Two new hylid frogs (Anura: Hylidae: *Litoria*) from western New Guinea

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> Abstract

Two new *Litoria* species with affinities to the *L. nigropunctata* species-group are described on the basis of recently collected material from the base of the Wandammen Peninsula and from the Onin Peninsula, western Papua (formerly Irian Jaya), Province of Indonesia. The descriptions include mainly data on morphology, bioacoustics and osteology.

> Kurzfassung

Zwei neue Laubfroscharten (Anura: Hylidae: *Litoria*) aus dem Westen von Neuguinea. Auf der Basis eigener Aufsammlungen im Jahr 1999 im Wondiwoi Gebirge an der Basis der Wandammen Halbinsel und im Jahr 2000 im Fakfak Gebirge auf der Onin Halbinsel im Westen Neuguineas werden zwei neue Laubfroscharten der Gattung *Litoria* beschrieben. Verwandtschaftlich scheinen nähere Affinitäten zur *L. nigropunctata*-Artengruppe zu bestehen. Die Beschreibungen basieren hauptsächlich auf morphologischen, bioakustischen und osteologischen Befunden.

> Key words

Amphibia, Anura, Hylidae, *Litoria,* new species, morphology, osteology, bioacoustics, ecology, Papua Province, New Guinea, Indonesia.

Introduction

According to recent morphological and biochemical studies by FROST *et al*. (2006) the genus *Nyctimystes* should be treated as a synonym of *Litoria*. If one follows this proposal, 107 *Litoria* species presently should occur on New Guinea and its adjacent islands (FROST 2007). With this number *Litoria* is by far the most speciose frog genus on New Guinea and its surrounding islands. Descriptions of new species have been continuously published until very recently. Twenty-four species were newly described after the year 2000, nine of them in 2006 and 2007 alone (DENNIS & CUNNINGHAM 2006, GÜNTHER 2006 a and b, RICHARDS & ISKANDAR 2006, RICHARDS & OLIVER 2006 a and b, RICHARDS *et al*. 2006, OLIVER *et al*. 2007, RICHARDS 2007). Field work by the author in Papua, Province of Indonesia (formerly West Irian or Irian Jaya) led to the detection of two new *Litoria* forms – one in the Fakfak Mountains on the Onin Peninsula in the year 2000 and the other in the Wondiwoi Mountains at the base of the Wandammen Peninsula in the western Cenderawasih Bay in 1999 – which are here described as new species.

Material and methods

Most voucher specimens were collected after locating them by their advertisement calls. Some living specimens were photographed and all were fixed in 2 % formalin. Small tissue samples from the thigh muscle were taken from some specimens and stored in 75 % ethanol in order to allow subsequent DNA sequencing. All the material was transferred to 75 % ethanol in the museum's collection. Two specimens of the first new species were cleared and double stained as bone-cartilage preparations using a modified method from DINGERKUS & UHLER (1977). Through an oversight, both were not measured before cleaning and staining.

The following measurements were taken with a digital calliper (> 10 mm) or with a binocular dis-

secting microscope fitted with an ocular micrometer (< 10 mm) to the nearest 0.1 mm:

SUL snout-urostyle length from tip of snout to distal tip of urostyle bone;
TL tibia length;
TaL length of tarsus;
T1D transverse diameter of disc of first toe;
T4D transverse diameter of disc of 4th toe;
F1D transverse diameter of disc of first finger;
F3D transverse diameter of disc of 3rd finger;
HL head length, from tip of snout to posterior margin of tympanum;
HW head width, taken in the region of tympana;
SL snout length, from tip of snout to an imaginary line connecting centers of eyes;
END distance from anterior margin of orbital opening to center of naris;
IND internarial distance between centres of nares;
ED eye diameter, from anterior to posterior margin of orbital opening;
TyD horizontal diameter of one tympanum.

All measurements which include the nares were carried out also according to the method of Richards & Iskandar (2001). No obvious differences in the body ratios between their approach and the present method were observed. This concerns the measurements of snout-urostyle length too, which do not differ significantly from snout-vent length.

Advertisement calls were recorded in the field with a Sony Digital Audio Tape (DAT) Walkman TCD-D 100 and a Sennheiser microphone MKE 300 and later analysed with Avisoft-SAS Lab software. All specimens were initially given registration numbers from the Museum für Naturkunde Berlin (ZMB). After completing the study, part of the types will be transferred to the Museum Zoologicum Bogoriense, formerly in Bogor now in Cibinong (MZB) and to a museum in Papua if adequate curation is available.

Photographs of live specimens and habitat as well as audiospectrograms and wave forms originate from the author, drawings of Figures 1–4 and 12–15 are by Vera Heinrich.

Litoria christianbergmanni sp. nov.

(Figs. 1–11 and Tab. 1)

Holotype. ZMB 63929 (field number 7156), adult male, collected by R. Günther, M. Kapisa and I. Tetzlaff on 2nd May 2000, about 17 km along the road Fakfak-Kokas in the Fakfak Mountains, altitude 860 m a.s.l., coordinates 2°47'S and 132°16'E, Papua Province of Indonesia.

Paratypes. ZMB 63914-18, ZMB 63920-28 and ZMB 63930, all are males and were collected by the same collectors from 9 to 17 km along the road Fakfak Town-Kokas, in 770–860 m a.s.l, on April, 28–29th and May, 2nd 2000. The same applies to the specimens ZMB 62485 and ZMB 63919 which are osteological preparations today and which were erroneously not measured before preparation.

Diagnosis. With a snout-urostyle length of 26.9–31.2 mm in 16 males the new species belongs to the small members of its genus. Snout short with broadly spaced nares. Fingers one half and toes 2-4 nearly completely webbed. Dorsum in life green with small light green spots, hidden surfaces of posterior thighs dark brown. Dorsal surfaces of hands and feet conspicuously mottled. Typical advertisement calls consist of one long note followed by two short notes, long notes with pulse rates of 119–165 pulses per second and short notes with 215–529 pulses/s. By the latter criteria the new taxon may be differentiated from the most similar species *Litoria wapogaensis*.

Description of the holotype. Measurements (in mm) and body ratios are as follows: SUL 31.2, TL 17.2, Tal 10.8, T1D 0.8, T4D 1.3, F1D 0.9, F3D 1.5, HL 11.0, HW 10.5, SL 5.1, ED 3.8, TyD 1.6, END 2.9, IND 3.9, TL/SUL 0.55, TaL/SUL 0.35, T1D/SUL 0.026, T4D/SUL 0.042, F1D/SUL 0.029, F3D/SUL 0.048, HL/SUL 0.35, HW/HL 1.05, SL/SUL 0.163, ED/SUL 0.122, TyD/ED 0.42, END/IND 0.74. Head slightly longer than wide and a little wider than anterior body; head length equals 35 % of SUL; snout rounded with blunt tip in lateral view and not protruding (Fig. 1), broadly rounded in dorsal view (Fig. 2), Canthus rostralis slightly concave with no sharp edge, loreal region also slightly concave. Nostrils laterodorsally directed, near the tip of snout; eye large with a horizontal pupil; tympanum 42 % of eye diameter, its upper rim covered by the tympanal fold. Tongue oval, its posterior margin heart-shaped, vomerine teeth in two inconspicuous raised patches between choanae, vocal slits rather long.

Fingers moderately long, terminal discs clearly broader than penultimate phalanges and with circummarginal grooves (Fig. 3), a narrow and crenate cutaneous fringe along the outside of finger 4, some subarticular tubercles bilobed, webbing between fingers 1 and 2 reduced to basal fringe, between fingers 2, 3 and 4 reaching to distal subarticular tubercles. A brownish thumb pad, formed as in *L. spinifera* (see Fig. 3e in Tyler, 1968), is situated on the upper side of the basal half of the thumb. Relative length of fingers 3>4>2>1. Toes also of moderate length, terminal discs slightly smaller than that of fingers, webbing reaches discs of toes 2, 3 and 5, not that of toes 1 and 3 (Fig. 4). There is a cutaneous fringe along the outer side of toe 5 and a crenate ridge along

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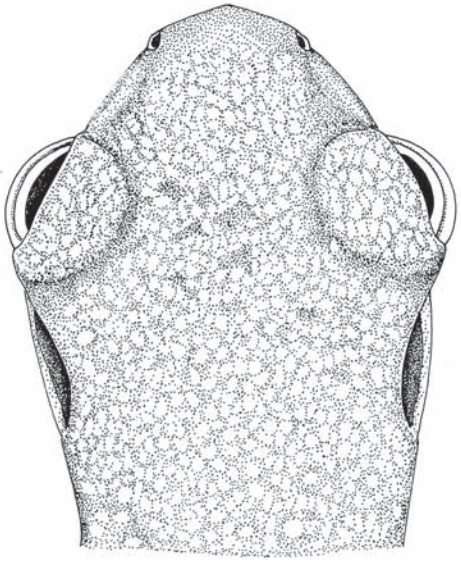

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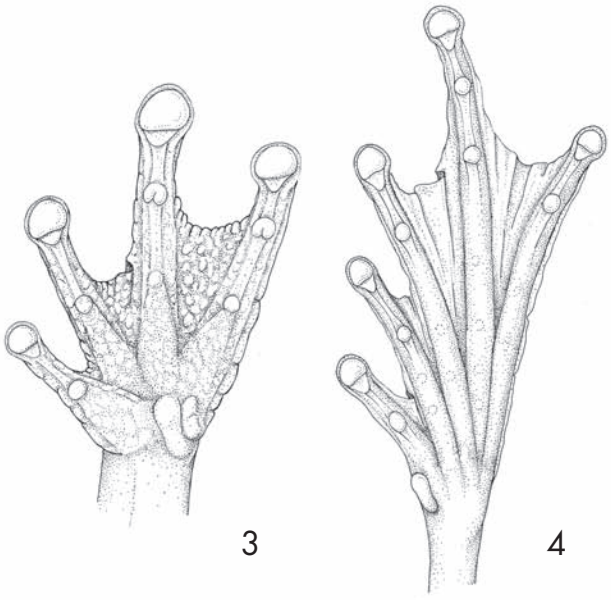

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Fig. 1. Lateral view of the head of the holotype of *Litoria christianbergmanni* sp. nov.

Fig. 2. Dorsal view of the head of the holotype of *Litoria christianbergmanni* sp. nov.

Fig. 3. Ventral view of the left hand of *Litoria christianbergmanni* sp. nov.

Fig. 4. Ventral view of the left foot of *Litoria christianbergmanni* sp. nov.

Tab. 1. Body ratios of 16 males of the type series of *Litoria christianbergmanni* sp. nov. SD = standard deviation, explanation of the other abbreviations in "Material and methods.

Ratio	Mean	SD	Range
TL/SUL	0.58	0.016	0.55–0.61
TaL/SUL	0.35	0.014	0.33–0.37
T1D/SUL	0.027	0.004	0.021–0.036
T4D/SUL	0.045	0.003	0.040–0.051
F1D/SUL	0.029	0.004	0.022–0.039
F3D/SUL	0.052	0.004	0.045–0.061
T4D/F3D	0.88	0.059	0.79–1.00
HL/SUL	0.34	0.012	0.32–0.36
HW/HL	1.02	0.037	0.97–1.08
SL/SUL	0.160	0.007	0.146–0.171
END/IND	0.82	0.049	0.74–0.91
ED/SVL	0.126	0.062	0.117–0.135
Tyd/ED	0.39	0.050	0.31-0.50

the outer tarsus. Inner metatarsal tubercle elongate, no outer metatarsal tubercle. Relative length of toes $4>5=3>2>1$.

Dorsal surfaces smooth, a prominent transverse ridge below anus and conspicuous white tubercles below this ridge. Belly granular, the remainder of the ventral surface smooth.

Dorsal colour in life was uniform green with small whitish-yellowish spots scattered on dorsum and hind legs. Iris silvery with dark venation. Belly and chest whitish, ventral surfaces of extremities yellowish, throat light greyish with fine dark greyish marks. A conspicuous white stripe from below eye through corner of mouth to insertion of forearm. Dorsal surfaces of hands including fingers and feet including toes brownish, fingers 3 and 4 as well as toes 4 and 5 strongly mottled with dark brown patches, finger 1 and toe 1 unpigmented. Posterior thighs dark brown; axilla, groin and anterior thighs uncoloured. Dorsal colouration changed in fixative from green to dark blue, other colours remained nearly as in life.

Variation in the type series. 16 males have a mean snout-urostyle length of 28.5 mm (SD 1.16) with the smallest male measuring 26.9 mm and the largest 31.2 mm. As in snout-urostyle length, there is also relatively little variation in body ratios (Tab. 1). Colouration in all types is very similar. Dorsal surfaces of all specimens in life were green and in preservative dark blue. All specimens exhibited in life small whitish, yellowish or light greenish spots on these green surfaces (Fig. 5, 6 and 8), the spots became whitish in preservative. Some specimens had very few and indistinct spots, but most frogs showed many conspicuous spots. All but two specimens had in life, and

in fixative, reddish brown or dark brown posterior thighs (Fig. 6); these two exceptions have uncoloured posterior thighs. Anterior thighs, flanks and groins in all specimens uncoloured. Throat in four specimens with only diffuse greyish patches, throat in all others with small dark grey or dark brown blotches (Fig. 7). Some specimens (Fig. 8) exhibit a white stripe from below eye to insertion of forearm as the holotype, in most frogs this white stripe reaches from the corner of the mouth to insertion of forearm. There is no type specimen without a striking white mark in this region. Colour and mottling of hands and feet (Fig. 5) are in all paratypes very similar to that of the holotype. All types have a prominent white ridge below the vent and rather large white tubercles on the proximal part of the ventral surface of the thighs (Fig. 7). Vomerine teeth are not very conspicuous and nearly invisible in some specimens.

Ostelogical characteristics (based on two cleared and double-stained paratypes, ZMB 62485 and ZMB 63919). Frontoparietals short, fused posteriorly and fused also to otoccipitals (sensu Trueb 1973), frontoparietal fontanelle oval and fairly large, sphenethmoid broad, notched anteriorly, its posterior processes largely overlapped by frontoparietals, nasals loosely aligned to anterolateral parts of sphenethmoid and with this broadly separated from one another; zygomatic ramus of squamosal somewhat shorter than otic ramus, the latter attached to crista parotica through a broad cartilaginous bridge, no quadratojugal. Maxillaries and premaxillaries with strong teeth, alary processes of premaxillaries strongly developed, vomerine teeth in ZMB 62485 not visible and in ZMB 63919 poorly developed. Parasphenoid with very long cultriform process and narrow alae. Hyoid plate as long as broad, no alary processes, its posterolateral processes situated far anteriorly. Arciferal pectoral girdle with omosternum and a long and broad anchor-like sternum. Eight procoelous presacral vertebrae with nonimbricate neural arches, sacrum with broad wings, urostyle with dorsal crest up to its middle part. Intercalary structures ossified, prepollex strongly developed (in ZMB 63919 the intercalary structures are partly cartilaginous and the prepollex is smaller than in ZMB 62485; this seems to indicate that the latter is younger than the former). There is a small ossified flange on the proximal end of the third metacarpal. All in all the osteological characteristics of *L. christianbergmanni* are very similar to that of *L. verae* and *L. umarensis* (GÜNTHER 2004).

Distribution. All specimens were found between 9 and 17 km along the road Fakfak Town and Kokas, at 770 to 860 m a.s.l. in the Fakfak Mountains, coordinates about 2°47'S and 132°16'E.

Habitat and habits. The Fakfak Mountains were originally covered by primary rainforest. In the course of road constructions between Fakfak Town and Kokas in the 1980s and early 1990s many of the tall trees were cleared near the new road. Great parts along this road are now covered by secondary forests and plantations. Only on very steep slopes, and far away from roads, primary forests can still be found. The habitat of the new species were herbaceous plants, tall grasses and low shrubs near and in small ponds and ditches which were created near the road, when the road was built (Fig. 9). The frogs perched on this vegetation at heights between 0.5 and 2 m above ground. They lived in mixed groups with *Litoria* cf. *havina* and their population density was rather high. They started calling before dusk and most calling activities were recorded between 17.30 and 20.00 p.m.

Vocalisation. Advertisement calls consist of two types of notes: long notes with less pulses per second and short notes with more pulses/s. Typically both note types were produced in combinations; most common was a combination of one long note followed by two short notes (Fig. 10). Not seldom one long note followed by one or 3–5 short notes can be heard. More seldom were two long notes or 1-5 short notes only. Occasionally mixed-notes consisting of elements of both note types occur. Long notes start with pulses of low amplitude, pulse amplitudes rise more or less quickly to maximum level and notes end abruptly at maximum pulse amplitude (Fig. 10 above). Often the last pulse is more widely spaced than the others. Mean duration of 26 long notes from two specimens was 0.28 s (SD 0.095), minimum 0.14 s, maximum 0.48 s. Mean pulse rate of these 26 long notes was 137 pulses/s (SD 12.9), range 119–165 pulses/s. Short notes mostly start with some distinct pulses or pulse groups consisting of 2–4 pulses and reach the maximum amplitude more quickly than in long notes. Short notes

Fig. 5. Dorsolateral view of a paratype of *Litoria christianbergmanni* sp. nov. in life without white subocular spot.

Fig. 6. Paratype of *Litoria christianbergmanni* sp. nov. in life showing (as typically) dark brown posterior surfaces of thighs.

Fig. 7. Ventral view of a paratype of *Litoria christianbergmanni* sp. nov. in life.

Fig. 8. Paratype of *Litoria christianbergmanni* sp. nov. in life with a white subocular spot.

Fig. 9. Habitat of *Litoria christianbergmanni* sp. nov. in the Fakfak Mountains.

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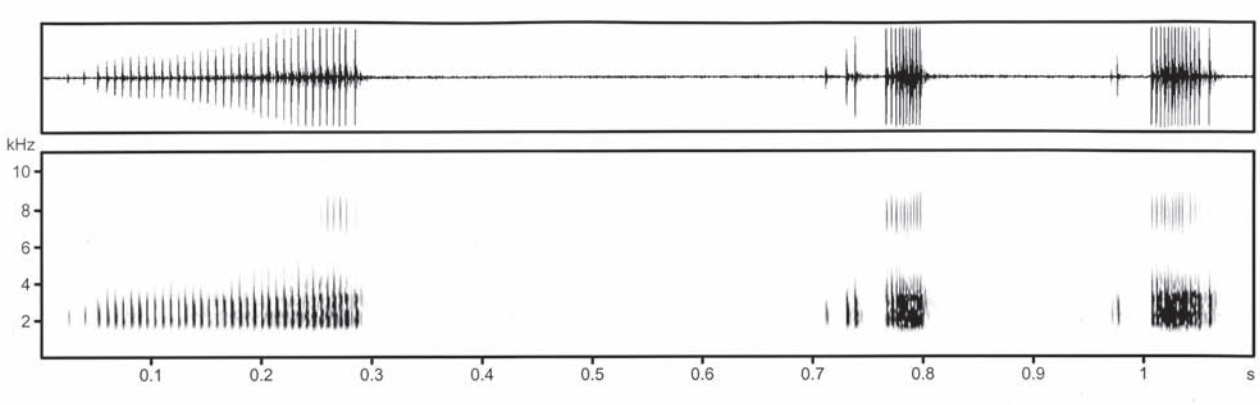


Fig. 10. Wave form (above) and audiospectrogram (below) of an advertisement call consisting of one long note (left) and two short notes (right) of *Litoria christianbergmanni* sp. nov.

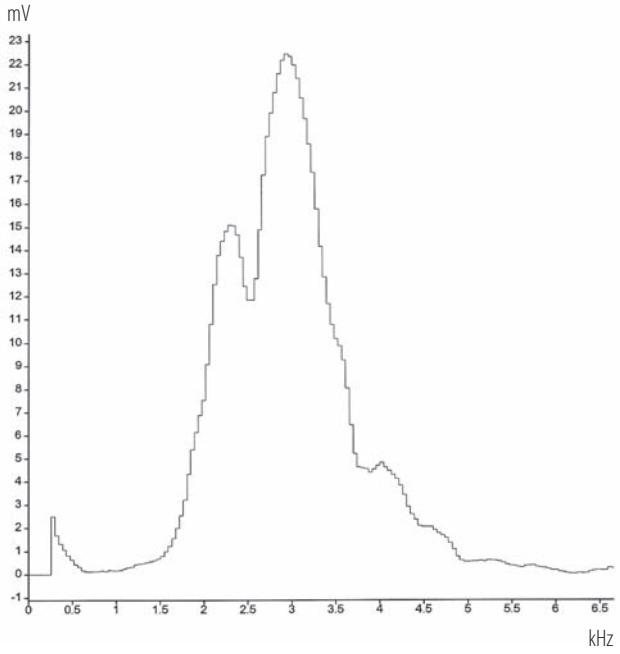


Fig. 11. Frequency spectrum of a long note of *Litoria christianbergmanni* sp. nov.

have also a sudden end at highest pulse amplitude and sometimes a broader-spaced end pulse. Mean duration of 45 short notes from three males was 0.045 s (SD 0.009), range 0.031–0.079 s (length of short notes was determined excluding the discret initial pulse groups). Mean pulse rate of these 45 short notes was 351 pulses/s (SD 59.9), range 215–529 pulses/s.

Intervals between a long and a short note and between two short notes vary considerably, but the former intervals are nearly always longer than the latter ones. Twenty-seven intervals between a long and the following short note were on average 0.37 s (SD 0.19), range 0.22–1,10 s. Thirty-five intervals between two short notes were on average 0.19 s (SD 0.04), range 0.13–0.35 s.

Frequencies of long notes range from 1.8 kHz to 3.8 kHz, dominant frequency centers around 3.0 kHz, there is a second peak around 2.3 kHz (Fig. 11). Many notes do not exhibit a bimodal frequency distribution but have a single dominant peak around 2.8 kHz. Frequencies of short notes are insignificantly higher. There is a weak harmonic "band" centering around 8.0 kHz (Fig. 10 below).

Etymology. The new species is dedicated to Prof. Dr. CHRISTIAN BERGMANN (Berlin, Germany) to recognise his support of my studies on the Papuan herpetofauna.

Comparison with other species. In their original description of *L. wapogaensis* RICHARDS & ISKANDAR (2001) clearly characterised this new species and delineated it from all congeners. All features which distinguish *L. wapogaensis* from its congeners also apply to *L. christianbergmanni* and need not be repeated here.

In most morphological characters *L. christianbergmanni* differs from *L. wapogaensis* only gradually. There are small differences in snout-vent length (30.5–32.9 mm, mean 31.9 mm, in 6 males of *L. wapogaensis* and 26.9–31.2 mm, mean 28.5 mm, in 16 males of *L. christianbergmanni*), in tibia length (mean ratio TL/SUL in *L. wapogaensis* 0.56 and in *L. christianbergmanni* 0.58), and in size of finger and toe discs (those of *L. wapogaensis* are larger). There are differences in the colouration of the upper surfaces of the hands including fingers and feet including toes. These regions (especially the outer fingers and toes) are heavily spotted in *L. christianbergmanni*, but unspotted in *L. wapogaensis*. There is a whitish and crenate cutaneous ridge on outer side of tarsus and fifth toe (see Fig. 5) in *L. christianbergmanni*, but no such structure seems to occur in *L. wapogaensis*. The best morphological trait, besides colouration of hands and feet, to differentiate between both species is a conspicuous white spot from the eye or from the corner of mouth to the insertion of forearm in *L. christianbergmanni*. Morphological characters alone seem insufficient for the delineation

of the new species. However, the bioacoustics of both forms is so different that the new description seems justified.

According to Richards & Iskandar (2001) advertisement calls of *L. wapogaensis* consist of single, distinctly pulsed notes with a mean length of 0.20 s and a mean pulse rate of 41.4 pulses/s, range 34.0-47.8. Long notes of *L. christianbergmanni* are longer, on average 0.28 s, and their pulse rate varies from 119–165, mean 137 pulses/s. The mean dominant frequency of the "slow calls" of *L. wapogaensis* was 2.4 kHz that of *L. christianbergmanni* is around 3.0 kHz. Richards & Iskandar (2001) also reported "fast calls" which they interpret as distress calls or something similar. These calls were obviously not uttered in combination with slow calls, but due to a similar pulse rate they could be homologised with the short notes of *L. christianbergmanni*.

If one takes into account all features of the new species, it seems to show the closest phylogenetic relationships to the *L. nigropunctata* species complex, as defined by Menzies (2006).

Litoria mareku sp. nov.

(Figs. 12–18 and Tab. 2)

Holotype. ZMB 62317 (field number 6916), adult male, collected by G. Mareku on 21 August 1999 in the Wondiwoi Mountains at the base of the Wandammen Peninsula about 7 km west of the Umar Bay coast, 500 m a.s.l. , 2°56´S, 134°38´E, Papua (formerly Irian Jaya), Province of Indonesia.
Paratype. ZMB 62318 (field number 6918), adult male. Collector, collection time and collection site are the same as for the holotype.

Tab. 2. Biometrical values of the holotype (ZMB 62317) and the paratype (ZMB 62318) of *Litoria mareku* sp. nov., all measurements in mm. Abbreviations are explained in the paragraph "Material and methods".

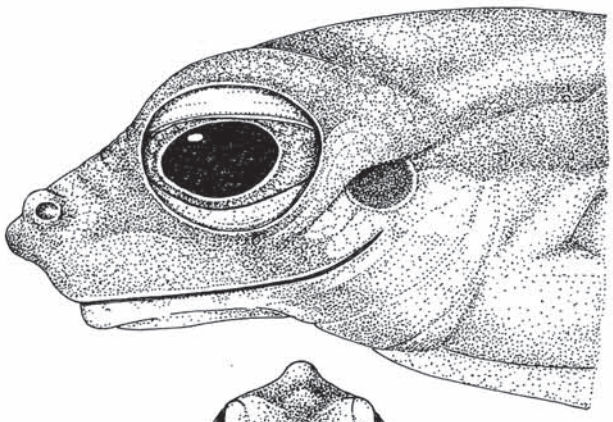
ZMB-No.	62317	62318
SUL	25.5	26.5
TL	13.8	13.6
TaL	9.0	9.1
T1D	0.4	0.4
T4D	0.75	0.75
F1D	0.5	0.5
F3D	1.0	1.1
HL	8.5	8.5
HW	7.6	7.7
END	2.4	2.5
IND	2.3	2.3
ED	3.1	3.0
TyD	0.9	1.0
SL	4.4	4.5
TL/SUL	0.54	0.51
TaL/SUL	0.35	0.34
T1D/SUL	0.016	0.015
T4D/F3D	0.029	0.028
F1D/SUL	0.020	0.019
F3D/SUL	0.039	0.042
T4D/F3D	0.75	0.68
HL/SUL	0.33	0.32
HW/HL	0.89	0.91
SL/SUL	0.173	0.170
END/IND	1.04	1.09
ED/SUL	0.122	0.113
TyD/ED	0.29	0.33

Diagnosis. Two adult males have a snout-urostyle length of 25.5 mm and 26.5 mm. By this small size and the presence of a short rostral spike the new species can be differentiated from all other Australopapuan *Litoria* species.

Description of the holotype. For measurements and body ratios see Tab. 2. Head longer than wide (HW/HL 0.89), head length equals 33 % of SUL. Nostrils on elevations, laterally directed and near snout tip, canthus rostralis roundish and with uneven surface, loreal region slightly concave. Snout slightly protruding and with a roundish protuberance (spike) in the middle of its upper part Figs. 12 and 13). Eye large with a horizontal pupil, tympanum fairly small (TyD/ED 0.29), its upper rim covered by a tympanal fold. No vomerine teeth visible, tongue fairly small and slightly indented posteriorly, two vocal slits at the bottom of the mouth.

Fingers moderately long, terminal discs only slightly wider than penultimate phalanges, for extension of webs see Fig. 14. Distal subarticular tubercles on fingers 2-4 clearly divided, that on first finger undivided. Relative length of fingers 3>4>2>1. Nuptial pad consists of a single oval brownish patch on the dorsal proximal surface of the thumb. Toes also of moderate length, their terminal discs small, clearly smaller than that of fingers. All distal subarticular tubercles except that on first toe divided, a weakly-expressed longish inner metatarsal tubercle, no outer metatarsal tubercle. Toes 2-5 nearly fully webbed, web between toes 1 and 2 reaching up to the level of the only subarticular tubercle on the thumb. Relative length of toes 4>5=3>2>1 (Fig. 15).

Dorsal surfaces smooth, belly, chest and throat granular, distinct granules below anus and on proximal lower surfaces of thighs. Colouration of dorsal surfaces of the preserved specimen is a mixture of



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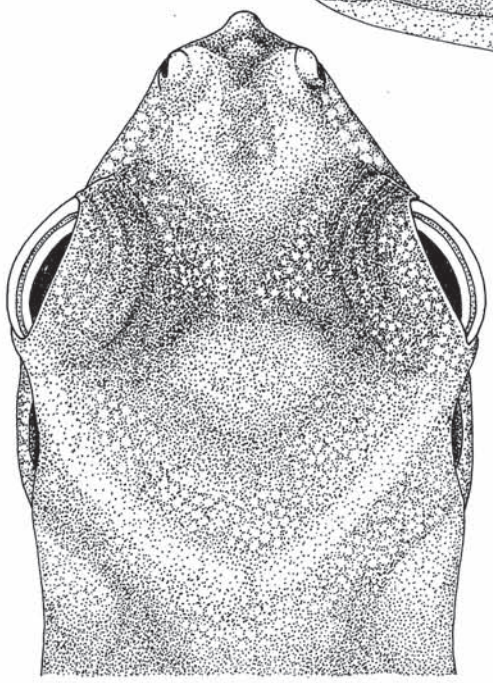

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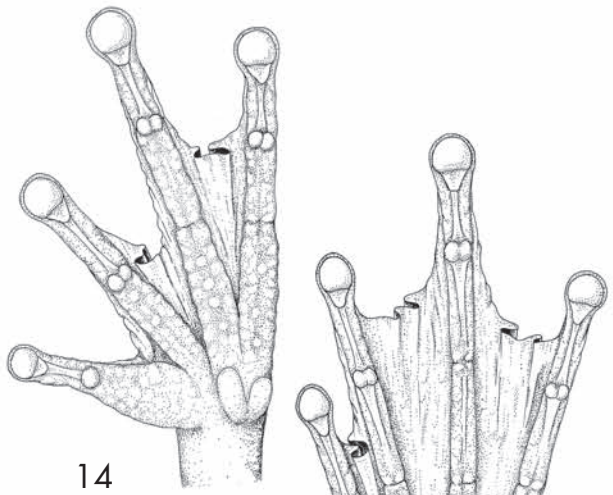

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brownish, bluish and greyish areas, all of which are composed of fine dots. Diffuse darker areas around anus, on the back and between eyes. Whitish spot between mouth corner and eye and above insertion of forearm. Dorsal surface of upper arm light, posterior surface of thigh brown, all ventral surfaces cream-coloured, only throat sides below mouth corners speckled with brown. In life the dorsal colouration consisted of a brown snout with a green tip, a green band between anterior part of eyes, a mixture of brownish, greyish and greenish colours on the anterior back and a green-brown posterior dorsum. Dorsal surfaces of extremities were grey-brown; were a whitish spot between eye and mouth corner and a blue annulus pericornealis were conspicuous (Fig. 16).

Description of the paratype. For measurements of the paratype see Tab. 2. Shape and colouration of the different body parts in the preserved specimen are approximately the same as in the holotype. Colouration of dorsal surfaces in life was as follows: tip of snout, a band between anterior parts of eyes, anterior back, posterior back and extremities exhibited a mixture of green and grey; middle of back with a broad blackish cross band, most of the dorsal surface of snout and a fairly broad band between posterior eyes also blackish (Fig. 17). Belly and chest whitish, throat cream-coloured, groins and lower posterior flanks yellow-orange, ventral surface of thighs bluish, anterior and posterior thighs dark brown, sides of throat and anterior flanks with small dark spots (Fig. 18).

Distribution. See under holotype and paratype.

Habitat and habits. The middle and higher reaches of the Wandammen Peninsula are still covered by primary rain forest. Both specimens were found perching in shrubs not far from a stream and also from a small swamp within a primary rain forest. The collector could not provide more information.

Vocalization. Unknown.

Etymology. The specific epithet is a patronym in nominative singular. It is to honour my Papuan friend Genus Mareku from the Yeretuar village, who not only collected the two type specimens but who was moreover an indispensable helper in the organisation of all excursions into the Wondiwoi Mountains.

Comparison with other species. There is no other Australopapuan *Litoria* known at present whose males have a head-body-length of only around 26 mm, a greenish ground colouration, a small rostral spike and a blue annulus pericornealis. Judging from external morphology (especially colouration), the new species could be more closely related to *Litoria mucro* or *Litoria nigropunctata*.

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Common names. "Bergmann's tree frog (Bergmanns Laubfrosch in German) is proposed for *Litoria christianbergmanni* and Mareku´s tree frog (Marekus Laubfrosch in German) is proposed for *Litoria mareku*.

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Fig. 12. Lateral view of the head of the holotype of *Litoria mareku* sp. nov.

Fig. 13. Dorsal view of the head of the holotype of *Litoria mareku* sp. nov.

Fig. 14. Ventral view of the left hand of the holotype of *Litoria mareku* sp. nov.

Fig. 15. Ventral view of the left foot of the holotype of *Litoria mareku* sp. nov.

Fig. 16. Laterodorsal view of the holotype of *Litoria mareku* sp. nov. in life.

Fig. 17. Dorsal view of the paratype of *Litoria mareku* sp. nov. in life.

Fig. 18. Ventral view of the paratype of *Litoria mareku* sp. nov. in life.

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