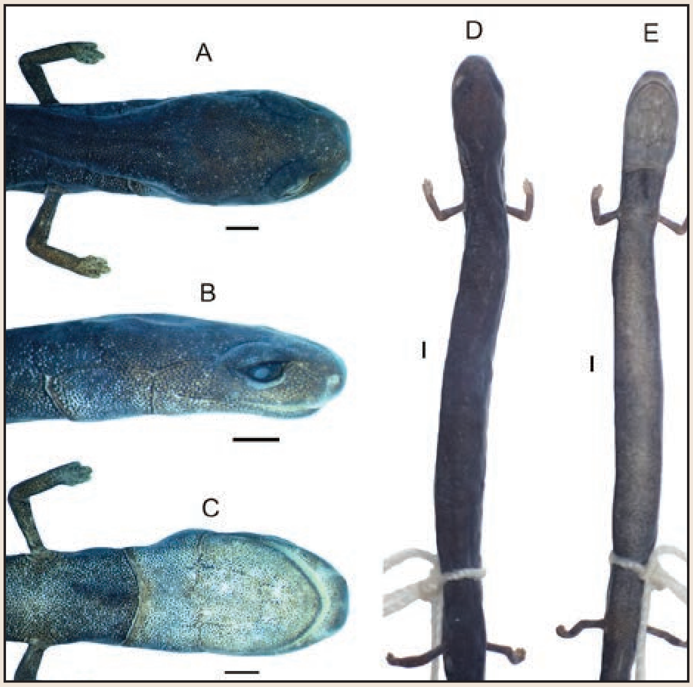

Fig. 3: Diagnostic photos of *Oedipina nica* (CM 158768). Dorsal (A), lateral (B), and ventral (C) views of the head, and dorsal (D) and ventral (E) views of the body. Scale bars = 1 mm. © Erich P. Hofmann

Morphological identification

We identified the specimen using the keys in Köhler (2011) and the species description in Sunyer et al. (2010). The measurements follow those of Brame (1968), and were made with digital calipers to the nearest 0.1 mm. We determined the sex by the presence of an enlarged premaxillary tooth protruding through the upper lip. CM 158768 (Figs. 2–3) is a small, slender male salamander with 19 costal grooves between the axilla and groin, 12 costal folds between the adpressed limbs, standard length (snout to posterior margin of the cloaca) 38 mm, tail length 73 mm (58 mm + 15 mm), axilla–groin length 25.7 mm, and total length 111 mm. The head width of the specimen is 3.5 mm, the hind limb length 4.9 mm, the hind foot width 0.8 mm, and the snout-to-gular fold distance 6.1 mm.

Molecular identification

Oedipina are highly conserved morphologically and the species can be difficult to distinguish. Therefore, we incorporated a DNA barcoding approach to supplement our morphological identification. We took a tissue sample prior to preserving the specimen by removing 15 mm of the tail tip and storing it in SED buffer (20% DMSO, 0.25 M EDTA, pH 7.5, NaCl saturated; Seutin et al., 1991; Williams, 2007). We extracted DNA from the tissue using a PureLink® Genomic DNA Mini Kit (Life Technologies, United States), and PCR amplified a 503 basepair segment of the mitochondrial gene 16S with the primers 16Sar and 16Sbr (Palumbi et al., 1991). We purified the PCR product with ExoSAP-IT®, then sequenced it using the SimpleSeq™ DNA sequencing service (Eurofins Genomics, United States). We aligned our sequence with data from GenBank in MEGA7 (Table 1; Kumar et al., 2016), and used jModelTest v2.1.10 (Darriba et al., 2012) to select the best fit model of nucleotide substitution. We carried out a maximum likelihood analysis in RAxML v7.2.8 (Stamatakis, 2006), with 1,000 bootstrap pseudoreplicates under the default GTR+GAMMA substitution model and with the dataset partitioned by gene. We performed Bayesian Inference with MrBayes v3.2.5 (Ronquist and Huelsenbeck, 2003), under the GTR+I+G model with the dataset partitioned by gene. Our analysis consisted of two parallel runs of four Markov chains (three heated, one cold) run for $20x10^6$ generations, sampled every 10,000 generations, with a random starting tree and the first 20% discarded as burn-in. The phylogenetic analyses of the barcoding marker 16S (Fig. 4) confirm that CM 158768 is conspecific with specimens of *O. nica* reported by Sunyer et al. (2010; 2011).

Table 1. 16S sequences used in the phylogenetic analysis.

Species	Locality	Museum Number	GenBank Accession Number
Nototriton barbouri	Honduras: Yoro	UF156538	GU971733
Oedipina alleni	Costa Rica: Puntarenas	MVZ 190857	AF199207
Oedipina capitalina	Honduras: Francisco Morazán	CM 158386	KU495731
Oedipina carablanca	Costa Rica: Limón	No voucher	FJ196862
Oedipina chortiorum	Honduras: Ocotepeque	USNM 530568	AF199231
Oedipina collaris	Panama: Coclé	SIUC H 8896	FJ196863
Oedipina complex	Panama: Colón	MVZ 236255	AF199213
Oedipina cyclocauda	Costa Rica: Heredia	MVZ 138916	AF199214
Oedipina elongata	Guatemala: Izabal	UTA A-51906	AF199216
Oedipina gephyra	Honduras: Yoro	UF 176100	JN190930
Oedipina gracilis	Costa Rica: Heredia	MVZ 210398	AF199219
Oedipina grandis	Costa Rica: Puntarenas	MVZ 225904	FJ196864
Oedipina kasios	Honduras: Olancho	MVZ 232825	FJ196866
Oedipina kasios	Honduras: Francisco Morazán	UF156500	HM113477
Oedipina kasios	Honduras: Olancho	FN 253109	JF499891
Oedipina koehleri	Nicaragua: Matagalpa	SMF 90079	JN190927
Oedipina maritima	Panama: Bocas del Toro	MVZ 219997	AF199221
Oedipina motaguae	Guatemala: Zacapa	USAC 1134	HM068304
Oedipina nica	Nicaragua: Matagalpa	MHUL 003	JN190928
Oedipina nica	Nicaragua: Jinotega	MVZ 263774	HM068306

Oedipina nica	Nicaragua: Jinotega	UF156447	HM113474
Oedipina nica	Nicaragua: Jinotega	UF156453	HM113475
Oedipina nica	Nicaragua: Jinotega	UF156446	HM113473
*Oedipina nica**	Nicaragua: Jinotega	CM 158768	KX686567
Oedipina pacificensis	Costa Rica: Puntarenas	UCR 12063	AF199222
Oedipina petiola	Honduras: Atlántida	USNM 343462	AF199217
Oedipina poelzi	Costa Rica: Alajuela	MVZ 206398	AF199223
Oedipina pseudouniformis	Costa Rica: Cartago	MVZ 203749	AF199227
Oedipina quadra	Honduras: Gracias a Dios	MVZ 232824	FJ196865
Oedipina quadra	Honduras: Olancho	FN 253156	JF499893
Oedipina quadra	Honduras: Olancho	FN 252582	JF499896
Oedipina quadra	Hondruas: Olancho	FN 252559	JF499895
Oedipina savagei	Costa Rica: Puntarenas	UCR 14587	AF199209
Oedipina sp.	Nicaragua: Jinotega	SMF 78738	FJ196868
Oedipina stenopodia	Guatemala: San Marcos	MVZ 163649	AF199228
Oedipina tomasi	Honduras: Cortés	UF 150066	JN190929
Oedipina uniformis	Costa Rica: Cartago	MVZ 203751	AF199230

* Sequence generated for this note

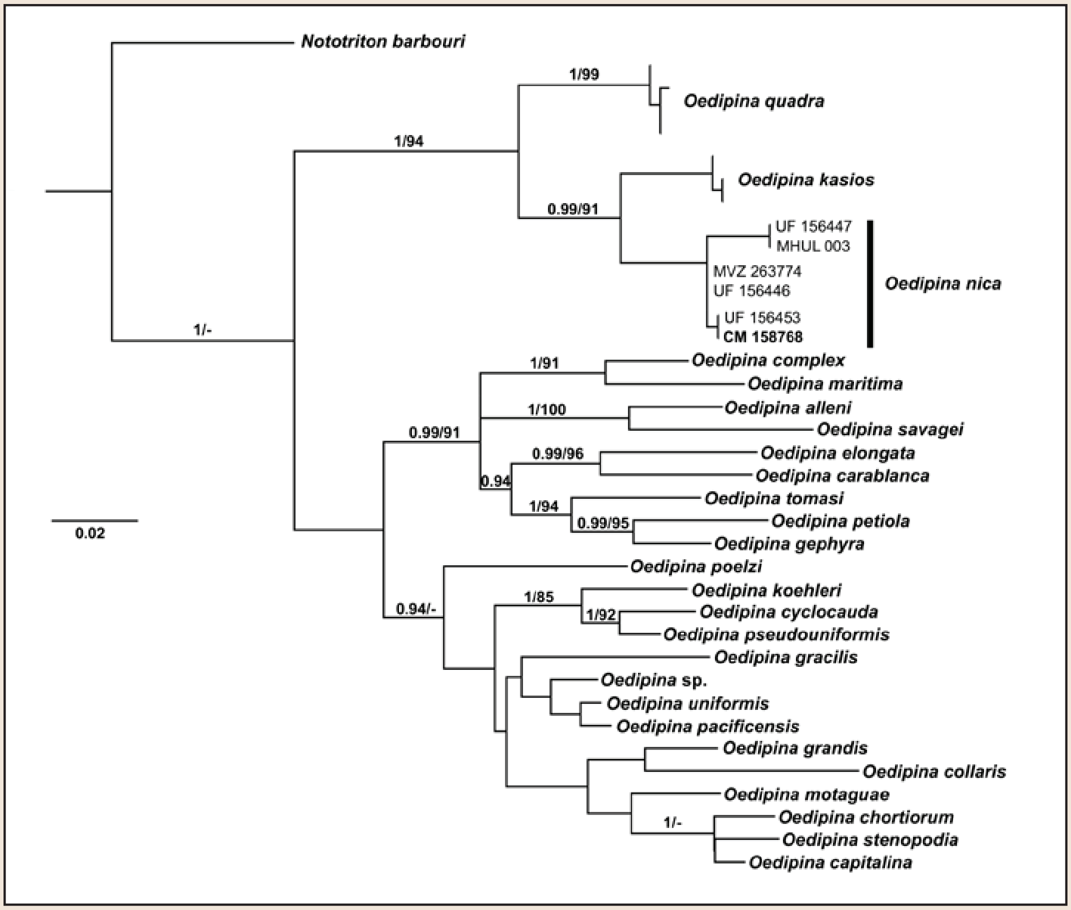

Fig. 4. Phylogenetic tree showing the relationship of CM 158768 to members of the genus *Oedipina* based on a fragment of the mitochondrial gene 16S. Bayesian posterior probabilities and maximum likelihood bootstrap scores are shown when greater than 0.75 and 75, respectively.

REMARKS

Geographic and elevational distribution

Our finding represents the fifth locality for the Nicaraguan endemic *Oedipina nica*. Reserva El Jaguar represents the westernmost locality for *O. nica* (Fig. 1) and the lowest elevation recorded for this species (1,291 m). This record extends the known range approximately 22.6 km west-northwest from the closest known locality, Cerro Datanlí-El Diablo. In addition to geographic distance, Reserva El Jaguar and Cerro Datanlí-El Diablo are separated by an extensively altered anthropogenic landscape and unsuitable habitat for this species, including a relatively large reservoir (Lago de Apanás).

Reserva El Jaguar

All previously known specimens of *Oedipina nica* have been reported from public natural reserves. Reserva El Jaguar, however, is a private coffee farm and nature reserve with approximately 100 ha of protected Lower Montane Wet Forest (Sunyer and Köhler, 2010). This reserve is well known as a site for avian research in Nicaragua and has served as the location for several biodiversity studies (e.g. Morales et al., 2008; Sherlock et al., 2011). Nevertheless, its herpetofaunal diversity has been poorly cataloged.

Conservation status and loss of habitat

Oedipina nica remains a critically threatened member of the Nicaraguan herpetofauna, known from an area less than 1,000 km^2 of which only a small portion is habitable. Johnson et al. (2015) assigned the species an Environmental Vulnerability Score of 17, placing it in the middle of the "High Vulnerability" category. The IUCN Red List has yet to formally evaluate *O. nica* (as of 11 August 2016). Using the IUCN's own criteria, Sunyer et al. (2010) evaluated the species as "Endangered" due to its restricted range and loss of habitat. Between 2001 and 2014, nearly 64,000 ha of forest were lost in the department of Jinotega (Global Forest Watch, 2014). Given the intensity with which Nicaragua's natural areas are being cleared and converted to agriculture (Hansen et al., 2013; Global Forest Watch, 2014), the proliferation of privately protected reserves such as Reserva El Jaguar is becoming increasingly important for ensuring the protection of the remaining populations of the country's threatened herpetofauna.

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***Hypopachus variolosus* (Cope, 1866). New range extension in a different vegetation type.** The Sheep Frog, *Hypopachus variolosus*, is a small microhylid characterized by a transverse fold of skin that crosses from one tympanum to the other, and a yellow longitudinal stripe that extends from the tip of the snout to the posterior region of the body above the vent (Dixon and Lemos-Espinal, 2010; Ramírez-Bautista et al., 2014). The distribution of this species is along the Pacific and the Atlantic coasts from southern Texas, in United States, and southern Sonora and adjacent Chihuahua, southward to northern Costa Rica (Frost, 2016). In Mexico *H. variolosus* has been reported in the states of Sonora, Sinaloa, Nayarit, Aguascalientes, Jalisco, Michoacán, Guerrero, Oaxaca, Chiapas, Chihuahua, Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Hidalgo, Veracruz, Puebla, Tabasco, Campeche, Yucatán, and Quintana Roo (Vázquez-Díaz and Quintero-Díaz, 2005; Ramírez-Bautista et al., 2014). This species is known from several vegetation types, including tropical dry forest, dry lowland scrub forest, and subtropical and subhumid forests (Ramírez-Bautista, 1994; Lemos-Espinal and Dixon, 2013), at elevations from sea level to 2,200 m (Wilson and Johnson, 2010). Breeding is known to occur from March to October, in a variety of temporary and permanent aquatic habitats (Lannoo, 2005).

Hypopachus variolosus has been recorded in northeastern Hidalgo, in the municipalities of Huautla and Huehuetla, in tropical dry forest (Ramírez-Bautista et al., 2014). In July of 2010, however, CEM found several individuals of this species (photo voucher UTEP G-2016.21; Fig. 1) in Jacala de Ledezma, Municipio Jacala de Ledezma, Hidalgo (21.017083°, -99.186909°; WGS 84) in the northwestern portion of the state, at 123.09 km (airline distance) W from where the species previously was recorded in Huehuetla (Ramírez-Bautista et al., 2014).

The individuals (a male is shown in Fig. 1) were found at 2200 h artificial temporary pools used for cattle in the Sierra Madre Oriental, located in a remnant patch of *Juniperus* forest (locally known as tascate or enebro forest), at an elevation above 2,000 m. The forest in this area has been disturbed, and grazing areas for cattle and sheep are found nearby. The native vegetation consists of temperate mixed forest dominated by *J. flaccida*, *J. Juniperus deppeana*, and *Cupressus* sp. (all Cupressaceae). The mean annual temperature in this region is 17.8 °C, and the rainy season lasts from June to September. This record presents new distributional and vegetation type information for this species.

Fig. 1. An individual of *Hypopachus variolosus* found near capital of Jacala de Ledezma, Municipio de Jacala de Ledezma, Hidalgo, Mexico. © Claudia E. Moreno

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A new record, distributional range extension, and notes on *Coniophanes lateritius* (Squamata: Colubridae) in Sonora, Mexico

Herpetofaunal distribution in Sonora, Mexico, has been relatively well studied (Enderson et al., 2009a, b, Enderson et al., 2014). Early published surveys of the amphibians and reptiles of Sonora were provided by Van Denburgh (1922), Slevin (1928), Taylor (1936) and Bogert and Oliver (1945). The most recent summaries of the state's herpetofauna are Enderson et al. (2009a), Lemos-Espinal et al. (2015), and Rorabaugh and Lemos-Espinal (2016). A total of ~72 species of snakes have been recorded in Sonora, but no localities for *Coniophanes* have been published (Rorabaugh and Lemos-Espinal, 2016). Ambía Molina (1969) listed *C. lateritus* in a checklist for Sonora, without providing any locality information (Heimes, 2016).

Coniophanes lateritius Cope, 1861, is a poorly known species and is considered rare. No information on the habitat of this species is available, and its conservation status has been assessed as Data Deficient by IUCN (Ponce-Campos, 2007). This species is endemic to Mexico and its known distribution previously was limited to Morelos (Castro-Franco and Bustos-Zagal, 1994), Colima (Reyes-Velasco et al., 2009), Michoacán (Wellman, 1959), Jalisco (García and Ceballos, 1994), Nayarit (Loc-Barragán et al., 2016), western Durango (EncicloVida, 2016), and southern Sinaloa (Ponce-Campos, 2007). The previous northernmost museum documented records for this species are in Sinaloa (8 km N, and 8 km NE of Villa Unión; and 8 km SW of San Ignacio; Ponce-Campos and Smith, 2001) in thornscrub (Webb, 1984) and in tropical deciduous forest. This species has been recorded at elevations from 16 and 1,589 m, and thus likely occurs in oak woodland and pine-oak forest, although the higher elevation records are from central Jalisco might be from low-lying habitat that includes grassy hillsides (Tanner and Robinson, 1960) instead of temperate woodland.

Our new photographic record of *C. lateritius* was collected on 6 August 2016 at 2153 h by Rafael A. Lara-Resendiz, and added to the national collection of amphibians and reptiles of the Universidad Nacional Autónoma de México (UNAM; IBH-RF 318). The individual was found in Rancho San Pablo, Municipio de Álamos, Sonora (27º03'24"N, 108º42'44"W; WGS 84; elev. 538 m), a site located in the Reserva Monte Mojino, which lies within the Reserva de la Biosfera Sierra de Álamos-Río Cuchujaqui. The coloration was bright red dorsally, with darker hues middorsally and fading to reddish brown posteriorly; the belly was cream; the head was black with minute white speckling, with a white labial stripe. The black on the head extended onto the neck, which was bordered by a thin, faint, white neck ring (Fig. 1). We presume the specimen to be an adult (total length 270 mm), of undetermined sex.

Liner and Casas-Andreu (2008) indicated the English standard name for *C. lateritus* as "Stripeless Snake," and in Spanish the name "Culebra Lisa," which translates to "Smooth Snake." We suggest a new vernacular names for this species, inasmuch as "stripeless" communicates so little about the animal: in English, we propose the "Brick-red Snake," referring to the lateritous coloration, and in Spanish suggest "Culebra de Color Ladrillo."

The snake was found active along a two-track dirt road, on level ground in short forbs; therefore, we can assume terrestrial habits. The habitat was characterized by tropical deciduous forest, where the main representative woody perennial plants are *Bursera* spp., *Chloroleucon mangese*, *Heamatoxylum brasiletto*, *Ipomea arborescens*, and *Tabebuia impetiginosa*, and among many other tree species; important columnar cacti included *Pachycereus pecten-aboriginum*, *Pilosocereus alensis*, *Stenocereus montanus*, and *S. thurberi*; larger shrubs included *Croton lindquistii*, *Jatropha malacophylla*, and *Montanoa rosei*; and the sub-shrub layer was dominated by *Ambrosia cordifolia* and *Senna pallida.* The snake, however, was encountered near a small non-perennial stream, in a livestock pasture in the process of being reclaimed by tropical deciduous forest. The diet of this species is unknown, but amphibians, especially anurans, are reported to predominate in diets of the other species of *Coniophanes* (Álvarez del Toro, 1960; McCoy, 1960; Seib, 1985; Werler and Dixon, 2000; Savage, 2002; Ernst and Ernst 2003; Köhler, 2003; Lemos-Espinal and Dixon, 2013), although they also can be euryphagic (Seib, 1985, and references therein). Thus, it might be significant that the local anuran fauna (within 0.25 km) of the habitat of this record contained most of the species we saw within our 2-km survey area (*Gastrophryne mazatlanensis*, *Incilius mazatlanensis*, *Leptodactylus melanonotus*, *Lithobates magnaocularis*, *Pachymedusa dacnicolor* and *Smilisca baudinii*), with the first species listed notably abundant as adults and larvae. The herpetofauna we observed within 2 km of the record was strongly tropical in affiliation, lacking any species primarily associated with the Sonoran Desert region. The average annual temperature in the region is 21–22ºC with 10ºC and 41ºC as general minimum and maximum, and the average annual precipitation is highly variable with a mean of 650 mm and ranges from 190 to 1,120 mm, as recorded by nearby meteorological stations (López-Toledo et al., 2011), although it might be slightly greater at the elevation of this locality.

In conclusion, this photo voucher represents the first record of *C. lateritius* from Sonora and a northern range extension of about 423 airline km from the nearest museum-based record (8 km SW of San Ignacio, Sinaloa; Ponce-Campos and Smith 2001) and ca. 328 km airline km NW of the online record from western Durango provided by EncicloVida (2016).

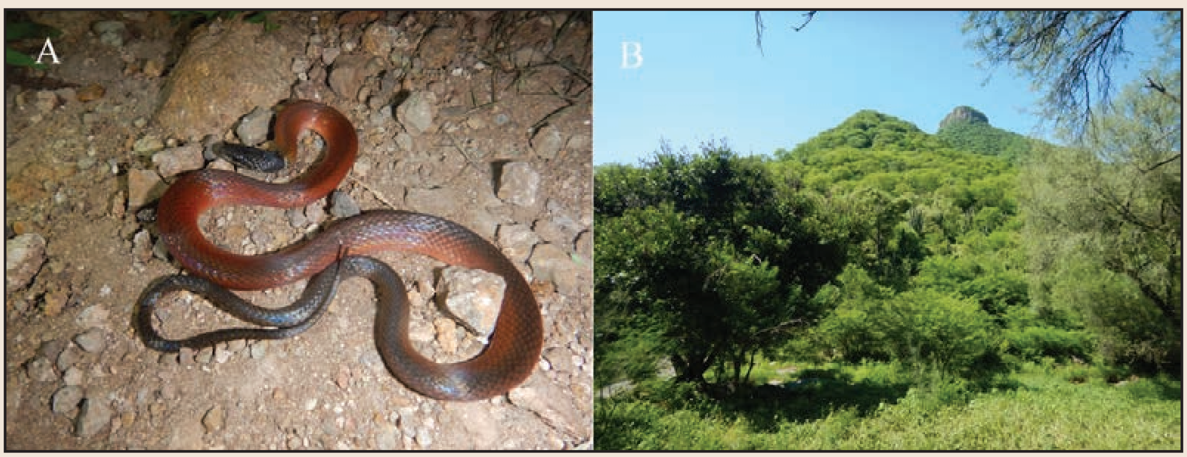

Fig 1. (A) An individual of *Coniophanes lateritius* (photo voucher IBH-RF 318) from Rancho San Pablo, Reserva Monte Mojino, Álamos, Sonora, Mexico; and (B) the habitat of *C. lateritius*, characterized by tropical deciduous forest.

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Presence of *Agkistrodon taylori* in disturbed areas (cultivated fields) in the municipality of San Felipe Orizatlán, Hidalgo, Mexico

Taylor's Cantil, *Agkistrodon taylori*, is a venomous pitviper with a distribution in northeastern Mexico, in the states of Nuevo León, Tamaulipas, San Luis Potosí, Hidalgo, and Veracruz (Campbell and Lamar, 2004). This species is known to inhabit mesquite grassland, thorn forest, and tropical deciduous forest, transitional areas between xeric scrub and tropical deciduous forest, and some oak forests, at elevations from 160 to 914 m (Burchfield, 1982; Gloyd and Conant, 1990; Tovar-Tovar and Mendoza-Quijano, 2001; Campbell and Lamar, 2004; Canseco-Márquez et al., 2004; Lazcano-Villarreal et al., 2010; Fernández-Badillo et al., 2011). Campbell and Lamar (2004) noted that most individuals have been found far from water, on or near rocky hillsides with abundant limestone outcroppings.

Only two specimens of *A. taylori* have been reported from the state of Hidalgo. Tovar-Tovar and Mendoza-Quijano (2001) reported a specimen (ITAH 535) from Coyolapa, Municipio de Atlapexco, a male with a total length (TL) of 521 mm. Subsequently, Bryson and Mendoza-Quijano (2007) reported a specimen (ITAH 579) from El Moreno, Municipio de Huejutla de Reyes, a juvenile female measuring 235 mm TL. Both specimens were found in secondary vegetation in areas containing tropical deciduous forest (Bryson and Mendoza-Quijano, 2007). Additionally, we are aware of a non-published record of an individual found in a suburb outside of Huejutla, Municipio de Huejutla de Reyes (R. Mendoza-Paz, pers. comm.).

On 2 February 2016, one of us (GHH) found a dead *A. taylori* (Fig. 1) near La Cruz, Municipio de San Felipe Orizatlán (21.2031639°N; -98.5597778°W; WGS 84), at an elevation of 196 m. The snake was found in an advanced state of decomposition, as according to local workers it was killed on 30 January 2016 at 1330 h while clearing a cornfield from the previous year. The surrounding area consisted of cultivated fields, pastures, and patches of secondary vegetation (Fig. 2A, B). We deposited a photo voucher of this snake (CH-CIB 075) in the herpetological collection of the Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo.

The highly disturbed area where the voucher was found differs from the typical habitats where this species has been recorded. The occurrence of the snake in this area might be due to the high degree of habitat destruction that has transpired in the municipality of San Felipe Orizatlán, where 73% of the of the land is devoted to agriculture (INEGI, 2009), and thereby individuals of *A. taylori* are forced to inhabit disturbed areas because of the lack of natural cover. Conversely, in other parts of Hidalgo cultivated areas have been reported as responsible for creating various microhabitats that harbor a large number of rodents, and therefore attract snakes (Fernández-Badillo and Goyenechea, 2010). The local people mentioned that although this species (called "metlapil") rarely is seen, they have observed other individuals within patches of vegetation, as well as in cultivated plots and pastures.

Herein we also present an ecological niche model for *A. taylori* to determine its potential distribution. Accordingly, we used 20 records with precise locality data for this species, which we obtained from the literature and from online databases and collections; we did not include the new locality. Subsequently, we extracted 19 climate variables for each locality (Hijmans et al*.,* 2005; www.worldclim.org) and conducted a factorial analysis using STATISTICA v.10 to identify the variables that better explain environmental variation in the species' distributional range. Highly correlated variables ($r > 0.75$) were discarded to avoid multicolinearity. We used five variables to model the ecological niche of *A. taylori* along a defined accessible geographical area, based on the known distribution of the species and the terrestrial ecoregions of Mexico (INEGI-CONABIO-INE. 2008). Finally, we elaborated the model by using the algorithm MaxEnt; training was performed using 16 presence records (80%), thereby leaving four records (20%) to test the model accuracy.

Fig 1. An *Agkistrodon taylori* (CH-CIB 075) found dead near la Cruz, San Felipe Orizatlán Hidalgo, Mexico.
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We transformed the resulting model into a binary map (presence/absence), with a cutoff threshold (training and evaluation) based on the equal test for sensitivity and specificity (cutoff value 0.283). The resulting model (Fig. 3) shows that the new record is located southwest of the potential distribution for the species, which includes the states of Hidalgo, Nuevo León, San Luis Potosí, Tamaulipas, and Veracruz, as previously reported (Campbell and Lamar, 2004). Our model also predicts the presence of this species in small areas in northwestern Querétaro and northern Puebla, as well as an isolated population in central Veracrúz where future fieldwork is necessary to corroborate its presence.

The predicted area of occurrence in central Veracruz coincides with the taxon described from a single specimen as *Agkistrodon bilineatus lemosespinali*, which tentatively was assigned to *A. b. bilineatus* by Bryson and Mendoza-Quijano (2007) but whose taxonomic status is considered as unresolved (Porras et al., 2013). A possible explanation is that ecological niche modeling also can predict the distribution of sister species (Raxworthy et al., 2003).

Based on this information, more detailed studies are necessary on the distribution and natural history of *A. taylori* in order to protect its populations, a complicated matter because the species is venomous and recognized as a threat to local people—the reason why individuals are killed when encountered. Among the conservation recommendations provided by Porras et al. (2013) were the undertaking of population assessments for all cantils at or near localities where they have been recorded, the development of management plans to determine if the species are found within established protected areas, the implementation of long-term population monitoring, and the establishment of zoo conservation and outreach programs, including the provision of captive assurance colonies that might provide future options for the recovery of wild populations.

Fig. 2. (A) Photograph of the area where the dead *Agkistrodon taylori* was found, near la Cruz, San Felipe Orizatlán, Hidalgo, Mexico, and (B) the surrounding habitat. © Gonzalo Hernández-Hernández

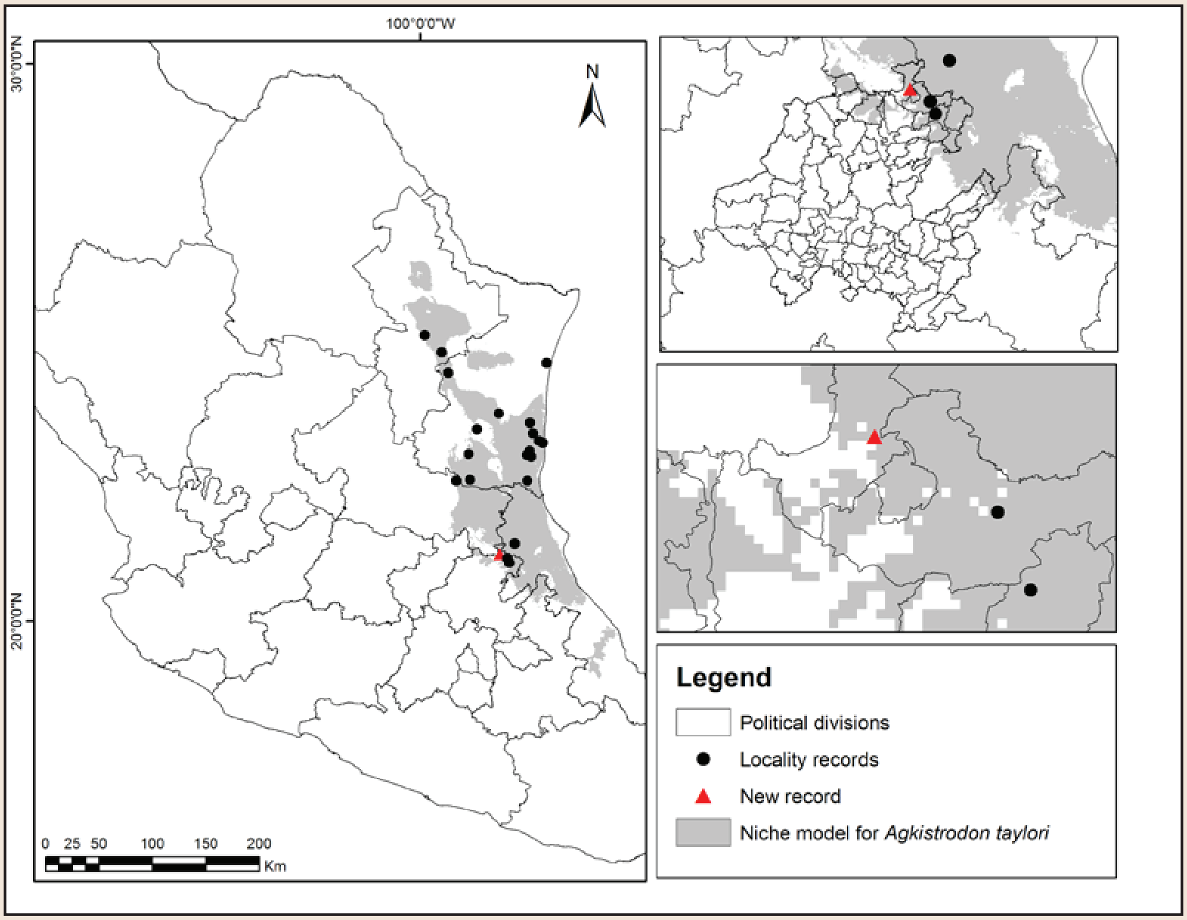

Fig. 3. Niche model map for *Agkistrodon taylori*.

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Reptiles in a cultural deposit in western Mexico

Cultural depositional processes constitute the dominant factor in forming the archaeological record, and there are four primary ways in which artifacts are part of this process: discard, loss, caching, and ritual interment (see Thomas and Kelly, 2006). One of us (JBM) recently discovered an archaeological site called Arroyo Piedras Azules, located in the in the Municipio de Cabo Corrientes, on the eastern edge of the village of Maito, and 1.5 km from the Pacific coast of Jalisco in western Mexico (20°15'42.7.33"N, 105°34'30.20"W; datum WGS 84; elev. 29 m). The site is associated with the Aztatlán archaeological culture of the Early Postclassic period (Mountjoy et al., 2016). The prehispanic habitation area of the site extends over ca. 4 ha, and the land has not been cultivated or subjected to any major human activities. The area of Arroyo Piedras Azules was dated as 1215 ± 30 A.D. (Beta Laboratories, Florida, two samples of charcoal Beta 419370 and 419371). During a recent excavation, we found decorated pottery, figurines, metal objects, shells, and bones. Here, we report finding the bone fragments of three reptile species: Green Iguana *Iguana iguana* (Linnaeus, 1758), Olive Ridley Sea Turtle *Lepidochelys olivacea* (Eschscholtz, 1829), and Mexican

Spotted Wood Turtle *Rhinoclemmys rubida* (Cope, 1869). The presence of these bones within the Arroyo Piedras Azules cultural deposit suggests the use of these species as food by prehispanic people.

On 11 June 2015, at a depth of 130–150 cm within a 1m^2 test pit (number 2; Fig. 1A), we found the left dentary bone of an *I. iguana* (Fig. 1B, C) and the carapacial bone (coastal) of an *R. rubida* (Fig. 1D, E). At a depth of 80–120 cm in another test pit (named "general"), we found the plastral and carapacial bones of an *L. olivacea* (Fig. 1F). *Iguana iguana* is a wide-ranging species, with a distribution extending from Sinaloa and Veracruz, Mexico, to Ecuador on the Pacific versant, and northern Bolivia, Paraguay, and south-central Brazil on the Atlantic versant, as well as in some Caribbean islands (Savage, 2002). The range of *R. rubida* is in the Mexican states of Jalisco, Colima, Michoacán, Oaxaca, and Chiapas, and possibly extends into Guatemala (van Dijk et al. 2014). The distribution of *L. olivacea* is circumtropical, with nesting occurring throughout tropical waters except for the Gulf of Mexico (Abreu-Grobois and Plotkin, 2008). We deposited all of the bone fragments in the Estación de Biología Chamela collection (EBCH), Instituto de Biología, Universidad Nacional Autónoma de México. Although protected, *I. iguana* and *L. olivacea* still are being used as food in the region (Alvarado-Díaz and Suazo-Ortuño, 1996; Ceballos and García, 2010). Although *R. rubida* generally is not sought for human consumption, it still is traded illegally in the pet trade (Ceballos and García, 2010; Legler and Vogt, 2013).

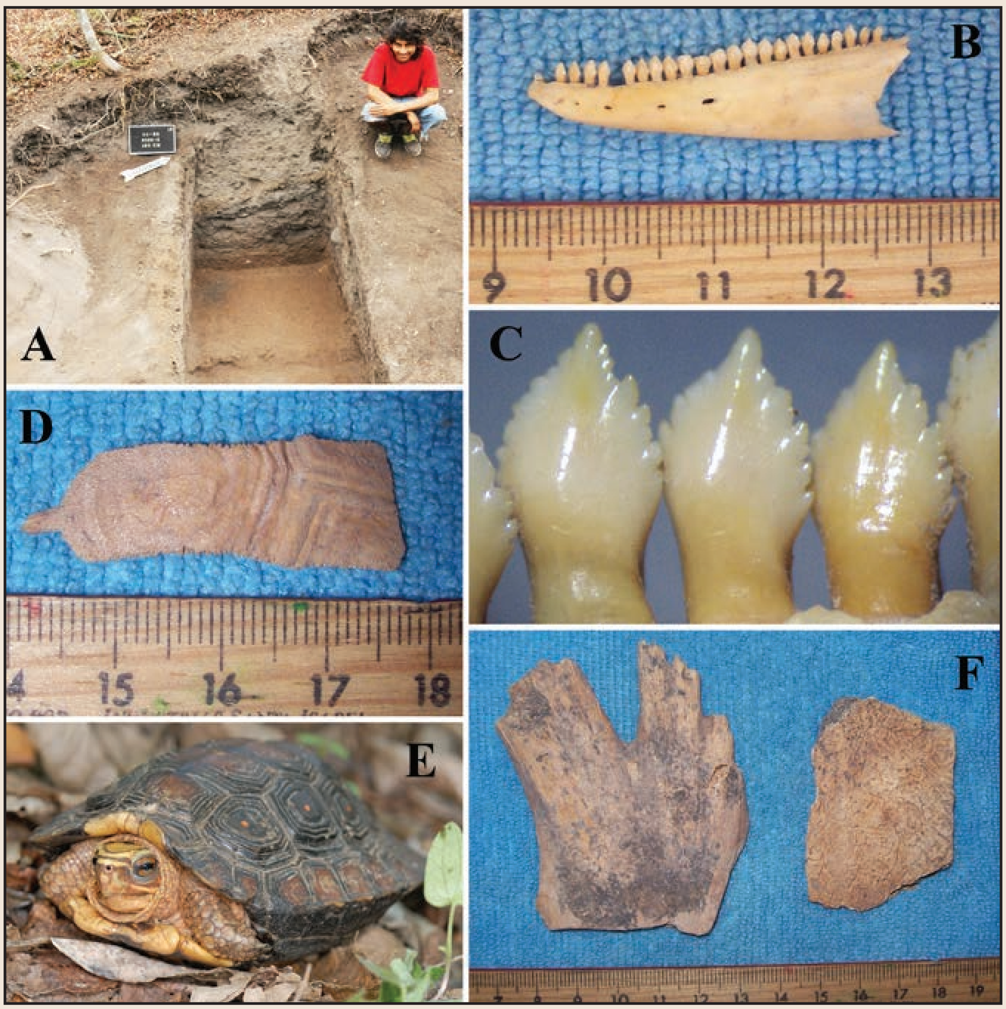

Fig. 1. (A) Test pit #2 at Arroyo Piedras Azules, Jalisco; (B) *Iguana iguana* left dentary bone; (C) *Iguana iguana* detail of teeth; (D) *Rhinoclemmys rubida* carapacial bone; (E) Live individual of *R. rubida* from Chamela, Jalisco; and (F) *Lepidochelys olivacea* plastral (left) and carapacial (rigth) bones. Scale in centimeters.

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ERRATA

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Appendix 1. Material Examined. Pages 372–373.

The three entries below are duplicated and should be disregarded:

Under *Epictia ater* for El Salvador (p. 372), FMNH 154796 is listed incorrectly and should be deleted. FMNH 154796 is *E. phenops* (p. 249).

Under *Epictia bakewelli* for Mexico: Colima (p. 372), FMNH 99676–79 are listed incorrectly and should be deleted. FMNH 99676–79 are *E. schneideri* paratypes (p. 280).

Under *Epictia phenops* for Mexico: no specific locality (p. 373), FMNH 99676–79 are listed incorrectly and should be deleted. FMNH 99676–79 are *E. schneideri* paratypes (p. 280).