

# NEW RECORDS OF TWO ANURAN SPECIES WITH ECOLOGICAL NOTES IN OAXACA, MEXICO

## NUEVOS REGISTROS DE DOS ESPECIES DE ANUROS CON NOTAS ECOLÓGICAS EN OAXACA, MÉXICO

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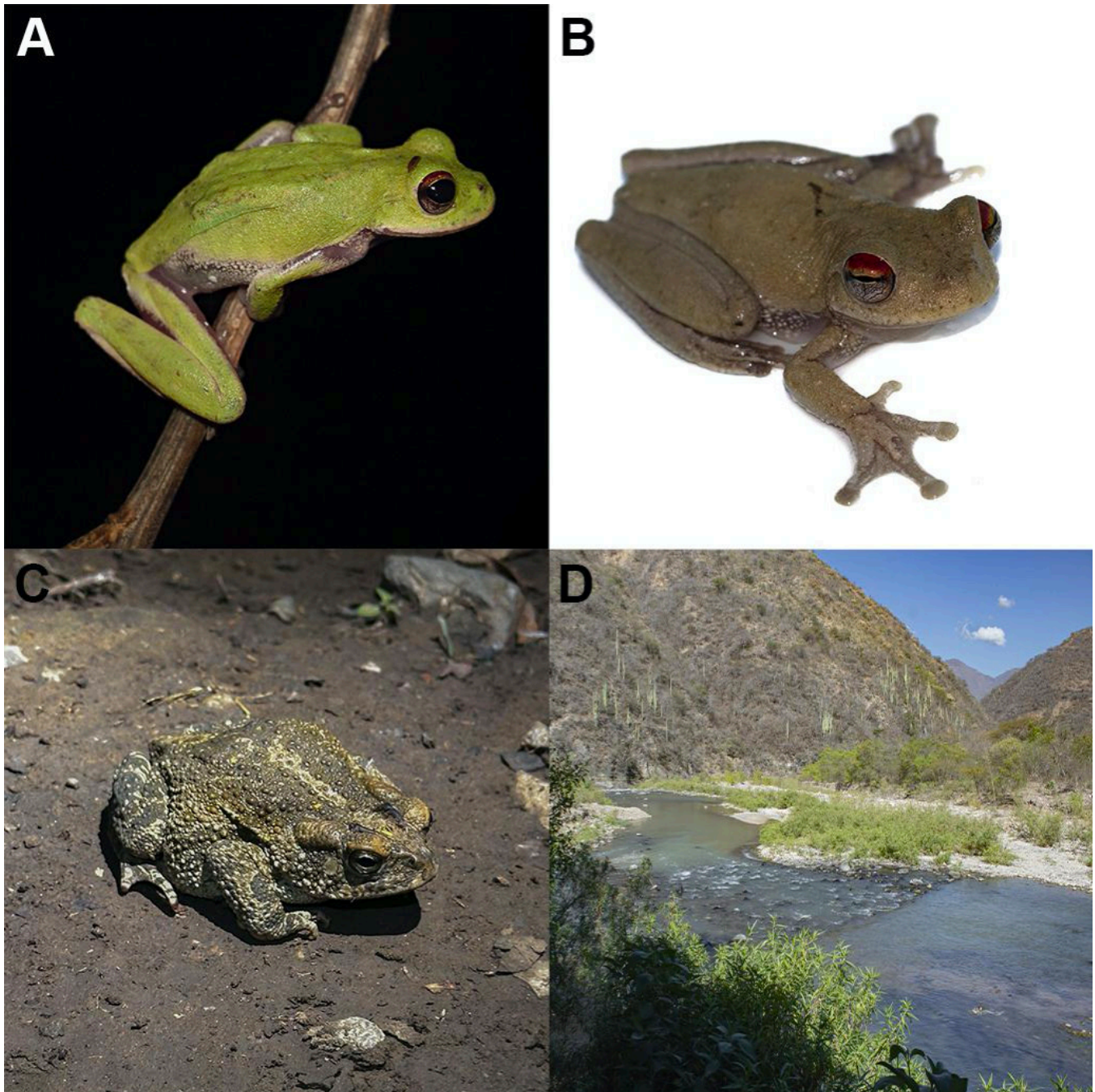
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Amphibian habitats are increasingly fragmented and degraded due to human activities, including the creation of roads, vehicular traffic, pollution from living spaces, and the use of water resources (Tan et al., 2023). In this sense, to identify the threats to amphibian populations, it is necessary to incorporate additional information, such as the different types of habitats used, and increase information on their geographic distribution areas (Lucas et al., 2019; Laufer et al., 2021). Despite its wide diversity of amphibian species, the Mexican state of Oaxaca still presents gaps in terms of its distribution in certain regions, such as the northern part of the state (Ramírez-Bautista et al., 2023). In addition, similar to other vertebrates, there may be a potential bias in existing inventories because of monitoring focused on areas that are easily accessible by roads, which can lead to overlooking the use of different types of habitats even for species with a wide distribution (Steen & Smith, 2006; Barends et al., 2020).

The genus *Rheohyla* is a monotypic genus (Duellman et al., 2016), including only the Small eared-frog *R. miotympanum* (Cope, 1863). This semi-terrestrial frog is of medium size and exhibits arboreal habits (Duellman, 2001). It is a stream-breeding species and is identified by its pale green dorsum with darker reticulations or mottling against a green or tan background (Duellman, 2001). The mating calls consist of a series of short, rather low-pitched notes (Duellman, 2001). Its diet is composed primarily of arthropods (Luría-Manzano & Ramírez-Bautista,

2019) and is preyed upon by spiders and snakes (Díaz-García et al., 2022; Luría-Manzano et al., 2020). The species is endemic to Mexico and inhabits montane cloud forests, with a range that extends from 1,000 to 2,800 m elevation (Duellman et al., 2016). In Oaxaca, *R. miotympanum* has been recorded in three of the 12 physiographic regions: Sierra Madre de Oaxaca, Montañas y Valles de Occidente y Valles Centrales de Oaxaca (Ortiz-Pérez et al., 2004; GBIF, 2024a).

The Pine toad *Incilius occidentalis* (Camerano, 1879) is a medium-sized terrestrial species endemic to Mexico. It typically measures between 52 and 91 cm in length and has brown skin with light stripes and dark spots on its dorsum (Santos-Barrera, 2014). The skin is covered by pointed keratinized tubercles, and larger individuals may exhibit pronounced cranial, supraocular, and postocular crests (Santos-Barrera, 2014). The distribution range of this species extends from the state of Durango to the Istmo de Tehuantepec on the Pacific coast. It can also be found from San Luis Potosí to central Veracruz and eastern Oaxaca, typically in pine-oak forest habitats within arid zones, at elevations ranging from 150 to 2,600 m a.s.l. (Santos-Barrera, 2014). Within Oaxaca, *I. occidentalis* is distributed in eight out of the 12 physiographic subprovinces, except for Depresión del Balsas, Planicie Costera de Oaxaca y Chiapas, Depresión del Istmo de Tehuantepec, and Planicie Costera del Golfo (Ortiz-Pérez et al., 2004; GBIF, 2024b).

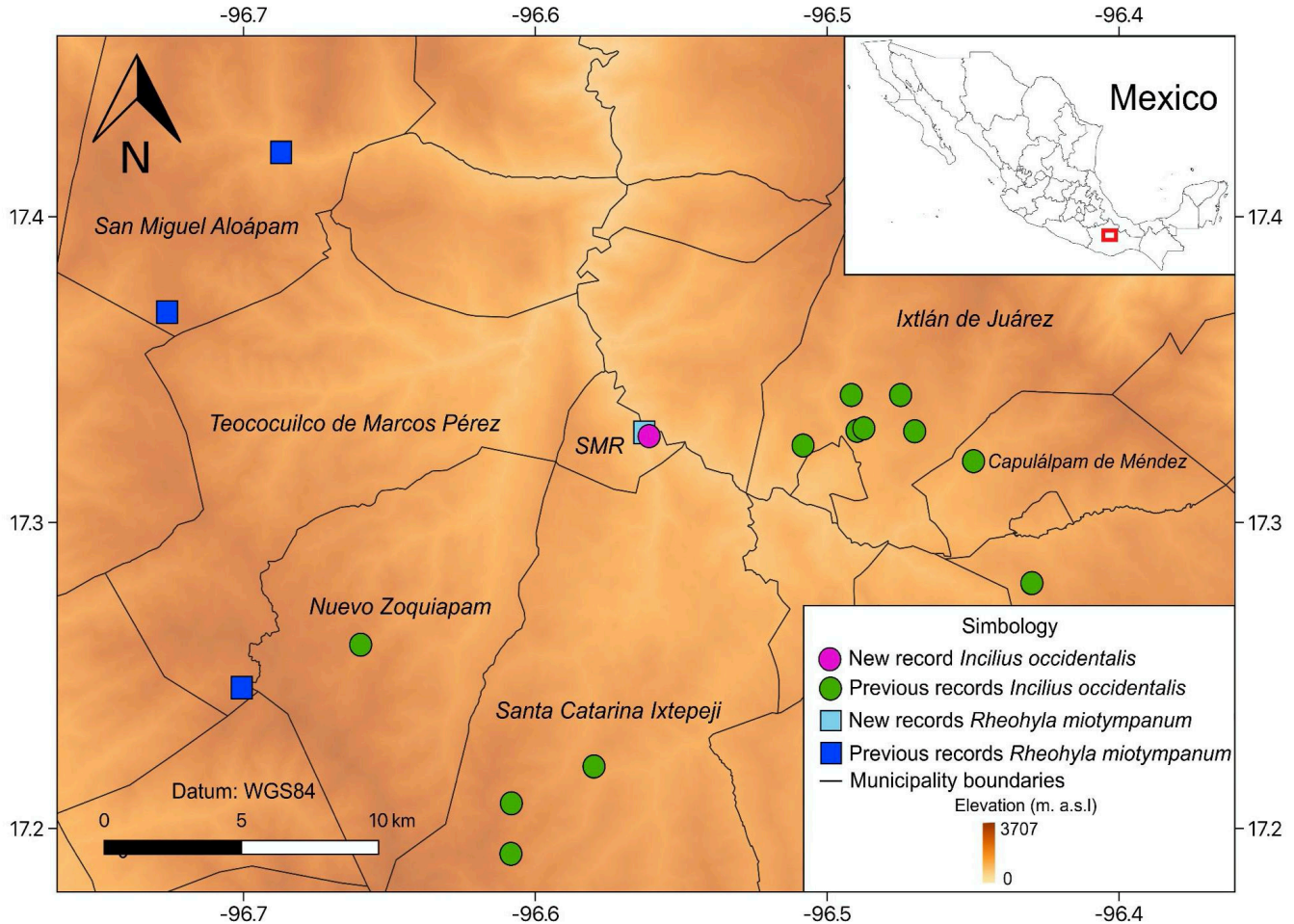


**Figura 1.** Nuevos registros de *Rheohyla miotympanum* e *Incilius occidentalis* en el municipio de San Miguel del Río, Oaxaca. *Rheohyla miotympanum* resaltando la variación de color; A) Hembra (CNAR-RF 977); B) Macho CNAR-RF 976; C) *Incilius occidentalis* (CNAR-RF 978) y D) Hábitat natural de ambas especies.

**Figure 1.** New records of *Rheohyla miotympanum* and *Incilius occidentalis* in the municipality of San Miguel del Río, Oaxaca. *Rheohyla miotympanum* highlighting the color variation; A) Female (CNAR-RF 977); B) Male CNAR-RF 976; C) *Incilius occidentalis* (CNAR-RF 978) and D) Natural habitat of both species.

Despite their wide distribution, both species are facing a continuous decline in area, extent and/or quality of habitat according to the International Union for Conservation of Nature

(IUCN) Red List of Threatened Species classifies both species as Least Concern (IUCN SSC Amphibian Specialist Group, 2020,



**Figura 2.** Nuevos registros y registros previos de *Incilius occidentalis* (GBIF, 2024b) y *Rheohyla miotympanum* (GBIF, 2024a) en el estado de Oaxaca, México. SMR=San Miguel del Río.

**Figure 2.** New records and previous records of *Incilius occidentalis* (GBIF, 2024b) and *Rheohyla miotympanum* (GBIF, 2024a) from the state of Oaxaca, Mexico. SMR=San Miguel del Río.

a, b), and they are not covered by Official Mexican legislation NOM-ECOL-059-SEMARNAT-2020 (SEMARNAT, 2019).

It's necessary to highlight that species classified as Data Deficient and Least Concern are often considered low priority and become excluded from both conservation and management plans (Mace et al., 2008; Bland et al., 2017). The lack of information on these may not accurately reflect its vulnerability, it is advisable to gather more information on this type of species.

Here, we present the first record of *R. miotympanum* and *I. occidentalis* in the Municipality of San Miguel del Río, Oaxaca along with a brief description of their habitat. We provide morphological measurements and one call for *R. miotympanum*.

The habitat where the species were recorded consists mainly of xerophilic vegetation, low deciduous forest, shrubs with a predominance of bushes, and cacti (INEGI, 2019). It is situated in a matrix of non-irrigated agriculture, an on-site Nile tilapia (*Oreochromis niloticus*) hatchery, and greenhouses. The river, known as Río Grande, is situated in the Quiotepec River sub-basin (RH28Af), which forms part of the Papaloapan River Basin (RH28). It measures 22 to 32 meters wide in the vicinity of the study site. Annual temperature range of 16–22°C, average precipitation of 700–1,000 mm. Semi-warm subhumid climate with rains in summer (96.63% of annual rainfall) and temperate sub-humid with rains in summer (3.37%) (INEGI, 2010).

**México: Oaxaca: Municipality of San Miguel del Río:** locality of Road to San Miguel del Río. Small eared-frog *R. miotympanum*

**Tabla 1.** Mediciones morfológicas y temperatura de *Rheohyla miotypanum* en el Municipio de San Miguel del Río, Oaxaca. SVL = Longitud Hocico Cloaca (mm), B = Biomasa (g), BT = Temperatura corporal (°C) y ST = Temperatura del sustrato (°C).

**Table 1.** Morphological measurements and temperature of *Rheohyla miotypanum* in the Municipality of San Miguel del Río, Oaxaca. SVL = Snout Vent Length (mm), B = Biomass (g), BT = Body temperature (°C), and ST = Substrate temperature (°C).

ID	SEX	SVL	B	BT	ST
1	Male	303	2.8	-	-
2	Male	329	3	16	16.2
3	Female	357	3.2	16.4	16
4	Male	322	3.6	16.4	15.9

(Cope, 1863). We found four individuals along a section of the river, whose measurements are listed in Table 1. Additionally, we heard three males vocalizing near the site on January 26, 2024. One of these calls was recorded with a smartphone and then deposited (MZFC-HEC4468) in the Fonoteca de Anfibios, Facultad de Ciencias, UNAM. We also recorded variation in color between the sexes of the species (Fig. 2 A, B). First municipality record in San Miguel del Río (17.329457° N, 96.562693° W; WGS 84; 1,400 m a.s.l.). The nearest vouchered record is 16.6 km to the northwest of Municipality of San Miguel Aloápam (University of Michigan Museum of Zoology [UMMZ] 239816; GBIF, 2024a).

**México: Oaxaca: Municipality of San Miguel del Río:** locality of Road to San Miguel del Río. Pine toad *I. occidentalis* (Camerano, 1879). We found an adult individual (CNAR-RF 978) (Fig. 2 C) in xerophytic vegetation near agricultural areas and greenhouses on January 26 of 2024. First municipality record in San Miguel del Río (17.328736° N, 96.561685° W; WGS 84; 1,460 m a.s.l.). The nearest vouchered record is 9.2 km to the northeast in the municipality of Ixtlán de Juárez (University of Michigan Museum of Zoology [UMMZ] 99861; GBIF, 2024b).

Photographic vouchers of the specimens were deposited in the Colección Nacional de Anfibios y Reptiles (CNAR), Instituto de Biología. The identification of the specimens was verified by Víctor H. Jiménez-Arcos. Although both species have a wide distribution (Santos-Barrera, 2014; Duellman et al., 2016), there are still gaps in certain geographic regions and in our knowledge of their ecology. We noticed that the primary threats at this site may be the construction of new roads and the extraction of stone material, both potentially affecting the Pine Toad and the Small eared-frog. With respect to the Small eared-frog we observed

color variations between the sexes, as well as recorded a call and morphometric measurements that are consistent with those described by Duellman (2001).

Future research should prioritize determining the water quality at this site, as it directly impacts the stream-breeding species, and also prevent the risk of escape of fingerlings of tilapia into the river, which prey on wild amphibian populations (Zambrano et al., 2010). For instance, even though *R. miotypanum* and *I. occidentalis* are endemic to Mexico, neither is protected by Mexican laws NOM-059 (SEMARNAT, 2019). Both species are considered as Least Concern by the IUCN (IUCN SSC Amphibian Specialist Group, 2020). However, the only reference is made to the loss of habitat due to human actions and pollution as their main threats. It is essential to increase knowledge about distribution ranges in order to identify their primary threats. Given the lack of information on amphibians in this Municipality, there is an urgent need to generate a list of species.

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