The Totonacan Rattlesnake (*Crotalus totonacus*) is found in several states in northeastern and east-central Mexico. During the course of field studies in the state of Tamaulipas, William L. Farr (WLF) and colleagues have found numerous individuals of this species. Interestingly, all 12 of the individuals encountered by WLF displayed a gentle disposition, even after being weighed and measured, and to this day he never has heard one rattle. Pictured here is an adult male from the Sierra Madre Oriental, west of Ciudad Victoria, Tamaulipas, Mexico, found in oak forest at an elevation of 1,078 m.

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# The distribution of *Crotalus totonacus* in Nuevo León, Mexico

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**Abstract:** Although the occurrence of *Crotalus totonacus* in the state of Nuevo León, Mexico, has been documented, the exact distribution of this species in the state remains somewhat vague because certain records with data are over 30 years old and not available in the mainstream literature. Herein we include new records for voucher specimens in the UANL/FCB collection, and provide new localities from the state of Tamaulipas, variations in lepidosis, and brief comments on *C. durissus neoleonensis*, a *nomen nudum* in the synonymy of *C. totonacus*.

**Key Words:** *Crotalus durissus neoleonensis*, lepidosis, Tamaulipas, Totonacan Rattlesnake

**Resumen:** Aunque se ha documentado la ocurrencia de *Crotalus totonacus* en el estado de Nuevo León, México, la distribución exacta de esta especie en el estado sigue siendo algo vaga porque ciertos registros con datos son más de 30 años antiguos y no están disponibles en la literatura convencional. Aquí incluimos nuevos registros de ejemplares de la colección de la FCB/UANL y proporcionamos nuevas localidades del estado de Tamaulipas, las variaciones en la lepidosis y breves comentarios sobre *C. durissus neoleonensis*, un *nomen nudum* bajo la sinonomia de *C. totonacus*.

**Palabras Claves:** Cascabel Totonaca, Tepocolcoatl, *Crotalus durissus neoleonensis*, lepidosis, Tamaulipas

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## INTRODUCTION

The Totonacan Rattlesnake (*Crotalus totonacus*) is endemic to Mexico, where it inhabits the coastal plain of the Gulf of Mexico and adjacent areas on the eastern versant of the Sierra Madre Oriental, and has been reported from the states of Nuevo León, Tamaulipas, San Luis Potosí, Querétaro, Hidalgo, and Veracruz (McCranie 1993; Campbell and Lamar 2004; Ramírez-Bautista et al., 2014; Ramos Frías et al., 2015). Wallach et al. (2014) note the occurrence of this species in central Michoacán, but this entry was made in error (V. Wallach, pers. comm). A plausible photographic record from the state of Guanajuato, Municipio de Xichú, also has been posted on the Internet (Hernández-Arciga, 2011). Gloyd and Kauffeld (1940) described *C. totonacus* from Veracruz, but Smith and Taylor (1945) considered it a subspecies of *Crotalus durissus*; subsequently, most literature has regarded this taxon as *C. d. totonacus*. More recently, Campbell and Lamar (2004) considered this taxon as a species (*C. totonacus*), and remarked on the similarities of this species to *C. molossus*. Subsequent molecular studies recognized *C. totonacus* as a full species, as a member of the *Crotalus molossus* complex (Wüster, et al., 2005; Anderson and Greenbaum, 2012).

In his seminal opus on rattlesnakes, Klauber (1972) did not include Nuevo León in the distribution of *C. d. totonacus*. Similarly, Armstrong and Murphy (1979) did not include Nuevo León in its distribution and considered it the least known subspecies of *C. durissus*, noting that few specimens had reached collections. Current queries on the online database VertNet (2015) revealed only 14 specimens (we examined 12) among 61 participating institutions, with none from Nuevo León. Some recent publications (e.g. Tipton, 2005; Lemos-Espinal and Dixon, 2013) and an online database (Uetz and Hošek, 2015) have not indicated the occurrence of *C. totonacus* in Nuevo León. McCranie (1993) and Campbell and Lamar (2004) included a single locality in the state of Nuevo León on their respective maps, from the vicinity of Monterrey; the former interpreted the locality as an allopatric population, and the latter mapped it as a continuous range. Neither publication, however, provided a museum voucher number or precise locality information. Literature identifying museum vouchers and specific localities from Nuevo León appeared over 30 years ago in non-peer-reviewed forums, unpublished theses, and other gray literature not widely available (e.g., Harris, Jr. and Simmons, 1978; Treviño-Saldaña, 1978; Juliã-Zertuche, 1981; Vallejo-Gamero, 1981; Benavides-Ruiz, 1987). Most of these publications referenced specimens in the UANL (Universidad Autónoma de Nuevo León) collection. Unfortunately, those specimens and other early entries for *C. totonacus* from Nuevo León in the UANL catalogue no longer are present in the collection, and presumably are lost. The published localities nearest to Nuevo León are from the neighboring state of Tamaulipas, all of which are at least 75 km SE of the state line, and at least 270 km SE of the Monterrey area, and include the following: KU 174827, 38.4 km N Soto la Marina [ca. 24.10726°N, 98.18601°W] (Armstrong and Murphy, 1979); SMBU [BCBF]-C1867, 45.4 mi. E of Ciudad Victoria [23.57318°N, 98.51998°W]; specimen not examined (Auth et al., 2000); and UMMZ 103206–103207, La Joya de Salas [23.17311°N, 99.30078°W] (Martin, 1958).

## MATERIALS AND METHODS

Five voucher specimens of *Crotalus totonacus* from Nuevo León currently are available in the UANL preserved collection (Appendix 1). Only one of these specimens, however, is a whole and intact individual (UANL-7361). The other specimens include UANL-2674 (a nearly complete skin [in alcohol] missing only part of the tail), UANL-3113 (a head with the anterior 265 mm of the body attached, and a detached 357 mm segment of the posterior body missing the tail), UANL-6903 (a head with 113 mm of the body attached), and UANL-7325 (an incomplete dry skin). Regardless of the condition of these specimens, their identifications are unequivocal. We reference two additional specimens in the UANL collection (UANL-4850, 7904) from adjacent areas of Tamaulipas where the species has not been reported, partially filling a distributional gap between the recorded Tamaulipas populations and those from Nuevo León. We supplement these museum specimens with photographic vouchers of four individuals, deposited at the University of Texas at Arlington Digital Collection (UTADC-8173–8178; Fig. 1), to better delineate the distribution of this species in the region. Additionally, we include data for six specimens listed in the UANL catalogue that currently cannot be located and presumably are lost, of which five (UANL-463, 1764, 1853, 2492, 2498) have been referenced in previous literature as *Crotalus durissus neoleonensis* (Treviño-Saldaña, 1978; Vallejo-Gamero, 1981). One of these specimens (UANL-1853) was illustrated in Treviño-Saldaña (1978). We follow Sabaj Pérez (2014) in the abbreviations for symbolic codes of institutional resource collections. For older specimens collected before coordinates were standard data, we determined their approximant coordinates and elevations using Google

Earth, based on recorded localities, and include this information throughout this paper in brackets [ ] along with the original data. We express all coordinates in map datum WGS84, and distances in straight-line air kilometers. We mapped the localities for these records to illustrate the distribution of the species in the state, and describe and illustrate the distribution and associated vegetation zones. We examined five morphological characters of lepidosis on the available specimens (mid-body dorsal scale rows, ventrals, subcaudals, supralabials, and infralabials) and compare their ranges with those established in the literature. We collected specimens under collecting permit number OFICIO NUM.SGPA/DGVS/06452/10 12 Ago. 2010 issued by SEMARNAT (now Instituto Nacional de Ecología y Cambio Climático).

**Fig. 1.** An individual of *Crotalus totonacus* (UTADC-8177) from Municipio de Cadereyta Jiménez, Nuevo León, Mexico.
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## RESULTS

In Nuevo León, *Crotalus totonacus* is known from the central region of the state along a narrow zone on the eastern versant of the Sierra Madre Oriental at elevations from 459 to 1,465 m. (Fig. 2). We confirmed records for the municipalities of Benito Juárez, Cadereyta Jiménez, Guadalupe, Montemorelos, and Santiago. The northernmost record for this species is UTADC-8175-8176, from Nuevo León, Municipio de Guadalupe, Monumento Natural "Cerro de la Silla" (25.649286°N, 100.252342°W), located at the southeast edge of Ciudad de Monterrey. A distributional gap of 97 km is present between the southernmost record in Nuevo León, Municipio de Montemorelos (UANL-2492), and the nearest records from Municipio de Hidalgo, Tamaulipas (UANL-4850). Suitable habitat is uninterrupted throughout this region, with no apparent natural barriers. The Nuevo León population likely is continuous, as indicated by Campbell and Lamar (2004). Although *C. totonacus* is not a rare species in this area, it is not abundant and future collecting likely will fill this distributional gap. This rattlesnake has not been recorded from the arid interior/plateau region of southwestern Nuevo León or the arid interior slopes of the Sierra Madre Oriental. We are not aware of records from the coastal plain in the northeastern part of the state, but records from the coastal plain of Tamaulipas suggest that this species might be found in the vicinity of Linares, Nuevo León.

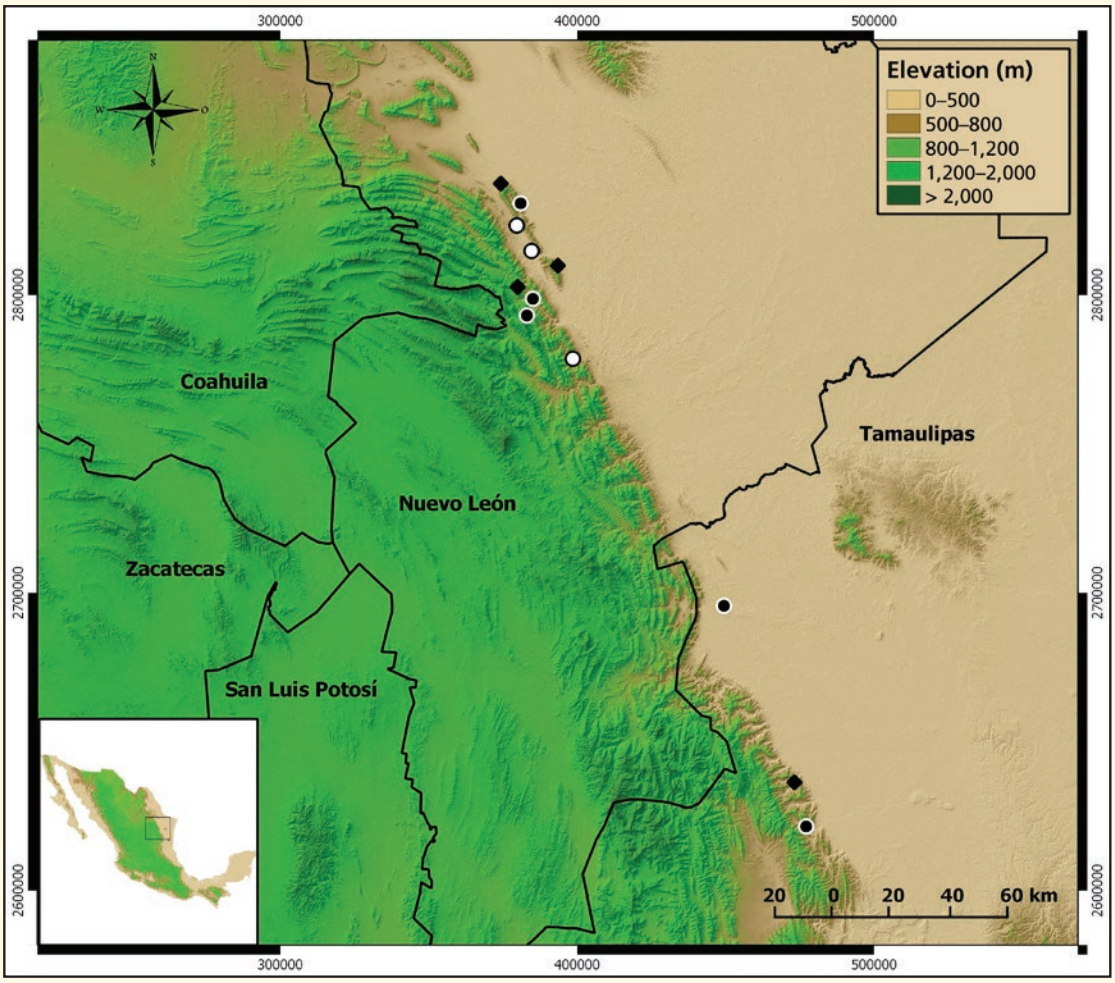


**Fig. 2**. Distribution map of *Crotalus totonacus* in central Nuevo León and adjacent Tamaulipas, Mexico. Verified museum vouchers = black circles; UANL catalogue data for lost specimens / literature records = white circles; and photographic vouchers = black diamonds.

## DISCUSSION

*Crotalus totonacus* is known to occur in a remarkably diverse range of habitats and vegetation zones including the following: barrier islands of the Gulf of Mexico near sea level (Gloyd and Kauffeld 1940); cloud forest, humid pine-oak forest, and dry oak-pine forest up to 1,680 m (Martin, 1958 [vegetation zones defined therein]); pine-oak woodlands (Dixon et al., 1972; McCranie 1993); tropical thorn forest, tropical deciduous forest, and some elements of temperate deciduous forest (Armstrong and Murphy, 1979 [vegetation zones defined by Leopold, 1950]); and seasonal formation series and steppe, thicket and scrub desert (Armstrong and Murphy, 1979 [vegetation zones defined by Wagner, 1964]). Although Armstrong and Murphy (1979: 13) noted Martin's (1958) records from cloud forest in the Sierra de Guatemala, they described this species as "typically a lowland inhabitant." In our surveys in Tamaulipas we found *C. totonacus* to be equally abundant on the eastern versant of the Sierra Madre Oriental of the state (Farr et al., 2013), and all the records known to us from Nuevo León are from the Sierra Madre Oriental, from sub-montane scrub (Fig. 3), oak forest (Fig. 4), and pine-oak forest. Ramos Frías et al. (2015) reported a maximum elevation of 1,925 m for this species from the state of Hidalgo. Armstrong and Murphy (1979) also stated that this species most often is associated with watercourses, but on a few occasions we observed individuals in areas where no surface water was evident. Although we have encountered *C. totonacus* active at night, we found this species to be largely diurnal and crepuscular.

**Fig. 3**. Sub-montane scrub habitat in Municipio de Cadereyta Jiménez, Nuevo León, Mexico. © Carlos Velazco-Macias

**Fig. 4**. Oak forest habitat in the Sierra Madre Oriental, Municipio de Victoria, Tamaulipas, Mexico. © William L. Farr

In Nuevo León, *C. totonacus* is known to inhabit protected areas under federal (Parque Nacional Cumbres de Monterrey, Monumento Natural Cerro de la Silla) and state jurisdiction (Sierra de la Silla), and the species also is protected by Mexican law in the category of "Subject to Special Protection" (NOM 059 SEMARNAT, 2010). Although these areas are protected, the land within them is privately owned and often is subject to development and irresponsible tourism activities. The valleys and lower elevations on both the eastern and western slopes of the Sierra Madre Oriental are undergoing urbanization, owing to the explosive growth of the city of Monterrey. Some

localities for the presumably lost UANL specimens (El Cerrito, UANL-2188, UANL-2498, and Presa Rodrigo Gómez [= Presa La Boca], UANL-1764) in central Nuevo León have become urbanized, particularly in the valley that lies between the Sierra Madre Oriental and the Sierra de la Silla, and *C. totonacus* likely has been extirpated from these areas. The results of urbanization and development have led to the isolation of these ranges, effectively converting them into "islands" and thereby compromising the viability of this and other vertebrate species. Forest fires pose another threat, and state government data from 2003 to 2013 indicate a total of 444 incidents of forest fires that affected 29,386 ha, primarily in dwindling wooded areas (Anonymous, 2014).

As noted by Armstrong and Murphy (1979) and indicated by the few specimens included on VertNet (2015), *C. totonacus* is not well represented in museum collections. We examined one complete specimen from Nuevo León (UANL-7361) and several specimens in the UANL collection from the neighboring state of Tamaulipas. Our scale counts from these relatively new specimens revealed notable variation in supralabials, as well as in the ventral and subcaudal counts of females (Table 1), exceeding the ranges reported in previous literature (Klauber, 1972; McCranie, 1993; Campbell and Lamar, 2004). In two specimens, 16 supralabials were present on one side, exceeding the previous maximum count of 15 (Campbell and Lamar, 2004). We found ventral counts of 199 and 204 in two females in the UANL collection, which exceeded the previous maximum counts of 195 ventrals in females (McCranie 1993; Campbell and Lamar, 2004). We found a range of 20–21 subcaudals in females, which was lower than the range of 22–26 in prior descriptions (McCranie, 1993; Campbell and Lamar, 2004).

**Table 1.** A comparison of five characters of lepidosis made between previous literature and specimens in the UANL collection. *Data for lost specimens from Trevino-Saldaña (1978).

| | **Mid-body Dorsal Scale Rows** | **Supralabials** | **Infralabials** | **Ventrals** ♂ ♀ | **Subcaudals** ♂ ♀ |
|---|---|---|---|---|---|
| McCranie (1993) | 25–27 | — | — | 187–196<br>189–195 | 24–29<br>22–26 |
| Campbell and Lamar (2004) | 25 | 12–15 (14) | 12–17 (15) | 184–192<br>193–195 | 26–29<br>22–26 |
| UANL-4850 ♀ | 25 | 14-14 | 15-14 | 195 | 21 |
| UANL-7361 ♀ | 25 | 16-15 | 14-14 | 199 | 21 |
| UANL-4137 ♀ | 25 | 14-14 | 13-14 | 204 | 20 |
| UANL-7904 ♂ | 25 | 16-15 | 15-15 | 185 | 27 |
| | | | | | |
| Vallejo-Gamero (1981) "*Crotalus neoleonensis*" | 25 | 13-17 | 16-16 | 162–196<br>196 | 24–28<br>27 |
| UANL-463 ♂* | 25 | 16-14 | 17-16 | 194 | 24 |
| UANL-1764 ♂* | 25 | 13-13 | 17-16 | 196 | 28 |
| UANL-1853 Undetermined * | 25 | 14-17 | 16-16 | 162 | 29 |

Taxonomic status has been suggested for the Nuevo León population based on specimens (now lost) in the UANL collection; however, *C. durissus neoleonensis* (Harris and Simmons, 1978; Juliá-Zertuche and Treviño S., 1978) is considered a *nomen nudum*, as this name first appeared in a non-reviewed forum, lacked an adequate description, and no holotype was designated (McCranie 1993; Campbell and Lamar 2004; Uetz and Hošek, 2015). Interestingly, Rubio (1998) suggested that with proper review the population might prove to be valid. Although they cannot be verified, we list the scale counts for *C. d. neoleonensis* reported by Treviño-Saldaña (1978) and Vallejo-Gamero (1981) for three lost specimens from the UANL collection in Table 1. McCranie (1993) speculated, however, that the ventral count of 162 was a typographical error in Treviño-Saldaña (1978). Our observations of *C. totonacus* in Nuevo León and the limited data from specimens we examined does not suggest evidence to support a taxonomic change for this population, and the Nuevo León population does not appear to be allopatric.

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**Appendix 1.** List of specimens examined, catalogue data and literature records for lost specimens in the UANL collection, and list of photo vouchers. Coordinates and elevations in brackets [ ] indicate approximate localities for the original collecting data.

**Specimens examined.** NUEVO LEÓN: UANL-2674 (ethanol, skin missing tail): Municipio de Santiago, Puerto La Trinidad [25.250000°N, 100.161000°W; elev. 1,465 m]; May 1984; Rita Yolanda Benavides-Ruiz; UANL-3113 (ethanol, head with incomplete body): Municipio de Santiago, Las Adjuntas [25.300832°N, 100.141382°W; elev. 736 m]; 26 August 1978. ND; UANL-6903 (ethanol, head with incomplete body): Municipio de Juárez, Charco Azul, Cerca del Guarda Ganado [25.589851°N, 100.185320°W; elev. 533 m]; 18 April 2008; Ramiro David Jacobo-Galván; UANL-7325 (Dry, incomplete skin): Municipio de Benito Juárez, Charco Azul, Monumento Natural "Cerro de la Silla" (25.589851°N, 100.185320°W); elev 533 m; 7 June 2011; Jerónimo Alejandro Chavéz-Cisneros; UANL-7361 (ethanol, whole specimen): Municipio de Santiago, Las Adjuntas [25.300832°N, 100.141382°W; elev. 736 m]; 8 June 1984; Rita Yolanda Benavides-Ruiz. TAMAULIPAS: UANL 4137 (ethanol, whole specimen): Municipio de Aldama, Aldama-Barra del Tordo Hwy ca. Moron road [22.93117°N, 97.96933°W; elev. 153 m]; 20 July 1996; David Lazcano, Alan Kardon, Mike Bishop, and Ramiro David Jacobo-Galván; UANL-4850 (ethanol, whole specimen): Municipio de Hidalgo, Mex. Hwy 85, 15 km. N of Hidalgo [24.373067°N, 99.498597°W; elev. 424 m]; 14 July 1997; David Lazcano; UANL-7904 (ethanol, whole specimen): Municipio de Victoria, Cañón del Novillo [23.704371°N, 99.224529°W, elev. 518 m]; 12 September 1987; Jesus Garcia.

**UANL catalogue data for lost specimens / literature records.** NUEVO LEÓN: UANL-463: Municipio de Santiago, Las Adjuntas [25.300832°N, 100.141382°W; elev. 736 m]; 28 June 1966; Alejandro Aseff-Martínez and Fernando Jiménez-Guzmán. UANL-1764: Municipio de Santiago, Presa Rodrigo Gómez = "Presa La Boca" [25.445738°N, 100.147341°W; elev. 459 m]; 8 May 1977; Carlos Humberto Treviño-Saldaña. UANL-1853: Municipio de Santiago, Las Adjuntas [25.300832°N, 100.141382°W; elev. 736 m]; 24 September 1977; Carlos Humberto Treviño-Saldaña. UANL-2188: Municipio de Santiago, El Cerrito [25.522556°N, 100.197478°W; elev. 543 m]; 18 November 1978; José Luis Vallejo-Gamero. UANL-2492: Municipio de Montemorelos, Rancho La Mora [25.119887°N, 100.006260°W; elev. 661 m]; 18 April 1980; Silvia L. Porrás-Rios and CHTS. UANL-2498: Municipio de Santiago, El Cerrito [25.522556°N, 100.197478°W; elev. 543 m]; 15 December 1979; José Luis Vallejo Gamero.

**Photo vouchers.** NUEVO LEÓN: UTADC-8175-8176: Municipio de Guadalupe, "Monumento Natural Cerro de la Silla" (25.649286°N, 100.252342°W), elev. 793 m; 14 December 2013; Mayra C. Nevárez. UTADC-8177-8178: Municipio de Cadereyta Jiménez, "Sierra de la Silla" (25.402111°N, 100.058670°W); elev. 562 m; 20 May 2009; Carlos Velazco-Macias. UTADC-8173: Municipio de Santiago, road to Ciénega de González (25.335934°N, 100.192566°W); elev. 1,282 m; 6 June 2007; Sadot Edgardo Ortiz-Hernández. TAMAULIPAS: UTADC-8174: Municipio de Victoria, Cañón de Caballeros 15 km NW of Ciudad Victoria (23.83805°N, 99.26333°W); elev 325.8 m; 17 Sept 2004; William L. Farr, Tim Burkhardt, Gilberto Herrera, and Ricardo Nuñez.

**William L. Farr** is an independent researcher living in Houston, Texas, United States. Largely self-educated, he received many hours of mentorship from the late herpetologist James R. Dixon. His main research interest is in the herpetofauna of Tamaulipas, Mexico. William has authored or co-authored over 20 peer reviewed papers, including chapters in a book on the US–Mexico Border States expected to be released soon. Another interest is wildlife photography, and many of his photographs have appeared in journals, books, and websites.

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