

Notes on Mexican Herpetofauna 11: Herpetological Diversity in Sierra “Cerro de La Silla” (Saddleback Mountain), Nuevo León, Mexico

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Abstract

Sierra “Cerro de La Silla” is a natural protected area in the Sierra Madre Oriental. Our objectives were: 1) Carry out an herpetological inventory, and 2) Determine the distribution of species found in the area according to vegetation type and altitudinal gradient. Based on plant communities, the area to be studied in “Cerro La Silla” was divided into four zones: submontane matorral, low semi-evergreen forest, oak forest and pine forest. Twelve field trips were conducted during 2005 (April–October) and at the beginning of 2006 (April–May); each trip lasted 2–4 days. Our herpetological survey was focused mainly on submontane matorral and low semi-evergreen forest. A total of 123 individual specimens were observed. Ecological distribution of species was as follows: 14 species in the low semi-evergreen forest, and 8 species in the submontane matorral. Based on the literature, this natural protected area Sierra “Cerro de La Silla” harbors 46 species. In this research we observed 17 of those species.

Resumen

La Sierra “Cerro de La Silla” es un área natural protegida dentro del macizo de la Sierra Madre Oriental. Los objetivos fueron: 1). Hacer un inventario herpetológico actualizado, 2)..Determinar la distribución de las especies presente aquí por tipo de vegetación y rango altitudinal. El área que aquí fue estudiada del Cerro “La Silla “ fue dividido en cuatro zonas de acuerdo a la presencia de las comunidades vegetales, que fueron: matorral submontano, subperennifolia, encino y bosque de pino. Se realizaron 12 viajes de colecta durante el inicio de 2005 (Abril–Octubre) y hasta los meses de Abril–Mayo de 2006; cada viaje tenía una duración de 2 a 4 días. El inventario herpetológico se enfocó principalmente en las comunidades vegetales de matorral submontano y subperennifolia. Un total de 123 individuos fueron observados. La distribución ecológica de las especies fue de la siguiente manera 14 para subperennifolia, 8 para matorral submontano. De acuerdo a la literatura citada la Sierra “Cerro de La Silla “ alberga 46 especies. En esta investigación se observaron 17 de estas especies.

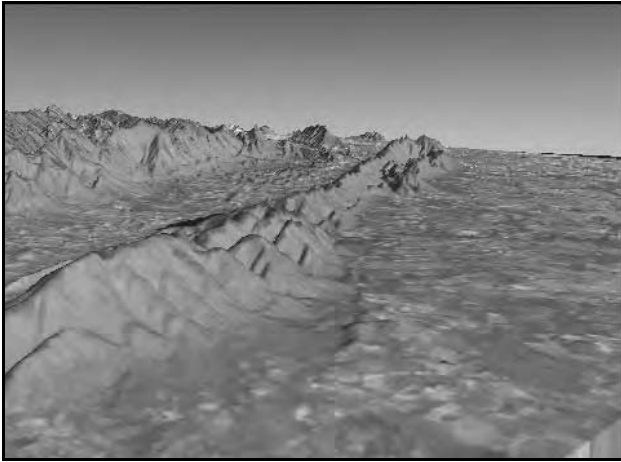
Introduction

The Sierra Madre Oriental is a chain of mountains running north–south throughout eastern Mexico, from the boundary with the United States to central Mexico. This mountainous system occupies an area of 60,978.34 km², which is equivalent to about 3% of the country’s territory, and varies in altitude between 200 and 3600 m (Luna et al., 2004). Several regionalization systems of Mexico, based on both physical and biotic criteria, show the Sierra Madre Oriental to have unique geographical and biological diversity. Geology and vertebrate distribution patterns combine to make it different from other regions.

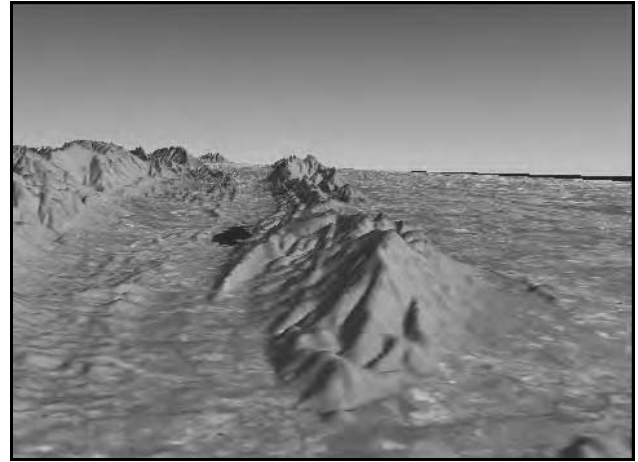
Considering the above, our interest has increased in conducting herpetological surveys throughout those portions of the state of Nuevo León that harbor sections of this Sierra Madre. This has been especially true since the establishment of federal national and state protected areas or parks (Anonymous, 2000; Arriaga et al., 2000). Some of these surveys in the Sierra Madre area would be: Parque Ecológico Chipinque (Banda, 2002;

Lazcano et al., 2006); Sierra San Antonio Peña Nevada (Lazcano et al., 2004); San Juan y Puentes in Aramberri (Lazcano et al., 2007); Sierra de Picachos (Contreras-Lozano et al., 2007); and recently in process Sierra “Cerro del Potosí” and Cuenca Palo Blanco. But there are still many areas that haven’t been surveyed.

Sierra “Cerro de La Silla” or Saddleback Mountain without any doubt is the most representative natural landmark for the inhabitants of the state of Nuevo León and northeastern Mexico; it is an important natural area, with a wide diversity of biological resources that give 4 million inhabitants natural services. However, until now no actual survey or inventory study had been conducted in this area. In this field work an update survey herpetological study was conducted, taking note of plant association and altitudinal gradient distribution. Information here obtained has contributed significantly to our knowledge of herpetological distribution in this landmark within the Monter-



3-D view of Sierra "Cerro de La Silla" from the north-northeast.



3-D view of Sierra "Cerro de La Silla" from the south-southwest.

rey metropolitan area. This knowledge will help establish better conservation and management practices of vertebrates in both east and west slopes, involving in this action private owners and the government offices that regulate activities in state natural protected areas.

Physical and biological characteristics, along with its geographic location make the Sierra "Cerro de La Silla" corridor in Nuevo León, Mexico, extremely vulnerable to the explosive growth of the Monterrey metropolitan area, which is certain to continue on the eastern slope of the mountain.

Location and Characteristics of the Site

Sierra "Cerro de La Silla" physiographically forms part of the Sierra Madre Oriental that is included in the Gulf Coastal Plain province, within Nuevo León, in northeastern Mexico. Geographic location of the protected area is given by Anonymous (2000). The protected area covers about 10620 ha, occupying mountainous parts of the municipalities of Allende (1117 ha), Cadereyta (1021 ha), Guadalupe (1908 ha), Juárez (3331 ha), Monterrey (800 ha) and Santiago (2442 ha). Much of the eastern slope is still intact (but in great

danger because of human housing development). Latitude ranges from 25°33'2"N to 25°33'60"N; longitude from 100°2'17"W to 100°11'59"W. Altitude varies from 500 to 1300 m.

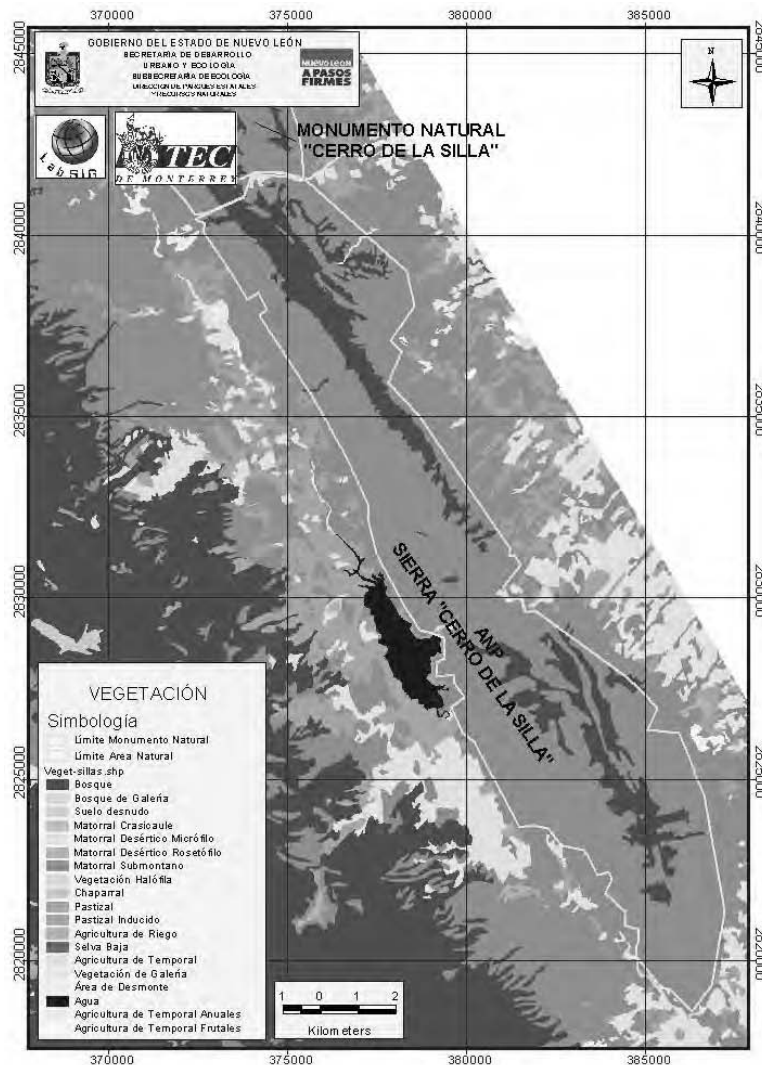
Climate in the area is classified as (A)C(W°) corresponding to the temperate group, with semi-warm and subhumid areas, with rains in the summer and 5 to 12% of rains in the winter (García, 2004). The annual median temperature is higher than 18°C and the coldest month temperatures fluctuate between -3 and 18°C.

This protected area is located in the Monterrey hydrological basin, its principal river is La Silla, fed by the tributary streams Calabozo, La Virgen and Elizondo, that arise on the slopes of the northeast section of Parque Nacional Cumbres of Monterrey. These waters end up in the Santa Catarina River, another landmark of Monterrey.

Plant communities in this protected area are as follows:

Submontane Matorral (7,691.77 ha)

The climax areas of this plant community can reach heights over 6 m, with outward-extending branches giving it a dense appearance. The dominant



Vegetation map of "Cerro de La Silla"

Table 1. Species Present in the Natural Protected Area Sierra “Cerro de La Silla,” Nuevo León, México. Recent taxonomic changes follow Crother et al. (2003) and Liner (2007); altitude gradients are as given by Canseco-Márquez et al. (2004).

Class	Order	Family	Scientific Name	Altitude Gradient (m)	Status
Amphibia	Anura	Bufo	<i>Ollotis nebulifer</i>	310 – 1550	
		Hyla	<i>Ecnomiohyla miotypanum</i>	200 – 2600	
			<i>Smilisca baudinii</i>	200 – 1450	
		Rana	<i>Lithobates berlandieri</i>	300 – 2500	
		Brachycephalus	<i>Eleutherodactylus augusti</i> †	1100 – 1800	
			<i>Eleutherodactylus cystignathoides campi</i>	930 – 1800	
			<i>Syrhophus longipes</i> †	500 – 1800	
	Leptodactylus	<i>Leptodactylus fragilis</i> †	425 – 1800		
Reptilia	Squamata	Anguilliformes	<i>Gerrhonotus infernalis</i> †	1356 – 2835	Special Protection
		Phrynosomatidae	<i>Phrynosoma modestum</i> †	600 – 1250	
			<i>Sceloporus grammicus disparilis</i> †	1700 – 2600	Special Protection
			<i>Sceloporus serrifer cyanogenys</i>	800 – 1800	
			<i>Sceloporus jarrovi cyaneus</i>	Not mentioned	
			<i>Sceloporus olivaceus</i> †	200 – 650	
			<i>Sceloporus torquatus binocularis</i>	2349 – 2835	
			<i>Sceloporus marmoratus</i>	200 – 1800	
		Scincidae	<i>Plestiodon brevirostris pineus</i>	1400 – 2835	
			<i>Scincella silvicola caudaequinae</i>	310 – 2100	Special Protection
		Teiidae	<i>Aspidoscelis gularis gularis</i> †	200 – 1320	
		Xantusiidae	<i>Lepidophyma sylvaticum</i> †	310 – 2000	
		Leptotyphlopidae	<i>Leptotyphlops myopicus myopicus</i> †	Up to 1200	
		Colubridae	<i>Coluber constrictor oaxaca</i> †	200 – 1060	Threatened
			<i>Coluber schotti ruthveni</i> †	1300 – 1800	
			<i>Diadophis punctatus regalis</i> †	Up to 1800	
			<i>Drymarchon melanurus erebennus</i>	475 – 710	
			<i>Drymobius margaritiferus margaritiferus</i>	550 – 1010	
			<i>Ficimia streckeri</i> †	640 – 880	
			<i>Lampropeltis alterna</i> †	Not mentioned	Threatened
			<i>Leptodeira septentrionalis septentrionalis</i> †	500 – 2000	
			<i>Leptophis mexicanus</i>	550 – 1260	Threatened
			<i>Opheodrys aestivus</i> †	Not mentioned	
			<i>Pantherophis bairdi</i> †	Up to 2300	
			<i>Pantherophis emoryi</i>	200 – 740	
			<i>Rhadinea montana</i>	Up to 2134	
			<i>Salvadora grahamiae lineata</i> †	200 – 750	
			<i>Sonora semiannulata semiannulata</i> †	Not mentioned	
			<i>Storeria hidalgoensis</i> †	1380 – 2954	
			<i>Tantilla atriceps</i> †	Not mentioned	
			<i>Tantilla rubra</i> †	350 – 1050	
			<i>Trimorphodon tau tau</i> †	1000 – 2100	
	<i>Tropidodipsas sartorii sartorii</i> †	350 – 1600			
	Elapidae	<i>Micrurus tener tener</i> †	Up to 2000	Special Protection	
	Viperidae	<i>Crotalus atrox</i> †	Up to 1900	Special Protection	
		<i>Crotalus lepidus lepidus</i> †	Up to 2835	Special Protection	
		<i>Crotalus molossus molossus</i> †	Up to 1800	Special Protection	
		<i>Crotalus totonacus</i>	Up to 1680	Special Protection	

† Individuals cited in the literature that were not observed in the survey.

species are *Acacia amenthaceae*, *Casimiroa pringlei*, *Fraxinus greggii*, *Helietta parvifolia*, *Neopringlea integrifolia*, *Pithecellobium pallens* and *Zanthoxylum fagara*. Less dominant are *Ehretia anacua*, *Cordia boissieri*, *Sargentia gerggii* and *Randia laetevirens*. In lower numbers are found *Celtis pallida* and *Indigofera suffrutescens* (Melgoza, 1977). According to plant association this community can be divided into *matorral submontano inerme*, *matorral submontano subinerme* and *matorral submontano espinoso* (Cabral-Cordero, 1984).

Oak Forest (2,075.55 ha)

The highest areas of Sierra are located in the portion that corresponds to the municipality of Santiago. Here the height of the forest is between 10 and 13 m, with dominant species such as *Quercus polymorpha*, *Quercus canbyi*, and *Brahea berlandieri*, considered a codominant species especially in areas that have suffered forest fires in the past. This type of plant community is found along steep eastern and western slopes.

Low Semi-evergreen Forest (808.98 ha)

Low semi-evergreen forest forms a small portion of the protected area. Here we can find species such as *Pithecellobium ebano*, *Aristolochia* spp., *Operculina dissecta*, *Matelea reticulata*, *Echites coulteri*, *Clematis drummondii*, *Meloyhia crassifolia*, *Ipomoea* spp. and *Centrosema virginianum* (Rojas-Mendoza, 1965).

Materials and Methods

Plant communities found in this study were determined using INEGI (1978a-r) maps. Communities present were: submontane matorral, oak forest, low semi-evergreen forest and a very small extension of pine forest and grassland (about 48 ha). Oak forest sampling was excluded from this study, because it was literally inaccessible. A total of 12 trips were conducted during April–October of 2005 and April–May of 2006, with a 2- to 4-day period in each trip, investing a total of 10 search hours per day (9:00 to 14:00 and 15:00 to 20:00 hrs). We used the Campbell and Christman (1982) searching method, locating and capturing specimens in the substrate they were using (rocks or rock piles, dry tree trunks, live plant substrates, under leaf litter and any artificial substrate, in mud ponds or other water bodies, etc.).

Specimens were captured using snake hooks, leather gloves and forceps; they were transported in labeled cloth bags. Each collected specimen was given an identification collecting number; a field collecting sheet was filled in. When possible specimens and habitat were photographed. For each collected specimen the following data were taken: species, date, collecting hour, altitude, plant community found, active or non-active, substrate used, ambient humidity and temperature, weather conditions.

Specimens collected here were identified using Smith and Taylor (1945, 1948, 1950), Conant and Collins (1998), Lemos-Espinal and Smith (2007), and SSAR catalogue accounts. In particular the phrynosomatids genus-species groups for Nuevo León and Tamaulipas were identified using special keys prepared by Dr. Hobart Smith and personnel of our lab.

Results

The literature indicates that 8 species of amphibians and 38 species of reptiles can be found in Sierra “Cerro de La Silla” (Table 1). Summarizing our collected material, 17 species were observed in the Sierra “Cerro de La Silla,” distributed taxonomically as follows: Amphibians: Anura (4 families, 5 genera and 5 species). Reptiles: Squamata—lizards (2 families, 3 genera and 6 species); Squamata—serpents (2 families, 6 genera and 6 species). This then represents 37% of those cited in the literature.

It is important to mention that 11 of the reptile species known from the area are listed in NOM-059-ECOL.-2001 (Anonymous, 2001) and are considered threatened or in need of special protection. Eight have Special Protection status: *Gerrhonotus infernalis*, *Sceloporus grammicus disparilis*, *Scincella silvicola caudaequinae*, *Micrurus tener tener*, *Crotalus atrox*, *C. lepidus lepidus*, *C. molossus molossus* and *C. totonacus*. Three are reported as Threatened: *Coluber constrictor oaxaca*, *Lampropeltis alterna* and *Leptophis mexicanus*.

Discussion

The herpetofauna of the Sierra Madre Oriental comprises 207 species: 2 families, 4 genera and 20 species of salamanders;

Table 2. Ecological distribution and species frequency present in the different plant communities in Natural Protected Area Sierra “Cerro La Silla,” Nuevo León, México.

Species	Low semi-evergreen forest	Submontane matorral	Total
<i>Ollotis nebulifer</i>	23	6	29
<i>Ecnomiohyla miotympanum</i>	29	0	29
<i>Smilisca baudinii</i>	1	0	1
<i>Lithobates berlandieri</i>	2	7	9
<i>Eleutherodactylus cystignathoides campii</i>	23	5	28
<i>Sceloporus serrifer cyanogenys</i>	1	0	1
<i>Sceloporus jarrovi cyaneus</i>	0	6	6
<i>Sceloporus torquatus binocularis</i>	1	0	1
<i>Sceloporus marmoratus</i>	1	4	5
<i>Plestiodon brevirostris pineus</i>	2	0	2
<i>Scincella silvicola caudaequinae</i>	0	2	2
<i>Drymarchon melanurus erebennus</i>	1	0	1
<i>Drymobius margaritiferus margaritiferus</i>	3	0	3
<i>Leptophis mexicanus</i>	1	1	2
<i>Pantherophis emoryi</i>	0	1	1
<i>Rhadinea montana</i>	2	0	2
<i>Crotalus totonacus</i>	1	0	1
Number of specimens	91	32	123
Number of species	14	8	17



Submontane matorral plant community.



Low semi-evergreen forest plant community.



Crotalus totonacus.



Water bodies are found throughout the park.



Ollotis nebulifer.



Plestiodon brevirostris pineus.

6 families, 14 genera and 44 species of anurans; 12 families, 20 genera and 49 species of lizards; 5 families, 48 genera and 88 species of snakes; and 2 families, 3 genera and 6 species of testudines (Canseco-Márquez et al., 2004).

Table 2 shows the ecological distribution of the specimens we collected. The low semi-evergreen forest plant community showed the highest herpetofaunal activity: 14 species were found here, 5 species of anurans, 4 of lizards, and 5 of serpents, with a total of 91 individuals observed. In the submontane matorral 8 species were found: 3 species of anurans, 3 of lizards and 2 of serpents, with a total of 32 observed individuals. The following authors point out in their distribution maps the possibility of finding these species in the area (Table 1): Behler and King (1992), Dixon and Werler (2005), Canseco-Márquez et al. (2004), Conant and Collins (1998), Gallardo-Valdez (2006), Köhler and Heimes (2002), Werler and Dixon (2000), and Lemus-Espinal and Smith (2007). Our efforts confirm the presence of these species for the area. Colubrids were the least found, probably due to their crepuscular and nocturnal habits. The oak forest community area was not sampled because it was extremely difficult to access from any point of the sierra.

In this study we collected 17 species. Fourteen species were found between 450 and 600 m, and 3 species between 601 and 750 m; none were found from 901 up to 1350 m. These results are consistent with the altitude gradients given by Canseco-Márquez et al. (2004). An update of the herpetofauna found in the state of Nuevo León accounts (literature and preserved collections) for ~127 species (http://www.fcb.uanl.mx/esp/herpetologia/lista_herpetofauna_de_NL). There is also general study of the Sierra "Cerro de La Silla" where 46 species are reported, but no collecting or sampling was ever conducted; it

was based on literature map records that indicated the possibility of the species being found here (Anonymous, 2000; Contreras-Balderas et al., 1995).

It is possible that this Natural Protected Area accounts for a larger number of species; we hope to continue monitoring the area, especially the eastern slopes (plant communities, seasonal, diurnal and nocturnal activities and climate changes), and that will likely increase the total. The low number of species observed in this survey could be due to many different factors such as the altitude gradient, seasonal fluctuations in humidity and temperature, habitat destruction and forest fires. Another important factor is that during the time of this survey the state of Nuevo León suffered from a drought.

Most of the species mentioned here are also found in all surrounding mountain sites. With the exception of *Lepidophyma sylvaticum* and *Crotalus totonacus*, both reported for this area, no endemic species has been found in this sierra habitat. There still exist mountainous areas in Nuevo León that haven't been collected in the municipalities to the north and south. We hope to continue our research of the area, expecting that financial support will continue flowing from government and non-government organizations. Pinpointing these species in the different mountain areas will fill in gaps of their distribution throughout the state and the northeast of Mexico.

Acknowledgments

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