REPTILES & AMPHIBIANS

Defensive Tail-Display Behavior in the Brown Rainbow Boa (*Epicrates maurus*) and Central American Boa Constrictor (*Boa imperator*) (Squamata: Boidae)

Ronald A. Díaz-Flórez

Departamento de Ciencias Biológicas, Facultad de Ciencias, Universidad de los Andes, Bogotá, 111711, Colombia; and Museo de Historia Natural C.J. Marinkelle, Universidad de Los Andes, Bogotá, 111711, Colombia (ronalddias_10@hotmail.com)

Animals have evolved various defensive strategies in response to predation (Brodie et al. 1991). These function largely by means of acoustic, chemical, or visual signals that often include interactions between colors and movements (Rowe and Halpin 2013; Dalziell and Welbergen 2016). In addition to the obvious benefit in deterring a predator, such responses can play important roles when occupying new environments and obtaining resources (Lima and Dill 1990). In snakes, a variety of antipredator mechanisms attempt to avoid detection and injury in response to predators that include invertebrates, other reptiles, birds, and mammals (Greene 1988; Tozetti et al. 2009). However, knowledge of anti-predator mechanisms in many species of snakes is incomplete or missing (Lopes de Assis et al. 2020).

One defensive strategy is head mimicry, which consists of curling and lifting the tail while hiding the head and/or remaining motionless (Greene 1973, 1979; Jackson 1979). This behavior has been described in species that include the South American False Coralsnake (*Erythrolamprus aesculapii*), Sao Paulo False Coralsnake (*Simophis rhinostoma*) (Sazima and Abe 1991), South American Hognose Snake (*Xenodon dorbignyi*) (Tozzetti et al. 2009), Neuwied's False Fer-de-lance (*Xenodon neuwiedii*), Wagler's Snake (*Xenodon merremii*), Günther's False Fer-de-lance (*Xenodon guentheri*) (Pedrozo et al. 2020), Western Coralsnake (*Micruroides euryxanthus*) (Greene 1988), Ring-necked Snake (*Diadophis punctatus*), Yellow-bellied Seasnake (*Hydrophis platurus*), Black Groundsnake (*Atractus elaps*), Atlantic Central American Milksnake (*Lampropeltis polyzona*), African Gartersnake (*Elapsoidea sundevallii*), Blue Malaysian Coralsnake (*Calliophis bivirgatus*) (Greene 1973), and several Coralsnakes of the genus *Micrurus* (Díaz-Flórez et al. 2022).

Neotropical Brown Rainbow Boas (*Epicrates maurus*) and Central American Boa Constrictors (*Boa imperator*) range from Nicaragua to northern Brazil and from Mexico to northwestern Peru, respectively (Uetz et al. 2025). Research on these species has focused largely on diets (e.g., Pérez-Alvarado et al. 2019; Salcedo-Rivera et al. 2021; Aguilar-López and

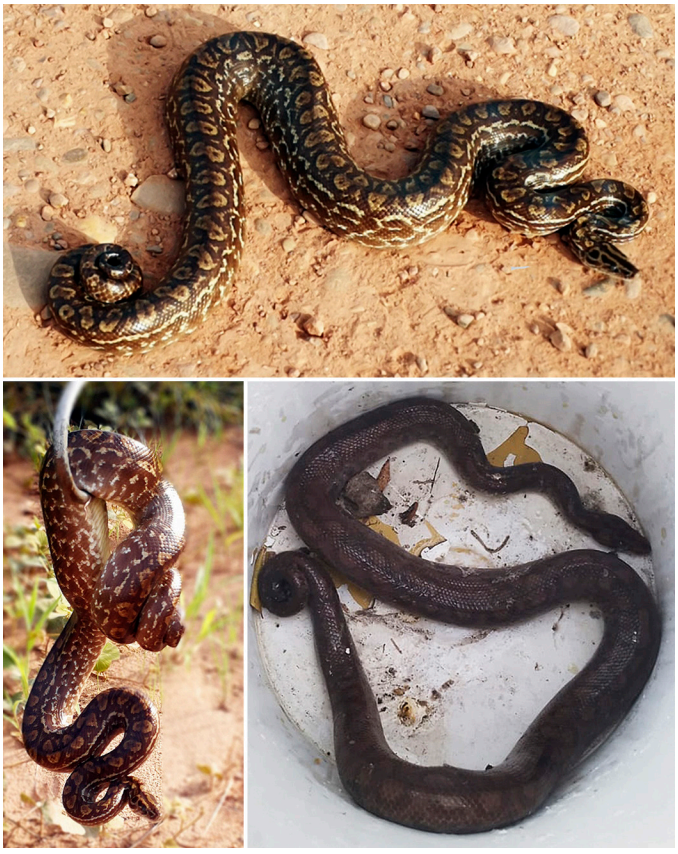

Figure 1. Brown Rainbow Boas (*Epicrates maurus*) exhibing tail-curling behavior on the ground and while being held in the Municipality of Puerto Gaitán, Meta, Colombia (top and lower left), and after capture in Honda, Tolima, Colombia (lower right). Photographs by Diana Zorro (top and lower left) and Luzmila Rodriguez (lower right).

Reptiles & Amphibians ISSN 2332-4961
https://doi.org/10.17161/randa.v33i1.24141

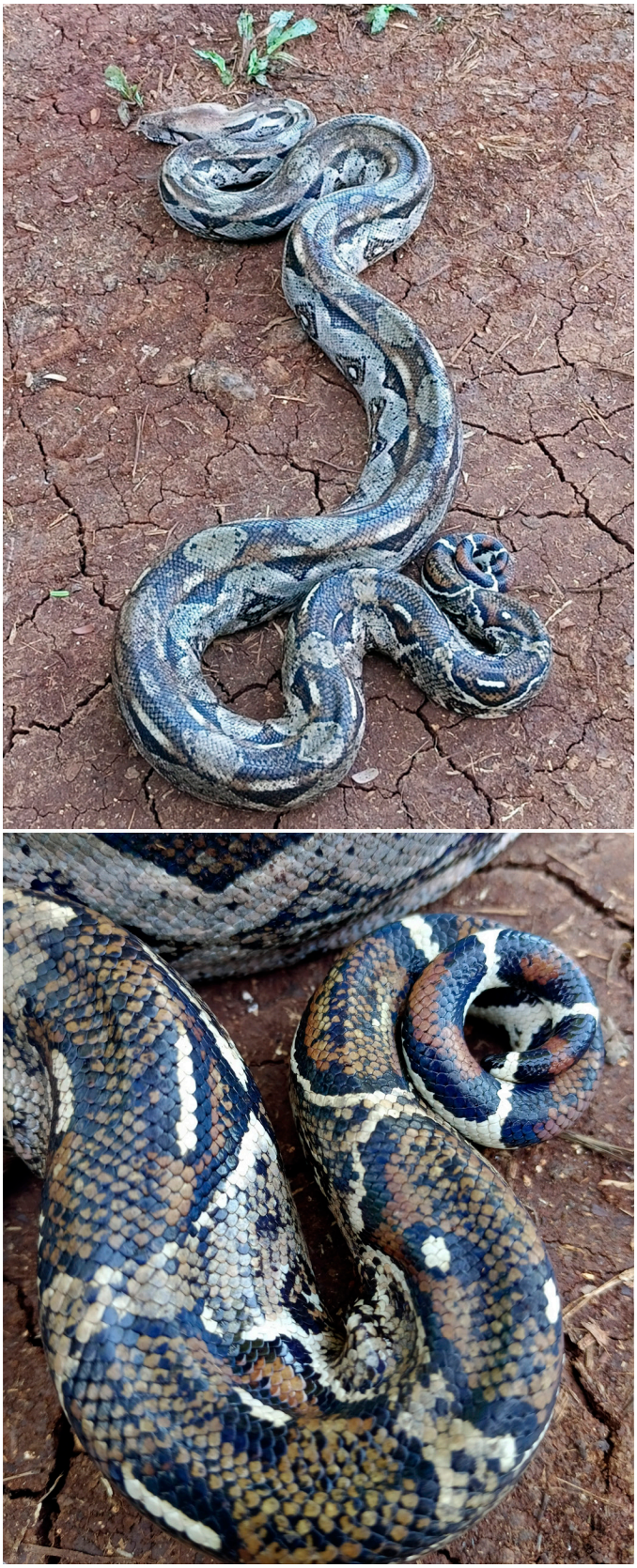

Figure 2. A Central American Boa (*Boa imperator*) exhibiting tail-curling behavior with immobility in Valladolid, Yucatan, Mexico. Note the brighter coloration of the tail. Photographs by Isaac F.

Tapia-Ramírez 2025) and reproduction (e.g., Tolson 1992; Booth et al. 2011; Meza-Manríquez et al. 2015), but defensive strategies are not well documented. I herein present the first records of tail-curling in *E. maurus* and *B. imperator*.

At 0715 h on 5 November 2018, D. Zorro photographed a Brown Rainbow Boa on a rural road in Puerto Gaitán, Meta, Colombia (3.47659, -72.19011). When handled, the snake displayed defensive tail-coiling behavior that persisted while the snake was being held and was on the ground (Fig. 1). At 1100 h on 21 October 2023, L. Rodríguez found a Brown Rainbow Boa in his house in Honda, Tolima, Colombia (5.2145, -74.7343). Upon capturing it for relocation, the snake displayed defensive tail-coiling behavior accompanied by escape attempts and erratic movements (Fig. 1; https://youtu.be/TOMieVzC7-4?si=f7pS4ch0rAN9EbLG). At 0758 h on 18 August 2023, Isaac F. photographed a Central American Boa in Valladolid, Yucatan, Mexico (20.7743, -88.3151) (Fig. 2), that exhibited tail-curling behavior accompanied by immobility.

Greene (1973) reported tail-display behavior in some amphisbaenians and multiple species of snakes, including the Western Rainbow Boa (*Epicrates cenchria*), the behavior of which was essentially like that described herein for *E. maurus*. We found no information on comparable behaviors in other species of Neotropical boids. Note also that all of the anti-predator behaviors described herein were triggered by humans, but presumably are essentially identical to how snakes in nature respond to threats posed by predators.

Some species that employ defensive tail-curling behaviors have brighter or more vividly colored tails that, in addition to distracting a predator away from the head, also could function as warning or aposematic signals (Cott 1940), especially in species with otherwise cryptic coloration (Greene 1973). This is evident in species of the genus *Boa* whose tail colors are brighter than those of their bodies (Fig. 2). Bright tails are clearly evident in neonates and are retained through adulthood (Pérez-Santos and Moreno 1988).

Acknowledgements

I thank Diana Zorro, Isaac F., and Luzmila Rodríguez for allowing me to use their photographs and cite their observations and the video.

Literature Cited

Aguilar-López, J.L. and G. Tapia-Ramírez. 2025. Depredación de *Rattus rattus* (Muridae) por *Boa imperator* (Boidae) en el sur de México. *Revista Latinoamericana de Herpetología* 8: 271–276. https://doi.org/10.22201/fc.25942158e.2025.4.1460.

Booth, W., L. Million, R.G. Reynolds, G.M. Burghardt, E.L. Vargo, C. Schal, A.C. Tzika, and G.W. Schuett. 2011. Consecutive virgin births in the New World boid snake, the Colombian rainbow boa, *Epicrates maurus*. *Journal of Heredity* 102: 759–763. https://doi.org/10.1093/jhered/esr080.

Brodie, E.D., Jr., D.R. Formanowicz, Jr., and E.D. Brodie III. 1991. Predator avoidance and antipredator mechanisms: Distinct pathways to survival. *Ethology, Ecology & Evolution* 3: 73–77. https://doi.org/10.1080/08927014.1991.9525390.

Cott, H.B. 1940. *Adaptive Coloration in Animals*. Methuen & Co. Ltd., London, UK.

Dalziell, A.H. and J.A. Welbergen. 2016. Mimicry for all modalities. *Ecology Letters* 19: 609–619. https://doi.org/10.1111/ele.12602.

Díaz-Flórez, R.A, C. Bran, and A. Montoya-Cruz. 2022. Defensive head-mimicry in coralsnakes, *Micrurus* spp. (Squamata: Elapidae): Three new records and a review of congeners exhibiting this behavior. *Reptiles & Amphibians* 29: 134–136. http://doi.org/10.17161/randa.v29i1.16324.

Greene, H.W. 1973. Defensive tail display by snakes and amphisbaenians. *Journal of Herpetology* 7: 143–161. https://doi.org/10.2307/1563000.

Greene, H.W. 1979. Behavioral convergence in the defensive displays of snakes. *Experientia* 35: 747–748. https://doi.org/10.1007/BF01968221.

Greene, H.W. 1988. Antipredator mechanisms in reptiles, pp. 153–234. In: C. Gans and R.B. Huey (eds.), *Biology of the Reptilia. Volume 16. Ecology B, Defense and Life History*. Alan R. Liss, Inc., New York, New York, USA.

Jackson, J.F. 1979. Effects of some ophidian tail displays on the predatory behavior of Grison (*Galictis* sp.). *Copeia* 1979: 169–172. https:// doi.org/10.2307/1443751.

Lima, S.L. and L.M. Dill. 1990. Behavioral decisions made under the risk of predation: a review and prospectus. *Canadian Journal of Zoology* 68: 619–640. http://dx.doi.org/10.1139/z90-092.

Lopes de Assis, C., J.J.M. Guedes, L.M. Gomes de Jesus, and R. Neves Feio. 2020. New defensive behaviour of the false coral snake *Oxyrhopus rhombifer* Duméril, Bibron & Duméril, 1854 (Serpentes, Dipsadidae) in south-eastern Brazil. Novos comportamentos defensivos da falsa-coral *Oxyrhopus rhombifer* Duméril, Bibron & Duméril, 1854 (Serpentes, Dipsadidae) no sudeste do Brasil. *Neotropical Biology and Conservation* 15: 71–76. https://doi.org/10.3897/neotropical.15.e48564.

Meza-Manríquez, M.A., A. Avalos-Rodríguez, G. Fuentes-Mascorro, J.A. González-Santos, and J.A. Herreera-Barragan. 2015. Caracterización seminal de *Boa imperator* (Sauropsida: Squamata: Boidae). *Ciencia y Mar* 19(57): 13–18.

Pedrozo, M., M. Moroti, and E. Muscat. 2020. New defensive behaviour for *Xenodon neuwiedii* Günther, 1863 (Squamata, Dipsadidae) in a fragment of Atlantic Forest. *Herpetology Notes* 13: 863–865.

Pérez-Alvarado, C.J., F.A. Lara-Hernández, V. Vázquez-Cruz, and J. Peña-Serrano. 2019. Contribución al conocimiento de la dieta natural de la serpiente mazacoatl (*Boa imperator* Daudin, 1803) en Veracruz, México. *Revista Latinoamericana de Herpetología* 2: 91–93. https://doi.org/10.22201/fc.25942158e.2019.2.56.

Pérez-Santos, C. and A.G. Moreno. 1988. *Ofidios de Colombia*. Monographie VI. Museo Regionale di Scienze Naturali, Torino, Italy.

Rowe, C. and C. Halpin. 2013. Why are warning displays multimodal? *Behavioral Ecology and Sociobiology* 67: 1425–1439. https://doi.org/10.21203/rs.3.rs-777244/v1.

Salcedo-Rivera, G.A., J. Vanegas-Arroyo, C.J. Castillo, J.A. Diaz-Perez, and D. Montes-Vergara. 2021. On the human-snake conflict: Predation attempt of *Oryctolagus cuniculus* (Linnaeus, 1758) by *Epicrates maurus* Gray, 1849 on a farm in the Caribbean Region of Colombia. *Herpetology Notes* 14: 941–943.

Sazima, I. and A.S. Abe. 1991. Habits of five Brazilian snakes with coral-snake pattern, including a summary of defensive tactics. *Studies on Neotropical Fauna and Environment* 26: 159–164. https://doi.org/10.1080/01650529109360848.

Tolson, P.J. 1992. The reproductive biology of the Neotropical boid genus *Epicrates* (Serpentes: Boidae), pp. 165–178. In: W.C. Hamlett (ed.), *Reproductive Biology of South American Vertebrates*. Springer Verlag, New York, New York, USA.

Tozzetti, A.M., R.B. de Oliveira, and G.M.F. Pontes. 2009. Defensive repertoire of *Xenodon dorbignyi* (Serpentes, Dipsadidae). Repertório defensivo de *Xenodon dorbignyi* (Serpentes, Dipsadidae). *Biota Neotropica* 9: 175–163. https://doi.org/10.1590/S1676-06032009000300016.

Uetz, P., P. Freed, R. Aguilar, F. Reyes, J. Kudera, and J. Hošek (eds.). 2025. *The Reptile Database*. <http://www.reptile-database.org>.