



Facultative Parthenogenesis in a Captive Tarahumara Mountain Boa (*Boa sigma*)

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Facultative parthenogenesis (FP), asexual reproduction by a typically sexually reproducing species, has been documented in several vertebrate groups including sharks, birds, lizards, and snakes (Avisé 2008; Lampert 2008; Booth et al. 2014; Avisé 2015). However, most examples of FP — both genetically confirmed and anecdotal cases — have been reported in snakes (Groot et al. 2003; Booth and Schuett 2011; Booth et al. 2012; Lara-Resendiz et al. 2013; Booth et al. 2014; Vaughan and Steele 2014; Jordan et al. 2015; reviewed in Booth and Schuett 2016; Shibata et al. 2017; Allen et al. 2018; Seixas et al. 2019; Cubides-Cubillos et al. 2020). Herein we report the first occurrence of facultative parthenogenesis in the Tarahumara Mountain Boa, *Boa sigma* (formerly *B. constrictor sigma* Smith 1943) (Card et al. 2016).

On 3 July 2022, a female *B. sigma* (SVL = 138 cm, 1774 g; measurements taken three days postpartum; Fig. 1), born in captivity (2014) and housed in complete isolation since birth, produced a litter of 13 unfertilized ova and one fully developed neonate (Fig. 2). The neonate was alive but survived for only 15 minutes after removal from the egg. The



Fig. 1. Postpartum adult female Tarahumara Mountain Boa (*Boa sigma*) that produced a fully developed neonate via facultative parthenogenesis. Photograph by Christopher M. Bordne.



Fig. 2. Two of the 13 unfertilized ova (A) and the fully developed neonate before removal from its transparent egg (B) produced by a Tarahumara Mountain Boa (*Boa sigma*) on 3 July 2022. The red lighting in panel A is from an infrared heat source in the mother’s enclosure. Photographs by Christopher M. Bordne.

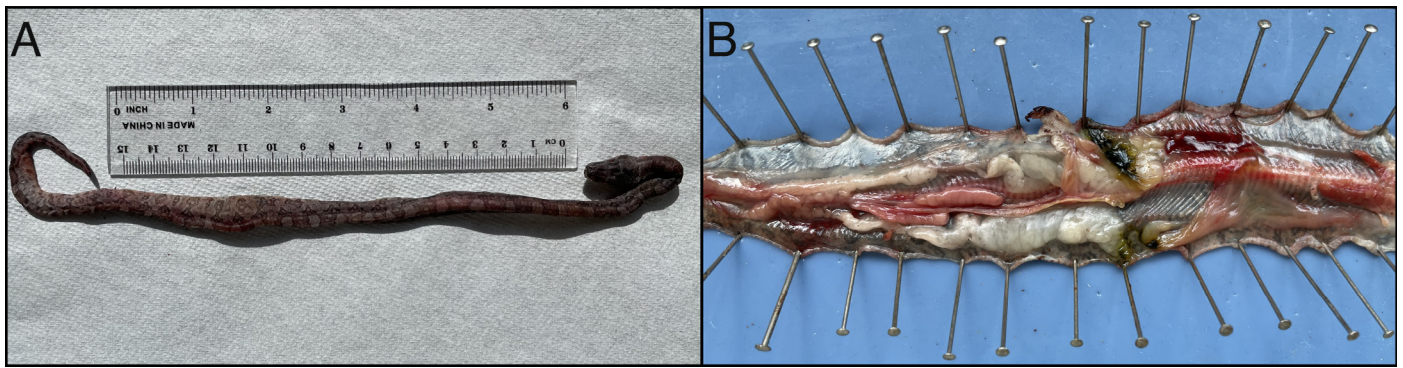


Fig. 3. Measurement and dissection of the female Tarahumara Mountain Boa (*Boa sigma*) neonate on 13 July 2022. Note the severe kink in the hatchling's neck and minor kinks along its body. Photographs by Francis Rose.

hatchling had a severe kink in its neck about 2 cm behind the head and a kinked body, but no other obvious malformations (Fig. 3A). We confirmed the sex of the neonate to be female by examination of its gonads via dissection (Fig. 3B). The female neonate (SVL = 25.3 cm; 7.88 g) was preserved in 70% ethanol and deposited in the Natural History Museum at Boston University (WC0754).

Although our case lacks molecular support for FP, the fact that the mother had no contact with other individuals since birth rules out the possibility of long-term sperm storage and suggests the most plausible explanation for this case of asexual reproduction is FP. To the best of our knowledge, FP has now been reported and validated — either by molecular or captivity information — in at least 28 species across six families of snakes: Boidae, Pythonidae, Viperidae, Acrochordidae, Colubridae, and Elapidae (reviewed in Cubides-Cubillos et al. 2020). Most cases of FP in snakes — including all cases of boids and pythonids — have been reported in captive animals; however, the discovery of FP in wild individuals of two species of North American pitvipers rejects the notion that FP is strictly a captive syndrome (Booth et al. 2012). More research is needed to better understand the taxonomic breadth and ecological role of FP, particularly in natural populations.

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