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A new species of *Kalophrynus* (Amphibia, Anura, Microhylidae) from Southern Peninsular Malaysia

MASAFUMI MATSUI[1,5], KANTO NISHIKAWA[1], DAICUS M. BELABUT[2,3], AHMAD NORHAYATI[3,4] & HOI SEN YONG[2]

[1]*Graduate School of Human and Environmental Studies, Kyoto University, Kyoto 606-8501, Japan*
[2]*Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia*
[3]*Institute for Environment and Development (LESTARI),Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia*
[4]*Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia*
[5]*Corresponding author. E-mail: fumi@zoo.zool.kyoto-u.ac.jp*

Abstract

A new microhylid, *Kalophrynus limbooliati* **sp. nov.**, is described from the state of Johor, in the southern part of Peninsular Malaysia. Morphologically, the new species differs from all known congeners in the combination of medium body size; short fourth finger; two subarticular tubercles on fourth finger and none on the fifth toe; presence of light lateral stripe and dark inguinal spot; absence of nuptial pads and outer metatarsal tubercles. Acoustically, the new species clearly differs from all congeners whose calls have been reported, and resembles a syntopic ranid *Hylarana laterimaculata* with a long series of high-pitched whistle like notes.

Key words: *Kalophrynus*, advertisement call, cryptic species, new species, Southeast Asia, taxonomy

Introduction

The microhylid frog genus *Kalophrynus* Tschudi, 1838 has a wide range from Southern China to Java, the Philippines, and Assam, India (Matsui 2009). Peninsular Malaysia is situated in the center of this distribution and four species of *Kalophrynus* have been recorded from there (*K. pleurostigma* Tschudi; *K. robinsoni* Smith; *K. palmatissimus* Kiew; and *K. yongi* Matsui) (Berry 1975; Kiew 1984; Das & Haas 2003; Matsui 2009). Of these, *K. pleurostigma* was once thought to widely occur in the Peninsula (e.g. Berry 1975), but some records for this species later proved to include *K. palmatissimus* (Kiew 1984). Taxonomic problems amongst specimens referred to *K. pleurostigma* from Peninsula Malaysia, however, have never been completely resolved; in particular Dring (1979) noted morphological variation in this 'species', which is not attributable to misidentification of *K. palmatissimus* with well-developed toe webbing.

During fieldwork to the southern part of Peninsular Malaysia in 2009 we detected strange frog calls that resemble those of a ranid, *Hylarana laterimaculata* (Barbour & Noble) to the human ear (Leong *et al*. 2003). The calls, however, were heard from the forest litter, and not from near pools and streams where *H. laterimaculata* was actually found. Intensive searches in forest revealed that these calls were coming from a *Kalophrynus* species that superficially resembled *K. pleurostigma*.

The *Kalophrynus* in question is acoustically very unique and clearly differs from all congeneric species whose calls are known (see Matsui 2009; Dehling 2011). Because acoustic signals play an important role in reproductive isolation among frog species, unique calls alone justify recognizing the *Kalophynus* from the southern part of the Peninsula as a distinct species. However, in addition to this difference, later detailed examination also revealed a suite of morphological characteristics that differentiate this taxon from all other *Kalophrynus*, including the superficially similar *K. pleurostigma.* Sequence divergences at the mitochondrial 16S rRNA gene, which is often utilized in elucidating cryptic species (e.g. Fouquet *et al*. 2007), were also very large between this species (as *Kalophrynus* sp.) and other *Kalophrynus* (Matsui *et al*. 2011). We herein describe this new species.

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