Other Contributions

NATURE NOTES

Amphibia: Anura

Craugastor hobartsmithi **(Taylor, 1936). Reproductive behavior.** *Craugastor hobartsmithi* is a small frog (snout–vent length to 32 mm) that can be identifid by its sometimes slightly defined paratoid glands, a brown dorsum, dark spots on the body and dark bars on the lips, a triangular patch between the eyes, and a yellowish-white venter (Alvarado-Díaz and Huacuz-Elias, 1996). This species is endemic to Mexico, and is distributed along the southwestern portion of the Central Plateau in Nayarit, Jalisco, Michoacán, and the state of Mexico, as well as along the coasts of Nayarit and Jalisco. This nocturnal, terrestrial, and insectivorous species is found in tropical deciduous forest. Reproduction is by means of eggs deposited on the ground, and there is no larval stage (Alvarado-Díaz and Huacuz-Elias, 1996).

On 20 July 2011 at 2218 h, while conducting a herpetofaunal survey we found a pair of *C. hobartsmithi* in amplexus (Fig. 1) in tropical deciduous forest in the town of Puerta de Hierro, Municipio de Coahuayana, Michoacán, Mexico. This event took place on the forest floor on a layer of leaf litter (18°40'3.10"N, 103°38'24.9"W; WGS 84); elev. 533 m; air temperature 29°C; relative humidity 97%. Rain had fallen moments before the sighting, so the ground was wet. After taking photographs, we left the frogs unmolested. To our best knowledge, these are the first photographs showing amplexus in *C. hobartsmithi*.

Fig. 1. A pair of *Craugastor hobartsmithi* found in amplexus at Puerta de Hierro, Municipio de Coahuayana, Michoacán, Mexico.
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Literature Cited

Alvarado-Díaz, J., and D. C. Huacuz-Elias. 1996. Guía Ilustrada de los Anfibios y Reptiles más Comunes de la Reserva Colola-Maruata en la Costa de Michoacán, México. Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, Mexico.

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***Incilius valliceps* and *Leptodactylus fragilis*. Sharing refuge with a scorpion.** *Incilius valliceps* is a medium-sized (snout–vent length 60–100 mm), terrestrial, and insectivorous *bufonid* characterized by the presence of cranial crests that form a cavity on the dorsal surface of the head, parotoid glands approximately the size of the eyes, the dorsal region is covered with warts, and a highly variable dorsal coloration (Campbell, 1998). This toad occurs from from central Veracruz, Mexico, along the Atlantic versant to extreme northeastern Costa Rica, and on the Pacific versant from the Isthmus of Tehuantepec, Mexico, to southeastern Honduras (Leenders, 2016), including throughout the Yucatan Peninsula (Campbell, 1998; Lee, 2000). *Leptodactylus fragilis* is a small (snout–vent length 33–40 mm), aquatic and terrestrial, and insectivorous leptodactylid characterized by the presence of slender and slightly expanded toes and fingers, a dorsal coloration generally with dark brown, tan, or gray spots or blotches against a paler background, and a conspicuous white stripe on the upper lip of most individuals. This frog occurs from extreme southern Texas, United States, through Mexico and Central America to northern Colombia and Venezuela (Leenders, 2016), including throughout the Yucatan Peninsula (Campbell, 1998; Lee, 2000).

During a diurnal survey on 22 September 2010, I observed an individual of *I. valliceps* and one of *L. fragilis* sheltering under a rock with a scorpion (*Centruroides ochraceus)*, a species endemic to southeastern Mexico (Pinkus-Rendón et al., 1999; Lourenço and Sissom, 2000; Figs. 1, 2) The event occurred at Kanasín, Estado de Yucatán, Mexico (20°54'56.03"N, 89°33'9.64"W; datum WGS 84; elev. 3 m) in a patch of secondary vegetation in a quarry undergoing ecological restoration. This note represents the first record of these anuran species sharing a refuge with this scorpion.

Fig. 1. An *Incilius valliceps* found sharing a refuge (under a rock) with a scorpion, *Centruroides ochraceus*.
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Fig. 2. A *Leptodactylus fragilis* sharing the same rock with the scorpion, *Centruroides ochraceus*.
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Literature Cited

Campbell, J. A. 1998. Amphibians and Reptiles of Northern Guatemala, the Yucatán, and Belize. University of Oklahoma Press, Norman, Oklahoma, United States.

Lee, J. C. 2000. A Field Guide to the Amphibians and Reptiles of the Maya World: The Lowlands of Mexico, Northern Guatemala, and Belize. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Leenders, Twan. 2016. Amphibians of Costa Rica: A Field Guide. A Zona Tropical Publication, Cornell University Press, Ithaca, New York, United States.

Lourenço, W. R., and W. D. Sissom. 2000. Scorpiones. Pp. 115–135 *In* J. Llorente-Bousquets, E. Gonzales-Soriano, and N. Papavero (Eds.), Biodiversidad, Taxonomía y Biogeografía de Artrópodos de México: Hacia una Síntesis de su Conocimiento, Volume 2. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Universidad Nacional Autónoma de México, and Bayer, México, D.F., Mexico.

Pinkus-Rendón, M. A., P. Manrique-Saide, and H. Delfín-González. 1999. Alacranes sinantrópicos de Mérida, Yucatán, México. Revista Biomédica, 10: 153–158.

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***Rana juliani*. Vocalization.** Frogs typically produce calls with the aid of a vocal sac (Hayes and Krempels, 1986; Vitt and Caldwell, 2014). Vocal sacs enable a frog to call efficiently (Bucher et al., 1982) and increase the conspicuousness of the call (Gridi-Papp, 2008), although they do not serve as cavity resonators as is popularly believed (Bucher et al., 1982; Rand and Dudley, 1993; Gridi-Papp, 2008). In addition to aiding in vocalization, vocal sacs can serve multiple communication functions as visual cues (Narins et al., 2003), vibrational cues (Lewis et al., 2001), and chemical signals (Starnberger et al., 2013; Starnberger et al., 2014). In frog species where vocalization does not play a large role in communication, other methods of signaling are used (e.g., foot signaling; Lindquist and Hetherington, 1996). Nevertheless, there are examples of frogs without vocal sacs that vocalize, albeit usually at a reduced volume (Hayes and Krempels, 1986).

On 5 March 2016, along Dry Creek (17°03'06.6"N, 88°34'07.9"W; UTM; elev. 184 m) near Hummingbird Highway in Middlesex, Belize, VK observed an adult *Rana juliani* produce a distress call while being handled (Fig. 1). On 21 June 2016, further upstream on Dry Creek (17°02'16.6"N, 88°33'49.5"W; UTM; elev. 500 m) KLJ observed six additional individuals produce a distress call when handled. *Rana juliani* lacks a vocal sac and vocal slits, and the original description noted that vocalizations are not known (Hillis and de Sá, 1988). To the best of our knowledge, no other reports of *R. juliani* vocalization exist.

A vocal sac and the presence of slits varies slightly in a sister species (*R. vaillanti*) that vocalizes (Hillis and de Sá, 1988; Hillis and Wilcox, 2005). In Hillis and de Sá's (1988) description, 88.7% of the specimens of *R. vaillanti* examined had vocal sacs and slits, yet they did not state whether individuals that lacked vocal sacs and slits vocalized or not. *Rana vaillanti* produces distress calls (Guyer and Donnely (2005), and if vocal sac-less individuals are able to vocalize, the mechanism might be similar in *R. juliani*.

Fig. 1. A *Rana juliani* observed vocalizing at Dry Creek, Middlesex, Belize. A video of the distress call is available at the following address: https://www.youtube.com/watch?v=mNaTFL2rSSM&feature=youtu.be

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Literature Cited

Bucher, T. L., M. J. Ryan, and G. A. Bartholomew. 1982. Oxygen consumption during resting, calling, and nest building in the frog *Physalaemus pustulosus*. Physiological Zoology 55: 10–22.

Gridi-Papp, M. 2008. The structure of vocal sounds produced with the mouth closed or with the mouth open in treefrogs. The Journal of the Acoustical Society of America 123: 2,895–2,902.

Guyer, C., and M. A. Donnelly. 2005. Amphibians and Reptiles of La Selva, Costa Rica, and the Caribbean Slope: A Comprehensive Guide. University of California Press, Berkeley, California, United States.

Hayes, M. P., and D. M. Krempels. 1986. Vocal sac variation among frogs of the genus *Rana* from western North America. Copeia 1986: 927–936.

Hillis, D. M., and R. de Sá. 1988. Phylogeny and taxonomy of the *Rana palmipes* group (Salientia: Ranidae). Herpetological Monographs 2: 1–26.

Hillis, D. M., and T. P. Wilcox. 2005. Phylogeny of the New World true frogs (*Rana*). Molecular Phylogenetics and Evolution 34: 299–314.

Lewis, E. R., P. M. Narins, K. A. Cortopassi, W. M. Yamada, E. H. Poinar, S. W. Moore, and X. Yu. 2001. Do male White-lipped Frogs use seismic signals for intraspecific communication? American Zoologist 41: 1,185–1,199.

Lindquist, E. D., and T. E. Hetherington. 1996. Field studies on visual and acoustic signaling in the "earless" Panamanian Golden Frog, *Atelopus zeteki*. Journal of Herpetology 30: 347–354.

Narins, P. M., W. Hödl, and D. S. Grabul. 2003. Bimodal signal requisite for agonistic behavior in a dart-poison frog, *Epipedobates femoralis*. Proceedings of the National Academy of Sciences 100: 577–580.

Rand, A. S., and R. Dudley. 1993. Frogs in helium: the anuran vocal sac is not a cavity resonator. Physiological Zoology 66: 793–806.

Starnberger, I., D. Poth, P. S. Peram, S. Schulz, M. Vences, J. Knudsen, et al. 2013. Take time to smell the frogs: vocal sac glands of reed frogs (Anura: Hyperoliidae) contain species-specific chemical cocktails. Biological Journal of the Linnean Society 110: 828–838.

Starnberger, I., D. Preininger, and W. Hödl. 2014. The anuran vocal sac: a tool for multimodal signalling. Animal Behaviour 97: 281–288.

Vitt, L. J., and J. P. Caldwell. 2014. Herpetology: An Introductory Biology of Amphibians and Reptiles. 4th ed. Academic Press, Elsevier, San Diego, California, United States.

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***Smilisca sordida* (Peters, 1863). Diet.** The Drab Treefrog, *Smilica sordida*, is a species with a distribution extending from Honduras to western Panama, as well as in the Magdalena Valley of Colombia, at elevations from sea level 1,525 m (Savage, 2002; Köhler, 2011). During the breeding season, males of this species prefer to perch at the level of the water or a few centimeters higher, where they vocalize to attract females or to reclaim their territories, and females normally are found perched at 1m or more in height (MAGC, pers. observ.). During amplexus, females construct basins in which to deposit their eggs (Malone, 2004). Males of *S. sordida* are smaller (maximum snout–vent length [SVL] 45 mm) than females (maximum SVL 65 mm) (Duellman and Trueb, 1966).

Predation of anurans on other vertebrates mainly has been recorded in the larger species, and is relatively uncommon in smaller species or individuals (Franca et al., 2004). The diet of Neotropical hylids primarily is based on terrestrial arthropods of various sizes and is directly related to the size of the anuran (Malone, 2006), and predatory events on fishes have not been recorded in most of these hylids (de Paula Lima et al., 2010).

On 10 January 2017, at Quebrada Lajas, San Antonio de Escazú, Provincia de San José, Costa Rica, at an elevation of ca. 1,200 m, while conducting a stomach content analysis by stomach eversion of living frogs (Giaretta et al., 1998), in both males and females of *S. sordida*, we located a male (Fig. 1) on a small sand bank next to a stream. Upon extracting the stomach contents from the individual, some pale-colored, fish-smelling contents emerged, which previously we had not recovered from any other individuals of *S. sordida*. After examining the contents in more detail, we found the remains of bony spines, scales, and skin, in addition to a skull and some soft tissues (Fig. 2A). On 23 January 2017, we continued the sampling and in another male *S. sordida* found similar remains, but this time consisting of bone parts and scales, which we identified as two individuals of the same species of poeciliid fish (Fig. 2B). Further, we identified the stomach contents of both samples as those of juveniles of *Brachyrhaphis* sp., which we determined to be juveniles based on size of the individuals (Bussing, 1998). Interestingly, directly adjacent to where the male frogs were collected the water was less than 5 cm deep, and thus the movement of the fish perhaps attracted the frogs. This species of fish apparently was the only one found in the stream.

Fig. 1. (A) A male *Smilisca sordida* found in a stream at Quebrada Lajas, San Antonio de Escazú, Provincia de San José, Costa Rica. © Marlon A. Guerrero Castro

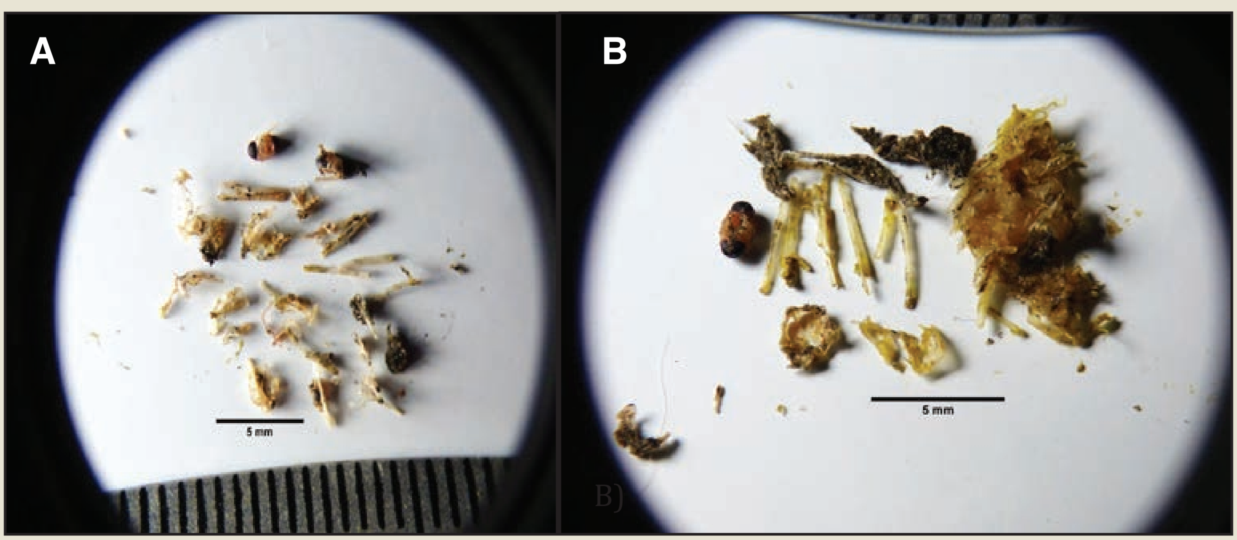

Fig. 2. Stomach contents showing the first records of predation on a poeciliid fish by the treefrog *Smilisca sordida*. (A) The remains of bony spines, scales, skin, a skull, and soft tissues; and (B) the remains of two fishes, including the upper part of their skulls and some bones and skin, with the soft tissues apparently having been digested. © Marlon A. Guerrero Castro

Literature Cited

Bussing, W. A. 1998. Peces de las Aguas Continentales de Costa Rica / Freshwater Fishes of Costa Rica. 2nd ed. Editorial Universidad de Costa Rica, San José, Costa Rica.

de Paula, J. E., D. Rödder, and M. Solé. 2010. Diet of two sympatric *Phyllomedusa* (Anura: Hylidae) species from a cacao plantation in southern Bahia, Brazil. North-Western Journal of Zoology 6: 13–24.

Duellman, W. E., and L. Trueb. 1966. Neotropical hylid frogs, genus *Smilisca*. University of Kansas Publications, Museum of Natural History 17: 281–375.

Franca , L., K. Facure, and A. Giaretta. 2004. *Leucopternis* and spatial niches of two large-sized species of *Leptodactylus* (Anura) in southeastern Brazil. Studies on Neotropical Fauna and Environment 39: 243–248.

Giaretta, A. A., Araújo, M. S., de Medeiros, H. F., and K. G. Facure. 1998. Food habits and ontogenetic diet shifts of the Litter Dwelling Frog *Proceratophrys boiei* (Wied). Revista Brasileira de Zoología 15: 385–388.

Köhler, G. 2011. Amphibians of Central America. Herpeton, Offenbach, Germany.

Malone, J. H. 2004. Reproduction in three species of *Smilisca* from Costa Rica. Journal of Herpetology 38: 27–35.

Malone, J. H. 2006. Ecology of the basin construction reproductive mode in *Smilisca sordida* (Anura: Hylidae). Journal of Herpetology 40: 230–239.

Savage, J. M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas. The University of Chicago Press, Chicago, Illinois, Unioted States.

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Reptilia: Crocodylia

Size-related habitat partitioning of yearling, juvenile, and subadult *Caiman crocodilus* in the Refugio Bartola region of Nicaragua

The socioeconomic pressures associated with increasing tourism and commerce in Nicaragua are rapidly transforming the aquatic ecosystems generally inhabited by *Caiman crocodilus* (Cropper and Griffiths, 1994). This species inhabits lowland wetland and riverine habitats throughout its range, which extends from the Isthmus of Tehuantepec, Mexico, to southern Ecuador, on the Pacific versant, and on the Atlantic versant from eastern Honduras to northern Colombia, Venezuela, and the Guianas and throughout the Orinoco- and Amazon basins to eastern Peru and central Brazil (Savage, 2002). Data on the behavior and ecology of *C. crocodilus* in Nicaragua, such as habitat niche partitioning, is lacking, and here we provide baseline information on niche partitioning in this species in the vicinity of Refugio Bartola, Nicaragua.

From 3 to 18 February 2013, we conducted capture surveys on a motorboat (8 m long, 40 hp) 30 min after sunset along a 2 km stretch of the Río San Juan and 1 km of the Río Bartola at the intersection with Refugio Bartola (10°58'19.80"N, 84°20'23.39"W) as part of the University of California, Los Angeles Field Biology Quarter. We pre-determined our field survey distance based on information provided by local people on the high density of *C. crocodilus* in this area of Refugio Bartola. We classified the *C. crocodilus* as yearlings (TL = < 50 cm), small juveniles (TL = 51–76 cm) and large juveniles/subadults (TL = > 76 cm). We also recorded the type of habitat in which they resided, and organized habitat types into the following five categories: (1) near bank vegetation (individual near slope of vegetated bank), (2) swamp/marsh (individual protruding from the water near aquatic vegetation), (3) near bank (individual near slope of bank, without vegetation), (4) on bank (individual on bank, with or without vegetation), and (5) open river (individual in middle 50% of river).

We captured 49 *C. crocodilus* during our field survey (yearlings: n = 30; small juveniles: n = 9; and large juveniles/subadults: n = 10). Most of the yearlings (47%) preferred habitats near banks with vegetation, whereas a majority of the large juveniles and subadults preferred to be near banks without vegetation (40%). Small juveniles did not appear to prefer banks, with or without vegetation (Table 1). A further examination of class percentage in each of the habitat types suggests that yearlings prefer areas with dense vegetation (70%), small juveniles inhabit areas with dense vegetation and near banks about equally, and 80% of the individuals sampled in the open river were larger animals.

Our goal here is to provide baseline information on *C. crocodilus* for future research in Refugio Bartola. In general, we found that yearlings preferred habitats in which vegetative cover is easily accessible, such as near well-vegetated banks or in swampy marsh habitats, whereas larger juveniles and subadults primarily were observed near banks that lacked vegetation or in open water. Small juveniles did not show a preference for a particular habitat, as they inhabit areas with a high density of foliage, as well as those that lack vegetation. We also observed repeated site fidelity by individual *C. crocodilus*, a common behavior shown by this species throughout its range (Ouboter and Nanhoe, 1988; Gorzula and Seijas, 1989). Overall, our results likely reflect an ontogenetic dietary preference of prey, territoriality, and predator and conspecific avoidance (Gorzula, 1978; Thorbjarnarson, 1993a, b; Silveira and Magnusson, 1999; Riley and Huchzermeyer, 1999). Given the ontogenetic shift in habitat preference during the earlier life history states that likely contribute to the survival of young individuals, the preservation of various habitats is warranted for any conservation plan involving *C. crocodilus* in the vicinity of Refugio Bartola to be effective.

Table 1. Percentage of habitat preference by size class of *Caiman crocodilus* around Refugio Bartola, Nicaragua.

	Near Bank Vegetation	Swamp/Marsh	Near Bank	On Bank	Open River
Yearlings	47% (n = 14)	23% (n = 7)	20% (n = 6)	7% (n = 2)	3% (n = 1)
Small Juveniles	4% (n = 3)	1% (n = 1)	44% (n = 4)	11% (n = 1)	0% (n = 0)
Large Juveniles/ Subadults	10% (n = 1)	10% (n = 1)	40% (n = 4)	10% (n = 1)	30% (n = 3)

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Literature Cited

Cropper, M., and C. Griffiths. 1994. The Interaction of population growth and environmental quality. The American Economic Review 84: 250–254.

Gorzula, S. 1978. An ecological study of *Caiman crocodilus crocodilus* inhabiting savanna lagoons in the Venezuelan Guayana. Oecologia 35: 21–34.

Gorzula, S., and A. E. Seijas. 1989. The Common Caiman. Pp. 44–61 *In* P. Hall and R. Bryant (Eds.), Crocodiles: their Ecology, Management, and Conservation. A Special Publication of the Crocodile Specialist Group of the Species Survival Commission of the International Union for Conservation of Nature and Natural Resources, Gland, Switzerland.

Ouboter, P. E., and L. M. Nanhoe. 1988. Habitat selection and migration of *Caiman crocodilus crocodilus* in a swamp and swamp-forest habitat in northern Suriname. Journal of Herpetology 22: 283–294.

Riley, J., and F. W. Huchzermeyer. 1999. African Dwarf Crocodiles in the Likouala Swamp forests of the Congo Basin: habitat, density, and nesting. Copeia 2: 313–320.

Savage, J. M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas. The University of Chicago Press, Chicago, Illinois, United States.

Silveira, R. D., and W. E. Magnusson. 1999. Diets of Spectacled and Black Caiman in the Anavilhanas Archipelago, Central Amazonia, Brazil. Journal of Herpetology 33: 181–192.

Thorbjarnarson, J. B. 1993a. Diet of the Spectacled Caiman (*Caiman crocodilus*) in the central Venezuelan Llanos. Herpetologica 49: 108–117.

Thorbjarnarson, J. B. 1993b. Fishing behavior of Spectacled Caiman in the Venezuelan Llanos. Copeia 1993: 1,166–1,171.

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Reptilia: Squamata (lizards)

***Hemidactylus frenatus*. Predation by a Turquoise-browed Motmot (*Eumomota superciliosa*; Momotidae).** The Common House Gecko, *Hemidactylus frenatus*, is a small, nocturnal species native to Southeast Asia but introduced worldwide in tropical and subtropical regions (Csurhes and Markula, 2016), and likely was introduced into Costa Rica after 1990 (Savage, 2002). This species adapts remarkably well to human settlements and highly human-modified habitats (Jiménez et al., 2015). In Costa Rica, natural predators of this gecko include snakes, birds, scorpions, and spiders (Barquero and Hilje, 2005; Abarca and Knapp, 2009; Domínguez-De la Riva and Carbajal-Márquez, 2016). The Turquoise-browed Motmot (*Eumomota superciliosa*) is an abundant species distributed from southern Mexico to northwestern Costa Rica (Garrigues, 2007). The diet of *E. superciliosa* is broad and includes a variety of insects, such as caterpillars, butterflies, and beetles, in addition to worms, spiders, and lizards (Skutch, 1947; Stiles and Skutch, 2007).

On 9 July 2016 at 1135 h, we observed an individual of *E. superciliosa* feeding on an adult *H. frenatus* at Playa La Penca, Distrito de Sardinal, Cantón de Carrillo, Provincia de Guanacaste, Costa Rica (10°34'18"N, 84°41'54"W; WGS 84); elev. 40 m. The bird was perched on an exposed branch of a leguminous tree holding the gecko in its beak (Fig. 1). The bird continued holding the gecko for nearly 25 min, then flew off with its prey and was not observed swallowing it. *Eumomota superciliosa* often remains perched until locating a prey item, and after catching the prey will beat it against a branch before consuming it; perhaps this is the reason why the *H. frenatus* was missing its tail (Fig. 1). Although *E. superciliosa* sometimes bites on the head of the lizards to swallow them more easily, in this case the head of the gecko looked complete, so perhaps the bird recently had captured the gecko.

Hemidactylus frenatus is an invasive species, and thus it is important to know its predators because they might help prevent its dispersal. In this regard, the House Wren (*Trogloytes aedon*) and the Great-tailed Grackle (*Quiscalus mexicanus*) have been reported to prey on this species (Barquero and Hilje, 2005; Rojas-Gonzalez and Wakida-Kusunoki, 2012). These birds, however, are diurnal and geckos are primarily nocturnal. Nonetheless, *E. superciliosa* has been reported to feed at night near lights where insects are attracted (Thurber and Komar, 2002). Because *H. frenatus* also feeds on insects attracted by nocturnal lights, *E. superciliosa* might represent a potential predator of *H. frenatus* in Costa Rica. This report is the first to document predation of *H. frenatus* by *E. superciliosa*.

Fig. 1. A Turquoise-browed Motmot (*E. superciliosa*) holding a Common House Gecko (*Hemidactylus frenatus*) in its beak at Playa La Penca, Distrito de Sardinal, Cantón de Carrillo, Provincia de Guanacaste, Costa Rica. © Fabián Araya

Literature Cited

Abarca, J. G., and C. R. Knapp. 2009. Natural History Notes. *Oxybelis aeneus* (Narrow-Headed Brown Vine Snake). Behavior. Herpetological Review 40: 101.

Barquero-Rodríguez, M. D., and B. Hilje-Rodríguez. 2005. House Wren preys on introduced gecko in Costa Rica. Wilson Bulletin. 117: 204–205.

Csurhes, S., and Markula, A. 2016. Invasive Animal Risk Assessment. Asian House Gecko: *Hemidactylus frenatus*. State of Queensland, Queensland, Australia. 16 pp. (www.daf.qld.gov.au/__data/assets/pdf_file/0007/58687/IPA-Asian-House-Gecko-Risk-Assessment.pdf).

Domínguez-De la Riva, M. A, and R. A. Carbajal-Márquez. 2016. Nature Notes. *Hemidactylus frenatus*. Predation. Mesoamerican Herpetology. 3: 724–725.

Garrigues, R. 2007. The Birds of Costa Rica: A Field Guide. A Zona Tropical publication, Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Jiménez, R., E. Barquero-Calvo, J. G. Abarca, and L. Porras. 2015. *Salmonella* isolates in the introduced Asian House Gecko (*Hemidactylus frenatus*) with emphasis on *Salmonella* Weltevreden, in Two Regions in Costa Rica. Vector-Borne and Zoonotic Diseases. 15: 550–555

Rojas-González, I. and A. Wakida-Kusunoki. 2012. Natural History Notes. *Hemidactylus frenatus* (House Gecko). Predation. Herpetological Review 43: 133.

Savage J. M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between two continents, between two seas. The University of Chicago Press, Chicago, Illinois, United States.

Skutch, A. 1947. Life history of the Turquoise-browed Motmot. The Auk 64: 201–217.

Stiles, G., and A. Skutch. 2007. Guía de Aves de Costa Rica. 4th ed. Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica.

Thurber, W., and O. Komar. 2002. Turquoise-browed Motmot (*Eumomota superciliosa*) feeds by artificial light. The Wilson Bulletin. 114: 525–526.

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***Lepidophyma sylvaticum*. Captive birth.** The Madrean Tropical Night Lizard, *Lepidophyma sylvaticum*, is endemic to Mexico and occurs in the states of Puebla, Hidalgo, Nuevo León, Querétaro, San Luis Potosí, Tamaulipas, and Veracruz, at elevations from 300 to 1,800 m (Canseco-Márquez et al., 2000; Ramírez-Bautista et al., 2014). This species inhabits tropical rainforest, cloud forest, and pine-oak forest (Bezy and Camarillo-Rangel, 2002; Ramírez-Bautista et al., 2014). Reproduction in *L. sylvaticum* has been documented relatively well, as the reproductive period in this viviparous species occurs during spring and summer, and the litter size is known to range from 1 to 7 neonates ($\bar{x}$ = 4.7 ± 0.39, n = 18; Ramírez-Bautista et al., 2008). Lemos-Espinal and Dixon (2010) reported two females from Querétaro collected on June 17 and 19 that contained 5 and 8 embryos, respectively, while none of the females collected in August contained embryos. A female collected in Tepehuacán de Guerrero, Hidalgo, measuring 87.5 mm in snout-vent length (SVL), gave birth to three neonates with a mean SVL of 38.7 mm and a body mass of 0.3358 g (L. Badillo-Saldaña, pers.comm). Data on reproduction, however, remains absent for several areas of its distributional range, such as in Tamaulipas.

On 24 June 2012, a pregnant female (CAR-ITCV-0158) was collected under a rock in pine-oak forest, on a rocky hillside with herbaceous vegetation, at Rancho El Tejocote (23°41'20.80"N, 99°16'12.56"W; WGS 84; elev. 1,775 m), Victoria, Tamaulipas, Mexico. The measurements of the individual were as follows: SVL = 62.3 mm; tail length (TL) = 42.7 mm; head length = 14 mm; and head width = 8.5 mm. This female was taken to the laboratory, where it was placed in a terrarium and maintained in conditions similar to those in its natural environment. Six days later the female gave birth to three neonates (CAR-ITCV-0159: SVL = 27.1 mm, TL = 30.2 mm; CAR-ITCV-0160: SVL = 28 mm, TL= 32 mm; and CAR-ITCV-0161: SVL = 27.3 mm, TL [partially incomplete] = 12.7 mm). The color pattern of the neonates was similar to that of the mother but more vividly defined, as has been reported for this species and other members of the genus *Lepidophyma* (Dixon and Lemos-Espinal, 2010).

The number of offspring and the SVL of the neonates in this report was similar to that observed for this species in Tepehuacán de Guerrero, Hidalgo (L. Badillo-Saldaña, pers. comm.), although it is below the reported average for this species (Ramírez-Bautista et al., 2008; Lemos-Espinal and Dixon, 2010). According to the available data, a variable litter size has been reported for *L. sylvaticum*, such as in other species of this genus (e.g., *L. flavimaculatum*, *L. pajapanensis*; see Ramírez-Bautista et al., 2008). The lack of a more structured litter size and the wide variety of environments in which this species occurs suggests that litter size might be determined more by local adaptations than by phylogeny.

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Literature Cited

Bezy, R. L., and J. R. Camarillo. 2002. Systematics of Xantusiid Lizards of the genus *Lepidophyma*. Contributions in Science 493: 1–41.

Canseco-Márquez, L. G., G. Gutiérrez-Mayen, and J. Salazar-Arenas. 2000. Geographic Distribution. New records and range extensions for amphibians and reptiles from Puebla, México. Herpetological Review 31: 259–263.

Lemos-Espinal, J. A. and J. R. Dixon. 2010. Anfibios y Reptiles del Estado de Querétaro, México / Amphibians and Reptiles of the State of Querétaro, Mexico. Texas A&M University, College Station, Texas, United States, Universidad Nacional Autónoma de México, Tlalnepantla, Estado de México, and Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico.

Ramírez-Bautista, A., L. J. Vitt, A. Ramírez-Hernández, F. Mendoza Quijano, and G. R. Smith. 2008. Reproduction and sexual dimorphism of *Lepidophyma sylvaticum* (Squamata: Xantusiidae), in a tropical night lizard from Tlanchinol, Hidalgo, México. Amphibia-Reptilia 29: 207–216.

Ramírez-Bautista, A., U. Hernández-Salinas. R. Cruz-Elizalde. C. Berriozabal-Islas, J. D. Lara-Tufiño, I. Goyenechea Meyer-Goyenechea, and J. M. Castillo-Cerón. 2014. Los Anfibios y Reptiles de Hidalgo, México: Diversidad, Biogeografía y Conservación. Sociedad Mexicana de Herpetología, A.C., Mexico.

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***Norops biporcatus* (Wiegmann, 1834). Color change during foraging.** Reptiles use body colors for many purposes: camouflage, warning predators, mate choice, and thermoregulation, among others (Cooper and Greenberg, 1992). The body color of anoles results from a combination of three pigments (pteridines, carotenoids, and drosopterines), as well as from structural coloration (Macedonia et al., 2000). These lizards are known for their ability to change color by expanding or contracting melanin in their skin cells (Horowitz, 1958). One of the best-studied cases of color change in anoline lizards involves *Anolis carolinensis*, in which the evidence presented shows that this species changes color to match its background (Hadley, 1929; Kleinholz, 1938; Dores et al., 1987). Nonetheless, Jenssen et al. (1995) found the opposite in that lizards mismatched their background more than would be expected by chance. Other studies also have shown that *A. carolinensis* changes its skin color during sexual interactions, territorial defense, stress, predation, and according to the temperature and light conditions (Greenberg et al., 1984; Cooper and Greenberg, 1992; Jenssen et al., 1995).

On 9 October 2016, at Centro Científico Kekoldi, Talamanca, Provincia de Limón, Costa Rica (09°37'56"N, 82°47'12"W; WGS 84) we observed a female *N. biporcatus* perched on an inflorescence of *Sanchezia parvibracteata* (Acanthaceae), next to the guest house. The lizard was preying on stingless bees (Apidae: Meliponini) that approached the flowers. While perching, the individual's color was dull brown, but when potential prey approached the lizard attempted to catch it, and the lizard turned bright green (Fig. 1). Most of the time the eating attempts were successful, and after eating a bee the lizard returned to its normal dull brown coloration. We observed the lizard changing color at least 10 times in a time period of about 30 min. Little information is available regarding color change in anoles, other than in *A. carolinensis*. To our knowledge this is the first report of color change during prey capture in *N. biporcatus*.

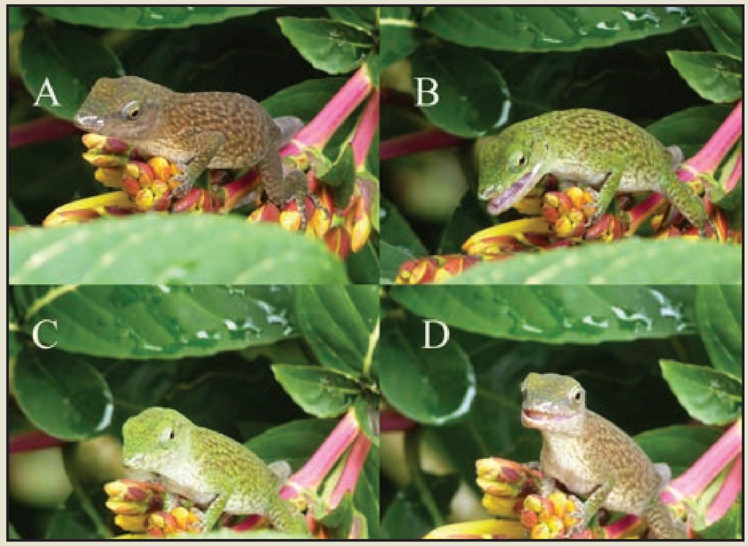

Fig. 1. Color change sequence in *Norops biporcatus* at Centro Científico Kekoldi, Talamanca, Provincia de Limón, Costa Rica: (A) a female shows dull brown coloration while perching; (B) the color turns bright green while capturing prey; (C) lizard is green while ingesting prey; and (D) once the prey is ingested, the color returns to dull brown. © Carolina Esquivel

Acknowledgments.—We thank the staff of Centro Científico Kekoldi for support in the field; José Esteban Jiménez Vargas and Fabián Araya Yanarella for helping to identify the plant where we observed the lizard; Oscar Ramírez for providing the geographic coordinates; and Jennifer Stynoski for offering helpful suggestions on the language.

Literature Cited

Cooper, W., and N. Greenberg. 1992. Color and behavior. Pp. 298–422 *In* C. Gans and D. Crews (Eds.), Biology of the Reptilia, Volume 18, Physiology E: Hormones, Brain, and Behavior. The University of Chicago Press, Chicago, Illinois, United States.

Dores, R. M., M. W. Wilhelm, and D. M. Sandoval. 1987. Steady-state analysis of □-melanotropin in the pars intermedia of *Anolis carolinensis*: effect of background adaptation. General and Comparative Endocrinology 68: 153–160.

Greenberg, N., T. Chen, and D. Crews. 1984. Social status, gonadal state, and the adrenal stress response in the lizard, *Anolis carolinensis*. Hormones and Behavior 18: 1–11.

Hadley, C. E. 1929. Color changes in two Cuban lizards. Bulletin of the Museum of Comparative Zoology 69: 107–114.

Horowitz, S. B. 1958. The energy requirements of melanin granule aggregation and dispersion in the melanophores of *Anolis carolinensis*. Journal of Cellular and Comparative Physiology 51: 341–357.

Jenssen, T. A., N. Greenberg, and K. A. Hovde. 1995. Behavioral profile of free-ranging male lizards, *Anolis carolinensis*, across breeding and post-breeding seasons. Herpetological Monographs 9: 41–62.

Kleinholz, L. H. 1938. Studies in reptilian colour changes II. The pituitary and adrenal glands in the regulation of the melanophores of *Anolis carolinensis*. Journal of Experimental Biology 15: 474–491.

Macedonia, J. M., S. James, L.W. Wittle, and D. L. Clark. 2000. Skin pigments and coloration in the Jamaican radiation of *Anolis* lizards. Journal of Herpetology 34: 99–109.

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Reptilia: Squamata (snakes)

Clelia clelia*. Predation on *Basiliscus basiliscus. *Clelia clelia* (Daudin, 1803) is a large dipsadid snake with a broad distribution that extends from southern Mexico southward to Bolivia, and Argentina, including the islands of Trinidad, Granada, and Dominica (Campbell, 1998; Wallach et al., 2014). This species is well known for its ophiophagous habits and feeds on a variety of snakes, including venomous ones (Savage, 2002; Solórzano, 2004; Chavarría and Barrio-Amorós, 2015). Savage (2002) and Solórzano (2004) indicated lizards and small mammals in its diet, but did not mention the species.

Herein we report a young adult *C. clelia* subduing and likely eating an adult female *Basiliscus basiliscus*. The event occurred at Finca Econaturalistica La Tarde, located near La Palma, Cantón de Osa, Provincia de Puntarenas, Costa Rica. On 19 June 2016 at ca. 1225 h, in thick vegetation near the ground along a riverbank, DP discovered a *C. clelia*, total length (TL) > 1 m, attempting to eat an adult female *B. basiliscus*, TL ca. 40 cm. The *Clelia* was biting the *Basiliscus* on the throat while constricting its lower abdomen. The lizard remained motionless for a few minutes, with its front legs stretched, but at that point it was not subdued. After releasing the throat of the *Basiliscus*, the *Clelia* began flicking its tongue along the lizard's body. Upon reaching the head, the *Basiliscus*, in apparent desperation, bit the snake's lower jaw. The bite caused no harm to the *Clelia*, but the snake retracted its head from view while still constricting the lizard's lower body, and then reappeared and bit the *Basiliscus* on the neck, this time sinking its teeth in. The encounter lasted for 25 min, with the snake still holding and biting the lizard, which appeared subdued, but we left before witnessing the ingestion process. We show the sequence of events in Fig 1.

Fig. 1. A Young adult *Clelia clelia* subduing an adult female *Basiliscus basiliscus* at Finca Ecoturística La Tarde, Península de Osa, Provincia de Puntarenas, Costa Rica. © Sergei Timofeevski

Literature Cited

Chavarría, M., and C. L. Barrio-Amorós. 2014. Nature Notes. *Clelia clelia*. Predation. Mesoamerican Herpetology 1: 286.

Campbell, J. A. 1998. Amphibians and reptiles of Northern Guatemala, theYucatán, and Belize. University of Oklahoma Press, Norman, Oklahoma, United States.

Savage, J. M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas. The University of Chicago Press, Chicago, Illinois, United States.

Solórzano, A. 2004. Serpientes de Costa Rica: Distribución, Taxonomía e Historia Natural / Snakes of Costa Rica: Distribution, Taxonomy, and Natural History. Instituto Nacional de Bioversidad (INBio), Santo Domingo de Heredia, Costa Rica.

Wallach, V., K. L. Williams, and J. Boundy. 2014. Snakes of the World: A Catalogue of Living and Extinct Species. CRC Press, Taylor & Francis Group, Boca Raton, Florida, United States.

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***Conophis lineatus* (Duméril, Bibron & Duméril, 1854) Diet.** *Conophis lineatus* is a colubrid with a distribution extending from Veracruz and Oaxaca, Mexico, to Costa Rica on the Atlantic versant, and on the Pacific versant from Chiapas, Mexico, to Costa Rica; this species inhabits dry and humid forests, secondary vegetation, savannas, pastures, and natural clearings (Campbell, 1998; Lee, 2000; Stafford and Meyer, 2000; Köhler, 2008; McCranie, 2011). Often encountered on trails, this snake commonly is referred to as the "guarda camino" (road guarder). *Conophis lineatus* is diurnal and its diet is known to include mainly lizards (*Aspidoscelis*, *Holcosus*, and *Sceloporus*), frogs (*Leptodactylus* sp.), toads (*Incilius luetkenii*) and snakes (*Micrurus* spp., in captivity); individuals also have been observed feeding on a juvenile *Ctenosaura similis*, a Gaumer's Spiny Pocket Mouse (*Heteromys gaumeri*), and the eggs of ground-nesting birds (Wellman, 1963; Campbell, 1998; Rodriguez Garcia et al., 1998; Stafford and Henderson, 2006; Pérez-Higareda et al., 2007; Hernández-Gallegos et al., 2008; Köhler, 2008; Mays, 2010).

On March 8, 2014 at 1001 h, in the port of Sisal, Municipio de Hunucmá, Yucatán, Mexico (21.1669865°N, -90.024357°E; datum WGS 84; elev. 3 m), GMGR observed an adult *C. lineatus* among grasses in a coastal dune (mainly *Passiflora foetida*, *Ernodea littoralis*, and *Canavalia rosea*) consuming a *Holcosus gaigeae* (Meza-Lázaro and Nieto-Montes de Oca , 2015; Fig. 1). The *C. lineatus* captured the *H. gaigeae* by biting one of

Fig 1. A *Conophis lineatus* capturing an adult *Holcosus gaigeae* on a coastal dune at Sisal, Municipio de Hunucmá, Estado de Yucatán, Mexico. © Gilda María Gómez-de Regil

the lizard's hind legs. The snake then coiled around the *H. gaigeae* for about 5 min, which prevented its movement and presumably allowed the venom to take effect, and subsequently positioned itself toward the snout of the lizard and swallowed it. This observation represents the first record in this region of *C. lineatus* feeding on *H. gaigeae*.

Literature Cited

Campbell, J. A. 1998. Amphibians and Reptiles of Northern Guatemala, the Yucatán, and Belize. University of Oklahoma Press, Norman, Oklahoma, United States.

Hernández-Gallegos, O. F. Rodríguez-Romero, G. Granados-González, and F. R. Méndez. 2008. Natural History Notes. *Conophis lineatus* (Road Guarder) Diet. Herpetological Review 39: 467.

Köhler, G. 2008. Reptiles of Central America. 2nd ed. Herpeton, Offenbach, Germany.

Lee, J. C. 2000. A Field Guide to the Amphibians and Reptiles of the Maya World: The Lowlands of Mexico, Northern Guatemala, and Belize. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Mays, J. D. 2010. Natural History Notes. *Conophis lineatus* (Road Guarder) Diet. Herpetological Review 41: 500.

McCranie, J. R. 2011. The Snakes of Honduras: Systematics, Distribution, and Conservation. Contributions to Herpetology, Volume 26, Society for the Study of Amphibians and Reptiles, Ithaca, New York, United States.

Meza-Lázaro, R. N., and A. Nieto-Montes de Oca. 2015. Long forsaken species diversity in the Middle American lizard *Holcosus undulatus* (Teiidae). Zoological Journal of the Linnean Society 175: 189–210.

Pérez-Higareda, G., M. A. López-Luna, and H. M. Smith. 2007. Serpientes de la Región de los Tuxtlas, Veracruz, México. Guía de Identificación Ilustrada. Universidad Nacional Autónoma de México, México D.F., Mexico.

Rodriguez Garcia, J. G. Pérez-Higareda, H. M. Smith, and D. Chiszar. 1998. Natural History Notes. *Micrurus diastema* and *M. limbatus* (Diastema Coral Snake and Tuxtlan Coral Snake, respectively). Diet. Herpetological Review 29: 45.

Stafford, P. J., and R. W. Henderson. 2006. Ecological traits of the colubrid snake *Conophis lineatus concolor* (Guarda Camino) in the Yucatan Peninsula. South American Journal of Herpetology 1: 210–217.

Stafford, P. J., and J. R. Meyer. 2000. A Guide to the Reptiles of Belize. Academic Press, San Diego, California, United States.

Wellman, J. 1963. A revision of snakes of the genus *Conophis* (Family Colubridae, from Middle America). University of Kansas Publications, Museum of Natural History 15: 251–295.

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***Oxybelis aeneus* (Wagler, 1824). Maximum elevation**. This member of the family Colubridae is widely distributed in the New World, from southern Arizona southward along the eastern and western coasts of Mexico, reaching the margins of the Central Plateau and across the Isthmus of Tehuantepec, through most Central America and reaching northern Peru and northern Argentina in South America, as well as the on the islands of Trinidad and Tobago (Keiser, 1982; Savage, 2002). *Oxybelis aeneus* occurs in a variety of vegetation types, including low deciduous forest, medium subperennifolia forest, subtropical scrubland, dry forest, riparian vegetation, and also is known to penetrate the edge of oak forest (Keiser, 1982; Vázquez-Díaz and Quintero-Díaz, 1997; 2005; Ramírez-Bautista et al., 2014).

In Mexico, *O. aeneus* has been reported at elevations from sea level to 1,920 m (in the state of Hidalgo; Ramírez-Bautista et al., 2014). Stebbins (2003: 403), however, previously noted the elevational range of this species as from "sea level to around 8,200 ft. (2,500 m)." Because no published records of *O. aeneus* from the countries where this species occurs approximate this elevation, presumably the location referred to by Stebbins (2003) was in

Arizona, in the United States; nonetheless, no locality information or a specimen number were provided in Stebbins (2003). Because we have been unable to track down a museum specimen with such an elevation in several museum collections in the United States, herein we report the maximum elevation for *O. aeneus* in Mexico, and unless a specimen with the elevation of 2,500 m is found, perhaps the elevation we report herein (see below) tentatively can serve as the verified elevational record for this species.

On 24 April 2005 at 1540 h, we encountered a female *O. aeneus* (total length [TL] 1,340 mm, body mass 40 g) crossing a dirt road in subtropical scrub in Aguascalientes (21.743656°N, -102.713596°W; WGS 84) at an elevation of 2,251 m, which was the highest elevation known for the state. Subsequently, on 5 November 2016 at 1248 h, we found another active female (TL 1,170 mm, body mass 30 g), crossing a dirt road in an ecotone between subtropical scrub and oak forest in Municipio de San José de Gracia, Aguascalientes (22.055463°N, -102.732473°W; WGS 84) at an elevation of 2,381 m. A photo voucher of this individual is deposited at the San Diego Natural History Museum (SDSNH_HerpPC_05345), and represents the highest known elevation for *O. aeneus* in Mexico, and perhaps from throughout this species' range. Our observations increase the elevation of *O. aeneus* in Mexico by 461 m, and also suggest that this species penetrates oak forest; Mendoza-Quijano et al. (2006) noted the presence of *O. aeneus* in tropical montane cloud forest, and perhaps the ability of this species to occupy such diverse habitats has resulted in it's broad distribution. In Mexico, this species sometimes finds shelter in oak forest during the driest months of the year, in areas where food is available and the microclimate is are favorable for its activities.

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Literature Cited

Keiser, E. D., Jr. 1982. *Oxybelis aeneus*. Catalogue of American Amphibians and Reptiles. 305.1–305.4.

Mendoza-Quijano, F., G. Quijano-Manilla, and R. F. Mendoza-Paz. 2006. Análisis fenético de la herpetofauna de los bosques mesófilos de montaña del estado de Hidalgo. Pp. 99–109 *In* A. Ramírez-Bautista, L. Canseco-Márquez, and F. Mendoza-Quijano (Eds.), Inventarios Herpetofaunísticos de México: Avances en el Conocimiento de su Biodiversidad. Publicaciones de la Sociedad Herpetológica Mexicana No. 3, Sociedad Herpetológica Mexicana A.C., Mexico.

Ramírez-Bautista, A., U. Hernéandez-Salinas, R. Cruz-Elizalde, C. Berrizobal-Islas, D. Lara-Tufiño, I. Goyenechea Mayer-Goyenechea, and J. M. Castillo-Cerón. Los Anfibios y Reptiles de Hidalgo, México: Diversidad, Biogeografía y Conservación. Sociedad Herpetológica Mexicana, Mexico.

Savage, J. M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas. The University of Chicago Press, Chicago, Illinois, United States.

Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians. 3rd ed. Houghton Mifflin Company, Boston, Massachusetts, United States.

Vázquez-Díaz, J., and G. E. Quintero-Díaz. 1997. Anfibios y Reptiles de Aguascalientes. Centro de Investigaciones y Estudios Multidisciplinarios de Aguascalientes, and Gobierno del Estado de Aguascalientes, Aguascalientes, Mexico.

Vázquez-Díaz, J., and G. E. Quintero-Díaz. 2005. Anfibios y Reptiles de Aguascalientes. 2nd ed. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., and Centro de Investigaciones y Estudios Multidisciplinarios de Aguascalientes, Aguascalientes, Mexico.

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***Trimorphodon tau* Cope, 1870. Maximum elevation**. This member of the family Colubridae is endemic to Mexico, and occurs in all of the states north of the Isthmus of Tehuantepec, except for Coahuila and the Baja California peninsula (Scott and McDiarmid, 1984; Vázquez-Díaz and Quintero-Díaz, 1997; 2005; Canseco-Márquez and Gutiérrez-Mayén, 2006; Lazcano et al., 2010; Lemos-Espinal and Dixon, 2013; Ramírez-Bautista et al., 2014). Specimens have been reported from the Pacific coastal plain and from the central plateau in the foothills of the Balsas and Tepalcatepec basins (Mendoza-Quijano and Hammerson, 2007), from conifer and low deciduous forests (Flores and Gerez, 1994), oak forest, oak-pine forest, xerophytic scrub, grassland, and riparian vegetation (Vázquez-Díaz and Quintero-Díaz, 1997; 2005; Ramírez-Bautista et al., 2014), and from cracks between rocky areas and on canyon slopes (Lemos-Espinal and Dixon, 2013), at elevations ranging from 100 to 2,600 m (Mendoza-Quijano and Hammerson, 2007;Wilson and Johnson, 2010). Several specimens have been reported from Aguascalientes, collected at elevations from 1,920 m (McDiarmid and Scott (1970; UIMNH 27566) to 2,500 m at La Congoja, Municipio de San José de Gracia (Quintero-Díaz et al., 2008).

On 5 November 2016 at 1639 h, an individual of *Trimorphodon tau* (total length 550 mm, body mass 27.6 g) was found under a rock near a stream in oak-pine forest at an elevation of 2,711 m in Municipio de San José de Gracia, Aguascalientes (22.100602°N, -102.696444°W; WGS 84). A photo voucher of the snake (Fig. 1) is deposited at the San Diego Natural History Museum (SDSNH_HerpPC_05346). This report, therefore, represents the highest known elevation for this species in the state of Aguascalientes, as well as for its entire range. Our record increases the known elevation by 111 m, and confirms the presence of *T. tau* in oak-pine forest.

Fig. 1. A *Trimorphodon tau* found in oak-pine forest in Municipio de San José de Gracia, Aguascalientes, Mexico, at an elevation of 2,711 m. © Gustavo E. Quintero-Díaz

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Literature Cited

Canseco-Márquez, L., and M. G. Gutiérrez-Mayen. 2006. Herpetofauna de Cuetzalan del Progreso, Puebla. Pp. 180–196 *In* A. Ramírez-Bautista, L. Canseco-Márquez, F. Mendoza-Quijano (Eds.), Inventarios Herpetofaunísticos de México: Avances en el Conocimiento de su biodiversidad. Sociedad Herpetológica Mexicana and Benemérita Universidad Autónoma de Puebla, Mexico.

Flores, Villela. O. F., and P. Gerez. 1994. Biodiversidad y Conservación en México: Vertebrados, Vegetación y Uso del Suelo. 2nd ed. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, and Universidad Nacional Autónoma de México, México, D.F., Mexico.

Lazcano Villarreal, D., J. Banda Leal, and R. D. Jacobo Galvan, G. 2010. Serpientes de Nuevo León. Universidad Nacional Autónoma de Nuevo León, Monterrey, Nuevo León, Mexico.

Lemos-Espinal, J. A. and J. R. Dixon. 2013. Amphibians and Reptiles of San Luis Potosí. Eagle Mountain Publishing, LC, Eagle Mountain, Utah, United States.

McDiarmid, R. W., and N. J. Scott, Jr. 1970. Geographic variation and systematic status of Mexican lyre snakes of the *Trimorphodon tau* group (Colubridae). Los Angeles Coounty Museum, Contributions in Science 179: 1–43.

Mendoza-Quijano, F., and Hammerson, G. A. 2007. *Trimorphodon tau*. The IUCN Red List of Threatened Species 2007: e.T63996A12728389. (www.dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T63996A12728389.en; accessed 22 December 2016).

Quintero-Díaz, G. E., J. Vázquez-Díaz, and J. J. Sigala-Rodríguez. 2008. Reptiles. Pp. 141–145 *In* La Biodiversidad en Aguascalientes. Estudio de Estado. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Instituto del Medio Ambiente del Estado de Aguascalientes, Aguascalietes, and Universidad Autónoma de Aguascalientes, Aguascalientes, Mexico.

Ramírez-Bautista, A., U. Hernández-Salinas., R. Cruz-Elizalde., C. Berriozabal-Islas., I. Goyenechea M. , and J. M. Castillo-Cerón. 2014. Los Anfibios y Reptiles de Hidalgo, México: Diversidad, Biogeografía y Conservación. Sociedad Herpetológica Mexicana, A.C., Mexico.

Scott, Jr., N., and R. W. McDiarmid. 1984. *Trimorphodon tau*. Catalogue of American Amphibians and Reptiles. 354.1–354.2.

Vázquez-Díaz, J., and G. E. Quintero-Díaz. 1997. Anfibios y Reptiles de Aguascalientes. Centro de Investigaciones y Estudios Multidisciplinarios de Aguascalientes, and Gobierno del Estado de Aguascalientes, Aguascalientes, Mexico.

Vázquez-Díaz, J., and G. E. Quintero-Díaz. 2005. Anfibios y Reptiles de Aguascalientes. 2nd ed. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., and Centro de Investigaciones y Estudios Multidisciplinarios de Aguascalientes, Aguascalientes, Mexico.

Wilson, L. D., and J. D. Johnson. 2010. Distributional patterns of the herpetofauna of Mesoamerica: a biodiversity hotspot. Pp. 31–235 *In* L. D. Wilson, J. H. Townsend, and J. D. Johnson (Eds.), Conservation of Mesoamerican Amphibians and Reptiles. Eagle Mountain Publishing, LC., Eagle Mountain, Utah, United States.

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Reptilia: Testudines

Predation on *Gopherus berlandieri* (Testudines: Testudinidae) by *Rattus norvegicus* (Rodentia: Muridae) in the wild

Gopherus berlandieri (Agassiz, 1857) is a tortoise distributed from southern Texas and eastern Coahuila southward to the Sierra Madre Oriental, through a large portion of Nuevo León and Tamaulipas to extreme northern Veracruz (Niño-Ramirez et al., 1999; Lemos-Espinal and Smith, 2007; Legler and Vogt, 2013; Nevárez-de los Reyes et al., 2016), at elevations from sea level to 884 m. Predation on its eggs is known to be undertaken by Western Spotted Skunks (*Spilogale gracilis*), Northern Raccoons (*Procyon lotor*), Common Opossums (*Didelphis marsupialis*), and rats (not identified; Auffenberg and Weaver, 1969), and on adults by Coyotes (*Canis latrans*), Bobcats (*Lynx rufus*), Southern Crested Caracaras (*Caracara plancus*), and Cougars (*Puma concolor*) (Hellgren et al., 2000; Kazmaier et al., 2001; Adams et al., 2006). Lazcano et al. (2005) also documented the consumption of recently hatched young of *G. berlandieri* by an adult *Drymarchon melanurus*, which occurred during a herpetofaunal inventory in the municipality of El Carmen, Nuevo León.

During the second week of October of 2016, an adult female Texas Tortoise (*Gopherus berlandieri*) was brought to the Laboratorio de Herpetología de la Facultad de Ciencias Biológicas de la Universidad Autónoma de Nuevo León for identification, and to bring attention to various injuries on its body. The individual presented the following body measurements (length 17.2 cm, width 13.8 cm, height 7.9 cm), and a body mass of 705.5 g. This individual was found a month earlier before it crossed state highway no. 186 near Zacatequitas, Municipio de Pesquería, Nuevo León (25.804991°N, -100.107417°W; elev. 370 m). Upon visiting this locality we found the habitat in the process of urbanization, with several decades old industrial installations along with recent residential areas, and a few remaining pockets of the original vegetation consisting of Tamaulipan thorn scrub. The Río Pesquería, which is one of the most contaminated in the state (www.milenio.com; www.cronicaambiental.com.mx; both sites accessed 10 December 2016), lies about 100 m from the site of capture.

Upon examining the condition of this individual, we noted a series of injuries to the shell and body, which we identified as resulting from rat bites. The injuries clearly were caused by a large rodent (or rodents), of which the Brown Rat (*Rattus norvergicus*) is relatively abundant in the area. We discarded the possibility of wood rats (*Neotoma* sp.), because their diet consists primarily of vegetable matter, and because their characteristic burrows and typical habitat largely have been reduced in the area. We describe the injuries below (Fig. 1, A–C) using the terminology for scutes and bones in Ernst and Barbour (1989), Hutchison (1991), and Rostal et al., (2014).

1. Absence of toes and claws due to bites and damage to the terminal phalanges on all of the extremities. These wounds were healed.
2. Second costal scute on the right damaged in its anterodorsal quarter, exposing part of the 2nd and 3rd pleural bones.
3. Absence of part of the 2nd and 3rd costal scutes on the right side at the border between the two, exposing part of the 2nd pleural bone.
4. Superficial wound without damage to the underlying bone and with partial regeneration on the lower portion of the 8th marginal scute on the right and the anterodorsal portion of the 9th marginal scute.
5. Superficial wound on the central portion of the 11th marginal on the right side.
6. Superficial damage without exposure of the underlying bone on the supracaudal scute.
7. Superficial wound on the posteroventral portion of the 5th vertebral scute.
8. Complete damage to the 11th marginal on the left side.
9. Entire surface of the 4th coastal on the left side, without exposure of the underlying bone.
10. Wound on the 8th marginal scute on the left side, with accompanying fracture of the 8th peripheral bone.
11. Wound on the gular scute, partially exposing the epiplastron bone.

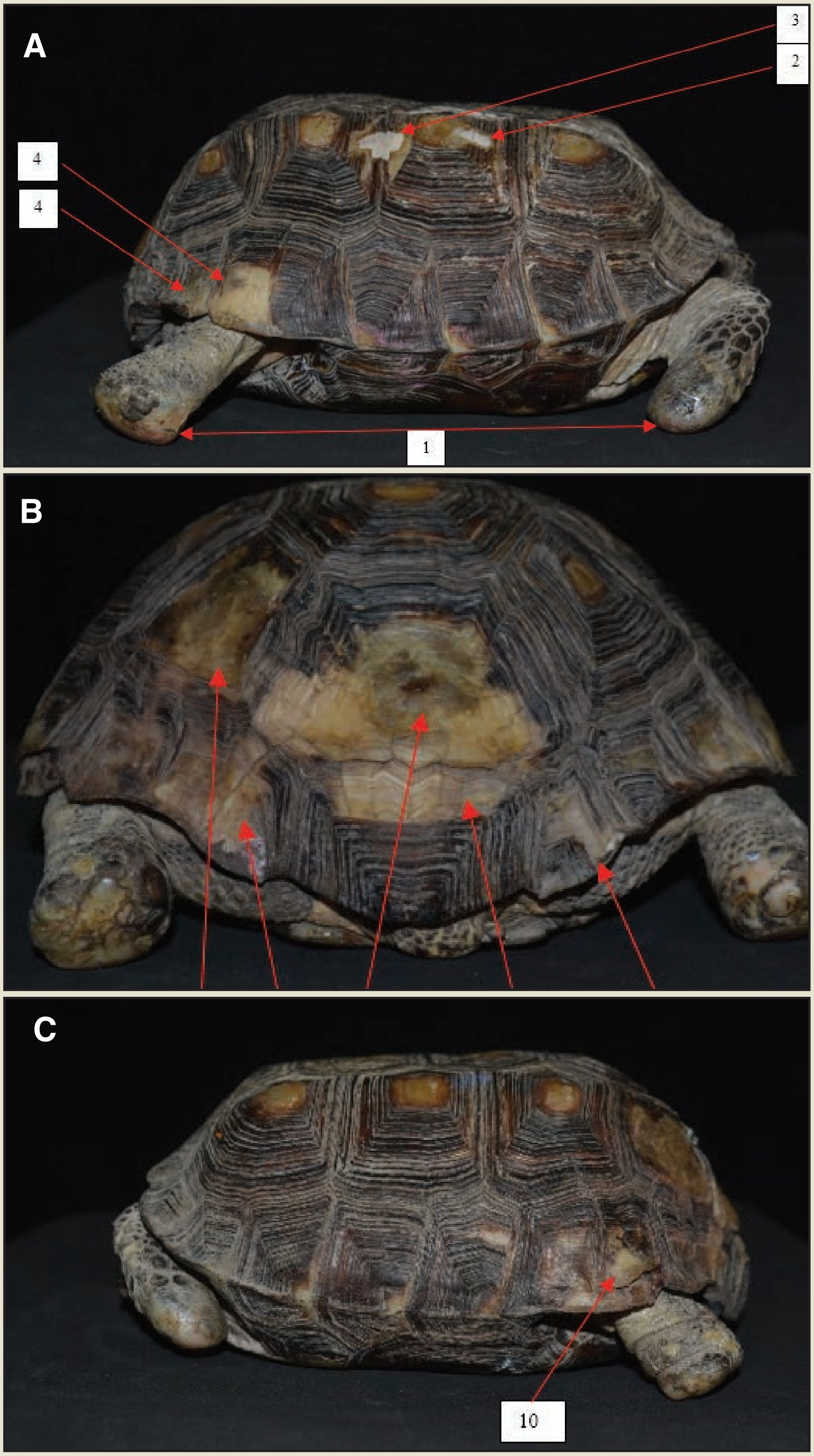

Fig. 1. (A) Injuries (numbers 1–4), (B) (numbers 5–9), and (C) (number 10) sustained by a female *Gopherus berlandieri* from a *Rattus norvegicus* near Zacatequitas, Municipio de Pesquería, Nuevo León. © Manuel Nevárez de los Reyes

Rattus norvegicus is native to southeastern Siberia, northeastern China and parts of Japan (Wilson and Reeder, 1993). This rodent has been introduced throughout the world, and is associated with human settlements where food is available (Álvarez-Romero and Medellín, 2005; Álvarez-Romero et al., 2008); this species is omnivorous, and consumes seeds, grains, fruits, eggs, insects, birds, fish, chickens, piglets, and human waste (Nowak, 1991). Due to it wide distribution, abundance, ability to displace other species of rodents greater in size, aggressiveness, and diet (Bertram and Nagorsen, 1995) it has become a major problem around human settlements.

Attacks by *R. norvegicus* are relatively common on captive turtles, and some authors have emphasized the importance of protecting turtle hatchlings in captivity to avoid predation by cats, birds, and rodents (Avanzi, 2004). Another example of attacks occurs in island ecosystems, such as the destruction of clutches of *Chelonoidis nigra* by rats, mice, pigs, and goats introduced in the Galapagos Islands archipelago (Rueda-Almonacid, 2007).

Habitat destruction due to the expansion of the Monterrey metropolitan area, which now encompasses 12 municipalities, has been identified as one of the direct threats to the herpetofauna of the central part of Nuevo León (Nevárez et al., 2016), since this region contains 90% of the state's population. The "secondary" impact due to the anthropization of the environment and the proliferation of the associated exotic fauna, however, had not been documented. As far as we know, no previous records of *G. berlandieri* predation by *R. norvegicus* in the wild are available, so this finding constitutes the first documentation of this interaction.

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Literature Cited

Adams, R. B., J. C. Pitman and L. A. Haverson. 2006. Texas Tortoise (*Gopherus berlandieri*) consumed by a Mountain Lion (*Puma concolor*) in southern Texas. The Southwestern Naturalist 51: 581–582.

Álvarez-Romero, J. G. and R. A. Medellín. 2005. *Canis lupus*. Vertebrados superiores exóticos en México: diversidad, distribución y efectos potenciales. Instituto de Ecología, Universidad Nacional Autónoma de México. Bases de datos SNIB-CONABIO, Proyecto U020, México, D.F., Mexico.

Álvarez-Romero, J. G., R. A. Medellín, A. Oliveras de Ita, H. Gómez de Silva, and O. Sánchez. 2008. Animales exóticos en México: una amenaza para la biodiversidad. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Instituto de Ecología, Universidad Autónoma de México, and Secretaría de Medio Ambiente y Recursos Naturales, México, D.F., Mexico.

Auffenberg, W., and W. G. Weaver, Jr. 1969. *Gopherus berlandieri* in southeastern Texas. Bulletin of the Florida State Museum. 13: 141–203.

Avanzi, M. 2004. Las Tortugas Terrestres: La Morfología, las Especies, la Cría y los Cuidados. Parkstone International, De Vecchi Ediciones S.A., Barcelona, Spain.

Bertram, D. F., and D. W. Nagorsen. 1995. Introduced rats *Rattus* spp., on the Queen-charlotte Islands, implications for seabird conservation. Canadian Field Naturalist 109: 6–10.

Ernst, C. H., and R. W. Barbour. 1989. Turtles of the World. Smithsonian Institution Press, Washington, D.C., United States.

Hellgren, E. C., R. T., Kazmaier, D. C. Ruthven III, and D. R. Synatzske. 2000. Variation in tortoise life history: demography of *Gopherus berlandieri*. Ecology 81: 1,297–1,310.

Hutchison, J. H. 1991. Early Kinosterninae (Reptilia: Testudines) and their phylogenetic significance. Journal of Vertebrate Paleontology 11: 145–167.

Kazmaier, R.T., E. C. Hellgren, and D. R. Synatze. 2001. Patterns of behavior in the Texas Tortoise, *Gopherus berlandieri*: a multivariate ordination approach. Canadian Journal of Zoology 79: 1,363–1,371.

Lazcano, D., C. García de la Peña, G. Castañeda-Gaytán, and J. I. González-Rojas. 2005. Natural History Notes. *Drymarchon corais* (Indigo Snake). Diet Herpetological Review. 36: 193.

Legler, J., and R. Vogt. 2013. Turtles of Mexico: Land and Freshwater Forms. University of California Press, Berkeley, California, United States.

Lemos-Espinal, J. A., and H. M. Smith. 2007 Amphibians and Reptiles of the State of Coahuila, Mexico. Universidad Autónoma de México, Tlalnepantla, Estado de México, and Comisión Nacional Para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico.

Nevárez-de los Reyes, M., D. Lazcano, E. García-Padilla, V. Mata-Silva, J. D. Johnson, and L. D. Wilson. 2016. The herpetofauna of Nuevo León, Mexico: composition, distribution, and conservation. Mesoamerican Herpetology 3: 558–638.

Niño Ramírez, A., Benavides Ruiz, R. Y., Guerra Pérez, A. and D. Lazcano Villa Real. 1999. Distribución y Estructura Poblacional de la Tortuga de Berlandier, (*Gopherus* [Xerobates] *berlandieri*) en México. Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicos. Informe Final SNIB-CONOBIO Proyecto No. H093, México, D.F., Mexico.

Nowak, R. M. 1991. Walker's Mammals of the World. 2 Volumes. The Johns Hopkins University Press, Baltimore, Maryland, United States.

Rostal, D. C., E. D. McCoy, and H. R. Mushinsky. 2014. Biology & Conservation of North American Tortoises. The Johns Hopkins University Press, Baltimore, Maryland, United States.

Rueda-Almonacid, J. V., J. L. Carr, R. A. Mittermeier, J. V. Rodríguez-Mahecha, R. B. Mast, R. C. Vogt, A. G. J. Rhodin, J. de la Ossa-Velásquez, J. N. Rueda, and C. G. Mittermeier. 2007. Las Tortugas y los Cocodrilianos de los Países Andinos del Trópico. Conservación Internacional, Serie de Guías Tropicales de Campo 6, Conservación Internacional. Bogotá, D.C., Colombia.

Wilson, D. E., and D. M. Reeder. 2005. Mammal Species of the World: A Taxonomic and Geographic Reference. 3rd ed. John Hopkins University Press. Baltimore, Maryland, United States.

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***Trachemys ornata* (Gray, 1831). Diet.** The Ornate Slider, *Trachemys ornata* (Gray, 1831) (Fig.1), is one of the largest endemic freshwater sliders in Mexico (maximum carapace length sizes for adult males and females are 359 mm and 353 mm, respectively), which occurs in the northwestern Mexico from Culiacán, Sinaloa, to the northern coast of Jalisco (Legler and Vogt, 2013, Parham et al., 2015), including in Puerto Vallarta (Casas-Andreu et al., 2015), at elevations below 300 m (Legler and Vogt, 2013).

The diet of *T. ornata* has not been well documented from throughout its entire distribution. Roots, grass stems, and pieces of broad leaves (not identified to species level) are the only recorded dietary items for this species (Legler and Vogt, 2013). Herein we examined the dietary habits of *T. ornata* based on the identification of prey items obtained by the technique of stomach flushing (Legler, 1977). To our knowledge, this is the first report of specific prey items, including plants and animals, in the diet of *T. ornata*.

From 11 to 25 October 2016, we captured seven adult individuals of *T. ornata* (one male, six females; see Table 1) with traps in a freshwater pond at the campus of the Universidad de Guadalajara (20°42'15.58"N, 105°13'18.49"W; datum WGS 84; elev. 11 m) in Puerto Vallarta, Jalisco, Mexico. The turtles were released after flushing out the stomach contents with water. We found six food items: leaves of the Royal Poinciana Tree, *Delonyx regia* (Boj. ex Hook.) Raf.; seeds of the Laurel Fig, *Ficus microcarpa* L. f.; juveniles and adults of the Longarm River Prawn, *Macrobrachium tenellum* (Smith, 1871); adults of the millipede, *Chondromorpha xanthotricha* (Attems, 1898); a worker of the Carpenter Ant, *Camponotus atriceps* (Smith, 1858); and juveniles of the Nile Tilapia, *Oreochromis niloticus* (Linnaeus, 1758) (Table 1, Fig. 1).

Delonyx regia and *F. microcarpa* are abundant in the region, but both are no-native species introduced from Madagascar and Asia, respectively (Lesur, 2011); *M. tenellum* is widely distributed from Mulegé (Baja California Sur) and Yávaros (Sonora), Mexico, to the Río Chira in Peru (Espinosa-Chaurand et al., 2011); *C. xanthotricha* is a no-native millipede likely from Sri Lanka or India (Shelley and Lehtinen, 1998); *C. atriceps* is Nearctic and Neotropical in distribution (Alatorre-Bracamontes and Vásquez-Bolaños, 2010); and *O. niloticus* is a no-native fish introduced from Africa (Contreras-MacBeath et al., 2014).

Table 1. Presence of food items and number of individuals in stomach contents of *Trachemys ornata* specimens. S = number of specimen, EX = sex, M = male, F = female, CL = carapace length in millimeters, and BM = body mass in grams.

Food Item	S	1	2	3	4	5	6	7
	EX	F	F	F	F	F	M	F
	CL	152.61	309.00	226.00	157.61	144.82	307.00	325.00
	BM	500	4200	1500	600	500	4100	5100
Delonyx regia		1						
Ficus microcarpa		40+						7
Macrobrachium tenellum				1	1		1	
Chondromorpha xanthotricha			3		20			
Camponotus atriceps					1			
Oreochromis niloticus						3	2	2

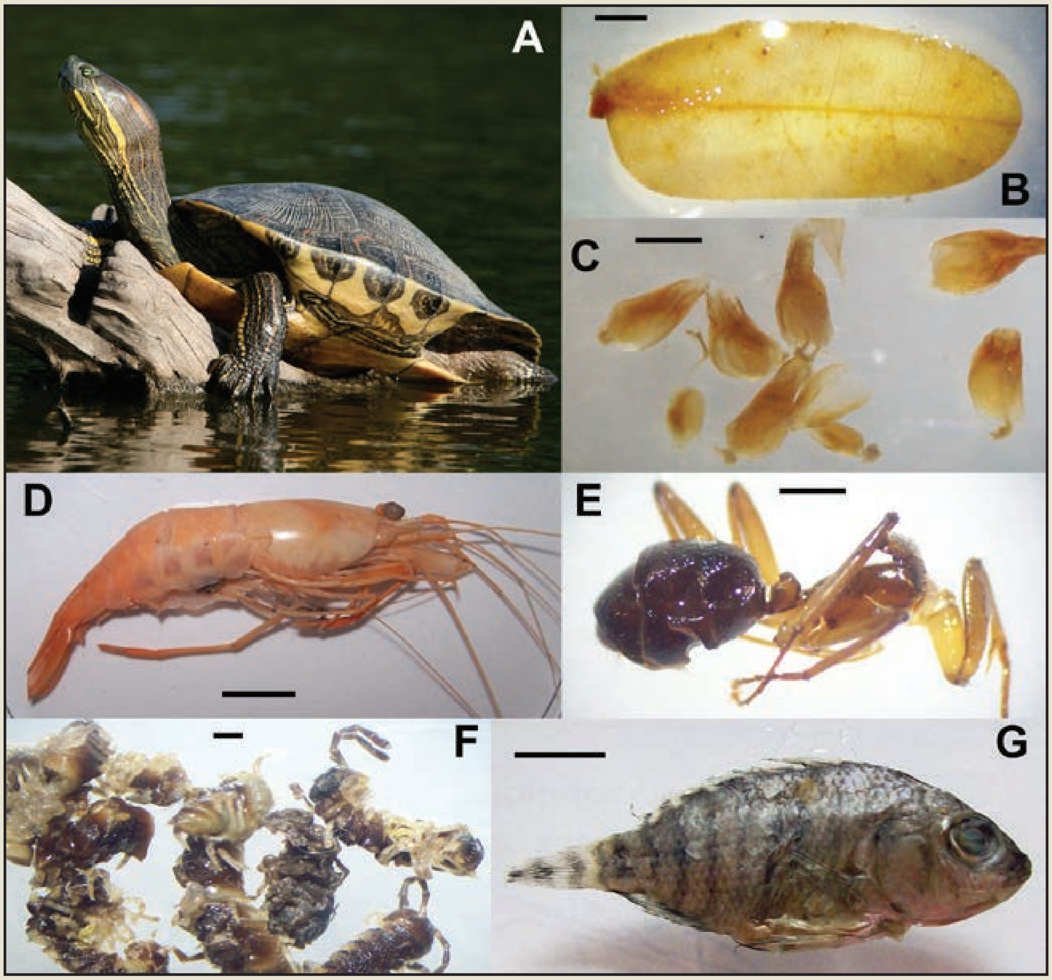

Fig. 1. (A) An individual of *Trachemys ornata* at a freshwater pond in Puerto Vallarta, Jalisco, Mexico; (B) a *Delonyx regia* leaf; (C) *Ficus microcarpa* seeds; (D) an adult *Macrobrachium tenellum*; (E) a *Camponotus atriceps* worker missing its head; (F) adults of *Chondromopha xanthotricha*; (G) and a juvenile *Oreochromis niloticus*. Scale bar in millimeters (B, C, E, F), and centimeters (D, G). © Frank Mc Cann (A), and Fabio Germán Cupul-Magaña (B–G)

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Literature Cited

Alatorre-Bracamontes, C. A., and M. Vásquez-Bolaños. 2010. Lista comentada de las hormigas (Hymenoptera: Formicidae) del norte de México. Dugesiana 17: 9–36.

Casas-Andreu, G., F. G. Cupul-Magaña, and S. M. Chávez-Avila. 2015. Primer registro preciso de *Trachemys ornata* (Gray, 1831) (Testudines: Emydidae) para el estado de Jalisco, México. Acta Zoológica Mexicana (nueva serie) 31: 477–479.

Contreras-MacBeath, T., M. T. María Teresa Gaspar-Dillanes, L. Huidobro-Campos, and H. Mejía-Mojica. 2014. Peces invasores en el centro de México. Pp. 413–424 *In* R. Mendoza and P. Koleff (Eds.), Especies Acuáticas Invasoras en México. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico.

Espinosa-Chaurand, L. D., M. A. Vargas-Ceballos, M. Guzmán-Arroyo, H. Nolasco-Soria, O. Carrillo-Farnés, O. Chong-Carrillo, and F. Vega-Villasante. 2011. Biología y cultivo de *Macrobrachium tenellum*: estado del arte. Hidrobiológica 21: 99–117.

Legler, J. M. 1977. Stomach flushing: a technique for chelonian dietary studies. Herpetologica 33: 281–284.

Legler, J. M., and R. C. Vogt. 2013. The Turtles of Mexico: Land and Freshwater Forms. University of California Press, Berkeley, California, United States.

Lesur, L. 2011. Árboles de México. Editorial Trillas, México, D.F., Mexico.

Parham, J. F., T. J. Papenfuss, J. R. Buskirk, G. Parra-Olea, J. Y. Chen, and W. B. Simison. 2015. *Trachemys ornata* or not *ornata*: reassessment of a taxonomic revision for Mexican *Trachemys*. Proceedings of the California Academy of Sciences 62: 359–367.

Shelley, R. M., and P. T. Lehtinen. 1998. Introduced millipeds of the family Paradoxosomatidae on Pacific Islands (Diplopoda: Polydesmida). Arthropoda Selecta 7:81–94.

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Amphibia: Anura

First records for the invasive Greenhouse Frog, *Eleutherodactylus planirostris* (Cope, 1862) (Anura: Eleutherodactylidae), in the state of Yucatán, Mexico

The Greenhouse Frog, *Eleutherodactylus planirostris*, is considered one of the most successful invasive anuran species (Bomford et al., 2009). Schwartz (1974) originally reported its introduction in Mexico, based on one specimen collected in Veracruz, but more recent introductions have been documented in three localities in the state of Quintana Roo: Playa del Carmen (Cedeño-Vázquez et al., 2014), Cancún (García-Balderas et al., 2016), and Isla de Cozumel (Pavón-Vázquez et al., 2016). Herein, we provide new information on the distribution of *E. planirostris* in the Yucatan Peninsula, reporting its presence in the state of Yucatán for the first time.

The first individual of *E. planirostris* we documented (UTEP G-2017.5) was found on 20 January 2015 at 1200 h, in a mound of rocks along the edge of an artificial lake in Parque Ecológico "Kai lu um" (21°2'35.37"N, 89°39'14.27"W; WGS 84; elev. 7 m), located in the vicinity of Mérida, Municipio de Mérida. This area had been used as a municipal garbage dump for about 20 years, which was closed down in 1998 and abandoned for 15 years. Subsequently, reforestation and rehabilitation of the contaminated areas were carried out to convert them into green areas, and since then it has become an ecological park.

A second individual (UTEP G-2017.8) was observed on 20 June 2015 at 2230 h, in the garden of a house in Mérida (21°1'22.27"N, 89°39'12.79"W; WGS 84; elev. 6 m). On 7 October 2015 at 1100 h, another frog (UTEP G-2017.6) was found around an artificial pond at Campus de Ciencias Biológicas y Agropecuarias, Universidad Autónoma de Yucatán, located within the Reserva Ecológica Cuxtal, ca. 2 km south of Mérida (20°51'58.52"N, 89°37'25.40"W; WGS 84; elev. 12 m). This reserve has an extension of 10,757 ha, and the vegetation in the area is composed of tropical deciduous forest in different successional stages.

A fourth specimen (UTEP G-2017.9) was observed after a heavy rain on 24 June 2016 at 2200 h, on leaf litter in the garden of another house in Mérida (21°1'5.38"N, 89°36'42.14"W; WGS 84; elev. 10 m).

After these sporadic observations of individual frogs, during a field survey conducted on 4 October 2016 from 2115 to 2340 h, numerous individuals of *E. planirostris* (Fig. 1A, C, E) were observed active on leaf litter at Parque Zoológico del Bicentenario Animaya, ca. 1 km west of Mérida (20°58'59.08"N, 89°41'25.70"W; WGS 84; elev. 6 m). A sample of 31 specimens (including froglets, juveniles, and adult individuals: mean snout–vent length [SVL] = 17.7 mm, range = 10.26–24.07 mm) were collected and deposited in the herpetological collection of El Colegio de la Frontera Sur, Unidad Chetumal (ECO-CH-H3860-3890, Amphibian Collection record number QNR.AN.033.0697).

Additionally, three other frogs of this species were found in a mound of rocks surrounded by grass in an urban park in Mérida (20°58'8.73"N, 89°35'14.37"W; WGS 84; elev. 12 m); one was found on 7 October 2016 (UTEP G-2017.7), and the other two on a second visit to the same site on 11 October 2016.

These six localities demonstrate the scattered presence of *E. planirostris* throughout the municipality of Mérida, indicating that the population of this species is well established. This municipality is located ca. 263.8 km to the WNW (airline distance) of the nearest reported locality in the Yucatan Peninsula at Playa del Carmen, Municipio de Solidaridad, Quintana Roo (Cedeño-Vázquez et al., 2014).

On 20 December 2016 between 1900 and 2000 h, numerous individuals of this invasive species (Fig. 1B, D, F) were found along the perimeter of a house in the village of Emiliano Zapata, Municipio de Oxkutzcab (20°13'32.72"N, 89°28'2.15"W; WGS 84; elev. 58 m), which is located ca. 72.7 km to the SSE (airline distance) of the nearest site in the above-mentioned Municipio de Mérida. The frogs were found under plant pots and rocks, inside chicken coops, on leaf litter, and inside and around puddles of water resulting from laundry activitities. A total of 78 specimens (including froglets, juveniles, and adult individuals: mean SVL = 15.5 mm, range = 7.02–22.66 mm) were collected and deposited in the herpetological collection mentioned above (ECO-CH-H3891-3968). These records indicate that the invasion of *E. planirostris* in Yucatán has spread beyond the urban area of Mérida and into rural areas, possibly through commerce and the transportation of ornamental plants, and we presume that the distribution of this species is wider in the state than the records indicate. As stated by Cedeño-Vázquez et al. (2014) and García-Balderas et al. (2016), studies are urgently needed to evaluate the possible ecological impact of *E. planirostris* invasions in the Yucatan Peninsula.

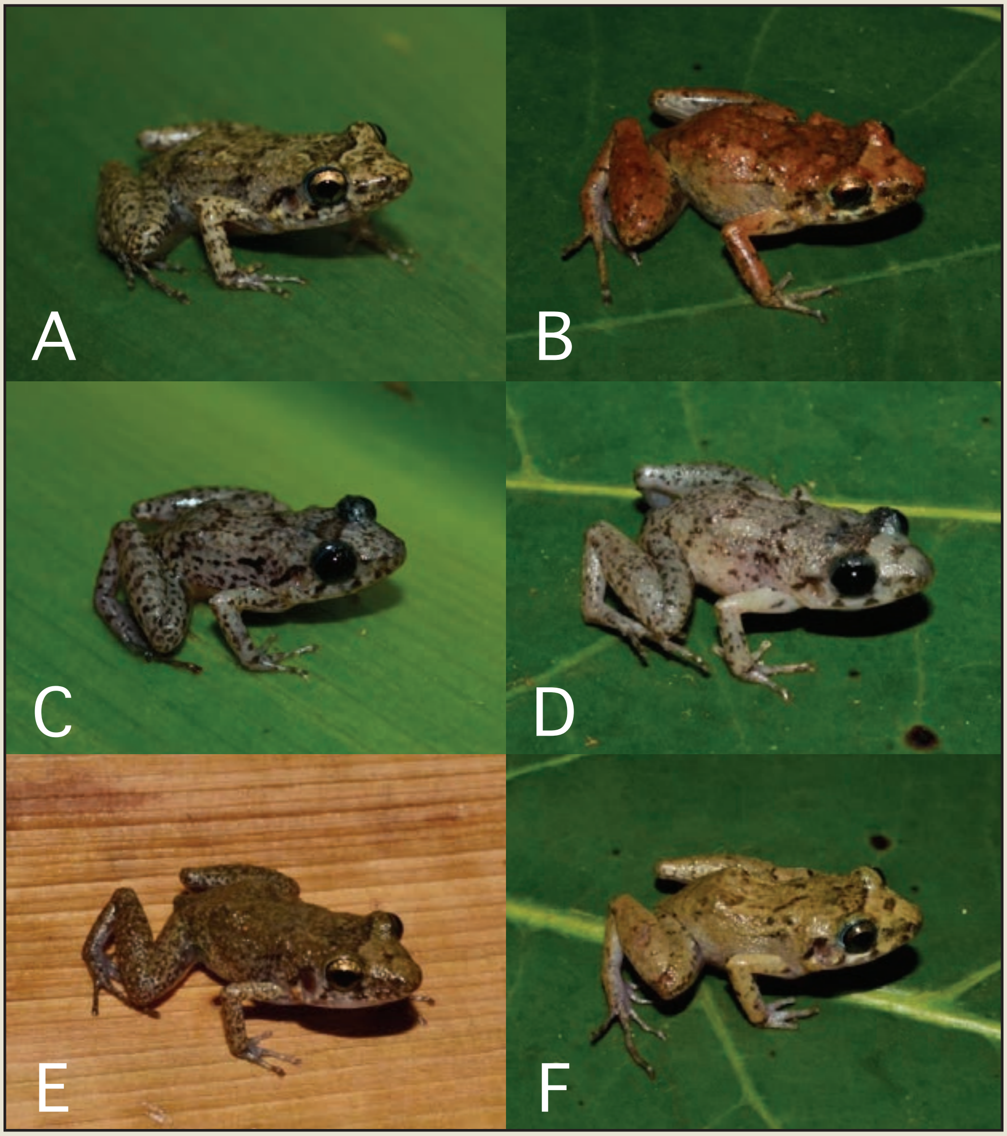

Fig. 1. Individuals of *Eleutherodactylus planirostris* from Municipio de Mérida (A, C, E) and from Emiliano Zapata, Municipio de Oxkutzcab (B, D, F), Yucatán, Mexico. © Javier A. Ortiz-Medina

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Literature Cited

Bomford, M., F. Kraus, S. C. Barry, and E. Lawrence. 2009. Predicting establishment success for alien reptiles and amphibians: a role for climate matching. Biological Invasions 11: 1,387–3,547.

Cedeño-Vázquez, J. R., J. González-Vázquez, A. Martínez-Arce, and L. Canseco-Márquez. 2014. First record of the invasive Greenhouse Frog (*Eleutherodactylus planirostris*) in the Mexican Caribbean. Revista Mexicana de Biodiversidad 85: 650–653.

García-Balderas, C. M., J. R. Cedeño-Vázquez, and R. Mineros-Ramírez. 2016. *Eleutherodactylus planirostris*. Distribution Notes. Mesoamerican Herpetology 3: 173.

Pavón-Vázquez, C. J., L. N. Gray, B. A. White, U. O. García-Vázquez, and A. S. Harrison. 2016. First records for Cozumel Island, Quintana Roo, Mexico: *Eleutherodactylus planirostris* (Anura: Eleutherodactylidae), *Trachycephalus typhonius* (Anura: Hylidae), and *Indotyphlops braminus* (Squamata: Typhlopidae). Distribution Notes. Mesoamerican Herpetology 3: 531–533.

Schwartz, A. 1974. *Eleutherodactylus planirostris* (Cope). Catalogue of American Amphibians and Reptiles 154: 1–4.

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Family Hylidae

***Ptychohyla leonhardschultzei* (Ahl, 1934).** MEXICO: OAXACA: Municipio de Santa Catarina Juquila, 3.8 km E of Santa Catarina Juquila (16.236936°N, -97.255507°W; datum WGS 84), elev. 1,794 m; 16 June 2016; Dominic L. DeSantis, Vicente Mata-Silva, Elí García-Padilla, and Larry David Wilson. Two individuals (CIB-5077, CIB-5078; Fig. 1A and 1B, respectively) were found calling while perched on vegetation in a riparian area surrounded by remnants of pine-oak forest; other individuals also were heard calling.

Another individual (CIB-5076, Fig. 1C) was found near El Obispo, in the same municipality (16.175215°N -97.322873°W; WGS 84), elev. 1,216 m; 14 June 2016; Dominic L. DeSantis, Vicente Mata-Silva, Elí García-Padilla, and Larry David Wilson. This frog was calling perched on vegetation next to a stream; other individuals were calling in the area. The three specimens are deposited in the herpetological collection of the Centro de Investigaciones Biológicas of the Universidad Autónoma del Estado de Hidalgo.

These individuals represent new records for the municipality of Santa Catarina Juquila, and slightly extend the distribution of this species in the state ca. 16 and 24 km (3.8 km of Santa Catarina Juquila and near El Obispo, respectively) to the W of various records in the Municipio de San Juan Lachao (Duellman, 2001; Köhler et al. 2016).

Fig. 1. Two adult male *Ptychohyla leonhardschultzei* (CIB-5077 and CIB-5078, A and B, respectively) from 3.8 km E of Santa Catarina Juquila, and another adult male (CIB-5076, C) from near El Obispo (1C), in Municipio de Santa Catarina Juquila, Oaxaca, Mexico.
© Vicente Mata-Silva

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Literature Cited

Duellman, W. E. 2001. The Hylid Frogs of Middle America. 2 Volumes. 2nd ed. Contributions to Herpetology, Volume 18, Society for the Study of Amphibians and Reptiles, Ithaca, New York, United States.

Köhler, G., R. G. Trejo-Pérez, V. Reuber, G. Wehrenberg, and F. Méndez-de la Cruz. 2016. A survey of tadpoles and adult anuras in the Sierra Madre del Sur of Oaxaca, Mexico (Amphibia: Anura). Mesoamerican Herpetology 3: 640–660.

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Amphibia: Caudata

Family Plethodontidae

***Pseudoeurycea conanti* Bogert, 1967**. MEXICO: OAXACA: Municipio de Zaragoza, Santa Cruz Itundujia, Cerro de las Chinches (16°40'42.99"N, -97°47'33.72"W; WGS 84); elev. 1,942 m; 12 May 2015; Maribel Riaño-García. A photograph of this individual is deposited in the University of Texas at El Paso Vertebrate Digital Collection (Photo voucher UTEP G-2017.4). This voucher (Fig. 1) represents a new municipality record, and narrows the gap between the closets localities ca. 46 km to the N from "near Municipio de Putla Villa de Guerrero" (IUCN SCC Amphibian Specialist Group, 2016), and ca. 86 km to the SSE at La Cumbre, Municipio de Villa de Sola de Vega (Parra-Olea et al., 1999; Mata-Silva et al., 2015). This individual was found crawling in leaf litter at 0850 h, in cloud forest with elements consisting of *Pinus douglasiana*, *Quercus elliptica*, *Stirax* sp., *Magnolia* sp., *Clethra* sp., and *Carpinus* sp. Unfortunately, salamanders (locally known as "niños cueros") in this region often are killed by most villagers, because of the erroneous belief that they will enter the vagina of women.

Fig. 1. An individual of *Pseudoeurycea conanti* (UTEP G-2017.4) from Cerro de las Chinches, Santa Cruz Itundujia, Municipio de Zaragoza, Oaxaca, Mexico. © Maribel Riaño-García

Acknowledgments.—A special thanks to Luis Miguel Cruz-González and Dominica García-García for field assistance, and to Arthur Harris for kindly providing the photo voucher number.

Literature Cited

IUNC SSC Amphibian Specialist Group. 2016. *Pseudoeurycea conanti*. The IUCN Red List of Threatened Species 2016: e.T59375A53981822. www.dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T59375A53981822.en; accessed 4 February 2017.

Mata-Silva, V., D. L. DeSantis, E. García-Padilla, and L. D. Wilson. 2015. Comments on the natural history of the rare salamander *Pseudoeurycea conanti* (Caudata: Plethodontidae) from Oaxaca, Mexico. Mesoamerican Herpetology 2: 533–535.

Parra-Olea G., M. Garcia-Paris, and D. B. Wake. 1999. Status of some populations of Mexican salamanders (Amphibia: Plethodontidae). Revista de Biología Tropical 47: 217–223.

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Reptilia: Squamata (lizards)

Family Anguidae

***Gerrhonotus infernalis* (Baird, 1859).** MEXICO: DURANGO: Municipio de Santiago Papasquiaro, Mex Hwy 36 between Santiago Papasquiaro and Topia (25.08647°N, -105.54132°W, WGS 84), elev. 2,197 m; 10 August 2008; Ginny N. Weatherman, Coleman M. Sheehy III, Christian L. Cox, and Jacobo Reyes-Velasco. Museo de Zoología, Facultad de Ciencias, Universidad Nacional Autónoma de México (MZFC; field number JAC 29285). Hwy 36 W of Santiago Papasquiaro (25.08665°N, -105.54322°W, WGS 84), elev. 2,200 m; 11 July 2016; R. W. Bryson, Jr. and J. Galvan. Museo de Zoología, Facultad de Estudios Superiores Zaragoza, Universidad Nacional Autónoma de México (photo vouchers MZFZ IMG 17–18). These records extend the known distribution of this taxon ca. 120 (airline) km to the S from the closest recorded site in Durango (Webb and Hensley, 1959) and ca. 185 km to the W of records in eastern Durango (Gadsden et al., 2006). Both specimens were found along the rocky foothills of the Sierra Madre Occidental in Madrean pine-oak forest.

Under the proposed taxonomy of Lemos-Espinal et al. (2004) and Lemos-Espinal and Smith (2007), this population of *Gerrhonotus* is assignable to *G. taylori* Tihen, 1954. Good (1994), however, found no morphological differences between *G. infernalis* and *G. taylori* and subsequently proposed that *G. taylori* be synonymized with *G. infernalis*. Neither Lemos-Espinal et al. (2004) nor Lemos-Espinal and Smith (2009) presented new data to counter Good's (1994) proposal. We therefore follow the taxonomic recommendations of Good (1994) and Liner and Casas-Andreu (2008) and use the name *G. infernalis* rather than *G. taylori*.

Literature Cited

Gadsden, H., J. L. Estrada-Rodríguez, and S. V. Leyva-Pacheco. 2006.Checklist of amphibians and reptiles of the Comarca Lagunera in Durango-Coahuila, Mexico. Bulletin of the Chicago Herpetological Society 41:2–9.

Good, D. A. 1994. Species limits in the genus *Gerrhonotus* (Squamata: Anguidae). Herpetological Monographs 8: 180–202.

Lemos-Espinal, J. A., D. Chiszar, H. M. Smith, and G. Woolrich-Piña. 2004. Selected records of 2003 lizards from Chihuahua and Sonora, Mexico. Bulletin of the Chicago Herpetological Society 39: 164–168.

Lemos-Espinal, J. A., and H. M. Smith 2007. Anfibios y Reptiles del Estado de Chihuahua, México / Amphibians and Reptiles of the State of Chihuahua, Mexico. Universidad Nacional Autónoma de México, México, and Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico.

Liner, E. A., and G. Casas-Andreu (Eds.). 2008. Nombres Estándar en Español en Inglés y Nombres Científicos de los Anfibios y Reptiles de México / Standard Spanish, English and Scientific Names of the Amphibians and Reptiles of Mexico. 2nd ed. Society for the Study of Amphibians and Reptiles, Herpetological Circular 38, Shoreview, Minnesota, United States.

Webb, R. G., and M. Hensley. 1959. Notes on reptiles from the Mexican state of Durango. Publications of the Museum, Michigan State University. Biological Series 1: 249–258.

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Family Dactyloidae

Norops sagrei **(Duméril & Bibron, 1837).** MEXICO: VERACRUZ: Municipio de Córdoba, Córdoba (18°52'59.42"N, 96°55'27.02"W; WGS 84); elev. 827 m; 16 June 2015. At 1413 h, we encountered a population of *Norops sagrei* (Fig. 1), outside of its known range in Mexico. The population, found in secondary vegetation, consisted of 40 individuals: 12 males, 23 females, and five juveniles. We measured four individuals (Table 1) following the measurements reported by Lee (1996), and deposited a photo voucher in the University of Texas at Arlington Digital Collection (UTADC-8763); all of the lizards were released at the site. Our observation constitutes the first record of this specie in the Altas Montañas de Veracruz, suggesting that this population was transported to this area by vehicle. This report represents a range extension of 275 km to the NE of the closest previously reported locality in Municipio de Minatitlán (IBUNAM:CNAR:19729; Departamento de Zoología, 2016); Mestizo-Rivera (2006) reported this municipality, and according to Álvarez-Romero et al. (2005) it corresponds to the nonnative distribution of this species.

Fig. 1. A male *Norops sagrei* (UTADC-8763) from Córdoba, Veracruz.
© Arleth Reynoso-Martínez

Table 1. Measurements of individuals of *Norops sagrei* for Municipio de Córdoba, Veracruz, Mexico. SVL = snout–vent length, and TL = tail length.

SVL	TL	Sex	Age Class
62 mm	163 mm	Male	Adult
55 mm	95 mm	Male	Adult
54 mm	130 mm	Female	Adult
34 mm	95 mm	Male	Juvenile
$\bar{x}$ = 51.25 ± 10.4	$\bar{x}$ = 120.75 ± 28.2		

Acknowledgments.—We thank to Luis Canseco-Márquez and Sean Rovito for their support in preparing the manuscript, Arleth Reynoso-Martínez for providing the photo of the species, and Carl J. Franklin for cataloguing the digital photograph.

Literature Cited

Álvarez-Romero, J., R. A. Medellín, H. Gómez de Silva, and A. Oliveras de Ita. 2005. *Anolis sagrei*. Vertebrados superiores exóticos en México: diversidad, distribución y efectos potenciales. Instituto de Ecología, Universidad Nacional Autónoma de México. Bases de datos SNIB-CONABIO, Proyecto U020, México. D.F., Mexico.

Departamento de Zoología. 2016. *Anolis sagrei* Duméril & Bibron, 1837, ejemplar de: Colección Nacional de Anfibios y Reptiles (CNAR). *In* Portal de Datos Abiertos UNAM, Instituto de Biología (IBUNAM), Universidad Nacional Autónoma de México, México. (www.datosabiertos.unam.mx/IBUNAM:CNAR:19729; accessed 13 December 2016).

Lee, J. C. 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Mestizo-Rivera, L. R. 2006. La Herpetofauna del Pantano Santa Alejandrina, Minatitlán, Veracruz, México. Unpublished Licenciatura thesis. Universidad Veracruzana, Facultad de Biología, Xalapa, Veracruz, Mexico.

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Family Gekkonidae

***Hemidactylus turcicus* (Linnaeus, 1758).** MEXICO: SONORA: Municipio de Hermosillo, Las Quintas (29.0815°N, 110.9898°W; WGS 84), elev. 195 m; 20 October 2016; Rafael A. Lara-Resendiz. A photograph of this individual was deposited in the national collection of amphibians and reptiles of the Universidad Nacional Autónoma de México (Photo Voucher UNAM; IBH-RF 414). Another individual was found (online record 4153534) in the same municipality, Colonia La Huerta (29.08859°N, 110.97187°W; WGS 84), elev. 203 m; 19 September 2016, and provided by Naturalista (CONABIO, 2016). Both geckos were found on house walls at 2053 h and 2029 h, respectively.

These observations represent a range extension of ca. 103 km to the ENE (airline distance) from nearest record in Bahía de Kino, Sonora (Peralta-García and Valdez-Villavicencio, 2008; Rorabaugh and Lemos-Espinal, 2016).

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Literature Cited

CONABIO. 2016. Naturalista. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico. (www.naturalista.mx/observations/4153534; acces-sed 16 December 2016).

Peralta-García, A., and J.H. Valdez-Villavicencio. 2008. Geographic Distribution. *Hemidactylus turcicus* (Mediterranean Gecko). Herpetological Review 39: 367.

Rorabaugh, J. C., and J. A. Lemos-Espinal. 2016. A Field Guide to the Amphibians and Reptiles of Sonora, Mexico. ECO Herpetological Publishing and Distribution, Rodeo, New Mexico, United States.

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Reptilia: Squamata (snakes)

First record of *Leptophis ahaetulla* (Linnaeus, 1758) (Squamata: Colubridae) from the state of Yucatán, Mexico

The Green Parrot Snake, *Leptophis ahaetulla*, is one of 11 species currently included in the colubrid genus *Leptophis* (Murphy et al., 2013). In Mexico, this species is found in the states of Veracruz, Tabasco, Campeche, Quintana Roo, Oaxaca, and Chiapas, and its distribution extends southward through Central America to Ecuador, Brazil, and Argentina (Lee, 1996; Campbell, 1998; Köhler, 2008; Johnson et al., 2010; Wallach et al., 2014), at elevations from sea199 level to 1,300 m (Köhler, 2008). Wallach et al. (2014) included this species in the state of Yucatán, but this information was in error (V. Wallach, pers. comm. to L. Porras).

According to the distribution maps in Lee (1996; 2000), the known range of *L. ahaetulla* in the Península de Yucatan includes localities in Quintana Roo and southern Campeche; these maps suggested (with question marks) the possible occurrence of this species in the eastern portion of the state of Yucatán. More recently, on 1 September 2014 Sabrina Van Remoortere uploaded an observation of *L. ahaetulla* in the iNaturalist online project (www.inaturalist.org; accessed 10 May 2016) from Área de Protección de Flora y Fauna Otoch Ma'ax Yetel Kooh (also known as Reserva Punta Laguna), Municipio de Solidaridad, Quintana Roo (20°38'44.84"N, 87°38'2.71"W; WGS 84; elev. 27 m), from ca. 11.4 km to the E (airline distance) of the border with the state of Yucatán. Presently, however, no published reports are available to confirm the presence of *L. ahaetulla* in the state of Yucatán.

On 16 October 2016 at ca. 1545 h, one of us (MATS) found an adult *L. ahaetulla* at 3.2 km to the SE of Colonia Yucatán, Municipio de Tizimín, Yucatán, Mexico (21°11'40.46"N, 87°42'1.76"W; WGS 84; elev. 15 m Fig. 1); the snake was found dead on the road from La Sierra to San Juan Kilómetro Cuatro, in semi-evergreen tropical forest. We deposited a photograph of the snake at the University of Texas at El Paso Biodiversity Digital

Fig.1. A *Leptophis ahaetulla* (UTEP G-2017.11) from 3.2 km to the SE of Colonia Yucatán, Municipio de Tizimín, Yucatán, Mexico. © Miguel A. Torres-Solís

Collection (UTEP G-2017.11). This voucher represents a new state record, located ca. 56.6 km to the NW (airline distance) of the nearest reported locality at Leona Vicario (as "Colonia Santa María"), Quintana Roo (Lee, 1996).

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Literature Cited

Campbell, J. A. 1998. Amphibians and Reptiles of Northern Guatemala, the Yucatán, and Belize. University of Oklahoma Press, Norman, Oklahoma, United States.

Köhler, G. 2008. Reptiles of Central America. 2nd ed. Herpeton, Offenbach, Germany.

Johnson, J. D., V, Mata-Silva, and A. Ramírez-Bautista. 2010. Geographic distribution and conservation of the herpetofauna of southeastern Mexico. Pp. 323–369 *In* L, D. Wilson, J. H. Townsend, and J. D.Johnson (Eds.), Conservation of Mesoamerican Amphibians and Reptiles. Eagle Mountain Publishing, LC, Eagle Mountain, Utah, United States.

Lee, J. C. 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press. Ithaca, New York, United States.

Lee, J. C. 2000. A Field Guide to the Amphibians and Reptiles of the Maya World: The Lowlands of Mexico, Northern Guatemala, and Belize. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Murphy, J. C., S. P. Charles, R. M., Lehtinen and K. L. Koeller. 2013. A molecular and morphological characterization of Oliver's parrot snake, *Leptophis coeruleodorsus* (Squamata: Serpentes: Colubridae) with the description of a new species from Tobago. Zootaxa 3,718: 561–574.

Wallach, V., K. L. Williams, and J. Boundy. 2014. Snakes Species of the World: A Cataloguе of Living and Extant Species. CRC Press, Taylor & Francis Group, Boca Raton, Florida, United States.

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Family Leptotyphlopidae

***Rena dulcis* Baird and Girard, 1853.** MEXICO: HIDALGO: Municipio de Tepeapulco, Cd. Sahagún (19.76959°N, -98.576°W) elev. 2,462 m; 25 May 2016; Abigail Magaly Reyes-Vera. The snake (CIB-5084), found dead by a dog in the morning on the lawn of a house, was donated to the Herpetological Collection of the Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo. The specimen represents a new municipality record, with the closest known locality ca. 63.13 km to the SE (airline distance) in the vicinity La Casita, Municipio de Metztitlán (Ramírez-Bautista et al*.*, 2010).

Acknowledgments.—A special thanks to Irene G. Mayer-Goyenechea for kindly providing the specimen number.

Literature Cited

Ramírez-Bautista, A., U. Hernández-Salinas, F. Mendoza-Quijano, R. Cruz-Elizalde, B. P. Stephenson, V. D. Vite-Silva, and A. Leyte-Manrique. 2010. Lista Anotada de los Anfibios y Reptiles del Estado de Hidalgo, México. Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, and Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, D.F., Mexico.

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Family Typhlopidae

***Indotyphlops braminus* (Daudin, 1803).** MEXICO: HIDALGO: Municipio de Metztitlán, near Los Venados (20.467997°N, -98.679454°W; WGS 84); elev. 1,308 m; 28 August 2016; Cristian Raúl Olvera-Olvera. This individual (Photo voucher CH-CIB 85; Fig. 1) represents a new municipality record, with the closest known locality 54.73 km to the ENE (airline distance) in Tunititlán, Municipio de Chilcuautla (Fernández-Badillo et al., 2015). The snake was found under a rock, in xerophytic scrub. This voucher represents the third record of this species for the state of Hidalgo (Hernández-Salinas and Ramírez-Bautista, 2010; Fernández-Badillo et al., 2015). The photo voucher is deposited in the Photographic Collection of the Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo.

Fig. 1. *Indotyphlops braminus* (CH-CIB 85) from Los Venados, Municipio de Metztitlán, Hidalgo, Mexico.
© Cristian Raúl Olvera-Olvera

Literature Cited

Fernández-Badillo, L., A. Archundia-Cedillo, C. M. Torrez-Nuñez, J. A. Hernéandez Beltran, and V. J. Acevedo-Mota. 2015. Distribution Notes. *Indotyphlops braminus* (Daudin, 1803). Mesoamerican Herpetology. 4: 551–552.

Hernández-Salinas, U., and A. Ramírez-Bautista. 2010. Geographic Distribution. *Ramphlotyphlops braminus* (Brahminy Blind Snake). Herpetological Review 41: 519.

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Family Viperidae

***Crotalus culminatus* Klauber, 1952**. MEXICO: OAXACA: Municipio de Zaragoza, Paraje Río Tigre (16°41'24.58"N, -97°42'41.43"W; WGS 84), elev. 758 m; 13 August 2011; Maribel Riaño-García. A photograph of this individual is deposited in the University of Texas at El Paso Vertebrate Digital Collection (Photo voucher UTEP G-2017.10). This voucher (Fig. 1) represents a new municipality record, and fills a gap between the nearest known localities at ca. 77 km to the SSE and 126 km to the W (airline distance), respectively, in Parque Nacional Lagunas de Chacahua, Municipio de Villa de Tututepec de Melchor Ocampo, Oaxaca (García-Grajales, et al., 2016) and Copala, Guerrero (Armstrong and Murphy, 1979). The individual was found coiled in leaf litter, in habitat consisting of pine-oak forest and a coffee grove.

Fig. 1. A *Crotalus culminatus* (UTEP G-2017.10) found at Paraje Río Tigre, Municipio de Zaragoza, Oaxaca, Mexico.

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

Literature Cited

Armstrong, B. I., and J. B. Murphy. 1979. The Natural History of Mexican Rattlesnakes. Special Publication of the Museum of Natural History, University of Kansas 5: *i–vii* + 1–88.

García-Grajales, J., A. Buenrostro-Silva, and V. Mata-Silva. 2016. Diversidad herpetofaunística del Parque Nacional Lagunas de Chacahua y La Tuza de Monroy, Oaxaca, México. Acta Zoológica Mexicana (n. s.) 32: 90–100.

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Reptilia: Testudines

Family Kinosternidae

***Claudius angustatus* (Cope, 1865).** MEXICO: YUCATÁN: Municipio de Hunucmá, 3.7 km SE of Sisal (21°8'11.17"N, 90°0'34.72"W; WGS 84); elev. 3 m; 13 December 2016; Jonatán A. Ravell-Ley. Two photographs of the turtle are deposited at the University of Texas at El Paso Vertebrate Digital Collection (Photo Vouchers UTEP G-2017.2 and G-2017.3). The turtle (Fig. 1) was found in the rain at 0936 h, crossing a road through a mosaic of vegetation consisting of mangrove swamp, influenced by flooded tropical forest and flooded grassland. Flooding in this area is seasonal (from July to February), but some bodies of water known as *petenes* are still available during the dry season, which is the reason why the salinity is low or null. The main plants in this area are *Conocarpus erectus* and *Crescentia cujete*, with elements of *Acoelorrhaphe wrightii*, and the main grasses are *Cladium jamaicense* and *Eleocharis mutata.* This voucher represents the second published record of *Claudius angustatus* for the state of Yucatán, as well as the northernmost record on the Yucatan Peninsula, extending the know distribution of this species 36 km to the NE (airline distance) from the single known reported locality in the state at "20 km E Celestún" (Calderón-Mandujano et al., 2001).

Fig. 1. Two images of an individual *Claudius angustatus* (UTEP G-2017.2 and G-2017.3, respectively) from 3.7 km SE of Sisal, Municipio de Hunucmá, Yucatán, Mexico. © Jonatán A. Ravell-Ley

Acknowledgments.—We thank Arthur Harris for kindly providing the photo voucher numbers.

Literature Cited

Calderon-Mandujano, R., J. R. Cedeño-Vázquez, and C. Pozo. 2001. Geographic Distribution. *Claudius angustatus* (Narrowbridge Musk Turtle). Herpetological Review 32: 191.

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Two new herpetofaunal records for Stann Creek District, Belize

While the diversity of amphibians and reptiles in Belize is relatively well understood (Stafford et al., 2010), new records of previously overlooked taxa continue to expand our knowledge of their distributions. Here, we report two new records for Stann Creek District, *Bolitoglossa dofleini* and *Ninia diademata*, encountered during a community ecology study performed by RJG between June and September of 2016 at the Toucan Ridge Ecology and Education Society field station. Multiple individuals of each species were captured using funnel traps, and then released. We deposited three photo vouchers of an individual of each species in the San Diego Natural History Museum Department of Herpetology digital collection, and elaborate on the records and their significance below.

Amphibia: Caudata

Family Plethodontidae

***Bolitoglossa dofleini* (Werner, 1903).** BELIZE: STANN CREEK: Stann Creek West Constituency, Toucan Ridge Ecology and Education Society field station, near Middlesex (17.050467°N, 88.567400°W; WGS 84); elev. 192 m; Russell J. Gray. Two individuals were found in evergreen broadleaf forest. One individual found on 5 June 2016 (SDSNH_HerpPC_05350–2; Fig. 1) was digitally vouchered.

The distribution of *Bolitoglossa dofleini* is poorly documented in Belize, and the species is considered rare in the Yucatan Peninsula (Lee, 2000). McCoy (1990) reported a single specimen from Cayo District (CM 112124), the only one referenced in Lee (1996). This species also is known from the Columbia River Forest Reserve in Toledo District (Meerman and Lee, 2003), as noted in Stafford et al. (2010). This voucher represents the first verified record of *B. dofleini* in Stann Creek, extending the known range ca. 65 km (airline distance) to the NE from the locality of CM 112124 (McCoy, 1990) and ca. 92 km (airline distance) to the NE from the Toledo District locality.

Reptilia: Squamata

Family Dipsadidae

***Ninia diademata* Baird and Girard, 1853.** BELIZE: STANN CREEK: Stann Creek West Constituency, Toucan Ridge Ecology and Education Society field station, near Middlesex (17.050500°N, 88.567430°W; WGS 84); elev. 192 m; Russell J. Gray. Four adults (three males, one not sexed) were found in an overgrown orchard near evergreen broadleaf forest. One adult male found on 2 September 2016 (SDSNH_HerpPC_05347–9; Fig. 2) was digitally vouchered.

Little is known about the distribution of *Ninia diademata* in Belize. Stafford and Meyer (2000) noted that this species occurs in "Cayo and Toledo Districts" (p. 222), and later indicated its occurrence in Stann Creek District as "#?" (p. 321), meaning "confirmed from District but specific locality(s) unknown." Stafford et al. (2010) made no mention of potential localities in Stann Creek, and listed its distribution only as Cayo and Toledo districts. Additionally, Lee (1996; 2000) and Wallach et al. (2014) did not list this species as occurring in the country outside of Toledo. To our knowledge, only a single specimen of *N. diademata* from Belize exists (KU 157600; "2.7 mi NE of Golden Stream", Toledo District; Lee, 1996: 343). Therefore, these vouchers represent the first records of *N. diademata* with verified localities in Stann Creek District, extending the known range of this species ca. 78 km (airline distance) to the NNE from the locality of KU 157600, and ca. 36 km (airline distance) to the NE from the Cayo District locality given by Stafford and Meyer (2000) without a reference.

Fig. 1. Dorsal (top) and frontal (bottom) views of a *Bolitoglossa dofleini* (SDSNH_HerpPC_05350, 05352) from Stann Creek District, Belize. © Russell J. Gray

Fig. 2. An adult *Ninia diademata* (SDSNH_HerpPC_05347) from Stann Creek District, Belize. © Russell J. Gray

Acknowledgments.—We thank the directors of Toucan Ridge Ecology and Education Society, Vanessa Kilburn and Mathieu Charette, for their support, and Bradford D. Hollingsworth for providing the photo voucher numbers. This study was carried out under Scientific Collection/Research Permit Ref. No. WL/1/1/16(48) and we thank Edgar Correa of the Belize Forestry Department for assistance obtaining the permit. Finally, we thank Louis W. Porras and Javier Sunyer for helpful comments on the manuscript.

Literature Cited

Lee, J. C. 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Lee, J. C. 2000. A Field Guide to the Amphibians and Reptiles of the Maya World: The Lowlands of Mexico, Northern Guatemala, and Belize. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

McCoy, C. J. 1990. Additions to the herpetofauna of Belize, Central America. Caribbean Journal of Science 26: 166–170.

Meerman, J., and J. C. Lee. 2003. Amphibians and Reptiles of the Columbia River Forest Reserve. Pp. 66–70 *In* J. Meerman and S. Matola (Eds.), The Columbia River Forest Reserve: Little Quartz Ridge Expedition, A Biological Assessment. Columbia University Printing Services, New York, New York, United States.

Stafford, P. J., and J. R. Meyer. 2000. A Guide to the Reptiles of Belize. Academic Press, London, United Kingdom.

Stafford, P. J., P. Walker, P. Edgar, and M. G. Penn. 2010. Distribution and conservation of the herpetofauna of Belize. Pp. 371–404 *In* L. D. Wilson, J. H. Townsend, and J. D. Johnson (Eds.), Conservation of Mesoamerican Amphibians and Reptiles. Eagle Mountain Publishing, LC, Eagle Mountain, Utah, United States.

Wallach, V., K. L. Williams, and J. Boundy. 2014. Snakes of the World: a Catalogue of Living and Extinct Species. CRC Press, Taylor & Francis Group, Boca Raton, Florida, United States.

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Verified distribution records and prey items of *Isthmura bellii* (Gray, 1850) (Caudata: Plethodontidae) in Jalisco, Mexico

Bell's False Brook Salamander, *Isthmura bellii* (Gray, 1850), formerly in the genus *Pseudoeurycea* (see Rovito et al., 2015), is a species endemic to Mexico that inhabits pine and pine-oak forests at high elevations (Parra-Olea et al., 2005). This species is considered as threatened by Mexican law NOM-059-2010 (SEMARNAT, 2010), and has been assessed as Vulnerable in the IUCN Red List of Threatened Species (IUCN, 2016). Herein, we present two verified distribution records from western Jalisco, Mexico, and report on prey items found in the stomach contents of one individual.

An individual of *I. bellii* was found on 20 June 2016, on the road to Barrio de Las Garrapatas, Municipio de San Sebastián del Oeste, San Sebastián (20°45'39.96"N, -104°51'15.32"W; datum WGS 84); elev. 1,415 m; Raúl Bernal-Contreras. On June 21 2016, another *I. bellii* was found at San Sebastián, Calle La Pareja (20°45'43.62"N, -104°51'34.09"W; datum WGS 84); elev. 1,417 m; Miguel Ángel Lepe-Sánchez. Both salamanders were encountered and photographed during the rainy season. Photo vouchers were deposited at the University of Texas at El Paso Biodiversity Digital Collection. The vegetation in the vicinity of San Sebastián is dominated by pines (*Pinus* sp.) and patches of cloud forest. The first animal (UTEP G-2017.16) was observed near a house on a street made of rocks (Fig. 1A), and the second (UTEP G-2017.17) was found dead on a sidewalk under a Shamel Ash (*Fraxinus uhdei*), near a coffee plantation (Fig. 1B). The dead specimen was an adult male measuring 94.73 mm in snout–vent length and 189.57 mm in total length. This specimen (specimen number not asigned) was deposited in the Collection of the Instituto de Biología, Estación de Biología de Chamela (EBCH), Universidad Nacional Autónoma de México (UNAM).

Although the occurrence of *I. bellii* in Nayarit (north of San Sebastián, Jalisco) has been discussed recently (Luja et al., 2014; Woolrich-Piña et al., 2016), collecting or georeferencing data from Nayarit were not provided. Luja et al. (2014: 1,139) mentioned nearby records of *I. bellii* in San Sebastián del Oeste, but did not provide additional information. Our observations, therefore, are the first verified records of *I. bellii* in the municipality of San Sebastián del Oeste, Jalisco (Fig. 2). Our observations also extend the distribution of this species ca. 162 km SW (airline distance) from the nearest locality in Jalisco, at Sierra de los Huicholes, 29 km NW of Bolaños on the road to Huejuquilla and ca. 26 km S (airline distance) from Nayarit (Jalisco–Nayarit border; Ahumada-Carrillo et al. 2014; Woolrich-Piña et al. 2016). These records of *I. bellii* represent the closest records to the Pacific coast ca. 42 km W (airline distance) from Bahía de Banderas, Jalisco–Nayarit (shared by the municipality of Bahía de Banderas in Nayarit and the municipalities of Puerto Vallarta and Cabo Corrientes in Jalisco).

Canseco-Márquez and Gutiérrez-Mayén, (2010) indicated a varied diet for *I. bellii*, including insects (Hemiptera: Lygaeidae and Coreidae), adult beetles (Coleoptera: Tenebrionidae and Chrysomelidae), larvae (Coleoptera: Tenebrionidae), parasitic Hymenoptera, Lepidoptera larvae (Pyralidae), insect eggs, pillbugs (Crustacea: Isopoda), millipedes (Diplopoda), and spiders (Arachnida: Araneae). We conducted a stomach content analysis of the dead salamander and found the following prey items: Cosmatidae (Opiliones), *Oxidus gracilis* (Koach, 1847), (Diplopoda: Polydesmida: Paradoxosomatidae), Raphidophoridae (Orthoptera), and Philonthina (Coleoptera: Staphylinidae: Staphylininae) (Fig. 3). Our analysis revealed new orders and families of arthropods as part of diet of *I. bellii*.

Fig. 1. Individuals of *Isthmura bellii* from San Sebastián, Municipio de San Sebastián del Oeste, Jalisco. (A) UTEP G-2017.16, photographed 20 June 2016; and (B); UTEP G-2017.17, photographed 21 June 2016.

© Raúl Bernal-Contreras (A) and Miguel Ángel Lepe-Sánchez (B)

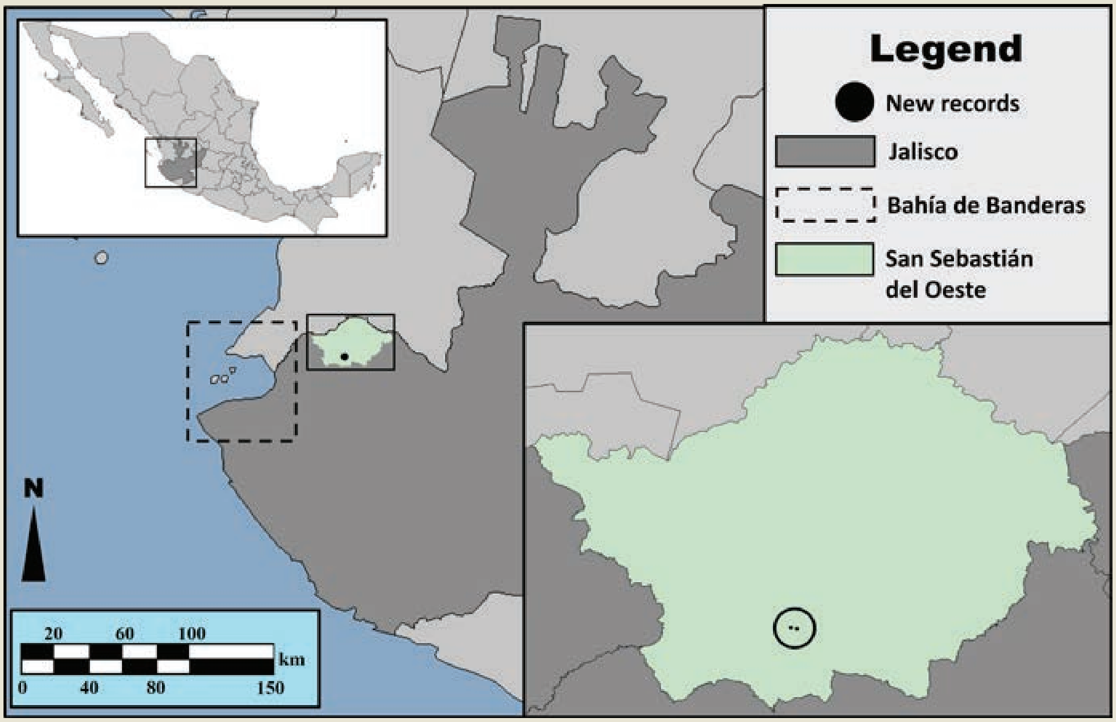

Fig. 2. Map indicating the new localities for *Isthmura bellii* from San Sebastián, Municipio de San Sebastián del Oeste, Jalisco, Mexico.

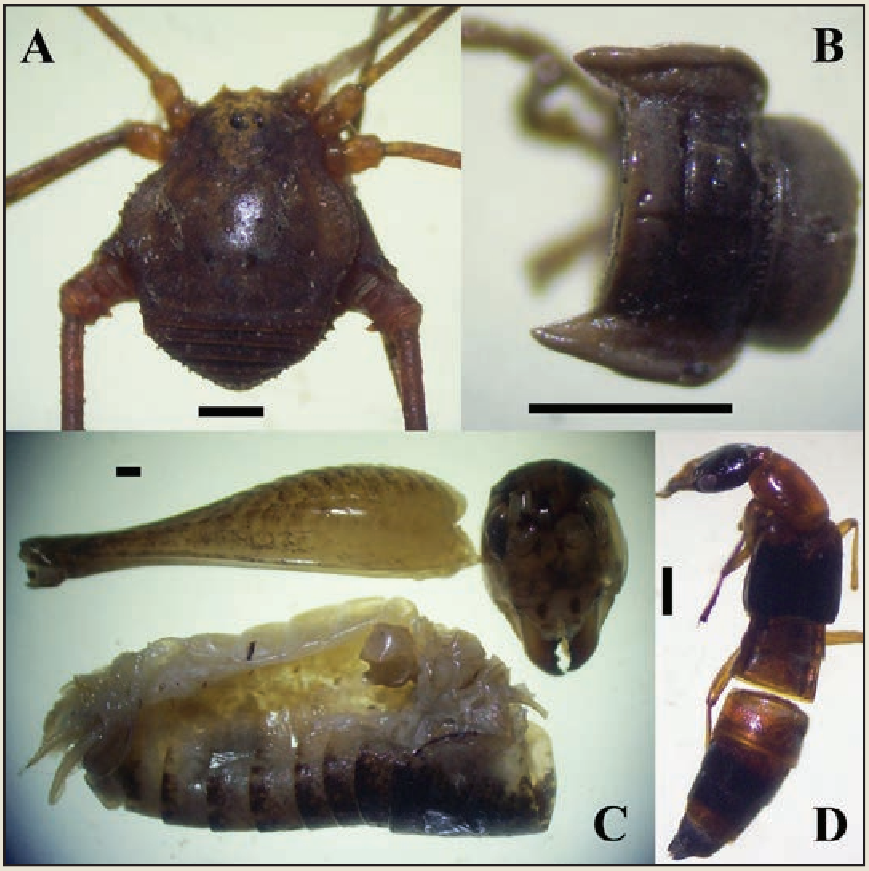

Fig. 3. Stomach contents found in a specimen of *Isthmura bellii* (specimen number not assigned) (A) Order Opiliones, family Cosmetidae; (B) a diplosegment of the millipede *Oxidus gracilis*; (C) the abdomen, head, and femur of hind leg of an orthopteran, family Raphidophoridae; and (D) a beetle, family Staphylinidae, subtribe Philonthina. Scale bar 1 mm. © Fabio Germán Cupul-Magaña

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Literature Cited

Ahumada-Carrillo, I. T., N. Pérez, J. Reyes-Velasco, C. I. Grünwald, and J. M. Jones. 2014. Geographic Distribution. Notable records of amphibians and reptiles from Colima, Nayarit, Jalisco and Zacatecas, México. Herpetological Review 45: 287–291.

Canseco-Márquez, L., and M. G. Gutiérrez-Mayen. 2010. Anfibios y Reptiles del Valle de Tehuacán-Cuicatlán. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Fundación para la Reserva de la Biosfera Cuicatlán A.C., and Benemérita Universidad Autónoma de Puebla, México, D.F., Mexico.

IUCN. 2016. The IUCN Red List of Threatened Species. Version 2016.1. (www.iucnredlist.org; accessed 1 July 2016).

Luja, V. H., I. T. Ahumada-Carrillo, P. Ponce-Campos, and E. Figueroa-Esquivel. 2014. Checklist of amphibians of Nayarit, western Mexico. Check List, 10: 1,336–1,341.

Parra-Olea, G., M. Garcia-Paris, T. J. Papenfuss, and D. B. Wake. Systematics of the *Pseudoeurycea bellii* (Caudata: Plethodontidae) species complex. Herpetologica, 61: 145–158.

Rovito, S. M., G. Parra-Olea, E. Recuero, and D. B. Wake. 2015. Diversification and biogeographical history of Neotropical plethodontid salamanders. Zoological Journal of the Linnean Society 175: 167–188.

SEMARNAT. 2010. (Secretaría de Medio Ambiente y Recursos Naturales) Norma Oficial Mexicana NOM-059-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. Diario Oficial de la Federación. Ciudad de México, Mexico.

Woolrich-Piña, G. A., P. Ponce-Campos, J. Loc-Barragan, J. P. Ramírez-Silva, V.

Mata-Silva, J. D. Johnson, E. García-Padilla, and L. D. Wilson. 2016. The herpetofauna of Nayarit, Mexico: composition, distribution, and conservation status. Mesoamerican Herpetology 3: 376–448.

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Morphological variation in *Abronia reidi* (Squamata: Anguidae) with comments on distribution

Many herpetofaunal species in Mesoamerica are known to science from few specimens, and hence their morphological variation remains poorly characterized (Bezy and Camarillo R., 2002; Wilson and Townsend, 2007; Mendelson III et al., 2015; Wilson and Mata-Silva, 2015; Kubicki, 2016). The lack of comparative material in such taxa typically is due to a combination of restricted geographic range and secretive natural history (Caviedes-Solis et al., 2015; Wallach, 2016), often compounded by their occupancy of difficult-to-sample habitats, such as forest canopies (Mendelson III et al., 2015). Arboreal alligator lizards in the genus *Abronia* exemplify these patterns (Campbell and Frost, 1993; Bille, 2001). Encompassing 29 described species, this genus ranges from Mexico through Guatemala and into parts of Honduras and El Salvador. Generally, *Abronia* are forest-canopy specialists distributed allopatrically across highland regions. Six morphologically and genetically diagnosable clades are recognized within the genus (Campbell and Frost, 1993; Chippindale et al., 1998). One of these clades, *Abaculabronia*, typically is considered a subgenus. This clade contains two described species: *Abronia ornelasi* Campbell, 1984, and *A. reidi* Werler and Shannon, 1961.

Cumulatively, *Abaculabronia* is known to science from only nine specimens. *Abronia ornelasi* was last reported in 1980 and is known from the holotype and six paratypes, with only one female represented. All were taken at elevations from 1,500 to 1,600 m on Cerro Baúl, in the Chimalapas highlands of Oaxaca and Chiapas, Mexico (Campbell, 1984). Scientists last documented *A. reidi* in 1954. This species is known from just two specimens, the adult male holotype and a juvenile female paratype, both from an elevation of 1,635 m on the crater rim of Volcán San Martín Tuxtla, in the Sierra de Los Tuxtlas of Veracruz, Mexico (Werler and Shannon, 1961).

Here, we describe morphological variation from two additional *A. reidi*, based on voucher photographs deposited at the Natural History Museum of Los Angeles County (LACM PC; the PC indicates Photo Collection). Together, these two individuals revise our concept of the species' diagnostic traits, and narrow the morphological divergence separating *A. reidi* from *A. ornelasi*. Our new material also expands the known distribution of *A. reidi* within the Sierra de Los Tuxtlas.

Our two new *A. reidi* were temporarily made available to one of us (PH) for photography in the early 2000s by a resident of La Victoria, Municipio de Catemaco, Veracruz. One of these (LACM PC 2105–2107) was a live adult male (Fig. 1). We analyze this male here for the first time, but it previously was mentioned in the literature (Heimes, 2002; Zaldívar Riverón et al., 2002). This male was collected along with a live adult female when the pair reportedly fell from a tree while mating, along a dirt road at an elevation of 1,000–1,200 m on the slopes of the Santa Marta area, Sierra de Los Tuxtlas. We do not report on this female further, due to lack of suitable photographic documentation. The second individual we studied (LACM PC 2105–2107) was a road-killed adult male (Fig. 2) from an undisclosed location on the slopes of Volcán Santa Marta, Sierra de Los Tuxtlas. The eventual disposition of these three individuals is unknown, but we presume them to be lost. In reporting these individuals, we follow the scale terminology of Bogert and Porter (1967) and scale count protocols from Campbell (1982). For bilateral head scales, we recorded counts on both sides, expressed herein as "right/left."

Abaculabronia are differentiated from all other *Abronia* subgenera by the following combination of eight characters, as described by Campbell and Frost (1993): (1) frequent prefrontal-anterior superciliary scale contact; (2) absence of expanded lower temporal scales; (3) three primary temporal scales in contact with the postocular scales; (4) absence of "protuberant head shields" on the posterolateral corners of the head; (5) absence of protuberant supra-auricular scales; (6) fewer than eight longitudinal nuchal scale rows; (7) fewer than 38 transverse dorsal scale rows; and (8) lateral-most rows of ventral scales expanded. Although we could not verify the condition of the first and last characters in our new material, all of their other diagnostic features conform to *Abaculabronia*, and this combination of features is not found within any other clade.

Traditionally, *A. reidi* has been distinguished morphologically from *A. ornelasi* based on four characters of lepidosis. In *A. reidi*, these characters are as follows (condition of *A. ornelasi* in parentheses): absence of frontonasal-frontal scale contact (present in *A. ornelasi*); three temporal scales (four); parietal scale in contact with median supraoculars (no contact); and 34–36 transverse dorsal scale rows (30–33). In this contribution, we reexamine these characters to revise our concept of the species' diagnostic characters. We present the relevant character data in Table 1.

Fig. 1. A live adult male *Abronia reidi* from the slopes of Volcán San Martín, Sierra de Los Tuxtlas (LACM PC 2105–2107), illustrating the diagnostic lepidosis characters. The difference in color between these two images, which illustrate the same animal, could be attributed to the process of digitally scanning the photographic slides and/or because these photos were taken several months apart.

Fig. 2. An adult male *Abronia reidi* found road-killed on the slopes of the Santa Marta area, Sierra de Los Tuxtlas (LACM PC 2108–2110), illustrating the diagnostic lepidosis characters. © Peter Heimes

Table 1. Summary of characters separating *Abronia ornelasi* from *Abronia reidi.*

Character	*Abronia ornelasi* Type series	*Abronia reidi* Type series	*Abronia reidi* LACM PC 2105–2107	*Abronia reidi* LACM PC 2108–2110
Frontonasal-frontal scale contact	Yes	No	Yes	Yes, but narrow
Number of anterior temporal scales	4/4	3/3	3/3	4/-
Parietal scale in contact with median supraoculars	No	Yes	Yes/Yes	No/No
Number of transverse dorsal scale rows	30–33	34–36	36	36

Our new material indicates that *A. reidi* and *A. ornelasi* are not as morphologically divergent as once thought. Only one of the four scale characters traditionally used to separate *A. reidi* and *A. ornelasi* can still be considered diagnostically informative: number of transverse dorsal scale rows (Table 1.). All of the remaining characters we examined were inconsistent with what previously were considered to be diagnostic characteristics between the two species. The idea that our new material is simply misidentified *A. ornelasi* is precluded by the preponderance of character data available for our specimens.

These results are consistent with recent findings, in congeners, of similar variation in supposedly diagnostic morphological traits (Bille, 2001; Clause et al., 2016b). In particular, the variation in anterior temporal scale number and in frontonasal-frontal scale contact from our study mirrors findings from those previous studies, indicating that these characters are far more labile than previously believed. Thus, we conclude that the diagnostic importance traditionally allocated to cranial lepidosis characters in *Abronia* might have been misplaced.

Similar to recent revelations that *Abronia chiszari* is widespread across the Sierra de Los Tuxtlas (Clause et al., 2016b), here we show that *A. reidi* is not limited solely to Volcán San Martín, contrary to past suppositions (Werler and Shannon, 1961; Smith and Smith, 1981). Furthermore, *A. reidi* appears to occur at a much broader elevational band, from 1,635 m down to as low as 1,000 m. This suggests that *A. reidi* and *A. chiszari* might occur in syntopy in parts of the Sierra de Los Tuxtlas, which would contribute to a growing list of *Abronia* taxa that are not allopatric to all congeners, as previously believed (Torres et al., 2013; Clause et al., 2016b).

Although we show that *A. reidi* and *A. ornelasi* display limited morphological divergence, they are nonetheless quite isolated from one another biogeographically. They exist on opposite sides of the Isthmus of Tehuantepec, a known biogeographic barrier for numerous herpetofaunal species (Campbell, 1984). Furthermore, they are geographically separated by over 100 km of inhospitable lowland habitat in the Gulf Coastal Plain. Unfortunately, no DNA samples exist for *A. reidi*, so we cannot compare levels of genetic divergence between it and *A. ornelasi*. Pending genetic analysis, we refrain from advocating for the synonymization of these two species.

As argued elsewhere (Clause et al., 2016a), the collection of whole-body specimens and tissue samples in addition to photos is a vitally important best-practice for researchers who document biodiversity. Despite numerous trips and hundreds of person-hours we and others have spent searching for *A. reidi* in the Sierra de Los Tuxtlas over the past 12 years, no new material has been forthcoming. As such, we deemed it prudent to release this photo-based information in the hope that it will stimulate additional survey efforts for this enigmatic species.

Acknowledgments.—We thank Santos Rodríguez Leal for permission to photograph the *A. reidi* in his care, and Neftali Camacho at the LACM for graciously accessioning our photo vouchers. Financial support provided by a University of Georgia Presidential Fellowship and a State of Georgia Hope Scholarship. We also thank Angela Burrow, Erin Cork, and Micah Miles for reviewing and offering comments on an earlier draft of this manuscript.

Literature Cited

Bezy, R. L., and J. L. Camarillo R. 2002. Systematics of xantusiid lizards of the genus *Lepidophyma*. Contributions in Science 493: 1–41.

Bille, T. 2001. A second specimen of *Abronia bogerti* Tihen, 1954 from Oaxaca, Mexico, with remarks on the variation of the species. Salamandra 37: 205–210.

Bogert, C. M., and A. P. Porter. 1967. A new species of *Abronia* (Sauria, Anguidae) from the Sierra Madre del Sur of Oaxaca, Mexico. American Museum Novitates 2,279: 1–21.

Campbell, J. A. 1982. A new species of *Abronia* (Sauria, Anguidae) from the Sierra Juárez, Oaxaca, México. Herpetologica 38: 355–361.

Campbell, J. A. 1984. A new species of *Abronia* (Sauria, Anguidae) with comments on the herpetogeography of the highlands of southern Mexico. Herpetologica 40: 373–381.

Campbell, J. A., and D. R. Frost. 1993. Anguid lizards of the genus *Abronia*: revisionary notes, descriptions of four new species, a phylogenetic analysis, and key. Bulletin of the American Museum of Natural History 216: 1–121.

Caviedes-Solis, I. W., L. F. Vázquez-Vega, I. Solano-Zavaleta, E. Pérez-Ramos, S. M. Rovito, T. J. Devitt, P. Heimes, O. A. Flores-Villela, J. A. Campbell, and A. Nieto Montes de Oca. 2015. Everything is not lost: recent records, rediscoveries, and range extensions of Mexican hylid frogs. Mesoamerican Herpetology 2: 230–241.

Chippindale, P. T., L. K. Ammerman, and J. A. Campbell. 1998. Molecular approaches to phylogeny of *Abronia* (Anguidae: Gerrhonotinae), with emphasis on relationships in subgenus *Auriculabronia*. Copeia 1998: 883–892.

Clause, A. G., C. J. Pavón-Vázquez, P. A. Scott, C. M. Murphy, E. W. Schaad, and L. N. Gray. 2016a. Identification uncertainty and proposed best-practices for documenting herpetofaunal geographic distributions, with applied examples from southen Mexico. Mesoamerican Herpetology 3: 977–1,000.

Clause, A. G., W. Schmidt-Ballardo, I. Solano-Zavaleta, G. Jiménez-Velázquez, and P. Heimes. 2016b. Morphological variation and natural history in the enigmatic lizard clade *Scopaeabronia* (Squamata: Anguidae: *Abronia*). Herpetological Review 47: 536–543.

Heimes, P. 2002. *Abronia*: Baumschleichen in Bedrängnis Datz. 55: 16–20.

Kubicki, B. 2016. A new species of salamander (Caudata: Plethodontidae: *Oedipina*) from the central Caribbean foothills of Costa Rica. Mesoamerican Herpetology 3: 818–840.

Mendelson III, J. R., A. Eichenbaum, and J. A. Campbell. 2015. Taxonomic review of the populations of the fringe-limbed treefrogs (Hylidae: *Ecnomiohyla*) in Mexico and nuclear Central America. South American Journal of Herpetology 10: 187–194.

Smith, H. M., and R. B. Smith. 1981. Another epiphytic alligator lizard (*Abronia*) from Mexico. Bulletin of the Maryland Herpetological Society 17: 51–60.

Torres, M., A. Urbina, C. Vásquez-Almazán, T. Pierson, and D. Ariano-Sánchez. 2013. Geographic Distribution. *Abronia lythrochila* (Red-Lipped Arboreal Alligator Lizard). Herpetological Review 44: 624.

Wallach, V. 2016. Morphological review and taxonomic status of the *Epictia phenops* species group of Mesoamerica, with description of six new species and discussion of South American *Epictia albifrons*, *E. goudotii*, and *E. tenella* (Serpentes: Leptotyphlopidae: Epictinae). Mesoamerican Herpetology 3: 216–375.

Werler, J. E., and F. A. Shannon. 1961. Two new lizards (genera *Abronia* and *Xenosaurus*) from the Los Tuxtlas range of Veracruz, Mexico. Transactions of the Kansas Academy of Science. 64: 123–132.

Wilson, L. D., and V. Mata-Silva. 2015. A checklist and key to the snakes of the *Tantilla* clade (Squamata: Colubridae), with comments on taxonomy, distribution, and conservation. Meso-american Herpetology 2: 418–499.

Wilson, L. D., and J. H. Townsend. 2007. A checklist and key to the snakes of the genus *Geophis* (Squamata: Colubridae: Dipsa-dinae), with commentary on distribution and conservation. Zootaxa 1,395: 1–31.

Zaldívar Riverón, A., W. Schmidt, and P. Heimes. 2002. Revisión de las categorías en el proyecto de norma oficial Mexicana (PROY-NOM-059-2000) para las especies de lagartijas de la Familia Anguidae (Reptilia). Museo de Zoología "Alfonso L. Herrera". Departamento de Biología, Facultad de Ciencias, Universidad Nacional Autónoma de México. Bases de datos SNIB-CONABIO. Proyecto W026. México, D.F., Mexico.

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Additional information on the natural history of *Anolis cusuco* (Squamata: Dactyloidae)

Anolis (*Norops*) *cusuco* (McCranie, Köhler, and Wilson, 2000) is a poorly studied species of Neotropical anole thatonce was believed endemic to the vicinity of its type locality: Parque Nacional El Cusuco Centro de Visitantes... Departamento de Cortés, Honduras. Since that time additional localities in northwestern Honduras have been reported, in the departments of Copan, Cortés, and Santa Barbara, including in Parque Nacional Cerro Azul (Townsend and Wilson, 2008; McCranie and Köhler 2015). McCranie and Köhler (2015) indicated that no information is available on the diet or reproduction of this species.

This note represents a substantial increase to the natural history of *A. cusuco*. We observed all agonistic and reproductive interactions in and around the vicinity of the type locality: the park's visitor center (Centro de Visitantes La Naturaleza)/ Operation Wallacea Base Camp (15.49641°N, 88.21186°W; WGS 84); elev. 1,575 m. The visitor center/ base camp is located in a man-made clearing within a high elevation mixed coniferous and broadleaf forest. During the time of our observations, this clearing was heavily trafficked and disturbed. We also documented all observations involving predatory behavior in the surrounding forest, within about a 100 m radius of this location. This anole is locally abundant in this region of the park, where we observed a consistently dense population despite periodic high levels of anthropogenic disturbance. Based on our observations across a 4-year period, the population of *A. cusuco* in this locality appears to be stable.

Territorial Behavior

On 15 June 2015 at 1430 h, we observed two adult male *Anolis* (*Norops*) *cusuco* engaging in an agonistic interaction on a tree stump ca. 20 m from the nearest forest edge, within the clearing surrounding the visitor center. The two individuals faced off with their dewlaps extended; one showed an erected nuchal crest and dorsal ridge, but both characteristics subsided ca. 15 min after capture (Fig. 1).

Fig. 1. Our initial observation showing an erected nuchal crest and dorsal ridge in a male *Anolis* (*Norops*) *cusuco* in Parque Nacional Cusuco, Honduras. © Tom W. Brown

On 27 July 2015, we observed two adult male *A. cusuco* in an agonistic interaction, with their nuchal crests and dorsal ridges raised, on a wooden pillar ca. 10 m from the previous observation. We confirmed them as different individuals from those in the previous observation by comparing their morphological characteristics. The individuals initially appeared to size each other up, and approached one another laterally while making short head-bobbing movements (Fig. 2, Stage 1). When within ca. 35 cm of one another, one male extended its dewlap and began bouncing in a "push-up" fashion while gradually edging closer, and the other male mirrored this behavior (Fig 2, Stage 2). One male then initiated a physical confrontation, which involved both males biting each other around the jaw and head (Fig. 2, Stage 3). The individuals remained locked in conflict for roughly 5 min before we captured them for morphometric data collection.

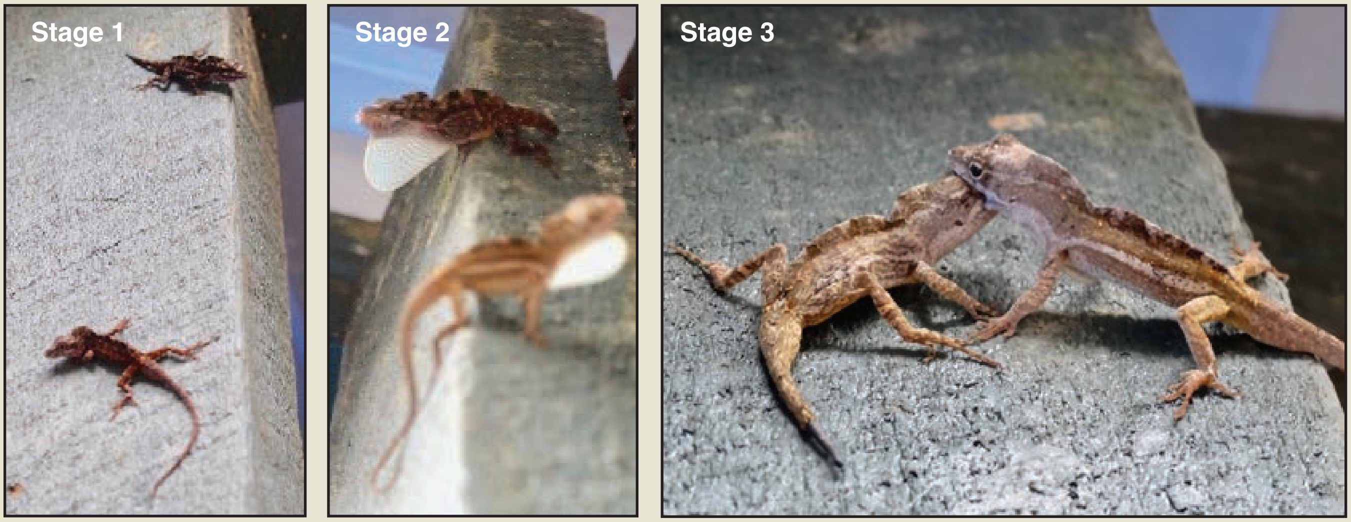

Fig. 2: Two male *Anolis* (*Norops*) *cusuco* in an agonistic interaction. Stage 1: individuals size each other up while making short head-bobbing movements. Stage 2: the anoles extend their dewlaps and bounce in "push up" fashion. Stage 3: the anoles engage in a physical confrontation by biting each other on the head and jaw. © Ruth Shepherd

We also observed male *A. cusuco* appearing to maintain territories during their main periods of activity, i.e., morning and late afternoon. We witnessed multiple mature males establishing dominance by vigorously bouncing in an archetypal "push-up" motion, and intimidating, chasing, and attacking rival males while extending their dewlaps and raising their dorsal ridges and nuchal crests. The dorsal ridge was roughly 5 mm high in all observations. In some cases, the erection of a ridge and crest, combined with an extended dewlap, was enough to intimidate rivals without the need for a physical confrontation. The use of dorsal ridges and nuchal crests in these agonistic interactions is common in members of the family Dactyloidae (Williams, 1983; Köhler et al., 2015). To the best of our knowledge, this is the first record of *A. cusuco* displaying or using these structures.

Reproduction

On 22 March 2016 at 1530 h, we observed an adult pair of *Anolis* (*Norops*) *cusuco* copulating on the cement steps of the visitor center, ca. 20 m from the nearest forest edge. The male held onto the female by using its legs, tail, and jaws (Fig. 3A).

On 23 March 2016 at 1130 h, we observed an adult pair of *A. cusuco* copulating on the wooden exterior of the visitor center (Fig 3B). The male in this observation appeared to be different from the one in the previous observation, based on its dorsal pattern; however, we were unable to determine whether the female was different in both mating events.

To the best of our knowledge, these are the first recorded observations of mating in this species. No egg-laying sites or eggs have been described for *A. cusuco*.

One of us (TWB) has conducted fieldwork in Parque Nacional Cusuco from June to August on four successive years (2013–2016), and no additional mating events were observed during this time. This information suggests that mating is not continuous throughout the year, but likely is temporally restricted. We cannot estimate the exact beginning or end of the mating season for *A. cusuco* at this time, as neither of us has been in the park from September to February or from April to May.

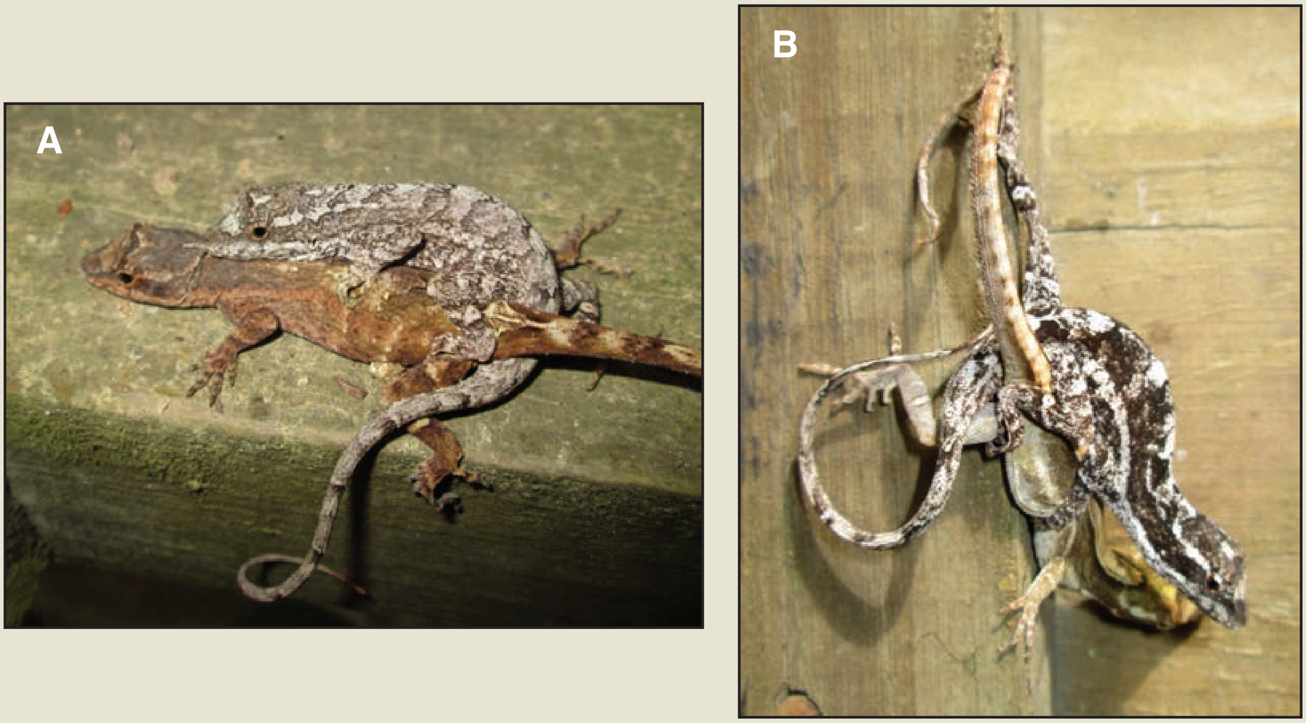

Fig. 3. Observations of *Anolis* (*Norops*) *cusuco* mating. (A) On the concrete steps, and (B) on the wooden wall of the visitor center.
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Fig. 4. A female *Anolis* (*Norops*) *cusuco* preying on an unidentified species of stick insect (Phasmatodea).
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Diet

On 17 June 2015 1340, we observed a female *Anolis* (*Norops*) *cusuco* preying on an unknown species of stick insect (Phasmatodea) (Fig. 4). The observation occurred within a small garden, ca. 25 m from the nearest forest edge, within the clearing surrounding the visitor center. In addition, from June through August 2015 we observed *A. cusuco* preying several other species of small insects, including spiders and crickets. In all of our predatory observations, movements by the insects triggered the feeding response by *A. cusuco*, suggesting that this species primarily is an opportunistic predator of invertebrates. Our nearby presence, however, might have caused the lizards to cease active foraging behavior to avoid detection. We were unable to find any published information on the diet of *A. cusuco*.

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Literature Cited

Köhler, J, J. Poe, S. Ryan, M, J., and G. Köhler. 2015. *Anolis marsupialis* Taylor 1956, a valid species from southern Pacific Costa Rica (Reptilia, Squamata, Dactyloidae). Zootaxa 3,915: 111–122.

McCrainie, J. R, and G. Köhler, G. 2015. The Anoles (Reptilia: Squamata: Dactyloidae: *Anolis*: *Norops*) of Honduras: Systematics, Distribution and Conservation. Bulletin of the Museum of Comparative Zoology, Special Publications Series, No. 1. Harvard University Press, Cambridge, Massachusetts, United States.

Townsend, J. H., and L. D. Wilson. 2008. The Amphibians and Reptiles of Cusuco National Park, Honduras / Los Anfibios y Reptiles del Parque Nacional Cusuco, Honduras. Bibliomania! Salt Lake City, Utah, United States.

Williams, E. E. 1983. Ecomorphs, faunas, island size, and diverse endpoints in island radiations of *Anolis*. Pp. 326–370 *In* R. B. Huey, E. R. Pianka, and T. W. Schoener (Eds.), Lizard Ecology: Studies of a Model Organism. Harvard University Press, Cambridge, Massachusetts. United States.

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Use of backpack radio-transmitters on lizards of the genus *Aspidocelis* (Squamata: Teiidae)

Radio-transmitters are used widely in field studies when tracking animals under natural conditions, especially when the spatial or temporal location of individuals provides information for behavioral studies and the weight of the transmitters has minimal adverse effects on their behavior. Radio telemetry has been used in ecological studies in lizards (e.g., Richmond, 1998; Warner et al., 2006; García-Bastida et al., 2012) and various methods have been proposed for securing the radio-transmitters (e.g., Fisher and Mut, 1995; Goodman, 2005; Goodman et al., 2009); not all methods, however, are suitable for the different sizes, shapes, or habits of the lizards under study.

Lizards of the genus *Aspidoscelis* are slender, highly active, and agile, so the use of external equipment that is too heavy can compromise their activity and survival. For example, species in this genus usually seek refuge among rocks and holes in the ground, and the addition of an object strapped to their body might limit their mobility to enter or leave the shelters. Moreover, during annual periods of inactivity these lizards become fossorial in their habits, and therefore require the use of some lightweight material for attaching an external transmitter.

Herein we describe a simple, inexpensive, and lightweight material that can be used for attaching an external radio-transmitter for telemetry field studies on lizards. This method involves a modification of that proposed by Gerner (2008) for the gecko *Phelsuma guentheri*, and is based on the use of a simple backpack, of low cost and high reliability, in which light-weight material is used. The placement of the backpack on the lizards apparently did not interfere with their normal behavior, such as foraging, the use of shelters, or mobility. In our original study, we monitored the use of shelter sites in *Aspidoscelis* spp.

Methods

From April to August 2015, we tracked four male *Aspidoscelis* sp. (mean body mass = 43.8 g; mean snout–vent length (SVL) = 118.4 mm; Table 1), near Tonatico, Estado de México, Mexico. The material used to make the backpacks consisted of a black latex band (SYRVET® syrflex cohesive starting line technology) made of a soft and elastic material, and manufactured for veterinary use. A commercial roll measuring 4,570 mm (length) × 100 mm (width) provides enough material for 45 backpacks. We cut the band into squares (100 mm × 100 mm), and later each square was cut into an X shape, which left four arms (70 mm × 10 mm) wide and four inner triangles (80 mm); we cut off and discarded three of the triangles, but one triangle was not removed (Fig. 1); we then made two cuts of 50 mm in this triangle and folded it twice (Fig. 1), adhering each fold with cyanoacrylate glue. This place is where the radio-transmitter attaches to the backpack, with the X-shaped arms used as straps on the back of the lizard. The radio-transmitter (Telenax® TCX-007BR, 5-month battery, weight 2 g, 216mHz) is positioned so that the antenna runs along the body from the top (Fig. 2). On average, the equipment (backpack and radio-transmitter) weighed 3.12 g (Table 1).

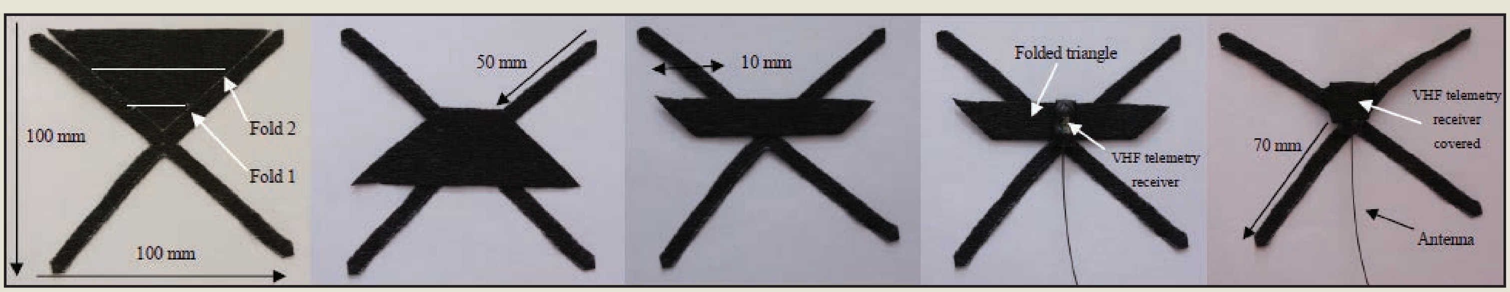

Fig. 1. The design and assembly of the backpack, with the attached radio-transmmiter VHF, for use in telemetry studies.
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Table 1: Measurements of lizards of the genus *Aspidoscelis* and weight of the backpack and radio-transmitter.

Lizards		Equipment			% (Lizard Body Mass/Total Weight of Equipment)
SVL (mm)	Body Mass (g)	Backpack Weight (g)	Radio-transmitter Weight (g)	Total Equipment Weight (g)	
122.77	48	0.674	2.4730	3.147	2.6
122.53	54	0.692	2.4730	3.165	2.6
110.45	27.37	0.642	2.4115	3.0535	2.8
117.93	46	0.656	2.4565	3.1125	2.6

We placed the backpack around the around a lizard's neck, which left the transmitter on the upper part of the body, with one set of straps anterior to the arms and the other set posterior to the arms and on the upper part of the body (Fig. 2), where the straps can stick in velcro form. When necessary we shortened the straps of the backpack with scissors, and then applied a drop of glue on the straps to prevent the backpack from shifting on the back of the lizard. We did not place any glue directly on the lizard.

Fig. 2. The backpack used to secure the VHF radio-transmitters in lizards of the genus *Aspidoscelis*.

Because *Aspidoscelis* are extremely active lizards and appear to be easily stressed, it helps to use two people to place the backpack on a lizard: one to hold the lizard and another for the placement of the backpack. This process lasts about 10 min, whereas removing the backpack only requires cutting the straps, so it can only be done once.

After releasing the lizards, we monitored them daily for seven consecutive days to assess their behavior. We attempted to find any qualitative evidence of rejection, discomfort, or negative effect on the mobility of the lizard, which might be associated with the use of backpack-transmitter. We monitored and evaluated the functionality of the backpack during observational intervals that lasted 1 hr. Previously we had made such observations to locate the areas inhabited by these lizards and their places of refuge, and then continued with the telemetric studies weekly for four weeks.

Results

We used the equipment (backpack and radio-transmitter) in four adult lizards for four weeks. During this time, the backpacks we assembled were resistant to sun exposure and moisture. The overall weight of the equipment averaged 3.12 g (Table 1). Three backpacks remained attached to the lizards, but one backpack (with the radio-transmitter) was located inside of a hole used as temporary shelter. The backpack likely had fallen off the lizard because it was not adjusted properly.

None of the four lizards showed any apparent behavior patterns resulting from the placement of the backpacks, and we did not encounter any lizards entangled in vegetation or where they might not be able to access their places of refuge. We also did not find evidence of degradation in health in the lizards, and none died during four weeks of tracking.

Discussion

Although we followed the design of the backpack described by Gerner (2008), we modified it by changing the material, and we also used certain characteristics proposed by other authors (Warner et al, 2006; Goodman et al., 2009; Price-Rees and Shine, 2011; García-Bastida et al., 2012), because they provided some advantages. For example, we used a latex band; a durable material designed for veterinary use, because it is permeable and lighter in weight than other materials, and also is inexpensive. When stretched, the latex band adapted to the body of the lizards, allowing them to move freely.

The use of the backpack on the lizards showed no apparent adverse effects on their behavior, as they exhibited such habitual behaviors as escaping, searching for shelter, and foraging. The use of the backpack transmitter was necessary for locating overwintering sites and areas of shelter in *Aspidoscelis*, because like in many reptile species these lizards are difficult to locate on account of their elusiveness (Goodman et al., 2000). With use of the backpack we were able to locate two hibernation sites for *Aspidoscelis*. Our proposed backpack radio-transmitter could be used for other purposes involving telemetry, whereas the design easily can be easily adapted to other lizard species that are different from *Aspidocelis* in body size, habits, and ecology.

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Literature Cited

Fisher, M., and A. Muth. 1995. A backpack method for mounting radio transmitters to small lizards. Herpetological Review 26: 139–140.

García-Bastida, M. C., A. Madrid-Sotelo, and D. Lazcano. 2012. Evaluation of a simple method of externally attaching radio-transmitters to the Texas Alligator Lizard, *Gerrhonotus infernalis.* Herpetological Review 43: 410–412.

Gerner, T. 2008. Home Range, Habitat Use and Social Behaviour of the Endangered Mauritian Gecko *Phelsuma guentheri.* Unpublished Master's thesis, Institute of Environmental Sciences, University of Zurich, Zurich, Switzerland.

Goodman, R.M. 2005. Attachment of radio transmitters in a rock iguana, *Cyclura lewisi*. Herpetological Review 36: 150–152.

Goodman, R. M., P. S. Harlow, and J. E. Taylor. 2000. Reproductive ecology of the Jacky Dragon (*Amphibolurus muricatus*): an agamid lizard with temperature-dependent sex determination. Austral Ecology 25: 640–652.

Goodman, R. M., C. R. Knapp, K. A. Bradley, G. P. Gerber, and A. C. Alberts. 2009. Review of radio transmitter attachment methods for West Indian rock iguanas (genus *Cyclura*). Applied Herpetology 2009: 151–170.

Price-Rees, S. J., and R.Shine. 2011. A backpack method for attaching GPS transmitters to bluetongue lizards (*Tiliqua*, Scincidae) Herpetological Conservation and Biology 6: 142–148.

Richmond, J. Q. 1998. Backpacks for lizards: a method for attaching radio transmitters. Herpetological Review 29: 220–221.

Warner, D. A., J. Thomas, and R.Shine. 2006. A simple and reliable method for attaching radio-transmitters to lizards. Herpetological Conservation and Biology 1: 129–131.

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A new locality for *Ctenosaura pectinata* (Wiegmann, 1834) (Squamata: Iguanidae) in central Mexico, with implications for its conservation

The natural distribution of spiny-tailed iguanas (genus *Ctenosaura*), which includes 18 species, is exclusive to Mesoamerica and extends from Mexico to Panama (Köhler, 2002; Buckley et al., 2016). The Black Spiny-tailed Iguana (*C. pectinata*) is an oviparous lizard endemic to Mexico, with a broad distribution extending along the Pacific coast from Sinaloa through Chiapas, including the Río Balsas Basin in central Mexico and two islands in the Pacific Ocean (Köhler, 2002); this species also has been introduced into Texas and Florida, in the United States (Kraus, 2009). The state of Michoacán is a major center of herpetofaunal diversity in Mexico, in which three species of iguanids occur: *Iguana iguana*, *C. clarki,* and *C. pectinata*; the latter species occurs in three physiographic regions: Coastal Plain, Balsas-Tepalcatepec Depression, and Sierra Madre del Sur (Alvarado-Díaz et al., 2013). According to Mexican law, *C. pectinata* currently is considered threatened (SEMARNAT, 2010), and is categorized as a priority species for conservation (SEMARNAT, 2014); in Michoacán it also was assessed an Environmental Vulnerability Score (EVS) of 15, placing it in the lower portion of the high vulnerability category (Alvarado-Díaz et al., 2013). Genetic and morphological evidence suggests high variation throughout its distributional range (Zarza et al., 2008, 2016). Also, due to multiple uses for this species in rural communities (e.g., as food, pets, medicinal practices, and handicrafts), this iguanid is both culturally and economically important, resulting in many conservation challenges (Zarza et al., 2016).

During a herpetological survey, on 17 September 2016 at 1435 h, at Mesas de Enandio, Municipio de Zitácuaro, Michoacán, Mexico (19.34975°N, -100.454194°W; WGS 84; elev. 1,429 m; Fig. 1), we captured an adult male *C. pectinata* (345 mm snout–vent length, 634 mm tail length). The individual was photographed (Colección Fotográfica de Herpetología, Facultad de Ciencias, Universidad Autónoma del Estado de México, Photo Voucher CFH 13; Fig. 2) and released. The iguana was found perched on a log in an area of tropical dry forest that also contained an abundance of guava crops.

To our knowledge, the nearest previously recorded localities for this species are 92.6 km (airline distance) to the S in Huetamo, Michoacán (Reyna-Alvarez et al., 2010), and 27.3 km (airline distance) to the SE in Santo Tomás de los Plátanos, Estado de México (Köhler, 2002). Our record is significant because (1) it establishes needed locality information for this species of concern, as outlined by Buckley et al. (2016); (2) it represents a new municipality record for Michoacán; (3) this new locality presently is not included in its known geographic distribution (Köhler, 2002), including the predicted distribution for *C. pectinata* (Buckley et al., 2016); (4) it represents the most inland record for *C. pectinata* in central Mexico, including the state of Michoacán (Köhler, 2002); and (5) peripheral and newly discovered populations might show exclusive phenotypic traits that makes them valuable for conservation (Lesica and Allendorf, 1995).

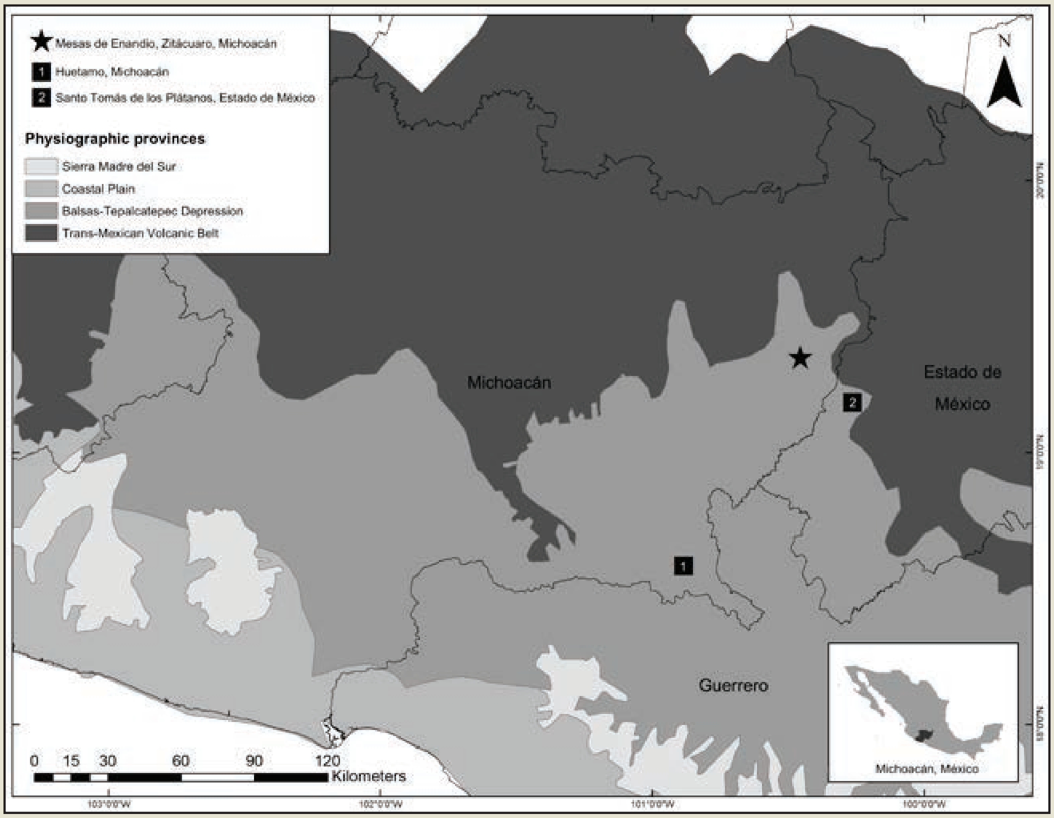

Fig. 1. Map showing a new locality (star) for *Ctenosaura pectinata* at Mesas de Enandio, Municipio de Zitácuaro, Michoacán, Mexico. The squares represents the nearest previously recorded localities.

Fig. 2. An adult male *Ctenosaura pectinata* (Photo voucher CFH13) found on September 17, 2016 during a survey at Mesas de Enandio, Municipio de Zitácuaro, Michoacán, Mexico. © Oswaldo Hernández-Gallegos

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Literature Cited

Alvarado-Díaz, J., I. Suazo-Ortuño, L. D. Wilson, and O. Medina-Aguilar. 2013. Patterns of physiographic status of the herpetofauna of Michoacán, Mexico. Amphibian and Reptile Conservation 1: 128–170.

Buckley, L. J., K. De Queiroz, T. D. Grant, B. D. Hollingsworth, J. B. Iverson, S. A. Pasachnik, and C. L. Stephen. 2016. A checklist of the iguanas of the world (Iguanidae; Iguaninae). Herpetological Conservation and Biology 11 (Monograph 6): 4–46.

Köhler, G. 2002. Schwarzleguane-Lebensweise, Pfleje, Zucht. Herpeton, Offenbach, Germany.

Kraus, F. 2009. Alien Reptiles and Amphibians. A Scientific Compendium and Analysis. Springer Science + Business Media B. V., Hawaii, United States.

Lesica, P., and F. W. Allendorf. 1995. When are peripheral populations valuable for conservation? Conservation Biology 9: 753–760.

Reyna-Alvarez, J., I. Suazo-Ortuño, and J. Alvarado-Díaz. 2010. Herpetofauna del Municipio de Huetamo, Michoacán, México. Biológicas 12: 40–45.

SEMARNAT. 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. Diario Oficial de la Federación. Ciudad de México, Mexico.

SEMARNAT. 2014. Acuerdo por el que se da a conocer la lista de especies y poblaciones prioritarias para la conservación. Diario Oficial de la Federación. Ciudad de México, Mexico.

Zarza, E., V. H. Reynoso, and B. C. Emerson. 2008. Diversification in the northern Neotropics: mitochondrial and nuclear DNA phylogeography of the iguana *Ctenosaura pectinata* and related species. Molecular Ecology 17: 3,259–3,275.

Zarza, E., V. H. Reynoso, and B. C. Emerson. 2016. Genetic tools for assisting sustainable management and conservation of the spiny-tailed iguana, *Ctenosaura pectinata*. Herpetological Conservation and Biology 11 (Monograph 6): 255–264.

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New records, distributional range, and notes on *Marisora brachypoda* (Squamata: Mabuyidae) in Mexico

The Middle American Short-limbed Skink, *Marisora brachypoda* (Taylor, 1956), formerly in the synonymy of *Mabuya unimarginata* (for a taxonomic review see Hedges and Conn, 2012), is a poorly known species that generally is considered rare, although it can be locally abundant. Chaves. (2013) provided general information on the habitat of this species, whose conservation status has been assessed as Least Concern by IUCN. The evidence suggests that *M. brachypoda* represents a species complex throughout its wide distribution, which comprises Nicaragua, Costa Rica, Honduras, El Salvador, Guatemala, Belize, and Mexico (Hedges and Conn, 2012). In Mexico, the available locality records for this species are dispersed throughout the literature and in herpetological collections (Hedges and Conn, 2012). In Mexico, the known distribution of *M. brachypoda* extends from Veracruz and northern

Nayarit south to the Belize and Guatemala borders; however, there is no a clear distribution pattern for this species (e.g., Ochoa-Ochoa, 2006; Chaves et al., 2013).

Marisora brachypoda is a viviparous, diurnal, terrestrial skink that has been reported in herpetofauna checklists and other publications on the Mexican states of Chiapas (Johnson et al., 2015), Colima (Duellman, 1958), Guerrero (Pérez-Ramos et al., 2000), Jalisco (García and Ceballos, 1994), Michoacán (Alvarado-Díaz et al., 2013), Morelos (Castro-Franco and Bustos-Zagal, 1994), Nayarit (Casas-Andreu, 1992; Woolrich-Piña et al., 2016), Oaxaca (Casas-Andreu et al., 1996; Castro-Gálvez, 2011), Puebla (García-Vázquez et al., 2006), Veracruz (Pelcastre-Villafuerte and Flores-Villela, 1992; Aguilar-López and Canseco-Márquez, 2006; Chavez-Lugo, 2015), and the Yucatan Peninsula (Lee, 1996; Köhler, 2003, Calderón-Mandujano et al., 2008); many of these publications, however, do not provide specific localities. In addition, few published records are available, such as in Estado de México (Macip-Ríos et al., 2012), Quintana Roo (Calderón-Mandujado and Mora-Tembre, 2004; Luja, 2006), Tabasco (Hernández-Franyutti and Uribe, 2012), and Campeche (Burger, 1952). For this reason, herein we cite most of the available distributional information for *M. brachypoda* in Mexico, including new locality records resulting from fieldwork, in order to identify and analyze any patterns. We also include a distribution map of *M. brachypoda*, as well as a map on its potential sites of occurrence.

Geographic data for *M. brachypoda* were obtained from the following sources: Global Biodiversity Information Facility (GBIF, 2016; www.gbif.org); Colección Nacional de Anfibios y Reptiles of the Instituto de Biología, Universidad Nacional Autónoma de México (CNAR-UNAM); Museo de Zoología Alfonso L. Herrera of the Facultad de Ciencias (MZFC-UNAM); Laboratorio Integral de Fauna Silvestre of the Universidad Autónoma de Guerrero (LIFAS-UAGro); University of Illinois Museum of Natural History Amphibian and Reptile Collection (UIMNH); California Academy of Science Herpetology Collection (CAS); University of California, Berkeley, Museum of Vertebrate Zoology (MVZ); specialized literature, and from our field sampling. To compile the database to generate the distribution model, we removed points with uncertain or indeterminate locality or inaccurate identification information. We georeferenced all of the localities without geographical information to the nearest minute of latitude and longitude, after consulting a series of maps. We compiled all the localities into a geographical information system (GIS) to identify and analyze patterns in the previous distribution of *M. brachypoda* for aid in generating a revised distribution model. The data set consisted of 162 records, representing 153 different distribution points. We used Maxent (version 3.3.3k; Phillips et al., 2006) to generate a species distribution model (SDM). This algorithm combines presence points and raster layers to calculate the environmental niche of the species determining the probable distribution based on maximum entropy (Phillips et al., 2006). This niche modeling approach has been used in several studies to predict species distributions (Elith et al., 2011). Based on our objective to determine the geographic distribution, we used Mexico and Central America (from latitude 9.5° to 25°) as an environmental background (M) following the BAM diagram proposed by Soberón and Peterson (2005). We included all records of *M. brachypoda* and environmental layers from Worldclim (bio1-bio19; www.worldclim.org) and topographic data (elevation, aspect, and slope; http://eros.usgs.gov/), all in ~1 km^2 resolution (Hijmans et al., 2005). We used the default parameters of Maxent and 80% of the initial records to create a training model and the remaining 20% to assess the accuracy of the models. We used the receiver operating characteristic curve (ROC) to examine model performance calculating the area under the receiver operating curve (AUC), which measures the ability of a model to discriminate between sites where a species is present or absent (Phillips et al., 2006). We ran five replicates using the bootstrap algorithm and 1,500 iterations with random seed (permitting the initial conditions to change for each run), using the minimum training presence as a threshold value. Finally, we selected the consensus model produced by replicates as the proposed geographic distribution for *M. brachypoda*.

We show the distribution records for *M. brachypoda* in Mexico in Figure 1 and present the new records in Table 1. Our new photographic records of *M. brachypoda* were collected between 2014 and 2016 and added to the CNAR-UNAM (IBH-RF 408[a-d]-414), MZFC-UNAM (31316), and LIFAS-UAGro (1520,1521,1586). *Marisora brachypoda* occurs on both the mainland and islands in the Pacific Ocean and the Gulf of Mexico. This species has been recorded at elevations from sea level to 2,192 m. At low and moderate elevations (0–1,200 m), this species occurs mainly in tropical deciduous forest (TDF) and thorn forest (Fig. 2 E, F), although at higher elevations (> 1,200 m), for example in central Guerrero, the vegetation corresponds to oak forest or oak woodland with patches of grassland and scrub with *Agave* spp. and herbaceous plants (Fig. 2 B–D).

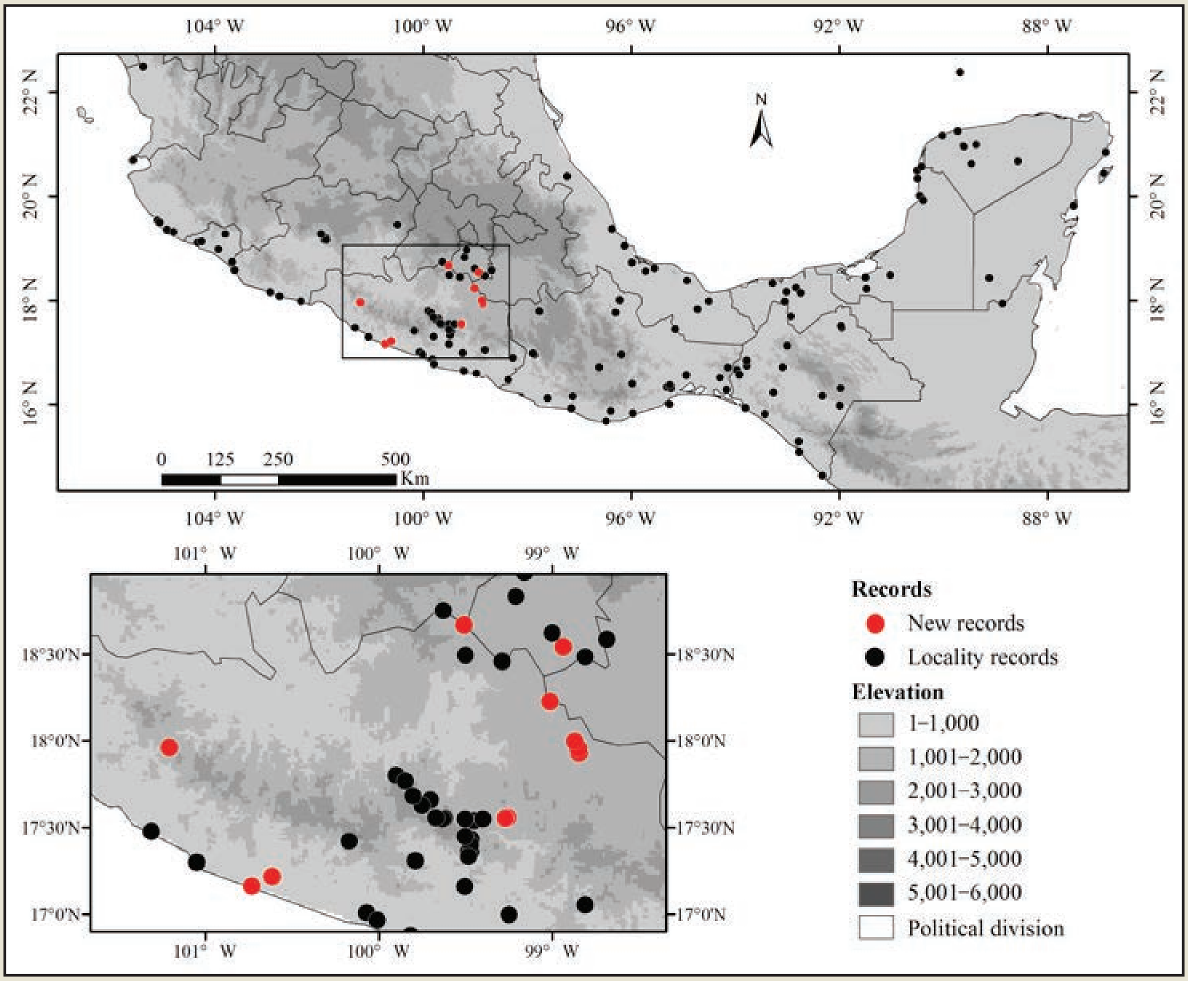

Fig 1. Occurrence records for *Marisora brachypoda* within Mexico. Black circles denote museum, database, and literature records (n = 150), and red circles indicate the new records (n = 12). Gray scale represents the elevation. The distribution of *M. brachypoda* extends into Central America, but is not shown here.

We show the potential distribution model for *M. brachypoda* in geographical space in Figure 3. The results generated an AUC value of 0.973, implying potentially significant results. Our model corresponded closely with our general understanding of the distribution of *M. brachypoda* in Mexico and Central America. This geographic model shows previously known areas and ecosystems (TDF and oak forest) inhabited by *M. brachypoda*; however, it also reveals new areas without records that show medium–high probabilities of distribution on the Pacific and Gulf coasts of Mexico and in southern Puebla.

According to the prediction model, we found three areas out of the known distributional sites. Our model suggests that *M. brachypoda* could occur in: (a) southern Sinaloa near the northern border of Nayarit; (b) southern Tamaulipas near Veracruz; and (c) the southern mountains of Tehuacan in Puebla near Oaxaca (Fig. 3). The lack of records in these areas may be due to the secretive habits and cryptic strategies of *M. brachypoda*. The model also shows a high probability of occurrence in the Mexico/Guatemala border areas. More intensive surveys in these areas are necessary to confirm the presence of *M. brachypoda*, and thus increase the distributional information for this taxon or improve over-prediction in this model, if such is the case.

Table 1. New municipality records and populations of *Marisora brachypoda* in Morelos and Guerrero, Mexico.

Locality	Municipality	State	Latitude	Longitude	Elevation (m)	Habitat
Carrizal de Cinta Larga	Tecpan de Galeana	Guerrero	17.1634	-100.7333	9	Tropical deciduous forest
Rancho Jerusalen	Tecpan de Galeana	Guerrero	17.2177	-100.6142	32	Tropical deciduous forest
Parque Nacional Grutas de Cacahuamilpa	Pilcaya	Guerrero	18.6692	-99.5094	1,175	Tropical deciduous forest
1.4 km SW of La Carbonera	Atenango del Río	Guerrero	18.2279	-99.0118	1,229	Oak woodland
La Encinera, 4.5 km SW of Papalutla, road Papalutla–Xixila	Olinalá	Guerrero	17.9979	-98.8686	1,290	Oak woodland
Estación Biológica El Limón	Tepalcingo	Morelos	18.5425	-98.9359	1,311	Tropical deciduous forest
1 km NE of Xixila	Olinalá	Guerrero	17.9581	-98.8499	1,647	Oak woodland
ca. 5 km S Puerto del Bálsamo	Coyuca de Catalán	Guerrero	17.96192	-101.2079	1,650	Oak woodland
1.6 km S of Xixila	Olinalá	Guerrero	17.9309	-98.8464	1,785	Oak woodland
Chilacachapa	Tixtla de Guerrero	Guerrero	17.5522	-99.2710	1,994	Oak woodland
Tenexatlajco/El Peral	Chilapa de Álvarez	Guerrero	17.554378	-99.2697	2,010	Oak woodland

Because a significant part of the predicted distribution area of *M. brachypoda* lies within TDF, it is important consider the status of this forest. TDF is the most representative tropical ecosystem in Mexico, and occurs principally on the Pacific coast and is one of the most important biodiversity reservoirs, as it contains 33% of the terrestrial vertebrates. According to Dinerstein et al. (1995), however, the conservation status of this ecosystem in most regions is critical, and the conservation priority is high due to its biodiversity value and conservation importance. The national forest census in 2000 calculated that only 53% of the dry forest along the Pacific coast remains. The combined influences of a variety of social factors, such as deforestation, fire, and habitat fragmentation (Ceballos et al., 2010) create an annual disappearance rate of 1.1% of area per year. TDF is threatened by the effects of human activities, as well as climate change and its associated effects (Miles et al., 2006; Sotelo-Caro et al., 2015). These ecological pressures could determine the presence/absence of the species.

Finally, these findings and records have valuable applications for identifying areas of endemism, and consequently will aid the development of inclusive strategies for conserving regional endemism. More information is necessary to determine the taxonomy of *M. brachypoda*, which will lead to a better method for evaluating the conservation status of this species complex. Information on the natural history and ecology of this species, such as habitat and physiological requirements, thermal tolerances, periods of activity, and population dynamics, is necessary to determine the impact of human activities on its vulnerability. The secretive habits and cryptic strategies of this organism make it difficult to find robust populations and might present a problem in determining the impact of human activities on the vulnerability of this species. All of these pressures on *M. brachypoda* and its habitat are concerning, not just for this species, but for many other reptiles that share its TDF and oak forest environments, on which modification or reduction will have important consequences on populations.

Fig 2. (A) An individual of *Marisora brachypoda* (photo voucher IBH-RF 409); and the habitats of this species, characterized by (B) oak woodland with patches of grassland, shrubs, agaves, and herbaceous plants, (C, D) oak woodland; and (E, F) tropical deciduous forest.

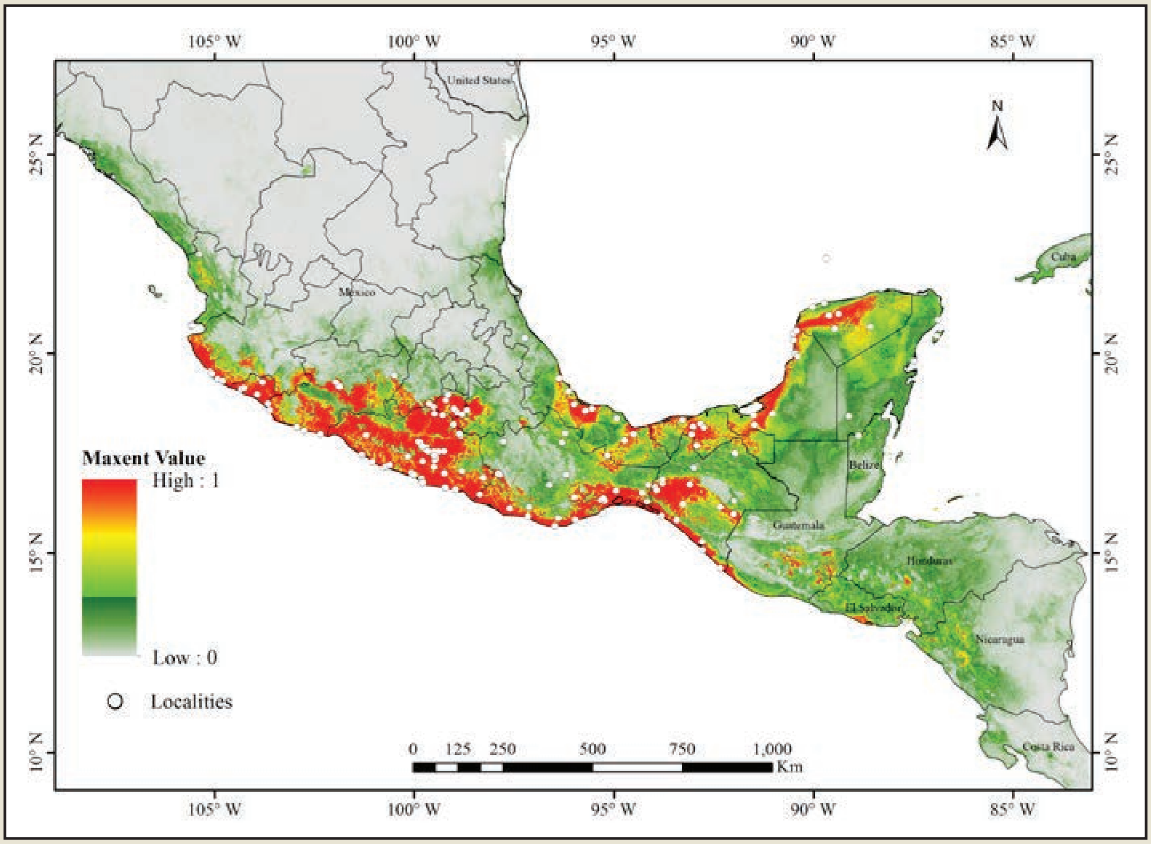

Fig. 3. Potential geographic distribution for *Marisora brachypoda* according to Maxent, using occurrence records and considering climatic and topographic variables. Colors progressing from green to yellow to red refer to Maxent values of probability of presence, with warmer colors indicating areas with better-predicted conditions (range 0–1, logistic Maxent output). All areas with a Maxent prediction of or near 1 represent suitable environmental conditions for the species. White circles indicate occurrence records on which the models were based.

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Literature Cited

Aguilar-López, J. J., and L. Canseco-Márquez. 2006. Herpetofauna del municipio de las Choapas, Veracruz, México. Boletín de la Sociedad Herpetológica Mexicana 14: 20–37.

Alvarado-Díaz, J., I. Suazo-Ortuño, L. D. Wilson, and O. Medina-Aguilar. 2013. Patterns of physiographic distribution and conservation status of the herpetofauna of Michoacán, Mexico. Amphibian & Reptile Conservation 7: 128–170.

Burger, L. 1952. Notes on the Latin American Skink, *Mabuya mabouya*. Copeia 1952: 185–187.

Calderón-Mandujano R., and L. Mora-Tembre. 2004. Geographic Distribution. New distributional records and comment on Amphibians and Reptiles from Quintana Roo, México. Herpetological Review 35: 295–296.

Calderón-Mandujano, R., H. Vahena-Basave, and S. Calme□. 2008. Guía de los Anfibios y Reptiles de la Reserva de la Biósfera de Sian Ka'an y Zonas Aledañas / Amphibians and Reptiles of the Sian Ka'an Biosphere Reserve and Surrounding Areas. COMPACT, ECOSUR, CONABIO, and SHM A.C., Reserva de la Biósfera Sian Ka'an, Quintana Roo, Mexico.

Casas-Andreu, G. 1992. Anfibios y reptiles de las Islas Marias y otras islas advacentes a la costa de Nayarit, México. Aspectos sobre su biogeografía y conservación. Anales del Instituto de Biología, Universidad Nacional Autónoma de México. Serie Zoologica. 63: 95–112.

Casas-Andreu, G., F. R. Méndez-de la Cruz, and J. L. Camarillo. 1996. Anfibios y reptiles de Oaxaca. Lista, distribución y conservación. Acta Zoológica Mexicana 69: 1–35.

Castro-Franco, R., and M. G. Bustos-Zagal. 1994. List of reptiles of Morelos, Mexico, and their distribution in relation to vegetation types. The Southwestern Naturalist 39: 171–174.

Castro-Gálvez, Z. 2011. Distribución de los Anfibios y Reptiles de la Mixteca de Oaxaca. Unpublished Licenciatura thesis, Universidad Nacional Autónoma de México, Mexico.

Ceballos, G., L. Martínez, A. García, E. Espinoza, J. B. Creel, and R. Dirzo. 2010. Diversidad, Amenazas y Áreas Prioritarias para la Conservación de las Selvas Secas del Pacífico de México. FCE-CONABIO-TELMEX-CONANP-WWF México-EcoCiencia SC, Mexico.

Chaves, G., Porras, L.W., Nicholson, K. and Sunyer, J. 2013. *Marisora brachypoda.* The IUCN Red List of Threatened Species 2013. e.T16391158A16391161. (www.iucnredlist.org; accessed 14 November 2016).

Chavez-Lugo, E. G. 2015. Diversidad de Herpetofauna en el Área Privada de Conservación Talhpan, Veracruz. Unpublished Licenciatura thesis, Universidad Veracruzana, Veracruz, Mexico.

Dinerstein, E., D. M. Olsen, A. L. Graham, A. L. Webster, S. A. Primm, M. P. Bookbinder, and G. Ledec. 1995. A conser-vation assessment of the terrestrial ecoregions of Latin America and the Caribbean. The World Bank, in association with the World Wildlife Fund, Washington, D.C., United States.

Duellman, W. E. 1958. A preliminary analysis of the herpetofauna of Colima, Mexico. Occasional Papers of the Museum of Zoology, University of Michigan 589: 1–22.

Elith, J., S. J. Phillips, T. Hastie, M. Dudík, Y. E. Chee, and C. J. Yates. 2011. A statistical explanation of MaxEnt for ecologists. Diversity and Distributions 17: 43–57.

García, A., and G. Ceballos. 1994. Guía de Campo de los Reptiles y Anfibios de la Costa de Jalisco, México / Field Guide to the Reptiles and Amphibians of the Jalisco Coast, Mexico. Fundación Ecológica de Cuixmala, Instituto de Biología, Universidad Nacional Autónoma de México, México, D.F., Mexico.

García-Vázquez, U. O., L. Canseco-Márquez, J. L. Aguilar-López, C. A. Hernández-Jiménez, J. Maceda-Cruz, M. G. Gutiérrez-Mayén, and E. Y. Melgarejo-Velez. 2006. Análisis de la distribución de la herpetofauna en la región mixteca de Puebla, México. Pp. 152-169 *In* A. Ramirez-Bautista, L. Canseco Márquez, and F. Mendoza-Quijano (Eds.), Inventarios Herpetofaunísticos de México: Avances en el Conocimiento de su Biodiversidad. Publicaciones de la Sociedad Herpetológica Mexicana, Mexico.

GBIF. 2016. Global Biodiversity Information Facility, Occurrence Download (http://doi.org/10.15468/dl.xpc96z; accessed 14 November 2016).

Hedges, S. B., and C. E. Conn. 2012. A new skink fauna from Caribbean islands (Squamata, Mabuyidae, Mabuyinae). Zootaxa 3,288: 1–244.

Hernández-Franyutti, A., and M. C. Uribe. 2012. Seasonal spermatogenic cycle and morphology of germ cells in the viviparous lizard *Mabuya brachypoda* (Squamata, Scincidae). Journal of Morphology 273: 1,199–1,213.

Hijmans, R. J., S. E. Cameron, J. L. Parra, P. G. Jones, and A. Jarvis. 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1,965–1,978.

Johnson, J. D., V. Mata-Silva, E. García Padilla, and L. D. Wilson. 2015. The herpetofauna of Chiapas, Mexico: composition, distribution, and conservation. Mesoamerican Herpetology 2: 271–329.

Köhler, G. 2003. Reptiles of Central America. Herpeton, Offenbach, Germany.

Lee, J. C. 1996. The Amphibians and Reptiles of the Yucatán Peninsula. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, United States.

Luja, V. H. 2006. Natural History Notes. *Mabuya unimarginata* (Central American Mabuya). Reproduction. Herpetological Review 37: 469.

Macip-Ríos, R., G. Barrios-Quiroz, V. Sustaita-Rodriguez, and G. Casas-Andreu. 2012. Geographic Distribution. *Mabuya unimarginata* (Central America Mabuya). Herpetological Review 43: 103.

Miles, L., A. C. Newton, R. S. Defries, C. Ravilious, I. May, S. Blyth, V. Kapos, and J. E. Gordon. 2006. A global overview of the conservation status of tropical dry forest. Journal of Biogeogaphy 33: 491–505.

Ochoa-Ochoa, L., O. Flores-Villela, U. García-Vázquez, M. Correa-Cano, and L. Canseco-Márquez. 2006. *Mabuya brachypoda.* Áreas Potenciales de Distribución de la Herpetofauna de México. (www.conabio.gob.mx; accessed 14 November 2016).

Pelcastre-Villafuerte, L., and O. Flores-Villela. 1992. Lista de especies y localidades de recolecta de la herpetofauna de Veracruz, México. Publicaciones especies del Museo de Zoología, Facultad de Ciencias, UNAM 4: 25–92.

Pérez-Ramos, E., L. Saldaña de la Riva, and Z. Uribe-Peña. 2000. A checklist of the reptiles and amphibians of Guerrero, Mexico. Anales del Instituto de Biología, Serie Zoología 71: 21–40.

Phillips, S. J., R. P. Anderson, and R. E. Schapired. 2006. Maximum entropy modeling of species geographic distributions. Ecological Modelling 190: 231–259.

Soberón J., and T. Peterson. 2005. Interpretation of models of fundamental ecological niches and species' distributional areas. Biodiversity Informatics 2: 1–10.

Sotelo-Caro, O., J. Chichia-González, V. Sorani, and A. Flores-Palacios. 2015. Changes in the deforestation dynamics of a river sub-basin of Mexico: non-recovery of primary habitats following cessation of deforestation. Revista de Geografía Norte Grande 61: 205–219.

Woolrich-Piña G. A., P. Ponce-Campos, J. Loc-Barragán, J. P. Ramírez-Silva, V. Mata-Silva, J. D. Jonhson, E. García-Padilla, and L. D. Wilson. 2016. The herpetofauna of Nayarit, Mexico: composition, distribution, and conservation status. Mesoamerican Herpetology 3: 376–448.

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Wild and captive observations on the Burrowing Python, *Loxocemus bicolor* (Loxocemidae)

The Burrowing Python, *Loxocemus bicolor* Cope, 1861, is a secretive snake that occurs primarily in subhumid lowlands and adjacent premontane slopes along the Pacific versant from Nayarit, Mexico, to northwestern Costa Rica, and on the Atlantic versant in interior valleys in Chiapas, Mexico, Guatemala, and Honduras, at elevations from sea level to 979 m (Castro-Franco and Bustos Sagal, 1994; Savage, 2002; Solórzano, 2004; McCranie, 2011; Carbajal-Márquez et al., 2015). The total length (TL) of this snake is known to range from 700 to 1,600 mm (Alvarez del Toro, 1982; Mora and Chaves-Quiroz, 1989; Solórzano, 2004). This species preys primarily on terrestrial vertebrates, including anurans, lizards, snakes (including its own species), and rodents, as well as the eggs of turtles (including sea turtles) and iguanids (see Merchán and Mora, 2001, Savage, 2002, and Solórzano, 2004, and references therein).

The IUCN Red List of Threatened Species has assessed the conservation status of *L. bicolor* as Least Concern (Chaves et al., 2014), and Johnson et al. (2015) gauged this species with an EVS of 10, placing it in the lower portion of the medium vulnerability category. In Mexico, *L. bicolor* is classified as a species under special protection (Pr) by NOM-059 (Herrera Flores, 2010), but this assessment eventually might change as a result of continued development along the Pacific coast of the country (Meave et al., 2012). Importantly, relatively little life history information is available for this species, and the purpose of this note is to provide new observations on *L. bicolor* from the wild and in captivity.

Wild and Captive Observations

On 16 June 2009, one of us (SVG) found a clutch of six eggs (Fig.1A) at Urbanización Las Garzas, Ixtapa Zihuatanejo, Municipio de Zihuatanejo de Azueta, Guerrero, Mexico (17°40'28.69"N, 101°36'9.49" W; datum WGS 84; elev. 15 m); when the clutch was discovered, the identification of the species that laid the eggs was uncertain. The eggs had been deposited in a hole under a concrete slab, and were found when the area was being cleared for development.

The eggs were removed and incubated at a temperature of 27°C and a humidity of 100%, using the same sandy substrate recovered from the nest (Fig. 1B). Nine days later, on 25 June, five eggs hatched (Fig. 1B), which confirmef the identification of the species as *L. bicolor*, and the last egg hatched two days later (Fig. 1C). The mean snout–vent length (SVL) of the six hatchlings was 330.0 ± 5.34 mm (range 320–330 mm), and their mean body mass was 22.5 ± 2.31g (range 20–25g) (Table 1). By 4 July all of the hatchlings had shed their skin and fed voluntarily on young mice (4g).

Fig. 1. (A) Empty eggshells of *Loxocemus bicolor*. The eggs were placed in the substrate in which they were found, and hatched in 5–7 days; (B) hatchlings of *L. bicolor* burrowing in the sandy substrate used for incubation; and (C) the last individual of *L. bicolor* just before emerging from the egg. © Saraí Vázquez-González

Table 1. Snout–vent length (SVL) and body mass of *Loxocemus bicolor* hatchlings found in 2009 at Las Garzas Ixtapa Zihuatanejo, Municipio de Zihuatanejo de Azueta, Guerrero, Mexico.

Number of Individual	Sex	SVL (mm)	Body Mass (g)
1	M	320	25
2	M	330	20
3	M	330	20
4	M	330	25
5	H	330	25
6	H	340	20
Mean and SD		330.0 ± 5.34 mm	22.5 ± 2.31 g

At ca. 0600 h on 15 October 2010, at Bolsón de Santa Cruz, Provincia de Guanacaste, Costa Rica (10°22'4.45"N, 85°24'53.46"W; WGS 84; elev. 8 m), Ronny Alexander Hernández Mora and Karen Jiménez encountered two adult individuals of *L. bicolor* engaged in reproductive activity (Fig. 2). The snakes were intertwined and were observed for 16 min, up until one of the snakes, likely the male, began biting the other, but soon after the snakes dispersed in opposite directions. Interestingly, that year the seasonal rains had ceased and the level of the rivers had dropped considerably (R. Hernández Mora, pers. comm.), suggesting that the change in weather conditions perhaps triggered reproductive activity in this species. In northwestern Costa Rica and in southern Honduras, juveniles of *L. bicolor* often are encountered crossing roads in May and early June, at the beginning of the rainy season (LWP, pers. observ.; W. Lamar, pers. comm.).

Fig. 2. A pair of *Loxocemus bicolor* engaged in reproductive activity on 15 October 2010, at Bolsón de Santa Cruz, Provincia de Guanacaste, Costa Rica. © Alexander Hernández Mora

Additional Observations in Captivity

Ross and Marzec (1990) reported three instances of oviposition by captive *Loxocemus bicolor*, of which one clutch contained fertile eggs. These eggs were incubated at a temperature of 32.2°C, and 79 days later the eggs were found to contain dead, deformed embryos, suggesting that they should have been incubated at a lower temperature. Subsequently, a clutch produced by a wild-mated female was laid in March. This clutch was divided into two groups, one incubated at temperatures from 27.8 to 28.9°C, and the other at 30.0 to 31.1°C. The eggs incubated at the lower temperature failed to hatch, whereas those incubated the higher temperature hatched in May. Subsequently, Odinchenko and Latyshev (1996) reported on a clutch of four eggs deposited at the Moscow Zoo, which hatched at an incubation temperature of 31°C and a relative humidity of 100%.

Two of us (SG, AG) obtained a sexual pair of *L. bicolor* in the spring of 1989, which originated in Honduras. Both animals measured ca. 1,370 mm (TL). The pair began showing reproductive behavior in 1997 (Fig. 3), and in March of 1998 the female laid 11 eggs. Prior to depositing the eggs, the female was observed rolling the lower portion of her body under a heat lamp that had been placed above the enclosure. The eggs were incubated at a temperature of 27.8°C, and 64 days later two of them hatched; one of the hatchlings, however, was noticeably underdeveloped and soon died. On 5 April 2000, the same pair copulated and the female laid six eggs, which were incubated at temperatures ranging from 31.1 to 31.7°C, and approximately 60 days later all of them hatched. In ensuing years, the pair copulated several more times, but the female never laid more fertile eggs. The male died in 2010, at which time he measured 1,550 m (TL), and after showing signs of old age, the female died in 2013.

SG and AG obtained two other females of *L. bicolor* that were born in captivity at the San Antonio Zoo in 1992, which later bred on a somewhat regular basis. Growth in both females was about equal, and in 1998, when they measured about 1,070 mm (TL), they were introduced to a male. The male showed no interest in either female, although when introduced to the enclosure of the female indicated in the previous paragraph, he immediately would start courting her. The male began showing interest in the two females in 2006, when they were over 14 years of age and measured about 1,220 mm (TL). That year each of the females produced eggs, which hatched in 60 days at the aforementioned incubation temperatures of 31.1–31.7°C. Eight more clutches (5–8 eggs) were produced during the next several years (Fig. 4), of which the earliest was deposited on 8 February and the latest on 29 March. Both of the females are still alive, and currently measure about 1,520 mm (TL).

Fig. 3. A pair of *Loxocemus bicolor* from Honduras copulating in captivity. © Stan Grumbeck

Fig. 4. A captive born and raised *Loxocemus bicolor* ovipositing in captivity. © Stan Grumbeck

Based on these observations and others accumulated by SG, individuals of *L. bicolor* do not appear to reach sexual maturity until they reach at least 10 years of age, individuals are still alive at the age of 25, and females are known to deposit up to 11 eggs. The above information also suggests that breeding in *L. bicolor*, at least in Costa Rica and southern Honduras, commences at the transition between the rainy and dry seasons, or early in the dry season, and hatching takes place at the end of the dry season or the beginning of the rainy season.

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Literature Cited

Alvarez del Toro, M. 1982. Los Reptiles de Chiapas. 3rd ed. Colección Libros de Chiapas, Instituto de Historia Natural, Tuxtla Gutiérrez, Chiapas, Mexico.

Carbajal-Márquez, R. A., J. C. Arenas-Monroy, M. A. Domínguez-De la Riva, and E. A. Rivas-Mercado. 2015. *Loxocemus bicolor* (Serpentes: Loxocemidae): Elevational and geographic range extension in Michoacán, México. Revista Mexicana de Herpetología 1: 15–17.

Castro-Franco, R., and M. G. Bustos Sagal. 1994. List of reptiles of Morelos, Mexico, and their distribution in relation to vegetation types. The Southwestern Naturalist 39: 171–213.

Chaves, G., W. Lamar, L.W. Porras, J. Sunyer, and A. Solórzano. 2014. *Loxocemus bicolor*. The IUCN Red List of Threatened Species 2014: e.T169678A1280046. www.dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T169678A1280046.en; accessed 17 January 2017.

Herrera Flores, S. D. 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestre-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. Diario Oficial, Jueves 30 de diciembre de 2010, Segunda Sección: 1–78.

Johnson, J. D., V. Mata-Silva, and L. D. Wilson. 2015. A conservation reassessment of the Central American herpetofauna based on the EVS measure. Amphibian & Reptile Conservation 9(2) [General Section]: 1–94 (e100).

McCranie, J. R. 2011. The Snakes of Honduras: Systematics, Distribution, and Conservation. Contributions to Herpetology, Volume 26, Society for the Study of Amphibians and Reptiles, Ithaca, New York, United States.

Meave J. A., M. A. Romero-Romero, S. H. Salas-Morales, E. A. Pérez-García, and J.A. Gallardo-Cruz. 2012. Diversidad, amenazas y oportunidades para la conservación del bosque tropical caducifolio en el estado de Oaxaca, México. Ecosistemas 21: 85–100.

Merchán, M., and J. M. Mora. 2001. *Loxocemus bicolor*: biology and distribution of the Mexican Burrowing Python in Costa Rica. Reptilia 15: 50–55.

Mora, J. M., and A. C. Chávez-Quiroz. 1989. Life History Notes. *Loxocemus bicolor* (Burrowing Python). Size. Herpetological Review 20: 72.

Odinchenko, V. I., and V. A. Latyshev. 1996. Keeping and breeding in captivity the Mexican Burrowing Python *Loxocemus bicolor* (Cope, 1861) at Moscow Zoo. Russian Journal of Herpetology 3: 95–97.

Ross, R. A., and G. Marzec. 1990. The Reproductive Husbandry of Pythons and Boas. Institute for Herpetological Research, Stanford, California, United States.

Savage, J.M. 2002. The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents between Two Seas. The University of Chicago Press, Chicago, Illinois, United States.

Solórzano, A. 2004. Serpientes de Costa Rica: Distribución, Taxonomía e Historia Natural / Snakes of Costa Rica: Distribution, Taxonomy, and Natural History. Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica.

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