

Herpetofauna of the Mesa Tres Ríos Area in the Northern Sierra Madre Occidental of Sonora, Mexico

The Sierra Madre Occidental (SMO) extends from northeastern Sonora and northwestern Chihuahua south through western Mexico to the Transverse Volcanic Axis in the state of Guanajuato, which forms a montane bridge to the Sierra Madre del Sur to the south and the Sierra Madre Oriental to the east. All of these mountain ranges are volcanic in origin and are part of the American Cordillera that shapes the western backbone of North, Central, and South America, and Antarctica (Dickinson 2004). The northern limit of the SMO is difficult to define because the high sierra begins to break up into “sky islands” (discrete sierras isolated from other sierras by desert or grassland vegetation communities) at about north latitude 30.6°; however, oak woodlands form a nearly continuous band northward into the Peloncillo Mountains, Arizona and New Mexico, and the Animas Mountains, New Mexico at latitudes of 31.8°N and 31.6°N, respectively, with patches of pine-oak forest and mixed-conifer forest at the higher elevations (Brown and Lowe 1994). For the purposes of this paper, we

consider the northern limit of the SMO to be the northern end of the Sierra Huachinera at 30.7°N in Chihuahua, which is consistent with the definition of McCranie and Wilson (1987). To the north of the SMO are a series of sky islands that extend to the base of the mountains of the Mogollon Rim in Arizona and New Mexico. These sky islands support a mixture of species typical of the SMO, as well as the Mogollon Rim and Rocky Mountains to the north (Lavin-Murcio and Lazcano 2010; González-Elizondo et al. 2012).

The highest peaks of the northern SMO are in western Chihuahua (e.g., Cerro Mohinora at 3300 m, Sierra de Gasachic at 3060 m; Lemos-Espinal et al. 2014), whereas the highest peak in the Sonora portion of the SMO is Cerro Pico Guacamayas, about 17 km (by air) northwest of Mesa Tres Ríos (2620 m; INEGI Mesa Tres Ríos topographic map, 1:50,000, 2006). The most accessible portion of the northern SMO is along the paved federal Highway 16, which crosses the SMO at about latitude 28.4°N, passing through Yécora and Maycoba, Sonora, and on into Chihuahua. As a result, amphibian and reptile distributions are better understood along the Highway 16 corridor compared to elsewhere in the northern SMO of Sonora. Such contrast in regional sampling effort is evidenced by perusal of HerpNet collection records, the Madrean Discovery Expedition database (<http://www.madreandiscovery.org/>), and dot distribution maps in Lemos-Espinal et al. (2015). Lara-Gongora (1986), and in a more detailed paper, Enderson et al. (2014) described the herpetofauna along the Sonora portion of Highway 16. Lemos-Espinal and Smith (2007), Lemos-Espinal (2015), and Lemos-Espinal et al. (2014 and 2015) detailed the

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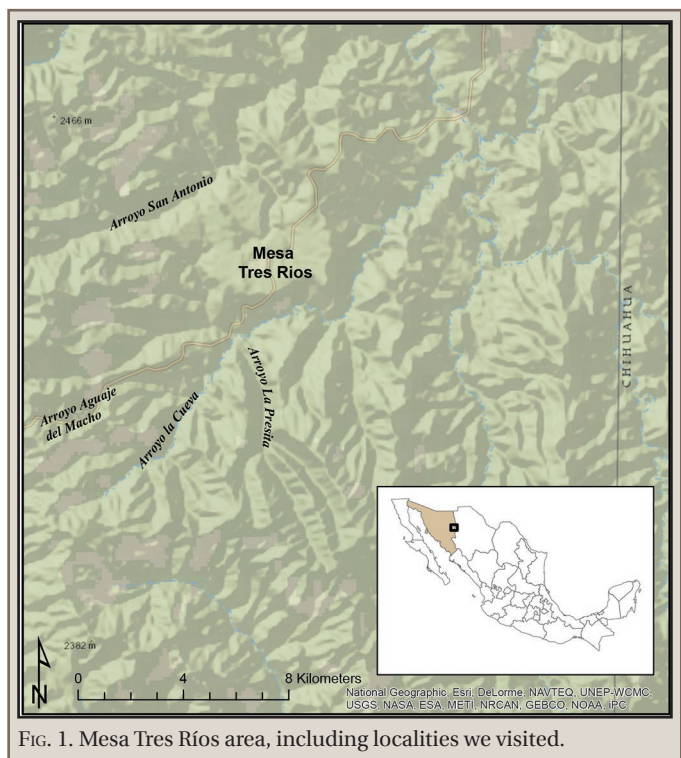


FIG. 1. Mesa Tres Ríos area, including localities we visited.

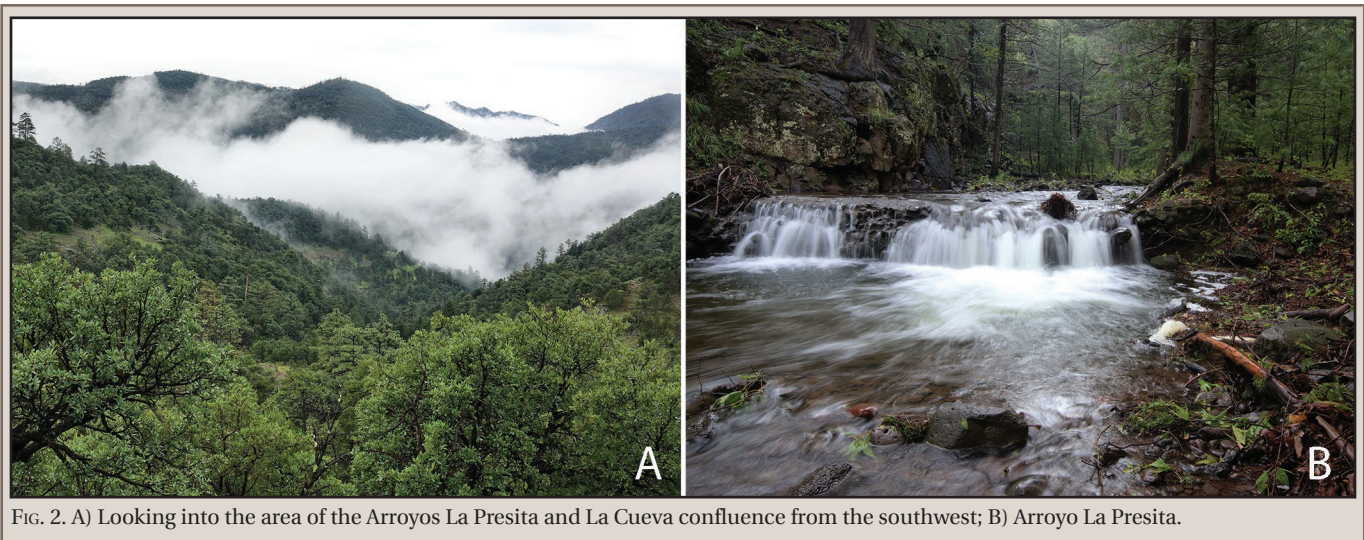


FIG. 2. A) Looking into the area of the Arroyos La Presita and La Cueva confluence from the southwest; B) Arroyo La Presita.

herpetofauna of the Chihuahua side of the northern SMO and also reviewed previous herpetological work in that region. McCranie and Wilson (1987) summarized the herpetofauna of the entire SMO.

The focus of the current study is the northern SMO of Sonora in the vicinity of Mesa Tres Ríos, municipality of Nácori Chico (Fig. 1). We also present herein notable herpetofaunal records from adjacent lowlands in Sonora through which we travelled on the way to Mesa Tres Ríos. Previous work in the Mesa Tres Ríos area is limited. Wilmer and Lynn Tanner and Verl Allman collected in the vicinity of Three Rivers (= Tres Ríos area, about 29.8°N) in 1956 and 1958 (Tanner 1985). Their collections are at BYUH. Robert Webb visited Rancho Tres Ríos in 1972 (collections at UTEP). Charles Lowe collected for the UAZ in the Mesa Tres Ríos area in 1972. Stephen Hale, Jim Jarchow, Charles Lowe, Peter Holm, and Brent Martin also collected in that area in 1984 and 1985 (collections at UAZ). Van Devender et al. (2013) documented nine species of amphibians and 21 species of reptiles about 25 km (by air) to the west of Mesa Tres Ríos in the Sierra Bacadéhuachi, which they considered as part of the SMO, but others categorize as a separate sky island (Jacobs 2012).

MATERIALS AND METHODS

Mesa Tres Ríos is a town of about 600 inhabitants at an elevation of 1897 m, accessed via a rough dirt road and 3–4 hours of driving from Nácori Chico, Sonora, or a similarly rough road from Chihuahua. The area is characterized by rugged, montane terrain vegetated with pine-oak forest (Fig. 2; see vegetation discussions in Martin et al. 1998, Rio Mayo flora; and Van Devender et al. 2013, flora of the Sierra Bacadéhuachi) and, at higher elevations, mixed-conifer forest (Brown and Lowe 1994; Felger et al. 2001). The climate is humid-temperate (Vivó-Escoto 1964), in which mean monthly temperatures at Mesa Tres Ríos range from 5.4°C in January to 21.5°C in June and July. Mean precipitation is 591 mm, with 64% falling in the June to September period (<https://es.climate-data.org/location/239129/>).

We visited the Mesa Tres Ríos study area during 25–28 June and 5–11 August 2018. The June visit was a scouting trip for the larger expedition in August, which was hosted by Greater Good of Tucson as a Madrean Discovery Expedition. Our camp was along a flowing stream in Arroyo La Presita, 3.6 km (by air) SSW of Mesa Tres Ríos, at an elevation of 1602 m in a diverse pine-oak-cypress

forest. Three species of pine (*Pinus leiophylla* var. *chihuahuana*, *P. engelmannii*, and *P. strobiformis*), three species of oak (*Quercus durifolia*, *Q. hypoleucoides*, and *Q. rugosa*), Arizona Cypress (*Hesperocyparis arizonica*), Alligator Juniper (*Juniperus deppeana*), Big-tooth Maple (*Acer grandidentatum*), Arizona Sycamore (*Platanus wrightii*), American Hop Hornbeam (*Ostrya virginiana*), Chilillo (*Ilex rubra*), and two species of Madrone (*Arbutus arizonica*, *A. xalapensis*) were common in the forest at Arroyo La Presita (G. Ferguson, pers. comm.). We also visited Arroyo La Cueva, 3.3 km (by air) SW Mesa Tres Ríos; Rancho San Antonio, 4.1 km (by air) NNW of Mesa Tres Ríos; and Arroyo Aguaje del Macho, 9.4 km (by air) SW of Mesa Tres Ríos at elevations of 1566–2142 m and montane vegetation communities similar to Arroyo La Presita (Fig. 1). In these areas we conducted visual encounter surveys for amphibians and reptiles, walking through habitat by day and night, turning rocks and logs (and replacing them into their original positions), inspecting rock crevices, and searching along streams and at other water bodies. One of us (VHC) visited the area in 2012 and 2017 and made significant discoveries, which are included herein. We also perused collection records from 28 herpetological museums, as well as VertNet and the Madrean Discovery Expedition database, and we reviewed literature for previous herpetofaunal records from the area. Records and images are available online at the Consortium of Small Vertebrate Collections (ASU: csvcoll.org) and Madrean Discovery Expedition database.

RESULTS

Amphibians and reptiles documented from the Mesa Tres Ríos area include two salamanders, seven anurans, one turtle, 13 lizards, and 12 snakes for a total of 35 species (Table 1). Amphibians and reptiles found by us in the Mesa Tres Ríos area that represent range extensions, new municipality records, or significant natural history observations are described below. Also detailed below, but excluded from Table 1, are five notable records from the Río Bavispe Valley and the Nácori Chico area along the route into Mesa Tres Ríos.

Isthmura sierraoccidentalis.—This species was recently split from *I. bellii* (formerly *Pseudoeurycea bellii*; Rovito et al. 2015). Our two records from Arroyo La Presita represent the third locality for the species, the second for Sonora, and a range extension of 172 km (by air) NNE of the nearest locality near

TABLE 1. Amphibians and reptiles of the Mesa Tres Ríos area and their biogeographical affiliations.

Species	Locality ¹ and source	Biogeographical affiliation ²
PLETHODONTIDAE		
<i>Isthmura sierraoccidentalis</i>	Arroyo La Presita, 4.2/4.3 km S Mesa Tres Ríos (ASU HP00224/ASU HP00225)	SMO
AMBYSTOMIDAE		
<i>Ambystoma rosaceum</i>	Arroyo Aguaje de Macho, 8.9 km SW Mesa Tres Ríos (ASU HP00233); small side stream, Bavispe River below Three Rivers (BYUH 13727–13730); Arroyo el Macho, ca 5 mi (rd) W Mesa Tres Ríos (UAZ 45963)	SMO+SI
BUFONIDAE		
<i>Anaxyrus punctatus</i>	5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 8091)	WS
<i>Anaxyrus woodhousii</i>	Bavispe River below Three Rivers (BYUH 13458, 13497)	WS
<i>Incilius mccoysi</i>	La Presita Camp, 3.6 km SSW Mesa Tres Ríos (ASU HP00217, HP00228, HP00229)	SMO+SI
CRAUGASTORIDAE		
<i>Craugastor tarahumaraensis</i>	Arroyo La Presita, 3.3 km SSW Mesa Tres Ríos (ASU HP00218); Arroyo La Presita, 3.5/3.6 km SSW Mesa Tres Ríos (ASU HP00265/ASU HP00264)	SMO+SI
HYLIDAE		
<i>Hyla arenicolor</i>	Upper Fork of Nutria Creek (BYUH 13489); 5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 8092); Arroyo La Presita, 3.3/3.6 km SSW Mesa Tres Ríos (ASU HP00235/HP00234)	WS
<i>Hyla wrightorum</i>	Los Indios, 1.3 km ENE of Mesa Tres Ríos (ASU HP00215); Arroyo Aguaje del Macho, 8.9 km SW Mesa Tres Ríos (ASU HP00226)	WS
RANIDAE		
<i>Rana yavapaiensis</i>	La Presita Camp, 3.6 km SSW Mesa Tres Ríos (ASU HP00262); Rancho San Antonio, 4.2 km NNW of Mesa Tres Ríos (ASU HP00263, HP00294); Upper Forks of Nutria Creek (BYUH 13492 ³); 5 mi ENE of Mesa Tres Ríos, Rancho Tres Ríos (UTEP 7385 ⁴)	WS
KINOSTERNIDAE		
<i>Kinosternon sonoriense</i>	5 mi ENE of Mesa Tres Ríos, Rancho Tres Ríos (UTEP 3831, 3832)	WS
ANGUIDAE		
<i>Elgaria kingii</i>	Arroyo La Presita, 3.3 km SSW Mesa Tres Ríos (ASU HP00269); Los Indios, 1.3 km ENE of Mesa Tres Ríos (ASU HP00268); Bavispe River (below 3 Rivers), near Chihuahua-Sonora line (BYUH 13442)	SMO+SI
PHRYNOSOMATIDAE		
<i>Holbrookia elegans</i> ⁵	Along road from Mesa Tres Ríos to Arroyo Aguaje del Macho, 3.6 km SW Mesa Tres Ríos (ASU HP00275); Bavispe River below Three Rivers (BYUH 13452); 5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 4694, 4695)	WS
<i>Phrynosoma orbiculare</i>	Pico la India road, 7.6 km SSE Mesa Tres Ríos (ASU HP00212); Puerto del Macho, 17.6 km SSW of Mesa Tres Ríos (ASU HP00195)	SMO+SI
<i>Sceloporus clarkii</i>	5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 4291); Bavispe River below Three Rivers (BYUH 13369, 13429, 13431–13433, 13494, 13495, 13498, 13500, 13506, 13584–13587, 113503)	WS
<i>Sceloporus jarrovi</i>	Arroyo La Presita 4.3 km S Mesa Tres Ríos (ASU HP00239); Top of Arroyo Aguaje del Macho, 10 km SW Mesa Tres Ríos (ASU HP00238); Upper Fork of Nutria Creek (BYUH 13488); Mesa Tres Ríos (UAZ 45619); 11.8 mi (rd) above El Chorro on rd to Mesa Tres Ríos (UAZ 45620); 10.2 mi (rd) below Mesa Tres Ríos on rd to Nácori Chico (UAZ 43501)	SMO+SI
<i>Sceloporus lemosespinali</i>	Mesa Tres Ríos (NW of Chuuiichupa), Sierra Madre (UAZ 35328–35342 ⁶); Top of Arroyo Aguaje del Macho, 10 km SW Mesa Tres Ríos (ASU HP00240); Curva de Chinane-Los Presones area along the Pico la India road, 4.4 km SSE of Mesa Tres Ríos (ASU HP00291); Pico la India road, 6.2 km SSE of Mesa Tres Ríos (ASU HP00290); Los Indios, 1.3 km ENE of Mesa Tres Ríos (ASU HP00219); Arroyo La Presita, 3.3 km S of Mesa Tres Ríos (ASU HP00276)	SMO+SI
<i>Sceloporus poinsettii</i>	On road from Arroyo La Cueva to Arroyo Aguaje del Macho, 5.1 km SW Mesa Tres Ríos (ASU HP00241); La Presita Camp, 3.6 km SSW Mesa Tres Ríos (ASU HP00242); Mesa de Tres Ríos (NW of Chuuiichupa), Sierra Madre (UAZ 35182); approx. 4 miles E of Nutria Ridge (BYUH 13491); 3.1 mi (rd) below Mesa Tres Ríos on rd to Nácori Chico (UAZ 45618); 10.2 mi (rd) below Mesa Tres Ríos on rd to Nácori Chico (UAZ 53500)	WS
<i>Sceloporus slevini</i>	Mesa Tres Ríos (NW of Chuuiichupa), Sierra Madre (UAZ 35283); Arroyo Aguaje del Macho, 9.7 km SW of Mesa Tres Ríos (ASU HP00267)	SMO+SI
<i>Sceloporus virgatus</i>	Arroyo La Presita, 3.9 km SSW Mesa Tres Ríos (ASU HP00243); Top of Arroyo Aguaje del Macho, 10 km SW Mesa Tres Ríos (ASU HP00244); Curva de Chinane-Los Presones area along the Pico la India road, 4.4 km SSE of Mesa Tres Ríos (ASU HP00289); Mesa Tres Ríos (NW of Chuuiichupa), Sierra Madre (UAZ 35278–35282); 10.2 mi (rd) below Mesa Tres Ríos on rd to Nácori Chico (UAZ 53498, 53499)	SMO+SI
<i>Urosaurus ornatus</i>	5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 4596, 4602–4607); Bavispe River below Three Rivers (BYUH 13427, 13428, 13430, 13436–13438, 13453, 13461, 13466, 13467, 13471, 13473, 13503, 13507, 13595, 14559–14562, 14565, 14566)	WS

TABLE 1. Continued.

Species	Locality ¹ and source	Biogeographical affiliation ²
SCINCIDAE		
<i>Plestiodon callicephalus</i>	Upper Forks of Nutria Creek (BYUH 13140, 13141); Bavispe River below Three Rivers, Sonora-Chihuahua line (BYUH 13145–13150, 14233); Mesa Tres Ríos (NW of Chuichupa) (UAZ 35176–35178, 35270, 35659); Mesa Tres Ríos (UAZ 45640); Arroyo La Cueva, 3.0 km SW Mesa Tres Ríos (ASU HP00245); Curva de Chinane-Los Presones area along the Pico la India road, 4.4 km SSE of Mesa Tres Ríos (ASU HP00292); along road from Mesa Tres Ríos to Arroyo Aguaje del Macho, 5.8 km SW Mesa Tres Ríos (ASU HP00277)	SMO+SI
TEIIDAE		
<i>Aspidoscelis exsanguis</i>	Arroyo La Cueva, 3.0 km SW Mesa Tres Ríos (ASU HP00246); Mesa Tres Ríos (NW of Chuichupa) (UAZ 43730); Rancho San Antonio, 4.2 km NNW of Mesa Tres Ríos (ASU HP00272); 5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 5292–5294, 5300)	WS
<i>Aspidoscelis sonorae</i>	5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 5291, 5295–5299)	SMO+SI
COLUBRIDAE		
<i>Lampropeltis knoblochi</i>	Arroyo La Presita, 3.6/3.8 km SSW Mesa Tres Ríos (ASU HP00250, HP00227/HP00251); Pico la India road, 2.3 km S of Mesa Tres Ríos (ASU HP00296)	WS
<i>Masticophis mentovarius</i>	Cueva Creek near Tres Ríos (BYU 17112 ⁷)	WS
<i>Pituophis catenifer</i>	Arroyo La Cueva, 2.8 km SW of Mesa Tres Ríos (ASU HP00214); Arroyo La Presita, 3.3 km SSW of Mesa Tres Ríos (ASU HP00215)	WS
DIPSADIDAE		
<i>Diadophis punctatus</i>	5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 4028)	WS
<i>Hypsiglena chlorophaea</i>	Near corral at Arroyo La Cueva, 3.0 km SW Mesa Tres Ríos (ASU HP00230); Arroyo La Presita, near junction with Arroyo La Cueva, 3.3 km SSW of Mesa Tres Ríos (ASU HP00283)	
NATRICIDAE		
<i>Thamnophis cyrtopsis</i>	Arroyo La Presita, 3.5 km SSW Mesa Tres Ríos (ASU HP00273); Arroyo Aguaje del Macho, 8.7 km SW of Mesa Tres Ríos (ASU HP00274); 5 mi ENE Mesa Tres Ríos, Rancho Tres Ríos (UTEP 4802)	WS
<i>Thamnophis melanogaster</i>	Bavispe River, below Three Rivers (BYUH 13371, 13373, 13493, 13496, 13505, 14197–14202, 14208, 14209); Three Rivers (CAS 88444)	WS
<i>Thamnophis unilabialis</i>	Confluence of Arroyo La Cueva and Arroyo La Presita (ASU HP00221); Rancho San Antonio, 4.1 km NNW of Mesa Tres Ríos (ASU HP00278); Arroyo La Presita, 4.8 km SSW Mesa Tres Ríos (ASU HP00247)	SMO ⁸
VIPERIDAE		
<i>Crotalus lepidus</i>	Arroyo La Cueva, 2.9 km SW Mesa Tres Ríos (ASU HP00222); Arroyo La Presita, 3.2/3.3 km SSW of Mesa Tres Ríos (ASU HP00279/HP00280, HP00248); 1 mi N La Mesa (SDNHM 42906, 42907)	SMO+SI
<i>Crotalus molossus</i>	Arroyo La Presita, 3.3/3.6 km SSW Mesa Tres Ríos (ASU HP00284/HP00249)	WS
<i>Crotalus pricei</i>	Puerto del Macho, 9.4 km SW of Mesa Tres Ríos (ASU HP00216); Pillar along rd from Arroyo La Presita to Nácori Chico, 10.8 km SW Mesa Tres Ríos (ASU HP00223)	SMO+SI
<i>Crotalus willardi</i>	Arroyo La Presita, 3.3 km SSW Mesa Tres Ríos (ASU HP00270, HP00271, HP00282); Arroyo La Cueva, 2.7 km SSW of Mesa Tres Ríos (ASU HP00281); Upper Forks of Nutria Creek (BYUH 13487); Mesa Tres Ríos (NW of Chuichupa) (UAZ 35081)	SMO+SI

¹All distances are by air unless otherwise indicated.

²SMO = Sierra Madre Occidental, SMO+SI = Sierra Madre Occidental plus sky islands, WS = widespread, occurs well beyond the SMO and sky islands.

³In catalogue as “*Rana magnaocularis*.” *Rana magnaocularis* and *R. yavapaiensis* are very similar in appearance and morphology. Distinguishing between these two is best done with genetics, although a suite of characters examined in a series of specimens can also provide accurate identifications (Rorabaugh and Lemos-Espinal 2016). We base our identifications on these characters plus distribution. The nearest known *R. magnaocularis* are on the Río Yaqui and the Northern Jaguar Reserve, about 89 and 66 km to the southwest, respectively, of La Presita Camp (Oláh-Hemmings et al. 2010; Rorabaugh et al. 2011), whereas *R. yavapaiensis* is well-distributed in northeastern Sonora (Rorabaugh and Lemos-Espinal 2016).

⁴In catalogue as “*Rana* sp. *pipiens* group”

⁵Lemos-Espinal et al. (2015) list *Holbrookia approximans* as occurring in the SMO of Chihuahua. The taxonomy of these montane *Holbrookia* are unclear and we did not examine specimens from the Mesa Tres Ríos area in enough detail to properly distinguish between *H. approximans* and *H. elegans*. Lemos-Espinal et al. (2015) and Rorabaugh and Lemos-Espinal (2016) only show *H. elegans* in the Mesa Tres Ríos area.

⁶In catalogue as “*Sceloporus grammicus*.”

⁷Tanner (1985) listed this site as “just east of the Sonora border” in Chihuahua, but it is actually in Sonora (Lemos-Espinal and Smith 2007).

⁸The distribution extends onto the Mexican plateau east of the SMO.



FIG. 3. Representative amphibians: A) *Isthmura sierraoccidentalis* (ASU HP00225); B) juvenile *Incilius mccoyi* (ASU HP00228); C) *Craugastor tarahumaraensis* (ASU HP00265).

Rancho El Puerto, Sonora. Both specimens were found inside wet, rotted logs and were only 0.24 km apart. ASU HP00225 (Fig. 3A) was found in the arroyo bottom adjacent to a talus slope, 11 m lateral distance from a flowing stream and 4 m above it. That individual measured 82 mm SVL and 142 TL. ASU HP00224 was found on a 30-degree northeast-facing slope of 55 degrees and was 10 m lateral distance from a hillside seep; it measured 52 mm SVL and 82 mm TL and weighed 2.4 g. Both individuals were in a forest of pines, oaks, and cypress. The stream that flows through the arroyo is almost certainly perennial, at least in pools, because we found three species of native fishes inhabiting that section of stream. Lowe et al. (1968) also found this species under or in logs near Rancho El Puerto, Sonora, and described similar ecological conditions. Near Ocampo, Chihuahua, Van Devender et al. (1989a,b) found salamanders emerging from holes formed from rotted tree roots in a road cut. The forest at the Ocampo locality was more dominated by oaks than at our locality or Rancho El Puerto. Cypress was not mentioned as being present at either of the other localities. Our observations were at elevations (1642 and 1731 m) intermediate between the Rancho El Puerto (roughly 1525 m) and Ocampo (1830 m) records.

ASU HP00224 had six small and several minute reddish-orange dorsal spots. ASU HP00225 had only two reddish-orange dorsal spots, which were on the neck. The venter was slightly lighter in color than the dorsum on both specimens. Lowe et al.

(1968) noted that four of seven salamanders from near Rancho El Puerto dropped their tails when handled. Neither of our salamanders lost their tails despite considerable handling for measurements and photography. Our records help fill in what Bezy et al. (2004) referred to as the “Plethodontid Gap.”

Incilius mccoyi.—Our records of this species in the Mesa Tres Ríos area are the first for this portion of the SMO and the first for the municipality of Náciori Chico. The nearest record is UAZ 57395-PSV, Sierra Bacadéhuachi, 16.5 km (by air) ENE of Bacadéhuachi, Sonora, approximately 25 km (by air) W of our localities. Small, reddish juveniles (Fig. 3B), surface active during the day, were common in Arroyo La Presita. One of these small juveniles and a *Hyla arenicolor* were palped from a *Thamnophis cyrtopsis* at La Presita Camp. Lemos-Espinal et al. (2015) suggested that *Thamnophis* are the main predators of *I. mccoyi*; however, this is the first record of predation on this species of which we are aware.

Craugastor tarahumaraensis.—Our records are the first for the Mesa Tres Ríos area and the first for the municipality of Náciori Chico. The nearest record is from the Sierra Bacadéhuachi, (UAZ 57337-PSV, Ferguson et al. [2012]). ASU HP00218 was surface active after dark in camp on 27 June and was calling. ASU HP00265 (Fig. 3C) was found in a rotted-out root hole in a road cut, and ASU HP HP00264 was found in a cave formed by granite boulders. The latter two, found 9–10 August, were not calling.



FIG. 4. Representative reptiles: A) DOR *Boa sigma* (ASU HP00237); B) *Crotalus pricei* (ASU HP00223); C) *Lampropeltis knoblochi* (ASU HP00250) consuming a bat (probably a *Myotis* sp. or *Parastrellus hesperus*); D) Adult *Thamnophis unilabialis* (ASU HP00221) at the confluence of Arroyos La Cueva and La Presita; E) *Crotalus lepidus* (ASU HP00248).

Hyla wrightorum.—Duellman et al. (2016) used the genus name *Dryophytes* for this and other *Hyla* species in the New World and East Asia. We follow AmphibiaWeb's proposal to consider *Dryophytes* a subgenus of *Hyla*, maintaining the traditional taxonomy of this species and *H. arenicolor*. Our records of this species are the first for the Mesa Tres Ríos area. The nearest locality to our sites is that for UAZ 45595 collected by C. H. Lowe and Brent Martin on 2 September 1984 at "El Chorro, 5.1 mi (rd) NE Nácóric Chico," which is at the southern end of the Sierra Bacadéhuachi, but at a curiously low elevation for the species (1006 m). JCR examined the specimen, which is a very small (16 mm SVL) metamorph with three front limbs and the distal half of the right hind limb missing. It is the only *H. wrightorum* collected at that locality, although 50 small juvenile and metamorph *Smilisca fodiens* (UAZ 45305–45353) were collected from the same locality on the same day and by the same collectors. All but one of those specimens (UAZ 45321) is labeled "*Hyla wrightorum*" with a line through that name followed by "*Pternohyla*" (= *Smilisca fodiens*). UAZ 45321 is simply labeled "*Pternohyla*." Diagnostic characters of UAZ 45595 are not well-developed enough to distinguish it from small juvenile or metamorph *H. wrightorum* from the Yécora area of Sonora, or small *S. fodiens* from elsewhere in Sonora. C. H. Lowe is deceased, but JCR communicated with Brent Martin about UAZ 45595. He did not remember the specimen or the collections on that day. We surmise that Lowe and Martin believed they were collecting *H. wrightorum*, then thought better of it and relabeled the specimens (very small *H. wrightorum* and *S. fodiens* are very difficult to tell apart). The one specimen that remained labeled as *H. wrightorum* has a catalog number more than 200 higher than the rest of the series. We suspect it became separated from the other specimens and was never relabeled. Given the apparent reassessment of the series, and the low elevation of El Chorro uncharacteristic of *H. wrightorum* habitat, but consistent with that of *S. fodiens*, we believe UAZ 45595 to be *S. fodiens* misidentified as *H. wrightorum*. With the reassessment of that specimen, our findings of *H. wrightorum* in the Mesa Tres Ríos area represent the third area for the species in Sonora, the others being Rancho Los Fresnos north of Cananea (Maldonado-Leal et al. 2009) and the Yécora area (Gergus et al. 2004; Rorabaugh and Lemos-Espinal 2016) both of which are at least 160 km away. This is a fairly common species in the higher SMO of Chihuahua (Lemos-Espinal et al. 2015).

Smilisca fodiens.—Our ASU HP00236 from Granados is the northernmost in the Río Bavispe Valley and the first for the municipality of Huásabas. Our specimen was found adjacent to our motel in a small, shallow puddle (approx. area 6 x 3 m) in the middle of a dirt road in disturbed foothills thornscrub. Several small metamorphs were also found but not photo vouchered. The next nearest record is 29.1 km (by air) ESE in desert grassland at 1293 m elevation in the Sierra Bacadéhuachi (Madrean Discovery Expedition database [MDE] son-trv-4168).

Spea multiplicata.—One small juvenile (ASU HP00266) was observed on the outskirts of Granados in disturbed foothills thornscrub. This specimen represents the first record for the municipality of Huásabas. The nearest records are 98 km (by air) to the northwest at Arizpe in the Río Sonora drainage (UAZ 8056-8066).

Heloderma suspectum.—Our record from 3.7 km (by air) NE Nácóric Chico (ASU HP00288) is the first for the municipality of Nácóric Chico and the eastern-most record in this portion of Sonora. This specimen was found dead on the Nácóric Chico-Mesa

Tres Ríos road in foothills thornscrub. The next nearest record is MDE 9639, 30.3 km (by air) to the west near Bavispe.

Phrynosoma orbiculare.—Our ASU HP00212 is the second record for the Mesa Tres Ríos area. An observation from Puerto del Macho, 17.6 km (by air) SSW of Mesa Tres Ríos (ASU HP00195; Aguilar-Morales and Van Devender 2018) from 2017 was the first. These records document the third area for this species in Sonora, the others being the Sierra El Tigre and the SMO in the Yécora area (Rorabaugh and Lemos-Espinal 2016).

Plestiodon obsoletus.—Our record from the Río Bavispe, 2.3 km (by air) NE Huásabas (ASU HP00220), is the first for the municipality of Huásabas. The next nearest record is MVZ 136764 collected 16.4 km (by air) NE of our specimen. Our specimen was a juvenile found dead at the ecotone between riverine riparian vegetation and agriculture. This record is only the 14th *P. obsoletus* for Sonora.

Boa sigma.—Our record from the Río Bavispe Valley (ASU HP00237, Fig. 4.A) is the northeastern-most for the species and the first for the municipality of Huásabas. The specimen was dead on federal Highway 14, 4 km (by air) E of the Río Bavispe in foothills thornscrub. The next nearest locality is 41.9 km (by air) to the west (MDE son-trv-9053).

Lampropeltis knoblochi.—Our records are the first for the Mesa Tres Ríos area and the first for the municipality of Nácóric Chico. The next nearest locality in Sonora is 82 km (by air) WNW in the Sierra La Madera (MDE son-trv-1103). ASU HP00250 was found on 3 August at 2130 hr inside a wooden shed in the process of consuming a bat that was probably a *Myotis* sp. or *Parastrellus hesperus* (Fig. 4.C). The snake was found again on 8 August on the doorstep of the shed with a noticeable bolus in its stomach. Fox (2002) found a *Myotis volans* in the stomach of a *L. knoblochi* collected from the Peloncillo Mountains, New Mexico.

Pituophis catenifer.—Our records (ASU HP00215 and ASUHP00214) are the first for the SMO of Sonora, although this species has been collected at similar elevations and habitats nearby in the SMO of Chihuahua (Lemos-Espinal et al. 2015). Our records are also the first for the municipality of Nácóric Chico.

Hypsiglena chlorophaea.—Our ASU HP00230 and HP00238 are the first records of this species from the northern SMO of Sonora and the municipality of Nácóric Chico. The next nearest locality is "ca. 6 miles E (rd) from Huasabas" (LACM 108845), about 32 km (by air) WNW of our locality. Both specimens were found under rocks in pine-oak forest. Most records for this species in Sonora are at lower elevation and in more arid vegetation communities. Although we call this animal *H. chlorophaea*, it might be part of Mulcahy's (2008) undescribed "Cochise Clade" based on configuration of the single neck blotch, the eye stripe, and two offset rows of dorsal spots.

Thamnophis unilabialis.—This species was first collected in Sonora in 1893 (USNM 21055), but the collection record merely lists "Sonora" as the locality with a note to peruse Mearns (1907), which was the report of the 1892–1894 U.S.-Mexico boundary survey, for further information. We find no mention, however, of the specimen or the species in that publication. UAZ 32235, the only other record from Sonora, was found in September 1972 in Yécora. Rorabaugh and Lemos-Espinal (2016) mentioned a sight record from the Río Sonora that they considered suspect. Our three localities in the Mesa Tres Ríos area are a range extension within Sonora of 161–169 km (by air) N of Yécora and about 140 km (by air) ENE of the Río Sonora locality. This species is more commonly collected in the SMO of Chihuahua (Lemos-Espinal et al. 2015). Adults at our sites were a slate gray to dull

brown with very little patterning (Fig. 4D), which contrasts with the coloration of adults from western Chihuahua that are dark brown with five or more rows of reddish to black spots or black-bordered red spots on the dorsum (Lemos-Espinal and Smith 2007). Neonates in our area, however, showed the more typical, spotted pattern. Most were found under rocks near streams and one was captured in a minnow trap. An unvouchered specimen from Arroyo La Presita had a *Gila minacae* in its stomach.

Crotalus lepidus.—While studying birds, Joe Marshall collected two *Crotalus lepidus* on 28 August 1952 from “Sierra Madre, 1 mi N La Mesa” (SDNHM 42906, 42907). Based on figure 1 in Marshall (1957), we believe his La Mesa is the same as Mesa Tres Ríos. Our records are the first for the Mesa Tres Ríos area since Marshall’s collections. This species has been found in only a few other sierras in Sonora: Pan Duro, San Luis, Mariquita, Elenita, and La Madera, and in the SMO in the Yécora area (Rorabaugh and Lemos-Espinal 2016, MDE 6422, MDE 6421).

Crotalus molossus.—Our records from Arroyo La Presita are the first for the Mesa Tres Ríos area. The next nearest record in Sonora is from El Chorro (UAZ 45912), 21.1 km (by air) to the southwest.

Crotalus pricei.—Our two records document the species from a third mountain range in Sonora (the other two being the Sierras El Tigre and Los Ajos) and are the first for the municipality of Nácori Chico (Rorabaugh and Lemos-Espinal 2016). This species is more commonly collected and more widely distributed in the SMO of Chihuahua (Lemos-Espinal et al. 2015).

Only one of the 35 herpetofaunal species known from the Mesa Tres Ríos area is an SMO endemic (*Isthmura sierraoccidentalis*). One other (*Thamnophis unilabialis*) is found in the SMO and adjacent areas of the Mexican Plateau. The distributions of 13 other species include both the SMO and adjacent sky islands, and 20 others are distributed well beyond the SMO and sky island region (Table 1). Thus, the herpetofauna of the study area consists of 43% species of the SMO and adjacent ranges or the Mexican Plateau, and 57% by species that range more broadly, particularly to the north. Other species likely to occur in the Mesa Tres Ríos area based on occurrence nearby in Chihuahua or Sonora in similar montane habitats include *Anaxyrus mexicana*, *Barisia levicolis*, *Plestiodon multilineatus*, *Geophis dugesii*, *Masticophis bilineatus*, *Tantilla wilcoxi*, *T. yaquia*, *Salvadora bairdi*, *S. grahamiae*, *Storeria storeriodes*, *Thamnophis elegans*, and *T. eques* (Van Devender et al. 2013; Lemos-Espinal et al. 2015; Rorabaugh and Lemos-Espinal 2016).

Acknowledgments.—The following people assisted with the field work, providing logistical support or helping to locate and document amphibians and reptiles: Enrique Ballesteros, Mario Cirett, George Ferguson, Sky Jacobs, Robert Johnson, Andrew Johnston, Ana L. Reina-G., Isaac Marck, Steve Minter, Guillermo Molina, F. Fabriani, John Palting, R. Puente-Martínez, A. Ponce-Vargas, Rick Overson, J. J. Sánchez-Escalante, Laura Steger, and Nora Villanueva. We particularly thank Andrew Holycross at ASU for processing our photo vouchers. Melanie Bucci (UAZ) and Alison Whiting (BYUH) graciously assisted with identification of previously collected specimens from the Mesa Tres Ríos area. Greater Good of Tucson supported the expedition monetarily and logistically.

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Herpetological Review, 2019, 50(2), 259–262.
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Body Temperature of *Phrynosoma braconnieri* (Squamata: Phrynosomatidae) from a Xeric Scrubland in Central Mexico

Horned lizards (genus *Phrynosoma*) share many ecological, physiological, and morphological traits (Pianka and Parker 1975), despite their wide distribution range throughout North America: from southern Canada through south-central Mexico, to northern Guatemala (Hodges 2004; Nieto-Montes de Oca et al. 2014). *Phrynosoma braconnieri* is an endemic species of Mexico, inhabiting oak-pine forest and xeric scrubland in the Sierra Madre Oriental and Sierra Madre del Sur in the states of Oaxaca and Puebla (Zamudio and Parra-Olea 2000; Canseco-Márquez and Gutiérrez-Mayén 2010). Recently, some studies have found that field body temperature of this species is not related to air or substrate temperature, nor with snout vent-length (SVL; Woolrich-Piña et al. 2012). Among viviparous and

high elevation *Phrynosoma* species, *P. braconnieri* has one of the highest recorded body temperatures (Lara-Reséndiz et al. 2015). Herein, we assess whether there are effects of thermal environments and seasonality on the body temperature of a *P. braconnieri* population.

MATERIALS AND METHODS

The fieldwork was carried out from September 2014 to May 2015 at La Magdalena Cuaxixtla, municipality of Tecali de Herrera, Puebla, Mexico (18.8708°N, 97.9477°W, WGS 84; 2033 m elev.). The mean annual temperature and precipitation are 18.7°C and 724 mm, respectively (CONAGUA 2010). The vegetation is xeric scrubland, composed of succulent plants, some of which live in colonies (Rzedowski 1978). Sampling effort was equally distributed among months and days, from 0900–2000 h. Lizards were collected by hand. Once captured, we recorded cloacal temperature (T_c) with a Miller-Weber rapid registering thermometer ($\pm 0.2^\circ\text{C}$). Substrate temperature (T_s , measured in the place where lizards were found) and air temperature (T_a , in shade and 1 m above ground level) were recorded with Kestrel weather and environmental meter ($\pm 1^\circ\text{C}$) (Ramírez-Bautista and Benabib 2001). All temperatures were taken within 30 sec after the capture of a lizard (Vitt et al. 2003). We also recorded SVL (with a plastic ruler ± 1 mm), date, time of day, microhabitat, weather (sunny or cloudy), and lizard exposure to light (direct sun, filtered sun, or shade; Vitt et al. 2003). Lizards that needed a major effort to capture

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