ANOTHER NEW SPECIES OF CHOEROPHRYNE (ANURA: MICROHYLIDAE) FROM SOUTHERN HIGHLANDS PROVINCE, PAPUA NEW GUINEA

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Summary

Choerophryne burtoni sp. nov. is described from lower-montane rainforest in the Kikori Integrated Conservation and Development Project area, Southern Highlands Province, Papua New Guinea. It is distinguished from congeners by a combination of moderately small size (three males 12.1-12.4 mm SV), reduced snout overhang and its unique advertisement call. The call is a series of 1-6 notes, each containing 9-15 pulses and produced at a rate of 1.5 notes/s. The dominant frequency is 4590-4800 Hz. Males called from hidden sites in curled leaves about 0.2-1.0 m above the forest floor during and after heavy rain.

KEY WORDS: Anura, Microhylidae, Choerophryne burtoni sp. nov., Papua New Guinea, new species, advertisement call.

Introduction

The microhylid genus Choerophryne is a group of small, terrestrial or scansorial frogs known only from the island of New Guinea. These frogs are easily recognisable by virtue of their conspicuously elongated snouts (Kraus & Allison 2001) but the genus remains poorly known and two of the four recognised taxa (C. rostellifer (Wandolleck, 1911), C. proboscidea van Kampen, 1914, C. longirostris Kraus & Allison, 2001, and C. allisoni Richards & Burton, 2003) were described within the past 6 years.

The last species of Choerophryne to be described, C. allisoni, is known only from Mt Sisa in the Kikori Integrated Conservation and Development Project (KICDP) area of Southern Highlands Province, Papua New Guinea (Richards & Burton, 2003). That species is remarkable for its tiny size (males ~ 11.5 mm SV) and relatively reduced snout overhang. Subsequent surveys in lower montane rainforest in the KICDP have revealed another undescribed species of Choerophryne. The new species shares with C. allisoni a relatively reduced snout overhang (compared with the remaining three species; Kraus & Allison, 2001) but differs from that species in its larger size, and in its different advertisement call. Here we describe and illustrate the new species.

Methods

Measurements (to 0.1 mm) were made with dial callipers and a microscope fitted with an ocular micrometer and follow Zweifel (1985) and Zweifel & Parker (1989) with additional measurements from Kraus & Allison (2001). They were snout-vent length (SV), tibia length (TL), arm length (AL), head width at the angle of the jaws (HW), head length as a straight-line distance from angle of jaws to tip of snout (HL), eye diameter (EYE), inter-narial distance (IN), eye-naris distance (EN), snout overhang (SO), width of third finger disc at right angle to digital axis (3FD) and width of penultimate phalanx of third finger (3FP), width of first finger disc (1FD) and first phalanx (1FP), and of fourth toe disc (4TD) and fourth toe phalanx (4TP), as for third finger. The tympanum of the new species is indistinct, precluding accurate measurements. Superficial dissection of the pectoral girdle and snout was undertaken to determine the generic status. Advertisement calls were recorded.
with a Sony TCM-5000EV tape recorder and Sennheiser ME66 microphone, and were analysed using the AVISOFT SAS-Lab Pro sound analysis program. Temperature adjacent to the calling male was measured with a Miller & Weber quick-reading thermometer. Specimens are deposited in the South Australian Museum, Adelaide (SAMA) and the University of Papua New Guinea Natural Sciences Resource Centre collection (UPNG); FN = Field Number.

Results

*Generic Diagnosis*

The new species lacks clavicles or any pre-zonal elements of the pectoral girdle. The otic ramus of the squamosal is much elongated. The m. depressor mandibulae arises from this ramus, but lacks any origin from the dorsal fascia. Reduction of the pectoral girdle is shared by *Albericus*, *Aphantophryne*, *Choerophryne*, *Cophixalus* and *Copiula*, and the conditions of the otic ramus and the m. depressor mandibulae are shared by *Albericus* and *Choerophryne* alone. The processes of the premaxillae are directed anteriorly, a character unique to *Choerophryne*.

*Choerophryne burtoni* sp. nov.

*Figure 1.* (LHS) Head of *Choerophryne burtoni* sp. nov. holotype (SAMA R62475) in lateral view. Scale = 1 mm

*Figure 2.* (RHS) *Choerophryne burtoni* sp. nov. A. Palmar view B. Plantar view of holotype (SAMA R62475). Scale = 1 mm

*Holotype:* ♂ SAMA R62475 (FN SJR8565), Moran area, Southern Highlands Province, Papua New Guinea, 6°14.363'S, 143°07.660'E, altitude ~ 1800 m. 18.xi.2004. Coll. S. J. Richards, C. Dahl and J. Hiaso.
NEW SPECIES OF FROG FROM NEW GUINEA

Paratypes: ♂♂ UPNG 10040 (FN SJR 8511), SAMA R62476 (FN SJR 8837), same data as for holotype except UPNG 10040 collected 14.xi.2004 and SAMA R62476 collected 13.xi.2004.

Definition

A small species (♂♂ 12.1-12.4 mm SV) with a moderately elongated snout (SO/SV 0.032-0.048) and short legs (TL/SV > 0.38); first finger distinct, not rudimentary, tips of digits rounded or expanded into small discs, disc of fourth toe larger than disc of third finger; advertisement call normally with 1-6 (but usually 5-6) notes each with 9-15 pulses.

![Figure 3](image1.png)  
Figure 3. (LHS) Choerophryne burtoni sp. nov. holotype (SAMA R62475) in dorsal aspect. Scale = 5 mm.

![Figure 4](image2.png)  
Figure 4. (RHS) Choerophryne burtoni sp. nov. holotype (SAMA R62475) in life. SV = 12.1 mm

Description of Holotype

Adult ♂ with vocal slits and calling when collected. Measurements are presented in Table 1. Small (12.1 mm SV), slender habitus, head moderately narrow (HW/SV 0.38); snout narrow, elongate, projecting well beyond lower jaw; canthus rostralis broadly rounded, slightly curved, loreal region vertical; eye to naris distance more than twice internarial span (EN/IN 2.3); tympanic membrane poorly defined, posterior and dorsal portions of annulus indistinct.

Relative lengths of fingers 3>4=2>1; first finger not significantly reduced, about half length of second finger (Fig. 2), without expanded terminal disc but with faint indication of circum-marginal groove; tips of fingers 2-3 only slightly expanded, that of finger 4 not expanded, but all with distinct circum-marginal grooves (Fig. 2); fingers without subarticular tubercles or webbing. Relative lengths of toes 4>3=5>2>1; tips of digits rounded or expanded into small round discs with circum-marginal grooves; toes without subarticular tubercles or webbing, no metatarsal tubercles; expansion of terminal discs greatest on finger 3 and toes 3-4; fourth toe disc same size as third finger disc (Fig. 2).
Dorsum in life with numerous scattered tubercles and a fine but distinct mid-vertebral ridge and an inverted V-shaped scapular ridge; Ventraly throat and chest finely granular, becoming more coarsely granular on the abdomen.

Colour and pattern: In life dorsum pale, fleshy orange-brown with darker brown patches concentrated on snout anterior of a point about mid-way between eyelids, and in a broad band behind the eyes that continues across top of tympanum reaching axilla where it contacts a broader, mottled dark lateral patch that extends two-thirds distance to groin. Darker lateral patches are bordered dorsally by two crescent-shaped patches of paler, fleshy orange-brown. Limbs dorsally with patches of paler and darker brown, thighs ventrally heavily mottled with brown and grey. Iris orange, densely infused with black; a reddish ring surrounds pupil (Fig. 4). In preservative pale orange-brown colour has faded to grey, and brown patches have become more intensely brown. Brown patches behind eyes more reddish brown than other brown patches. Venter grey with extensive irregular brown pigmentation enclosing small spots of grey or forming convoluted patterns of grey and brown. A narrow pale grey line from vent to chest where it diverges and extends laterally to elbows. Between chest and tip of snout pale line is present but less well defined. Brown pigmentation on throat extremely fine, and grey spots tiny, giving overall appearance of darker throat than belly. Palmar and plantar surfaces dark brown with scattered grey flecks. Digits paler brown.

Variation

Measurements and proportions of two paratypes are similar to the holotype (see Table 1). The paratypes have the same basic pattern as the holotype but were slightly more rugose in life. Both were much darker, and the dorsal patterns described for the holotype were scarcely discernable in life, giving the impression of near-uniformly dark-brown frogs.

| Frog # | UPNG 10040 | SAMA R62475 | SAMA R62476 |
|--------|------------|-------------|-------------|
| SV     | 12.4       | 12.1        | 12.4        |
| EN     | 1.5        | 1.6         | 1.7         |
| EN/IN  | 2.14       | 2.28        | 2.42        |
| HW     | 4.5        | 4.55        | 4.6         |
| HW/SV  | 0.36       | 0.37        | 0.36        |
| EYE    | 1.4        | 1.5         | 1.4         |
| EYE/SV | 0.11       | 0.12        | 0.11        |
| TL     | 4.8        | 4.6         | 4.8         |
| TL/SV  | 0.38       | 0.38        | 0.38        |
| IN     | 0.7        | 0.7         | 0.7         |
| HL     | 3.7        | 3.8         | 3.7         |
| EAR    | 1          | N/A         | 1           |
| AL     | 4.1        | 4.2         | 4.3         |
| SO     | 0.6        | 0.5         | 0.4         |
| SO/SV  | 0.048      | 0.041       | 0.032       |
| 4TD    | 0.3        | 0.4         | 0.3         |
| 1TP    | 0.3        | 0.3         | 0.3         |
| 1TD    | 1          | 1           | 1           |
| 3FD    | 0.3        | 0.4         | 0.3         |
| 3FP    | 0.2        | 0.3         | 0.3         |
| 1FD    | 0.2        | 0.2         | 0.3         |
| 1FP    | 0.2        | 0.2         | 0.3         |

Advertisement call

The call is a very long series of short (0.18-0.29s; mean = 0.241; SD = 0.030; n = 48) distinctly pulsed notes in which the last pulse interval in each note is distinctly shorter than preceding
intervals (Fig. 5). Nineteen consecutive calls of the holotype (SAMA R62475) recorded at an air temperature of 19°C were produced at a rate of 0.116 calls/s. Eight calls contained 5 notes, eight calls contained 6 notes and one call contained 1, 3, and 4 notes each. Note repetition rate within individual calls was 1.36-1.64/s (mean = 1.57; SD = 0.07; n = 19). Notes contained 9-15 pulses (mean = 12.83; SD = 1.54; n = 48), and pulse rate was 45.5-56.2/s (mean = 49.6; SD = 2.2; n = 48). Individual pulses were ~ 0.002-0.005s and the first pulse in each note was often weak (Fig. 5) and in some cases barely discernable. The dominant frequency is 4590-4800 Hz. A single call is illustrated in Figure 5.

**Figure 5.** Wave form (above) and spectrogram (below) of a 6-note advertisement call of *Choerophryne burtoni* sp. nov. holotype (SAMA R62475) recorded at an air temperature of 19°C.

*Comparison with other species*

With an SV of 12.1-12.4 mm *Choerophryne burtoni* sp. nov. is intermediate in size between the smallest member of the genus (*C. allisoni*; 11.5-11.6 mm SV) and *C. rostellifer* (13.9-17.8 SV). It differs from both of these species in having a moderately well-developed (vs. reduced) first finger, and it differs further from *C. allisoni* in having slightly longer legs (TL/SV 0.38 vs. 0.33) and in having the first toe not fused to the second toe (Richards & Burton, 2003). From *C. rostellifer*, *C. longirostris* and *C. proboscidea* the new species differs in its much smaller size, shorter legs (TL/SV 0.38 vs. 0.37-0.54; Kraus & Allison 2001) and relatively short snout overhang (SO/SV < 0.05) vs. snout overhang long (0.08-0.094 for *C. rostellifer*, 0.07-0.10 for *C. proboscidea*, and 0.10-0.11 for *C. longirostris*) (Kraus & Allison 2001). The new species can also be distinguished from all congeners by its advertisement call, which is a series of 1-6 distinctly pulsed notes each with 9-15 pulses and a dominant frequency of 4590-4800 Hz (Fig. 5). The call of *C. rostellifer* is a series of notes with ~14 pulses/note but has a much lower dominant frequency of about 3570 Hz. The call of *C. allisoni* has just 2-7 pulses/note and a dominant frequency around 3230 Hz. The call of *C. proboscidea* consists of three notes uttered at a rate of 1.59 notes per second and, like *C. rostellifer*, has a much lower dominant frequency than the new species (around 3230 Hz). The call of *C. longirostris* has 3-4 notes delivered at a rate of about 0.7/s and a dominant frequency around 3100 Hz. (Kraus & Allison, 2001).

*Distribution*

Known only from the type locality in lower-montane rainforest at Moran in the Kikori Integrated Conservation and Development Project area, Southern Highlands Province, Papua New Guinea.

*Habitat and habits*

*Choerophryne burtoni* sp. nov. called from elevated positions between 0.2-0.5 m high in dense mossy forest after heavy rain at night. No calling was heard on dry nights. Males called from within curled leaves in dense low foliage and were extremely difficult to detect. The type locality is on steep limestone karst in lower-montane rainforest. Many individuals were heard calling during rain but their small size, concealed calling sites and the difficult and dangerous terrain that included deep hidden sink-holes made collection of specimens extremely difficult. This species was not
detected at numerous sites at lower altitudes in the KICDP area (Richards 2002) and was also absent from higher sites on Mt Sisa (Richards, unpubl.). It is possible that this species is restricted to a relatively narrow altitudinal range within the KICDP. However given the apparently large population at the type locality and the extensive area of undisturbed lower-montane rainforest in the project area the species’ immediate future is probably secure. We recommend that the conservation status of *C. burtoni* sp. nov. be classified as Data Deficient until further surveys can more adequately refine its distribution.

**Etymology**

This species is named for Dr Tom Burton in recognition of his substantial contributions to New Guinea microhylid systematics, and in gratitude for his cordial and enthusiastic assistance to the senior author over many years.

**Discussion**

The description of *Choerophryne burtoni* sp. nov. brings to five the number of species known in this genus. In most respects *C. burtoni* is closer morphologically to *C. allisoni* than to the three larger, longer-nosed species from northern New Guinea (Kraus & Allison, 2001). It resembles *C. allisoni* (and differs from *C. rostellifer*, *C. proboscidea* and *C. longirostris*) in its very small size, short legs, a relatively reduced (albeit still prominent) snout and barely distinct finger and toe discs. *Choerophryne allisoni* is a litter-dwelling species and Richards & Burton (2003) argued that these traits reflected that species’ near-fossorial lifestyle. *Choerophryne burtoni* sp. nov., like its north-coast congeners *C. longirostris*, *C. proboscidea* and *C. rostellifer* is at least partially scansorial, and this is reflected in its slightly longer legs and in having marginally better-developed fingers and toes than *C. allisoni*.

The relationships among *Choerophryne* species have not been examined, and genetic data will be vital for understanding the evolution of this fascinating genus. However the suite of characters shared by *C. allisoni* and *C. burtoni* sp. nov. and their geographic proximity in montane habitats on the central cordillera suggest that these two species are more closely related than either is to the three larger, longer-nosed northern New Guinea taxa.

**Specimens examined**

*Choerophryne allisoni* Richards and Burton 2003. SAMA R56075 (holotype): Mt Sisa, Southern Highlands Province, PNG; UPNG 9962 (paratype), same data as holotype.

*Choerophryne longirostris* Kraus and Allison 2001. BPBM 13813 (holotype): Mt Menawa, West Sepik Province, PNG.

*Choerophryne proboscidea* van Kampen 1914. UPNG 8514 (neotype): Sagoa Hill, Wewak, East Sepik Province, PNG; SAMA R60661-9 Wamangu, East Sepik Province, PNG.

*Choerophryne rostellifer* (Wandolleck 1911) BPBM 13816 (Neotype), 2 km W Utai Aerodrome, West Sepik Province, PNG; SAMA R60653-5 and 60657-60 Utai, Sandaun Province, PNG.

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