



A Dicephalic Western Dusky Rattlesnake, *Crotalus triseriatus* (Squamata: Viperidae)

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Congenital malformations that occur during embryonic development have been reported in all classes of vertebrates and usually are associated with limited life spans (de Carvalho et al. 2017). Most instances have been reported in captive individuals, whereas records of congenital malformations in wild animals tend to be rare (Bárceñas-Ibarra et al. 2015). Among the congenital malformations reported in reptiles (e.g., de Carvalho et al. 2017; Murphy 2018; Castillo-Juárez et al. 2020) is dicephalism (or bicephalism), the duplication of part or all of the cranium and/or spinal column (Wallach 2007). A number of possible causes of dicephalism have been proposed; for snakes in nature, suggestions of possible causes include incomplete division of a single embryo, partial fusion of two embryos, abnormally low or high temperatures during incubation or gestation, regeneration after an embryonic lesion, and environmental pollution (see Wallach 2007 and references therein).

We herein present the first record of dicephalism in a Western Dusky Rattlesnake (*Crotalus triseriatus*) (Fig. 1) from Necoxtla, Municipality of Camerino Z. Mendoza, Veracruz, Mexico (18°46'26.8"N, 97°09'33.8"W; WGS 84; 2,300 m asl). At about 1100 h on 3 February 2017, a local resident found a neonate on a path between patches of secondary vegetation and pine forest. On 15 March 2017, during fieldwork at the site, we had the opportunity to photograph the dicephalic individual. We deposited a photo voucher into the digital collection of the Natural History Museum of Los Angeles County (LACM PC 2591).

The individual was a neonate (with an umbilical scar) with snout-vent length = 159 mm, tail length = 19 mm (excluding button, which was 2 mm long), and tail length/total length ratio = 10.5%. The scale row formula was 23-25-21, with 138 ventrals and 34 subcaudals. The left head was 14.3 mm long and 8.5 mm wide with 13/13 supralabials and 12/11 infralabials; the right head was 14.2 mm long and 7.9 mm wide with 12/11 supralabials and 11/12 infralabials. The external morphology suggests that the heads were united at the angle of the jaws.

We cannot determine the cause of this particular malformation. Because the area where the snake was found supports

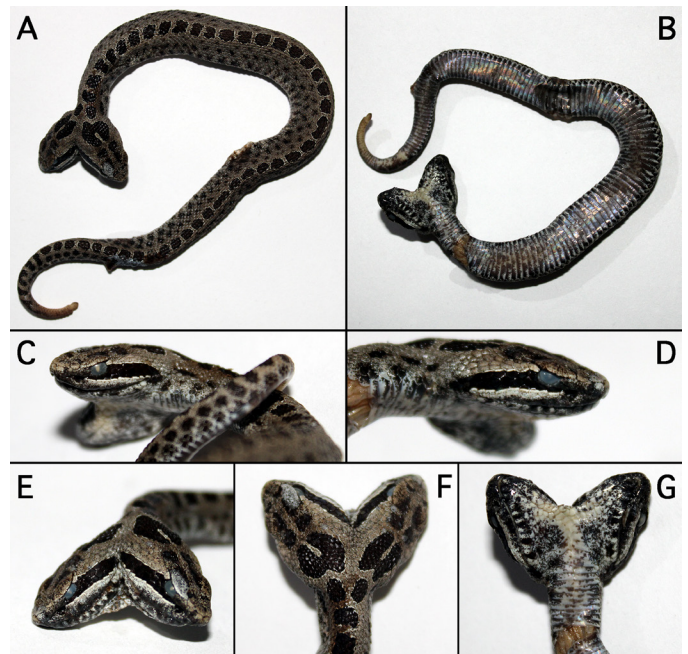


Fig. 1. A bicephalic Western Dusky Rattlesnake (*Crotalus triseriatus*): Dorsal and ventral views of the snake (A–B), lateral views of the heads (C–D), the laterally united heads at the angle of the jaws (E), and dorsal and ventral views of the heads (F–G). Photographs by Víctor Vásquez-Cruz.

only traditional subsistence agriculture, we consider environmental pollution unlikely, leaving temperature variation or an embryonic lesion as probable causes. The lack of other external malformations in the individual leads us to believe that it originated from a single embryo, and we hypothesize that head duplication occurred in the early stages of embryonic development, possibly stages 15, 16, or 17 (Zehr 1962), when head differentiation occurs. This could explain why both heads were well developed and the fact that they vary slightly in scaling (supralabials and infralabials) and in dorsal head patterns.

Records of dicephalism in the genus *Crotalus* are based on isolated, fortuitous observations (McAllister and Wallach 2006). Bicephalism has been reported in 15 species: *Crotalus adamanteus*, *C. atrox*, *C. basiliscus*, *C. cerastes*, *C. durissus col-*

lilineatus, *C. d. terrificus*, *C. horridus*, *C. l. lepidus*, *C. lutosus*, *C. mitchelli*, *C. molossus oaxacus*, *C. oreganus*, *C. scutulatus*, *C. tigris*, *C. viridis* (Wallach 2018), and now *Crotalus triseriatus*. To the best of our knowledge, this observation represents the second case of dicephalism in a species of *Crotalus* in Mexico (the first was *C. basiliscus* in captivity; McAllister and Wallach 2006) and the first case in nature.

Acknowledgments

We thank Arleth Reynoso-Martínez and Sean M. Rovito for their help in preparing the manuscript, Neftalí Camacho (LACM) for cataloging the photographs, and Luis Canseco-Márquez for confirming the identity of the species.

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