

DESCRIPTIONS OF THE ADVERTISEMENT CALLS OF SOME BORNEAN FROGS

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We describe the temporal and spectral properties of advertisement calls of seven species of Bornean anuran amphibians, from the following families — Bufonidae: *Ansonia leptopus* (Günther, 1872) and *Ingerophrynus quadriporcatus* (Boulenger, 1887); Microhylidae: *Microhyla borneensis* Parker, 1928; Ranidae: *Hylarana signata* (Günther, 1872); Megophryidae: *Leptobrachella mjobergi* Smith, 1925, *Leptotalax* cf. *gracilis* (Günther, 1872), and *Leptotalax maurus* Inger, Lakim, Biun et Yambun, 1997. All, except *L. gracilis*, were unreported in the literature before. For this species and for *Leptobrachella mjobergi*, we suspect the presence of ultrasonic component in the call, recently reported in several species of frogs from China and Borneo.

Keywords: acoustics, sound sampling, anuran amphibians, Borneo.

INTRODUCTION

Advertisement signals are a fundamental part of the frog reproductive system (Duellman and Trueb, 1986; Wells, 2007), facilitating pre-mating reproductive isolation, and thus speciation, and thereby, are subject to pressures of sexual selection. Reporting of advertisement calls of anuran amphibians has a long history (Rand, 2001), with an entire volume dedicated to its central theories, including behavior, endocrinology, evolution, neurobiology and developmental biology (Ryan, 2001).

The Sundaic island of Borneo straddles the equator, and as expected from its location, has a rich amphibian fauna, comprising over 150 described species (Inger and Stuebing, 2005; Haas and Das, 2010). The forests house species-rich frog assemblages, some with over 80 species, and in such sites, many species exhibit synchro-

nous calling. Call descriptions of a number of species remain unreported, let alone the vocal repertoire within species, including non-advertisement calls. A review by Sukumaran et al. (2006) shows that under 65% of calls remain undescribed, and for those that are, suffer from shortfalls such as being descriptive or onomatopoeic, lacking sonograms and oscillograms, and therefore, do not lend themselves to analysis. Excluding these exclusive descriptive calls, only 75 species (just under 49% of the fauna) have known calls, highlighting the lacuna in current knowledge of Bornean frog acoustics.

In this paper, we present quantitative as well as qualitative descriptions of the vocalizations of seven species of Bornean anurans. The vocalizations of six of these have never been reported before, or have been misattributed due to taxonomic uncertainty (Sukumaran et al., 2006).

MATERIAL AND METHODS

In a series of field trips to several sites in northern Borneo (Sabah and Sarawak: East Malaysia), made between February and October 2005, vouchered recordings of advertisement calls of several species of anuran amphibians were made (see Table 1) in order to describe the temporal and spectral properties of calls. All recordings were made with a Marantz PMD670 Portable

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