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Two new fringe-limbed frogs of the genus *Ecnomiohyla* (Anura: Hylidae) from Panama

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Abstract

Forest canopy-dwelling frogs are usually among the rarest anuran species observed in the neotropical forest, mainly because they fall outside of the scope of the standard search methods used by herpetologists. During field explorations undertaken in western and eastern Panama in recent years, we discovered two species belonging to the genus *Ecnomiohyla*, which showed significant differences in genetic distances (16S mtDNA gene) and morphological characteristics different from any known *Ecnomiohyla* species. The first specimen originates from the Serranía de Jingurudó, Darién province, southeastern Panamá, and is described herein as *E. bailarina* **sp. nov.**, and the second specimen was found at Santa Fe National Park, Veraguas province, central-western Panama, and is described as *E. veraguensis* **sp. nov.** We provide a detailed description of both new species, including comparisons of morphological and molecular characters of almost all members of the genus in lower Central America, as well as an identification key for the entire genus.

Key words: Fringe-limbed frogs, *Ecnomiohyla*, rare species, DNA barcoding, lower Central America, Panama

Introduction

After the description of a new species, subsequent sampling usually provides additional comparative specimens, which thus increases our knowledge about the biology and distribution of that species with time (Vrcibradic *et al.* 2008; Hertz *et al.* 2012a). Nonetheless, there are some apparently rare species, whose existence we know for decades based only on the type specimen(s) or material from the type locality (Pimenta *et al.* 2005; Frost 2013, Wickramasinghe *et al.* 2013). Burrowing caecilians, salamanders (*Oedipina* spp.) and forest canopy-dwelling frogs (e.g. *Pseudophilautus stellatus*) are examples of such infrequently encountered species, which are then perceived as very rare (García-París & Wake 2000; Hanken *et al.* 2005; Wilkinson *et al.* 2007; Kamei *et al.* 2009; Wickramasinghe *et al.* 2013), because the habitat of these amphibians usually falls outside of the scope of the standard search methods used by herpetologists. Thus, the perception of rarity might be only an artifact of limited or inappropriate search techniques. In this context, any information about such seldom-seen (or "rare") taxa can be relevant.

Among such rare species are most members of the fringe-limbed frogs of the genus *Ecnomiohyla* Faivovich, Haddad, Garcia, Frost, Campbell, & Wheeler 2005, which spend all their life phases in the canopy and only rarely climb down and become visible to us. Fringe-limbed frogs are large, morphologically unusual hylid frogs with a cryptic moss-like color pattern and dermal fringes on portions of the body, rendering them well camouflaged. They breed in phytotelmata (e.g. Savage 2002; Mendelson *et al.* 2008; Savage & Kubicki 2010), and most of them occur in wet lowland, premontane tropical, and cloud forests between 20–2000 m elevation (Wilson *et al.* 1985;

- b. Heel without tubercles but with a scalloped fringe; without black keratin tipped tubercles over most of flanks and venter; prepollical bony projection in males, variable 10
- 10a. Males without keratinized black spines on prepollex; without black keratin tipped tubercles on dorsum (Fig. 10D) *Ecnomiohyla sukia*
- b. Males with keratinized black spines on prepollex; black keratin tipped tubercles over most of dorsum 11
- 11a. Dorsum strongly tuberculated; two clusters of nuptial spines at the distal end of prepollical tubercle and the base of prepollex in males (Fig. 10C) *Ecnomiohyla bailarina*
- b. Dorsum slightly tuberculated; without nuptial spines arranged in clusters, instead 6-7 nuptial spines scattered along the pollex (Fig. 10B) *Ecnomiohyla veraguensis*
- 12a. Cephalic skin co-ossified with skull; webbing on fingers extensive, reaching to the base of disk on two to four but not all digits; toe webbing full, reaching to the base of disks on all digits *Ecnomiohyla salvaje*
- b. Cephalic skin not co-ossified with skull; finger webbing usually not reaching to the base of disk and if, then only on one digit; toe webbing never reaching to the base of disk on all digits 13
- 13a. Dorsum smooth; humeral projection absent in males; heel with few small tubercles; SVL of adult females 60.2 mm, SVL of adult males 57 mm *Ecnomiohyla echinata*
- b. Dorsum granular; humeral projection present in males; heel smooth; SVL of adult females 61.3–79.9 mm, SVL of adult males 62.8–97.3 mm *Ecnomiohyla rabborum*

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