

Catalogue of American Amphibians and Reptiles.

Greene, B.D., R.F. Wilkinson, Jr., and R. Powell. 1998. *Micrurus limbatus*.

Micrurus limbatus Fraser Tuxtlan Coral Snake

Micrurus limbatus Fraser 1964:570. Type locality, "on the southern slope of Volcán San Martín, 7 airline miles north of San Andrés Tuxtla, Veracruz, Mexico, at 1,050 m." Holotype, University of Michigan Museum of Zoology (UMMZ) 123858, a young female collected 11 July 1959 by D.C. Robinson (not examined by authors).

• **CONTENT.** Two subspecies are recognized: *Micrurus limbatus limbatus* and *M. l. spilosomus*.

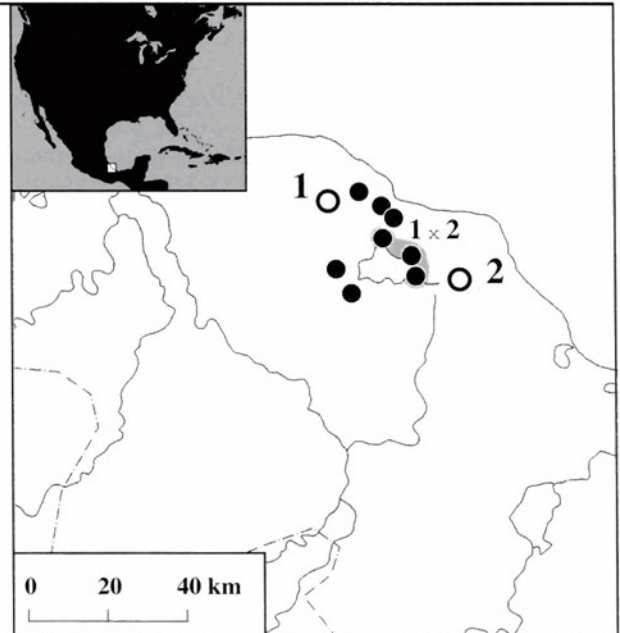
• **DEFINITION.** *Micrurus limbatus* is a bicolored coral snake known to reach a maximum total length of 635 mm (Roze 1996). Head scales include 1–1 preoculars, no loreals, 2–2 postoculars, 1–1 temporals, 7–7 supralabials with 3–4 entering the orbit, and 7–7 infralabials. Dorsal scale rows are 15–15–15. Ventrals number 189–192 (males) and 198–206 (females), divided subcaudals 37–42 (males) and 25–30 (females). Tail length/total length is 0.132–0.139 in males and 0.085–0.094 in females (Roze 1996). The anal plate (= cloacal scute) is divided. Keeled supraanal scales are absent. The hemipenes are long and bifurcated. See subspecific definitions for details of pattern.

• **DIAGNOSIS.** *Micrurus limbatus* may be distinguished from all other coral snakes in central and southern Veracruz on the basis of pattern. "*Micrurus elegans* possesses black rings disposed in triads and *M. diastema* in this region is tricolored, with clearly definable yellow rings, and fewer than 24 black rings on the body" (Campbell and Lamar 1989). Sympatric colubrids may be distinguished by various aspects of scalation and pattern, although both scalation and pattern of *M. l. limbatus* are remarkably similar (Greene and McDiarmid 1981) to those of sympatric *Pliocercus elapoides* (= *Urotheca elapoides*, *vide* Savage and Crother 1989, but see also Myers and Cadle 1994, Smith and Chiszar 1996, and Wilson and McCranie 1997).

• **DESCRIPTIONS.** In addition to the original by Fraser (1964), detailed descriptions may be found in Campbell and Lamar (1989), Pérez-Higareda and Smith (1990), and Roze (1996).

• **ILLUSTRATIONS.** Fraser (1964) included a line drawing of the pattern at midbody. Greene and McDiarmid (1981) provided a color illustration of a spotted *M. limbatus* and a similarly patterned colubrid in the genus *Pliocercus*. Color plates of both subspecies are in Campbell and Lamar (1989), and Pérez-Higareda and Smith (1991). A color photograph of *M. l. spilosomus* is in Roze (1996), as is a line drawing illustrating the color pattern in the nominate subspecies. Vogt (1997) provided black and white photographs of *M. l. limbatus*, similarly patterned *P. bicolor*, and venters of *M. l. limbatus* and *P. elapoides*. Pérez-Higareda and Smith (1990) included black and white photographs illustrating dorsal and ventral patterns of both subspecies.

• **DISTRIBUTION.** This species is endemic to the Los Tuxtlas region of southern Veracruz, México, where it occupies low to moderate elevations (160–1,500 m) in the moist tropical forest of Holdridge (1967). The ringed chromotypes are found in the



MAP. Range of *Micrurus limbatus*. Circles mark the type-localities, dots indicate other records. Some dots represent more than one proximate locality.

vicinity of Volcán San Martín Tuxtla, whereas spotted individuals are known only from the vicinity of Sierra Santa Marta. The range was illustrated in Campbell and Lamar (1989) and Roze (1996). Fraser (1964), Flores Villela et al. (1987), Pérez-Higareda [sic] et al. (1987), Pérez-Higareda and Smith (1990), and Dirzo et al. (1997) provided maps of the region.



FIGURE 1. *Micrurus limbatus limbatus* from the Estación de Biología Tropical "Los Tuxtlas," Veracruz, México.



FIGURE 2. *Micrurus limbatus spilosomus* from the Sierra de Santa Marta, Veracruz, México. Photograph by Harry W. Greene.

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** Fraser (1964) described the species and presented comparisons with sympatric *Micrurus affinis* (= *M. diastema*). In an analysis of variation in *M. diastema*, Fraser (1973) compared the number of bands with those of *M. limbatus*. Greene (1973) first noted the presence of a spotted individual and briefly described its behavior. Greene and Pyburn (1973) noted that snakes of this species "bite readily when forcibly restrained." Pérez-Higareda (1980), Greene and McDiarmid (1981), Pérez-Higareda and Smith (1986), Smith and Chiszar (1996), Greene (1997), and Vogt (1997), in discussing mimicry, noted the variation in pattern among *M. limbatus* and the corresponding similarities among sympatric snakes in the genus *Pliocercus*. Campbell and Lamar (1989) provided a description. Pérez-Higareda and Smith (1991) noted intergrades between the subspecies at Coyame, Tebanca, and Pipiapan. Roze (1996) included the species in his monograph on coral snakes and specifically noted that *M. limbatus* is only one of two coral snakes (*M. corallinus* is the other) that do not use a defensive tail display. Roze (1996) also mentioned that the principal food of the nominate subspecies was "colubrid snakes" (for *M. l. spilosomus* he indicated that food was "unknown"). Ramírez-Bautista and Nieto-Montes de Oca (1997) provided information on habitat association. Rodríguez García et al. (1998) included a list of snakes consumed, ignored, or feared by captive *M. limbatus*.

Liner (1994), Frank and Ramus (1995), and Roze (1996) listed the English common name (used here) proposed by Campbell and Lamar (1989); Liner (1994) also suggested the Spanish common name "coral de Los Tuxtlas."

This species is included in keys and checklists by Smith and Taylor (1966), Roze (1967, 1982 [1983]), Ramírez-Bautista (1977), Pérez-Higareda (1980), Ramírez et al. (1981), Golay (1985), Pelcastre Villafuerte and Flores-Villela (1992), Flores-Villela (1993), Welch (1994), Flores Villela et al. (1995), and Vogt et al. (1997). Anonymous (1994) listed *M. limbatus* as a rare Mexican endemic species.

• **ETYMOLOGY.** The name *limbatus* is from the Latin meaning "border," presumably in reference "to the black borders or margins outlining the red scales" (Roze 1996). The name *spilosomus* is derived from the Greek *spilo* (spot or spotted) and *somus* (body), in reference to the pattern of this form.

1. *Micrurus limbatus limbatus* Fraser

Micrurus limbatus Fraser 1964:570. See species synonymy.
Micrurus limbatus limbatus: Pérez-Higareda and Smith 1990:7.

• **DEFINITION.** This subspecies is characterized by 31–35 (male) or 35–43 (female) complete black rings, including the nuchal, on a red ground color. Dorsal scales in the intervening areas are heavily pigmented with black, but red areas of the venter are immaculate. The black snout includes the rostral, nasals, prefrontals, frontal, supraoculars, preocular, and most of the parietals and supralabials 1–3. Infralabials 1–4 and the mental are black-spotted, chinshields usually are spotted. The nuchal ring extends 4 scale lengths middorsally, 6 laterally, and 3–4 on the venter. Body rings average 3 scale lengths middorsally. Tail rings (5–6 in males, 4–5 in females) are complete and 4–5 subcaudals in length (shorter dorsally).

2. *Micrurus limbatus spilosomus* Pérez-Higareda and Smith

Micrurus limbatus spilosomus Pérez-Higareda and Smith 1990:

6. Type locality, "Bastonal, Sierra de Santa Marta, 900 m, municipality of Catemaco, Veracruz, Mexico." Holotype, Universidad Nacional Autónoma de México, Los Tuxtlas (UNAM-LT) 2733, adult female, collected July 1985 by G. Pérez-Higareda and O. Flores Villela (not examined by authors).

• **DEFINITION.** This subspecies is characterized by 14–21 round or oval black dorsal spots and highly irregular, widely-spaced ventral blotches on a red ground color. The principal dorsal spots (19–21 in males, 14–15 in females) are 6–10 scales in length, 4–7 in width, usually separated by spaces 10–14 scales in length, occasionally fewer, and are separated from the ventrals by at least two dorsal scale rows. Dorsal scales in the intervening areas are black-tipped, but much less so than in the nominate subspecies. Ventral blotches may extend to 10–15 ventrals in length, are asymmetrical and angular, and never reach the edges of the ventral scales. Intervening red areas are immaculate. Dorsal spots and ventral blotches do not correspond with each other. Black on the head extends from the prefrontals to the center of the parietal, and laterally includes the preocular, parts of the supraoculars and nasals, and the upper half of supralabials 1–2. Immediately adjacent areas are brown. Infralabials, the mental, and chinshields are immaculate. The nuchal ring extends 4 scale lengths middorsally and narrows ventrally, where it may be interrupted or is only 1 scale in length. The complete tail rings number 3–4, including the black tip, are 5 scales long dorsally, and 1–2 subcaudals in length ventrally.

• **ACKNOWLEDGMENT.** Marco A. López Luna of the Estación de Biología Tropical "Los Tuxtlas," UNAM, provided access to specimens and helped identify localities so obscure that they appear on no map.

LITERATURE CITED

- Anonymous. 1994. Poder ejecutivo. Secretaría de Desarrollo Social. Diario Oficial de la Federación. Organismo del Gobierno Constitucional de los Estados Unidos Mexicanos. Tomo 488, No. 10. 16 de mayo de 1994. México, D.F.
- Campbell, J.A. and W.W. Lamar. 1989. The venomous snakes of Latin America. Cornell Univ. Press, Ithaca, New York.
- Dirzo, R., E. González Soriano, and R.C. Vogt. 1997. Introducción general, p. 3–6. In E. González Soriano, R. Dirzo, and R.C. Vogt (eds.), Historia Natural de Los Tuxtlas. Univ. Nac. Aut. México, México.
- Flores-Villela, O. 1993. Herpetofauna Mexicana. Carnegie Mus. Nat. Hist. Spec. Publ. (17):iv + 73 p.
- , F. Mendoza Quijano, and G. Gonzalez Porter (eds.). 1995. Recopilación de claves para la determinación de anfibios y reptiles de México. Univ. Nac. Aut. México Publ. Esp. Mus. Zool. (10):1–285.
- , G. Pérez-Higareda, R.C. Vogt, M. Palma Muñoz, and O. Sánchez H. 1987. Claves para los géneros y las especies de anfibios y reptiles de la región de Los Tuxtlas. Estación "Los Tuxtlas," Univ. Nac. Aut. México, México, D.F.
- Frank, N. and E. Ramus. 1995. A Complete Guide to Scientific and Common Names of Reptiles and Amphibians of the World. NG Publ., Pottsville, Pennsylvania.
- Fraser, D.F. 1964. *Micrurus limbatus*, a new coral snake from Veracruz, Mexico. Copeia 1964:570–573.
- , 1973. Variation in the coral snake *Micrurus diastema*. Copeia 1973:1–17.
- Golay, P. 1985. Checklist and Keys to the Terrestrial Proteroglyphs of the World (Serpentes: Elapidae–Hydrophiidae). Elapsoidea, Geneva.
- Greene, H.W. 1973. Defensive tail display by snakes and amphisbaenians. J. Herpetol. 7:143–161.
- , 1997. Snakes: The Evolution of Mystery in Nature. Univ. California Press, Berkeley, Los Angeles, London.
- and R.W. McDiarmid. 1981. Coral snake mimicry: does it occur? Science 213:1207–1212.
- and W.F. Pyburn. 1973. Comments on aposematism and mimicry among coral snakes. Biologist 55:144–148.

- Holdridge, L.R. 1967. Life Zone Ecology. 2nd ed. Trop. Sci. Center, San José, Costa Rica.
- Liner, E.A. 1994. Scientific and common names for the amphibians and reptiles of Mexico in English and Spanish. Nombres científicos y comunes en inglés y español de los anfibios y los reptiles de México. SSAR Herpetol. Circ. (23):v + 113 p.
- Myers, C.W. and J.E. Cadle. 1994. A new genus for South American snakes related to *Rhadinaea obtusa* Cope (Colubridae) and resurrection of *Taeniophallus* Cope for the "Rhadinaea" *brevirostris* group. Amer. Mus. Nov. (3102):1–33.
- Pelcastre Villafuerte, L. and O.A. Flores-Villela. 1992. Lista de especies y localidades de recolecta de la herpetofauna de Veracruz, México. Univ. Nac. Aut. México Mus. Zool. Publ. Esp. (4):25–96.
- Pérez-Higadera [sic] (= Higareda), G., R.C. Vogt, and O.A. Flores Villela. 1987. Lista anotada de los anfibios y reptiles de la región de los Tuxtlas, Veracruz. Estación "Los Tuxtlas," Univ. Nac. Aut. México, México, D.F.
- Pérez-Higareda, G. 1980. Additions to and notes on the known snake fauna of the Estación de Biología Tropical "Los Tuxtlas," Veracruz, México. Bull. Maryland Herpetol. Soc. 16:23–26.
- and H.M. Smith. 1986. The status of the Los Tuxtlas (Mexico) False Coral Snakes (*Pliocercus*). Bull. Maryland Herpetol. Soc. 22:125–130.
- and —. 1990. The endemic coral snakes of the Los Tuxtlas region, southern Veracruz, Mexico. Bull. Maryland Herpetol. Soc. 26:5–13.
- and —. 1991. Ofidiofauna de Veracruz: Análisis Taxonómico y Zoogeográfico. Ophidiofauna of Veracruz: Taxonomical and Zoogeographical Analysis. Univ. Nac. Aut. México Inst. Biol. Publ. Esp. (7):1–122.
- Ramírez-Bautista, B.A. 1977. Algunos anfibios y reptiles de la Región de Los Tuxtlas. Unpubl. Thesis, Univ. Veracruzana, Xalapa.
- and A. Nieto-Montes de Oca. 1997. Ecogeografía de anfibios y reptiles, p. 523–532. In E. González Soriano, R. Dirzo, and R.C. Vogt (eds.), Historia Natural de Los Tuxtlas. Univ. Nac. Aut. México, México.
- , G. Pérez-Higareda, and G. Casas-Andreu. 1981. Lista preliminar de los anfibios y reptiles de la región de Los Tuxtlas, Veracruz. Inst. Biol., Univ. Nac. Aut. México, México, D.F.
- Rodríguez García, J., G. Pérez-Higareda, H.M. Smith, and D. Chiszar. 1998. *Micrurus diastema* and *M. limbatus*. Diet. Herpetol. Rev. 29:45.
- Roze, J.A. 1967. A check list of the New World venomous coral snakes (Elapidae), with descriptions of new forms. Amer. Mus. Novit. (2287): 1–60.
- . 1982 (1983). New World coral snakes (Elapidae): a taxonomic and biological summary. Mem. Inst. Butantan 46:305–338.
- . 1996. Coral Snakes of the Americas: Biology, Identification, and Venoms. Krieger Publ. Co., Malabar, Florida.
- Savage, J.M. and B.I. Crother. 1989. The status of *Pliocercus* and *Urotheca* (Serpentes: Colubridae), with a review of included species of coral snake mimics. Zool. J. Linnean Soc. 95:335–362.
- Smith, H.M. and D. Chiszar. 1996. Species-group taxa of the False Coral Snake genus *Pliocercus*. Ramus Publ., Inc., Pottsville, Pennsylvania.
- and E.H. Taylor. 1966. Herpetology of Mexico. Annotated checklists and keys to the amphibians and reptiles. A reprint of Bulletins 187, 194, and 199 of the U.S. National Museum with a list of subsequent taxonomic innovations. Eric Lundberg, Ashton, Maryland.
- Vogt, R.C. 1997. Comunidades de serpientes, p. 503–506. In E. González Soriano, R. Dirzo, and R.C. Vogt (eds.), Historia Natural de Los Tuxtlas. Univ. Nac. Aut. México, México.
- , J.-L. Villarreal Benítez, and G. Pérez-Higareda. 1997. Lista anotada de anfibios y reptiles, p. 507–522. In E. González Soriano, R. Dirzo, and R.C. Vogt (eds.), Historia Natural de Los Tuxtlas. Univ. Nac. Aut. México, México.
- Welch, K.R.G. 1994. Snakes of the World. A Checklist. 1. Venomous Snakes. R&A Res. Info. Ltd., KCM Books, Somerset, England.
- Wilson, L.D. and J.R. McCranie. 1997. Publication in non-peer-reviewed outlets: the case of Smith and Chiszar's "Species-group taxa of the False Coral Snake genus *Pliocercus*." Herpetol. Rev. 28:18–21.

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Primary editor for this account, Larry David Wilson.

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