



## Annotated checklist of amphibians and reptiles from Querétaro, Mexico, including new records, and comments on controversial species

MAURICIO TEPOS-RAMÍREZ<sup>1,2</sup>, FÁTIMA SOLEDAD GARDUÑO-FONSECA<sup>1,3</sup>, CRISTHIAN ALEJANDRO PERALTA-ROBLES<sup>1,3</sup>, OSCAR RICARDO GARCÍA-RUBIO<sup>3\*</sup>, RICARDO CERVANTES JIMÉNEZ<sup>1</sup>

1 Coordinación de Gestión para la Sustentabilidad, Universidad Autónoma de Querétaro, Santiago de Querétaro, Querétaro, México • MTR: [teposmauricio@gmail.com](mailto:teposmauricio@gmail.com)  <https://orcid.org/0000-0001-5464-2760> • FSGF: [sole0499@gmail.com](mailto:sole0499@gmail.com)  <https://orcid.org/0000-0002-8557-7380> • RCJ: [ricardo.cervantes@uaq.mx](mailto:ricardo.cervantes@uaq.mx)  <https://orcid.org/0000-0002-8951-4280>

2 Departamento de Zoología/Pabellón de la Biodiversidad, Instituto de Biología, Universidad Nacional Autónoma de México. Circuito Centro Cultural, Zona Cultural, Ciudad Universitaria, Coyoacán, CDMX, México

3 Laboratorio de Biogeografía e Integridad Biotíca, Universidad Autónoma de Querétaro, Campus Aeropuerto, Universidad Autónoma de Querétaro, Santiago de Querétaro, Querétaro, México • ORGR: [osrigaru@gmail.com](mailto:osrigaru@gmail.com)  <https://orcid.org/0000-0003-2053-6550> • CAPR: [peraltac1999@gmail.com](mailto:peraltac1999@gmail.com)  <https://orcid.org/0000-0002-8176-7419>

\* Corresponding author

**Abstract.** We present an updated checklist of amphibians and reptiles of Querétaro, Mexico. The herpetofauna of Querétaro is composed of 136 species, 35 amphibians (seven caudates and 28 anurans) grouped in nine families and 20 genera; 101 reptiles (five turtles, 33 lizards, and 63 snakes) grouped in 20 families and 59 genera. We did not include 13 previous records that do not have adequate evidence. We include three newly reported species for Querétaro: *Coniophanes imperialis* (Baird & Girard, 1859), *Scaphiodontophis annulatus* (Duméril, Bibron & Duméril, 1854), and *Xenosaurus newmanorum* (Taylor, 1949). A total of 69 species (51% of the total species) are endemic to Mexico, while one species, *Sceloporus exsul* (Dixon, Ketchersid & Lieb, 1972), is endemic to the state. According to Mexican law (SEMARNAT NOM-059), 50 species are threatened or under special protection, while according to the IUCN red list, only 11 species are under some category of risk. We suggest that a greater survey effort for amphibians and reptiles is required to discover unrecorded species in those areas that have not been sufficiently sampled.

**Keywords.** Anurans, caudates, lizards, physiographic regions, Sierra Madre Oriental, snakes, Trans-Mexican Volcano Belt

Academic editor: Ross MacCulloch

Received 11 December 2022, accepted 22 March 2023, published 28 April 2023

Tepos-Ramírez M, Garduño-Fonseca FS, Peralta-Robles CA, García-Rubio OR, Cervantes Jiménez R (2023) Annotated checklist of amphibians and reptiles from Querétaro, Mexico, including new records, and comments on controversial species. Check List 19 (2): 269–292. <https://doi.org/10.15560/19.2.269>

## Introduction

The state of Querétaro is approximately 11,699 km<sup>2</sup> and represents 0.6% of the total area of Mexico (Gobierno del Estado de Querétaro 2002). The state contains three biogeographic provinces: the Sierra Madre Oriental, the Central Plateau, and the Trans-Mexican Volcano Belt (Morrone and Márquez 2003). Due to its complex

orography and an elevation gradient ranging from 200 to 3,100 m a.s.l., a great variety of climatic conditions and vegetation types occur within a relatively small area (Zamudio 1992). The wide variety of environmental conditions has favored diversity and endemism in several vertebrate groups, including amphibians and reptiles (Ochoa-Ochoa et al. 2014).

Querétaro has recently been the subject of numerous

herpetofaunistic studies focused on biochemistry, diversity, ecology, molecular systematics, and taxonomy, among other biological aspects of herpetozoans. These publications include scientific articles (Smith and Taylor 1950; Dixon et al. 1972a, 1972b; Padilla-García et al. 1996; Padilla-García and Mendoza-Quijano 1996a, 1996b, 1996c; Nieto et al. 2013; Cruz-Elizalde et al. 2019, 2022; Roldán-Padrón et al. 2019; Tepos-Ramírez et al. 2021a, 2021b, 2021c, 2022), science communication articles (Gillingwater and Patrikeev 2004; Jiménez-Velázquez and Cruz-Pérez 2011), book chapters (Cruz-Elizalde et al. 2016; Domínguez-Vega et al. 2019), books (Dixon and Lemos-Espinal 2010), natural history notes (Cruz-Pérez et al. 2009; Cruz-Pérez et al. 2014; Acosta and Tepos-Ramírez 2019; Tepos-Ramírez et al. 2019; Peralta-Robles et al. 2022), and theses (Padilla 2005; Tinoco 2005; Cabrera 2009; Zea 2010; Rayas 2019).

Smith and Taylor (1950) produced the first list and identification keys to the amphibians and reptiles of Mexico, reporting only 15 species of amphibians and reptiles from Querétaro. Dixon et al. (1972a) were first to focus exclusively on the herpetofauna of the state, recording 65 species of amphibians and reptiles from fieldwork carried out from 1950 to 1971. Nieto and Pérez (1999) reported 133 species in the state, and Dixon and Lemos-Espinal (2010) reported 117 species. Among these authors, the largest number of collections were by Nieto and Pérez (1999) and Dixon et al. (1972a), who deposited most of their collected material in foreign collections. For a detailed compilation of new records for the state and its authors, see Dixon and Lemos-Espinal (2010). The most recent list (Cruz-Elizalde et al. 2022) reports 129 species of amphibians and reptiles using records from national and foreign collections, as well as electronic repositories.

The differences in the number of species recorded between the most recent studies include several factors, but highlights the lack of recent fieldwork and a rigorous review of controversial or doubtful records. Our objective was to provide a checklist of Querétaro that contains novel and corroborated information on the herpetofauna occurring in the state. Therefore, we reviewed records deposited in scientific collections and included new records derived from fieldwork. We hope that this work will be a useful baseline for future studies.

## Study Area

Querétaro is in the central region of Mexico bounded by coordinates 21.6700°N, 20.0150°S and 099.0431°E, 100.5967°W (INEGI 2017). To the north, it borders the state of San Luis Potosí, to the south with Mexico and Michoacán, to the east with Hidalgo, and to the west with Guanajuato. A great variety of vegetation types are present in Querétaro due to convergence of three biogeographic provinces. In the south of the state is the Trans-Mexican Volcano Belt, where the dominant vegetation types are low deciduous forest, grasslands, and

oak forest. In the Central Plateau, vegetation types are associated with desert and semidesert regions, such as xerophilous scrub, grassland, and subdeciduous forest. In the Sierra Madre Oriental, are pine-oak forest, mountain mesophilic forest, and tropical deciduous forest (Zamudio et al. 1992).

## Methods

**Mapping.** For a better understanding of the sampling effort made in Querétaro, we mapped 4,742 records of amphibians and reptiles (Table 1) obtained from online national and international repositories and citizen science portals (GBIF 2022). We used the Kernel Density Estimation (KDE) implemented in ArcGIS v. 10.5 to calculate the density of points around each output raster cell, generating a smoothly curved surface over each point. The surface value is highest at the location of the point and diminishes with increasing distance from the point.

**Checklist conformation and species selection.** We generated a preliminary checklist by reviewing previous works on the herpetofauna for Querétaro from Smith and Taylor (1950) to Cruz-Elizalde (2022) (see Introduction) and including information from collections in Mexico and the USA (GBIF 2022). For the final list, we only considered those records with a voucher specimen in a scientific collection, or with a reliable photographic record deposited in a scientific collection, or if it was directly observed by us in our fieldwork from 2010 to 2023, following Reyes (2019).

For fieldwork, we carried out intensive sampling in the preferred microhabitats of amphibians and reptiles, during two time intervals each day: 9:00–13:00 for diurnal species and 18:00–23:00 for crepuscular and nocturnal species. For reptiles, we used blanket sacks for transportation, while for amphibians, we used jars filled with humid substrate from the collection site to avoid desiccation. The specimens were photographed ex-situ inside a light box with a white background, and in-situ when the specimens were found. The collected specimens are part of the reference collection of the herpetofauna of Querétaro currently located in the Biotic Integrity Laboratory at the Faculty of Natural Sciences, Universidad Autónoma de Querétaro. Specimens were collected under collection permit issued by

**Table 1.** Number of records from the five major groups of amphibians and reptiles in Querétaro.

Taxon	Number of records
Class Amphibia	
Order Anura	1,436
Order Caudata	162
Class Reptilia	
Suborder Lacertilia	2,261
Suborder Serpentes	791
Suborder Testudines	92
Total	4,742

SEMARNAT (SGPA/DGVS/00027/22). All the photographs in this work are held in the Colección Nacional de Anfibios y Reptiles (CNAR) at Universidad Nacional Autónoma de México (UNAM), CDMX, México.

For a detailed revision, we focused our attention on records of species whose reported distribution in Mexico did not include Querétaro [e.g. *Aquiloeurycea scandens* (Walker, 1955), *Kinosternon scorpioides* (Linnaeus, 1766), and *Incilius valliceps* (Wiegmann, 1833)], those species that have been reported on few occasions [e.g. *Tlalocohyla picta* (Günther, 1901), *Trachycephalus vermiculatus* (Duméril & Bibron, 1841), *Pliocercus elapoides* (Cope, 1860), and *Thamnophis sumichrasti* (Cope, 1866)], and those species that have a complex taxonomic history capable of generating confusion (e.g. *Eleutherodactylus* spp. and *Sceloporus* spp.). When it was not possible to directly study the specimens held in foreign collections, we made inquiries through the digital repositories or by direct request to the curators of the collections to corroborate correct identification and provenance of the specimen (Table 2).

**Classification.** For amphibians, we follow the supraspecific classification proposed by Wilson et al. (2013), while for reptiles we follow Burbrink et al. (2020). Species names follow Frost (2021) for amphibians and Uetz et al. (2021) for reptiles. In cases of taxonomic controversy, we reviewed the expert literature to determine the current name and distribution (for amphibians:

Hedges et al. 2008; Streicher et al. 2014; Grünwald et al. 2018; for reptiles: Hansen and Salmon 2017; Tepos-Ramírez et al. 2021a). All the specimens in this work were identified by external morphology, coloration, and measurements following the keys by Dixon and Lemos-Espinal (2010), as well as specific literature for new records and controversial species.

## Results

The herpetofauna of Querétaro is composed of 136 species, including 35 amphibians (26 %) and 101 reptiles (74 %). We recorded nine families and 20 genera of amphibians and 20 families and 59 genera of reptiles (Table 3). Of the total number of species, 114 (83%) were observed or re-collected by us, and 22 (16%) are held in various collections.

Of the 136 recorded species, 69 are endemic to Mexico (19 amphibians and 50 reptiles), one reptile is endemic to Querétaro (*S. exsul*), and five are considered exotic species (*Hemidactylus frenatus*, *H. turcicus*, *Indotyphlops braminus*, *Graptemys pseudogeographica*, and *Trachemys scripta*). According to Mexican law (DOF, 2019), 50 species are threatened or under special protection, while according to the IUCN Red List (2022), only 11 species are under some category of risk (Table 3). Municipalities with the greatest numbers of records and species are Landa de Matamoros, Cadereyta de

**Table 2.** Annotated list of institutional collections from Mexico and the USA, and the number of records from Querétaro in each collection.

Acronym	Institution	Location	No. of records	Code
<b>Mexico</b>				
CNAR	Colección Nacional de Anfibios y Reptiles	Universidad Nacional Autónoma de México	213	A
ENCB	Escuela Nacional de Ciencias Biológicas	Instituto Politécnico Nacional	9	B
MZFC	Museo de Zoología de la Facultad de Ciencias	Universidad Nacional Autónoma de México	1,485	C
<b>USA</b>				
AMNH	American Museum of Natural History	New York	25	D
CM	Carnegie Museum of Natural History	Pittsburgh, Pennsylvania	55	E
CUMV	Cornell University Museum of Vertebrates	Cornell University	1	F
FMNH	Field Museum of Natural History	Chicago, Illinois	1	G
KU	Biodiversity Institute	University of Kansas	23	H
LACM	Natural History Museum of Los Angeles County	Los Angeles, California	75	I
LSU	University Museum of Natural Science	Louisiana State	2	J
MVZ	Museum of Vertebrate Zoology	University of California	78	K
SNMH	San Diego Natural History Museum	San Diego Natural History Museum	5	L
TCWC	Biodiversity Research and Teaching Collection	Texas A&M University	1,006	M
UCM	Museum of Natural History	University of Colorado	6	N
UIMNH	Museum of Natural History	University of Illinois	31	O
UMMZ	Museum of Zoology	University of Michigan	107	P
USNM	Museum of Natural History	Smithsonian Institution	15	Q
UTA	Herpetology Collection, Arlington	Texas A&M University	28	R
UTEP	Herpetology Collection, El Paso	Texas A&M University	74	S
Total			3,238	

**Table 3.** Amphibians and reptiles from Querétaro, Mexico. IUCN Red List categories (Least Concern = LC, Near Threatened = NT, Vulnerable = VU, Endangered = EN, Critically Endangered = CR); and NOM-059-SEMARNAT-2010 (in danger of extinction = E, threatened = A; subject to special protection = Pr). Newly recorded from the state (\*). Mexican endemics are indicated. Institution codes are included in Table 1.

Taxon	IUCN	NOM-059	Endemism	Institution code
<b>Amphibia</b>				
<b>Anura</b>				
Bufonidae				
<i>Anaxyrus compactilis</i> (Wiegmann, 1833)	LC	—	Mexico	A, C, M, O, H, P
<i>Anaxyrus punctatus</i> (Baird & Girard, 1852)	LC	—		A, C, I, M, P, S
<i>Incilius nebulifer</i> (Girard, 1854)	LC	—		C
<i>Incilius occidentalis</i> (Camerano, 1879)	LC	—	Mexico	A, C, B, I, M, O, H, S
<i>Incilius valliceps</i> (Wiegmann, 1833)	LC	—		C, M, Q
<i>Rhinella horribilis</i> (Wiegmann, 1833)	—	—		C, M
Craugastoridae				
<i>Craugastor augusti</i> (Dugès, 1879)	LC	—		C, H, M, P
<i>Craugastor decoratus</i> (Taylor, 1942)	LC	Pr	Mexico	C, H, I, M, P
<i>Craugastor pygmaeus</i> (Taylor, 1937)	LC	—		A
<i>Craugastor rhodopis</i> (Cope, 1867)	LC	—	Mexico	A
Eleutherodactylidae				
<i>Eleutherodactylus guttatus</i> (Cope, 1879)	LC	—		C, M
<i>Eleutherodactylus longipes</i> (Baird, 1859)	LC	—	Mexico	A, C, H, M
<i>Eleutherodactylus verrucipes</i> (Cope, 1885)	LC	Pr	Mexico	C, B, M, P, R
Hylidae				
<i>Dryophytes arenicolor</i> (Cope, 1866)	LC	—		A, C, H, E, M, S
<i>Dryophytes eximius</i> (Baird, 1854)	LC	—	Mexico	A, C, H, E, M, N, O, S
<i>Rheohyla miotympanum</i> (Cope, 1863)	LC	—	Mexico	A, C, M
<i>Scinax staufferi</i> (Cope, 1865)	LC	—		C
<i>Smilisca baudinii</i> (Duméril & Bibron, 1841)	LC	—		C, K, M, R
<i>Tlalocohyla godmani</i> (Günther, 1901)	VU	A	Mexico	C
<i>Tlalocohyla picta</i> (Günther, 1901)	LC	—		C
<i>Trachycephalus vermiculatus</i> (Linnaeus, 1758)	—			K
Microhylidae				
<i>Hypopachus variolosus</i> (Cope, 1866)	LC	—		C, M
Ranidae				
<i>Lithobates berlandieri</i> (Baird, 1859)	LC	Pr		A, C, H, K, M, Q
<i>Lithobates montezumae</i> (Baird, 1854)	LC	Pr	Mexico	A, C, D, G, M, P
<i>Lithobates neovolcanicus</i> (Hillis & Frost, 1985)	LC	A	Mexico	M
<i>Lithobates spectabilis</i> (Hillis & Frost, 1985)	LC	—	Mexico	B, C
Scaphiopodidae				
<i>Scaphiopus couchii</i> (Baird, 1854)	LC	—		M
<i>Spea multiplicata</i> (Cope, 1863)	LC	—		C, E, H, M, O, P, Q
<b>Caudata</b>				
Ambystomatidae				
<i>Ambystoma velasci</i> (Dugès, 1888)	LC	Pr	Mexico	A
Plethodontidae				
<i>Aquiloeurycea cephalica</i> (Cope, 1865)	LC	A	Mexico	A, C, I, K, M, Q
<i>Bolitoglossa platydactyla</i> (Gray, 1831)	LC	Pr	Mexico	A
<i>Chiropterotriton chondrostega</i> (Taylor, 1941)	EN	Pr	Mexico	A, I, K, M
<i>Chiropterotriton magnipes</i> (Rabb, 1965)	EN	Pr	Mexico	C
<i>Chiropterotriton multidentatus</i> (Taylor, 1939)	EN	Pr	Mexico	A, C, H, P
<i>Isthmura bellii</i> (Gray, 1850)	LC	A	Mexico	A, C, D, M, P

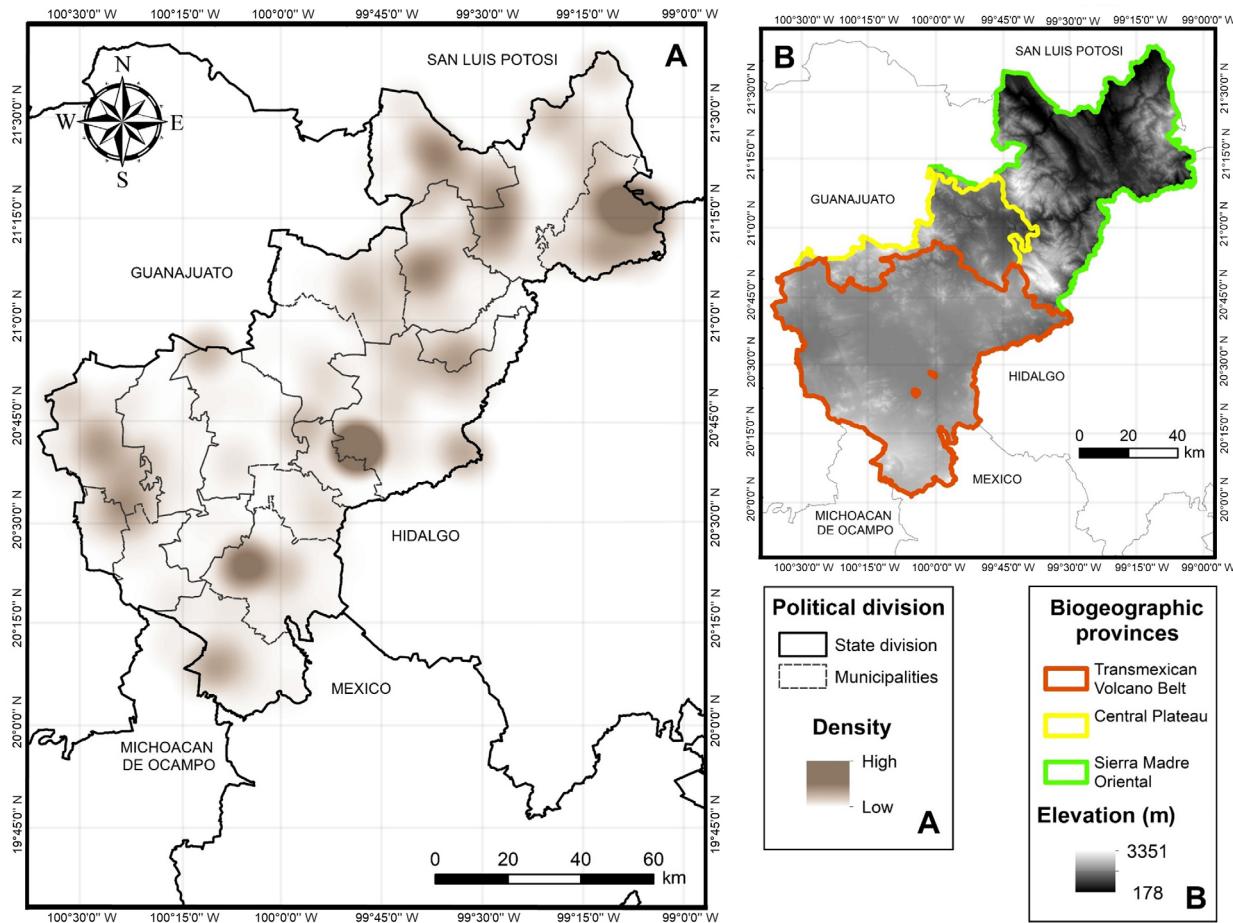
TAXON	IUCN	NOM-059	ENDEMISM	INSTITUTION CODE
<b>Reptilia</b>				
<b>Testudines</b>				
Kinosternidae				
<i>Kinosternon hirtipes</i> (Wagler, 1830)	LC	Pr		B, M
<i>Kinosternon integrum</i> (Le Conte, 1854)	LC	Pr	Mexico	A, C, D, M, P, S
Emydidae				
<i>Graptemys pseudogeographica</i> (Gray, 1831)	LC	—		A
<i>Trachemys scripta</i> (Thunberg, 1792)	LC	Pr		A
<i>Trachemys venusta</i> (Gray, 1855)	—	—		A
<b>Squamata</b>				
<b>Lacertilia</b>				
Anguidae				
<i>Abronia taeniata</i> (Wiegmann, 1828)	VU	Pr	Mexico	C, E, M
<i>Barisia ciliaris</i> (Smith, 1942)	—	—	Mexico	A, C, M
<i>Gerrhonotus infernalis</i> (Baird, 1859)	LC	—		C
<i>Gerrhonotus ophiurus</i> (Cope, 1867)	LC	—	Mexico	C
Corytophanidae				
<i>Corytophanes hernandesii</i> (Wiegmann, 1831)	LC	Pr		A
<i>Laemanctus serratus</i> (Cope, 1864)	LC	Pr		C
Dactyloidae				
<i>Anolis sericeus</i> (Hallowell, 1856)	LC	—		C, M
Dibamidae				
<i>Anelytropsis papillosum</i> (Cope, 1885)	LC	A	Mexico	A, I, M, S
Gekkonidae				
<i>Hemidactylus frenatus</i> (Duméril & Bibron, 1836)	LC	—		C
<i>Hemidactylus turcicus</i> (Linnaeus, 1758)	LC	—		A
Phrynosomatidae				
<i>Phrynosoma orbiculare</i> (Linnaeus, 1758)	LC	A	Mexico	A, C, M, P
<i>Sceloporus aeneus</i> (Wiegmann, 1828)	LC	—	Mexico	A, C, M, P
<i>Sceloporus dugesii</i> (Bocourt, 1874)	LC	—	Mexico	A, C, I, L, M, S
<i>Sceloporus exsul</i> (Dixon, Ketchersid & Lieb, 1972)	CR	A	Querétaro, Mexico	C, M, S
<i>Sceloporus grammicus</i> (Wiegmann, 1828)	LC	Pr		A, C, D, I, M, P, S
<i>Sceloporus melanogaster</i> (Cope, 1885)	—	—	Mexico	A, B, C, D, E, I, K, M, P, R, S
<i>Sceloporus minor</i> (Cope, 1885)	LC	—	Mexico	C
<i>Sceloporus mucronatus</i> (Cope, 1885)	LC	—	Mexico	A
<i>Sceloporus parvus</i> (Smith, 1934)	LC	—	Mexico	A, C, I, M, S
<i>Sceloporus scalaris</i> (Wiegmann, 1828)	LC	—	Mexico	M, P
<i>Sceloporus spinosus</i> (Wiegmann, 1828)	LC	—	Mexico	A, C, D, E, H, I, L, M, P, S
<i>Sceloporus variabilis</i> (Wiegmann, 1834)	LC	—		A, B, C, E, I, M, P, Q, S
Scincidae				
<i>Plestiodon lynxe</i> (Wiegmann, 1834)	LC	Pr	Mexico	A, C, I, K, M, P, R
<i>Plestiodon tetragrammus</i> (Baird, 1859)	LC	—		C, M
<i>Scincella gemmingeri</i> (Cope, 1864)	LC	—	Mexico	E, M
<i>Scincella silvicola</i> (Taylor, 1937)	LC	A	Mexico	C, M
Teiidae				
<i>Aspidoscelis gularis</i> (Baird & Girard, 1852)	LC	—		A, C, D, E, I, M, N, O, S
<i>Holcosus amphigrammus</i> (Smith & Laufe, 1945)	—	—	Mexico	C
Xantusiidae				
<i>Lepidophyma gaigeae</i> (Mosauer, 1936)	VU	Pr	Mexico	A, C, E, I, K, M, P, R, S
<i>Lepidophyma occulor</i> (Smith, 1942)	LC	Pr	Mexico	M, R
<i>Lepidophyma sylvaticum</i> (Taylor, 1939)	LC	Pr	Mexico	A, I, M, P

TAXON	IUCN	NOM-059	ENDEMISM	INSTITUTION CODE
<b>Xenosauridae</b>				
<i>Xenosaurus mendozai</i> (Nieto, García, Zúñiga & Schmidt, 2013)	—	—	Mexico	A, C
<i>Xenosaurus newmanorum*</i> (Taylor, 1949)	EN	Pr	Mexico	A
<b>Squamata</b>				
<b>Serpentes</b>				
<b>Boidae</b>				
<i>Boa imperator</i> (Daudin, 1803)	LC	—		A
<b>Colubridae</b>				
<i>Conopsis lineata</i> (Kennicott, 1859)	LC	—	Mexico	A, C, I, M, P
<i>Conopsis nasus</i> (Günther, 1858)	LC	—	Mexico	A, C, E, I, M, P, S
<i>Drymarchon melanurus</i> (Duméril, Bibron & Duméril, 1854)	LC	—		C, M
<i>Drymobius margaritiferus</i> (Schlegel, 1837)	LC	—		M
<i>Ficimia olivacea</i> (Gray, 1849)	LC	—	Mexico	M, R
<i>Ficimia streckeri</i> (Taylor, 1931)	LC	—		C
<i>Gyalopion canum</i> (Cope, 1860)	LC	—		M
<i>Lampropeltis polyzona</i> (Cope, 1860)	LC	—	Mexico	C, M, R
<i>Lampropeltis ruthveni</i> (Blanchard, 1920)	NT	A	Mexico	A
<i>Leptophis mexicanus</i> (Duméril, Bibron & Duméril, 1854)	LC	A		C
<i>Masticophis mentovarius</i> (Duméril, Bibron & Duméril, 1854)	LC	—		C
<i>Masticophis schotti</i> (Baird & Girard, 1853)	LC	—		L
<i>Masticophis taeniatus</i> (Hallowell, 1852)	LC	—		C, M
<i>Mastigodryas melanolomus</i> (Cope, 1868)	LC	—		A, C
<i>Oxybelis potosiensis</i> (Taylor, 1941)	—	—	Mexico	I, M
<i>Pantherophis emoryi</i> (Baird & Girard, 1853)	LC	—		A
<i>Pituophis deppei</i> (Duméril, 1853)	LC	A	Mexico	C, D, E, I, M, P, R, S
<i>Pliocercus elapoides</i> (Cope, 1860)	LC	A		C
<i>Scaphiodontophis annulatus*</i> (Duméril, Bibron & Duméril, 1854)	LC	—		A
<i>Salvadora bairdi</i> (Jan, 1860)	LC	Pr	Mexico	C, D, I, M, Q
<i>Salvadora lineata</i> (Schmidt, 1940)	—	—		H, M, R
<i>Senticolis triaspis</i> (Cope, 1866)	LC	—		C, I, M
<i>Spilotes pullatus</i> (Linnaeus, 1758)	LC	—		C
<i>Tantilla bocourtii</i> (Günther, 1895)	LC	—	Mexico	C, I, M
<i>Tantilla rubra</i> (Cope, 1875)	LC	Pr		M
<i>Trimorphodon tau</i> (Cope, 1870)	LC	—	Mexico	A, C, I, M, P, R, S
<b>Dipsadidae</b>				
<i>Adelphicos quadrivirgatum</i> (Jan, 1862)	LC	—		C, M
<i>Amastridium sapperi</i> (Werner, 1903)	LC	—		F
<i>Chersodromus rubriventris</i> (Taylor, 1949)	EN	Pr	Mexico	M
<i>Coniophanes fissidens</i> (Günther, 1858)	LC	—		C
<i>Coniophanes imperialis*</i> (Baird & Girard, 1859)	LC	—		A
<i>Coniophanes taeniata</i> (Peters, 1870)	—	—	Mexico	P
<i>Diadophis punctatus</i> (Linnaeus, 1766)	LC	—		M, P
<i>Geophis latifrontalis</i> (Garman, 1883)	—	Pr	Mexico	A, M, P
<i>Geophis mutitorques</i> (Cope, 1885)	LC	Pr	Mexico	I, M
<i>Geophis sartorii</i> (Cope, 1863)	LC	—		K, M, R
<i>Hypsileena jani</i> (Dugès, 1865)	LC	Pr		C, I, M, R, S
<i>Imantodes gemmistratus</i> (Cope, 1861)	LC	Pr		C
<i>Leptodeira septentrionalis</i> (Kennicott, 1859)	LC	—		C, M, R
<i>Ninia diademata</i> (Baird & Girard, 1853)	LC	—		C

TAXON	IUCN	NOM-059	ENDEMISM	INSTITUTION CODE
<i>Rhadinaea gaigeae</i> (Bailey, 1937)	—	—	Mexico	A, C, H, I, M, P, S
Elapidae				
<i>Micruurus tener</i> (Baird & Girard, 1853)	LC	—		C, M, P, R
Leptotyphlopidae				
<i>Epictia wynnii</i> (Wallach, 2016)	—	—	Mexico	E, I, M, Q
<i>Rena dulcis</i> (Baird & Girard, 1853)	LC	—		C, E, M, O
Natricidae				
<i>Storeria dekayi</i> (Holbrook, 1839)	LC	—		A
<i>Storeria hidalgoensis</i> (Taylor, 1942)	VU	—	Mexico	A, I, M
<i>Storeria storerioides</i> (Cope, 1866)	LC	—	Mexico	C
<i>Thamnophis cyrtopsis</i> (Kennicott, 1860)	LC	A		C, M, S
<i>Thamnophis eques</i> (Reuss, 1834)	LC	A		A, C, D, J, M, P, S
<i>Thamnophis melanogaster</i> (Peters, 1864)	EN	A	Mexico	A, C, D, M, P
<i>Thamnophis pulchrilatus</i> (Cope, 1885)	LC	—	Mexico	M
<i>Thamnophis scalaris</i> (Cope, 1861)	LC	A	Mexico	P
<i>Thamnophis sumichrasti</i> (Cope, 1866)	LC	A	Mexico	C, M
Typhlopidae				
<i>Indotyphlops braminus</i> (Daudin, 1803)	—	—		C, M, P
Viperidae				
<i>Bothrops asper</i> (Garman, 1883)	LC	—		C
<i>Crotalus aquilus</i> (Klauber, 1952)	LC	Pr	Mexico	C
<i>Crotalus atrox</i> (Baird & Girard, 1853)	LC	Pr		M
<i>Crotalus molossus</i> (Baird & Girard, 1853)	LC	Pr		C, M, P
<i>Crotalus polystictus</i> (Cope, 1865)	LC	Pr	Mexico	A
<i>Crotalus scutulatus</i> (Kennicott, 1861)	LC	Pr		C, E, P
<i>Crotalus totonacus</i> (Gloyd & Kauffeld, 1940)	LC	—	Mexico	C, M
<i>Metlapilcoatlus borealis</i> (Tepos-Ramírez, Flores-Villela, Velasco, Pedraza-Lara, García-Rubio & Jadin, 2021)	—	—	Mexico	C

**Table 4.** Number of records by municipality currently held in electronic repositories.

Municipality	No. of species	Records	%
Landa de Matamoros	87	808	17.0
Cadereyta de Montes	71	769	16.2
Jalpan de Serra	82	461	9.7
Arroyo Seco	56	386	8.1
Querétaro	42	371	7.8
Pinal de Amoles	61	364	7.7
San Juan del Río	43	336	7.1
Amealco de Bonfil	37	221	4.7
Peñamiller	49	188	4.0
Colón	31	155	3.3
San Joaquín	35	127	2.7
El Marqués	31	116	2.4
Ezequiel Montes	24	97	2.0
Tolimán	29	93	2.0
Corregidora	27	88	1.9
Tequisquiapan	24	68	1.4
Huimilpan	22	66	1.4
Pedro Escobedo	16	28	0.6
Total		4,742	100



**Figure 1.** **A.** Density map by points where shaded areas represent places with higher sampling effort; bold lines represent state lines and thin lines represent municipalities within Querétaro. **B.** Digital elevation model with the three biogeographical regions present in Querétaro indicated in color.

Montes and Jalpan de Serra (Table 4).

Class Amphibia

Order Caudata

Family Ambystomatidae

#### *Ambystoma velasci* (Dugès, 1888)

Figure 2A

**Material examined.** MEXICO – Querétaro • Pinal de Amoles, Puerto de los Velázquez; 21.1260°N, 099.6739°W; elev. 2671 m; 29.VIII.2021; Mauricio Tepos Ramírez obs.; sex undetermined, CNAR-RF 893 (photograph).

The specimen was captured at the bottom of a natural pond.

**Identification.** *Ambystoma velasci* is the largest species of the genus. It has approximately 14–18 gill rakers per side (Irschich and Shaffer 1977). Adults have lungs and lack nasolabial folds (Dixon and Lemos-Espinal 2010).

**Remarks.** This species has a wide geographical distribution, from northern Chihuahua state to central Mexico, also in the mountains of the Trans-Mexican Volcanic Belt and through the Mexican Altiplano (Contreras-Calvario 2021).

Family Plethodontidae

#### *Aquiloeurycea cephalica* (Cope, 1865)

Figure 2B

**Material examined.** MEXICO – Querétaro • Pinal de Amoles, Puerto de los Velázquez; 21.1260°N, 099.6739°W; elev. 2671 m; 29.VIII.2021; Mauricio Tepos Ramírez obs.; sex undetermined, CNAR-RF 893 (photograph).

The specimen was found under a rock in an oak forest.

**Identification.** *Aquiloeurycea cephalica* has a flattened head. Snout truncated with the nasolabial region extending far beyond the lower lip. Tail slightly shorter than body, thickened near base. Limbs well developed; fingers and toes partially webbed with flattened tips. Dorsum and venter black to bluish blackish gray, with irregular cream to silvery white, licheniform markings on the upper and lower parts of the tail and the belly (Raffaëlli 2014).

**Remarks.** This species is endemic to central Mexico; it is distributed along the Trans-Mexican Volcanic Belt. Classified as Threatened by the Mexican Official Norm 059-SEMARNAT-2010 (DOF 2019) and Least Concern by the IUCN.

#### *Isthmura bellii* (Gray, 1850)

Figure 2C



**Figure 2.** Some amphibians of Querétaro, Mexico. **A.** *Ambystoma velsaci* (Dugès, 1888). **B.** *Aquiloeurycea cephalica* (Cope, 1865). **C.** *Isthmura bellii* (Gray, 1850). **D.** *Bolitoglossa platydactyla* (Gray, 1831). **E.** *Chiropterotriton chondrostega* (Taylor, 1941). **F.** *Craugastor pygmaeus* (Taylor, 1937). **G.** *Craugastor rhodopis* (Shannon & Werler, 1955). **H.** *Rheohyla miotympanum* (Cope, 1863). Photographs by ORGR (A–C, F–H), Ezau Garay Hernández (B), and MTR (E).

**Material examined.** MEXICO – Querétaro • Pinal de Amoles, La Pingüica; 21.1260°N, 099.6739°W; elev. 2671 m; 29.VIII.2021; Alison Khadije Salinas Olguín obs.; sex undetermined, CNAR-RF 894 (photograph).

This salamander was found under a slab-shaped rock, in a pine forest (*Pinus* spp.).

**Identification.** This salamander can be distinguished from other species of this genus by the presence of a marked nasolabial fold in males. Dorsum black, with a paravertebral row of bright orange spots. Limbs separated by 1–3 intercostal folds when the arm and the leg are adpressed (Lowe et al. 1968; Dixon and Lemos-Espinal 2010).

**Remarks.** This species is endemic to Mexico. It is widely distributed from Sonora, Chihuahua, and Tamaulipas to Oaxaca. There is a population from Tamaulipas with a dorsal pattern differing from typical *I. bellii* from the Trans-Mexican Volcanic Belt and Querétaro (Dixon and Lemos-Espinal 2010).

#### *Bolitoglossa platydactyla* (Gray, 1831)

Figure 2D

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Neblinas; 21.2668°N, 099.0578°W; elev. 919 m; 29.XI.2020; Ezau Garay Hernández and Jesús de

Jair Garay Hernández obs.; sex undetermined, CNAR IBH-648 (photograph).

The specimen was found under a rock in a tropical subdeciduous forest, dominated by elm (*Ulmus* sp.), oak (*Quercus* spp.), pochote (*Ceiba* sp.), and cherry (*Aphananthe* sp.).

**Identification.** *Bolitoglossa platydactyla* is one of the largest specimens of the genus. Elongated limbs, relatively large head, almost completely webbed fingers and toes. Broad, yellowish dorsal stripe from the top of the head to the end of the tail, with partially irregular margins, often with black speckling, sometimes immaculate (Raffaëlli 2014).

**Remarks.** This species is endemic to Mexico. It is in the Special Protection category (DOF 2019) and Least Concern in the IUCN Red List.

#### *Chiropterotriton chondrostega* (Taylor, 1941)

Figure 2E

**Material examined:** MEXICO – Querétaro • Landa de Matamoros, La Yesca; 21.2227°N, 099.1520°W; elev. 1886 m; 13.VII.2022; Cristhian Alejandro Peralta Robles obs.; sex undetermined, CNAR-RF 895 (photograph).

This specimen was found between bromeliad bracts (*Tillandsia deppeana*) in a cloud forest.

**Identification.** The diameter of the eye is greater than the length of the snout. The snout is rounded and truncated at its tip; and compared with sympatric congeners, smaller feet, shorter limbs, and narrower head (Dixon and Lemos-Espinal 2010). This species may vary in its color pattern, but it usually exhibits a brown dorsum with a middorsal red stripe (Dixon and Lemos-Espinal 2010).

**Remarks.** It is distributed from northern Hidalgo, through the Sierra Madre Oriental in Querétaro to San Luis Potosí and southwestern Tamaulipas. It mainly inhabits pine-oak forests, fir forests, and cloud forests between 1,560 and 2,700 m a.s.l. Preferred microhabitats are under rocks, bark from rotten logs, moss, fallen bromeliads, and other objects on the forest floor (Rab 1958; Dixon and Lemos-Espinal 2010).

Order Anura

Family Craugastoridae

#### *Craugastor pygmaeus* (Taylor, 1937)

Figure 2F

**Material examined:** MEXICO – Querétaro • Landa de Matamoros, La Yesca; 21.2108°N, 099.1221°W; elev. 1893; 26.VIII.2021; Geovani Gómez Recoder obs.; sex undetermined, CNAR-RF 896 (photograph).

The specimen was found under leaf litter in a mountain mesophyll forest.

**Identification.** *Craugastor pygmaeus* is one of the smallest frogs in Querétaro. The head is almost triangular. The body may be smooth or warty. The limbs are long and slender, the fingers slightly short and lacking

interdigital membrane, and there are well-developed subarticular tubercles (Köhler 2013).

**Remarks.** Its distribution extends from southeastern Michoacán to the extreme western Guatemala. This species was recently reported from Querétaro (Tepos-Ramírez et al. 2022).

#### *Craugastor rhodopis* (Shannon & Werler, 1955)

Figure 2G

**Material examined:** MEXICO – Querétaro • Jalpan de Serra, Valle Verde; 21.5033°N, 099.1665°W; elev. 1307 m; 11.VIII.2015; Mauricio Tepos Ramírez obs.; sex undetermined, CNAR IBH-647 (photograph).

The frog was found resting on leaf litter in a mountain mesophyll forest.

**Identification.** According to Streicher et al. (2014), the most reliable trait to distinguish species of the *Craugastor rhodopis* group is geographic distribution. However, *C. rhodopis* can be distinguished from other *Craugastor* species by the lack of digital pads on the innermost fingers, at least the thumb and toes (Köhler 2013).

**Remarks.** Populations of *C. rhodopis* were recorded from the highlands of Veracruz and Hidalgo, as well as southeastern Chiapas and Oaxaca (Frost 2021). The northernmost record, in Hidalgo, was reported by Streicher et al. (2014). This frog was recently reported in Jalpan, Querétaro, where it inhabits cloud forest (Tepos-Ramírez et al. 2022).

Family Hylidae

#### *Rheohyla miotympanum* (Cope, 1863)

Figure 2H

**Material examined:** MEXICO – Querétaro • Cadereyta de Montes, Maconí; 20.8453°N, 099.5394°W; elev. 1674 m; 11.X.2017; Karla-Zaldaña and Oscar-Rayas obs.; 1♂, CNAR-RF 897 (photograph).

This frog was found very close to a stream surrounded by riparian vegetation.

**Identification.** This is a small-bodied *Rheohyla* (SVL in ♀ = 27–32 mm). The species is recognizable by the distinctive white to yellow stripes along the edge of the upper lip, across the anus, and on the outer edges of the forelimbs and feet. These stripes are not present in any other amphibian in Querétaro (Duellman 2001).

**Remarks.** This species is widely distributed along the Pacific versant of Mexico and a small portion of the Trans-Mexican Volcano Belt. Recent analysis by Rayas et al. (2019) found a complex genetic structure across its geographic range, indicating the presence of cryptic species in some populations.

Order Testudines

Family Emydidae

#### *Graptemys pseudogeographica* (Gray, 1831)

**Material examined:** MEXICO – Querétaro • Cadereyta de Montes, Cadereyta; 21.6915°N, 099.8116°W; elev.

2037 m; 03.V.2017IBH-RF 651; José Belem Hernández Díaz obs.; sex undetermined.

The specimen was observed basking on the edge of an artificial pond; it may have been a released pet.

**Identification.** *Graptemys pseudogeographica* is a turtle endemic to the United States and is occasionally kept as a pet. The carapace is brown, and the middorsal keel has the suggestion of knobs. There is a light spot or line posterior to eye, and light neck stripes may reach the eye. The head is relatively small (Conant and Collins 1998).

**Remarks.** This is an invasive species in Mexico. These turtles are strong swimmers and voracious predators. *Graptemys pseudogeographica* should be removed and monitored to minimize damage to the ecosystems it invades.

#### *Trachemys venusta* (Gray, 1855)

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, Presa Jalpan; 21.2049°N, 099.4708°W; elev. 775 m; 21.III.2021; IBH-RF 653; Raúl Hernández Árciga obs.; sex undetermined.

The turtle was observed basking on the shore of the Jalpan dam.

**Identification.** *Trachemys venusta* is a medium-sized turtle, with an olive carapace having irregular yellow or orange lines, and ocelli on the carapace and plastron (Conant and Collins 1998).

**Remarks.** This species has a diverse diet which allows them to be well-adapted to varied ecosystems when released. Their potential as an invasive species is remarkable.

Order Squamata (Lacertilia)

Family Anguidae

#### *Abronia taeniata* (Wiegmann, 1828)

Figure 3A

**Material examined:** MEXICO – Querétaro • Cadereyta, La Esperanza; 20.8916°N, 099.5399°W; elev. 2350 m; 10.III.2022; Fátima Soledad Garduño-Fonseca obs.; 1♀; CNAR-RF 898 (photograph).

The lizard was found emerging from a tubular cavity of limestone in an oak forest.

**Identification.** This is a medium-sized lizard (SVL = 10–138 mm). The body is elongate, the legs are short legs, and the tail is prehensile. The enlarged, depressed head has the following scale counts: transverse nuchal rows 4–6 and transverse dorsal rows 31–34. The dorsum is creamy white to yellow or greenish yellow or grayish green, with six to eight dark, transverse bands; the tail has incomplete transverse ventral bands (Dixon and Lemos-Espinal 2010; Campbell and Frost 1993; Sánchez-Herrera et al. 2017; Lemos-Espinal and Dixon 2013; Good 1988).

**Remarks.** Distributed in Mexico, Guatemala, El Salvador, and Honduras (Villamar-Duque et al. 2019). In Mexico it has been reported from Tamaulipas, Puebla, San Luis Potosí, Nuevo León, Hidalgo, Veracruz, and

Querétaro. It is found in cloud forests with abundant bromeliads, ferns, and mosses, and often is found in cracks in limestone rocks, which are possibly used as hibernacula. It occurs at elevations of 1,000–2,600 m a.s.l. (Dixon and Lemos-Espinal 2010).

Family Corytophanidae

#### *Corytophanes hernandesii* (Wiegmann, 1831)

Figure 3B

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Neblinas; 21.2668°N, 099.0578°W; elev. 860 m; 25.VIII.2020; Ezau Garay Hernández and Jesús de Jair Garay Hernández obs.; sex undetermined, CNAR-RF 899 (photograph).

This lizard was seen basking on a rock at noon, in a subhumid tropical forest.

**Identification.** This is a medium-sized lizard (SVL = 105 mm) with a laterally compressed body. It is characterized by a short, triangular cephalic helmet projecting beyond the posterior part of the head but disjunct from the middorsal crest. The helmet is formed by ridges rising from the canthal region above the eyes, and the posterior ridges join and curve downwards. The supraocular and parietal scales are keeled, and there is a prominent spiny scale above each tympanum. The dorsum is green with gray or brown patches outlined with white on the shoulders (Smith and Burger 1950; McCranie et al. 2004).

**Remarks.** This species occurs in Mexico, Guatemala, Belize, and Honduras. Within Mexico it occurs in eastern Puebla, central Veracruz, Tabasco, and Chiapas (Wilson et al. 2010). It can be found in tropical forests, humid, seasonal, subtropical humid, and secondary forests but not in highly disturbed areas. It lives from sea level to 1,400 m a.s.l. (Wilson et al. 2010).

Family Gekkonidae

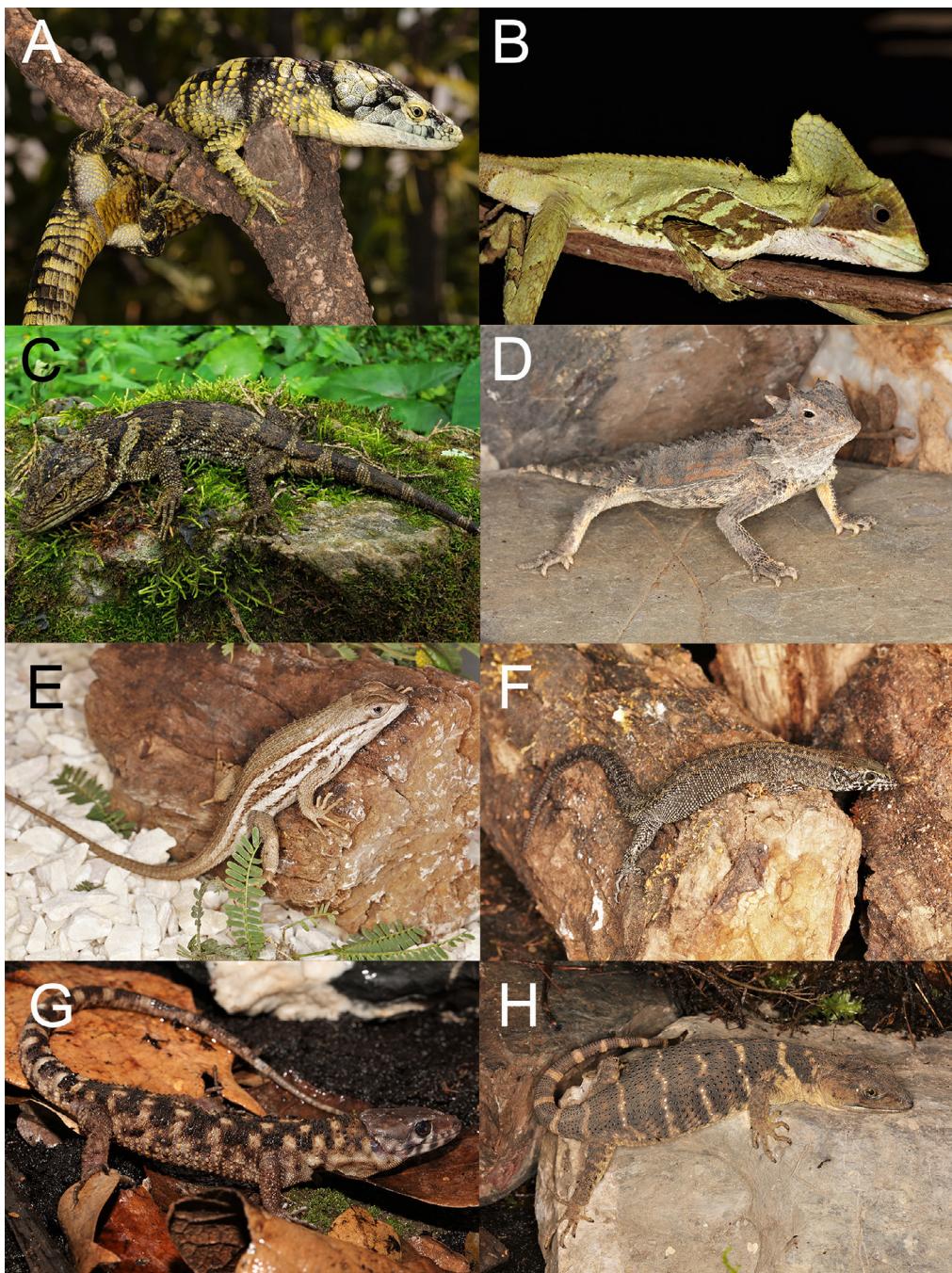
#### *Hemidactylus turcicus* (Linnaeus, 1758)

**Material examined.** MEXICO – Querétaro • Municipality of Querétaro Santiago de Querétaro; 20.6330°N, 100.4471°W; elev. 1800 m; IBH-T-492; Mauricio Tepos-Ramírez and Leonardo Álvarez obs.; 1♂ (photograph).

The specimen was photographed inside a residence in a southern suburb of Querétaro City.

**Identification.** This is a relatively small gecko (SVL = 10–13 cm). It differs from all native lizards by having sticky toe pads, vertical pupils, and eyes lacking eyelids (Loveridge 1947). It is generally light gray or almost white with dark mottling. This species can be easily distinguished from the only other gecko species in Querétaro (*Hemidactylus frenatus*) by its bumpy or warty skin.

**Remarks.** This gecko is not native in Mexico. The closest record to the city of Querétaro is from Tlahualilo, Durango, 693 km away (Álvarez-Romero 2008). Because other specimens of different age classes have



**Figure 3.** Some lizards of Querétaro, Mexico. **A.** *Abronia taeniata* (Wiegmann, 1828). **B.** *Corytophanes hernandesii* (Wiegmann, 1831). **C.** *Xenosaurus newmanorum* (Taylor, 1949). **D.** *Phrynosoma orbiculare* (Linnaeus, 1758). **E.** *Sceloporus exsul* (Dixon, Ketchersid & Lieb, 1972). **F.** *Lepidophyma gaigae* (Mosauer, 1936). **G.** *Lepidophyma occulor* (Smith, 1942). **H.** *Xenosaurus mendozai* (Nieto, García, Zúñiga & Schmidt, 2013). Photographs by ORGR (A, D–H), MTR (B), and Gonzalo Medina Rangel (C).

been observed nearby, it is assumed that there is a viable breeding population in Querétaro.

#### Family Phrynosomatidae

##### *Phrynosoma orbiculare* (Linnaeus, 1789)

Figure 3D

**Material examined.** MEXICO – Querétaro • Amealco de Bonfil, Amealco; 20.1798°N, 100.1542°W; elev. 2605 m; 8.VII.2021; Mauricio Tepos Ramírez obs.; 1♀, CNAR-RF 901 (photograph).

This lizard was found in an oak forest next to a log

in sandy soil.

**Identification.** The body is dorsolaterally flattened. There are conical middorsal scales, smooth ventrals, and a pair of occipital horns and three temporal horns on each side; all are approximately the same size. The tail is shorter than the body (Moreno-Barajas et al. 2013; Dixon and Lemos-Espinal 2010). The coloration varies from gray to dull yellow, with grayish brown or dark brown spots extending over the shoulders and neck, and the tail is banded with dark and light gray and the venter has a reticulate pattern of dark gray and

cream (Dixon and Lemos-Espinal 2010).

**Remarks.** The subspecies inhabiting Querétaro is *P. orbiculare dugesii* (Duméril & Bocourt, 1870), which has a wide distribution from Nuevo León, extreme southwestern Tamaulipas and southeastern Coahuila through northern Hidalgo, Querétaro, San Luis Potosí, Aguascalientes, and Zacatecas to central Jalisco and northern Nayarit. It lives at elevations of 1,045–2,600 m a.s.l. (Köhler 2021).

#### *Sceloporus exsul* (Dixon, Ketchersid & Lieb, 1972)

Figure 3E

**Material examined.** MEXICO – Querétaro • Cadereyta de Montes, El Banco; 20.8844°N 099.7088°W; elev. 1981 m; 9.III.2022; Cristhian Alejandro Peralta-Robles and Fátima Soledad Garduño-Fonseca leg.; 1♂, CNAR-RF 902 (photograph).

These lizards were found under rocks in thorn scrub.

**Identification.** This is a small lizard (SVL=63 mm). The dorsal scales are strongly keeled, while the ventrals are smooth. There are 13–15 femoral pores. Gular and ventral coloration is completely white (Nieto and Pérez 1998).

**Remarks.** This is a micro-endemic species at high risk according to Mexican law NOM-059. It has been assessed as Critically Endangered by the IUCN. Little has been documented about the habits and general biology of this lizard. The first specimens in Queretaro were collected by Nieto and Pérez (1999).

#### Family Xantusiidae

#### *Lepidophyma gaigeae* (Mosauer, 1936)

Figure 3F

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, Soledad de Guadalupe; 21.3483°N, 099.2650°W; elev. 1488 m; 31.IX.2021; Fátima Soledad Garduño-Fonseca leg.; sex undetermined, CNAR-RF 903 (photograph).

The lizard was observed basking in a rocky outcrop.

**Identification.** This is small *Lepidophyma* species with a dorsoventrally compressed body (Leavitt and Hibbits 2012). It has relatively large dorsals, ventrals, and gulars, and microtubercles absent on the dorsal surface (Canseco-Marquez 2008).

**Remarks.** This species differs from all others in the genus, except for *L. tarascae* (Bezy, Webb & Álvarez, 1982), in having whorls of enlarged caudal scales dorsally separated by two whorls of intermediate scales, both complete ventrally. It lacks markedly enlarged lateral tubercles, as in *L. sylvaticum* (Taylor, 1939) (Bezy and Camarillo 2002). *Lepidophyma gaigeae* differs from all other congeners, except *L. dontomasii* (Smith, 1942), in that it has 39–73 lateral scales between the axilla and groin rather than 15–46 vertical rows of tubercles separated by small granular scales. It differs from *L. dontomasii* in having 28–39 femoral pores (<28 in *L. dontomasii*) (Bezy and Camarillo 1992).

#### *Lepidophyma oculor* (Smith, 1942)

Figure 3G

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, San José de los Paredones; 21.6321°N, 099.2004°W; elev. 775 m; 22.VI.2022; Mauricio Tepos Ramírez obs.; sex undetermined, CNAR-RF 904 (Photograph).

This specimen was found under wet leaf litter in a subtropical forest.

**Identification.** This species is one of the largest species of the genus (♀ SVL = 102 mm; ♂ SVL = 90 mm; Dixon and Lemos-Espinal 2010) and can be easily distinguished from its congeners in Querétaro by having 15–42 enlarged, keeled tubercles on the side of the body and 23 or more femoral pores.

**Remarks.** It is found in thorny thickets in the Jalpan Valley of Querétaro and San Luis Potosí. This species is active at night near limestone outcrops and in rock walls and crevices. It occurs in Guanajuato, Tamaulipas, Hidalgo, San Luis Potosí, and Querétaro (Dixon and Lemos-Espinal 2010), although it is not an abundant species.

#### Family Xenosauridae

#### *Xenosaurus mendozai* (Nieto-Montes De Oca, García-Vázquez, Zúñiga-Vega & Schmidt-Ballardo, 2013)

Figure 3H

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Tilaco; 21.1771°N 099.1690°W; elev. 1135 m; 9.VIII.2022; Cristhian Alejandro Peralta-Robles and Fátima Soledad Garduño-Fonseca leg.; 1♂, 1♀, CNAR-RF 905 (photograph).

These lizards were observed in oak forest where they occurred in holes in rocks in large rocky outcrops.

**Identification.** This species possesses two postrostral scales on each side of the midline. Supraocular scales are longer than wide. The body is brown, sometimes with diffuse and scattered dark spots on the side of the body and with transversal yellowish bands. The post-orbital region is rounded and does not present a temporal canthus delimited by enlarged or well-defined scales (Nieto et al. 2013).

**Remarks.** In Queretaro, it is known only from the vicinity of Tilaco and Acatitlán de Zaragoza in the Municipality of Landa de Matamoros, northeastern part of the state within the Sierra Gorda Biosphere Reserve (Nieto et al. 2013). It has also been recorded from El Pinalito, municipality of Jacala, Hidalgo (Zamora-Abrego 2009).

#### *Xenosaurus newmanorum* (Taylor, 1949)

Figure 3C

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, San Juan de los Duran; 21.4966°N, 099.1679°W; elev. 1151 m; 1.X.2021; Brett Buttler obs.; 1♂, CNAR-RF 900 (photograph)

The specimen was observed in the cleft of a rock, in a transitional *Quercus* forest with elements of mountain mesophyll forest such as *Liquidambar styraciflora*.

**Identification.** *Xenosaurus newmanorum* is a medium-sized lizard, ( $\varnothing$ SVL = 124 mm;  $\delta$ SVL = 118 mm). This species differs from other *Xenosaurus* species in having the zygomatic and postocular ridges separated, the supraorbital semicircles in contact or separated medially by one scale row, a smooth tympanum, and no enlarged canthal scales (Lemos-Espinal et al. 2012). The color pattern consists of a V-shaped dark mark on the neck; the dorsum usually exhibits four pale crossbands that alternate with dark crossbands. There is an immaculate pale gray to gray venter and laterally interrupted, dark-margined, pale caudal bands (Lemos-Espinal et al. 2012).

**Remarks.** This is a Mexican endemic lizard species previously reported from only two localities: the Municipality of Pisaflor in Hidalgo, and the Municipality of Xilitla in San Luis Potosí. Our new record represents the first of this species from Querétaro. This lizard species is of major conservation concern; it is under the category of Special Protection (DOF 2019) and has been assessed as Endangered by the IUCN. This species may not be able to survive in a highly modified vegetation community (Lara-Tufiño et al. 2013).

Order Squamata (Serpentes)

Family Boidae

#### *Boa imperator* (Daudin, 1803)

Figure 4A

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, San José de los Paredones; 21.6321°N, 099.2004°W; elev. 775 m; 22.VI.2022; Fernando Hidalgo Licona obs.; sex undetermined, CNAR-RF 906 (photograph).

This snake was found under wet leaf litter in a subtropical forest.

**Identification.** This species has the following scale combinations: ventrals 225–288, subcaudals 49–70, supralabials 19–20, infralabials 20–24, scales around the body lacking apical depressions 55–88, scales between eyes across the top of the head 15–170, and an entire anal scale. A pattern of 20–33 middorsal spots is present (Dixon and Lemos-Espinal 2010). The dorsal color pattern is grayish brown, and the dorsum of the head is gray to bronze (Ramírez-Bautista et al. 2014).

**Remarks.** Until 2015 this species was considered to be subspecies of *Boa constrictor* Linnaeus, 1758. The geographic range is from southern Tamaulipas to eastern Colombia in South America (Card et al. 2016).

Family Natricidae

#### *Diadophis punctatus* (Linnaeus, 1766)

Figure 4B

**Material examined.** MEXICO – Querétaro • Amealco de Bonfil, La Beata; 20.3138°N, 100.2361°W; elev. 2379

m; 20.VII.2022; Leonardo Álvarez Alvarado obs.; sex undetermined, CNAR-RF 907 (photograph).

This snake was seen basking in depressions in clay soil of an oak forest.

**Identification.** This is a small snake (TL = 677 mm) presenting the following scale characteristics and combinations: dorsal scales smooth without apical pits, supralabials 7 or 8, supralabials touching the orbit 2, infralabials 8, preocular and postocular usually 2. There is a cream to orange ring, with or without black margins, around the neck; this ring covers 2–4 scales (Dixon and Lemos-Espinal 2010).

**Remarks.** The species occurs from southern Canada to Mexico, from the Atlantic to the Pacific coasts, excluding most of the western deserts (Stebbins 1985). It is found in the Central Plateau and the Trans-Mexican Volcanic Belt in central Mexico (Hammerson and Frost 2007). It lives in a wide range of habitat types, such as grasslands, rocky and wooded slopes, chaparral, upland deserts, tropical and temperate forests, and thickets (Blanchard et al. 1979; Ernst and Ernst 2003; Ramírez-Bautista et al. 2009; Fernández-Badillo et al. 2016).

#### *Storeria dekayi* (Holbrook, 1839)

Figure 4C

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Neblinas; 21.2546°N, 099.0686°W; elev. 1275 m; 28.VIII.2021; IBH-RF 650; Mauricio Tepos Ramírez obs.; 1♂, CNAR-RF 908 (photograph).

The specimen was found in a paddock surrounded by mesophyll forest.

**Identification.** The dorsal coloration is cinnamon, brown, or orange. There are keeled dorsal scales all over the body, no loreal scale, and the anterior temporal scale is uniform in color or with darker margin (Ramírez et al. 2014).

**Remarks.** This snake has a wide distribution from Canada to Central America in a variety of habitats. In Mexico it is distributed along the Gulf coast and the Sierra Madre Oriental in Nuevo León, Tamaulipas, San Luis Potosí, Puebla, and Hidalgo (Fernández-Badillo et al. 2016).

Family Colubridae

#### *Drymarchon melanurus* (Duméril, Bibron & Duméril, 1854)

**Material examined.** MEXICO – Querétaro • Arroyo Seco, Purísima de Cubos; 21.2546°N, 099.0686°W; elev. 1275 m; Mauricio Tepos Ramírez obs.; 1♀.

The specimen was found in a paddock surrounded by mesophyll forest.

**Identification.** This is a large-bodied snake (TL = 2.295 mm) presenting the following scale combinations: parietal scales 2, supraocular 1, postoculars 2, preocular 1, supralabials 7 or 8, infralabials 7, middorsal scale rows 17. Vertical black stripes are present in the posterior



**Figure 4.** Some snakes of Querétaro, Mexico. **A.** *Boa imperator* (Daudin, 1803). **B.** *Diadophis punctatus* (Linnaeus, 1764). **C.** *Storeria dekayi* (Holbrook, 1839). **D.** *Scaphiodontophis annulatus* (Duméril, Bibron & Duméril, 1854). **E.** *Coniophanes imperialis* (Baird & Girard, 1859). **F.** *Micruurus tener* (Baird & Girard, 1853). **G.** *Crotalus aquilus* (Klauber, 1952). **H.** *Metlapilcoatlus borealis* (Tepos-Ramírez, Flores-Villela, Velasco, Pedraza-Lara, García-Rubio & Jadin, 2021). Photographs by ORGR (A, C–H) and Leonardo Álvarez Alvarado (B).

region of the subocular and supralabial scales (Dixon and Lemos-Espinal 2010; Ramirez-Bautista et al. 2014).

**Remarks.** A widely distributed species, ranging from southern Texas, USA to Venezuela, at elevations from sea level to 1900 m (Dixon and Lemos-Espinal 2010). Its habitat consists of dry subtropical forests, humid tropical forests, oak forests, and savanna (Stebbins 1985; Hammerson and Frost 2007; Rorabaugh and Lemos-Espinal 2016).

#### *Scaphiodontophis annulatus* (Duméril, Bibron & Duméril, 1854)

#### Figure 4D

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, San José de los Paredones; 21.6246°N, 099.1905°W; elev. 770 m; 24.VIII.2022; Cristhian Alejandro Peralta Robles obs.; sex undetermined, CNAR-RF 909 (photograph).

This specimen was found hidden underground in a subtropical forest. This observation represents the first record of this species in Querétaro.

**Identification.** This species presents the following scale combinations: ventrals 123–149 and subcaudals

234–262. The dorsum is red, with yellow bands bordered with black dorsal bands encompassing a pair of scales. The posterior half of the body often, but not always, exhibits a different color pattern, typically uniformly brown, with white chin (Kohler 2008).

**Remarks.** The typical habitat is humid lowland forests, also in subhumid forests in the extreme north of the Yucatan Peninsula (Kohler 2008). This is the only specimen known for Querétaro, so the color pattern of the population in general is unknown.

#### Family Dipsadidae

##### *Coniophanes imperialis* (Baird & Girard, 1859)

Figure 4E

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Neblinas; 21.2586°N, 099.0549°W; elev. 862 m; 24.VIII.2022; Jonatan Pérez Coeto obs.; sex undetermined, CNAR-RF 910 (photograph).

This specimen was found on a dirt road, at the boundary between cloud and subtropical forest. This observation represents the first record of this species in Querétaro.

**Identification.** This species exhibits the following scale combinations: supralabials 8, infralabials 10, preoculars 2, postoculars 2, ventrals 130, anal and subcaudals divided (Ramírez-Bautista et al. 2014). The dorsum is light brown, with three dark brown stripes extending from head to tail, each covering two rows of scales. The head is dark brown, with a pale brown stripe from the tip of snout through the eye to the temporal region (Berriozabal-Islas 2012).

**Remarks.** In Mexico this species is distributed along the Gulf Slope from northern Tamaulipas to southern Chiapas, encompassing the entire Yucatan Peninsula where it inhabits humid and subhumid forests. It has also been reported in cloud forests (Ramírez-Bautista et al. 2014). This genus has recently been reviewed by Palacios-Aguilar and Flores-Villela (2020).

##### *Pantherophis emoryi* (Baird & Girard, 1853)

**Material examined.** MEXICO – Querétaro • Cadereyta de Montes, Higuerillas; 20.9158°N 99.7648°W; elev. 1569 m; 31.VIII.2014; Mauricio Tepos Ramírez and Alfredo Acosta Ramírez obs.; 1♂, CNAR-RF 911a, b.

This specimen was found dead on a road, in xerophilous scrub habitat.

**Identification.** *Pantherophis emoryi* is a robust snake with a large head which is more differentiated from the neck than other in members of the *P. guttatus* complex. It has a background coloration of grey, olive, or brown, with brown and olive dorsal and lateral spots with black edges, but the most distinguishing character is a brown, reddish-brown, or almost black spear-shaped mark on the nape pointing toward the snout (Schultz 1996; Dixon and Lemos-Espinal 2010).

**Remarks.** It is distributed in the United States and Mexico. In Mexico it is found in San Luis Potosí, northern

Veracruz, Chihuahua, northern Durango, Coahuila, Nuevo León, Tamaulipas, Querétaro, Jalisco, Hidalgo, and Aguascalientes (Calzada-Arciniega et al. 2015) (Bohannon et al. 2018). It lives in oak-táscate forests, dry thorny scrub forests, Chihuahuan Desert vegetation, canyons, and tropical deciduous forest.

#### Family Elapidae

##### *Micruurus tener* (Baird & Girard, 1953)

Figure 4F

**Material examined.** MEXICO – Querétaro • Landa de Matamoros, Pinalito de la Cruz; 21.3200°N, 099.1698°W; elev. 2022 m; 29.IX.2021; Brett Buttler obs.; 1♂, CNAR-RF 912 (photograph).

This specimen was found on a rocky outcrop, in a pine-oak forest.

**Identification.** The species possess the following scale combinations: ventrals 200–231, caudals 26–46; mid-dorsal rows 15, loreal scale absent (Campbell and Lamar 2004). The dorsum and venter have a series of red-yellow-black-yellow bands, while the tail has only black and yellow bands (Campbell and Lamar 2004). The head is black, with a yellow band that covers part of the parietal scales (Ramírez-Bautista et al. 2014).

**Remarks.** This species is distributed from eastern Texas, USA, passing through the Gulf Slope to northern Guerrero, Mexico. It is semifossorial and inhabits humid places, generally among leaf litter or under logs and rocks (Dixon and Lemos-Espinal 2010).

#### Family Viperidae

##### *Crotalus aquilus* (Klauber, 1952)

Figure 4G

**Material examined.** MEXICO – Querétaro • Ezequiel Montes, Bernal; 20.7471°N, 099.9431°W; elev. 2050 m; 14.XII.2021; Mauricio Tepos Ramírez obs.; 1♀, CNAR-RF 913 (photograph).

This specimen was found basking on a rocky outcrop, among xerophytic scrub.

**Identification.** The species possess the following scale combinations: rostral wider than long; prenatal curves below the postnasal, anterior subocular is usually in contact with supralabials 4 and 5, long internasals in contact 2 or 3, canthals on each side 1 or 2, intercanthals 0–2, internasal–prefrontal area 5–10; intersupraoculars 2–5, loreals 1 or 2, infralabials 9–13; midbody dorsal scale rows 21–25 (usually 23), scales in contact with the rattlesnake 8–11 (Campbell and Lamar 2004; Dixon and Lemos-Espinal 2010; SEMARNAT 2018). The coloration generally ranges from pale brown or dark brown, gray, or greenish gray, and yellowish green to reddish brown. There are a couple of brown spots on the nape and 21–41 spots on the back, followed by 3–8 bands on the tail (SEMARNAT 2018).

**Remarks.** This is a Mexican endemic species, ranging from northwestern Veracruz to southern San Luis

Potosí and including Aguascalientes, Guanajuato, Hidalgo, Querétaro, Michoacán, Jalisco, and Zacatecas (SEMARNAT 2018). This species can tolerate some amount of disturbance from agricultural and industrial activities, as some populations persist in human-modified habitats (Meik et al. 2007).

***Metlapilcoatlus borealis* (Tepos-Ramírez, Flores-Villela, Velasco, Pedraza-Lara, García-Rubio & Jadin, 2021)**

Figure 4H

**Material examined.** MEXICO – Querétaro • Jalpan de Serra, El Pilón; 21.4990°N, 099.1730°W; elev. 1134 m; 30.VI.2015; Jacinto Chávez obs.; 1♀, CNAR-RF 914 (photograph).

This snake was found on vegetation of a transition zone between a *Quercus* forest and elements of the mountain mesophyll forest such as *Liquidambar styraciflua*.

**Identification.** *Metlapilcoatlus borealis* is a medium-sized, moderately robust viper (♀ TL = 594 mm; ♂ TL = 657 mm) with the following scale combinations: midbody scale rows 22–25, nasorostral 4–6, ventrals 130–132, subcaudals 26–35, supraoculars 8–10, interocularial 2 or 3, blotches at the sides of the body before the cloaca 21–26.

**Remarks.** Populations of *M. borealis* differ from the *M. mexicanus*–*M. nummifer*–*M. olmec* group, which are separated by two biogeographic barriers—the Trans-Mexican Volcanic Belt and the Sierra Madre Oriental. However, *M. borealis* may be sympatric with *M. nummifer*, especially in mid- and lowland areas in central and southern Veracruz, south of the Trans-Mexican Volcanic Belt (Tepos-Ramírez et al. 2021a).

## Discussion

Our study demonstrates the importance of Querétaro as a reservoir of amphibian and reptile diversity in Mexico and highlights the importance of using rigor-

ous methodologies and protocols to generate reliable checklists. The number of species that we report here is fewer than reported for neighboring states, such as San Luis Potosí (182 species; Lemos-Espinal et al. 2018), state of Mexico (150 species; Lemos-Espinal and Smith 2020), and Hidalgo (203 species; Ramírez-Bautista et al. 2020), but greater than in other, larger states, such as Nuevo León (132 species; Lemos-Espinal et al. 2016). Querétaro (51%) has a higher percentage of endemic species than San Luis Potosí (40%), but less than Hidalgo (53%), Guanajuato (57%), Michoacán (67%) and the state of Mexico (71%). Additionally, Querétaro only has one endemic species to the state, Michoacán 21 and the State of Mexico 5, while the rest of the neighboring states do not register any endemic species to the state (Table 5). However, the number of amphibians and reptiles reported in this study will continue growing with the description of new species (e.g. Campillo et al. 2021).

There are a large number of controversial records since the first published lists for Querétaro (Smith and Taylor 1950; Dixon et al. 1972; Nieto and Pérez 1999). Among amphibians, some of these controversial records are *Anaxyrus speciosus* (Girard, 1854), *Eleutherodactylus cystignathoides* (Cope, 1877), *Eleutherodactylus nitidus* (Peters, 1870), and *Aquiloeycea scandens*; among reptiles, the controversial records are *Kinosternon scorpioides*, *Gerrhonotus liocephalus* (Wiegmann, 1828), *Scincella lateralis* (Say, 1822), *Lepidophyma flavimaculatum* (Duméril, 1851), *Pseudoeelaphe flavirufa* (Cope, 1867), *Thamnophis marcianus* (Baird & Girard, 1853), *Agkistrodon taylori* (Burger & Robertson, 1951), *Crotalus ravus* (Cope, 1865), and *Crotalus triseriatus* (Wagler, 1830). Differences in the number of species reported for Querétaro may be due to four major causes outlined below. (More detailed discussion on controversial records considered in earlier checklists and recent nomenclatural changes can be found in the Appendix and Table A1, respectively.)

1) Taxonomic and nomenclatural changes. Among amphibians, there is confusion caused by numerous changes in the systematics of genera such as *Craugastor*

**Table 5.** Number of endemic species of amphibians and reptiles in Querétaro and neighboring states. The number of endemic species to Mexico include the number endemic species to the state.

State (reference)	Anura	Caudata	Testudines	Lacertilia	Serpentes	Species endemic to Mexico	Endemic state species	Total species
<b>Querétaro</b> (this paper)	12	7	1	23	26	69	1	136
<b>Mexico State</b> (Lemos Espinal and Smith 2020)	20	16	2	33	36	107	5	150
<b>Guanajuato</b> (Hernández-Arciga et al. 2018)	13	3	2	21	29	68	0	120
<b>Michoacán</b> (Suazo-Ortuño et al. 2019)	32	9	2	40	67	150	21	224
<b>Hidalgo</b> (Ramírez-Bautista et al. 2020)	22	16	3	25	42	108	4	203
<b>San Luis Potosí</b> (Lemos-Espinal et al. 2018)	12	5	3	25	28	73	0	182

(Cope, 1862) (Heinickie et al. 2007; Frost 2021), *Eleutherodactylus* (Duméril & Bibron, 1841) (Frost 2021), and *Lithobates* (Fitzinger, 1843) (Yuan et al. 2016; Frost 2021), *Eleutherodactylus* spp. are especially complex in this regard.

2) Erroneous identifications of specimens and outdated databases. Among reptiles, *Thamnophis marcianus* (Nieto and Pérez, 1999), *Lepidophyma flavimaculatum* (Nieto and Pérez, 1999). *Sceloporus serrifer* (Cope, 1866) (Nieto and Pérez, 1999) are examples of misidentifications acknowledged by collection curators but never properly corrected.

3) Species included in regional checklists by extrapolation but without recorded data/evidence. Among the amphibians, *Aquiloerycea scandens* and *Pseudoeurycea leprosa* are two species without reliable records for Querétaro and their historical distribution do not include Querétaro (Parra-Olea et al. 2012; Raffaëli 2014; Frost 2021). Among reptiles, *Gerrhonotus liocephalus*, *Agkistrodon taylori*, and *Crotalus ravus* have been reported for Querétaro by Cruz-Elizalde et al. (2019, 2022); however, there is no reliable data or collected specimens of these species from Querétaro, even in recent studies (García-Vázquez et al. 2018; Cisneros-Bernal et al. 2022). For that reason, neither species was included in this list.

4) Loss of specimens in collections, or confusion about locality names. For Querétaro, *Kinosternon scorpioides*, and *Pseudoelaphe flavirufa* were both reported by Dixon and Lemos (2010), and Cruz-Elizalde et al. (2019, 2022). *Pseudoelaphe flavirufa* may possibly occur in northern Querétaro.

Querétaro has been the subject of herpetofaunistic studies for five decades, and during this time several species have been described (Smith 1942; Dixon et al. 1972b; Nieto et al. 2013; Wallach 2016; Tepos-Ramírez et al. 2021a). Possible new species of lizards, frogs, and salamanders are currently under study. However, there are still gaps in the knowledge of species that occur in Querétaro. The inclusion of a species within a geopolitical area is not a trivial matter, especially when we consider that these borders are often delimited by environmental barriers, geography, and cultural elements. Additionally, there are species known to occur just beyond the borders of Querétaro, for example, *Rhadinaea marcellae* (Taylor, 1949) and *Dryophytes plicatus* (Brocchi, 1877), which may occur in Querétaro; it is important to confirm their presence there.

## Acknowledgements

We thank Carol Spencer and Jo Gualpa (Museum of Vertebrate Zoology, University of Berkeley California), Gregory Pandelis (Amphibian and Reptile Diversity Research Center, the University of Texas at Arlington), Joseph Martínez and Brendan Haley (Museum of Vertebrate Zoology, Harvard University), Stevie Kennedy-Gold (Carnegie Museum of Natural History), Toby Hibbitts (Department of Ecology and Conservation

Biology, Texas A&M University), Vicky M. Zhuang and Carl S. Lieb (University of Texas at El Paso, Biodiversity Collections), Coatlán A.C., and Neblinas Vivo Collective for providing information and photographs of observed and preserved specimens. We thank Robert Bezy, Ricardo Palacios Aguilar, and Gustavo Campillo for their comments on the taxonomy and distribution of some species in the checklist. We thank Krisly Saucedo Uuh for her help in developing SIG products. We thank Arturo Rosas Ramírez, Brett Buttler, Don Maximino, Don Adán, Gonzalo Medina Rangel, Emmanuel Ribeiro Aceves, Ezau Garay Hernández, Fernando Hidalgo Licona, Jair Garay, Joaquin Villegas, Jonatan Pérez Coeto, Margarita Carranza Cruz, Thelma Quezada Carreón, Ulises Padilla, Yolocalli Cisneros Bernal, for their help during the field outings. In loving memory of Polok. Collection permit issued by SEMARNAT (SGPA/DGVS/00027/22). We appreciate the financial support given for the FONDEC-UAQ 2021.

## Author Contributions

Conceptualization: ORGR, MTR. Data curation: CAPR, MTR, FSGF. Formal analysis: ORGR. Funding acquisition: ORGR, RCJ. Investigation: FSGF, CAPR. Methodology: MTR. Project administration: RCJ, ORGR, MTR.

## References

- Acosta RA, Tepos-Ramírez M** (2019) *Chiropterotriton chondrostega*. Predation. Herpetological Review 50 (1): 109.
- Álvarez-Romero JG, Medellín RA, Oliveras de Ita A, Gómez de Silva H, Sánchez O** (2008) Animales exóticos en México: una amenaza para la biodiversidad. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Instituto de Ecología, UNAM, Secretaría de Medio Ambiente y Recursos Naturales, Mexico City, Mexico, 518 pp.
- Berriozabal-Islas CS** (2012) Riqueza y diversidad herpetofaunística del bosque tropical, cafetales y potreros del municipio de Huehuetla, Hidalgo, México. Tesis de Licenciatura. Universidad Autónoma del Estado de Hidalgo, Hidalgo, Mexico 148 pp.
- Bezy RL, Camarillo R JL** (1992) Systematics of xantusiid lizards allied with *Lepidophyma gaigeae*. Mosauer. Herpetologica 48 (1): 97–110.
- Bezy RL, Camarillo JL** (2002) Systematics of xantusiid lizards of the genus *Lepidophyma*. Contributions in Science 493: 1–41.
- Blanchard FN, Gilreath MR, Blanchard FC** (1979) The eastern ring-neck snake (*Diadophis punctatus edwardsii*) in Northern Michigan (Reptilia, Serpentes, Colubridae). Journal of Herpetology 13 (4):377–402. <https://doi.org/10.2307/1563473>
- Bohannon AM, MacLaren AR, Forstner MRJ** (2018) Geographic distribution: *Pantherophis emoryi* (Great Plains Ratsnake). Herpetological Review 49 (2): 287.
- Bryson RW, Murphy RW, Lathrop A, Lazcano-Villareal D** (2011) Evolutionary drivers of phylogeographical diversity in the highlands of Mexico: a case study of the *Crotalus triseriatus* species group of montane rattlesnakes. Journal

- of Biogeography 38 (4): 697–710. <https://doi.org/10.1111/j.1365-2699.2010.02431.x>
- Bryson RW, Riddle BR** (2012) Tracing the origins of widespread highland species: a case of Neogene diversification across the Mexican sierras in an endemic lizard. Biological Journal of the Linnean Society 105 (2): 382–394. <https://doi.org/10.1111/j.1095-8312.2011.01798.x>
- Burbrink FT, Graziotin FG, Pyron RA, Cundall D, Donnellan S, Irish F, Keogh JS, Kraus F, Murphy RW, Noonan B, Raxworthy CJ, Ruane S, Lemmon AR, Lemmon EM, Zaher H** (2020) Interrogating genomic-scale data for Squamata (lizards, snakes, and amphisbaenians) shows no support for key traditional morphological relationships. Systematic Biology 69 (3): 502–520. <https://doi.org/10.1093/sysbio/syz062>
- Cabrera AEG** (2009) El cautiverio como una alternativa de conservación para la herpetofauna mexicana. Undergraduate degree thesis, Universidad Autónoma de Querétaro, Querétaro, México, 103 pp.
- Calzada-Arciniega RA, Toscano-Flores C, Briseño-Sánchez MI** (2015) Geographic distribution: *Pantherophis emoryi* (Great Plains Ratsnake). Herpetological Review 46 (2): 221.
- Campbell J, Frost D** (1993) Anguid lizards of the genus *Abroania*: revisionary notes, descriptions of four new species, a phylogenetic analysis, and key. Bulletin of the American Museum of Natural History 216: 121.
- Campbell JA, Lamar WW** (2004) The venomous reptiles of the western hemisphere. Vol. II. Comsotoc Publishing Associates / Cornell University Press, Ithaca, New York, USA, 870 pp.
- Campillo-García G, Flores-Villela O, Butler BO, Velasco Vinasco JA, Ramírez Corona F** (2021) Hidden diversity within a polytypic species: the enigmatic *Sceloporus torquatus* Wiegmann, 1828 (Reptilia, Squamata, Phrynosomatidae). Vertebrate Zoology 71: 781–798. <https://doi.org/10.3897/vz.71.e71995>
- Canseco-Márquez L, Gutiérrez-Mayen G, Mendoza-Hernández AA** (2008) A new species of night-lizard of the genus *Lepidophyma* (Squamata: Xantusiidae) from the Cuicatlán Valley, Oaxaca, México. Zootaxa 1750 (1): 59. <https://doi.org/10.11646/zootaxa.1750.1.6>
- Card DC, Schield DR, Adams RH, Corbin AB, Perry BW, Andrew AL, Pasquesi GIM, Smith EN, Jezkova T, Boback SM, Booth W, Castoe T** (2016) Phylogeographic and population genetic analyses reveal multiple species of *Boa* and independent origins of insular dwarfism. Molecular Phylogenetics and Evolution 102: 104–116. <https://doi.org/10.1016/j.ympev.2016.05.034>
- Cisneros-Bernal AY, Rodríguez-Gómez F, Flores-Villela O, Fujita MK, Velasco AJ, Fernández JA** (2022) Phylogeography supports lineage divergence for an endemic rattlesnake (*Crotalus ravus*) of the Neotropical montane forest in the Trans-Mexican Volcanic Belt. Biological Journal of the Linnean Society 137 (3): 496–512. <https://doi.org/10.1093/biolinnean/blac066>
- Conant R, Collins JT** (1998) A field guide to reptiles and amphibians: eastern and central North America. Houghton Mifflin Harcourt, Boston, Massachusetts, USA, 450 pp.
- Contreras-Calvario ÁI, Soto-Pozos ÁF, Castillo-Juárez JL, Calzada-Arciniega RA, Parra-Olea G** (2021) The distribution of *Ambystoma velasci* Dugès, 1888 in Veracruz, Mexico: insights for its conservation in the region. Herpetology Notes 14: 469–473.
- Cruz-Elizalde R, Padilla-García U, Cruz Pérez MC, Tinoco-Navarro C** (2016) Herpetofauna del estado de Querétaro. In: Jones, RW, Serrano CV (Eds.) Historia Natural de Querétaro. Universidad Autónoma de Querétaro, Querétaro, México 300–319.
- Cruz-Elizalde R, Ramírez-Bautista A, Hernández-Salinas U, Berriozabal-Islas C, Wilson LD** (2019) An updated checklist of the herpetofauna of Querétaro, México: species richness, diversity, and conservation estatus. Zootaxa 4638 (2): 273–290. <https://doi.org/10.11646/zootaxa.4638.2.7>
- Cruz-Elizalde R, Ramírez-Bautista A, Pineda-López R, Mata-Silva V, DeSantis DL, García-Padilla E, Johnson JD, Rocha A, Fucsko LA, Wilson LD** (2022) The herpetofauna of Querétaro, Mexico: composition, distribution, and conservation status. Amphibian & Reptile Conservation, 16 (1): 148–192.
- Cruz-Pérez MS, Rangel-Hernández JA, Roldan-Padron O, Soto-Alonso GA, Padilla-García U, García-Vázquez U** (2009) Presencia de malformaciones en *Ambystoma tigrinum* en Alameda del Rincón, Querétaro, México. Boletín de la Sociedad Herpetológica Mexicana 17 (2): 92–96.
- Cruz-Pérez MS, Hernández-Camacho N, Padilla-García U** (2014) Presencia de *Crotalus polystictus* (Cope, 1865) (Reptilia: Viperidae) en un área natural protegida suburbana de Querétaro, México. Acta Zoológica Mexicana 30 (2): 422–425.
- Daza JM, Smith EN, Páez, VP, Parkinson CL** (2009) Complex evolution in the Neotropics: the origin and diversification of the widespread genus *Leptodeira* (Serpentes: Colubridae). Molecular Phylogenetics and Evolution 53 (3): 653–667. <https://doi.org/10.1016/j.ympev.2009.07.022>
- Dixon JR, Ketchersid CA, Lieb CS** (1972a) The herpetofauna of Querétaro, México, with remarks on taxonomic status. Southwestern Naturalist 16: 225–237. <https://doi.org/10.2307/3670059>
- Dixon JR, Ketchersid CA, Lieb CS** (1972b) A new species of *Sceloporus (undulatus group; Sauria, Iguanidae)* from Mexico. Proceedings of the Biological Society of Washington 84 (38): 307–312.
- Dixon JR, Lemos EJA** (2010) Anfibios y reptiles del estado de Querétaro. Texas A&M University, Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Mexico City, Mexico, 429 pp.
- DOF (Diario Oficial de la Federación)** (2019) NOM-059-SEMARNAT-2010, Modificación del Anexo Normativo III, Lista de especies en riesgo de la Norma Oficial Mexicana, 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, publicada el 30 de diciembre de 2010. [https://www.dof.gob.mx/nota\\_detalle.php?codigo=5578808&fecha=14/11/2019](https://www.dof.gob.mx/nota_detalle.php?codigo=5578808&fecha=14/11/2019). Accessed on: 2022-05-26.
- Domínguez-Vega H, Gómez-Ortiz Y, Fernández-Badillo L** (2019) Técnicas para monitorear anfibios y reptiles

- en ambientes urbanos. In: Zuria I, Olvera-Ramírez AM, Ramírez B (Eds.) Manual de técnicas para el estudio de fauna nativa en ambientes urbanos. Universidad Autónoma de Querétaro, Querétaro, México, 77–102.
- Duellman WE** (1961) Hylid frogs of Middle America revised and expanded edition. Vol. 2. Society for the Study of Amphibians and Reptiles, Ithaca, USA, 753 pp.
- Ernst CH, Ernst EM** (2003). Snakes of the United States and Canada. Smithsonian Books, Washington DC, USA, 668 pp.
- Fernández-Badillo L, Aguillón-Gutiérrez DL, Valdez-Rentería SY, Hernández-Melo JA, Olvera CR, Callejas-Jiménez FJ, Hernández-Ramos M, Iturbe-Morgado JC, Torres F** (2016) First records for amphibians and reptiles from the municipality of Atotonilco el Grande, Hidalgo, México. Herpetological Review 47 (1): 91–93.
- Frost DR** (2021) Amphibian species of the world: an online reference. Version 6.1. <https://amphibiansoftheworld.amnh.org/>. Accessed on: 2022-02-16.
- García-Vázquez UO, Nieto-Montes de Oca A, Bryson RW, Schmidt-Ballardo W, Pavón-Vázquez CJ** (2018) Molecular systematics and historical biogeography of the genus *Gerrhonotus* (Squamata: Anguidae). Journal of Biogeography 45 (7): 1640–1652. <https://doi.org/10.1111/jbi.13241>
- Gillingwater S, Patrikeev M** (2004) Herpetological records from Reserva de la Biosfera Sierra Gorda (Querétaro, Mexico), November 2000. Institute for the Conservation of World Biodiversity, Nairobi, Kenya, 19 pp.
- Gobierno del Estado de Querétaro** (2002) Mapa Oficial del Estado de Querétaro de Arteaga. Escala. 2:250,000, Querétaro, Mexico.
- Good D** (1988) Phylogenetic relationships among gerrhonotinae lizards, and analysis of external morphology. University of California Press 121: 1–139.
- Grünewald CI, Reyes-Velasco J, Franz-Chavez H, Morales-Flores KI, Ahumada-Carrillo IT, Jones JM, Boissinot S** (2018) Six new species of *Eleutherodactylus* (Anura: Eleutherodactylidae: subgenus *Syrrophophus*) from Mexico, with a discussion of their systematic relationships and the validity of related species. Mesoamerican Herpetology 5 (1): 6–83.
- Grünewald CI, Toribio-Jiménez S, Montaño-Ruvalcaba C, Franz-Chávez H, Peñaloza-Montaño MA, Barrera-Nava EY, Jones JM, Rodríguez CM, Hughes IM, Strickland JL, Reyes-Velasco J** (2021) Two new species of snail-eating snakes of the genus *Tropidodipsas* (Serpentes, Dipsadidae) from southern Mexico, with notes on related species. Herpetozoa 34: 233–257. <https://doi.org/10.3897/herpetozoa.34e69176>
- Hammerson, GA, Frost DR** (2007) *Diadophis punctatus*. The IUCN Red List of threatened species. Accessed on: 2022-06-14.
- Hansen RW, Salmon GT** (2017) Distribution analysis, taxonomic updates, and conservation status of the *Lampropeltis mexicana* group (Serpentes: Colubridae). Mesoamerican Herpetology 4: 700–758.
- Harvey MB, Ugueto GN, Gutberlet RL** (2012) Review of teiid morphology with a revised taxonomy and phylogeny of the Teiidae (Lepidosauria: Squamata). Zootaxa 3459 (1): 1–156. <https://doi.org/10.11646/zootaxa.3459.1.1>
- Hedges SB, Duellman WE, Heinicke MP** (2008) New World direct-developing frogs (Anura: Terrarana): molecular phylogeny, classification, biogeography, and conservation. Zootaxa 1737: 1–182. <https://doi.org/10.11646/zootaxa.1737.1.1>
- Heinicke MP, Duellman WE, Hedges SB** (2007) Major Caribbean and Central American frog faunas originated by ancient oceanic dispersal. Proceedings of the National Academy of Sciences of the United States of America 104: 10092–10097. <https://doi.org/10.1073/pnas.0611051104>
- Hernández-Árciga R, Villegas RJ, Elizalde-Arellano C, López Vidal JC** (2018) Los anfibios y reptiles de Guanajuato. Secretaría de Medio Ambiente y Ordenamiento Territorial (SMAOT) y Herpetario de la Sierra Gorda, Guanajuato, Mexico, 284 pp.
- Hernández-Austria R, García-Vázquez UO, Grünewald CI, Parra-Olea G** (2022) Molecular phylogeny of the subgenus *Syrrophophus* (Amphibia: Anura: Eleutherodactylidae), with the description of a new species from eastern Mexico. Systematics and Biodiversity 20 (1): 1–20. <https://doi.org/10.1080/14772000.2021.2014597>
- Hernández-Jiménez CA, Flores-Villela O, Aguilar-Bremautz A, Campbell JA** (2021) Phylogenetic relationships based on morphological data and taxonomy of the genus *Salvadora* Baird & Girard, 1853 (Reptilia, Colubridae). European Journal of Taxonomy 764: 85–118. <https://doi.org/10.5852/ejt.2021.764.1473>
- INEGI (Instituto Nacional de Estadística y Geografía)** (2017) Anuario estadístico y geográfico de Querétaro 2017. Instituto Nacional de Estadística y Geografía, Querétaro, México, 451 pp.
- Irschick DJ, Shaffer HB** (1997) The polytypic species revisited: morphological differentiation among tiger salamanders (*Ambystoma tigrinum*) (Amphibia: Caudata). Herpetologica 53 (1): 30–49.
- IUCN (International Union for the Conservation of Nature)** (2022) The IUCN Red List of threatened species. Version 2022-2. <https://www.iucnredlist.org>. Accessed on: 2022-10-25.
- Jiménez-Velázquez G, Cruz-Pérez MS** (2011) Especies exóticas e invasoras, una perspectiva para la conservación de los anfibios y reptiles en Querétaro. Nuevos Tiempos (4) 25: 17–21.
- Köhler G** (2008) Reptiles of Central America. Herpeton Verlag, Offenbach, Germany, 367 pp.
- Köhler G** (2013) Amphibians of Central America. Herpeton Verlag Elke Kohler, Offenbach, Germany, 380 pp.
- Köhler G** (2021) Taxonomy of horned lizards, genus *Phrynosoma* (Squamata, Phrynosomatidae). Taxonomy 1 (2): 83–115. <https://doi.org/10.3390/taxonomy1020009>
- Lara-Tufiño D, Ramírez-Bautista A, Hernández-Austria R, David WL, Berrioabal-Islas C** (2013) *Xenosaurus newmanorum* Taylor, 1949 (Squamata: Xenosauridae): occurrence in the state of Hidalgo, Mexico. Check List 9 (5): 1101–1103. <https://doi.org/10.15560/9.5.1101>
- Leavitt, Dean J. and Toby J. Hibbitts. 2012. Lepidophyma gaigeae. Catalogue of American Amphibians and Reptiles** (896): 1-4. Lemos-Espinal JA, Dixon JR (2013) Amphibians and reptiles of San Luis Potosí. Eagle Mountain Publishing, Eagle Mountain, USA, 300 pp.

- Lemos-Espinal JA, Smith GR, Cruz A** (2016) Amphibians and reptiles of the state of Nuevo León, Mexico. *ZooKeys* 594: 123–141. <https://doi.org/10.3897/zookeys.594.8289>
- Lemos-Espinal JA, Smith GR, Woolrich-Piña, GA** (2018) Amphibians and reptiles of the state of San Luis Potosí, Mexico, with comparisons with adjoining states. *ZooKeys* 753: 83–106. <https://doi.org/10.3897/zookeys.753.21094>
- Lemos-Espinal JA, Smith GR** (2020) A conservation checklist of the amphibians and reptiles of the state of Mexico, Mexico with comparisons with adjoining states. *ZooKeys* 953: 137–159. <https://doi.org/10.3897/zookeys.953.50881>
- Lemos-Espinal JA, Smith GR, Woolrich-Piña GA** (2012) The family Xenosauridae in Mexico. Ecouniverse Herpetological Publishing, Rodeo, USA, 106 pp.
- Loveridge A** (1947) Revision of the African lizards of the family Gekkonidae. *Bulletin of the Museum of Comparative Zoology of Harvard* 98: 1–469.
- Lowe CH, Jones CJ, Wright JW** (1968) A new plethodontid from Sonora, Mexico. *Los Angeles County Museum Contributions in Science* 140:1–11. 411: 11–22.
- Martínez-Méndez N, Méndez-De la Cruz FR** (2007) Molecular phylogeny of the *Sceloporus torquatus* species-group (Squamata: Phrynosomatidae). *Zootaxa* 1609 (1): 53–68. <https://doi.org/10.11646/zootaxa.1609.1.2>
- McCrane JR, Townsend JH, Wilson LD** (2004) *Corytophanes hernandesii* (Wiegmann). Catalogue of American Amphibians and Reptiles 790: 1–6.
- McCrane JR, Hedges SB** (2016) Molecular phylogeny and taxonomy of the *Epictia goudotii* species complex (Serpentes: Leptotyphlopidae: Epictiinae) in Middle America and northern South America. *PeerJ* 4: e1551. <https://doi.org/10.7717/peerj.1551>
- Meik JM, Deloya EM, Setser K** (2007) New distribution records for the Querétaro Dusky Rattlesnake *Crotalus aquilus* (Viperidae), with comments on morphology and habitat use. *Western North American Naturalist* 67 (4): 601–604. [https://doi.org/10.3398/1527-0904\(2007\)67\[601:ndrf\]q2.0.co;2](https://doi.org/10.3398/1527-0904(2007)67[601:ndrf]q2.0.co;2)
- Meza-Lazaro RN, Nieto-Montes de Oca A** (2015) Long forsaken species diversity in the Middle American lizard *Holcosus undulatus* (Teiidae). *Zoological Journal of the Linnean Society* 175 (1): 189–210. <https://doi.org/10.1111/zoj.12264>
- Moreno-Barajas R, Rodríguez-Romero F, Velázquez-Rodríguez A, Aragón-Martínez A** (2013) Variación geográfica en *Phrynosoma orbiculare* (Sauria: Phrynosomatidae): análisis de las subespecies. *Acta Zoológica Mexicana* 29 (1): 129–143.
- Morrone JJ, Márquez J** (2003) Aproximación a un atlas biogeográfico mexicano: componentes bióticos principales y provincias biogeográficas. In: Morrone JJ, Llorente J (Eds.). Una perspectiva latinoamericana de biogeografía. Universidad Nacional Autónoma de México, Mexico City, Mexico, 217–220.
- Mulcahy DG** (2008) Phylogeny and species boundaries of the western North American Nightsnake (*Hypsiglena torquata*): revisiting the subspecies concept. *Molecular Phylogenetics and Evolution* 46 (3): 1095–1115. <https://doi.org/10.1016/j.ympev.2007.12.012>
- Murphy RW, Fu J, Lathrop A, Feltham JV, Kovak V** (2002) Phylogeny of the rattlesnakes (*Crotalus* and *Sistrurus*) inferred from sequences of five mitochondrial DNA genes. In: Schuett GW, Höggren M, Douglas ME, Greene HW (Eds.) *Biology of the vipers*. Eagle Mountain Publishing, Eagle Mountain, USA, 69–92.
- Myers EA, Burgoon JL, Ray JM, Martínez-Gómez JE, Matías-Ferrer N, Mulcahy DG, Burbrink FT** (2017) Coalescent species tree inference of *Coluber* and *Masticophis*. *Copeia* 105 (4): 640–648. <https://doi.org/10.1643/ch-16-552>
- Naturalista** (2022) *Eleutherodactylus cystignathoides*. <https://www.naturalista.mx/taxa/22393-Eleutherodactylus-cystignathoides>. Accessed on: 2022-01-02.
- Nieto MOA, Pérez RE** (1999) Anfibios y reptiles del estado de Querétaro. Universidad Nacional Autónoma de México. Facultad de Ciencias, Informe final SNIB-CONABIO, proyecto No. H250, México, DF, 145 pp.
- Nieto MOA, García VUO, Zúñiga VJJ, Schmidt BW** (2013) A new species of *Xenosaurus* (Squamata: Xenosauridae) from the Sierra Gorda Biosphere Reserve of Querétaro, Mexico. *Revista Mexicana de Biodiversidad* 84 (2): 485–498. <https://doi.org/10.7550/rmb.35733>
- Ochoa-Ochoa LM, Campbell JA, Flores-Villela OA** (2014) Patterns of richness and endemism of the Mexican herpetofauna, a matter of spatial scale? *Biological Journal of the Linnean Society* 111 (2): 305–316. <https://doi.org/10.1111/bij.12201>
- Padilla-García U, Mendoza-Quijano F** (1996a) Geographic distribution, *Ameiva undulata*. *Herpetological Review* 27: 210.
- Padilla-García U, Mendoza-Quijano F** (1996b) Geographic distribution, *Imantodes gemmistratus*. *Herpetological Review* 27: 213.
- Padilla-García U, Mendoza-Quijano F** (1996c) Geographic distribution, *Leptophis mexicanus septentrionalis*. *Herpetological Review* 27: 213–214.
- Padilla-García U, Schmidt-Ballardo W, Mendoza-Quijano F** (1996) Geographic distribution, *Laemanctus serratus serratus*. *Herpetological Review* 27: 21.
- Padilla GU** (2005) Diagnóstico y conservación de la microcuenca del Parque Nacional del Lago de Camécuaro, Michoacán. Undergraduated degree tesis, Universidad Autónoma de Querétaro, Querétaro, México, 89 pp.
- Palacios-Aguilar R, Flores-Villela O** (2020) Taxonomic revision and comments on two groups of the genus *Coniophanes* (Squamata: Dipsadidae). *Vertebrate Zoology* 70 (2): 111–124. <https://doi.org/10.26049/vz70-2-2020-02>
- Parra-Olea G, Windfield JC, Velo-Antón G, Zamudio KR** (2012) Isolation in habitat refugia promotes rapid diversification in a montane tropical salamander. *Journal of Biogeography* 39: 353–370. <https://doi.org/10.1111/j.1365-2699.2011.02593.x>
- Peralta-Robles CA, Garduño-Fonseca FS, Salinas-Olguín AK, Tepos-Ramírez M** (2022) Diet, *Conopsis nasus*. *Herpetological Review* 53 (3): 507.
- Rabb GB** (1958) On certain Mexican salamanders of the plethodontid genus *Chiropterotriton*. *Occasional Papers of the Museum of Zoology, University of Michigan* 587: 1–37.
- Raffaëlli J** (2014) Les urodèles du monde. 2nd edition.

- Penclen Edition, Plumelec, France, 480 pp.
- Ramírez-Bautista A, Hernández-Salinas U, García Vázquez UO, Leyte-Manrique A, Canseco-Márquez L** (2009) Herpetofauna del Valle de México: diversidad y conservación. Universidad Autónoma del Estado de Hidalgo/ Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Mexico City, Mexico, 240 pp.
- Ramírez A, Hernández U, Cruz R, Berriozabal B, Lara D, Goyenechea I, Castillo J** (2014) Los anfibios y reptiles de Hidalgo, México: diversidad, biogeografía y conservación. Sociedad Herpetológica Mexicana, Mexico City, Mexico, 104 pp.
- Ramírez-Bautista A, Hernández Salinas U, Cruz-Elizalde R, Berriozabal-Islas C, Moreno-Lara I, DeSantis DL, Johnson JD, García-Padilla, E, Mata-Silva V, Wilson LD** (2020) The herpetofauna of Hidalgo, Mexico: composition, distribution, and conservation status. *Amphibian and Reptile Conservation* 14 (1): 63–118.
- Rayas OA** (2019) Taxonomía integrativa de la rana endémica mexicana de orejas chicas (*Rheohyla miotympanum*). Tesis de maestría. Facultad de Ciencias Naturales, Universidad Autónoma de Querétaro, Querétaro, México, 52 pp.
- Reyes VJ** (2019) Algunas sugerencias para el formato de listados herpetofaunísticos de México. *Revista Latinoamericana de Herpetología* 2 (2): 103–106. <https://doi.org/10.22201/fc.25942158e.2019.2.113>
- Roldán-Padrón O, Castro-Guillén JL, García-Arredondo JA, Cruz-Pérez MS, Díaz-Peña LF, Saldaña C, García-Gasca T** (2019) Snake venom hemotoxic enzymes: biochemical comparison between *Crotalus* species from Central Mexico. *Molecules* 24 (8): 1489. <https://doi.org/10.3390/molecules24081489>
- Rorabaugh JC, Lemos-Espinal JA** (2016) A field guide to the amphibians and reptiles of Sonora, Mexico. ECO Herpetological Publishing, Rodeo, USA, 688 pp.
- Ruane S, Bryson RW, Pyron RA, Burbrink FT** (2014) Coalescent species delimitation in milksnakes (genus *Lampropeltis*) and impacts on phylogenetic comparative analyses. *Systematic Biology* 63 (2): 231–250. <https://doi.org/10.1093/sysbio/syt099>
- Sánchez-Herrera O, Solano-Zavaleta I, Rivera-Téllez E** (2017) Guía de identificación de los dragoncitos (lagartijas arborícolas, *Abronia* spp.) regulados por la CITES. CONABIO, México, 50 pp.
- SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales)** (2018) Programa de Acción para la Conservación de las Especies: Serpientes de Cascabel (*Crotalus* spp.). SEMARNAT/CONANP, México, 146 pp.
- Smith HM** (1939) The Mexican and Central American lizards of the genus *Sceloporus*. *Zoological Series, Field Museum of Natural History* 26: 1–397. <https://doi.org/10.5962/bhl.title.2894>
- Smith HM** (1942) Mexican herpetological miscellany. *Proceedings of the United States National Museum* 92 (3153): 349–395. <https://doi.org/10.5479/si.00963801.92-3153.349>
- Smith HM, Taylor EH** (1950) An annotated checklist and key to the reptiles of Mexico exclusive of the snakes. *Bulletin of the United States National Museum* 199: <https://doi.org/10.5479/si.03629236.199>
- Smith PW, Burger WL** (1950). Herpetological results of the University of Illinois field expedition, Spring 1949. III. Sauria. *Transactions of the Kansas Academy of Science* 53(2): 165–175.
- Stebbins RC** (1985) A field guide to western reptiles and amphibians. Houghton Mifflin, Boston, USA, 338 pp.
- Streicher JW, Garcia-Vazquez UO, Ponce-Campos P, Flores-Villela O, Campbell JA, Smith EN** (2014) Evolutionary relationships amongst polymorphic direct-developing frogs in the *Craugastor rhodopis* species group (Anura: Craugastoridae). *Systematics and Biodiversity* 12 (1): 1–22. <https://doi.org/10.1080/14772000.2014.882428>
- Schulz KD, Entzeroth A** (1996) Monograph of the colubrid snakes of the genus *Elaphe* Fitzinger (Vol. 7). Koeltz Scientific Books, Havlickuv Brod, Czech Republic, 460 pp.
- Suazo-Ortuño I, Alvarado-Díaz J, Medina-Aguilar O, Torres-Pérez-Coeto J** (2019) Anfibios y reptiles. In: La biodiversidad en Michoacán. Estudio de estado 2, vol. ii. CONABIO, Mexico City, Mexico, 475–493.
- Tepos-Ramírez M, Acosta-Ramírez A, Jiménez-Velázquez G, Álvarez-Alvarado L** (2019) *Hemidactylus turcicus*. *Herpetological Review* 50 (3): 526.
- Tepos-Ramírez M, Flores-Villela O, Velasco JA, Lara CP, García-Rubio OR, Jadin RC** (2021a) Molecular phylogenetics and morphometrics reveal a new endemic jumping pitviper (Serpentes: Viperidae: *Metlapilcoatlus*) from the Sierra Madre Oriental of Mexico. *Journal of Herpetology* 55(2): 181–191. <https://doi.org/10.1670/20-028>
- Tepos-Ramírez M, López RP, Vega HD** (2021b) Herpetofaunistic diversity in the ecological park “La Joya-La Barreta”, Querétaro, Mexico: a comparison between two sampling methods and vegetation types. *Revista Latinoamericana de Herpetología* 4 (2): 116–125. <https://doi.org/10.22201/fc.25942158e.2021.02.259>
- Tepos-Ramírez M, Pineda-López R, Acosta-Ramírez A, Soto-Calderón AM, Ocaña-Feregrino A** (2021c) Herpetofauna along an elevational gradient in the Sierra Madre Oriental, Querétaro, Mexico. *Herpetological Conservation and Biology* 16 (3): 471–481.
- Tepos-Ramírez M, Peralta-Robles CA, Salinas-Olguín AK, García-Rubio OR, Cervantes-Jiménez R, Hernández-Arciga R, Garduño-Fonseca FS** (2022) Confirmación y nuevos registros de herpetofauna para Querétaro, México a través de portales de ciencia ciudadana. *Revista Latinoamericana de Herpetología* 5 (1): 142–150. <https://doi.org/10.22201/fc.25942158e.2022.1.350>
- Tinoco NCM** (2005) Serpientes del Estado de Querétaro. Undergraduate degree thesis, Universidad Autónoma de Querétaro, Querétaro, México, 94 pp.
- Tucker DB, Colli GR, Giugliano LG, Hedges SB, Hendry CR, Lemmon EM, Pyron RA** (2016) Methodological congruence in phylogenomic analyses with morphological support for teiid lizards (Sauria: Teiidae). *Molecular Phylogenetics and Evolution* 103: 75–84. <https://doi.org/10.1016/j.ympev.2016.07.002>
- Uetz P, Freed P, Aguilar R, Hošek J** (2021) The reptile database. <http://www.reptile-database.org>. Accessed on: 2022-01-23.
- Villamar-Duque TE, Cruz-Elizalde R, Ramírez-Bautista A** (2019) Reproduction of the bromeliad arboreal alligator

- lizard, *Abronia taeniata* (Squamata: Anguidae), in a temperate environment of central Mexico. *Salamandra* 55 (4): 221–230.
- 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 (2): 216–375. <https://doi.org/10.7717/peerj.1551>
- Wilson LD, Townsend JH, Johnson JD** (2010) Conservación de anfibios y reptiles mesoamericanos. Eagle Mountain Publishing, Eagle Mountain, USA, 816 pp.
- Wilson LD, Johnson JD, Mata-Silva V** (2013) A conservation reassessment of the amphibians of Mexico based on the EVS measure. *Amphibian & Reptile Conservation* 7 (1): 97–127.
- Yuan ZY, Zhou WW, Chen X, Poyarkov NA Jr, Chen HM, Jang-Liaw NH, Chou WH, Matzke NJ, Iizuka K, Min MS, Kuzmin SL, Zhang YP, Cannatella DC, Hillis DM, Che J** (2016) Spatiotemporal diversification of the true frogs (genus *Rana*): a historical framework for a widely studied group of model organisms. *Systematic Biology* 65 (5): 824–842. <https://doi.org/10.1093/sysbio/syw055>
- Zamora-Abrego JG** (2009) Filogenia molecular de las lagartijas del género *Xenosaurus* (Xenosauridae) y evolución de sus características de historias de vida. PhD thesis, Universidad Nacional Autónoma de México, Mexico City, Mexico, 118 pp.
- Zamudio RS, Rzedowski J, Carranza GE, Calderón RG** (1992) La vegetación del estado de Querétaro. Instituto de Ecología A.C. Centro Regional del Bajío, Michoacán, México, 92 pp.
- Zea AE** (2010) Distribución y riqueza de anfibios en el Estado de Querétaro Undergraduate degree thesis, Universidad Autónoma de Querétaro, Querétaro, Mexico, 63 pp.

## Appendix

### Taxonomy-based problems

**Amphibians.** In Queretaro, *E. cystignathoides* (Naturalista 2022) and *E. nitidus* (Cruz-Elizalde et al. 2019) had been included in previous checklists. However, they are not represented in scientific collections with records from Querétaro. Despite none of these species being present in the state (Hernández-Austria et al. 2022), we can confirm that viable populations of an unknown species of the *E. cystignathoides* complex, probably a species closely related to *E. campi*, occur in northeastern Querétaro.

**Reptiles.** Taxonomic changes were made in some genera of lizards, including *Holcosus* spp., *Aspidoscelis* spp., *Barisia* spp., and *Sceloporus* spp. (Martínez-Mendez and Méndez-De la Cruz 2007; Bryson and Riddle 2012; Harvey et al. 2012; Meza-Lázaro and Nieto-Montes de Oca 2015; Tucker et al. 2016), and snake genera, including *Epictia* spp., *Coniophanes* spp., *Hypsilegna* spp., *Lampropeltis* spp., *Leptodeira* spp., *Masticophis* spp., *Salvadora* spp., and *C. aquilus* (Mulcahy 2008; Daza et

al. 2009; Ruane et al. 2014; McCraine and Hedges 2016; Wallach 2016; Hansen and Salmon 2017; Myers et al. 2017; Palacios-Aguilar and Flores-Villela 2020; Grünwald et al. 2021; Hernández-Jiménez et al. 2021). These have added many sources of confusion. The taxonomy has changed with the advancements in molecular systematics, and some species in Querétaro have had their name changed (Table S1).

In the case of *Crotalus triseriatus*, it is very morphologically similar to *Crotalus aquilus* (Uetz et al. 2021), which has caused confusion, especially if we consider that for decades *C. aquilus* was treated as a subspecies of *C. triseriatus*. Therefore, many of the collections in museums and publications prior to the recognition of *C. aquilus* as a species (Murphy et al. 2002) were cataloged as *C. triseriatus aquilus* or simply as *C. triseriatus*; such is the case of some specimens stored in foreign collections such as Harvard Museum of Comparative Zoology (MCZ-1578190). However, molecular studies (Bryson et al. 2011) have restricted the true *C. triseriatus* to the highlands of the Trans-Mexican Volcanic Belt, while *C. aquilus* is restricted to the highlands of the Sierra Madre Oriental, and there is no evidence of sympatry of both species in Querétaro (there is in the neighboring states of Hidalgo and Michoacán). Although it was impossible to review or request each record available in collections, they may be identical cases to the one mentioned above. We cannot rule out the presence of *C. triseriatus* in the state. Cruz-Elizalde et al. (2019) reported two species from Querétaro—*L. septentrionalis* and *L. maculata*—however, the latter does not have any data or specimen deposited in a scientific collection to corroborate this, and there is only one record on the Naturalista platform from the municipality of Cadereyta de Montes. Thus, its presence must be corroborated and so we did not include *L. maculata* in our list.

### Erroneous identification of specimens and outdated databases

**Reptiles.** *Thamnophis marcianus* was reported for the first time by Nieto and Pérez (1999), and the specimen was stored in the collection of amphibians and reptiles of the Carnegie Museum of Natural History under the catalog number CM-60100. In 2009, this specimen was reidentified by Dixon as *Thamnophis eques* (Kennedy-Gold pers. comm.). However, this change was not published and was only removed from the list published in Dixon and Lemos (2010). Another species misidentification is the case of *Lepidophyma flavimaculatum*, which was reported by Nieto and Pérez (1999). After analyzing photographs of the specimen (CM 73260), consulting and following Bezy and Camarillo (2002), we concluded that the specimen is *Lepidophyma sylvaticum*, as the postocular scales are in contact with the labial suture between the sixth and the seventh supralabial scale. Among lizards, *Sceloporus serrifer* is distributed in northwestern Mexico but was reported for Querétaro by Nieto and Pérez (1999; UTEP-14564). This

specimen was later identified as *Sceloporus cyanogenys* by curators of the museum of the University of Texas at El Paso. Nevertheless, this specimen does not share external morphological characters with *S. cyanogenys* according to the information published by Smith (1939), and it may be a new species, which is currently under description. Therefore, we have not included in our list.

### Extrapolation

**Amphibians.** *Aquiloerycea scandens* and *Pseudoeurycea leprosa* are entirely lacking records in available databases. *Aquiloerycea scandens* is reported for Coahuila, San Luis Potosí, and Tamaulipas (Raffaëli 2014; Frost 2021), while *P. leprosa* is reported for Puebla, Veracruz, Morelos, CDMX, Guerrero, and Oaxaca (Parra-Olea et al. 2012).

**Reptiles.** *Gerrhonotus liocephalus* was reported from Querétaro by Cruz-Elizalde et al. (2019); however, molecular systematics and biogeography of *Gerrhonotus* spp. (García-Vázquez et al. 2018) have restricted the distribution of *G. liocephalus* to the Sierra Madre del Sur. Therefore, only two species are present in Querétaro, *G. infernalis* and *G. ophiurus*. The vipers *Agkistrodon taylori* (Cruz-Elizalde et al. 2019), *C. triseriatus* (Cruz-Elizalde et al. 2022), and *C. ravus* (Cruz-Elizalde et al. 2019) are species with no reliable information from Querétaro, even considering some new studies including several samples of *C. ravus* along its distribution

(Cisneros-Bernal et al. 2022), and for that reason, both species were not included in our list.

### Loss of specimens and confusion of localities

**Reptiles.** *Kinosternon scorpioides* is distributed along the Pacific slope, and, although few records cross the mountainous masses that separate the Gulf coastal plain from other biogeographic regions such as Trans-Mexican Volcano Belt, Sierra Madre Oriental, or Sierra Madre de Oaxaca, it is unlikely that this species occurs in Querétaro. The only specimen recorded from Querétaro is stored in the herpetology collection of the Museum of Comparative Zoology at Harvard University (MCZ R-5311). This specimen came from Agua Blanca, Quintana Roo, while Dixon and Lemos (2010) reported *K. scorpioides* in Querétaro from Agua Blanca, Amealco. It is probable that the similarities between the names and state abbreviations of the localities caused this confusion. *Pseudoelaphe flavirufa* was reported by Nieto and Pérez (1999) from the municipality of Peñamiller, Querétaro, and stored at University of Texas at Arlington (UTA-14699). However, it was impossible to locate the specimen under that catalog number (Greg Pandelis pers. comm.). *Pseudoelaphe flavirufa* has few records, especially in the northernmost part of its distribution. Therefore, due to the absence of the specimen, and because this species is confused with other species such as juveniles of *Senticolis triaspis*, we have not included in our list.

**Table A1.** Taxonomic changes in the herpetofauna of Querétaro.

Species	Taxonomic change	Reference
<b>Amphibians</b>		
<i>Craugastor loki</i>	<i>Craugastor rhodopis</i>	Streicher et al. 2014
<i>Ecnomiohyla miotympanum</i>	<i>Rheohyla miotympanum</i>	Duellman et al. 2016
<i>Hyla arenicolor</i>	<i>Dryophytes arenicolor</i>	Duellman et al. 2016
<i>Hyla eximia</i>	<i>Dryophytes eximius</i>	Duellman et al. 2016
<i>Pseudoeurycea bellii</i>	<i>Isthmura bellii</i>	Rovito et al. 2015
<i>Pseudoeurycea cephalica</i>	<i>Aquiloerycea cephalica</i>	Rovito et al. 2015
<i>Rhinella marina</i>	<i>Rhinella horribilis</i>	Acevedo et al. 2016
<b>Reptiles</b>		
<i>Ameiva undulata</i>	<i>Holcosus amphigrammus</i>	Meza-Lazaro and Nieto-Montes de Oca 2015
<i>Barisia imbricata</i>	<i>Barisia ciliaris</i>	Bryson et al. 2012
<i>Cnemidophorus gularis</i>	<i>Aspidoscelis gularis</i>	Reeder et al. 2002
<i>Sceloporus torquatus</i>	<i>Sceloporus melanogaster</i>	Campillo et al., 2021
<i>Coluber flagellum</i>	<i>Masticophis flagellum</i>	O'Connell et al. 2017
<i>Coluber mentovarius</i>	<i>Masticophis mentovarius</i>	O'Connell et al. 2017
<i>Coluber schotti</i>	<i>Masticophis schotti</i>	O'Connell et al. 2017
<i>Epictia goudotii</i>	<i>Epictia wynnii</i>	Wallach 2016
<i>Lampropeltis triangulum</i>	<i>Lampropeltis polyzona</i>	Ruane et al. 2014
<i>Oxybelis aeneus</i>	<i>Oxybelis potosiensis</i>	Jadin et al. 2020
<i>Coniophanes piceivittis</i>	<i>Coniophanes taeniatus</i>	Palacios-Aguilar and Flores-Villela 2020
<i>Salvadora grahamiae</i>	<i>Salvadora lineata</i>	Hernández-Jiménez et al. 2021
<i>Tropidodipsas sartorii</i>	<i>Geophis sartorii</i>	Grünwald et al. 2021