CROTALUS TRANSVERSUS TAYLOR 1944, THE CROSS-BANDED MOUNTAIN RATTLESNAKE

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HISTORICAL

The cross-banded mountain rattlesnake was first described by Taylor in 1944, as *Crotalus transversus*. The type specimen, an adult female, was collected by E. Powell on 14 August 1942 (Taylor, 1944a; Davis and Smith, 1953). The type locality was given as 'about 55 km SW Mexico (city), near Tres Marias (Tres Cumbres), Morelos', at an elevation of about 3,077 m (Taylor, 1944a). The locality of Tres Marias (Tres Cumbres) is, in all probability, incorrect, as this is a small village along the highway between Mexico City (Distrito Federal) and Cuernavaca (Morelos). The elevation of this area is lower than that reported for *Crotalus transversus*, and no specimens have been collected there (Campbell, 1988; Campbell, pers. comm.). At Tres Cumbres, there is a road that leads up to an area which contains several lakes, called the Lagunas de Zempoala, and it is here that *Crotalus transversus* is found. Smith (pers. comm.) mentioned that the distance between Tres Cumbres and Lagunas de Zempoala is approximately 8 km.

Since the time of the original description, there seems to have been some question as to the correct state in which Lagunas de Zempoala is located: either Morelos or Mexico. Davis and Smith (1953) provided information regarding this matter, and, for the sake of clarity, I have decided to quote them directly. 'The type specimen of this species was collected by Ernest Powell, one of Davis' students, on August 14, 1942. The group at that time was camped at Laguna Zempoala in the state of Mexico, about five kilometers west of the Mexico-Morelos boundary. It is reasonable to assume that the specimen actually was taken in Mexico, rather than in Morelos, although at that time the group was working under the impression that their camp was in Morelos and so recorded it on all specimen labels. On that particular day Powell records in his journal that he observed creepers feeding in trees near the lake. It seems advisable to fix the type locality, therfore, as Laguna Zempoala, state of Mexico.'

More recently, Campbell (1988) clarified the locality problem by pointing out that the locality of Laguna(s) de Zempoala actually refers to 'any of at least six lakes, all of which lie in the state of Morelos'. Apparently, the problem, at least in part, is the lack of good quality maps to discern the actual location of Lagunas de Zempoala. Campbell (pers. comm.) informed this author that he recently received topographical maps of the area, which show that Lagunas de Zempoala are in northwestern Morelos. This information was used in the preparation of the map and distribution information provided by Campbell and Lamar (1989).

ETYMOLOGY

The specific name *transversus* is derived from the Latin word 'trans', which means across, and 'versus' or 'verto', to turn (Brown, 1985). The name is in reference to the crossbands that are usually present on the dorsal surface of this rattlesnake.

PHYLOGENY

Diagrams ('phylogenetic trees') depicting the phylogenetic relationships of *Crotalus* species, including *Crotalus transversus* can be found in Smith (1946), Klauber (1956), Brattstrom (1964), Klauber (1972), and Stille (1987). The latter account used dorsal scale microdermatoglyphics to show the relationship between the various *Crotalus* species.

DESCRIPTION

Cross-banded mountain rattlesnakes typically occur in 2 color phases: one is reddish or orangish, the other is gray, brownish-gray, or grayish-black. The dorsal pattern of the body consists of a series of 34-45 black or dark brown crossbands, usually 1 scale wide (occasionally 2), with interspaces of 2-4 scales. Occasionally, the crossbands are irregular (Y-shaped, or broken mid-dorsally), and are often widest mid-dorsally.

The ventral surface is pale or buff-colored, with varying amounts of dark mottling; some specimens have almost entirely black ventral surfaces.

The head is usually colored the same as the dorsal surface, and is not strongly marked. In some specimens, a pair of nape blotches (sometimes parenthetically-shaped) are present, and there are usually light (pale) bars on the supraocular scales. The most prominent markings on the head are the dark postocular stripes, one on each side, that extend from the eye, downward, to the angle of the jaw. These dark stripes are bordered above and below by narrower, light lines. The labial scales are usually pale, buff, or brown-colored, and may be variably mottled with darker pigment (more so on the infralabials).

The tail is patterned with 5-9 black or dark brown crossbands. The anterior rattle matrix can be buff, or it may be similar to the dorsal ground color.

Detailed descriptions of this rattlesnake species can be found in Martin del Campo (1940) (as an aberrant *Crotalus triseriatus*), Taylor (1944a), Smith (1946), Klauber (1952), Campbell (1988), and Campbell and Lamar (1989).

Dichotomous keys for rattlesnakes, including *Crotalus transversus* have been provided by Smith and Taylor (1945), Smith (1946), and Klauber (1952; 1956; 1971; 1972). In addition, Campbell and Lamar (1989) provided a key to the venomous snakes of Mexico, which included *Crotalus transversus*.

Photographs (black & white, and color) or line drawings can be found in Taylor (1944a), Harris and Simmons (1978), Armstrong and Murphy (1979), Glenn and Straight (1982), Campbell (1988) (taken from Taylor, 1944a), and Campbell and Lamar (1989).

SQUAMATION

Typically, *Crotalus transversus* has 21 scale rows at mid-body. Subcaudal scale counts range from 25-27 in males, and from 19-22 in females. Ventral scale counts range from 141-145 in males, and trom 142-155, in females. The number of supralabial scales range between 8-10 (usually 9), and the number of infralabials, between 8-9 (usually 9). There are typically 8 rattle-fringe scales in this species.

Literature accounts that contain squamation data, include Martin del Campo (1940) (as an aberrant *Crotalus triseriatus*), Taylor (1944a), Smith (1946), Klauber (1952; 1956; 1972), Campbell (1982; 1988), Campbell and Lamar (1989).

CONFUSING SPECIMEN

Campbell (1982) reported on a preserved *Crotalus* specimen (FMNH #39115) from Cerro Tancitaro, Michoacan, that has been collected in 1941. After examining this specimen, and collecting information on its squamation, coloration, and dorsal pattern, it became apparent, to him, that it shared similarities with *Crotalus intermedius*, *Crotalus pricei,* and *Crotalus transversus*, having 'closest affinities with *Crotalus transversus*' (Campbell, 1982). In fact, Campbell (1988) and Campbell and Lamar (1989) both mention that this questionable specimen might be 'closely related to', or, 'conspecific with', *Crotalus transversus.*

SIZE

Crotalus transversus is a small rattlesnake, with the type specimen, having a total length of 464 mm (some literature accounts report the length as 465 mm), being the largest known. All literature accounts (seen by this author), providing size data for this species cited measurements under 465 mm, with 6 exceptions: Klauber (1956; 1972) who gave the estimated size of a 'Large adult male' as 500 mm; Wittner (1978), who listed *Crotalus transversus* as one of 4 rattlesnakes species that 'seldom or never' exceed 559 mm; Gallina and Snagri (1979), who reported that its size is approximately 600 mm; Glenn and Straight (1982), who reported that the maximum length 'may approach' 610 mm; and Campbell and Lamar (1989) who listed it as one of 3 species that 'reach only 500-600 mm in total length'. The smallest specimen, so far reported, is the paratype, which has a total length of 183 mm.

RANGE

The cross-banded mountain rattlesnake is known only from a small part of the Sierra Ajusco mountains, located southwest of Mexico City, and northwest of Cuernavaca, in Morelos, Mexico. These mountains are part of the Transverse Volcanic Cordillera, and surround an area known as Lagunas de Zempoala. Gallina and Sangri (1979) (in Spanish) seemingly provide a detailed account of this area, including its history, habitats, elevations, temperatures, etc. All of the known specimens of *Crotalus transversus* have come from this area in Morelos, although this species may eventually be found to occur in the adjacent states of Distrito Federal and Mexico. There have been no specimens collected in either of the latter states, however, many authors include one, or both, of them, in their accounts of the species' range (Klauber, 1952, 1956; Klemmer, 1963; Hoge, 1965; Hoge and Romano, 1971; Brown, 1973; Gans, 1978; Hoge and Romano-Hoge, 1978/79; Harding and Welch, 1980; Kilmon and Shelton, 1981; Gonzales, Mendoza, Mancilla and Camarillo, 1985; Ganzalez, Camarillo, Mendoza and Mancilla, 1986; and Flores Villela and Gerez, 1988).

Literature accounts of the range of the cross-banded mountain rattlesnake (general or specific, including reference to the type locality) can be found in Martin del Campo (1940) (as an aberrant *Crotalus triseriatus*), Taylor (1944 a & b), Smith and Taylor (1945), Smith (1946), Martin del Campo (1950), Smith and Taylor (1950), Klauber (1952), Smith and Davis (1953), Klauber (1956), Klemmer (1963), Duelman (1965), Hoge (1965), Russell (1969), Hoge and Romano (1971), Klauber (1971; 1972) Brown (1973), Marx (1976), Gans (1978), Hoge and Romano-Hoge (1978/79), Armstrong and Murphy (1979), Gallina and Sangri (1979), Russell (1979), Gongora and Flores Villela (1980), Kisser (1980), Campbell (1982), Phelps (1984), Flores Villela (1985), Gonzales, Mendoza, Mancilla, and Camarillo

(1985), Gonzalez, Camarillo, Mendoza and Mancilla (1986), Mehrtens (1987), Campbell (1988), Flores Villela and Gerez (1988), Campbell and Lamar (1989).

Maps depicting the range of *Crotalus transversus* can be found in Smith (1946), Klauber (1956), Hoge and Romano (1971), Klauber (1971; 1972), Harris and Simmons (1978), Glenn and Straight (1982), Campbell (1988), and Campbell and Lamar (1989).

HABITAT

Crotalus transversus is found in temperate boreal forest as classified by Leopold (1950). According to that literature account, the elevations at which *Crotalus transversus* is found are characterized by open pine and bunchgrass. Campbell (pers. comm.) and Porras (pers. comm.) mentioned that fir trees also occur in this area. A photograph (black & white) of the habitat was provided by Armstrong and Murphy (1979).

Literature accounts of the habitat occupied by, or at least found within the range of, this rattlesnake occur in Leopold (1950), Armstrong and Murphy (1979), Gallina and Sangri (1979), Trutnau (1981), Campbell (1988), and Campbell and Lamar (1989).

Elevational records for *Crotalus transversus* range between 2896-3293 m, and can be found in Taylor (1944a), Klauber (1956; 1972), Armstrong and Murphy (1979), Campbell (1988), Flores Villela and Gerez (1988), and Campbell and Lamar (1989).

FOOD

There is little information in the literature regarding the food of this species. Klauber (1972) stated that 'one specimen contained lizard scales'. Kilmon and Shelton (1981), and Obst, Richter and Jacob (1988) both stated that *Crotalus transversus* feeds primarily on lizards. Armstrong and Murphy (1979) reported that one of their snakes 'defecated lizard scales, probably *Sceloporus aeneus*'. Campbell (pers. comm.) pointed out that the iguanid lizard, *Sceloporus gramicus* ssp., is abundant in the area where this rattlesnake is found, and may be the primary food source.

The 6 specimens of *Crotalus transversus* that were discussed in Armstrong and Murphy (1979), were maintained in captivity, at various institutions, for a short period of time. Charles Radcliffe (pers. comm.) informed this author that 3 of these specimens were maintained by him at the Denver Zoo, and 2 specimens were maintained at the Dallas Zoo. These 5 specimens lived in captivity for approximately 6 months (Murphy, pers. comm.; Radcliffe, pers. comm.), during which time they steadily refused food. However, Radcliffe (pers. comm.) mentioned that 1 of his specimens did strike at, and bite, a lizard, on one or two occasions. In addition, Harris (pers. comm.) received the sixth specimen, and maintained it in captivity for approximately 3-4 months. This specimen also refused food during its time in captivity. Moreover, Peterson, (pers. comm.) informed this author that the Laboratorio de Herpetologia located in Tlalnepantla, Mexico, maintained a subadult specimen in captivity for a while, and that it reportedly ate either a lizard or a mouse, before it died.

The disposition of the 7 specimens mentioned above, is as follows: the 3 specimens from the Denver Zoo are in the Univ. of Colorado Museum (#51421-23); the 2 specimens from the Dallas Zoo are in the collection at the Univ. of Arlington (UTA #R-3988, #12588); the single specimen maintained by Harris is in the collection at the Maryland Natural History Society (#RS1OS7 HSH/RSS); the specimen from the Laboratorio de Herpetologia, is in that institution's preserved collection.

HABITS

Armstrong and Murphy (1979) reported that 5 specimens were observed basking on south facing slopes on volcanic rocks. They were found, following morning rain-showers which occur 'almost daily' during the summer months (Armstrong and Murphyl 1979; Campbell, pers. comm.; Radcliffe, pers. comm.). The temperature at the time of collection was between 16°-20°C. Laszlo (19BO) considered *Crotalus transversus* to be a 'Mountain Cold Zone Form', with a temperature range of 12-21°C, and an 'optimal' temperature of 20°-21°C.

Armstrong and Murphy (1979) also reported that this species was a 'very inoffensive rattlesnake', and it retreated quickly when discovered. Radcliffe (pers. comm.) stated that a specimen he collected was 'extremely mild', and did not attempt to strike, but instead, tried to escape.

BREEDING

Virtually nothing is known about the breeding habits of this species. Apparently the only clue to its reproductive habits is that the holotype (collected in August) and UCM #51423 (collected in July) were gravid (Campbell, 1988).

LIVING SPECIMENS

Considering the apparent rarity of *Crotalus transversus*, it seems important to point out, that, as far as this author could ascertain, there are no living specimens of this rattlesnake in the United States, at this time, nor have there been in recent years. However, there are, or recently have been, live specimens in Mexico. Slavens (1987) reported I specimen (unknown sex) that was being maintained by Enrique Godinez, in the state of Mexico. In addition, Slavens (1988) reported that, as of January 1, 1988, a juvenile specimen was being maintained at the Laboratorio de Herpetologia, in Tlalnepantla, Mexico. However, Peterson (pers. comm.) reported that, during his recent visit to this institution, in June, 1989, he was told that the specimen had died.

PRESERVED SPECIMENS

An attempt was made to locate all specimens of *Crotalus transversus* that are currently in United States institutions, as well as some of those in Mexico. The paucity of preserved specimens of *Crotalus transversus* that are available, is evidenced by the brief list provided below. Hopefully, no U.S. specimens have been omitted from this list, although if they have been, this author would like to know about it. Admittedly, there may be a few additional specimens in Mexican institutions, but if there are, they have remained obscure, or, seemingly, unknown to U.S. workers. As can be seen from the list below, this species is apparently known from fewer that 15 specimens.

1: FMNH #100129 (previously EHT-HMS #30001) type specimen, adult female;
2: FMNH #100710 (previously EHT-HMS #15879), paratype, juvenile;
3: RS1087 HSH/RSS;
4: UCM #51421;
5: UCM #51422;

6: UCM #51423;
7: KU #159361;
8: KU #159362;
9: UTA #R-3988;
10: UTA #12588;
11: Mexican National Museum specimen, (discussed in Klauber, 1952), (time restrictions prevented locating the specimen #);
12: Laboratorio de Herpetologia, UANM, Tlalnepantla, Mexico, (time restrictions prevented locating the specimen #);
13: La Facultad de Ciencias (cited in Gongora and Flores Villela, 1980, time restrictions prevented locating the specimen #);
14: La Facultad de Ciencias (cited in Gongora and Flores Villela, 1980, time restrictisns prevented locating the specimen #).

ACKNOWLEDGEMENTS

Due to the rarity of this species, and the scarcity and limited availability of the literature pertaining to it, it was necessary to rely on the help of several people, in order to amass a fairly comprehensive review. Without their assistance, the content and quality of this article would have been considerably diminished.

I am grateful to Hobart Smith, Ph.D. (E.P.O. Dept., Univ. of Colorado) for bringing to my attention several of the references used in this article, for providing me with copies of 10 of them, for a discussion about the area where this species is found, and for providing a map of the Lagunas de Zempoala area. I am also thankful Jonathan Campbell, Ph.D. (Dept. of Biology, Univ. of Arlington) for discussions on various aspects of the biology of this species, for supplying a copy of one of the references, and for also providing a copy of one of his 'species data sheets' (for UCM #51423). Charles Radcliffe, Ph.D. (Dept. Herpetology, San Diego Zoo) related information concerning the collection of this species in the wild, and the subsequent maintenance of 3 specimens in captivity. Louis Porras (Zooherp Inc., Sandy, Utah) generously provided a copy of one of the references, and also discussed the geography and habitat of the area where this species is found. Jim Murphy (Dept. Herpetology, Dallas Zoo) and Herbert Harris (Natural History Soc. of Maryland) kindly related their experiences in maintaining these rattlesnakes in captivity. Karl Peterson (Dept. of Herpetology, Houston Zoo) related information about a specimen that had been maintained at the Laboratorio de Herpetologia, in the state of Mexico. Richard A. Davis, Ph.D. (Cincinnati Museum of Natural History) provided assistance regarding the format of this article, as well as proper literature citations. Joe Collins (Museum of Natural History, Univ. of Kansas) provided a copy of one of the references, and also confirmed the number of specimens at the Univ. of Kansas Museum. Paul Gritis provided a copy of one of the references used, and helped with the translation (from German) of another. Bonnie Kaufman kindly provided a copy of one of the references used. Finally, I am grateful to my wife, Jane, for diligently reviewing the final draft of the manuscript this article.

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