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A new species of tree frog genus *Rhacophorus* from Sumatra, Indonesia (Amphibia, Anura)

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Abstract

A small-sized tree frog of the genus *Rhacophorus* is described on the basis of 18 specimens collected from three different localities on Sumatra Island, Indonesia. *Rhacophorus indonesiensis* sp. nov. is divergent from all other *Rhacophorus* species genetically and morphologically. The new species is distinguished from its congeners by a combination of: the presence of black spots on the ventral surfaces of the hand and foot webbing, an absence of vomerine teeth, a venter with a white kite-shaped marking, raised white spots on the dorsum or on the head, and a reddish brown dorsum with irregular dark brown blotches and distinct black dots. With the addition of this new species, fifteen species of *Rhacophorus* are now known from Sumatra, the highest number of species of this genus in the Sundaland region. However, with the increasing conversion of forest to oil palm cultivation or mining, the possibility of the extinction of newly described or as yet undiscovered species is of great concern.

Key words: Tree frog, Sundaland, pond-breeding, elephant wallow

Introduction

Tree frogs of the genus *Rhacophorus* Kuhl and van Hasselt are distributed from India, China, Japan, Indochina, Sundaland to Sulawesi and the Philippines. The genus currently contains 86 species (Frost 2014). Fourteen species of *Rhacophorus* have been recorded from Sumatra: *R. achantharrhena* Harvey, Pamberton, & Smith, *R. barisani* Harvey, Pamberton, & Smith, *R. bengkuluensis* Streicher, Hamidy, Harvey, Andres, Shaney, Kurniawan, Smith, *R. bifasciatus* van Kampen, *R. catamitus* Harvey, Pamberton, & Smith, *R. cyanopunctatus* Manthey & Steiof, *R. modestus* Boulenger, *R. nigropalmatus* Boulenger, *R. norhayatae* Chan & Grismer, *R. pardalis* Günther, *R. poecilnotus* Boulenger, *R. prominanus* Smith, *R. pseudacutirostris* Dehling, dan *R. reinwardtii* (Schlegel). The second last species was previously assigned to *R. angulirostris* Ahl (e.g., Inger 1966).

During herpetological surveys in Teluk Nauli, in North Sumatra Province, Sumatra, in 2003, the junior author found a small-sized rhacophorid frog with distinct black spots on the ventral surfaces of the hand and foot webbing. Two years later she collected a similar-looking species from Sungai Durian, in central western Sumatra. For temporary identification she identified specimens from both localities as *Rhacophorus* sp. 1 (Kurniati 2011). In 2011, specimens thought to belong to the same species were collected from Jambi, around 50 km northeast of Sungai Durian by Mediyansyah. All specimens were sent to Museum Zoologicum Bogoriense (MZB), and we have now examined them, together with all specimens of rhacophorid frogs from Sumatra, Java, Borneo, and Sulawesi. Herein we describe these specimens with spotted webbing as a new species.

Material and methods

Collection localities for the new species are shown in Figure 1. Tissue samples were taken prior to fixing specimens in 10% formalin, and later storing them in 70% ethanol. Voucher specimens used in this study are stored

Rhacophorus indonesiensis **sp. nov.** was collected from primary lowland forest at 500 m asl to montane forest at 1100 m asl in the central western and northern regions of Sumatra. Most of the forests in Sumatra have been converted to oil palm plantations. Of the three locations where this species was found, only Sungai Durian (Fig. 1) is currently located in a protected area (Kerinci Seblat National Park). The other two locations are primary forests that have been converted to oil palm cultivation (Birun) and gold mining (Teluk Nauli) (HK pers. obs.), activities that are threats to biodiversity on Sumatra. Sumatra is reported to have lost nearly half of its natural forest cover in the past 30 years and possible extinction of many newly described species is a concern (Matsui *et al.* 2012). Among the vertebrates, amphibians are more vulnerable to changes in habitat (Stuart *et al.* 2004, Pounds *et al.* 1997, Pounds *et al.* 2000). With this mind it is essential to preserve the last remaining patches of primary and secondary rainforest across Sumatra, in order to protect the species that remain, including those yet to be discovered. In order to ensure these forests remain intact, a concerted effort from conservationists, management officials, and stakeholders will be critical in the years to come.

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APPENDIX. Comparative material examined.

- Rhacophorus achantharrhena*: Sumatra [MZB Amph 12363, 12364 (paratypes) from Bengkulu, Bukit Kaba; MZB Amph 22208 from Jambi, Kerinci Seblat National Park; MZB Amph 22209 from Lampung, Tanggamus, Ngarip; MZB Amph 14816–14819 from Jambi, Kerinci Seblat National Park, Gunung Tujuh; MZB Amph 22370 from Lampung, Tanggamus, Mt. Tanggamus].
- R. angulirostris*: Borneo [BMNH 1947.2.9.6 (previously 91.2.25.9/type) from North Borneo, Kinabalu].
- R. annamensis*: Vietnam [BMNH 1947.2.8.86 (previously 1924.1.31.15/type) from South Annam, Daban].
- R. barisani*: Sumatra [MZB Amph 12367, 12368 (paratypes) from Bengkulu, Bukit Kaba; MZB Amph 16308 from Bengkulu; MZB Amph 14628 from Lampung, Bukit Barisan Selatan National Park, Way Sepunti].
- R. belalongensis*: Borneo [MZB Amph 23961, MZB Amph 23962 from Central Kalimantan, Murung Raya, Bukit Batikap].
- R. bengkuluensis*: Sumatra [MZB Amph 21194 (holotype) from Bengkulu Tengah, Taba Pananjung, southwest slope of Bukit Barisan range; MZB Amph 16308 (paratype) from Bengkulu Tengah, Taba Pananjung; MZB Amph 3449 (paratype) from Bengkulu Utara, Napal Putih; MZB Amph 3482 (paratype) from Lampung Barat, Rata Agung; MZB Amph 14628 (paratype) from Lampung Barat, Way Sepunti; UTA A-62770 (paratype) from Lampung Barat, Kubu Perahu].
- R. bifasciatus*: Sumatra [RMNH5062A–E (syntypes) from Kerinci, Sungai Kumbang; MZB Amph 14801–14808, 14811–14815 from Jambi, Kerinci Seblat National Park, Rawa Bento; MZB Amph 3482 from Lampung, Bukit Barisan National Park, Rata Agung; MZB Amph 3449 from Bengkulu, Bukit Barisan Selatan National Park, Dirgahayu Rimba].
- R. bipunctatus*: India [BMNH 1872.4.17.123–129 (types) from Khasi Hill].
- R. borneensis*: Borneo [MZB Amph 22142, 23534 from East Kalimantan, East Kutai, Sangkulirang].
- R. burmanus*: Myanmar [BMNH 1947.2.8.17 (previously 1940.6.1.39/type) from Patsarlamdam, Triangle, Upper Burma].
- R. calcaneus*: Vietnam [BMNH 1947.2.9.18 (previously 1924.1.31.4/type) from Langbian Plateau].
- R. catamitus*: Sumatra [MZB Amph 12365, 12366 (paratypes) from Bengkulu, Bukit Kaba, western slope].
- R. cyanopunctatus*: Sumatra [MZB Amph 3717–3723 from Aceh, Mt. Leuser National Park, Soraya; MZB Amph 14627 from Bengkulu, Bukit Barisan National Park, Linau; MZB Amph 21843 from Jambi, Merangin, Durian Rambun; MZB Amph 21826 from Jambi, Merangin, Kotarami; MZB Amph 21827 from Jambi, Merangin, Tiaono; MZB Amph 11894, 11895 from South Sumatra, Kerinci Seblat National Park, Sungai Tabalok, Rupik].
- R. dulitensis*: Borneo [BMNH 1947.2.8.84 (previously 92.6.3.15) from Sarawak, Mt. Dulit.], Sumatra [MZB Amph 3465 from Lampung, Bukit Barisan Selatan National Park, Pemerihan].
- R. edentulus*: Sulawesi [BMNH 1947.2.8.82 (previously 94.9.28.3/type) from North Sulawesi, Tomohow; MZB Amph 20684 from South Sulawesi, Toraja, Hare Mt. Forest 28 km; MZB Amph 22019–22022 Southeast Sulawesi, Kolaka, Pomala, Ewo ewo village 300 km; MZB Amph 17513–17517 from Southeast Sulawesi, Mekongga, Kolaka, Wawo Tinutarik village; MZB Amph 22616–22625 from South Sulawesi, Goa, Tampobolu, Mt. Lampobatang, Cikoro village; MZB Amph 11416–11421 from South Sulawesi, Buton, Kapontorik, Lambusango Nature Reserve; MZB Amph 10835–10839 from Southeast Sulawesi, Wawoni, Mt. Putih, Lampeatik village; MZB Amph 3673, 22629–22640 from South Sulawesi, Goa, Tompobolu, Bintolo village; MZB Amph 22666–22701 from West Sulawesi, Mamasa, Lambangan village; MZB Amph 8111–8114 from Central Sulawesi, Banggai, Luwuk, Salodik village; MZB Amph 7672–7685, 7688 from South Sulawesi, Serean, Bunder 2nd brigade on road north of Talimpo; MZB Amph 8407 from South Sulawesi, Buton, South Buton; MZB Amph 12952–12953 from South Sulawesi, Luwu, Konde Selatan, Lembo, PT. Inco].