

## A New Species of Pygmy Alligator Lizard (Squamata: Anguinae) from Nuevo León, México

JAVIER BANDA-LEAL,<sup>1,2</sup> MANUEL NEVÁREZ-DE LOS REYES,<sup>1</sup> AND ROBERT W. BRYSON, JR.<sup>3</sup>

<sup>1</sup>Laboratorio de Herpetología, Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Nuevo León, México

<sup>3</sup>Department of Biology and Burke Museum of Natural History and Culture, University of Washington, Seattle, Washington USA

**ABSTRACT.**—We describe a new species of smooth-scaled anguid from arid northern foothills of the Sierra Madre Oriental in Nuevo León, México. This new species is similar to the other smooth-scaled gerrhonotines: *Gerrhonotus lugoi* McCoy, 1970, from the Cuatrociénegas Basin of Coahuila; *G. parvus* Knight and Scudday, 1985, from the Sierra Madre Oriental in Nuevo León; and *G. farri* Bryson and Graham, 2010, from the Sierra Madre Oriental in Tamaulipas. It differs from these species in several important morphological characters, including number of postrostral scales, postoculars, postmentals, sublabials, and dorsal and ventral scale rows. It also is the only known anguid to possess three postmentals and a novel azygous scale between the postmentals and the gular shields.

**RESUMEN.**—Se describe una nueva especie de anguido de escamas lisas de zona árida en las faldas del norte de la Sierra Madre Oriental en Nuevo León, México. Esta nueva especie es similar a otros gerrhonótidos de escamas lisas como *Gerrhonotus lugoi* McCoy, 1970, del Valle de Cuatrociénegas en Coahuila, *G. parvus* Knight and Scudday, 1985, de la Sierra Madre Oriental en Nuevo León y *G. farri* Bryson and Graham, 2010, de la Sierra Madre Oriental en Tamaulipas. Se diferencia de estas especies en un número importante de caracteres morfológicos, incluyendo el número de escamas postrostrales, postoculares, postmentales, sublabiales y en las hileras de escamas dorsales y ventrales. También es el único anguido conocido que posee tres postmentales y una escama entre el postmentales y escudos gulares.

The lizard family Anguinae is broadly distributed across the Northern Hemisphere (Vitt and Caldwell, 2009). Seven genera and 44 species of anguines are found in México (Uetz, 2016). The genus *Gerrhonotus* Wiegmann, 1828, is comprised of six species (Bryson and Graham, 2010; Uetz, 2016), including three relatively wide-ranging species (*G. infernalis* Baird, 1859; *G. liocephalus* Wiegmann, 1828; and *G. ophiurus* Cope, 1867) and three narrow-range endemics (*G. farri* Bryson and Graham, 2010; *G. lugoi* McCoy, 1970; and *G. parvus* Knight and Scudday, 1985). *Gerrhonotus farri*, *G. lugoi*, and *G. parvus* are unique among *Gerrhonotus* in that they all share a miniaturized body plan and smooth, glossy dorsal scales; however, various researchers have placed some of these species in different genera, including *Barisia* Gray, 1838 (Waddick and Smith, 1974; Smith, 1986) and *Elgaria* Gray, 1838 (Smith, 1986; Good, 1988). Recent studies based on molecular data strongly support a close relationship between *G. parvus* and the related species *G. infernalis* and *G. liocephalus* (Conroy et al., 2005). Molecular data are still lacking for *G. farri* and *G. lugoi*.

During fieldwork carried out by researchers from the Universidad Autónoma de Nuevo León, a juvenile lizard of an undescribed species of smooth-scaled anguid was collected along the northern foothills of the Sierra Madre Oriental in the municipality of García, Nuevo León. In 2010, we made 20 more trips to the area in an attempt to find more specimens. Despite these repeated attempts, no new specimens were found. Because the single juvenile that was collected is distinctly different from other described anguines, here we describe this new species and compare it to other smooth-scaled *Gerrhonotus*.

### MATERIALS AND METHODS

Procedures for scale counts and descriptions of external morphological features follow Good (1988). Measurements of

the body and tail were made with a digital vernier caliper, and scale counts were made through a dissecting microscope. We made color descriptions of the specimen from the specimen in life and after preservation. We determined the coordinates and elevation of the type locality with a handheld global positioning system unit by the collectors. Comparative material used for scale counts and measurements are noted in Appendix 1; data also were included from McCoy (1970) and Knight and Scudday (1985) for type specimens of *G. lugoi* and *G. parvus* and from García-Vázquez et al. (2017) for a new record of *G. lugoi* east of the Cuatrociénegas Basin.

*GERRHONOTUS LAZCANOI* SP. NOV.

FIGURES 1–2, TABLE 1

**Holotype.**—Juvenile male (UANL 7273; Fig. 1), collected by Manuel Nevárez de los Reyes on 3 July 2010, 4.4 km east of Rinconada, Municipality of García, Nuevo León, México (25.67461°, –100.67288°, WGS84; 1,144-m elevation).

**Diagnosis.**—*Gerrhonotus lazcanoi* is a relatively small anguid with smooth dorsal scales, three postmentals, an azygous scale between the postmentals and the gular shields, and a postrostral scale. It is most similar in appearance to *G. farri*, *G. lugoi*, and *G. parvus*. These four species are distinguished from other *Gerrhonotus*, and all other gerrhonotines (except *Coloptychon rhombifer*), by the lack of keeling on the scales in both juveniles and adults, giving the dorsal surface of the body a glossy appearance. The only known specimen of *G. lazcanoi* also has three postmental scales and a single large azygous scale between the postmentals and gular shields (Fig. 2), neither of which have been reported previously in any other gerrhonotines (Good, 1988). *Gerrhonotus lazcanoi* can be further distinguished from other smooth-scaled species by several differences in the scalation of the face and body. *Gerrhonotus lazcanoi* has a postrostral scale present (absent in *G. farri*, *G. lugoi*, and *G. parvus*), four postoculars (two–three in *G. farri* and *G. lugoi*, three in *G. parvus*), nine sublabial scales (*G. farri* and

<sup>2</sup>Corresponding Author. E-mail: javier\_banda@hotmail.com  
DOI: 10.1670/15-168



FIG. 1. *Gerrhonotus lazcanoi* sp. nov. (holotype, UANL 7273), specimen in life.

*G. lugoi* have six, *G. parvus* has seven), 20 rows of longitudinal dorsal scales (*G. lugoi* has 18–19, *G. parvus* 16, and *G. farri* 14), and 15 longitudinal ventral scale rows (*G. lugoi* has 14, *G. parvus* and *G. farri* have 12). *Gerrhonotus lazcanoi* shares with *G.*

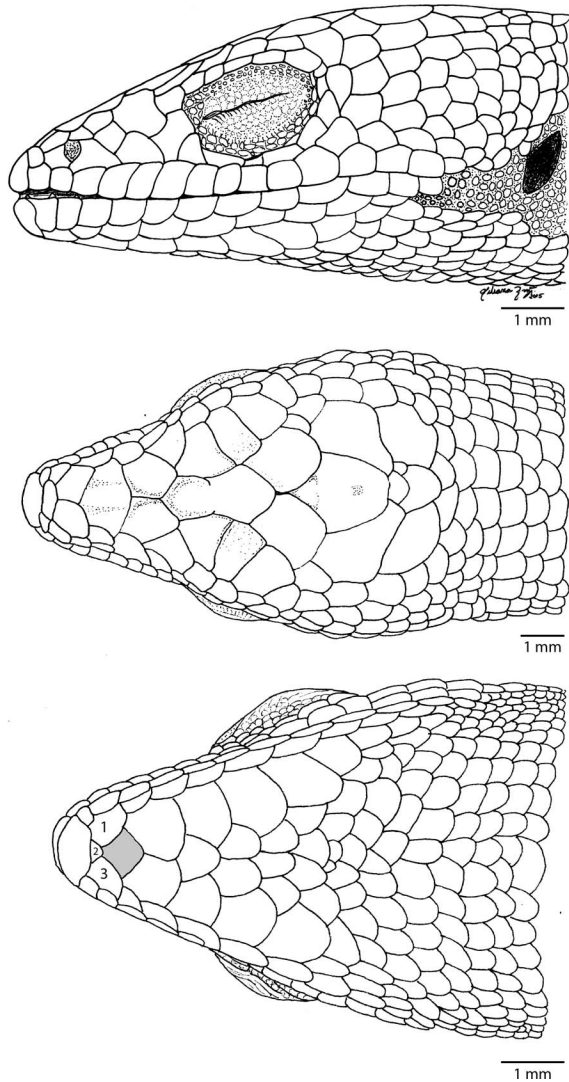


FIG. 2. *Gerrhonotus lazcanoi* sp. nov. (holotype, UANL 7273), dorsal, lateral, and ventral views of head. Postmental scales numbered; differentiated, azygous scale between postmentals and gular shields shaded for identification.

TABLE 1. Selected morphological characteristics for the three smooth-scaled species of *Gerrhonotus* from northeastern México. See Appendix 1 for list of all specimens examined. Data for *G. lugoi* and *G. parvus* also include measurements and scale counts of type specimens in McCoy (1970) and Knight and Scudday (1985), and a new record of *G. lugoi* east of the Cuatrociénegas Basin in García-Vázquez et al. (2016).

	<i>G. lazcanoi</i>	<i>G. lugoi</i>	<i>G. farri</i>	<i>G. parvus</i>
Snout–vent length (maximum)	39.9	103.4	109.0	76.5
Rostral–nasal contact?	No	No	No	Yes
Scale between postmentals and chin shields present?	Yes	No	No	No
Postrostral present?	Yes	No	No	No
Postmental	3	2	2	2
Supranasal contact?	No	No	No	Yes
Cantholoreal present?	No	No	No	Yes
Anterior internasals present?	Yes	Yes	Yes	No
Preoculars	2	1–3	1	Absent
Postoculars	4	2–3	2–3	3
Suboculars	3	3	2	3
Sublabials	9	6	6	7
Primary temporals	5	5	4	4
Transverse dorsal scale rows	56	52–56	53	59
Longitudinal dorsal scale rows	20	18–19	14	16
Transverse ventral scale rows	65	65	60	60
Longitudinal ventral scale rows	15	14	12	12

*lugoi* two preoculars, five primary temporal scales, and 65 transverse ventral rows.

*Description of Holotype (measurements in mm).*—Snout-to-vent length, 39.9; width of body, 7.2; width of base of tail, 2.8; width of head, 6.6; length of head (from anterior margin of ear to tip of snout), 9.4; length of rostral (from anterior region of eye to tip of snout), 3.3; depth of head (at widest point), 7.6; orbital diameter, 2.7; axil to base of thigh, right, 21.8 and left, 20.1; length of arm, right, 3.4 and left, 3.4; length of tibia, right, 5.0 and left, 5.1; longest finger of anterior limb, 2.2; longest finger of posterior leg, 3.1; tail length (complete), 48.2.

Relatively large head (Fig. 3), wider than the neck, especially between the anterior auricular region and postocular region. Head scales smooth and glossy. Postrostral present; anterior internasals 1/1; supranasals 1/1; posterior internasals 1/1; primary temporals 5/5, first and second in contact with fifth supraocular; secondary temporals 5/5; preoculars 2/2, uppermost in contact with superciliaries; postoculars 4/4; suboculars 3/3; anterior as long as where two posteriors meet; superciliaries 6/6; loreals 2/2; canthals 2/2; postnasals 2/2; large frontonasal, twice wider than long and separated from frontal by two prefrontals in contact; supralabials 15/14; infralabials 12/12; 3 postmentals, with single, azygous scale between the postmentals and chinshields; sublabials 9/9, in contact with postmental; chinshields 5/5.

Body slender and elongated with small limbs; posterior limbs slightly more robust than anterior. Lateral fold consists of numerous granular scales that do not form diagonal rows. Transverse dorsal scales in 56 rows, longitudinal 20; transverse ventral scales in 65 rows, longitudinal 15. Forelimbs covered by large scales dorsally, becoming up to four times smaller ventrally. Subdigital lamellae of fingers as follows: 1°: 5–6; 2°: 9–9; 3°: 12–12; 4°: 12–12; and 5°: 7–7. Hindlimbs covered by

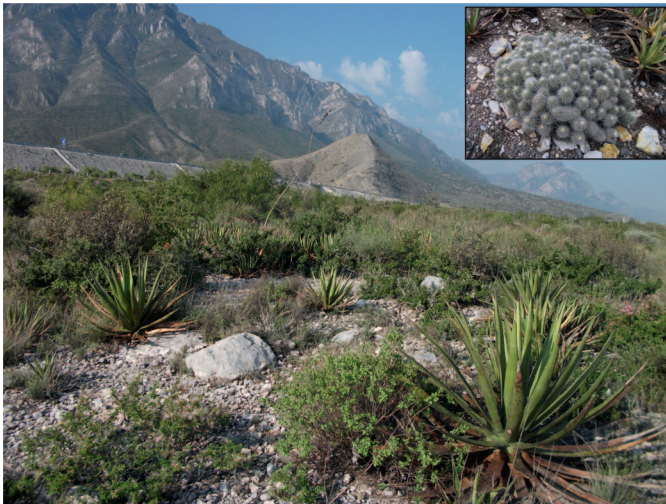


FIG. 3. Habitat at the type locality of *Gerrhonotus lazcanoii* sp. nov., 4.4 km east of Rinconada, Municipality of García, Nuevo León, México. Inset depicts the spot at the base of an *Echinocereus stramentius* cactus where the holotype was found.

relatively large scales dorsally; smaller scales on posterior surface of femur. Subdigital lamellae of toes as follows: 1°: 5–6; 2°: 9–9; 3°: 12–12; 4°: 12–12°; and 5°: 7–7. Tail complete with 90 caudal whorls.

**Coloration.**—In alcohol, head scales and body dark brown. Thin white bands between 0.25 to 1 scale wide present dorsally along body and tail. Single faint transverse band present in dorsal nuchal region, followed by eight transverse bands along dorsum in axilla–groin region, and transverse caudal 20 bands. Ventral surface white. Gular area dark brown, similar to dorsal coloration; light dorsal bands continue on ventrum. Ventral surfaces of extremities mostly pale, but sharply transition to dark brown where they meet dorsal surface. Dorsal anterior half of tail similar to body color; distal half and subcaudal region red, similar to extremities. Each white band along tail separated by four scales. In life (Fig. 1), light areas of limbs and tail red; in preservative, some red coloration present on tail. Overall coloration similar to juvenile *G. lugoi* (Lazcano et al., 1993).

**Etymology.**—The epithet is a patronym honoring our friend, teacher, and mentor Dr. David Lazcano, Head of the Laboratorio de Herpetología, Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo Leon, who has contributed substantially to the investigation of the herpetofauna in northeastern México.

**Ecology.**—The single specimen of *G. lazcanoii* was found at 1100 hours on a rocky slope with microphyllous and rosetophilous desert scrubs at the base of an *Echinocereus stramentius* cactus (Fig. 3). The sky was overcast, and it had rained in the days before and the afternoon after collection. The relative humidity was 85% and the ambient air temperature was 20°C.

#### DISCUSSION

Based on coloration and shared morphological features, *G. lazcanoii* is more similar to *G. lugoi* from the Chihuahuan Desert rather than to *G. parvus* from nearby localities in the Sierra Madre Oriental. The habitats of *G. lazcanoii* and *G. lugoi* also are similar. All known localities of *G. lugoi* (Fig. 4) are situated in the foothills of limestone mountains, in rosetophilous desert scrub; this habitat superficially resembles that of *G. lazcanoii* (Fig. 3). In contrast, *G. parvus* inhabits more mesic environments within the Sierra Madre Oriental (Fig. 4), including limestone, oak-studded

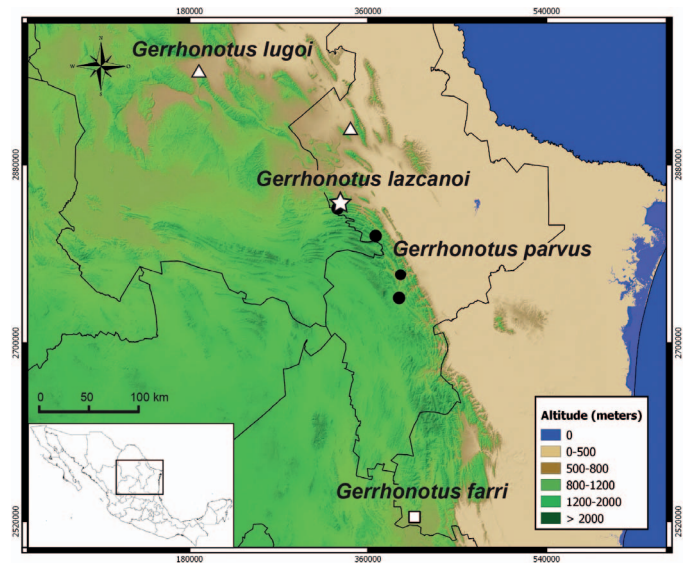


FIG. 4. Geographic distribution of the four smooth-scaled species of *Gerrhonotus*: *G. lugoi* (triangle), *G. lazcanoii* sp. nov. (star), *G. parvus* (circles), and *G. farri* (square).

canyons near Santiago, submontane matorral near Rayones, and open pine and desert shrubland areas in Galeana; however, the nearest documented locality of *G. parvus* is only 5.5 km away (Banda-Leal et al., 2014). *Gerrhonotus farri* is also known from foothills of the Sierra Madre Oriental in an area of desert scrub much farther to the south (Fig. 4); however, several important morphological characters differentiate this species from *G. lazcanoii*, including the number of suboculars, primary temporals, and latitudinal and longitudinal scale rows (Table 1). Genetic data are clearly needed to better determine phylogenetic relationships among these smooth-scaled anguids and other gerrhonotine lizards.

Although morphological variation found in *G. lazcanoii* might be explained as previously undocumented clinal diversity in *G. lugoi* morphology, meaning the new taxon might eventually be assigned to that species, several lines of evidence argue against this possibility. A new record of *G. lugoi* extends the distribution of this species over 150 km southeast of the Cuatrociénegas Basin (García-Vázquez et al., 2016) and significantly bridges the gap between *G. lugoi* and *G. lazcanoii* (Fig. 4). The listed scale counts of the newly reported specimen, however, are almost entirely within the range of variation for *G. lugoi* from the Cuatrociénegas Basin (Table 1), differing only in the number of transverse dorsal scale rows (52 vs. 56). Importantly, the specimen does not present new variation in the number of postoculars; rows of longitudinal dorsal scales; or longitudinal ventral scale rows, all of which help distinguish *G. lazcanoii* from *G. lugoi*. The new specimen also lacks the unique scale arrangements found in the single specimen of *G. lazcanoii*: three postmental scales, a single large scale between the postmentals and gular shields, and a postrostral scale.

Although generally not an encouraged practice, species descriptions based on single specimens are not unusual in the study of anguid lizard taxonomy. Although generally not an encouraged practice, descriptions based on single specimens are not unusual in the study of anguid lizard taxonomy. For example, *Coloptychon rhombifer* (Peters, 1876); *Abronia bogerti* Tihen, 1954; *A. chiszari* Smith and Smith, 1981; *A. leurolepis* Campbell and Frost, 1993; *A. mitchelli* Campbell, 1982; *A.*

*montecristoi* Hidalgo, 1983; *A. ramirezi* Campbell, 1994; and *G. farri* were all described on the basis of single specimens (Good, 1988; Campbell and Frost, 1993; Bryson and Graham, 2010; Uetz, 2016). Among these anguids, *C. rhombifer*, *A. bogerti*, and *A. chiszari* were described from single juvenile specimens (Tihen, 1949; Good, 1988). Many of these species remain known only from the holotype (Uetz, 2016), and their status as valid species has not been challenged. Although describing species on the basis of a single individual leaves much to be desired, we argue that doing so can provide important new evidence concerning the diversity of taxonomic groups with restricted geographical distributions or tightly defined niches, such as the four smooth-scaled species of *Gerrhonotus*. It may also have the desirable outcome of motivating other researchers to collect additional material for taxonomic study (Rocha et al., 2014).

*Acknowledgments.*—We thank Consejo Nacional de Ciencia y Tecnología for financially supporting JB-L to obtain his Ph.D. (scholarship 290049) and SEMARNAT for issuing collecting permits since 2002 (most recently SGPA/DGVA/D2265). We also thank A. Rodríguez-Jaime, A. Huereca-Delgado, L. Leal-Garza, C. García-Rendón, and C. Barriga-Vallejo for assistance during field trips; J. Valadez-Sánchez and L. Ramírez-Freire for photographs and illustrations of the head of the holotype; U. O. García-Vázquez for sharing his manuscript with us; and R. M. Brown, J. A. Campbell, T. M. Doan, R. W. Hansen, and two anonymous reviewers for helpful comments on previous drafts of this manuscript.

#### LITERATURE CITED

- BANDA-LEAL, J., D. LAZCANO, M. NEVÁREZ-DE LOS REYES, AND C. BARRIGA-VALLEJO. 2014. *Gerrhonotus parvus* Knight & Scudday, 1985 (Squamata: Anguidae): new range extension and clutch size in the state of Nuevo León, Mexico. *Check List* 10:950–953.
- BRYSON, R. W., AND M. R. GRAHAM. 2010. A new alligator lizard from northeastern México. *Herpetologica* 66:92–98.
- CAMPBELL, J. A. 1982. A new species of *Abronia* (Sauria, Anguidae) from the Sierra Juárez, Oaxaca, México. *Herpetologica* 38:355–361.
- CAMPBELL, J. A. 1994. A new species of elongate *Abronia* (Squamata: Anguidae) from Chiapas, Mexico. *Herpetologica* 50:1–7.
- CAMPBELL, J. A., AND D. R. FROST. 1993. Anguid lizards of the genus *Abronia*: revisionary notes on the species of nuclear Central America and adjacent Mexico, descriptions of four additional species, with a phylogenetic hypothesis for the genus and an identification key. *Bulletin of the American Museum of Natural History* 216:1–121.
- CONROY, C. J., R. W. BRYSON, D. LAZCANO, AND A. KNIGHT. 2005. Phylogenetic position of the pygmy alligator lizard based on mitochondrial DNA. *Journal of Herpetology* 39:142–147.
- GARCÍA-VÁZQUEZ, U. O., E. GARCÍA-PADILLA, AND G. J. HERRERA-ENRÍQUEZ. 2016. First record of the alligator lizard *Gerrhonotus lugoi* (Squamata: Anguidae) from the state of Nuevo León, Mexico. *Primer registro de la largartija *Gerrhonotus lugoi* (Squamata: Anguidae) para el estado de Nuevo León, Mexico*. *Revista Mexicana de Biodiversidad*, 87: 1399–1401.
- GOOD, D. A. 1988. Phylogenetic relationships among gerrhonotine lizards. An analysis of external morphology. University of California Publications in Zoology 121:1–139.
- HIDALGO, H. 1983. Two new species of *Abronia* (Sauria: Anguidae) from the cloud forests of El Salvador. *Occasional Papers of the Museum of Natural History, University of Kansas* 105:1–11.
- KNIGHT, R. A., AND J. F. SCUDDAY. 1985. A new *Gerrhonotus* (Lacertilia: Anguidae) from the Sierra Madre Oriental, Nuevo León, Mexico. *Southwestern Naturalist* 30:89–94.
- LAZCANO, D., A. CONTRERAS-ARQUIETA, AND M. NEVÁREZ DE LOS REYES. 1993. Notes on Mexican herpetofauna 3: Reproductive biology of *Gerrhonotus lugoi*, an anguid lizard from the Cuatro Ciénegas Basin, Coahuila, Mexico. *Bulletin of the Chicago Herpetological Society* 28: 263–265.
- MCCOY, C. J. 1970. A new alligator lizard (genus *Gerrhonotus*) from the Cuatro Ciénegas Basin, Coahuila, Mexico. *Southwestern Naturalist* 15:37–44.
- ROCHA, L. A., A. ALEIXO, G. ALLEN, F. ALMEDA, C. BALDWIN, M. V. L. BARCLAY, J. M. BATES, A. M. BAUER, F. BENZONI, C. M. BERNS, ET AL. 2014. Specimen collection: an essential tool. *Science* 344:814–815.
- SMITH, H. M. 1986. The generic allocation of two species of Mexican anguid lizards. *Bulletin of the Maryland Herpetological Society* 22: 21–22.
- SMITH, H. M., AND R. B. SMITH. 1981. Another epiphytic alligator lizard (*Abronia*) from Mexico. *Bulletin of the Maryland Herpetological Society* 17:51–60.
- TIHEN, J. A. 1949. *Gerrhonotinae* lizards recently added to the American Museum collection, with further revisions of the genus *Abronia*. *American Midland Naturalist* 41:579–601.
- UETZ, P. 2016. The Reptile Database. Available at <http://www.reptile-database.org>. Archived by WebSite at <http://www.webcitation.org/6hjB9AOkh>.
- VITT, L. J., AND J. P. CALDWELL. 2009. *Herpetology: An Introductory Biology of Amphibians and Reptiles*. 3rd ed. Academic Press, USA.
- WADDICK, J. W., AND H. M. SMITH. 1974. The significance of scale characters in evaluation of the lizard genera *Gerrhonotus*, *Elgaria*, and *Barisia*. *Great Basin Naturalist* 34:257–266.

Accepted: 29 August 2016.

Published online: 16 March 2017.

ZooBankID: urn:lsid:zoobank.org:act:251CE9FA-B397-4F5F-A463-E011673552C2

#### APPENDIX 1

##### *Specimens Examined*

*Gerrhonotus farri*.—Tamaulipas: North of Magdaleno Cedillo, 27 km southwest of Tula (holotype, UANL 6600). *Gerrhonotus lugoi*. Coahuila: in front of Poza La Becerra in the Sierra de San Marcos (UANL 4040); dirt road in front of Poza Churince, Cañón de San Marcos (UANL 4284). *Gerrhonotus parvus*. Nuevo León: Galeana (UANL 6208). Cañón San Isidro (UANL 5844, 6621, 6675, 6785, 6797, 6832, 6904). Rayones (UANL 6220).