*Article*

# Unveiling the venom composition of the Colombian coral snakes *Micrurus helleri, M. medemi,* and *M. sangilensis*

Supplementary Table

**Supplemental Table 1.** Predominant proteomic composition of various coral snake species in the Americas

| Species | $PLA_2$ (%) | 3FTx (%) | Location | Dominance | Group | Other toxins | | Reference |
|---|---|---|---|---|---|---|---|---|
| | | | | | | SVMP (%) | SVSP (%) | |
| *M. alleni* | 10.9 | 77.3 | Caribbean Costa Rica | 3FTx | Monadal | 1.2 | ND | [1] |
| *M. altirostris* | 13.7 | 79.5 | South Brazil | 3FTx | Triadal | 0.9 | ND | [2] |
| *M. clarki* | 36.5 | 48.2 | Costa Rica Pacific | 3FTx | Monadal | 1.6 | 1.0 | [3] |
| *M. corallinus* | 11.9 | 81.7 | Brazil | 3FTx | Monadal | 2.4 | ND | [2] |
| *M. dumerilii* | 52.0 | 28.1 | Antioquia, Colombia | $PLA_2$ | Monadal | 1.8 | 1.9 | [4] |
| *M. frontalis* | 49.2 | 42.4 | Sao Paulo, Brazil | $PLA_2$ | Triadal | 0.96 | ND | [5] |
| *M. fulvius* | 58.3 | 24.9 | Florida, USA | $PLA_2$ | Monadal | NQ | ND | [6] |
| *M. helleri* | 62.5 | 21.1 | Leticia, Colombia | $PLA_2$ | Triadal | ND | ND | [7] |
| *M. helleri* | 72.1 | 17.8 | Nangaritza, Ecuador | $PLA_2$ | Triadal | ND | ND | [8] |
| *M. helleri* | 40.6 | 14.1 | Villagarzón, Putumayo, Colombia | $PLA_2$ | Triadal | ND | ND | This work |
| *M. ibiboboca* | 66.5 | 13.5 | Bahía, Brazil | $PLA_2$ | Triadal | 2.5 | ND | [7] |
| *M. lemniscatus carvalhoi* | 20.2 | 76.7 | Sao Paulo, Brazil | 3FTx | Triadal | 1.1 | ND | [7] |
| *M. lemniscatus carvalhoi* | 22.1 | 71.3 | Rio de Janeiro, Brazil | 3FTx | Triadal | 0.8 | ND | [7] |
| *M. medemi* | 43.1 | 17.7 | Villavicencio, Meta, Colombia | $PLA_2$ | Monadal | ND | ND | This work |
| *M. mipartitus* | 19.1 | 63.4 | Esmeraldas, Ecuador | 3FTx | Bicolor | ND | ND | [8] |
| *M. mipartitus* | 29.0 | 61.1 | Antioquia, Colombia | 3FTx | Bicolor | 1.6 | 1.3 | [9] |
| *M. mipartitus* | 8.2 | 83.0 | Costa Rica | 3FTx | Bicolor | 3.6 | ND | [9] |
| *M. mipartitus (M. multifasciatus)* | 8.2 | 83.0 | Costa Rica | 3FTx | Bicolor | 3.6 | ND | [9] |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *M. mosquitensis* | 55.6 | 22.5 | Caribbean Costa Rica | $PLA_2$ | Monadal | 2.6 | 0.5 | [1] |
| *M. nigrocinctus* | 48.0 | 38.0 | Costa Rica | $PLA_2$ | Monadal | 4.3 | 0.7 | [10] |
| *M. pyrrhocryptus* | 17.0 | 27.0 | Cordoba, Argentina | 3FTx | Triadal | 12.0 | 7.0 | [11] |
| *M. ruatanus* | 29.8 | 46.4 | Roatan, Honduras (Confiscated) | 3FTx | Monadal | 2.7 | 1.2 | [12] |
| *M. sangilensis* | 30.4 | 17.7 | San Gil, Santander, Colombia | $PLA_2$ | Monadal | ND | ND | This work |
| *M. spixii* | 37.4 | 56.5 | Pará, Brazil | 3FTx | Triadal | ND | ND | [5] |
| *M. surinamensis* | 4.2 | 95.4 | Rondonia, Brazil | 3FTx | Triadal | ND | ND | [5] |
| *M. tener* | 45.6 | 37.5 | Tamaulipas, Mexico | $PLA_2$ | Monadal | ND | ND | [13] |
| *M. tschudii* | 4.1 | 95.2 | Peruvian Pacific | 3FTx | Triadal | ND | ND | [14] |
| *M. yatesi* | 54.7 | 20.2 | Pacific Costa Rica | $PLA_2$ | Monadal | 7.6 | 1.4 | [15] |

$PLA_2$: Phospholipases $A_2$, 3FTx: three-finger toxins, SVMP: snake venom metalloproteinases, SVSP: snake venom serine proteases, ND: Not determined, NQ: Determined but not quantified.

## References


1. Fernández, J.; Vargas-Vargas, N.; Pla, D.; Sasa, M.; Rey-Suárez, P.; Sanz, L.; Gutiérrez, J.M.; Calvete, J.; Lomonte, B. Snake venomics of Micrurus alleni and Micrurus mosquitensis from the Caribbean region of Costa Rica reveals two divergent compositional patterns in New World elapids. *Toxicon* **2015**, *107*, 217–233, doi:10.1016/j.toxicon.2015.08.016.
2. Corrêa-Netto, C.; Junqueira-De-Azevedo, I. de L.M.; Silva, D.A.; Ho, P.L.; Leitão-De-Araújo, M.; Alves, M.L.M.; Sanz, L.; Foguel, D.; Zingali, R.B.; Calvete, J. Snake venomics and venom gland transcriptomic analysis of Brazilian coral snakes, Micrurus altirostris and M. corallinus. *J. Proteomics* **2011**, *74*, 1795–1809, doi:10.1016/j.jprot.2011.04.003.
3. Lomonte, B.; Sasa, M.; Rey-Suárez, P.; Bryan, W.; Gutiérrez, J.M.J.M. Venom of the coral snake Micrurus clarki: Proteomic profile, toxicity, immunological cross-neutralization, and characterization of a three-finger Toxin. *Toxins (Basel).* **2016**, *8*, doi:10.3390/toxins8050138.
4. Rey-Suárez, P.; Núñez, V.; Fernández, J.; Lomonte, B.; Nuñez, V.; Fernández, J.; Lomonte, B. Integrative characterization of the venom of the coral snake Micrurus dumerilii (Elapidae) from Colombia: Proteome, toxicity, and cross-neutralization by antivenom. *J. Proteomics* **2016**, *136*, 262–273, doi:10.1016/j.jprot.2016.02.006.
5. Sanz, L.; de Freitas-Lima, L.N.; Quesada-Bernat, S.; Graça-de-Souza, V.K.; Soares, A.M.; Calderón, L. de A.; Calvete, J.J.; Caldeira, C.A.S. Comparative venomics of Brazilian coral snakes: Micrurus frontalis, Micrurus spixii spixii, and Micrurus surinamensis. *Toxicon* **2019**, *166*, 39–45, doi:10.1016/j.toxicon.2019.05.001.
6. Vergara, I.; Pedraza-Escalona, M.; Paniagua, D.; Restano-Cassulini, R.; Zamudio, F.; Batista, C.V.F.; Possani, L.D.; Alagón, A. Eastern coral snake Micrurus fulvius venom toxicity in mice is mainly determined by neurotoxic phospholipases A2. *J. Proteomics* **2014**, *105*, 295–306, doi:10.1016/j.jprot.2014.02.027.
7. Sanz, L.; Quesada-Bernat, S.; Ramos, T.; Casais-e-Silva, L.L.; Corrêa-Netto, C.; Silva-Haad, J.J.; Sasa, M.; Lomonte, B.; Calvete, J.J. New insights into the phylogeographic distribution of the 3FTx/PLA 2 venom

dichotomy across genus Micrurus in South America. *J. Proteomics* **2019**, *200*, 90–101, doi:10.1016/j.jprot.2019.03.014.
8. Hernández-Altamirano, J.A.; Salazar-Valenzuela, D.; Medina-Villamizar, E.J.; Quirola, D.R.; Patel, K.; Vaiyapuri, S.; Lomonte, B.; Almeida, J.R. First Insights into the Venom Composition of Two Ecuadorian Coral Snakes. *Int. J. Mol. Sci.* **2022**, *23*, doi:10.3390/ijms232314686.
9. Rey-Suárez, P.; Núñez, V.; Gutiérrez, J.M.; Lomonte, B. Proteomic and biological characterization of the venom of the redtail coral snake, Micrurus mipartitus (Elapidae), from Colombia and Costa Rica. *J. Proteomics* **2011**, *75*, 655–667, doi:10.1016/j.jprot.2011.09.003.
10. Fernández, J.; Alape-Girón, A.; Angulo, Y.; Sanz, L.; Gutiérrez, J.M.; Calvete, J.; Lomonte, B.; Fernández, J.; Alape-Girón, A.; Angulo, Y.; et al. Venomic and Antivenomic Analyses of the Central American Coral Snake , Micrurus nigrocinctus ( Elapidae ). *J. Proteome Res.* **2011**, *10*, 1816–1827, doi:10.1021/pr101091a.
11. Olamendi-Portugal, T.; Batista, C.V.F.; Pedraza-Escalona, M.; Restano-Cassulini, R.; Zamudio, F.Z.; Benard-Valle, M.; Rafael de Roodt, A.; Possani, L.D. New insights into the proteomic characterization of the coral snake Micrurus pyrrhocryptus venom. *Toxicon* **2018**, *153*, 23–31, doi:10.1016/j.toxicon.2018.08.003.
12. Lippa, E.; Török, F.; Gómez, A.; Corrales, G.; Chacón, D.; Sasa, M.; Gutiérrez, J.M.; Lomonte, B.; Fernández, J. First look into the venom of Roatan Island's critically endangered coral snake Micrurus ruatanus: Proteomic characterization, toxicity, immunorecognition and neutralization by an antivenom. *J. Proteomics* **2019**, *198*, 177–185, doi:10.1016/j.jprot.2019.01.007.
13. Bénard-Valle, M.; Carbajal-Saucedo, A.; de Roodt, A.; López-Vera, E.; Alagón, A. Biochemical characterization of the venom of the coral snake Micrurus tener and comparative biological activities in the mouse and a reptile model. *Toxicon* **2014**, *77*, 6–15, doi:10.1016/j.toxicon.2013.10.005.
14. Sanz, L.; Pla, D.; Pérez, A.; Rodríguez, Y.; Zavaleta, A.; Salas, M.; Lomonte, B.; Calvete, J. Venomic analysis of the poorly studied desert coral snake, Micrurus tschudii tschudii, supports the 3FTx/PLA2 dichotomy across Micrurus venoms. *Toxins (Basel).* **2016**, *8*, 9–12, doi:10.3390/toxins8060178.
15. Mena, G.; Chaves-Araya, S.; Chacón, J.; Török, E.; Török, F.; Bonilla, F.; Sasa, M.; Gutiérrez, J.M.; Lomonte, B.; Fernández, J. Proteomic and toxicological analysis of the venom of Micrurus yatesi and its neutralization by an antivenom. *Toxicon X* **2022**, *13*, doi:10.1016/j.toxcx.2022.100097.