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NOTES ON SCUTELLATION, LENGTH, AND DISTRIBUTION OF RATTLESNAKES (SERPENTES: VIPERIDAE: *CROTALUS*) IN THE STATE OF HIDALGO, MEXICO

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RESUMEN

Estudiamos las ocho especies del género *Crotalus* distribuidas en el estado de Hidalgo y encontramos variación adicional a la registrada en la literatura. *C. aquilus* y *C. atrox* registran variación morfológica, mientras que se registran nuevos datos de distribución para *C. aquilus*, *C. atrox*, *C. intermedius*, *C. scutulatus*, y *C. totonacus*.

Palabras Clave: *Crotalus*, *Crotalus aquilus*, *Crotalus atrox*, *Crotalus intermedius*, *Crotalus molossus*, *Crotalus scutulatus*, *Crotalus totonacus*, *Crotalus triseriatus*, rango de distribución.

ABSTRACT

We studied the eight species of *Crotalus* inhabiting the Mexican state of Hidalgo and found additional variation involving number of scales, body length, and distribution previously unreported in the literature. Supplementary morphological variation is reported for *C. aquilus* and *C. atrox*, and new distributional records are reported for *C. aquilus*, *C. atrox*, *C. intermedius*, *C. scutulatus*, and *C. totonacus*.

Key Words: *Crotalus*, *Crotalus aquilus*, *Crotalus atrox*, *Crotalus intermedius*, *Crotalus molossus*, *Crotalus scutulatus*, *Crotalus totonacus*, *Crotalus triseriatus*, range extension.

INTRODUCTION

The state of Hidalgo is located in the central part of Mexico, with an area of 20,905.12 km². Despite efforts made by researchers, little is known about its fauna. According to Flores-Villela & Gerez (1994), the state of Hidalgo has comparatively few vertebrate species. Only 44 reptile species endemic to Mesoamerica, and 28 endemic to Mexico, occur in the state. We consulted 23 publications documenting the presence of rattlesnakes in Hidalgo and found incongruence in the amount of species reported and their identity (21 different taxonomic names including subspecies). We also examined specimens housed in different Mexican collections and found noteworthy variation in some of the species listed for Hidalgo.

METHODS

Twenty five specimens of six species (*Crotalus aquilus*, *C. atrox*, *C. intermedius*, *C. molossus*, *C. ravus* and *C. scutulatus*) belonging to four collections, Museo de Zoología “Alfonso L. Herrera”, Facultad de Ciencias (MZFC) and Colección Nacional de Anfibios y Reptiles, Instituto de Biología (IBH), both from UNAM, the collection at the Laboratorio de Cordados Terrestres, Escuela Nacional de Ciencias Biológicas, IPN (ENCB), México D.F. and the collection at the Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo (CIB), were examined and compared with the descriptions published by Campbell & Lamar (2004) and Gloyd (1978). Also, online databases of four American collections were consulted: Harvard University Museum of Comparative Zoology (MCZR), University of Kansas (KU), Field Museum of Natural History (FMNH), University of Illinois Museum of Natural History (UIMNH), and University of Michigan Museum of Zoology (UMMZ) to assess the identity of the species inhabiting Hidalgo. Specimens examined are listed in Appendix 1. We counted cephalic scales through a stereoscopic microscope following standard nomenclature and figures in Valencia-Hernández (2006). Supraoculars, mental, upper and lower labials, rostral, internasal, prenasal, postnasal, loreal, prefrontal, frontal, parietal, preocular, subocular, postocular, foveal, cantals, and intercantals were examined under dorsal and lateral views of the organism; and mental, genial shields, and gular region under a ventral view. Ventral scales, anal and subcaudals were counted following Dowling (1975). We also determined rattle shapes and number of segments. Measures on head length and width, snout-vent length, and total length were verified.

RESULTS

After studying collected specimens from Mexican herpetological collections and consulting online American museums databases, eight species were evidenced in the state: *Crotalus aquilus*, *C. atrox*, *C. intermedius*, *C. molossus*, *C. ravus*, *C. scutulatus*, *C. totonacus*, and *C. triseriatus*. We did not assign subspecific names due to the taxonomic problems associated with them.

We found variation involving number of scales, body length, and distribution area in six of the eight species available from collections and data bases, as compared with Campbell & Lamar (2004), and Gloyd (1978), as explained below:

***Crotalus aquilus*.**- Specimens studied ranged between 192 (MZFC-05365) and 716 mm (MZFC-00027) in total length, increasing the maximum length (678 mm) reported by Campbell & Lamar (2004). An increase in the number of ventral scales is also reported in a specimen (MZFC-5404) which shows 164 ventrals instead of 161. A specimen (CIB-256) collected in Matías Rodríguez (98°31'56"N, 20°02'07"W), 2560 m in xerophytic scrub vegetation, expands the previously estimated distribution area approximately 20 km to the southeast.

Crotalus atrox.- Specimen IBH-0376 has one horizontally subdivided rostral scale, forming an upper and a lower rostral scale instead of only one rostral. Specimen IBH-0377 increases the maximum reported number of ventral scales from 196 to 198. This specimen also has a subdivided loreal scale. Specimens collected at Tasquillo (99°18'44"N, 20°33'04"W; IBH-374, 375, 376, 377), 1640 m in xerophytic scrub vegetation, extend the distribution area about 10 km to the south.

Crotalus intermedius.- Specimen ENCB-9811 presents one interocular scale. This specimen was collected in Presa Requena, Tepeji del Río (99°20'29"N, 19°54'14"W), 2109 m in xerophytic scrub vegetation, and extends the known distribution range almost 60 km to the northwest.

Crotalus molossus.- According to Campbell & Lamar (2004) this species has the rostral scale slightly higher than wide, thus the first upper labial and the prefoveals remain separated and the number of upper labials differs in number. In contrast, the five revised specimens (CIB-503, 517, ENCB-1577, IBH-744) have a notoriously higher than wide rostral scale showing 16, and 17 upper labials.

Crotalus rarus.- The two studied specimens (ENCB-15308, 15309) were collected at Tepeapulco (98°33'07"N, 19°47'04"W), 2580 m in xerophytic scrub vegetation, thus they expand the distribution range previously estimated in approximately 20 km to the north, as recently published by Campos-Rodríguez & Mendoza-Quijano (2004).

Crotalus scutulatus.- The rostral scale of the specimen CIB-512 is wider than longer, contrary to the data previously reported, and the amount of ventral scales (164) is lower than that reported by Campbell & Lamar (2004) although Gloyd (1978) reported 164 as the minimum number of ventral scales for the species. This specimen, collected in Mixquiahuala (99°12'51"N, 20°13'46"W), 2,080 m in xerophytic scrub vegetation, extends the distribution range approximately 5 km to the southwest. This variation may be clinal because the species varies greatly among its wide distribution area.

Crotalus totonacus.- The specimen KU-27726 was collected in Jacala (99°11'24"N, 21°00'18"W) 1320 m in oak forest, extending the previously known distribution area around 40 km to the south. We have not examined this specimen and are just using information on the museum data base.

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Appendix 1

Specimens examined. Acronyms for museums and collections are listed in methods. All specimens were collected in the Mexican state of Hidalgo.

Crotalus aquilus.- MZFC 00027 Borde Sur de la Sierra de Hidalgo. MZFC 02007 Parque Nacional El Chico. MZFC 03238 Sierra de Tezontlapan. MZFC 05365 Santuario Mapethé. MZFC 05404 La Encarnación. IBH 1003 15 km de Velasco. IBH 1812 Mataxi, cerca de Nopala. CIB 256 Matías Rodríguez cerca de Tulancingo. CIB 423 El Cedral. ENCB 06248 Las Ventanas. ENCB 11656 0.5 km W Omitlán.

Crotalus atrox.- IBH 0374, 375, 376, 377 Tasquillo. CIB 191 Hualula, Metztitlán.

Crotalus intermedius.- ENCB 09811 Presa Requena, Tepeji del Río.

Crotalus molossus.- CIB 503 Rancho Santa Elena, Huasca. IBH 0744 Tasquillo. IBH 5455 Xochitlán de las Manzanas, 10 km. W Tula. CIB 517 San Pedro Huaquilpan Zapotlán. ENCB 01577 3 km N Zimapán.

Crotalus ravus.- ENCB 15308 0.8 km N Tepeapulco. ENCB 15309 5 km E Tepeapulco.

Crotalus scutulatus.- CIB 512 Cerro Theñé, Mixquiahuala.
