Instituto Nacional de Salud

# • Llaneran Coral snake •

## (*Micrurus isozonus*)

Bites, venoms, and venomous snakes of Colombia

**G4**

MEDICAL IMPORTANCE GROUP 4

Snakes that bite rarely, and have not caused significant envenoming or have not causes documented bites

Poorly Reliable: Confidence for this species is poor due to the lack of data and information on Colombian populations. Therefore, most of our knowledge comes from a few studies and populations outside the national territory.

Detail of: Head, body and tail.

# 1. Envenomation symptoms

There are no published cases of envenomation by *Micrurus isozonus*, and no records of snakebite accidents caused by this species have been recorded in Colombia's National Public Health Surveillance System (SIVIGILA, Spanish acronym). Information on the composition of its venom is also lacking. The symptoms of envenomation by *M. isozonus* are likely similar to those observed in cases of envenomation by other *Micrurus* species.

The symptoms of bites by *Micrurus* include various local and systemic symptoms depending on the grade of envenomation. Mild envenomation results in exclusively local symptoms, including redness of the skin (erythema), mild local pain that may radiate to the entire limb, and swelling (edema). Muscle pain (myalgia) and muscle twitching (i.e., fasciculation) are also possible [1,2]. Moderate envenomation results in more severe redness of the skin, and pain, as well as burning, stabbing, or stinging sensation (dysesthesia), prickling sensations (paresthesia), drooping of the upper eyelid (palpebral ptosis), weakening of the muscles used to produce speech (dysarthria), and altered taste (dysgeusia) [1,2]. Severe envenomation can cause flaccid paralysis within the first 30 minutes of the bite, excessive salivation (sialorrhea), severe dysarthria, paralysis of the flexor muscles of the neck ("broken neck sign"), and shortness of breath (dypsnea) [1–3].

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## 2. Treatments and snakebite care

Life-threatening symptoms can appear rapidly after envenomation by *M. isozonus*. Rapid medical attention, especially antivenom therapy, is thus essential for ensuring the safety of patients bit by this snake [4]. The first action that should be taken after a bite by *M. isozonus* is to immobilize the bitten limb [5]. Any local treatments that delay arrival to a medical facility, including those lacking any clinically demonstrated efficacy (e.g., the use of ice, medicinal plants, or oils on the site of the bite) should be avoided.

Upon arrival at a medical facility, the antivenom treatment regimen should be administered once envenomation is confirmed (mild, moderate, or severe), and the geographical origin of the accident should be considered [2]. In cases occurring in the Andean, Caribbean, and Pacific regions, five vials of INS antivenom may be required, while for cases in the Amazon or Orinoquía regions, 10 vials are needed [2,3]. These antivenom dosages are the same for both children and adults [7], and the application of antivenom should only be performed by qualified medical personnel [1,6].

## 3. Snakebite capacity

No clinically significant snakebite accidents caused by *M. isozonus* have been reported in Colombia. In Venezuela, where this snake is more common and widespread, bites caused by *M. isozonus* make up less than 0.5% of all snakebite accidents annually [7–10]. The absence of snakebite accidents caused by this species in Colombia might stem from its rarity, as records of this species in the country are few [11,12]. Despite the lack of information on its potential to cause harm, *M. isozonus* can attain large sizes (>1 m) and should thus be regarded as a highly dangerous snake. Any bite by *M. isozonus*, regardless of whether fang marks are visible, can result in envenomation and should be treated as a medical emergency.

## 4. Recognition

*M. isozonus* is medium to large-sized tricolored coral snake with 9–14 body triads (repeating units consisting of three black rings separated by two pale rings that together separate the red-orange rings) and 1 to $1\frac{2}{3}$ triads on the tail. The red-orange rings are often longer than the black and white rings, and the primary black ring in each triad (the black ring in the middle of each triad) is often longer than the two accessory black rings (the two outer black rings in each triad). The apical tips of the white and red rings are black, but the sizes of the black apical tips are much greater in the former than in the latter. The snout is black and white, and the relative proportions of these colors on the snout can vary. A black band (often irregular) covers the eyes, and this is followed by a red ring and a black ring, which is the first ring of the first body triad.

*M. isozonus* can be distinguished from all other co-occurring coral snakes bearing triads (*M. dissoleucus*, *M. filiformis*, *M. helleri*, *M. ortoni*, *M. nattereri*, *M. obscurus*, and *M. surinamensis*) in Colombia by the color pattern on the head, body form and size, and the number of body triads. *M. dissoleucus* is a smaller snake (typically 28–40 cm) and has a black snout. *Micrurus nattereri* and *M. surinamensis* have a red snout and fewer body triads (5–8). *Micrurus filiformis* has a slender body (diameter less than 0.5 cm) and more body triads (10–24). *Micrurus helleri* has well-defined black and white bands on the snout and fewer body triads (9–11). *M. ortoni* has a black snout and fewer body triads (7–10). *Micrurus obscurus* is most similar to *M. isozonus* but has fewer body triads (4–9) and a slightly thicker body.

# 5. Distribution

In Colombia, *M. isozonus* occurs in the Trans-Andean region, throughout the Orinoquia, and in the foothills of the Andes up to 500 m [11]. It has been documented in the following departments: Arauca, Bolívar, Casanare, Meta, and Vichada [11–14] (Figure 1).

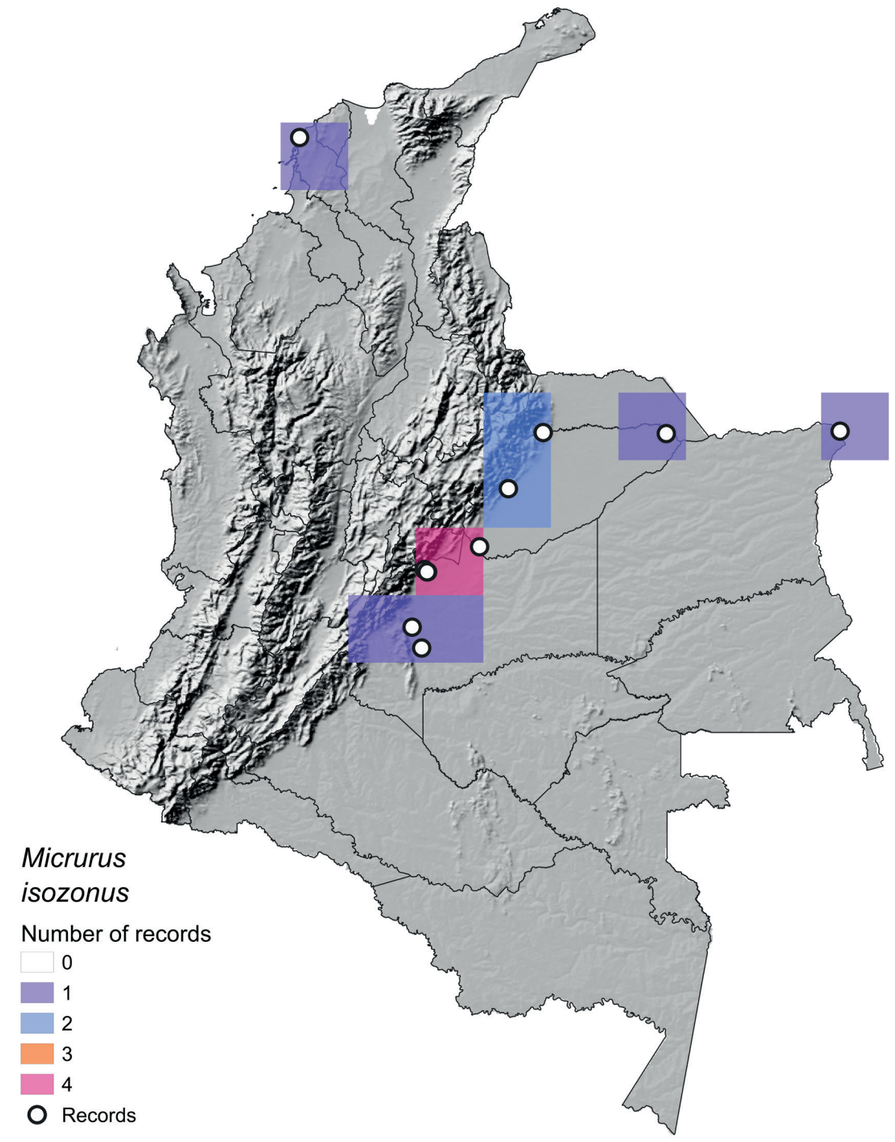


**Figure 1.** Geographic distribution of *Micrurus ancoralis* in Colombia and its habitat suitability model. Based on bioclimatic variables, the habitat suitability model predicts the species potential distribution in Colombia, identifying zones with suitable or unsuitable environmental conditions for its occurrence across the country. Values close to 1 indicate optimal environmental conditions (high probability of presence), while values close to 0 indicate unsuitable conditions (absence likely).

# 6. Natural history

Uncommon. This fossorial snake can be found in diverse habitats, including tropical deciduous forest, tropical thorn woodland, savanna, and gallery forest, but appears to be most common in semi-arid and seasonally dry regions [11,12,15,16]. It can also be found in disturbed habitats, such as pasture, secondary growth, and suburban areas [11,13]. *Micrurus isozonus* is surface-active in the morning, evening, or at night, but some populations in Venezuela appear to be chiefly nocturnal in their movements [17–20]. Although it is considered common throughout its range in Venezuela, it might be less common and widespread in Colombia based on the few numbers of localities from which it has been collected [8,12]. Given its apparent preference for semiarid habitats, *M. isozonus* could potentially colonize more humid areas at higher altitudes that have been aridified by human activities.

In Colombia, *M. isozonus* has been documented to prey on *Erythrolamprus bizona* [13]. Outside of Colombia, *M. isozonus* has been reported to prey on lizards and snakes, including microteiids (*Bachia* spp.), watersnakes (*Helicops* sp.), blindsnakes (*Leptotyphlops* sp.), and Boddaert's tropical racer (*Mastigodryas boddaerti*) [11,13,18]. No records of predation on *M. isozonus* have yet been reported. When threatened and unable to flee, *M. isozonus* often raises and curls its tail; it is also capable of vigorously defending itself [11,21,22]. *Micrurus isozonus* resembles *M. obscurus* in the Colombian Orinoquia, and whether this represents a case of Müllerian mimicry requires confirmation [11,13].

Unidentified nematodes have been reported in the intestines of this snake, and unidentified ticks have been observed on the infracephalic scales [13]. *M. isozonus* is oviparous, and no information on its reproduction is available for Colombian populations. In Venezuela, a 68-cm long female laid a clutch of 6 eggs, averaging 26.1 × 10.7 mm in size, on April 27 shortly before the start of the wet season [13,23]. Reproductive activity in *M. isozonus* is likely tied to the distribution of moisture throughout the year, with mating occurring in the dry season and oviposition before the beginning of the wet season [13,18]. More work is needed to clarify many aspects of the natural history of this poorly known snake in Colombia.

# 7. See it in the wild, rural or peri-urban areas

*Micrurus isozonus* can be found in the morning, evening, and at night in forest, pastures, savannas, and suburban areas. This snake can also be found under various types of natural and artificial cover, such as piles of leaves and waste.

# 8. Conservation

Least Concern. This species does not face immediate extinction threats because of its wide distribution across several countries and the fact that it occurs in various habitats, including disturbed environments. However, its ability to survive in altered environments makes *Micrurus isozonus* vulnerable to being killed by humans. This species is not listed in resolution 1912 of 2017 of the Colombian Environmental Ministry [24].

# 9. Scientific name and common names

The scientific name of this species is derived from the Greek roots *Mikros* (small) and *oura* (tail) referring to the short tails, which is a general trait of species from the *Micrurus* genus. The specific epithet is derived from two Greek roots: *isos* (equal) and *zone* (belt), which allude to the approximately equal length of the black and white rings [11,13]. In Colombia, this species is often referred to as *coral* or *coral llanera* [15].

**Table 1. Summary of important biological, venomic, epidemiological and medical traits.**

| TOXICITY AND BIOLOGICAL ACTIVITY ★ | VENOM ACTIVITY PROFILE | GENERAL BIOLOGICAL TRAITS |
|---|---|---|
| **$LD_{50}$ (µg/mice):** 57 (52–61 µg) | **Proteolytic:** Unknown | **Total Length (cm):** ♂ ♀ 21–127 |
| **MCD (µg/mL):** Unknown | **Neurotoxic:** Yes | **Weight (g):** ♂ ♀ Unknown |
| **MDD (µg/mice):** Unknown | **Myotoxic:** Unknown | **Reproduction:** oviparous |
| **MED (µg/mice):** Unknown | **Hemotoxic:** Unknown | **Diet:** lizards, snakes |
| **MHD (µg/mice):** Unknown | - | **Distribution:** Caribbean, Orinoquia, and Andes up to 500 m |

| PROTEOME | | | |
|---|---|---|---|
| **$PLA_2$:** Unknown | **SVSP:** Unknown | **SVMP:** Unknown | **NGF:** Unknown |
| **CRISP:** Unknown | **CTL:** Unknown | **DIS:** Unknown | **KUN:** Unknown |
| **BPPs:** Unknown | **VEFG:** Unknown | **3FTx:** Unknown | |
| **Crotoxin:** None | **Crotamine:** None | **LAAO:** Unknown | |

| MAIN ENVENOMATION SYMPTOMS | | RISK | GRADE OF ENVENOMATION |
|---|---|---|---|
| **Hemorrhage**: Unknown | **Ecchymosis:** Unknown | **Bites per year:** Unknown | **Mild:** Unknown |
| **Nausea:** Unknown | **Hematemesis:** Unknown | | |
| **Hypotension:** Unknown | **Blisters:** Unknown | **Bites per 1,000 people yearly:** Unknown | **Moderate:** Unknown |
| **Edema:** Unknown | **Vomiting:** Unknown | | |
| **Coagulopathy:** Unknown | **Diarrhea:** Unknown | **Sequalae caused per year:** Unknown | **Severe:** Unknown |
| **Sialorrhea:** Unknown | **Local Pain:** Unknown | | |
| **Hematuria:** Unknown | **Necrosis:** Unknown | **Deaths caused per year:** Unknown | |
| **Renal failure:** Unknown | | | |

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