



## Two new species of *Eleutherodactylus* (subgenus *Syrrhophus*) from western Mexico

JACOBO REYES-VELASCO<sup>1,2,6</sup>, IVAN AHUMADA-CARRILLO<sup>3</sup>,  
TIMOTHY R. BURKHARDT<sup>4</sup> & THOMAS J. DEVITT<sup>5</sup>

<sup>1</sup>Department of Biology, University of Texas at Arlington, 501 S. Nedderman Drive 337 Life Science. Arlington, TX 76010-0498

<sup>2</sup>Entorno Biotico A.C., Simon Bolivar #145, San Pablo. Colima, Colima, Mexico. 28000.

<sup>3</sup>Centro Universitario de Ciencias Biológicas y Agropecuarias, Carretera a Nogales Km. 15.5. Las Agujas, Nextipac, Zapopan, Jalisco, Mexico

<sup>4</sup>10150 West Rutasill Rd. Tucson, AZ 85743, USA

<sup>5</sup>Department of Integrative Biology, The University of Texas at Austin, Austin, TX 78712, USA

<sup>6</sup>Corresponding author. E-mail: [jacoborv@uta.edu](mailto:jacoborv@uta.edu)

### Abstract

We describe two new species of *Eleutherodactylus*, subgenus *Syrrhophus*, from two separate mountain ranges in western Mexico. *Eleutherodactylus grunwaldi* **sp. nov.** inhabits the Sierra de Manantlán in Colima and Jalisco from 1300 to 2200 m, whereas *E. wixarika* **sp. nov.** is known from a single locality in the Sierra Huichola of northern Jalisco at 2400 m, but is probably more widespread. *Eleutherodactylus grunwaldi* is readily distinguishable from most members of mainland *Syrrhophus* by a combination of its large size, broad, truncate digital pads more than three times the narrowest part of the digit, and a black and green marbled color pattern. This species is saxicolous, inhabiting limestone outcrops, and has been found in caves during the dry season. *Eleutherodactylus wixarika* is a moderate sized species, most similar to *E. teretistes*, *E. pallidus* and *E. modestus*. It is distinguished from all other members of the subgenus by the combination a tuberculate, reddish dorsum, lack of compact lumbar glands, and expanded digital pads less than twice the width of the narrowest part of the digit. This species inhabits areas with secondary vegetation in pine forest. Males of both species call at night during the rainy season. The advertisement call of both species consists of a short, narrow band, pure-tone note organized into a discrete train at a rate of about six times per minute. Spectral and temporal acoustic properties differ between species. The subgenus *Syrrhophus* of the genus *Eleutherodactylus* is one of the most poorly studied groups of frogs in Mexico but probably one of the most diverse.

**Key words:** Amphibia, Anura, Eleutherodactylidae, taxonomy, Terrarana, *Tomodactylus*, Jalisco, Colima, Sierra Manantlán, Sierra Huichol

### Resumen

Describimos dos nuevas especies de *Eleutherodactylus*, subgenero *Syrrhophus* de dos sistemas montañosos diferentes en el occidente de México. *Eleutherodactylus grunwaldi* **sp. nov.** habita la Sierra de Manantlán en Colima y Jalisco, entre los 1300 y 2200 m, mientras que *E. wixarika* **sp. nov.** se conoce de una sola localidad a 2400 m en la Sierra Huichola en el norte de Jalisco, pero probablemente su distribución sea más amplia. *Eleutherodactylus grunwaldi* se distingue de los demás miembros del subgenero por su gran tamaño, almohadillas digitales muy expandidas y una coloración de manchas verdes y negras. Esta especie parece ser estrictamente saxícola, habitando rocas kársticas y también se ha recolectado en cuevas durante la temporada seca. *Eleutherodactylus wixarika* es una especie de tamaño mediano, más similar a *E. teretistes*, *E. pallidus* y *E. modestus*. Se distingue de todos los miembros del subgenero *Syrrhophus* por su piel áspera y una coloración dorsal rojiza, así como por no presentar glándulas lumbares y por tener almohadillas digitales que son menos de dos veces el ancho de la parte más angosta del dedo. Esta especie habita zonas de vegetación secundaria en bosque de pino. Los machos de ambas especies cantan durante la noche en la temporada de lluvias. El canto de ambas especies consiste en una nota corta de banda estrecha, organizada en pulsos discretos a un ritmo de seis veces por minuto. Las propie-

Several of the most important topographic features of Mexico converge in central-western Mexico; these include the Sierra Madre Occidental, the Trans-Mexican Volcanic Belt and the Pacific lowlands. The merging of these areas in the region has created a diverse assortment of unique habitats, and has made this region an important center of biodiversity, with many endemic species of vertebrates (e.g. Ceballos *et al.*, 1995; Ceballos & Garcia, 1995; Peterson & Navarro, 2000). Many herpetological collections exist from the states of west central Mexico (Colima, Jalisco, Michoacán and Nayarit), but despite this, the herpetofauna of many areas in these states is still poorly known. We believe that future fieldwork in that area will result in new species discoveries, especially in isolated mountain ranges like the Sierra Cacoma and Sierra de Pihuamo in Jalisco, or the Sierra de Coalcomán in Michoacán.

Frogs of the subgenus *Syrrophus* are among the most diverse groups of anurans in Mexico, but because of the lack of attention that they have received, many species are still awaiting formal description (personal observation). Additional fieldwork in western Mexico and elsewhere will certainly result in the identification of new species of this group, and a careful revision of museum material along with molecular analyses will help us to better understand the species-level diversity and evolutionary history of the group.

**Conservation.** Iron ore mining is an important economic activity in the mountains surrounding the Manantlán Biosphere Reserve, which is inhabited by *E. grunwaldi*. Mining activities have had a negative impact in the ecosystems and communities around the area; for example, a new open pit mine has already destroyed one of the only localities for the rare Manantlán Long-tailed Rattlesnake (*Crotalus lannomi*) (Reyes-Velasco, personal observation; see also Reyes-Velasco *et al.* 2010 for a discussion on the biological importance of the region). The Sierra Huichol in northern Jalisco has some of the last remains of old growth forest in the Sierra Madre Occidental, which now contains less than 0.65% of its original extent (Lammertink, 1996). Logging and the conversion of forest into agricultural fields are some of the biggest threats to the biodiversity of the region. The Wixárika or Huichol people, for whom *E. wixarika* is named, have been greatly affected by new economic activities in the area, including new roads and mining projects, logging, agriculture and the expansion of drug cartels in recent years (authors personal observation; Boni, Garibay, & McCall, 2014; González-Elizondo *et al.*, 2012; Liffman, 2011; Tetreault & López, 2011). The culture and traditions of the Wixárika as well as the biodiversity of the area are increasingly threatened by human encroachment, and deserve protection if they are to persist in the long term.

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#### APPENDIX 1. Specimens examined.

*Eleutherodactylus grunwaldi*—Mexico: Colima: 3.5 km ESE of El Sauz, on road to El Terrero, Municipality of Minatitlán, 1,329 m (MZFC 27472); dirt road between El Sauz and El Terrero, Municipality of Minatitlán, 1,300–1,900 m (MZFC 27467–27471 & 27473–27475); 6.7 km SW of El Sauz, on road to El Terrero (MZFC 27484); Mexico: Jalisco: Grutas de Toxín, Municipality of Toliman, 770m (JRV-230).

*Eleutherodactylus wixarika*—Mexico: Jalisco: Bajío de los Amoles, Municipality of Mexquitic, 2,460 m. (MZFC 27477–27479).

Additional specimens examined at UTA:

*Eleutherodactylus angustidigitorum*: JAC 24912, JAC 26977. *E. cystignathoides*: JAC 30000–30001, JHM 1390–1394. *E. demmisi*: UTAA 59516–59521. *E. dilatus*: UTAA 4017–4020, 4023–4024, 5269, 5276–5279. *E. grandis*: UTAA 56845. *E. guttillatus*: JAC 29603, 29834, 29843. *E. leprus*: JAC 30833–30835, 30849. *E. longipes*: UTAA 59421–59422. *E. marnockii*: JHM 1427–1429. *E. modestus*: JAC 28295, 29117, 30498, 30499, 30518, 30519, 30631. *E. nitidus*: ENS 9557, JAC 26947. *E. nitidus nitidus*: JAC 27256–27276. *E. nitidus orarius*: JAC 29107, 30500, 30501, 30517, 30625. *E. nitidus petersi*: JAC 27237, 28612. *E. pipilans*: JAC 30813. *E. sp.*: ENS 9931, JAC 27707, 30723, 30725–30728, 26663, 30840, 30841, TDH 1530–1531.

Additional specimens examined at MZFC:

*Eleutherodactylus modestus*: MZFC 26888–26889. *E. nivicolimae*: MZFC 26889, 26882–26887, 26905–26908. *E. sp.*: MZFC 26893, 26896, 26898, 27476.