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Amphibia, Anura, Bufonidae, *Rhaebo ecuadorensis* Mueses-Cisneros, Cisneros-Heredia & McDiarmid, 2012, and Anura, Hylidae, *Phyllomedusa tarsius* (Cope, 1868): range extensions and first records for Zamora-Chinchipe province, Ecuador

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Abstract: We report the first provincial records for *Rhaebo ecuadorensis* Mueses-Cisneros, Cisneros-Heredia & McDiarmid, 2012, and *Phyllomedusa tarsius* (Cope, 1868) in Zamora-Chinchipe, southern Ecuador. The new locations are significant because they represent the southernmost records in Ecuador as well as the westernmost limits of the ranges of these two species.

Key words: Nangaritza canton; Las Orquideas harbour; geographic distribution

Ecuador has the highest density of amphibian species in the world and ranks third, after Colombia and Brazil, in number of species (Ron et al. 2011). Due to the high diversity, endemism and patchy distribution, knowledge of the species lists and range is scarce despite intensive work (Ron et al. 2016). Based on observations made during recent field surveys, we report the first records of *Rhaebo ecuadorensis* and *Phyllomedusa tarsius* from the province of Zamora-Chinchipe, Ecuador.

The data were collected during several field surveys in August and September 2014 and January and May 2016 in Nangaritza canton, province of Zamora-Chinchipe, southeastern Ecuador. We conducted day and night surveys along transects and active searching in plots of vegetation and litter. The Nangaritza River basin, between 780 to 2,800 m above sea level, has a north–south orientation. Its western slope is part of the foothills of the Andes, while its eastern part belongs to the Cordillera del Condor, which runs parallel to the Andes in southeast Ecuador and northeast Peru, just north of the Marañón River depression. This semi-remote eastern cordillera of the Andes has one of the highest concentrations anywhere in the world of vascular plants still unknown to science (Neill 2005; Guayasamin and Bonaccorso 2011). The highest part of this watershed forms a connection between these two mountain ranges faciliting the exchange of species (Krabbe and Sornoza 1994; Schulenberg and Awbrey 1997; Balchin and Toyne 1998; Neill 2005, Jadán and Aguirre 2011).

On 18 August 2014, in the vicinity of Cascadas de los Dioses, 4.5 km from Las Orquideas harbour, Nangaritza canton, Zamora-Chinchipe province (04.26251° S, 078.65705° W, datum: WGS84, 891 m above sea level) (Figure 1) we encountered a juvenile *Rhaebo ecuadorensis* (Figure 2). The toad (snout-vent length: 24.5 mm) was found on the ground on the Nangaritza riverbank.

Figure 1. Habitat within the Nangaritza River valley, Zamora-Chinchipe province, Ecuador.

Figure 2. Juvenile of *Rhaebo ecuadorensis.*

On 17 August 2014, in Reserva Maycu, 3 km from Las Orquideas harbour, Nangaritza canton, Zamora-Chinchipe province (04.21602° S, 078.64726° W, datum: WGS84; 892 m above sea level) we encountered a *Phyllomedusa tarsius* adult male (Figure 3). The monkey tree frog (snout-vent length: 89.3 mm) was caught on a leaf at 1.5 m from the ground, in the forest, near the Nangaritza River. All animals were photographed, measured and released back to their capture site.

Figure 3. Adult *Phyllomedusa tarsius.*

The data for the distribution maps was gathered from the on-line databases (Ron et al. 2016; Acosta Galvis and Cuentas 2016; AmphibiaWeb 2016), as well from Cochran and Goin (1970), Duellman (1978), Almendáriz (1987), Vigle (2008), Almendáriz (2011), Beirne and Whitworth (2011), Forlani et al. (2012), and Mueses-Cisneros et al. (2012).

The toad genus *Rhaebo* Cope, 1862 contains 13 species distributed from Honduras to the Pacific lowlands of western Ecuador, northern Colombia, northwestern Venezuela, the Guiana region, and the Amazonian lowlands of Venezuela, Colombia, Ecuador, Peru, Bolivia, and Brazil (Frost 2016). *Rhaebo ecuadorensis* Mueses-Cisneros, Cisneros-Heredia and McDiarmid, 2012 is a very large toad, phenetically similar to *Rhaebo guttatus* and *R. glaberrimus*, described in 2012 from the Amazonian lowlands of Colombia and Ecuador (Mueses-Cisneros et al. 2012). It differs from *R. glaberrimus* by having the cloacal opening towards the middle level of thighs, while the cloacal opening is situated towards the ventral level of the thighs in *R. glaberrimus*, rounded parotoid glands, as opposed to enlarged parotoid glands in *R. glaberrimus*, and by lacking the pink and yellow groin coloration present in *R. glaberrimus* (Mueses-Cisneros et al. 2012). Additionally, *R. glaberrimus* is distributed only in Amazonian Colombia (departments of Boyacá, Casanare, Cundinamarca, and Meta) in the eastern piedmont of the Cordillera Oriental and in the state of Táchira, Venezuela (Frost 2016). *Rhaebo ecuadorensis* can be easily distinguished from *R. guttatus* by the absence of the characteristic preocular ridge present in *R. guttatus* and by the ventral coloration pattern without circular spots, present in *R. guttatus* (Mueses-Cisneros et al. 2012). The specimen encountered by us had all the distinguishing features described for *R. ecuadorensis*: the cloacal opening towards the middle level of thighs, rounded parotoid glands, no pink and yellow groin coloration, ventral coloration without circular light spots and it lacked the preocular ridge characteristic to *R. guttatus*.

The hylid frog genus *Phyllomedusa* Wagler, 1830 is the most speciose genus (31 spp.) within Phyllomedusinae and is distributed from tropical Mexico to Argentina (AmphibiaWeb 2016). In a recent reclassification of hylid frogs (Duellman et al. 2016), this genus is represented by only 15 species, that is now included in the resurrected family Phyllomedusidae. The other, former *Phyllomedusa,* species were recombined in the resurrected genus *Pithecopus* and the newly proposed genus *Callimedusa*. *Phyllomedusa tarsius* (Cope, 1868) is a large monkey frog of the *P. tarsius* group (Faivovich et al. 2010; Pyron and Wiens 2011) and is widespread in the western part of the Amazon Basin (Frost 2016). It is easily distinguished from all the other Ecuadorian *Phyllomedusa* species by its large size (81–111 mm), the bright orange or red iris with bold black reticulations (Figure 4), the

Figure 4. Head detail of *Phyllomedusa tarsius*.

pair of white spots on the throat, median white spot on the chest, and by the pattern on the flanks, which consists of small irregular pale marks, without any flashy colors (Duellman 1974). The large male encountered by us had bright red irises with bold black reticulations, white spots on the throat and chest, and no flashy colors on the flanks.

Rhaebo ecuadorensis is known only from southeastern Colombia (Departamento Amazonas), eastern Ecuador (Provincias Sucumbios, Orellana, Napo, Pastaza and Morona-Santiago), northern Peru (Departamento de Huánuco) and also from central Amazonian Brazil and northeastern Bolivia, at elevations between 215 and 1,100 m (Mueses-Cisneros et al. 2012; Frost 2016). However, the records from Peru, Brazil and Bolivia are controversial and need confirmation. We present the first record of the species in the province of Zamora-Chinchipe, which extends the range south in Ecuador by ca. 154 km from the previously known distribution record in Morona-Santiago province (Figure 5). This species has not yet been evaluated by the International Union for the Conservation of Nature (IUCN), which means that any available distribution data is crucial for the assessment under the IUCN Red List Categories and Criteria and indirectly for the conservation of this species. *Phyllomedusa tarsius* is widespread in the Amazon basin from western Venezuela, southern Colombia (departaments of Meta, Caquetá and Amazonas), eastern Ecuador (provinces of Orellana, Napo, Pastaza and Morona-Santiago) through Peru and

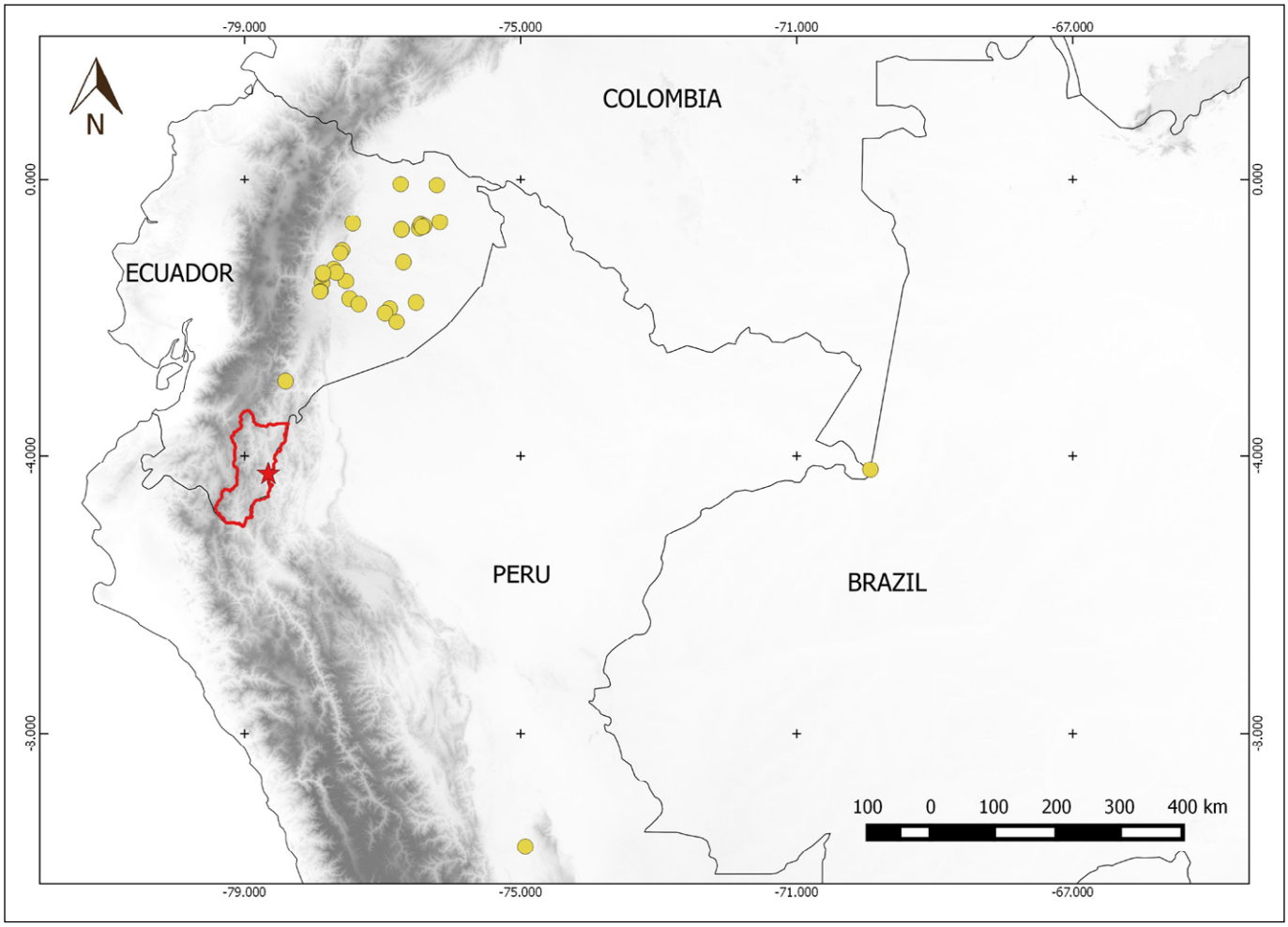

Figure 5. Distribution map of *Rhaebo ecuadorensis* in Ecuador and in the nearby countries, with the new location reported marked with a star. The contour of the province of Zamora-Chinchipe is marked with red.

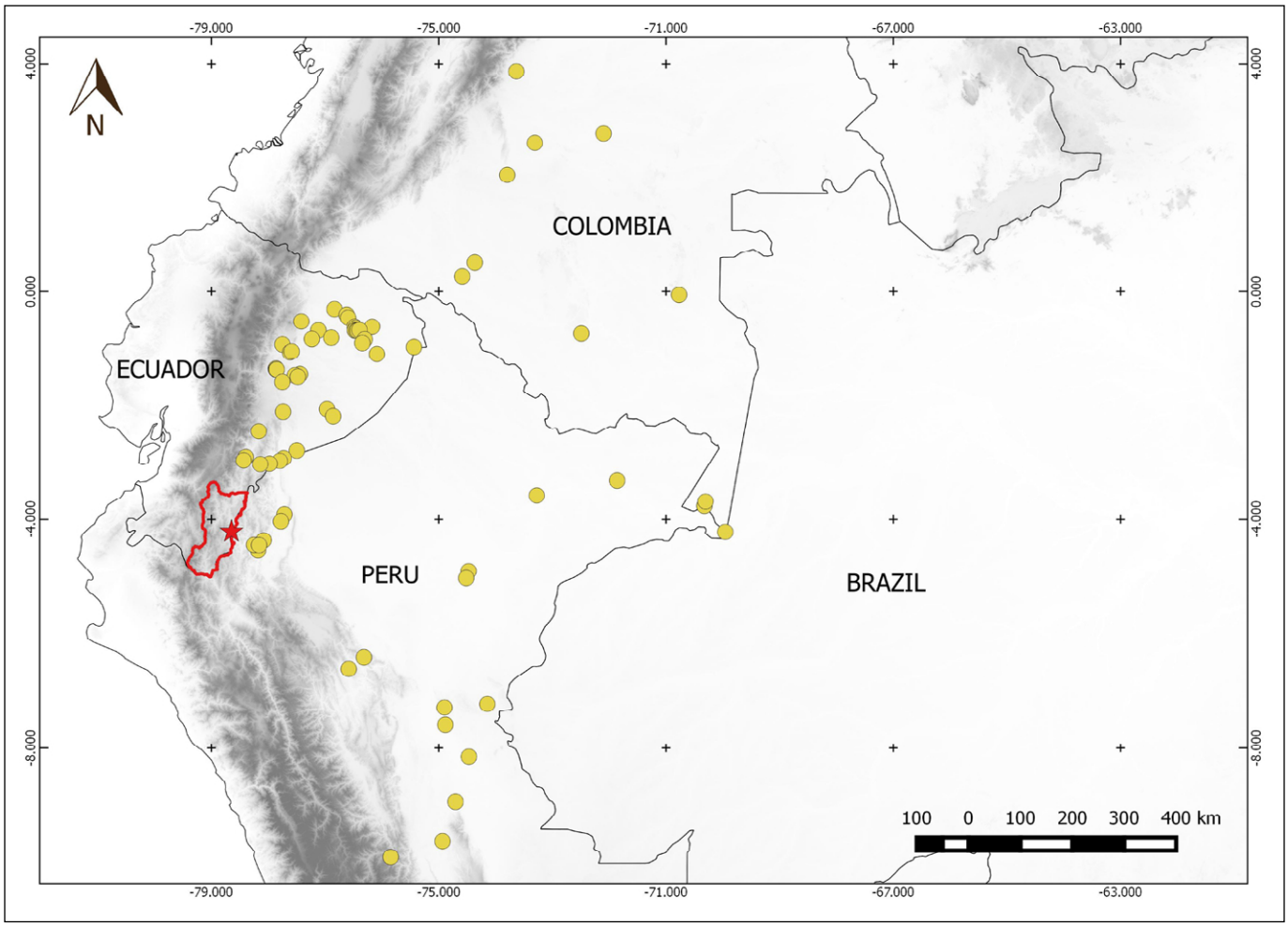

Figure 6. Distribution of *Phyllomedusa tarsius* in Ecuador and in the nearby countries, with the new location reported marked with a star. The contour of the province of Zamora-Chinchipe is marked with red.

western Brazilian Amazonia, at elevations between 0 and 450 m (La Marca et al. 2004; Frost 2016). Our record is the first for the province of Zamora-Chinchipe and extends this species' range south in Ecuador by ca. 141 km from the previously known record in Morona-Santiago province (Figure 6). Additionally, our record for *Phyllomedusa tarsius* is also an altitudinal range extension for this species from 450 m to 892 m above sea level (La Marca et al. 2004). Our new records are significant because they represent the southernmost records for both species in Ecuador. They are also at the westernmost limits of the ranges of these two species.

The Nangaritza region has a high species richness, not only in relation to plants (Neill 2007) and birds (Freile et al. 2014), but also to amphibians and reptiles. Despite several studies, new species are constantly described and new distributional data recorded (Teran-Valdez and Guayasamin 2010; Almendáriz et al. 2014a, 2014b; Núñez et al. 2015). Our study highlights the still poor knowledge of amphibians in the region and the importance of accurate geographical distribution data for adequate conservation measures.

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