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FIRST RECORD OF ECTOMELY IN *PHRYNOSOMA ORBICULARE* (SQUAMATA: PHRYNOSOMATIDAE)

PRIMER REGISTRO DE ECTOMELIA EN *PHRYNOSOMA ORBICULARE* (SQUAMATA: PHRYNOSOMATIDAE)

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Resumen.– Documentamos un caso de una anomalía en una extremidad anterior de una hembra adulta de *Phrynosoma orbiculare* encontrada en Aguascalientes, México.

Palabras clave.– Especie endémica, lagartija, México, anomalía morfológica, pérdida parcial de extremidad.

Abstract.– We report a case of a forelimb anomaly in an adult female of *Phrynosoma orbiculare* found in Aguascalientes, Mexico.

Keywords.– Endemic species, lizard, Mexico, morphological anomaly, partial limb loss.

In lizards, limb morphology is directly related to uses of habitats and microhabitats and represents the outcome of phylogenetic conservatism and the genetic pool of species (Vitt et al., 1997; Melville & Swain, 2000; Herrel et al., 2002). Considering it is also correlated positively with locomotor performance (Melville & Swain, 2000), and this in turn with dominance (Robson & Miles, 2000), it is expected that male limb morphology might be under stronger selective pressures than female limb morphology (Herrel et al., 2002). Therefore, any kind of limb anomaly might constitute a potential cost to the overall fitness of individuals (Gkourtsouli-Antoniadou et al., 2017). However, limb anomalies are quite common in different lizard species (Gleed-Owen, 2012; Kolenda et al., 2017; Gkourtsouli-Antoniadou et al., 2017; Christopoulos & Pafilis, 2020; Mora et al., 2020) and are regarded as having genetic and environmental origins (Rothschild et al., 2012; Kolenda et al., 2017; Christopoulos & Pafilis, 2020). Here we report the first case of a forelimb anomaly in an individual of Mountain Horned Lizard *Phrynosoma orbiculare*.

The Mountain Horned Lizard *Phrynosoma orbiculare* is an endemic species of Mexico, inhabiting an elevation range between 1,371-3,450 m a.s.l. across the Sierra Madre Occidental, Sierra Madre Oriental, Transmexican Volcanic Belt, and Chihuahuan Desert (Sherbrooke, 2003; Ramírez-Bautista et al., 2014). This species occupies xeric scrublands and pine-oak forests in states of the north (Sonora, Sinaloa, Chihuahua, Durango, Tamaulipas, Nuevo León, Zacatecas, Aguascalientes, and San Luis Potosi), center (Guanajuato, Querétaro, Hidalgo, Morelos, Tlaxcala, Ciudad de México, Estado de México, and Puebla), west (Jalisco and Michoacán) and south of the country (Veracruz, Sherbrooke, 2003; Moreno-Barajas et al., 2013; Ramírez-Bautista et al., 2014; Payan-Cazares et al., 2023). In the state of Aguascalientes, *P. orbiculare* is found in the municipalities of Calvillo, San José de Gracia, Jésus María, Tepezalá, and Aguascalientes (Vázquez-Díaz & Quintero-Díaz, 2005).

On August 20th, 1982 at 14:45 h, Zeferino Uribe-Peña collected alive an adult female of *P. orbiculare* (77.63 mm snout-vent length) at Barranca Los Pilares, Sierra de San Blas de Pabellón, San José de Gracia, Aguascalientes (22.214219° N, 102.483921° W, 2,420 m a.s.l.). The lizard was found on the leaf litter of an oak-juniper forest. It was humanely euthanized, fixed in 10% formalin, preserved in 70% ethanol, and stored by ARB at Laboratorio de Ecología de Poblaciones, Centro de Investigaciones Biológicas (CIB), Universidad Autónoma del Estado de Hidalgo (UAEH). Subsequently, we deposited this specimen in the herpetological collection of the CIB, UAEH, under the voucher number CIB-6469. This adult female of *P. orbiculare* had an incomplete left forelimb, from which the arm was complete and scarred, the forearm was stunted, and the hand and toes were lacking (Figure 1A, B). The scalation was normal, except at the base, where it had two tough and large scales of different color (Figure 1C, D). The

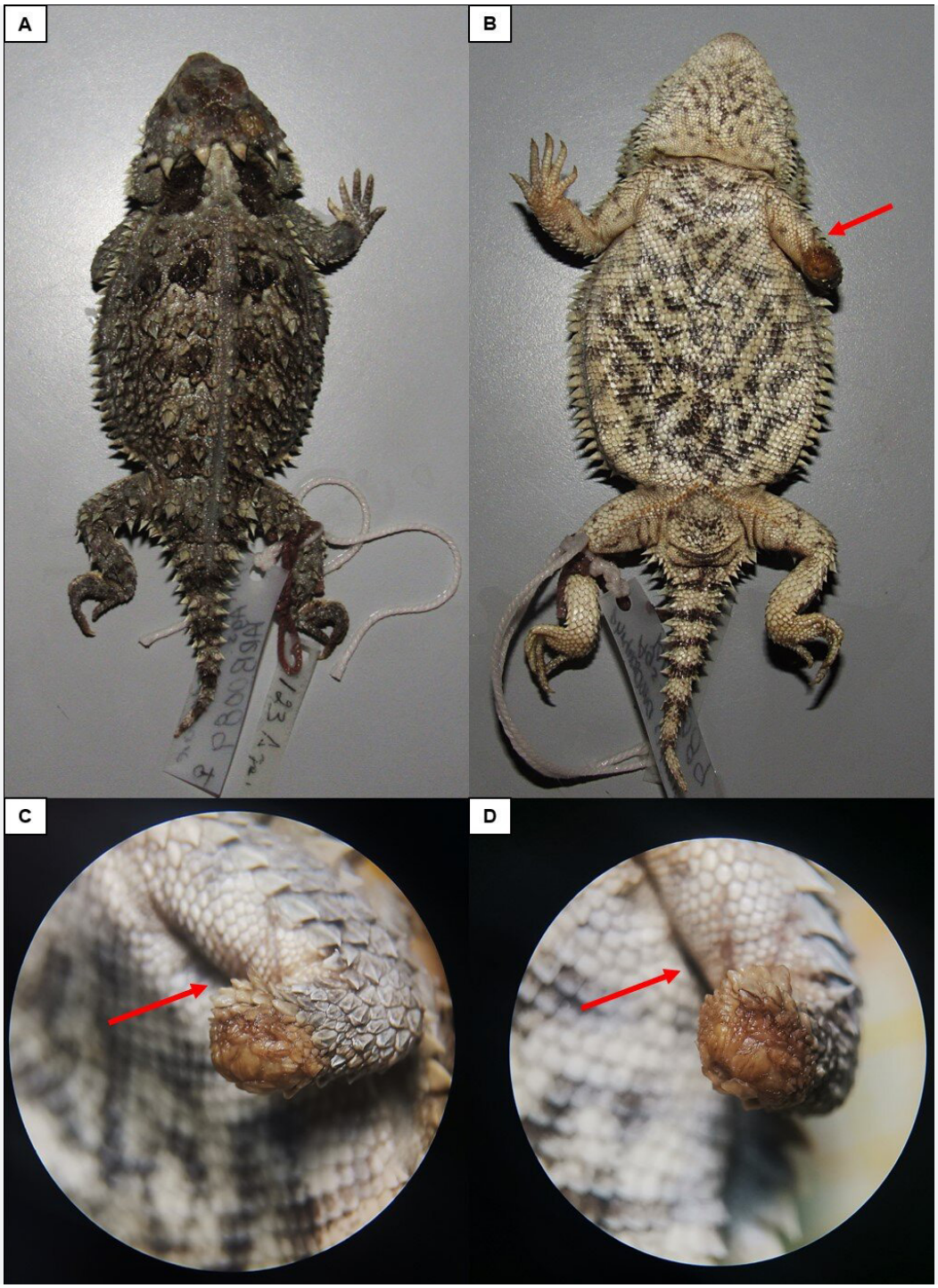

Figura 1. Vista dorsal (A) y ventral (B) de hembra de *Phrynosoma orbiculare* con anomalía en la extremidad anterior del municipio de San José Gracia en el estado de Aguascalientes en México. Detalles de la extremidad anterior en vista lateral (C) y ventral (D). Note el color y la forma distintivos de las escamas regeneradas en la base de la extremidad anterior y la cicatrización en el brazo (flechas rojas).

Figure 1. Dorsal (A) and ventral view (B) of the female of *Phrynosoma orbiculare* with forelimb anomaly from San José de Gracia municipality in the state of Aguascalientes in Mexico. Details of the forelimb in lateral (C) and ventral view (D). Note the distinct color and shape of regenerated scales at the base of the forelimb and scarring on the arm (red arrows).

change in coloration probably occurred either because of the fixation process, scarring, or both. Given that the lower portion was missing, this forelimb anomaly could be classified as an ectomely, according to Rothschild et al. (2012).

Previous studies in different lizard species have considered two potential causes for limb anomalies: injuries from predation attempts (Mora et al., 2020) or malformation during embryo development (Raynaud, 1990). Predators of *Phrynosoma* lizards are quite diverse, including mammals such as canids (e.g., *Vulpes* spp. and *Canis latrans*) and rodents (e.g., *Onychomys torridus*); birds such as falcons (*Falco* spp.) and hawks (e.g., *Buteo lineatus*); and snakes (e.g., *Crotalus atrox* and *Masticophis* spp.; Sherbrooke, 2003, 2022). Snakes generally attack and swallow their prey (including *Phrynosoma* lizards) from the head, while mammals and birds might grab them from any part of the body, including limbs (Sherbrooke, 2003). Given the available evidence of the *P. orbiculare* reported here, this limb anomaly probably would be related to a vertebrate predation attempt (e.g., mammal or bird), but we cannot rule out the possibility that it could result from a malformation of embryo development.

A previous record in *P. cornutum* has shown that horned lizards can survive predator attacks with visible and healed wounds (Sherbrooke, 2022); however, to our knowledge, there are no records of *Phrynosoma* lizards that had survived a predation attempt with partial limb loss. Records of other lizard species suggest that individuals with ectomely do not decrease their mobility and flee capacity (Gleed-Owen, 2012; Kolenda et al., 2017; Christopoulos & Pafilis 2020; Mora et al., 2020), but they probably would not be able to climb. Taking all into account, this is the first case of ectomely in a *Phrynosoma* lizard and further studies could help to elucidate if this kind of anomaly is environmentally or genetically determined.

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