

# • Anchor Coralsnake •

(*Micrurus ancoralis*)

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 caused documented bites



⚠ Moderate reliable: Confidence for this species is limited or almost non-existent for Colombian populations. Therefore, most of our knowledge comes from populations outside the national territory



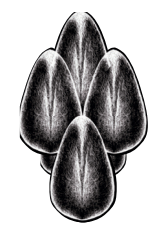
⚠ Detail of: Head, body and tail.

## 1. Envenomation symptoms



Symptoms of envenomation caused by *Micrurus ancoralis* venoms are unknown because most records of coralsnake bites are classified at the genus level in the Colombian public health system (SIVIGILA Spanish acronym). Furthermore, there is no information about the venom composition or proteome for this species. Unlike accidents with snakes from the family Viperidae, coralsnake bites occasionally may not leave fang marks on the skin, therefore, if marks are non-observed, the event should not be underestimated [1].

The symptoms of envenomation related to a coralsnake bite depend may vary in severity. Symptoms may range from pain and inflammation at the site of the bite (usually hands and feet), to respiratory paralysis [2]. The first symptoms are a loss of sensitivity, numbness, or paresthesia (tingling sensation) on the bitten zone, however, these symptoms may not appear in mild cases. Systemic neurological symptoms occur in moderate and severe envenoming cases according to the amount of venom inoculated, individual characteristics of the affected subject and time elapsed since the bite, among others. In severe cases, neurological manifestations are present within 30 min after the bite, but in moderate cases they appear between one to two hours. Neurological signs in moderate cases begin with fuzzy vision, palpebral ptosis (drooping eyelid), facial droop, difficulty in speaking, and disorientation; sometimes nausea and vomiting appear. Afterwards, symptoms may appear in larger muscle groups, including loss of strength in limbs, neck paralysis, difficulty walking, and paresthesia. Finally, respiratory paralysis occurs bringing the patient to a critical condition needing assisted (mechanical) breathing in severe cases [2].



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## 2. Treatments and snakebite care



Due to the neurotoxic action of coral snake venom and that symptoms can appear in less than an hour, *Micrurus ancoralis* envenoming must be treated as a serious accident, and medical attention must be carried out immediately to avoid serious lesions or the death of the patient [3].

In comparison with envenoming by a viper, the risk of respiratory failure from envenomation by a coral snake is so high that time plays a very important role for the survival of the patient. For this reason, any treatment with traditional medicine is totally contraindicated. Treatment with antivenoms is the most effective and recommended therapy [4].

To provide initial aid, the patient should maintain complete rest while continuously monitoring their movements and respiratory performance in case respiratory assistance becomes necessary [2]. Furthermore, studies have demonstrated that applying a firm crepe bandage and splint (or, if available, an appropriate air splint) is an effective technique for slowing down the absorption of elapid venom [5]. According to the clinical and paraclinical manifestations, the snakebite accident should be classified as mild, moderate or severe. With this classification, the medical staff will be able to categorize the envenomation severity in order to define management and antivenom therapy. The severity of the poisoning must be reclassified within the first 12 hours after the bite [6].

For envenomations caused by any species of coral snake there is a general management protocol. First, coral antivenom serum must be applied during the first two hours before or when signs of paralysis appear [6]. The amount of antivenom serum to be administered will depend on the severity of the envenomation, as well as the neutralization capability of the serum's laboratory brand. However, it is recommended to begin with 5 vials (INS antivenom) for mild cases and 10 vials (INS antivenom) for moderate to severe cases [1,6]. Dosages are the same for children and for adults [7]. In moderate and severe envenoming cases, the patient should be referred to a third and second level hospital with ventilatory support and intensive care units (ICU) without stopping the application of antivenom [6]. Furthermore, a hypersensitivity to antivenoms can always appear, so it is important that medically trained staff exclusively does its application.

## 3. Snakebite capacity



In Colombia, there are no specific epidemiological records for *Micrurus ancoralis*; up until 2004 snakebite accidents were not considered to be a mandatory notification because they were not considered to be an event of public health interest [8]. However, among Colombian medically important species, coral snakes, including *M. ancoralis*, only represent 1.2% of snakebite cases in the entire country throughout the last decade [9,10]. The low frequency of accidents reported for this species may be due to the fact that it is a rare species [11], and, because *M. ancoralis* individuals are usually calm and try to flee when they are threatened [12].

The area where *M. ancoralis* is distributed, the department of Antioquia reported two cases of coral snake bite during 2020, including one death [10]. However, the name of the species that caused these events is not reported. It is noteworthy that for the department of Chocó, there are no reports of snakebite accidents caused by *Micrurus* even though *M. ancoralis* represents about 25.7% of the coral snake species reported for the Chocóan region [10,13]. However, these data could be biased due to the absence or difficulties in reporting these events, such as misidentification of the species (Table 1).

## 4. Recognition



This species is a large coral snake compared with most of the species of the genus. Adult averages can reach between 70 and 90 cm, but the maximum lengths reported are 114.6 cm for males and 148.6 for females. The largest individual reported was 151 cm, although information about the gender of this specimen is unknown (possibly it was a female) [14].

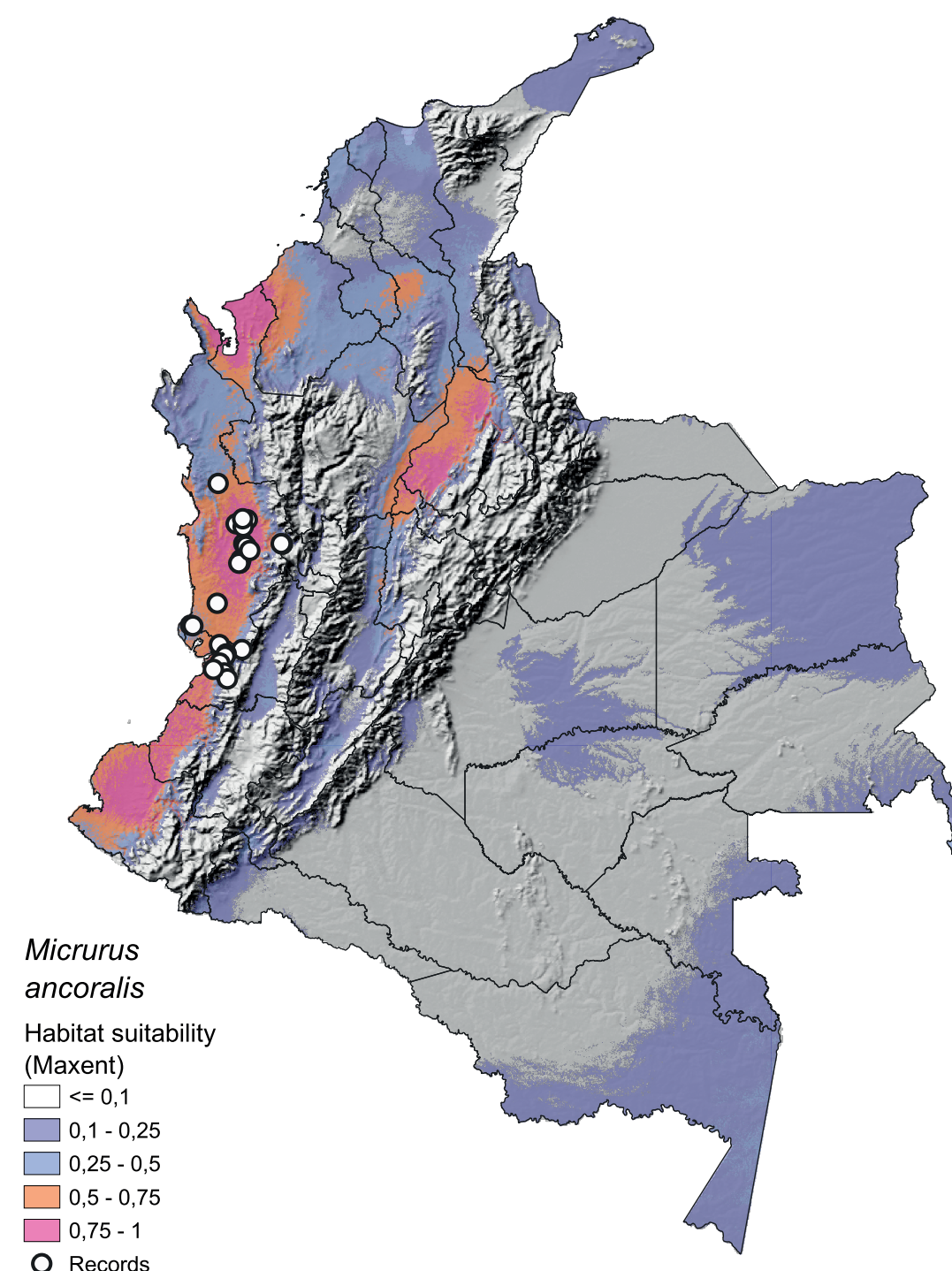
*Micrurus ancoralis* can be recognized by having between 12 and 24 black rings in triads (two white or yellow rings between three black rings) on the body, plus one or two more on the tail. The white rings are shorter than the black, and the triads are separated by red rings that can show some variations like a reduced size or turn towards a darker color (melanized). The first white ring usually is incomplete at the dorsum curving toward the head and opening onto the parietal scales, turning the black nuchal ring into two anchor-shaped lateral marks. This "anchor-shaped" nuchal band and the red snout are the most representative characters to distinguish this snake, unique among other *Micrurus* species [14].

In Colombia the most similar species is *Micrurus dissoleucus*, but this species has a black snout, while *M. ancoralis* is red. [14]. Furthermore, *M. ancoralis* can be easily recognized from other *Micrurus* species mainly because of the color pattern. *M. dumerilli* and *M. clarki* have a body coloration following the RANA pattern (Spanish acronym rojo-amarillo-negro-amarillo, meaning red-yellow-black-yellow). *Micrurus spurrelli* and *M. multiscutatus* show alternate red and black rings. *Micrurus mipartitus* has black and white (or yellow) rings throughout the body, and shows a red ring on the head, and two or three red rings on the tail [14-16].

## 5. Distribution

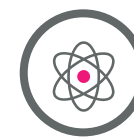


*Micrurus ancoralis* is distributed from Panamá to Ecuador apparently restricted through the Pacific lowlands. In Colombia this species has been recorded from Darién National Park in Chocó department to Nariño department [11]. This snake species occurs at elevations ranging from 0 m to 1500 m above sea level [11, 17]. According to some records and to a potential distribution analysis *M. ancoralis* is present in five departments of Colombia: Risaralda, Chocó, Valle del Cauca, Cauca, and Nariño, [11,13, 17-19]. There are two more records in Antioquia and Tolima departments, but confirmation of these occurrences is necessary [18, 22]. The potential area occupied by this snake is approximately 84503,43 km<sup>2</sup>, indicating that the primary habitats where this species may occur are the humid and premontane forests [13] (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



Rare. *Micrurus ancoralis* is a rare snake with a terrestrial and semi-fossorial habitat preference [11]. This snake has diurnal habits [12]. Like other coralsnakes, *M. ancoralis* shows a mimicry strategy when it is disturbed, hiding its head under the spirals of its body and showing its tail, wherein the snake appears to be two snakes, confusing a potential predator [23].

Information on the ecology and natural history of this species in Colombian populations is limited (almost nonexistent). Therefore, most of our knowledge about the species' natural history comes from Ecuadorian populations (Table 1).

This coralsnake searches actively for its prey, and its diet includes small semifossorial snakes such as *Atractus* and *Ninia* genera, as well as worm lizards (amphisbaenians) and limbless amphibians (caecilians) [12,21]. The species inhabits humid, pluvial and premontane forests, but also it is associated with heavily disturbed rainforests and forest borders. In Colombia, the area where *M. ancoralis* occurs is subject to agriculture, mining, and cultivation of illegal crops [11,12,14].

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



*Micrurus ancoralis* is rarely seen, therefore few reports exist for Colombia (58 records see <https://ofidismo.ins.gov.co/>) [22]. There is little information about the ecology of the species, but apparently the best way to find it in the wild is in the forest after sunset, especially after a warm day [12]. Nevertheless, the few reports from iNaturalist have been made for rural zones and small towns mainly in the Pacific region (e.g., Quibdó and Juanchaco) usually near conservation areas.

## 8. Conservation



**Least Concern.** This species does not present strong conservation concerns because it has a wide distribution and has been reported in many protected areas throughout its distribution [11]. Part of its distribution in Colombia (such as the Pacific Coast) has not been heavily affected by deforestation [12]. However, common threats for snakes are vehicular collisions and the fear from people in rural regions, who tend to kill any snake, particularly coralsnakes [24]. This species is not listed in Resolution 1912 of 2017 of the Colombian Environmental Ministry [25].

## 9. Scientific name and common names



The scientific name of this species is derived from Greek roots *Mikros* (small) and *oura* (tail) referring to the short tails, a general trait of species from the *Micrurus* genus. The species *ancoralis* is derived from the Latin words *ancora* (anchor) and the suffix *-alis* (having the nature of), referring to the distinctive anchor-shaped nuchal band [15].

In Colombia the common names for this species are *coral*, *coral verdadera*, *coral real* and *gargantilla*, but there are other common names near the border with Ecuador like *coral ancla* and *coral rey*, the first of them being the better known.

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



| ★ ★                                       |                             |   |
|---|-----------------------------|---|
| TOXICITY AND BIOLOGICAL ACTIVITY          | VENOM ACTIVITY PROFILE      | GENERAL BIOLOGICAL TRAITS   |
| <b>LD<sub>50</sub> (µg/mice):</b> Unknown | <b>Proteolytic:</b> Unknown | <b>Total Length (cm):</b> ♂ 114.6 (70-90) ♀ 148.6 (70-90)   |
| <b>MCD (µg/mL):</b> Unknown               | <b>Neurotoxic:</b> Yes      | <b>Weight (g):</b> Unknown  |
| <b>MDD (µg/mice):</b> Unknown             | <b>Myotoxic:</b> Unknown    | <b>Reproduction:</b> oviparous  |
| <b>MED (µg/mice):</b> Unknown             | <b>Hemotoxic:</b> Unknown   | <b>Dieta:</b> snakes, caecilians, and lizards   |
| <b>MHD (µg/mice):</b> Unknown             | -                           | <b>Distribución:</b> Pacific, and potentially in inter-Andean Magdalena River Valley between 0 and 1500 m elevation |

| PROTEOME                        |                        |                      |                     |
|---------------------------------|------------------------|----------------------|---------------------|
| <b>PLA<sub>2</sub>:</b> Unknown | <b>SVSP:</b> Unknown   | <b>SVMP:</b> Unknown | <b>NGF:</b> Unknown |
| <b>CRISP:</b> Unknown           | <b>CTL:</b> Unknown    | <b>DIS:</b> Unknown  | <b>KUN:</b> Unknown |
| <b>BPPs:</b> Unknown            | <b>VEFG:</b> Unknown   | <b>3FTx:</b> Unknown |                     |
| <b>Crotoxin:</b> None           | <b>Crotamine:</b> None | <b>LAAO:</b> Unknown |                     |

| MAIN ENVENOMATION SYMPTOMS |                             | RISK  | GRADE OF ENVENOMATION    |
|----------------------------|-----------------------------|---|--------------------------|
| <b>Hemorrhage:</b> No      | <b>Ecchymosis:</b> No       | <b>Bites per year:</b> Unknown                | <b>Mild:</b> Unknown     |
| <b>Nausea:</b> Yes         | <b>Hematemesis:</b> Unknown |   |                          |
| <b>Hypotension:</b> No     | <b>Blisters:</b> No         | <b>Bites per 1,000 people yearly:</b> Unknown | <b>Moderate:</b> Unknown |
| <b>Edema:</b> Yes          | <b>Vomiting:</b> Yes        |   |                          |
| <b>Coagulopathy:</b> No    | <b>Diarrhea:</b> No         | <b>Sequelae caused per year:</b> Unknown      | <b>Severe:</b> Unknown   |
| <b>Sialorrhea:</b> Unknown | <b>Local Pain:</b> Yes      |   |                          |
| <b>Hematuria:</b> No       | <b>Necrosis:</b> No         | <b>Deaths caused per year:</b> Unknown        |                          |
| <b>Renal failure:</b> No   |                             |   |                          |

★ ★ Moderate reliable: Confidence for this species is limited or almost non-existent for Colombian populations. Therefore, most of our knowledge comes from populations outside the national territory LD<sub>50</sub>: median lethal dose; MCD: minimum coagulant dose; MDD: minimum defibrinating dose; DEM: minimum edema-forming dose; DHM: minimum hemolytic dose; PLA<sub>2</sub>: phospholipases A<sub>2</sub>; SVSP: serine proteases, SVMP: metalloproteinases; NGF: nerve growth factor; CRISP: cysteine-rich secretory protein; CTL: C-type lectin/lectin-like, DIS: disintegrins, KUN: Kunitz peptides; BPPs: bradykinin-potentiating peptides; VEGF: vascular endothelial growth factor; 3FTx: three-finger toxins; LAAO: L-amino acid oxidases.

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