

## Missing toes in the graphic spiny lizard *Sceloporus grammicus* from central Mexico

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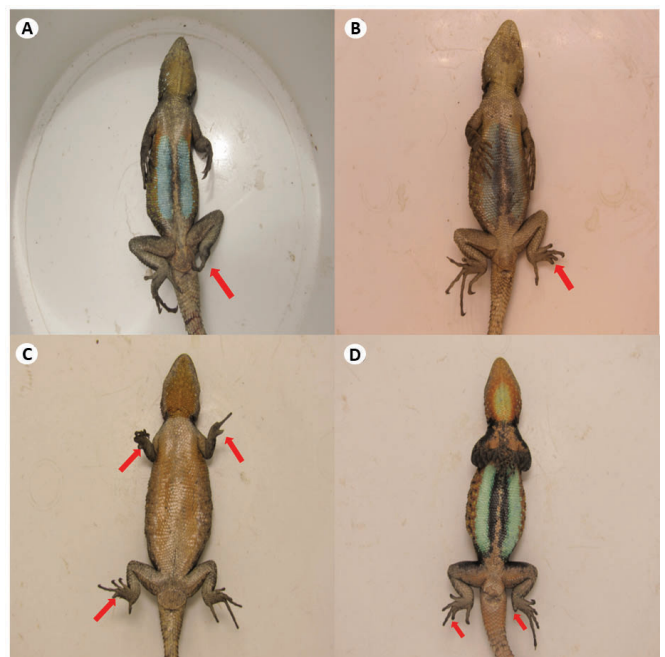
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One of the most reported morphological anomalies in lizards is missing toes. This may occur naturally for various reasons, including attempted predation (Hudson, 1996; Vervust et al., 2009), intraspecific aggression (Gvoždík, 2000; Vervust et al., 2009; Passos et al., 2013), or progressive digital necrosis (Hazell et al., 1985). The incidence of missing toes may vary across habitats (Vervust et al., 2009) and follow different sexual patterns, such as male-bias (Gvoždík, 2000; Vervust et al., 2009), female-bias (Passos et al., 2013), or no sexual bias (Hudson, 1996); longer digits are more likely to be missing (Vervust et al., 2009).

The graphic spiny lizard *Sceloporus grammicus* is widely distributed throughout most of the northern and central states of Mexico (Sites, 1982). During studies on the ecological aspects of this species in four different localities in central Mexico (three in Hidalgo and one in Puebla states), several lizards were captured (by hand, rubber banding, or noosing) that had missing toes (Table 1S - see Supplementary Material). Once captured, we photographed all lizards and measured their snout-vent length and body mass with a digital caliper ( $\pm 0.01$  mm, Mitutoyo) and a spring balance ( $\pm 0.02$ , Pesola®), respectively. Considering all localities from the years 2018, 2021 and 2022, we collected a total of twelve adult lizards that had some missing toes, which we believe were missing naturally. Two thirds (8) were male and one third (4) were female. According to the definitions of Rothschild et al. (2012), six of these lizards had ectrodactyly (absence of one or more digits, Fig. 1A), two had brachydactyly (shortened digits, Fig. 1B), and four had both anomalies (Fig. 1C-D). All of these lizards were seen perching and performing their usual activities so that initially we failed to notice their missing toes. After inspection, all individuals were returned to their capture site.

Other *Sceloporus* species have been reported to have lost toes naturally (e.g. *Sceloporus merriami* and *Sceloporus occidentalis* [Huey et al., 1990]) but this is the first account of this anomaly in *S. grammicus*. It is interesting to note that the removal of toes as a means of marking lizards is claimed to have no apparent effect on either locomotor performance (Huey et al., 1990, Vervust et al., 2009) or the ability of lizards to climb (Paulissen & Meyer, 2000). Given that all the lizards we observed with missing toes were large adults (54.18–71.5 mm) and were performing their activities as usual, we consider that the naturally missing toes also probably had no effect on performance; as was the case in *S. merriami*



**Figure 1.** Naturally missing toes in *Sceloporus grammicus* from central Mexico - **A.** Male with ectrodactyly (absence of one or more digits), **B.** Male with brachydactyly (shortened digits), **C.** Female with both ectrodactyly and brachydactyly, **D.** Male with both ectrodactyly and brachydactyly. Red arrows show the missing toes.

and *S. occidentalis* (Huey et al., 1990). It appears from our study that male *S. grammicus* may lose toes more frequently than females; this could result from intraspecific aggression (Gvoždík, 2000; Vervust et al., 2009). However, given the small sample size no definite conclusion can be drawn about this. Further data collection is required.

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