



Research note

New records of the rare Sinaloan Long-tailed Rattlesnake, *Crotalus stejnegeri*, from southern Sinaloa, Mexico

Nuevos registros para la poco conocida cascabel cola larga de Sinaloa, *Crotalus stejnegeri*, del sur de Sinaloa, México

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Abstract. Three specimens of the rare Sinaloan Long-tailed Rattlesnake, *Crotalus stejnegeri*, were obtained from Concordia, southern Sinaloa, Mexico. Morphometric and scalation data were compared with information available from recent literature, and aspects of geographical distribution, legal protection, activity patterns, coloration, and rattle sound are briefly discussed. These new records extend the lowest elevation limit for this species to 400 m and the maximum known total length to 79.0 cm.

Key words: morphometrics, scalation, geographic distribution, protection, activity pattern, elevation range, coloration, rattle, habitat.

Resumen. Se recolectaron 3 individuos de la poco conocida cascabel cola larga de Sinaloa, *Crotalus stejnegeri* en Concordia, en el sur de Sinaloa, México. Los datos morfométricos y de escamación fueron comparados con información disponible en la literatura reciente. Se discuten brevemente aspectos de distribución geográfica, protección legal, patrones de actividad, coloración y sonido del cascabel. Se registra un límite inferior de la distribución altitudinal de 400 m y una longitud total máxima de 79.0 cm.

Palabras clave: morfometría, escamación, distribución geográfica, protección, patrones de actividad, intervalo altitudinal, coloración, cascabel, hábitat.

Three species of Long-tailed Rattlesnakes have been described, *Crotalus stejnegeri* Dunn, 1919, *C. lannomi* Tanner, 1966, and *C. ericsmithi* Campbell and Flores-Villela, 2008. They are known from few specimens (13, 6, and 9, respectively), and are endemic to the Pacific slope of Mexico, where each of the species seems to be restricted to a small geographic area (Campbell and Flores-Villela, 2008; Reyes-Velasco et al., 2010; Reyes-Velasco pers. comm.).

The original description of the Sinaloan Long-tailed Rattlesnake, *C. stejnegeri*, by Dunn (1919), was based on 2 specimens collected at or near Plomosas, Sinaloa (erroneously spelled as "Plumosas"; all reptiles collected from Colomos to Plomosas by Nelson and Goldman in 1897 were labeled as Plomosas [Goldman, 1951];

holotype USNM 46586, paratype 46460). Dunn (1919) strongly suspected from its description that the specimen collected by Alphonse Forrer from Ventanas, Durango and reported by Boulenger (1896) under the name *C. tigris* (1883.4.16.64 BM), also belonged to *C. stejnegeri*. Gloyd (1940) subsequently examined all 3 specimens available at that time and confirmed that Boulenger's "*C. tigris*" should be assigned to *C. stejnegeri*.

Few additional specimens of *C. stejnegeri* have been reported since the original description in 1919 (Campbell and Flores-Villela, 2008). Klauber (1952) reported 2 live specimens from near Yamoriba, Durango (SDNHM Herps 41120, 41121, 6 mi N of Yamoriba). Hardy and McDiarmid (1969) examined 1 specimen from near Santa Lucía, Sinaloa (KU 78972). McDiarmid et al. (1976) reported 2 specimens from near Concordia, Sinaloa (LACM 37718, RS 901 HSH/RSS, NHSM). Harris and Simmons (1978) illustrated a specimen that was also

collected near Concordia, Sinaloa. Armstrong and Murphy (1979) reported 2 specimens captured at the type locality (Plomosas, UTA R-5926) and a large male that was found at Ejido Tebaira, Sinaloa (UTA R-6234). Recently, Villa and Uriarte-Garzón (2011) reported the capture of a specimen from the Municipality of San Ignacio, Sinaloa (UAZ 57312-PSV).

On April 2, 1999, the senior author, while exploring the bird fauna of the tropical dry forest of La Guásima, Concordia, and neighboring ejidos, received a small (55.3 cm total length), peculiar rattlesnake that had recently been killed by a local resident on the outskirts of Rancho Palo María, Ejido El Habal de Copala (23°20'27" N, 105°55'08" W, 399 m) in deciduous/semi-deciduous forest. The posterior part of the body was completely severed from the rest of the body, and the left posteroventral part of the head presented a deep longitudinal cut. Nevertheless, the overall condition of the specimen was good enough for it to be identified as *C. stejnegeri*. The specimen was deposited in the Zoological Museum "Alfonso L. Herrera" -UNAM (MZFC-27252).

On August 25, 2010, 2 young specimens of *C. stejnegeri*, each about 24 cm total length, were collected by the senior author at the Cerro del Pirame, Community La Guásima, Concordia (23°24'32" N, 105°59'30" W, 810 m). The slopes of this rocky flat-topped hill are covered by tropical dry forest grading into oak forest (*Quercus magnoliifolia* and *Q. aristata*) at about 700 m. Most of the mesa is covered by oak trees (Fig. 1A) interspersed with tepehuaje (*Lysiloma* cf. *acapulcense*), with open grassy areas and some large barren spaces where bushes of nanchi (*Byrsonima crassifolia*) can be very abundant. The snakes were found in a single large stand (about 1 ha) of pine trees (*Pinus oocarpa*) located on the western edge of the mesa at 810 m, surrounding a house that now belongs to the

Community of La Guásima and forms part of the remains of an ecotouristic development "El Pirame", which was abandoned in the year 2000 (Fig. 1B).

Identification of the species was done based on the works of Klauber (1952), Campbell and Flores-Villela (2008), and Reyes-Velasco et al. (2010). Methods for counts and measurements and terminology follow Klauber (1972). The body and tail of the dead specimen were measured using a measuring stick to the nearest mm. Both specimens from Cerro del Pirame were kept alive, and measured and photographed in September 2012 when they were fully grown (Fig. 2, female). Each was allowed to crawl into a rigid transparent plastic tube. Photographs were taken of the ventral side of the head, and total length and tail length (mean of 4 repeated measurements) were obtained by carefully placing a string along the midline of the snake over the outside of the tube and subsequently measuring the string with a tape measure to the nearest mm.

Morphometrics and scalation are presented in Table 1. The internasals are broadly triangular; canthals moderate to large separated by 2-4 scales; intersupraoculars small, 6-7; 14-19 scales between the intersupraoculars and intercanthals (Figs. 3A-C); first pair of infralabials not separated by mental and in broad contact midventrally, not tapering towards midline; second pair of infralabials in narrow to very narrow contact with chinshields (Figs. 3D-F); 6 prefoveals (Fig. 2C) (7 and 7-8 prefoveals, however, according to Tanner [1966] and Reyes-Velasco [2010], respectively). The formerly known maximum total length of 72.4 cm is now set at 79.0 cm by the large female specimen from Cerro del Pirame. The body of the female is much heavier and thicker than that of the male, which is slender and more agile.

Based on our current knowledge, all 3 species of long-tailed rattlesnakes occupy small geographic areas, although



Figure 1. Cerro del Pirame, La Guásima, Concordia: A, mesa covered by oak forest; B, stand of pine trees (*Pinus oocarpa*) where the 2 live specimens of *Crotalus stejnegeri* were found.



Figure 2. *Crotalus stejnegeri*: live female, 79.0 cm TL, from Cerro del Pirame, La Guásima, Concordia, Sinaloa: A, specimen *in toto*; B, orange-brown coloration after shedding skin; C, laterodorsal view of head showing 6 prefoveals.

Reyes-Velasco et al. (2010) suggest that their ranges must be far greater than presently understood. These authors offer several explanations in support of their statement, including the presence of illegal narcotics activity and the scarcity of accessible roads, which are nearly impossible to use during the rainy season. They also list anthropogenic factors potentially affecting the habitat of *C. lannomi* such as agriculture, cattle grazing, logging, and mining. All of the above explanations and factors are also applicable to the tropical dry forests covering the southern highlands of Sinaloa, and we feel that the presence of *C. stejnegeri* in southern Sinaloa and the neighboring states of Durango and Nayarit is probably greatly underestimated. It should be pointed out that many of the comuneros of La Guásima are familiar with this peculiar species of rattlesnake which they call “vibora sorda”, and it is considered a secretive, rarely observed species that does not grow very large (less than 1 m long).

The protection of these seemingly very rare species of Long-tailed Rattlesnakes should be of great concern, especially considering that none have as yet been reported from a federal natural protected area. According to Paredes-García et al. (2011), of the 21 species of rattlesnakes of the genus *Crotalus* endemic to Mexico, the known distribution of only 4 of them (*C. caliginis* and all 3 species of Long-tailed Rattlesnakes) does not seem

to overlap with any existing federal natural protected area (Fnpa). Over the last 3 years, the National Commission of Natural Protected Areas (Conanp), in collaboration with Conselva, Costas y Comunidades, A. C. and CIAD, A. C., has been promoting the creation of a very large Fnpa “Monte Mojino” in southern Sinaloa (currently a Priority Region for Conservation by Conanp) to protect the tropical dry forest and its associated fauna. Many of the sites where *C. stejnegeri* was collected, including La Guásima and El Habal de Copala, are located within this proposed region.

Concern about the survival of the Long-tailed Rattlesnakes is shared by the Official Mexican Standard Nom-059-Semarnat-2010 (Semarnat, 2010), which includes *C. stejnegeri* and *C. lannomi* under the risk category “amenazada”, i.e. “threatened” (*C. ericsmithi*, which was recently described in 2008, has not been listed yet in the Nom). Also, of the 34 species of *Crotalus* occurring in Mexico, 31 are included in the IUCN Red List, most in the category of Least Concern. Only 3 species are considered threatened, including *C. stejnegeri*, which is listed in the category of Vulnerable (*C. ericsmithi* has yet to be evaluated), and *C. lannomi*, which is oddly classified as “data deficient” (Ponce-Campos and Garcia-Aguayo, 2007) rather than “vulnerable” (Reyes-Velasco et al. 2010).

Table 1. Morphometrics, scalation, and color pattern characteristics for *Crotalus stejnegeri* (TL= total length)

Characters	Campbell and Flores-Villela (2008), Reyes-Velasco et al. (2010) (n= 8)	Southern Sinaloa (n= 3)		
		El Habal de Copala, Rancho Palo María	La Guásima, Cerro del Pirame	
			Female	Male
Maximum known TL	72.4 cm (female)		79.0	74.5
TL		55.3 cm	79.0	74.5
Tail length (% of TL)	10.4-14.5 (males) 9.7 (female)	13.7	10.6	11.8
Internasals	Broad, triangular	Broad, triangular	Broad, triangular	Broad, triangular
Canthals	Moderate in size; usually separated by 3 scales, rarely 2	Larger than internasals; separated by a square patch of 2-2 small scales, with 1 tiny scale in center	Smaller than internasals; Separated by a patch of 4-4 small to tiny scales	Moderate in size; separated by a patch of 4-3-5 small to tiny scales
Intersupraoculars	5-8	6	7	6
First pair infralabials	In broad contact midventrally, not tapering towards midline	In broad contact midventrally, not tapering towards midline	In broad contact midventrally, not tapering towards midline	In broad contact midventrally, not tapering towards midline
Dorsal scales at midbody	25-27	25	27	27
Ventrals	172-178 (males) 171-176 (females)	172	174	177
Subcaudals	42-45 (males) 36-37 (females)	45	37	45
Dorsal body blotches	32-43(males) 34-43 (females)	40	36	40
Tail bands	13-16	14	12	13
Scales between supraoculars and intercanthals	> 10	14	19	18
Prefoveals	7-8	6/6	6/6	6/6

As Campbell and Flores-Villela (2008) pointed out, knowledge of the activity patterns of Long-tailed Rattlesnakes is sparse at best. The specimen from Rancho Palo María was caught during the dry season and was found crawling at around 09:00 hrs among the sprawling roots of a large native ficus tree (*Ficus* sp.) that grows near a small man-made reservoir that is constantly supplied with water from a natural seepage in the rock fissures. In contrast, both specimens from the Cerro del Pirame were captured during the rainy season. Prior to the day the snakes were caught, heavy rain fell for 48 hours, creating humid and cool conditions for the snakes to bask (Campbell and Flores-Villela, 2008) or possibly causing habitat or shelter flooding. Specimens from Plomosas, as reported by Campbell and Flores-Villela (2008), were also found after heavy thunderstorms. During the day of capture, the Cerro

del Pirame was blanketed by mist in the morning and the sky was overcast and gray during the rest of the day; in the late afternoon, another violent thunderstorm occurred. The first snake was spotted about 5 m and the second about 25 m from the house (Fig. 1B), at 15:20 hrs and 16:00 hrs respectively, apparently undisturbed by the 6 people and 4 horses that had been in the area for about 2 days. They were coiled at the base of a large pine tree, one in a crevice between the large roots and the other partly upon shed pine needles. They were not at all aggressive nor did they try to escape and thus were easily maneuvered into a plastic jar by means of a long forceps.

The known elevational range of *C. stejnegeri* is about 500-1 200 m, corresponding to a zone where tropical deciduous forest grades into oak or pine-oak forests (Campbell and Flores-Villela, 2008). The

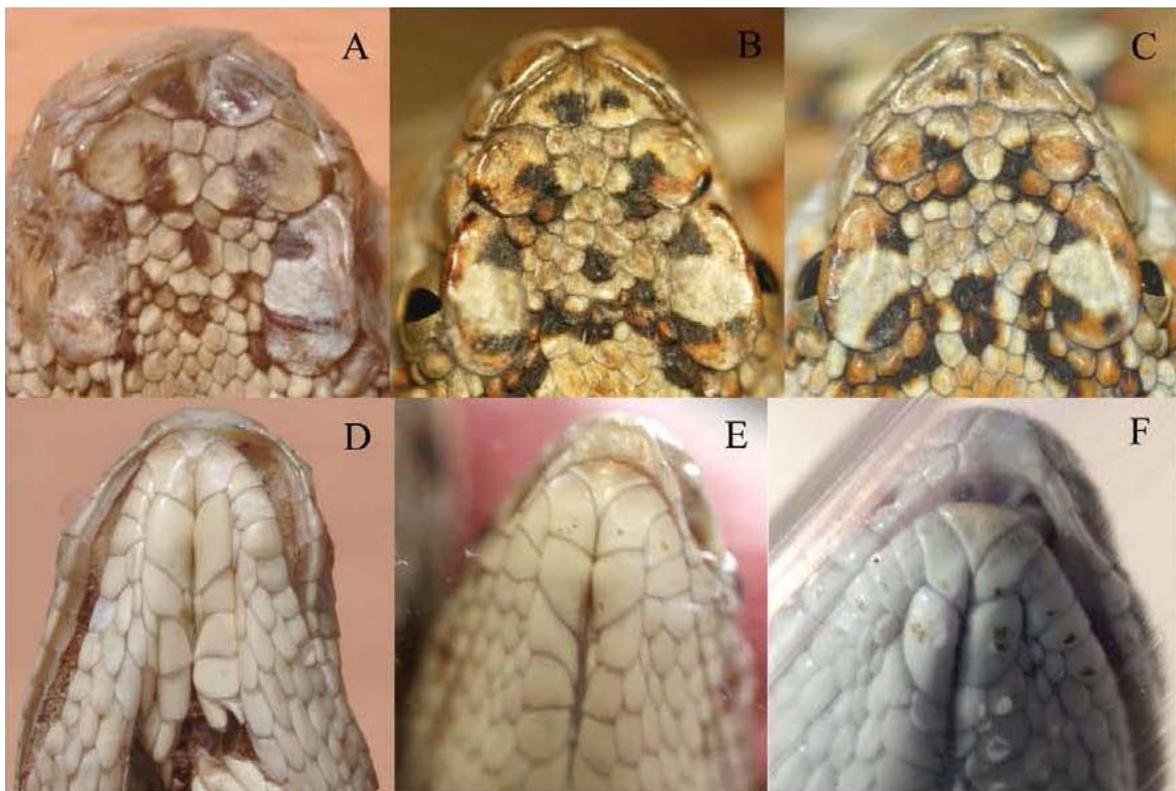


Figure 3. Dorsal and ventral head scalation of *Crotalus stejnegeri* obtained from: A, D, El Habal de Copala (MZFC-27252); B, E, female and C, F, male, La Guásima, Concordia, Sinaloa.

specimen from Rancho Palo María represents the lowest elevation at 400 m. Doubt is cast on the record reported by Klauber (1952), as “about 6 mi. north of Yamoriba (about 24°12½' N, 105°47' W), Durango” (corrected to 24°19'01" N, 105°49'05" W on both specimen labels at SDNHM). According to Uetz (2012), Robert Meidinger (pers. comm., 31 July, 2011) believes that this record is almost impossible and erroneous, and considers (Robert Meidinger pers. comm., 15 and 19 September, 2012) that the elevation at that locality of 2 500-2 800 m is simply not suitable for *C. stejnegeri*; even Yamoriba itself (24°14'06" N, 105°49'37" W) at about 1 780 m would be the highest location ever reported. Evidently, additional data of capture of the same specimens provided by Klauber (1972) fail to live up to scrutiny: “I was told by Langan W. Swent, who succeeded in having a collector get 2 specimens for me, that they were found on the border of a pine forest, at the upper edge of a canyon dissecting a plateau.” In any case, the place of capture of these specimens must have been at a very high altitude, since pine forests in that area are situated upward from about 1 200 m.

Campbell and Flores-Villela (2008) suggested that in life some specimens of *C. stejnegeri* might have a greatly

reduced amount of orange coloration, usually limited to a few scattered scales on the flanks. Reyes-Velasco et al. (2010) mentioned that *C. stejnegeri* is significantly duller in color compared to *C. lannomi* and *C. ericsmithi*. The 2 live specimens of *C. stejnegeri* we collected, however, display orange-brown coloration, especially after shedding their skin; the dorsal body blotches have a dark brown border with orange-brown at the inner side and a grayish-brown center while the dark part of the lateral blotches is amply covered by orange-brown (Fig. 2B).

According to Klauber (1972), the pigmy rattlesnake (*Sistrurus miliarius*) and the Long-tailed Rattlesnake (*C. stejnegeri*) have rattles so tiny as to be almost useless as sound producers. Our specimens, whilst indoors, in a glass terrarium, create a faint sound that can be heard from a distance of about 60 cm, resembling the buzzing of an insect, although not as continuous as that of a bee but more like the calling of a cicada.

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