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New records of cobra-like mimicry in *Lytorhynchus diadema* from Morocco

Adrián Talavera¹, Marc Albiac² & Aritz Ibarzabal³

¹ Cl. Deza, 1. 28670 Villaviciosa de Odón. Madrid. Spain. C.e: adtalave@ucm.es

² Paseo Doctor Moragas, 157. 08210 Barberà del Vallès. Barcelona. Spain.

³ Cl. Beato Domingo Iturrate, 3. 7º A. 48993 Getxo. Bizkaia. Spain.

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RESUMEN: Se describen dos nuevos casos de mimetismo Batesiano en Marruecos de la culebra cavadora *Lytorhynchus diadema*, un colúbrido de distribución sáhara-arábica y simpátrico con su modelo: la cobra egipcia *Naja haje*. Mientras que este comportamiento, que consiste en extender el cuello y elevar la parte anterior del cuerpo, parece común en Israel, solo había sido registrado una vez en Marruecos con anterioridad.

A number of defensive strategies to avoid predation have arisen during the evolutionary history of snakes. Among them, the Batesian mimicry, which consists in mimicking venomous taxa by non-venomous ones, is relatively common and evolved independently across several major snake lineages. This

mimicry can encompass both coloration and behaviour (Pokrant *et al.*, 2017).

One instance is the Awl-headed snake *Lytorhynchus diadema* (Duméril, Bibron & Duméril, 1854), a small and non-venomous colubrid with a wide Saharo-Arabian distribution, with the nominal subspecies inhabi-

ring NW Africa (Amr *et al.*, 2013). It shares a resembling blotched pattern with the sympatric and venomous viperid snakes of the genera *Bitis*, *Cerastes*, *Daboia*, *Echis*, *Macrovipera* and *Pseudocerastes*; and also with another Batesian mimicking snake such as *Malpolon moilensis* (Busack *et al.*, 2015). Furthermore, when threatened, *L. diadema* can also display a defensive cobra-like behaviour, although escaping is the most common response. Apparently, that behaviour is not rare in Israel (Werner, 2016), whereas it has been reported only once in NW Africa until now (Busack *et al.*, 2015).

Therefore, we describe here the second and the third records of cobra-like mimicry in this species in Morocco and the first ones in adult *L. diadema* as well. At least two different adult specimens (both sexes) repeated several times the defensive display, consisting in raising its forepart body (up to ~10 cm of height out of 36 cm of snout-to-vent length, SVL) and flattening the neck as a rudimentary hood, in order to probably resemble the also sympatric Egyptian cobra *Naja haje* (Figure 1). The entire displays lasted around six seconds. Both specimens were found active near Khenifiss National Park (28°01'01.7"N / 12°12'25.4"W and 27°57'44.6"N / 12°16'34.1"W; 21 and 7 masl respectively) in southernmost Morocco in August 2019. Whereas Busack *et al.* (2015) reported the display after touching the snake on the base of the tail, we stimulated the animals by means of covering the whole snake with the bare hand. While slipping away, the cobra-like behaviours were performed. The mimicry could not be elicited by another *L. diadema*, which was found and rescued from a dry water cistern in the same area, although being stimulated in the same way, perhaps owing to the possible starvation.

Probably because of its discrete habits and likely low densities (Bons & Geniez, 1996), this de-



Figure 1: First published image of the cobra-like display in *Lytorhynchus diadema diadema*. Khenifiss National Park, Morocco.

Figura 1: Primera imagen publicada del comportamiento de “imitación de cobras” por parte de *Lytorhynchus diadema diadema*. Khenifiss National Park, Morocco.

defensive behaviour remained unnoticed so long outside the Middle East. The fact that the behaviour is present in distant populations from its distribution—where there are no common elapid species to mimic—backs up that this mimicry is plesiomorphic within the species. Nevertheless, it would be interesting to evaluate this character in other populations of the species or even the genus since both lack taxonomical assessment (Jablonsky *et al.*, 2014).

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Primer registro de malformación y ectoparásitos en *Rhinella horribilis* (Anura: Bufonidae), Puerto López, Ecuador

N. Alexandra Allan-Miranda¹ & Salomón M. Ramírez-Jaramillo^{2,*}

¹ Investigadora Independiente. Ciudadela La Santiago.

² Investigador Independiente. Barrio Santa Isabel. Quito. Ecuador. *C.e.: kp-7sz@hotmail.com

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En el Neotrópico la presencia de malformaciones en anfibios se atribuye a efectos producidos por parásitos helmintos tremátodos, agroquímicos, endogamia y radiación ultravioleta (Sparling *et al.*, 2001; Ankley *et al.*, 2004; Gallo-Delgado *et al.*, 2006; Gurushankara *et al.*, 2007; Williams *et al.*, 2008; Peltzer *et al.*, 2011).

En Ecuador los reportes sobre malformaciones en anfibios son escasos (Merino-Viteri *et al.*,

2005) y se desconocen sus causas. En esta nota se da a conocer un caso de sindactilia y ectoparásitos presentes en un individuo de *Rhinella horribilis* Wiegmann (1833). El individuo fue fotografiado y medido para su posterior liberación.

El área de observación pertenece al ecosistema de Bosque semidecídido de tierras bajas del Jama-Zapotillo (MAE, 2013). El sitio se ubica a

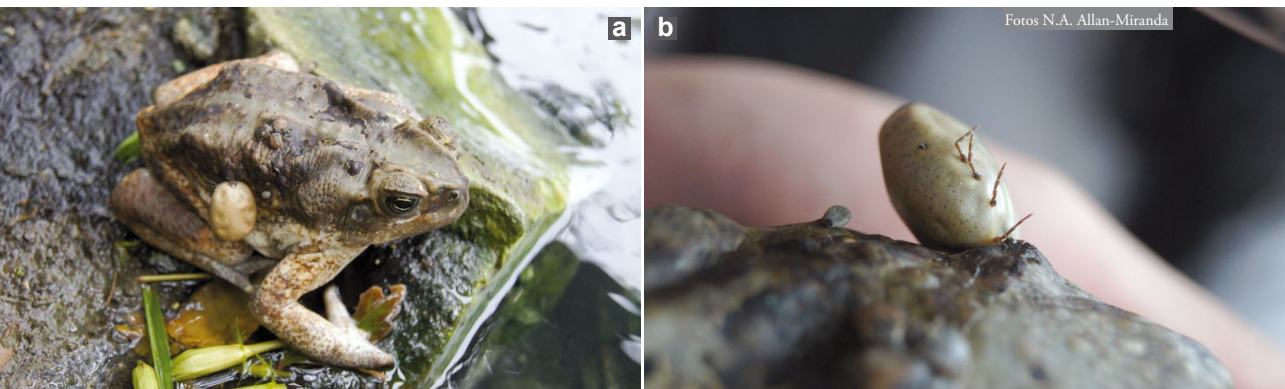


Figura 1: *Rhinella horribilis*. a) Con presencia de sindactilia en la mano derecha y varios ectoparásitos en el dorso y flancos. b) Ácaro (*Amblyomma* sp.) de gran tamaño junto a un pequeño ácaro.