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Red Hot Chili Pepper. A New *Calluella* Stoliczka, 1872 (Lissamphibia: Anura: Microhylidae) from Sarawak, East Malaysia (Borneo)

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Abstract

A new brightly-coloured (olive and red) species of microhylid frog of the genus *Calluella* Stoliczka 1872 is described from the upper elevations of Gunung Penrissen and the Matang Range, Sarawak, East Malaysia (Borneo). *Calluella capsa*, new species, is diagnosable in showing the following combination of characters: SVL up to 36.0 mm; dorsum weakly granular; a faint dermal fold across forehead; toe tips obtuse; webbing on toes basal; lateral fringes on toes present; outer metatarsal tubercle present; and dorsum greyish-olive, with red spots; half of venter bright red, the rest with large white and dark areas. The new species is the eighth species of *Calluella* to be described, and the fourth known from Borneo. A preliminary phylogeny of *Calluella* and its relatives is presented, and the new taxon compared with congeners from Malaysia and other parts of south-east Asia.

Key words: *Calluella capsa* **sp. nov.**, Microhylidae, systematics, new species, Gunung Penrissen, Matang Range, Malaysia

Introduction

The microhylid genus *Calluella* Stoliczka 1872 comprises seven nominal species that are known from southern China, Indo-Malaya and Indo-China (Frost 2013; Inger *et al.* 1999; Das *et al*. 2004). The genus was created to place *Megalophrys guttulata* Blyth 1856, by Stoliczka 1872, originally described as a monotypic genus. With the exception of *C. guttulata* (Blyth 1856) and *C. yunnanensis* Boulenger 1919, members of the genus tend to be rare in collections, with most species known from three or less specimens. This rarity is perhaps due to their fossorial habits within rainforest habitats, and temporally limited appearance on the soil surface. Perhaps as a consequence, as many as three synonyms are on record: *Colpoglossus* Boulenger 1905 (for *C. brooksii* Boulenger 1904), *Dyscophina* van Kampen 1905 (for *C. volzi* van Kampen 1905) and *Calliglutus* Barbour and Noble 1916 (for *C. smithi* Barbour & Noble 1916). The genus *Calluella* was placed in the subfamily Dyscophinae along with the Madagascan *Dyscophus,* although Vences (2004) mentioned that molecular data have failed to clarify their relationship. Subsequently, *Calluella* was transferred to Calluellinae by Fei *et al.* (2005), and on the basis of phylogenetic position to Microhylinae by Frost *et al.* (2006). More recently, de Sá *et al.* (2012) reported the genus, as currently construed, to be paraphyletic. Pyron and Wiens (2012) suggested a sister-relationship with *Glyphoglossus*, on the basis of sequence data, and together with *Glyphoglossus* and *Microhyla*, forming a well-supported clade within the Microhylinae (McPartlin 2010).

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TABLE 1. Mensural and meristic data for *Calluella capsa* **sp. nov**., compared with congeneric species. References: 1. Male SVL (maximum, unless range given, in mm); 2. Female SVL (maximum, unless range given, in mm); 3. Supratympanic fold indistinct (0) or distinct (1); 4. Dorsum smooth or granular (0) or tuberculate (1); 5. Toe webbing absent (0), basal (1) or extensive (2); 6. Lateral fringes on toes absent (0) or present (1); 7. Outer metatarsal tubercle absent (0) or present (1); 8. Pupil shape vertical (0), horizontal (1) or rounded (2); 9. Tips of toes obtuse (0) or expanded (1); 10. Interorbital fold absent (0), indistinct (1) or distinct (2); 11. Dorsum ground colour olive (0), yellow (1) or brown (2); 12. Dorsum unpatterned (0), with small spots (1) or large dark central area (2); 13. Flanks unpatterned (0), with dark blotches (1) or with red bars (2); 14. Venter unpatterned or finely speckled (0), with dark spots or streaks (1) or with bright red gular and abdominal regions (2). In addition, '?' denotes an unknown character state; '/' denotes a multistate character; '-' denotes not applicable, * denotes unknown sex.

Characters	*brooksii* western Sarawak, Borneo	*capsa* **sp. nov.** western Sarawak, Borneo	*flava* northern Sarawak, Borneo	*guttulata* Myanmar, Thailand, Laos, Vietnam	*minuta* Peninsular Malaysia	*smithi* northern Sarawak, Borneo	*volzi* Sumatra	*yunnanensis* southern China, Vietnam
1	51.0–55.0	34.2–36.0	35.25*	34.0	30.9-32.7	33.0	31.4	30.0–35.5
2	60–73.5	?	?	38.0	25.5	38.0–40.0	31.3 (34.0*)	40.0–48.8
3	0	1	0	0	1	?	1	1
4	1	0	0	0	1	0	1	1
5	1	1	1	1	2	1	2	2
6	1	1	1	1	1	?	1	1
7	0	1	0	0	1	0	1	1
8	0	2	?	2	2	1/2	1/2	2
9	0	0	1	0	0	0	1	1
10	0	1	1	0/1	0	2	1	?
11	1	0	1	0	1	2	2	2
12	1	1	1	2	2	1	1	2
13	2	2	1	0	0	1	1	0

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APPENDIX 1. Comparative material examined.

Calluella brooksii. UNIMAS 9422. Sama Jaya Nature Reserve, Sarawak, Kuching. Images of following specimen examined: BMNH 1903.11.24.3 (holotype). "Bidi, Sarawak".

Calluella flava. Images of following specimen examined: BMNH 1978.1599 (holotype). "..*kerangas* forest in the FEG Kerangas Plot situated at 190 m above sea level on the trail from Camp 5 to Sungai Berar Camp" in "Gunung Mulu National Park, Sarawak".

Calluella guttulata. ZRC A.9786–87; ZRC 1.9909; ZRC 1.9919–20. Cat Tien National Park, Vietnam; ZRC 1.116. Paknam Po, Nakhon Sawan Province, Thailand.

Calluella minuta. ZRC A.10888 (ex-DWNP A.0971, holotype) and FRIM 0579 (ex-DWNP A.0970; paratype), "from forest trail along Sungai Relau (04º 40' 46.3"N; 102º 03'21.2"E), Merapoh, Taman Negara, Pahang State, Peninsular Malaysia, altitude 167 m ASL"; ZRC 1.2919 (paratype), "Kuala Tahan, Taman Negara, Pahang State, Peninsular Malaysia".

Calluella volzi. NMBE 1018928, 1018929. Palembang, Sumatera, Indonesia.

Calluella yunnanensis. Images of following specimen examined: BMNH 1905.5.30.47, BMNH 1907.5.4.30 (two syntypes). "Yunnan Fou".