# Notes on Mexican Herpetofauna 19: Herpetofauna Sympatric with *Gerrhonotus parvus* in San Isidro Canyon, Santiago, Nuevo León, Mexico

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**Abstract**

*Gerrhonotus parvus* is a species endemic to the state Nuevo León, presently known from only three localities in the Sierra Madre Oriental, one of which is San Isidro Canyon, located in the municipality of Santiago, where they have been frequently reported. The objective of this research was to investigate the herpetological species richness that coexists with *Gerrhonotus parvus*. We conducted a literature review that documented the herpetofaunal species in the municipality of Santiago, Nuevo León, together with several visits to the sites beginning in 1999 by personnel of the Herpetological Laboratory, Facultad de Ciencias Biológicas /UANL and a few North American herpetologists. We obtained a total of 43 species. It is worth mentioning that even though it is a relatively small area, it presents a high diversity in comparison with the rest of the state.

**Resumen**

*Gerrhonotus parvus* es una especie endémica del estado de Nuevo León, se conoce únicamente en tres localidades de la Sierra Madre Oriental, el cañón de San Isidro en Santiago Nuevo León es el área de donde se han reportado más ejemplares. La intención de este trabajo es dar a conocer la riqueza de especies de anfibios y reptiles que coexisten con *Gerrhonotus parvus* en esta zona, se realizo una revisión de literatura sobre trabajos realizados con la herpetofauna en el municipio de Santiago Nuevo León, así como de las visitas que se han realizado desde el año de 1999 por parte del personal del Laboratorio de Herpetología, Facultad de Ciencias Biológicas/UANL y muchos herpetólogos North Americanos. Esto nos llevo a un total de 43 especies. Cabe mencionar que a pesar de ser un área relativamente pequeña, presenta una alta diversidad en comparación con el resto del estado.

## Introduction

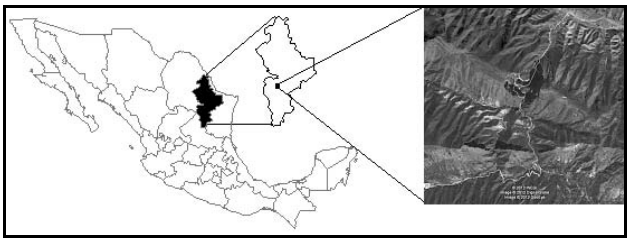
The family Anguidae comprises four subfamilies: Anguinae, Anniellinae, Diploglossinae and Gerrhonotinae. Its distribution is irregular in Europe; anguids also inhabit southern Asia and the Americas. This family is characterized by the presence of large body scales with minimal overlap. In addition there is a presence of adjacent osteoderms on the dorsal and ventral section that in most of the anguids are separated by a well defined deep granular ventrolateral fold. Two genera of the subfamily Anguinae and the members of Anniellinae lack limbs. In Gerrhonotinae and Diploglossinae the bodies are elongated and the limbs are reduced (Pianka and Vitt, 2003; Zug et al., 2001).

Anguids in Mexico are very diverse and include *Anniella* (2 species), *Barisia* (7 species), *Diploglossus* (3 species), *Elgaria* (7 species), *Gerrhonotus* (6 species, with a new species recently described by Bryson and Graham [2010]), *Mesaspis* (5 species), *Ophisaurus* (2 species) in the checklist of Liner and Casas-Andreu (2008). Many of these Mexican anguids are ecologically poorly known. In Nuevo León there are three species: *Barisia ciliaris*, *Gerrhonotus infernalis* and *Gerrhonotus parvus*. At some Nuevo León localities all three are sympatric, including San Isidro Canyon in the municipality of Santiago.

This group of species exhibits two foraging modes: active foraging (Vitt and Pianka, 1994), and "ambush," "sit-and-wait" or "passive foraging" (waiting for prey to come close—within the visual field) (Pianka, 1966; Vitt and Price, 1982). Anguids are often characterized as active foragers, even though the behavior has been documented from only a few species of this family (Bryson et al., 2003; Vitt and Congdon, 1978). We are actively studying anguid behavior in the field and laboratory.

## Study Site

The Sierra Madre Oriental is a mountain range which contains numerous valleys and mountains that present widely varying climatic conditions as well as vegetation types. San Isidro Canyon is located in what is known as the Curvature of Monterrey within the Protected Natural Area known as Parque Cumbres de Monterrey, Nuevo León, in the municipality of Santiago. This canyon is located southwest of the municipality and is contiguous to the south with the state of Coahuila. The canyon is approximately 2 km in length, at an elevation of 1600 m with numerous rock walls that are about 400 m in height. It is consti-



Study site area: San Isidro Canyon, Santiago, Nuevo León, Mexico.

tuted of limestone, and the walls have elements of desert *rosetófila* vegetation: *Agave lecheguilla* (lechuguilla), *Agave bracteosa* (squid agave), and *Dasylirium* sp. (sotol). The canyon floor mainly contains submontane elements such as: *Helietta parvifolia* (barreta), *Chilopsis linearis* (desert willow), *Cercis canadensis* (eastern redbud), *Gochnatia hypoleuca* (shrubby bullseye), *Acacia rigidula* (blackbrush acacia), *Acacia farnesiana* (sweet acacia), *Acacia berlandieri* (Berlandier's acacia) and several oak species *Quercus* sp.. There is a gallery forest with a distinguishing element, *Platanus occidentalis* (American sycamore), throughout the canyon. There is almost always water flowing, but in the dry season the water flow may be intermittent. In branch canyons small pools may form. We have found several of our specimens, including a neonate, in these branch canyons.

**Materials and Methods**

The list of herpetofauna sympatric with *Gerrhonotus parvus* was based on literature records for the municipality of Santiago, Nuevo León, as well as visits to the area. Since 1999 the authors, from the Laboratory of Herpetology of the Faculty of Biological Sciences of the UANL, and other herpetologists, mainly North American, have visited the canyon about four or five times per year, monitoring species of the area. It is illegal to collect animals in the canyon without a scientific permit issued by our Mexican federal authorities.

**Results**

During these field trips we found several pygmy alligator lizards. They were found under dead plant matter and in crevices or active on the canyon floor close to the walls.

A small number of publications (13) were found that deal with the herpetofauna of the area:

• Treviño (1978) studied the distribution of herpetofauna in southern Nuevo León and reported several species present in San Isidro Canyon, although he did not collect in the canyon itself, but in nearby areas. The information is part of his bachelor's thesis.

• Bezy (1984) carried out a study on the systematics of the genus *Lepidophyma* in the northeast of Mexico, in which he reports various specimens for the municipality of Santiago, one in the area of Presa la Boca, (one of the superficial water supplies for the Monterrey metropolitan area), the others from Las Adjuntas in Parque Nacional Cumbres de Monterrey, approximately 19 km in a straight line from San Isidro Canyon.

• Smith (1986) proposed a taxonomic change of *Gerrhonotus parvus* to *Elgaria parva* based on similarity of the scalation of the head with this genus.

• Benavides-Ruiz (1987) compiled a list of the herpetofauna of the southern part of the municipality of Santiago. From one of her localities near the Sierra of San Isidro, she reports species also present in San Isidro Canyon. She did not find *Gerrhonotus parvus*. The information is part of her bachelor's thesis.

• Wiens et al. (1999) reviewed the taxonomic status of populations of the *Sceloporus jarrovii* complex and assigned the populations from northeastern Mexico to two species, *Sceloporus minor* and *Sceloporus oberon*. Using some specimens from Laguna de Sanchez and San Isidro, they assigned *Sceloporus oberon* to the area.

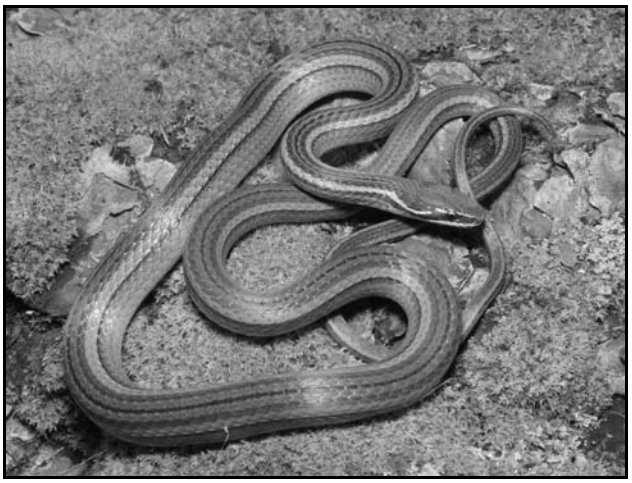
• Banda-Leal (2002) conducted a herpetofaunal study of Parque Ecológico de Chipinque in which he reports most of the species known from San Isidro Canyon, with exception of *Gerrhonotus parvus*. The information is part of his bachelor's thesis.

• Banda-Leal et al. (2002) documented a new locality for *Gerrhonotus parvus* (as *Elgaria parva*) in San Isidro Canyon. They discussed the morphology and taxonomic rank of the species and provided a description of the habitat that differs

Floor of the one of the branch canyons. Photograph by Javier Banda-Leal.

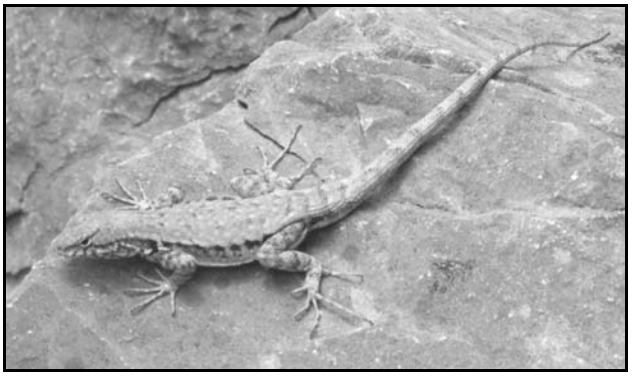
Pools of water sometimes form in the branch canyons. Photograph by Javier Banda-Leal.

A red-spotted toad, *Anaxyrus punctatus* from one of the branch canyons. Photograph bt Javier Banda-Leal.



A Nuevo León graceful brownsnake, *Rhadinea montana*, from the canyon. Photograph by Robert Hansen.

A marked male pygmy alligator lizard, *Gerrhonotus parvus,* from one of the branch canyons. Photograph by Javier Banda-Leal.



A male Couch's spiny lizard, *Sceloporus couchii*. Photograph by Javier Banda-Leal.

A male black-tailed rattlesnake, *Crotalus cf. molossus*, from one of the branch canyons. Photograph by Javier Banda-Leal.

A juvenile *Sceloporus oberon*. Photograph by Javier Banda-Leal.

significantly from the type locality in Galeana, Nuevo León. San Isidro is a limestone canyon at an elevation of 1600 m. The specimen was found on the floor of the canyon beside a wall, with decomposing organic matter as a substrate.

• Bryson et al. (2003) documented several natural history aspects of *Gerrhonotus parvus* at the type locality and at San Isidro Canyon, along with some sympatric herpetological species in both areas.

• Banda et al. (2005) documented the largest known specimen of *Gerrhonotus parvus*, which was from San Isidro Canyon. The specimen, which had a complete tail, measured 76.5 mm in total length, exceeding the next largest known by 4.4 mm. This large specimen was found in the month of May at the base of a branch canyon, at a time when the branch canyon was flooded. The specimen unfortunately had died, apparently drowned. Lizards in the branch canyons are at risk due to flooding and the formation of deep ponds. Before this a paratype from Galeana was the largest specimen reported (Knight and Scudday, 1985). It was maintained in captivity for about 5 years and was deposited in the collection at the Sull Ross University.

• Conroy et al. (2005) used Bayesian analysis of DNA sequences to determine the phylogenetic position of *Elgaria parva*, locating it as the sister species to *Gerrhonotus infernalis*. Thus, they proposed placing it in the genus *Gerrhonotus* (rather than *Elgaria* as originally described by Knight and Scudday [1985]).

• Lazcano and Bryson (2010) registered a young *Gerrhonotus parvus* for the first time, from San Isidro Canyon. The specimen described had a complete tail and its coloration was very different from the adults, consisting of sharply defined dark bands. Although the adults also have bands, they are not so dark and do not contrast sharply with the ground color. The young are very different from those of the sympatric *Gerrhonotus infernalis*, which are very similar to adults of the species.

• Dixon et al. (2011) reviewed three species of *Rhadinaea* found in the Sierra Madre Oriental of Mexico, including specimens of *Rhadinaea montana* from the mountains of Santiago, Nuevo León, and San Isidro Canyon, sympatric with *Gerrhonotus parvus*.

• Narváez-Torres (2012) conducted a study of the herpetofaunal composition of the natural protected area Parque Nacional Cumbres de Monterrey which included San Isidro Canyon. He did not find the endemic species *Gerrhonotus parvus*.

We have found a number of species sympatric to the pygmy alligator lizard in San Isidro Canyon: *Anaxyrus punctatus* (red-spotted toad); *Ollotis nebulifer* (Gulf Coast toad); *Eleutherodactylus cystignathoides campi* (Rio Grande chirping frog); *Eleutherodactylus longipes* (long-footed chirping frog); *Ecnomiohyla miotympanum* (small-eared treefrog; *Smilisca baudinii* (Mexican treefrog); *Scaphiopus couchii* (Couch`s spadefoot); *Gerrhonotus infernalis* (Texas alligator lizard) which has a wide distribution in Texas and northern Mexico; *Sceloporus couchii* (Couch's spiny lizard); *Sceloporus grammicus disparilis* (northeastern graphic lizard); *Sceloporus oberon* (royal lesser minor lizard); *Sceloporus parvus* (northern blue-bellied lizard); *Sceloporus torquatus binocularis* (Nuevo León torquate lizard); *Plestiodon brevirostris pineus* (pine woods short-nosed skink); *Scincella silvicola caudaequinae* (Horsetail Falls ground skink); *Aspidocelis scalaris gularis* (Texas spotted whiptail); *Coluber constrictor oaxaca* (Mexican racer); *Coluber schotti ruthveni* (Ruthven's whipsnake); *Coluber flagellum testaceus* (western coachwhip); *Lampropeltis mexicana mexicana* (San Luis Potosí kingsnake); *Pantherophis bairdi* (Baird's ratsnake); *Pituophis deppei jani* (northern Mexican pinesnake); *Rhinocheilus lecontei* (long-nosed snake); *Rhadinaea montana* (Nuevo León graceful brown snake); *Salvadora grahamiae lineata* (Texas patch-nosed snake); *Thamnophis proximus diabolicus* (arid land ribbonsnake); *Crotalus atrox* (western diamondback rattlesnake); *Crotalus cf. molossus* (black-tailed rattlesnake) and *Crotalus lepidus lepidus* (mottled rock rattlesnake).

Collected specimens were identified using criteria established by Smith and Taylor (1945, 1948, 1950), Conant and Collins (1998), and the *Catalogue of American Reptiles and Amphibians*. The phrynosomatids we collected were identified using keys for species from Nuevo León and Tamaulipas constructed by Hobart Smith. Scientific and common names were updated using Liner and Casas-Andreu (2008).

**Discussion and Conclusions**

The herpetological richness of the state of Nuevo León accounts for a total of ~136 species (110 reptiles and 26 amphibians). The 44 species (37 reptiles and 7 amphibians) on our list for San Isidro Canyon (see Table 1) represent 32.35% of the total herpetofauna of the state.

Some of these species on the list are potential predators of *Gerrhonotus parvus*. For example, we found a rock rattlesnake that had predated a juvenile *Sceloporus oberon* on the road in San Isidro Canyon toward Laguna de Sanchez (Lazcano et al., 2004). And as *Gerrhonotus infernalis* is a sympatric species and very aggressive it could easily predate the much smaller *G. parvus*.

With more field trips the herpetological list could grow easily. This is an excellent place to do continual monitoring of amphibians and reptiles. At the moment we have a doctoral degree thesis project underway on the ecology and phylogeny of the species in the canyon.

Alamo Canyon, a parallel canyon to San Isidro, has not been explored herpetologically. Access to Alamo Canyon is by dirt road, not paved like San Isidro. No doubt *Gerrhonotus parvus* and many of the sympatric species are there.

**Acknowledgments**

We would like to thank the multiple national and international institutions that supplied their collection data for this specific area, allowing us to update the herpetofauna for the Sierras of Nuevo León; the Universidad Autónoma de Nuevo León, for financial support of this study; the SEMARNAT for issuing collecting permits and providing the most recent ones: Oficio Num. SGPA/DGVS/0511/12 and Oficio Num. SGPA/DGVS/07101/12. We would also like to thank all the persons who participated in lab and field work, in particular Dr. James R. Dixon, Dr. Robert W. Bryson, Jr., and Dr. Robert L. Bezy for going over the manuscript and the authorities of Parque Nacional Cumbres de Monterrey.

**Table 1**. Amphibian and reptile species from the area of San Isidro Canyon, based on literature reports and specimens in preserved collections. Status = protection status in the Mexican NOM-059-SEMARNAT-2010: A = *Amenazada* (Threatened); Pr = *Protección Especial* (Special Protection); SE = *Sin Estatus* (No Status). Observed = species seen during the course of this study. Common and scientific names follow Liner and Casas-Andreu (2008).

| Taxon | Common Name | Status | Observed |
|---|---|---|---|
| **Amphibia: Anura** | | | |
| **Family Bufonidae** | | | |
| (1) *Anaxyrus punctatus* (Baird and Girard, 1852) | Red-spotted Toad | SE | X |
| (2) *Ollotis nebulifer* (Girard, 1854) | Gulf Coast Toad | SE | X |
| **Family Eleutherodactylidae** | | | |
| (3) *Eleutherodactylus cystignathoides campi* (Stejneger, 1915) | Spotted Chirping Frog | SE | X |
| (4) *Eleutherodactylus longipes* (Baird, *in* Emory, 1869) | Long-footed Chirping Frog | SE | X |
| **Family Hylidae** | | | |
| (5) *Ecnomiohyla miotympanum* (Cope, 1863) | Small-eared Treefrog | SE | X |
| (6) *Smilisca baudinii* (A. M. C. Duméril and Bibron, 1841) | Mexican Treefrog | SE | X |
| **Family Scaphiopodidae** | | | |
| (7) *Scaphiopus couchii* Baird, 1854 | Couch`s Spadefoot | SE | X |
| **Reptilia: Squamata—Lizards** | | | |
| **Family Anguidae** | | | |
| (8) *Barisia ciliaris* (H. M. Smith, 1942) | Northern Alligator Lizard | Pr | X |
| (9) *Gerrhonotus infernalis* Baird, 1859 (1858) | Texas Alligator Lizard | SE | X |
| (10) *Gerrhonotus parvus* Knight and Scudday, 1985 | Pigmy Alligator Lizard | Pr | X |
| **Family Phrynosomatidae** | | | |
| (11) *Sceloporus couchii* Baird, 1859 (1858) | Couch's Spiny Lizard | SE | X |
| (12) *Sceloporus grammicus disparilis* Stejneger, 1916 | Northeastern Graphic Lizard | Pr | X |
| (13) *Sceloporus oberon* H. M. Smith and B. C. Brown, 1941 | Royal Lesser Minor Lizard | SE | X |
| (14) *Sceloporus parvus* H. M. Smith, 1934 | Northern Blue-bellied Lizard | SE | X |
| (15) *Sceloporus torquatus binocularis* Dunn, 1936 | Nuevo Leon Torquate Lizard | SE | X |
| **Family Scincidae** | | | |
| (16) *Plestiodon brevirostris pineus* (R. W. Axtell, 1960) | Pine Woods Short-nose Skink | SE | X |
| (17) *Scincella silvicola caudaequinae* (H. M. Smith, 1950) | Horsetail Falls Ground Skink | A | X |
| **Family Teiidae** | | | |
| (18) *Aspidocelis scalaris gularis* (Baird and Girard, 1852) | Texas Spotted Whiptail | SE | X |
| **Family Xantusiidae** | | | |
| (19) *Lepidophyma sylvaticum* E. H.Taylor, 1939 | Madrean Tropical Night Lizard | Pr | |
| **Reptilia: Squamata—Snakes** | | | |
| **Family Colubridae** | | | |
| (20) *Coluber constrictor oaxaca* (Jan, 1863) | Mexican Racer | A | X |
| (21) *Coluber flagellum testaceus* Say, *in* James, 1823 | Western Coachwhip | A | X |
| (22) *Coluber schotti ruthveni* (Ortenburger,1923) | Ruthven's Whipsnake | SE | X |
| (23) *Drymarchon melanurus erebennus* (Cope,1860) | Texas Indigo Snake | SE | |
| (24) *Drymobius margaritiferus margaritiferus* (Schlegel, 1837) | Northern Speckled Racer | SE | |
| (25) *Hypsiglena jani texana* Stejneger,1893 | Texas Nightsnake | Pr | |
| (26) *Lampropeltis mexicana mexicana* (Garman, 1884 [1883]) | San Luis Potosí Kingsnake | A | X |
| (27) *Leptodeira septentrionalis* (Kennicott, *in* Baird, 1859) | Northern Cat-eyed Snake | SE | |
| (28) *Opheodrys aestivus majalis* (Baird and Girard, 1853) | Western Rough Greensnake | SE | |
| (29) *Pantherophis bairdi* (Yarrow, *in* Cope, 1880) | Baird's Ratsnake | SE | X |
| (30) *Pituophis deppei jani* (Cope, 1861 [1860]) | Northern Mexican Pinesnake | A | X |
| (31) *Rhadinaea montana* H. M. Smith, 1944 | Nuevo Leon Graceful Brown Snake | Pr | X |
| (32) *Rhinocheilus lecontei* Baird and Girard, 1853 | Long-nosed Snake | SE | X |

**Table 1 (cont'd).**

| Taxon | Common Name | Status | Observed |
|---|---|---|---|
| (33) *Salvadora grahamiae lineata* Schmidt, 1940 | Texas Patch-nosed Snake | SE | X |
| (34) *Senticolis triaspis intermedia* (Boettger, 1883) | Northern Green Ratsnake | SE | |
| (35) *Storeria hidalgoensis* E. H. Taylor, 1942 | Mexican Yellow-bellied Brownsnake | SE | |
| (36) *Tantilla rubra* Cope, 1876 (1875) | Red Black-headed Snake | Pr | |
| (37) *Thamnophis cyrtopsis cyrtopsis* (Kennicott, 1860) | Western Black-necked Gartersnake | SE | |
| (38) *Thamnophis proximus diabolicus* Rossman, 1963 | Arid Land Ribbonsnake | A | X |
| (39) *Trimorphodon tau tau* Cope, 1870 | Mexican Lyresnake | SE | |
| (40) *Tropidodipsas sartorii sartorii* Cope,1863 | Sartori`s Snail Sucker | Pr | |
| **Family Crotalidae** | | | |
| (41) *Crotalus atrox* Baird and Girard, 1853 | Western Diamondback Rattlesnake | Pr | X |
| (42) *Crotalus lepidus lepidus* (Kennicott, 1861) | Mottled Rock Rattlesnake | Pr | X |
| (43) *Crotalus cf. molossus* | Black-tailed Rattlesnake | Pr | X |
| **Family Elapidae** | | | |
| (44) *Micrurus tener* (Baird and Girard, 1853) | Texas Coral Snake | Pr | |

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