

Description of two new taxa of the ceratobatrachid genus *Platymantis* from western New Guinea (Amphibia, Anura)

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Abstract

Two new taxa of the ceratobatrachid genus *Platymantis* are described from western New Guinea on the basis of bioacoustic, morphological, ecological and biochemical studies. One of these, described as new species, is known only from in the Fakfak Mountains (Bomberai Peninsula) and the other, described as new subspecies, from Yapen Island. Their nearest relatives appear to be *P. batantae* ZWEIFEL, 1969, and *P. cryptotis* GÜNTHER, 1999 respectively. Besides data on the new taxa, some morphological, bioacoustic and molecular data are given for *P. papuensis* MEYER, 1875 from the type locality Biak Island.

Kurzfassung

Auf der Basis eigener Aufsammlungen im Westen Neuguineas in den Jahren 1999–2008 werden zwei neue Taxa des Genus *Platymantis*, Familie Ceratobatrachidae, beschrieben. Bioakustische, morphologische, ökologische und biochemische Untersuchungen weisen darauf hin, dass eine unbeschriebene Art im Fakfak-Gebirge (Bomberai Halbinsel) vorkommt und ein weiteres neues Taxon, das als Unterart deklariert wird, auf der Insel Yapen lebt. Nach den Paarungsrufen zu urteilen, dürfte die nächste Verwandte des ersten Taxons *Platymantis batantae* ZWEIFEL, 1969 sein, und vom zweiten Taxon dürfte es *Platymantis cryptotis* GÜNTHER, 1999 sein. Neben Daten zu den neuen Taxa werden auch morphologische, bioakustische und molekulare Befunde zu *Platymantis papuensis* MEYER, 1875 von der Typuslokalität Biak mitgeteilt.

Key words

Amphibia, Anura, Ceratobatrachidae, *Platymantis*, new taxa, western New Guinea.

Introduction

Of 70 species known in the ceratobatrachid genus *Platymantis* (FROST 2014), only seven are known from the island of New Guinea and the adjacent islands of Yapen, Batanta and Waigeo. Most localities in this region harbour one to three species of the genus, and until recently only one species, *P. papuensis*, was known from the islands of Biak and Yapen and from the Bomberai Peninsula on the New Guinea mainland (MENZIES 2006).

GÜNTHER (2006) described a second species (*P. wuenscheorum* GÜNTHER, 2006) from the central mountains of Yapen Island that not occur syntopically with *P. papuensis*. The same author collected additional material between 1999 and 2008 at various localities in the western Papua Province (former Irian Jaya or West Irian) of Indonesia, among them Yapen Island, Biak Island, and the Fakfak Mountains on the Bomberai Peninsula.

Bioacoustic, morphological, and biochemical studies of the collected *Platymantis* frogs led to the conclusion that four *Platymantis* species occur at least partly syntopically in the Fakfak Mountains, and three do so on Yapen Island. The taxon from the Fakfak Mountains is considered to be a new species and the taxon from Yapen Island is described as a subspecies of *Platymantis cryptotis*.

Material and methods

Most frogs were collected at night after locating them by their advertisement calls. Some animals were photographed alive the next day, and all were fixed in 2 % formalin. Tissue samples from thigh muscle were taken from some animals and stored in 75 % ethanol for later DNA sequencing. All the material was transferred to 75 % ethanol in the collection of the Museum für Naturkunde Berlin (ZMB).

The following measurements were taken to the nearest 0.1 mm with a digital calliper (> 10 mm) or with a binocular dissecting microscope fitted with an ocular micrometer (< 10):

SUL	snout-urostyle length, from tip of snout to distal tip of urostyle bone;
TL	tibia length, external distance between knee and ankle;
TaL	length of tarsus, external distance, tarsal and ankle joints held at right angles;
T4L	length of 4th toe, from tip of toe to proximal end of inner metatarsal tubercle;
T4D	transverse diameter of disc of 4th toe;
T1L	length of first toe, distal of the inner metatarsal tubercle;
MTL	length of the inner metatarsal tubercle;
F3D	transversal diameter of disc of 3rd finger;
HL	head length, from tip of snout to posterior margin of tympanum;
HW	head width, taken at the widest point of the head;
END	distance from anterior margin of orbital opening to centre of naris;
IND	internarial distance, between centres of nares;
ED	eye diameter, from anterior to posterior corner of orbital opening;
TyD	horizontal diameter of tympanum.

Advertisement calls were recorded in nature 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 of the new species are currently stored in the ZMB and were given registration numbers of this institution. Part of these types will be transferred to the Museum Zoologicum Bogoriense (MZB) at Cibinong.

Molecular results are taken from KÖHLER *et al.* (2008) and from personal communications with B. STELBRINK

and T. VON RINTELEN (then all at ZMB), which used the same methods.

All statistical calculations were done with the program Statgraphics Centurion Version 15.2.14 (Statpoint Technologies, Inc., Warrenton, Virginia, USA). All p-values (except those concerning molecular data) in the running text and in the tables are calculated by the non-parametric Mann-Whitney (Wilcoxon) Test for comparison of medians.

Figs. 1d and 1e as well as 11c and 11d were taken on a Leica DFC 495 mounted on a Z16 Apo-Stereomicroscope. Images were assembled using Automontage Essentials (Syncroscopy) and processed in Adobe Photoshop CS 6.

The holotype (British Museum of Natural History, BMNH, 1947.2.4.43) and seven paratypes (BMNH 1947.2.7.6, 1947.2.7.11, 1947.2.7.12, 1947.2.7.15, 1947.2.17.8, 1947.2.17.10, 1947.2.17.14) of *Platymantis cheesmanae* PARKER, 1940, the holotype of *Platymantis batantae* from the American Museum of Natural History (AMNH 74192), and numerous specimens of *P. papuensis*, *P. punctatus* PETERS & DORIA, 1878, *P. cryptotis*, *P. bimaculatus* GÜNTHER, 1999 and *P. wuenscheorum* from the ZMB collection were compared with the new species. This material includes all hitherto known species of *Platymantis* from the mainland of New Guinea and from the island of Yapen.

Results

Platymantis paepkei sp. nov.

Holotype. ZMB 80340 (field number = FN7883); adult male (Figs. 1a–1e), collected by R. GÜNTHER and M. KAPISA on 9 September 2008 near the road Fakfak Town–Kokas, Fakfak Mountains, 700 m above sea level (a.s.l.), 2°50'36"S and 132°18'23"E, Bomberai Peninsula, Papua Province, Indonesia.

Paratypes. ZMB 80341 (FN 7881), ZMB 80342 (FN 7882), ZMB 80343 (FN 7884), ZMB 80344 (FN 7904), ZMB 80345 (FN7905), ZMB 80346 (FN7920), ZMB 80347 (FN 7921), ZMB 80348 (FN 7932), ZMB 80349 (FN 7947), ZMB 80350 (FN 7948). All specimens were collected by R. GÜNTHER and M. KAPISA within a distance of 500 m on either side of the Fakfak Town–Kokas road between 9 and 14 September 2008. The elevation of the collection sites was between 400 m and 860 m a.s.l. ZMB 80341–344 and ZMB 80350 are adult males, ZMB 80346 and ZMB 80348 are adult females, ZMB 80349 is a subadult female, and ZMB 80345 and ZMB 80347 are juveniles.

Diagnosis. With a mean snout-urostyle length of 28.4 mm (range 24.6–31.4 mm) in six adult males, the new species is clearly smaller than the other “mainland” species *P. punctatus*, *P. papuensis* and *P. cryptotis*, all with a mean body length in adult males of more than 35 mm. Adult males of *P. cheesmanae* and *P. wuenscheorum* both have a mean body length of less than 25 mm, and only *P. batantae* and *P. bimaculatus* are of a size similar to that of *P. paepkei*. Basal webs between toes 1-2-3-4 are very scarcely developed and missing completely between toes 4 and 5.



Fig. 1. Holotype of *Platymantis paepkei* sp. nov. (ZMB 80340). (a) Dorsolateral view in life; (b) ventral view in life; (c) dorsal view of thighs in life; (d) ventral view of right hand of the preserved specimen; (e) ventral view of right foot of the preserved specimen.

A long dorsolateral skin ridge present on both body sides. Circummarginal grooves on fingers are less distinct than on toes. The best character to differentiate the new species from all others is its advertisement call, sounding like a low, short creak. These creaks are 80–126 ms (milliseconds) long with 7–11 pulses; pulse rate 71–129 pulses per second (s). Calls are uttered in trains.

Description of the holotype. Measurements of the holotype are listed in Tab. 1. There is a longitudinal slit in the right flank, and some muscle tissue was removed from

the inferior right thigh. Snout rounded in dorsal and lateral view (Fig. 1a). Canthus rostralis distinct, straight for some distance in front of the eyes and bends outward above the nostrils, loreal region concave, nostrils closer to end of snout than to anterior margin of eyes. Distance between nares same as distance between eye and naris (END/IND 1.0). Horizontal diameter of tympanum more than half that of eye (TyD/ED 0.60), pupil horizontally oval. Tongue markedly broader and about half free posteriorly, its posterior margin notched, and with a lingual process on its median anterior surface. Vocal slits

Table 1. Body measurements and body ratios of eight adults and one subadult of the type series of *Platymantis paepkei* sp. nov.; ZMB 80340 is the holotype; ZMB 80340–44 and ZMB 80350 are adult males; ZMB 80346 and ZMB 80348 are adult females, and ZMB 80349 is a subadult female. Measurements of two very young specimens of the type series (ZMB 80345 and ZMB 80347) with a snout-urostyle length of about 15 mm are not included in Table 1.

Reg.-No.	ZMB 80340	ZMB 80341	ZMB 80342	ZMB 80343	ZMB 80344	ZMB 80346	ZMB 80348	ZMB 80349	ZMB 80350	Mean ± SD
SUL	28.4	27.4	26.9	28.1	24.6	35.0	40.8	31.1	31.4	
TL	15.4	15.8	15.3	16.0	14.9	21.1	24.6	18.2	17.3	
TaL	9.3	9.1	8.9	9.4	9.0	12.7	14.5	11.2	9.8	
L4T	14.9	14.5	14.3	15.0	14.0	19.8	22.4	15.6	16.6	
T4D	1.2	1.0	0.9	1.1	0.9	1.2	1.4	1.1	1.2	
L3F	6.8	6.4	6.6	6.5	6.1	9.5	10.7	7.9	7.5	
F3D	0.6	0.7	0.5	0.6	0.4	0.8	0.9	0.6	0.7	
T1L	3.5	3.2	3.5	3.0	3.0	4.5	4.7	3.5	3.5	
MTL	1.2	1.3	0.7	1.3	1.2	1.4	2.0	1.3	1.6	
HL	13.1	12.2	12.1	12.3	10.9	14.6	16.9	14.0	13.5	
HW	11.8	10.8	11.4	12.2	10.4	14.3	16.4	13.4	13.3	
END	3.2	3.1	3.0	3.1	2.9	4.0	4.7	3.7	3.5	
IND	3.2	3.2	3.3	3.2	3.2	3.7	4.4	3.6	3.7	
ED	4.5	4.2	4.1	4.8	3.6	5.0	5.2	4.7	5.0	
TyD	2.7	3.0	2.3	2.7	2.5	3.0	3.4	2.6	3.1	
TL/SUL	0.54	0.58	0.57	0.57	0.61	0.60	0.60	0.59	0.55	0.58 ± 0.02
TaL/SUL	0.33	0.33	0.33	0.33	0.37	0.36	0.36	0.36	0.31	0.34 ± 0.02
T4L/SUL	0.52	0.53	0.53	0.53	0.57	0.57	0.55	0.50	0.53	0.54 ± 0.02
T4D/SUL	0.042	0.036	0.033	0.039	0.037	0.034	0.034	0.035	0.038	0.036 ± 0.003
F3D/SUL	0.021	0.026	0.019	0.021	0.016	0.023	0.022	0.019	0.022	0.021 ± 0.003
T4D/F3D	2.00	1.43	1.80	1.83	2.25	1.50	1.44	1.83	1.71	1.75 ± 0.27
MTL/T1L	0.34	0.41	0.20	0.43	0.40	0.31	0.43	0.37	0.46	0.37 ± 0.08
HL/SUL	0.46	0.45	0.45	0.44	0.44	0.42	0.41	0.45	0.43	0.44 ± 0.02
HL/HW	1.11	1.13	1.06	1.01	1.05	1.02	1.03	1.04	1.02	1.05 ± 0.04
ED/SUL	0.158	0.153	0.152	0.171	0.146	0.143	0.127	0.151	0.159	0.151 ± 0.01
END/IND	1.00	0.97	0.91	0.97	0.91	1.08	1.07	1.03	0.95	0.99 ± 0.06
TyD/SUL	0.095	0.109	0.086	0.096	0.102	0.086	0.083	0.084	0.099	0.093 ± 0.009
TyD/ED	0.60	0.71	0.56	0.56	0.69	0.60	0.62	0.55	0.62	0.61 ± 0.06

rounded, located near mouth angle. Upper jaw with small teeth and well-developed vomerine teeth in two oblique series between and behind choanae. No webs between fingers, subarticular tubercles well developed, a weakly expressed supernumerary tubercle proximal to the basal tubercle of each finger; tips of fingers slightly dilated with traces of circummarginal grooves only, inner and middle metacarpal tubercle large and well developed, outer one less than half the size of former, relative length of fingers $3 > 1 > 2 > 4$ (Fig. 1d). Tiny webs between toes 1-2-3-4 no web between 4-5, relative length of toes $4 > 3 > 5 > 2 > 1$ (Fig. 1e). Toe tips clearly broader than those of fingers (T4D/F3D 2.00) and with distinct circummarginal grooves. Subarticular tubercles, larger inner and a smaller outer metatarsal tubercle well developed, many inconspicuous plantar tubercles. Dorsal surfaces of legs, superior flanks and upper eyelids covered with tubercles, and dorsum covered with longitudinal skin folds of various length and shape (Fig. 1a and 1c). Conspicuous are two short ridges between eyes and two long dorsolateral folds. All tubercles and folds more distinctive in living than in preserved specimen. Entire underside of head, body and extremities smooth in life and in preserved specimen.

Colouration of the preserved holotype. Ground colour of dorsal surfaces greyish brown with irregularly shaped brown spots of various sizes. Limbs with dark-brown transverse bands. Brown mottling on snout, between eyes and on anterior back more intense than on posterior dorsum. A fine, partly interrupted vertebral line present from tip of snout to anal region. Small dark-brown spots on flanks, one curved dark-brown crescent from eye through tympanum to anterior insertion of fore limb. Anal region dark brownish. Posterior surface of thighs finely mottled pale grey and brownish. All ventral surfaces off-white.

Colouration in life. Ground colour of dorsal surfaces yellow-brown, with dark-brown to blackish mottling. Yellowish-white vertebral line begins on snout tip and continues onto hind legs. Posterior thighs auburn (Fig. 1c). Throat, chest and belly off-white; inferior shanks, tarsi and inguinal region purplish and without conspicuous mottling (Fig. 1b).

Variation in the type series. Body size (SUL) of six adult males (including the holotype) varied from 24.6 mm to 31.4 mm, mean 27.8 mm, SD (standard deviation) 2.2.



Fig. 2. Female paratype of *Platymantis paepkei* sp. nov. (ZMB 80346) in life.



Fig. 3. Male paratype of *Platymantis paepkei* sp. nov. (ZMB 80350) in life.

Two adult females were 35.0 and 40.8 mm long and a subadult female measured 31.1 mm (Table 1). Ground colour of dorsal surfaces in preserved specimens off-white, yellowish or brownish. Dorsal surfaces uniform in colour or, in most specimens, with numerous irregular dark and/or light spots. The female ZMB 80346 exhibits in life and in preservative a conspicuous white fleck in the loreal region (Fig. 2) and, as in the holotype, a light vertebral line. The male ZMB 80350 shows in life and in preservative two off-white dorsolateral stripes (Fig. 3). Both juveniles have a broad whitish middorsal stripe from behind eye to end of body; this stripe is bordered dorsolaterally by a blackish skin ridge that reaches to the posterior body region. All types show a more or less conspicuous dark banding on the limbs and a crescent-shaped dark spot from posterior of eye opening to near insertion of forelimbs, including upper part of tympanum. Upper margin of this spot is evenly bent and its lower margin exhibits one or more convexities. Most types have a dark- and in some cases – an interrupted spot between eyes that is bordered anteriorly by a light spot. A blackish anal region is ubiquitous. Two more-or-less intensively brown coloured spots below eyes and some dark small spots on anterior flanks on most specimens. Palmar and plantar surfaces and posterior tarsi in all cases dark brown. Most frogs had red-brown posterior surfaces of thighs and a red-brown inguinal region in life. These regions are off-white, brownish or brown in the preserved specimen. Upper and lower lip either unspotted or with more-or-less prominent dark-brown spots. Apart from lower legs, tarsi, feet and hands, all remaining ventral surfaces unspotted off-white.

Two uninterrupted or only slightly interrupted dorsolateral skin ridges, two short skin ridges between eyes, and several longitudinal ridges of various size, shape and orientation between the dorsolateral ridges in all types. Numerous small tubercles between the dorsal skin ridges and on upper flanks also present in most types. Ventral surface of head, body and limbs smooth in all paratypes.

Skin texture more smooth in all preserved than in living specimens.

Most specimens exhibit very small basal webs between toes 1-2-3-4, but not between toes 4 and 5.

Distribution and ecological notes. All specimens of the new species were found in a 1000 m wide strip along the Fakfak Town–Kokas road, Fakfak Mountains, at elevations ranging from 400 to 860 m a.s.l. The original habitat of the new species was certainly primary rainforest, but the frogs occur at present also in secondary vegetation (Fig. 4). Individual frogs occurred on soil or on leaf litter under bushes and trees, sometimes at distances of less than 2 m from one another. No specimen was seen climbing on leaves of bushes or trees or hidden under earth. Frogs called during both wet and dry weather from twilight until at least 11:00 p.m. after which observations ceased. *Platymantis paepkei* occurs sympatrically with at least 36 other anuran species in 15 genera: *Hylarana daemeli* (STEINDACHNER, 1868), *H. cf. papua* (LESSON, 1826), *H. volkerjane* (GÜNTHER, 2003); *Platymantis bimaculatus*, *P. papuensis*, *P. punctatus*; *Litoria amboinensis* (HORST, 1883), *L. christianbergmanni* GÜNTHER, 2008, *L. graminea* complex (calls only), *L. eucnemis* (LÖNNBERG, 1900), *L. havina* MENZIES, 1993, *L. infrafrenata* (GÜNTHER, 1867), *L. pronimia* MENZIES, 1993; *Albericus laurini* GÜNTHER, 2000; *Asterophrys turpicola* (SCHLEGEL, 1837); *Austrochaperina macrorhyncha* (VAN KAMPEN, 1906), *A. sp.*; *Callulops valvifer* (BARBOUR, 1910); *Cophixalus monosyllabus* GÜNTHER, 2010, *C. tetzlaffi* GÜNTHER, 2003, *C. tridactylus* GÜNTHER, 2006, *C. sp.*; *Copiula cf. obsti* GÜNTHER, 2002; *Hylophorbus picoides* GÜNTHER, 2001; *Metamagnusia cf. marani* GÜNTHER, 2009 (calls only); *Oninia senglaubi* GÜNTHER, STELBRINK & VON RINTELEN, 2010; *Oreophryne cf. sibilans* GÜNTHER, 2003, *O. unicolor* GÜNTHER, 2003 and four more undescribed *Oreophryne*-species; *Pseudocallulops eurydactylus* (ZWEIFEL, 1972); *Sphenophryne cornuta* PETERS & DORIA, 1878; *Xenorhina oxycephala* (SCHLEGEL, 1858)



Fig. 4. Habitat of *Platymantis paepkei* sp. nov. in the Fakfak Mountains, Bomberai Peninsula taken at 600 m a.s.l. near the road Fakfak Town-Kokas.

and *X. arndti* GÜNTHER, 2010. A similarly high anuran diversity was found by myself in the Wondiwoi Mountains (Wandammen Peninsula) and on Yapen Island and seems to be characteristic for low mountain ranges in the western Papua Province of Indonesia.

Vocalisation. The advertisement call of *Platymantis paepkei* can be described as a short, low “creak” and consists of a series of pulses (Fig. 5). Calls were uttered in trains with pronounced intervals between the single calls. The longest train of calls lasted 44 seconds and contained 44 calls. Shortest intercall interval 0.5 s and longest interval 2.1 s. Mean duration of 108 calls 92 ms, SD 5.8, range 80–106 ms. Mean number of pulses/call 9.38, SD 1.07, range 7–11 pulses/call. Mean pulse repetition rate 102 pulses/s, SD 11.1, range 72–129 pulses/s. Almost all calls start with a weak pulse of low amplitude and there is a longer inter-pulse interval between it and the next pulse than between the following pulses. Pulses after the weak introductory pulse have almost maximum amplitude and this drops toward the end of the call, giving an oval amplitude envelope. Pulse succession within calls often irregular. Frequencies range from 0.7 kHz to 3.9 kHz with dominant frequency at 2.5 kHz, there is one weakly expressed harmonic “band” around 8 kHz (Fig. 5).

I recorded a series of calls which probably also belong to the new species. Unfortunately, we did not observe or collect the specimen. Mean length of 12 calls was 122 ms, SD 2.7, range 116–126 ms and all calls had a

clearly expressed final section consisting of narrow and drastically ceasing pulses (Fig. 7). Such a final pulse clustering was not pronounced in the calls of four other males that were studied.

Etymology. The specific name is dedicated to my long-time colleague and friend, Dr. HANS-JOACHIM PAEPKE, former curator of the Ichthyological Collection of the Museum für Naturkunde Berlin, on the occasion of his 80th birthday on 7 December 2014 and to recognize his valuable contributions to ichthyology and herpetology.

Comparisons with other species. *Platymantis paepkei* sp. nov. occurs syntopically with three congeners in the Fakfak Mountains: *P. papuensis*, *P. punctatus* and *P. cf. bimaculatus*. This is the only known locality on mainland New Guinea where four *Platymantis* species occur together. *P. papuensis* with the type locality on Biak Island, north of the Cenderawasih (Cendrawasih) Bay, is thought to be widespread and common on mainland New Guinea (MENZIES 2006). Although *Platymantis papuensis* may be polyphyletic (KÖHLER et al. 2008) that species’ mating calls from various localities in the western Papua Province, among them also from the Fakfak Mountains, are similar to one another (ZWEIFEL 1969, MENZIES 1982, 2006, GÜNTHER 1999) and differ clearly from that of the new species. Call notes of *P. papuensis* are among others much louder, contain much more and partly clustered pulses, are uttered in shorter intervals and show more harmonics. Moreover, *P. papuensis* is larger (SUL in four

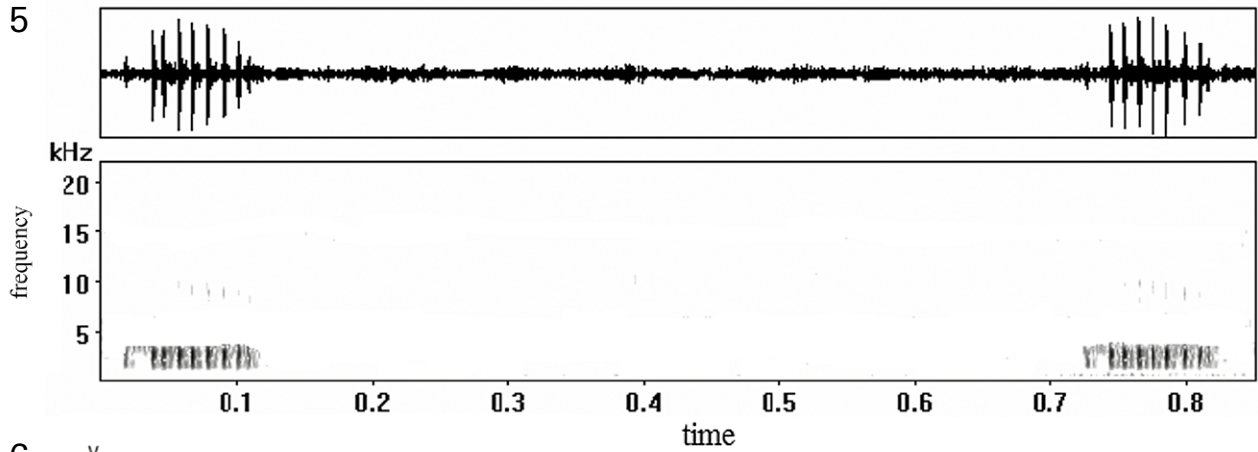


Fig. 5. Wave form (above) and spectrogram (below) of two advertisement calls of *Platymantis paepkei* sp. nov., recorded at 24 °C in the Fakfak Mountains (sound signals not produced by the frog were removed in the spectrogram).

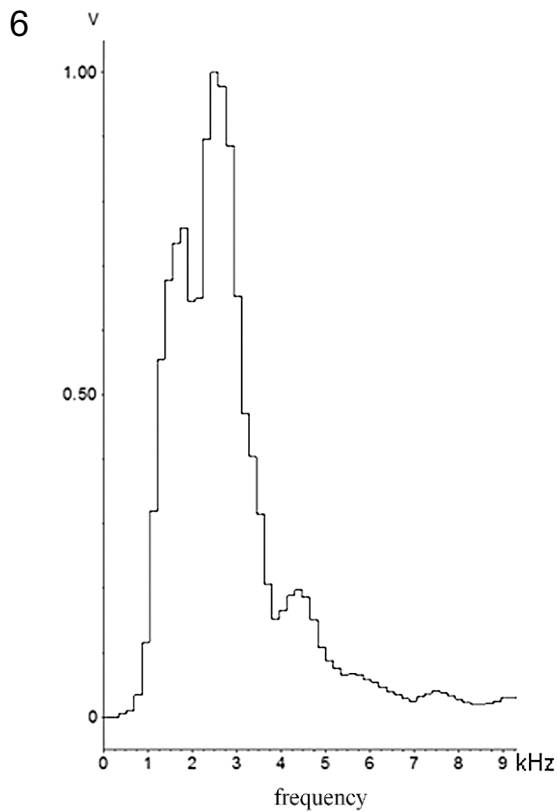
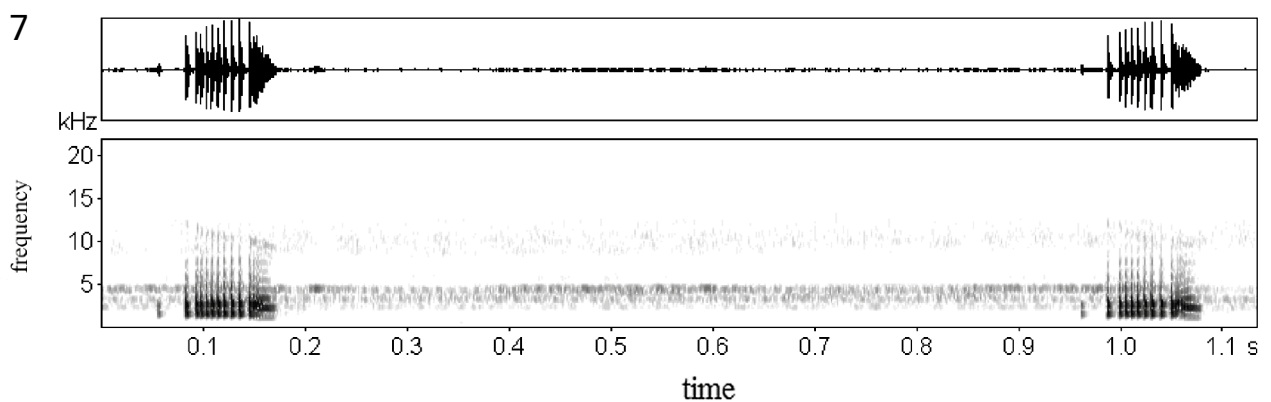


Fig. 6. Power spectrum of an advertisement call from *Platymantis paepkei* sp. nov.

Fig. 7. Wave form (above) and spectrogram (below) of an advertisement call that most probably also belong to *Platymantis paepkei* sp. nov. (sound signals not produced by the frog were removed in the spectrogram).



syntopic males 38.2–42.8 mm vs. 24.6–31.4 mm in six males of *P. paepkei*).

Platymantis punctatus is even larger than *P. papuensis*, has distinct webs between toes, and advertisement

calls that are very loud without pulsed structure (GÜNTHER 1999).

Size and body ratios of the single *P. cf. bimaculatus* male (ZMB 80374, FN 7871) collected by me in the

Fakfak Mountains coincide largely with those of the new species. However, its clustered pulse pattern is different and resembled that of *P. bimaculatus*, its tip of toe 4 was smaller than that of *P. paepkei* (T4D/SUL 0.028 vs. 0.033–0.042), and sequences in 487 base pairs of its mitochondrial 16S rRNA gene differed from all six studied *P. paepkei* in 4.1–4.6%. P-distances within these six specimens varied only from 0.0 to 0.4% (STELBRINK, pers. comm.). The specimen ZMB 80374 was designated *P. cf. bimaculatus* because most of its body ratios did not coincide with that of topotypic *P. bimaculatus* from the Wondiwoi Mountains. Unfortunately, the 16S rRNA gene was not investigated in frogs from the Wondiwoi Mountains, and therefore the taxonomic status of ZMB 80374 remains unclear.

P. paepkei (n=9) differs significantly from topotypic *P. bimaculatus* (n=30) in the following body ratios:

- TyD/ED (mean 0.61, range 0.55–0.71 vs. mean 0.52, range 0.45–0.61; p=0.0003);
- HL/HW (mean 1.05, range 1.01–1.13 vs. mean 0.99, range 0.92–1.05; p=0.0005);
- T4D/SUL (mean 0.036, range 0.033–0.042 vs. mean 0.032, range 0.023–0.036; p=0.0006);
- TyD/SUL (mean 0.093, range 0.083–0.109 vs. mean 0.080, range 0.068–0.089; p=0.0006);
- TL/SUL (mean 0.58, range 0.54–0.61 vs. mean 0.54, range 0.50–0.59; p=0.003);
- HL/SUL (mean 0.44, range 0.41–0.46 vs. mean 0.42, range 0.39–0.44; p=0.003);
- END/IND (mean 0.99, range 0.91–1.08 vs. mean 1.06, range 0.94–1.23; p=0.009);
- MTL/T1L (mean 0.37, range 0.20–0.46 vs. mean 0.45, range 0.33–0.60; p=0.025).

Moreover, differences in advertisement calls are evident. According to GÜNTHER (1999), *P. bimaculatus* mostly utters calls containing 2–5 notes; notes do not have a weak and isolated introductory pulse, pulses start with maximum amplitude, are much closer to one another, and notes are much shorter (38–52 ms) than those by the new species (80–106 ms).

Platymantis cheesmanae from the Cyclops Mountains is smaller than the new species, has extremely large inner metatarsal tubercles (MTL/T1L 0.62–0.84, see GÜNTHER 2006, Fig. 8), and has unpulsed advertisement calls.

The one to six double clicks of the advertisement calls from *P. wuenscheorum*, which lives in the higher mountains of Yapen Island, are unique among Papuan *Platymantis* and clearly distinguish this species from *P. paepkei*.

Platymantis cryptotis cryptotis from a region SE of Nabire with snout-urostyle lengths from 34.2–38.6 mm in five adult males is larger than *P. paepkei* (24.6–31.4 mm in six adult males), has significantly shorter tibiae (TL/SUL 0.50–0.54 vs. 0.54–0.61), a greater END/IND distance (1.11–1.20 vs. 0.91–1.08), a smaller tympanum

(TyD/SUL 0.061–0.073 vs. 0.083–0.109), and a clustered pulse structure of its advertisement calls (GÜNTHER 1999).

Platymantis batantae seems to be the closest relative of the new species. Body size and most body ratios of both species overlap. The holotype of *P. batantae* differs in the following ratios from the ratios of *P. paepkei*: T4D/SUL 0.028 vs. 0.033–0.042, T4D/F3D 1.38 vs. 1.43–2.25, TyD/ED 0.52 vs. 0.55–0.71, TyD/SUL 0.082 vs. 0.083–0.109 and TL/SUL 0.62 vs. 0.54–0.61. Subarticular tubercles on toes are strong and pointed in *P. batantae* (ZWEIFEL 1969) but roundish in *P. paepkei*. Tubercles on soles are numerous and well developed in *P. batantae* but scarcely visible in *P. paepkei*. Circummarginal grooves on fingers are well developed in *P. batantae* but scarcely to discern in *P. paepkei*. Both species have different calls. Similar to *P. paepkei*, *P. batantae* utters series of calls that consist of a small number of pulses (Fig. 8). However, length of calls, number of pulses per call, and pulse repetition rate are clearly different and cannot be explained by differences in temperature during calling (calls of *P. paepkei* were recorded at a temperature of 24 °C and those of *P. batantae* at 27 °C). Thirty-seven calls of *P. batantae* had a mean length of 37 ms, SD 3.1, range 30–42 ms; 108 calls of *P. paepkei* had a mean length of 92 ms, SD 5.9, range 80–106 ms (Fig. 9). Mean number of pulses/call was 6.5, SD 1.1, range 4–8 in *P. batantae* and mean number was 9.3, SD 1.1, range 7–11 in *P. paepkei*. Pulse repetition rate varied from 132–226 pulses/s, mean 178, SD 23.9 in *P. batantae* and from 72–129 pulses/s, mean 102, SD 11.1 in *P. paepkei* (Fig. 10). Calls of *P. batantae* (FN SJR 7587) were recorded by STEPHEN RICHARDS (South Australian Museum, Adelaide) on Batanta Island, the type locality of the species, at Warinkabom Camp on 10 June 2005.

Platymantis cryptotis yapeni ssp. nov.

Holotype. ZMB 80351 (FN 7977), adult male (Figs. 11a–11d), collected by R. GÜNTHER and M. KAPISA on 23 September 2008, 1.5 km west of the fishing village of Barawai, eastern tip of Yapen Island, 10 m a.s.l., 1°48'39"S and 136°51'26"E, Cenderawasih Bay, Papua Province, Indonesia.

Paratypes. (n=23) Waira Mountain at about 600 m a.s.l., near the Manawi–Yobi road, 9 September 1999 (ZMB 80394), 10 September 1999 (ZMB 62174, 62176–180), 19 May 2000 (ZMB 64085), 11 July 2003 (ZMB 70110); Amoman Mountain, near the Kontiunae(i)-Ambaidiru road, ~1000 m a.s.l., 5 April 2002 (ZMB 70009–70102); ~5 km west of Serui, near the coastal road, 10–20 m a.s.l., 12 July 2003 (ZMB 70111–114); ~1.5 km west of Barawai village, 10–25 m a.s.l. (see holotype), 23–24 September 2008 (ZMB 80352–356). One paratype (ZMB 80356) is an adult female, the remainder are adult males. ZMB 80394 is now an osteological preparation. Collectors of the paratypes as for the holotype.

Diagnosis. A combination of the following features will diagnose the new subspecies: SUL of adult males 33–40 mm, circummarginal grooves on fingers present but

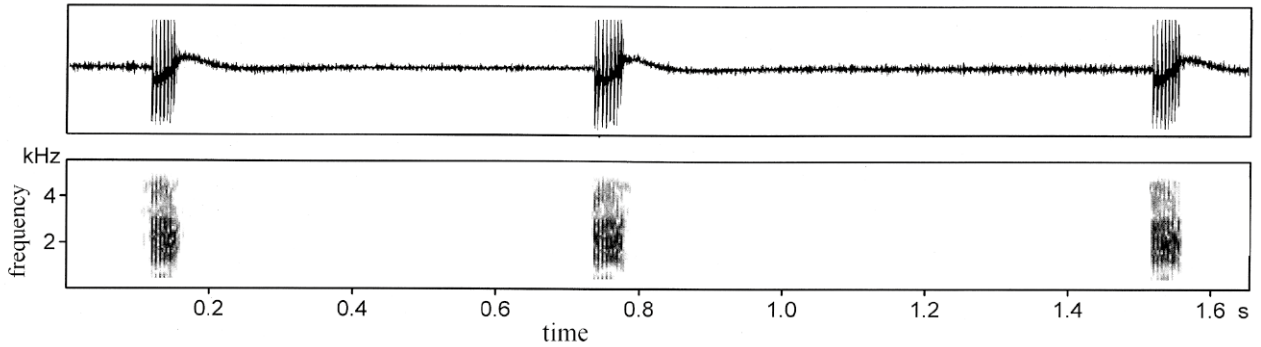


Fig. 8. Wave form (above) and spectrogram (below) of three advertisement calls of *Platymantis batantae*, recorded at 27 °C on Batanta Island (sound signals not produced by the frog were removed in the spectrogram).

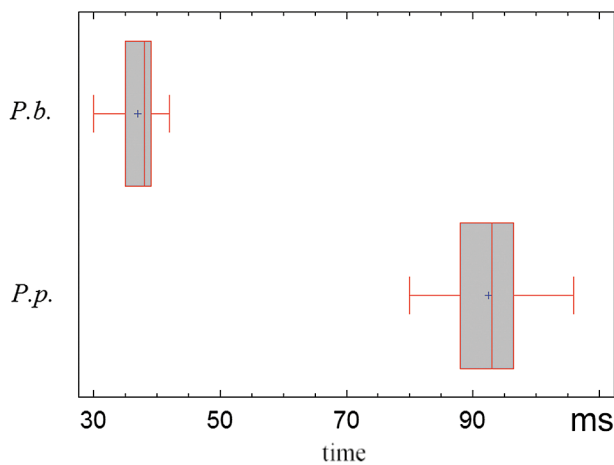


Fig. 9. Box-Whisker-Plot of call length (in ms) of *Platymantis batantae* (*P. b.*) and *P. paepkei* sp. nov. (*P. p.*).

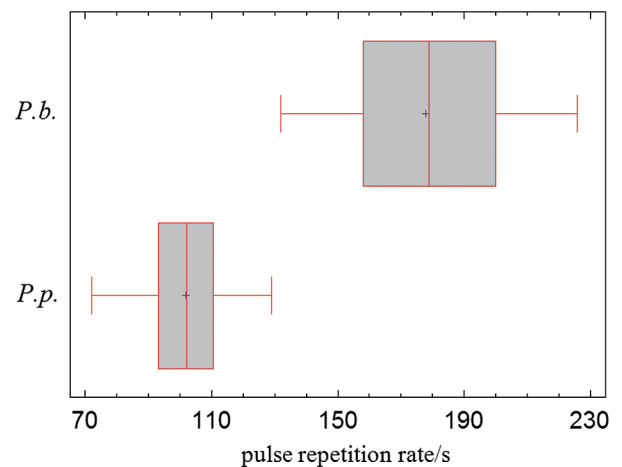


Fig. 10. Box-Whisker-Plot of repetition rate of pulses per second of *Platymantis batantae* (*P. b.*) and *P. paepkei* sp. nov. (*P. p.*).

weakly developed, first finger longer than second, longitudinal folds on dorsum comparatively few and as a rule not longer than 4.5 mm, no conspicuous long dorsolateral folds, posterior of thighs not intensely red-brown in colour, probably confined to Yapen Island. Advertisement call differs clearly from that of the sympatric *Platymantis papuensis* by shorter notes and a notably higher note repetition rate and from sympatric *P. wuenscheorum* by missing its characteristic double-click-calls. Studies of mitochondrial 12S and 16S rRNA gene allocate *P. cryptotis yapeni* sp. nov. to an own clade.

Description of the holotype. The holotype is an adult male (Fig. 11a) with the following measurements (in mm) and body ratios: SUL 40.2, TL 20.8, TaL 11.8, T4L 20.6, T4D 1.2, T1L 4.4, MTL 1.9, F3D 0.9, HL 17.4, HW 15.7, END 5.0, IND 3.7, ED 6.5, TyD 3.4; TL/SUL 0.52, TaL/SUL 0.29, T4L/SUL 0.51, T4D/SUL 0.030, F3D/SUL 0.022, T4D/F3D 1.33, MTL/T1L 0.43, HL/SUL 0.43, HL/HW 1.11, END/IND 1.35, ED/SUL 0.162, TyD/ED 0.52. Body slender with slender legs. Snout pointed in dorsal view and rounded in lateral view, scarcely protruding. Nares nearer to snout tip than to eyes. Canthus rostralis slightly concave and gently rounded, loreal re-

gion sloped and concave. Tympanum distinct and about half size of eye (TyD/ED 0.52). Tongue broad, half free, posterior margin clearly bifurcate. Vomerine teeth in two groups, clearly distinct and nearer to internal nares than to one another. Vocal sac openings small slits a short distance anterior to corner of the mouth. Tips of fingers scarcely wider than penultimate phalanx, their circum-marginal grooves present but difficult to see. Subarticular tubercles pronounced, an additional smaller tubercle proximal to each basal subarticular tubercle, three metacarpal tubercles, the outer half the size of the others. Relative length of fingers $3 > 4 > 1 > 2$ (Fig. 11c). Tips of toes broadened into discs, circummarginal grooves and subarticular tubercles clearly pronounced. One large inner and one small outer metatarsal tubercle, numerous small plantar tubercles. No webbing between toes, their relative length $4 > 3 > 5 > 2 > 1$ (Fig. 11d). Tympanic annulus clearly pronounced, as is the supratympanic fold that reaches from posterior corner of eye to above foreleg insertion. Several short (maximum 3.5 mm long) longitudinal dermal folds, mostly arranged symmetrically, begin between eyes and extend to the sacral region. All dorsal surfaces, including upper eyelids, covered with minute tubercles. All ventral surfaces smooth.

Colour in preservative. Dorsal surfaces grey. Snout brown with oblong small yellowish fleck anteriorly and a large fleck of the same colour posteriorly reaching between eyes. Dark-brown area between posterior portion of eyelids interrupted by an irregular light spot. Yellowish middorsal stripe extends to urostyle. Dorsal surfaces of extremities and flanks uniformly greyish, posterior thighs weakly mottled. Lower region of supratympanic fold blackish. Tympanum light brown. All ventral surfaces off-white, except soles and palms which are medium-brown with grey tubercles.

Colour in life. A dorsolateral and ventral view of the living holotype (Figs. 11a and 11b) shows its original colours and their patterns. Most conspicuous is the reddish colour of the light sections on head and dorsum.

Variation in the type series. Variation in body ratios of 22 male types (including the holotype) is listed in Table 2. Mean snout-urostyle length of these males is 36.5 mm, SD 1.91, range 33.4–40.3 mm. The single female, with a SUL of 53.0 mm, is clearly larger than the males; all of her body ratios, however, lie within the ranges of the males.

Ground colour of all dorsal surfaces of preserved frogs light grey-brown to dark grey-brown. Dark-brown to blackish spots located predominantly between eyes, on anterior back, and anterior flanks in most specimens. More than half of specimens with dark-brown longitudinal spots associated with dermal folds on anterior back. Almost all frogs have dark transverse bars or flecks on limbs, but their shape, number and colour intensity vary considerably. Besides the holotype, four additional specimens with a yellowish longitudinal mid dorsal stripe. Two paratypes with yellowish dorsolateral stripes, and one paratype (ZMB 70114) with completely yellowish dorsum clearly demarcated from dark-brown sides of body. A sickle-shaped dark-brown crescent extends from posterior eye margin along the upper tympanum margin and further to forelimb insertion in almost all specimens. Superior margin of this crescent evenly formed and accompanying tympanic fold, its inferior margin shows one or several convexities. Upper and lower lip with alternating dark and light spots in almost all specimens. Ventral surfaces off-white, about half of specimens with inconspicuous greyish mottling on throat. Dorsal surfaces of the only female (Fig. 13, ZMB 80356) medium-brown with some inconspicuous darker and lighter flecks and blotches. Number of dorsal longitudinal dermal folds relatively low in most specimens and these partly pairwise arranged in most specimens. Dorsal tubercles number from few to many and from inconspicuous to pronounced. Lower surfaces smooth in all specimens.

Distribution and ecological notes. The new subspecies was recorded at various localities from the region west of Serui to the eastern end of Yapen Island. It occurs at elevations from sea level (about 5 km west of Serui and near Barawai village, eastern tip of the island, Fig. 14) to 900 m

Table 2. Body ratios of 22 males from the type series of *Platymantis cryptotis yapeni* ssp. nov.

Ratio	Mean	Standard Deviation	Range
TL/SUL	0.53	0.015	0.51–0.56
TaL/SUL	0.31	0.015	0.28–0.33
T4L/SUL	0.54	0.019	0.51–0.56
T4D/SUL	0.030	0.003	0.025–0.035
F3D/SUL	0.023	0.003	0.019–0.029
T4D/F3D	1.28	0.098	1.11–1.44
MTL/T1L	0.38	0.027	0.33–0.44
HL/SUL	0.43	0.014	0.40–0.45
HL/HW	1.11	0.033	1.05–1.18
END/IND	1.24	0.056	1.16–1.35
ED/SUL	0.151	0.011	0.130–0.169
TyD/ED	0.55	0.075	0.40–0.73

a.s.l. in central Yapen (Ammoman Mountain near the road to Ambaidiru village) and was mostly found in forests. Near Serui it was also found in disturbed areas comprised of bushes with only a few trees. In contrast to *P. papuensis*, it was not encountered in the town of Serui. Most specimens were found on soil or fallen leaves, sometimes in small hollows, more seldom on stumps. None was seen climbing in vegetation or digging in the ground.

Male frogs did not call during the day, but rather from twilight to dawn, most intensively between 6:00 and 9:00 p.m. Wet weather stimulated more intense calling, but calls were also heard during dry conditions. Population density was fairly high at most localities. Minimal distances observed between calling males were about two meters. While *P. cryptotis yapeni* and *P. wuenschaeorum* were syntopic in only a small part of their known range around 900 m a.s.l. on Amoman Mountain in central Yapen, there were many sites between sea level and 750 m a.s.l. in the eastern half of Yapen Island where *P. cryptotis yapeni* occurs syntopically with *P. papuensis*. The relative abundance of each species at different sites varied considerably. Sites where only one of these species occurs do exist (for example *P. papuensis* does not occur higher than 750 m a.s.l.), but these are uncommon.

Platymantis cryptotis yapeni occurs sympatrically with at least 34 other anuran species in 12 genera: *Platymantis papuensis*, *P. wuenschaeorum*; *Hylarana daemeli*, *H. cf. volkerjane*; *Litoria cf. arfaki* (MEYER, 1875), *L. eucnemis*, *L. genimaculata* (HORST, 1883), *L. humboldtorum* GÜNTHER, 2006, *L. infrafrenata*, *L. mucro* MENZIES, 1993, *L. nigropunctata* (MEYER, 1875), *L. pygmaea* (MEYER, 1875); *Asterophrys turpicola*; *Austrochaperina cf. derongo* (VAN KAMPEN, 1906), *Callulops yapensis* GÜNTHER, STELBRIK & VAN RINTELEN, 2012; *Choerophryne amomani* GÜNTHER, 2008, *Ch. arndtorum* GÜNTHER, 2008, *Ch. nigrescens* GÜNTHER, 2008; *Cophixalus balbus* GÜNTHER, 2003, *C. humicola* GÜNTHER, 2006;



Fig. 11. Holotype of *Platymantis cryptotis yapeni* ssp. nov. (ZMB 80351). (a) dorsolateral view in life; (b) ventral view in life; (c) ventral view of left hand of the preserved specimen; (d) ventral view of left foot of the preserved specimen.



Fig. 12. Male paratype (ZMB 80354) of *Platymantis cryptotis yapeni* ssp. nov. in life with two light dorsolateral stripes.



Fig. 13. Female paratype (ZMB 80356) of *Platymantis cryptotis yapeni* ssp. nov. in life.



Fig. 14. Type locality of *Platymantis cryptotis yapeni* ssp. nov. near the fishing village of Barawai, eastern tip of Yapen Island.

Copiula expectata GÜNTHER, 2002, *C. pipiens* BURTON & STOCKS, 1986; *Hylophorbus* cf. *tetraphonus* GÜNTHER, 2001, *H. nigrinus* GÜNTHER, 2001; *Oreophryne asplenicola* GÜNTHER, 2003, *O. pseudasplenicola* GÜNTHER, 2003, *Oreophryne* cf. *sibilans*, *O. waira* GÜNTHER, 2003, *O.* cf. *wapoga* GÜNTHER, RICHARDS & Iskandar, 2001 and two more undescribed *Oreophryne*-species; *Xenorhina lanthanites* (GÜNTHER & KNOP, 2006), *X.* cf. *oxycephala*, *X. varia* GÜNTHER & RICHARDS, 2005.

Vocalisation. The advertisement call of *P. cryptotis yapeni* (Fig. 15) consists of a chain of melodious notes. Mostly calls are uttered in series of different length. The

shortest interval between two calls was about 3 s. Calls with fewer than 6 notes were rare, and the maximum number of notes per call was 13. Mean duration of 32 calls from two males from Waira Mountain and recorded at about 600 m a.s.l. at a temperature of 24 °C was 1.10 s, SD 0.21, range 0.67–1.52 s. A total of 214 notes had a mean duration of 57 ms, SD 8.4, range 43–89 ms, and 184 internote intervals were on average 104 ms long, SD 28.1, range 66–238 ms. Note repetition rate in 39 calls varied from 6.1–9.7 notes/s, mean 8.2 notes/s, SD 1.13. Outline of the amplitude envelope of each note is diamond-shaped. There is a strong increase in pulse frequency in the second half of each note. Frequencies var-

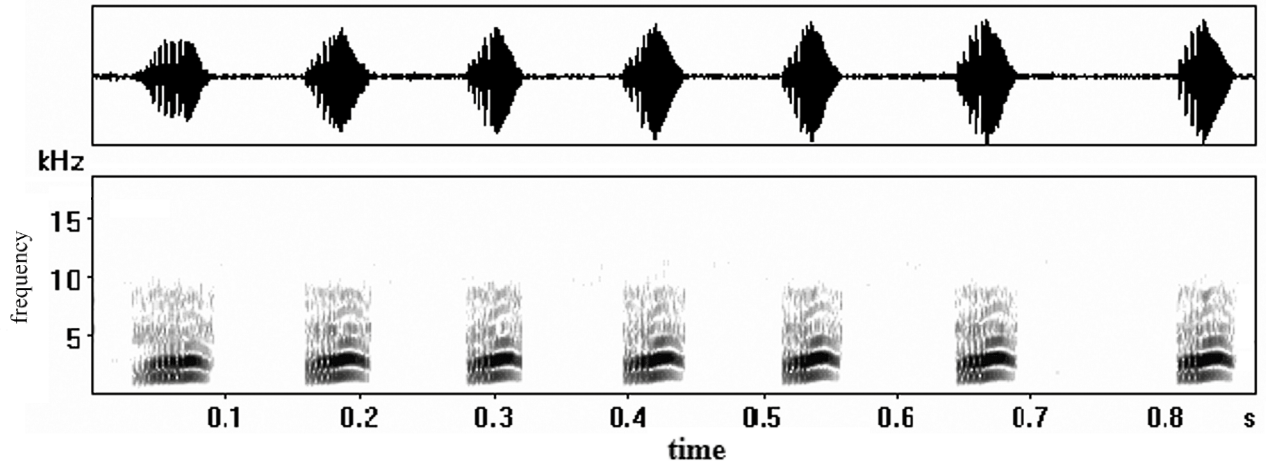


Fig. 15. Wave form (above) and spectrogram (below) of an advertisement call of *Platymantis cryptotis yapeni* ssp. nov. consisting of seven notes and recorded at 25 °C near the type locality on Yapen Island (sound signals not produced by the frog were removed in the spectrogram).

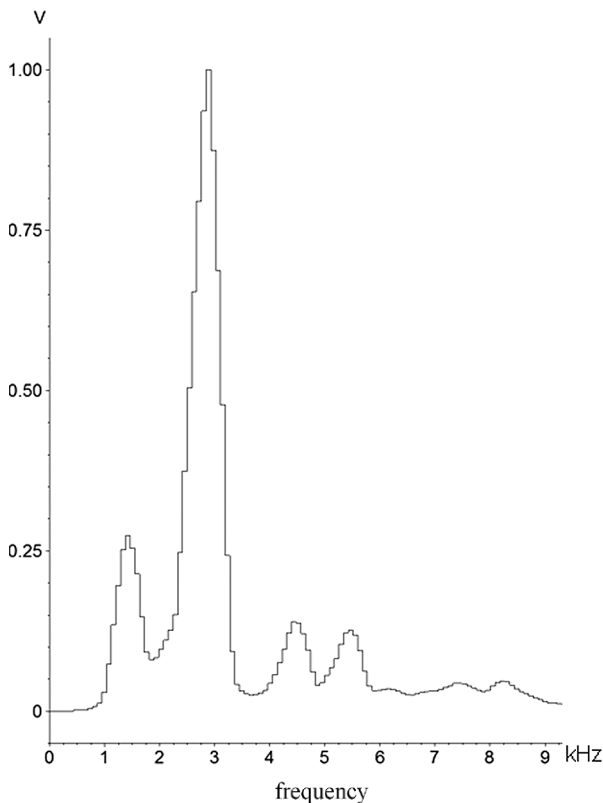


Fig. 16. Power spectrum of an advertisement call from *Platymantis cryptotis yapeni* ssp. nov.

ied from 1 to 9 kHz, fundamental frequency at 1.3 kHz, dominant frequency at 2.6 kHz and some more harmonics between 4 and 9 kHz (Fig. 16). All notes show a clear frequency modulation.

Etymology. The name of the new subspecies is derived from Latin and means that this new taxon was described on the basis of specimens from Yapen Island.

Comparisons with other species. Molecular data based on studies of the mitochondrial 12S rRNA gene and including among other species *P. papuensis*, *P. cryptotis cryptotis*, *P. cryptotis yapeni*, *P. punctatus*, *P. bimaculatus*, and *P. wuenscheorum* were presented by KÖHLER *et al.* (2008). Pairwise uncorrected genetic p-distances between *Platymantis punctatus*, *P. bimaculatus*, and *P. wuenscheorum* differed by more than 14 % from all other species. Moreover, these species have conspicuous species-specific morphological and behavioural features. According to the above studies, *P. papuensis*, *P. cryptotis cryptotis* and *P. cryptotis yapeni* (named *P. cryptotis* and *P. spec.* respectively in the paper by KÖHLER *et al.* 2008) are more closely related to one another and show p-distances of only 2–3 %. Nevertheless, *P. papuensis*, *P. cryptotis cryptotis* (as *P. cryptotis*), and *P. cryptotis yapeni* (as *P. spec.*) occupy different branches in the phylogram (Fig. 3 in KÖHLER *et al.* 2008). Unpublished studies of 487 base pairs of the 16S rRNA gene by B. STELBRINK (ZMB) yielded more sophisticated results. These studies included among others four specimens of *P. papuensis* from Yapen Island, one specimen of *P. papuensis* from Biak Island (type locality of *P. papuensis*), and three specimens of *P. cryptotis yapeni* from Yapen Island. As listed in Table 3, the sympatric and even mostly syntopic *P. papuensis* and *P. cryptotis yapeni* differ in 4.8 %, while intraspecific differences in *P. cryptotis yapeni* were 0.00 % and in *P. papuensis* 0.0–1.7 %. These results strongly support the hypothesis that both taxa represent independent species. *Platymantis papuensis* from the type locality Biak Island exhibited a sequence divergence of 6.1–6.8 % from *P. papuensis* of Yapen Island and in 5.9 % from *P. cryptotis yapeni*. Whether these molecular differences have also a taxonomic relevance remains to be explored.

Besides in molecular characters, *P. papuensis* from Yapen and *P. cryptotis yapeni* differ considerably in their advertisement calls (Fig. 17). Note and internote duration of *P. papuensis* are considerably longer than those

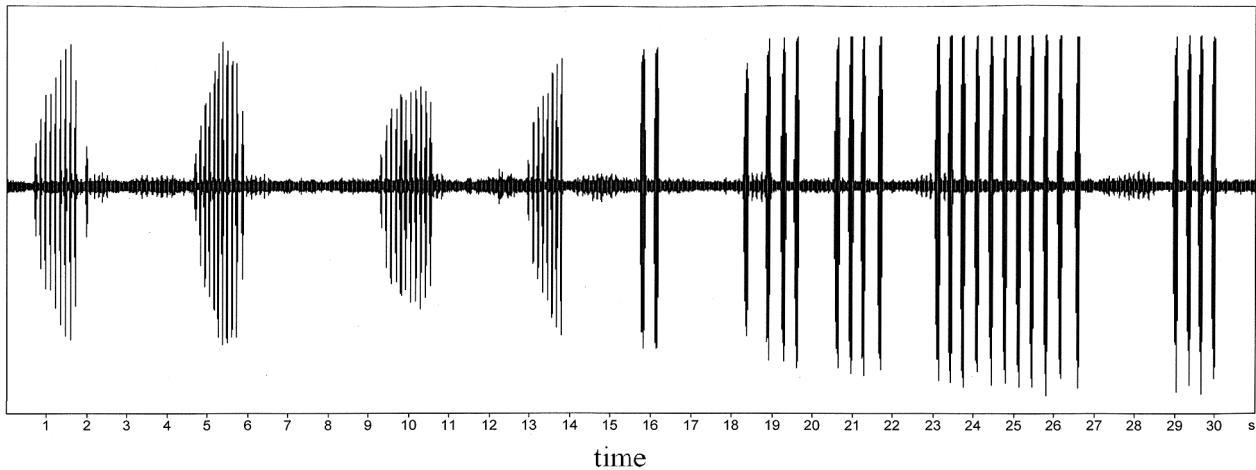


Fig. 17. Wave form of four advertisement calls from *Platymantis cryptotis yapeni* ssp. nov. followed by five advertisement calls (with 2, 4, 4, 11 and 4 notes) from *P. papuensis* (an uninterrupted record taken at the same site).

Table 3. Pairwise uncorrected genetic p-distances in 487 base pairs of the 16S rRNA gene within and between several *Platymantis* species. **1** = *P. papuensis*, Biak Island, ZMB 80375; **2–5** = *P. papuensis*, Yapen Island, ZMB 80433, 80434, 80435, 80436; **6–8** = *P. cryptotis yapeni* ssp. nov., Yapen Island, ZMB 80352, 80353, 80356.

	1	2	3	4	5	6	7
1							
2	0.068						
3	0.068	0.000					
4	0.068	0.000	0.000				
5	0.061	0.017	0.017	0.017			
6	0.059	0.048	0.048	0.048	0.044		
7	0.059	0.048	0.048	0.048	0.044	0.000	
8	0.059	0.048	0.048	0.048	0.044	0.000	0.000

Table 4. Body ratios of *Platymantis papuensis* (7 males, 8 females, and 4 subadults) from Biak Island (type locality). Because there are no significant differences between sexes or adults and subadults, their body ratios are combined in this table.

Ratio	Mean	SD	Range	Differences to <i>P. cryptotis yapeni</i> ssp. nov. (n = 23)
TL/SUL	0.54	0.017	0.52–0.57	no
TaL/SUL	0.31	0.012	0.29–0.33	no
T4L/SUL	0.55	0.029	0.50–0.60	no
T4D/SUL	0.025	0.004	0.018–0.032	p = 0.0002
F3D/SUL	0.019	0.003	0.013–0.023	p = 0.0003
T4D/F3D	1.36	0.22	1.11–2.00	no
MTL/T1L	0.37	0.033	0.28–0.42	no
HL/SUL	0.42	0.011	0.39–0.43	p = 0.029
HL/HW	1.09	0.090	0.98–1.04	no
END/IND	1.24	0.061	1.11–1.35	no
ED/SUL	0.137	0.009	0.124–0.152	p = 0.0003
TyD/ED	0.49	0.036	0.44–0.59	p = 0.031

of *P. cryptotis yapeni* and note repetition rate is notably lower. Mean note length in *P. papuensis* is 119 ms, SD 10.8, range 96–157 ms, n = 162, mean internote length is

160 ms, SD 25.3, range 130–306 ms, n = 137, and mean note repetition rate is 4.0, SD 0.24, range 3.6–4.5, n = 25 calls. Data from *P. cryptotis yapeni* for comparison:

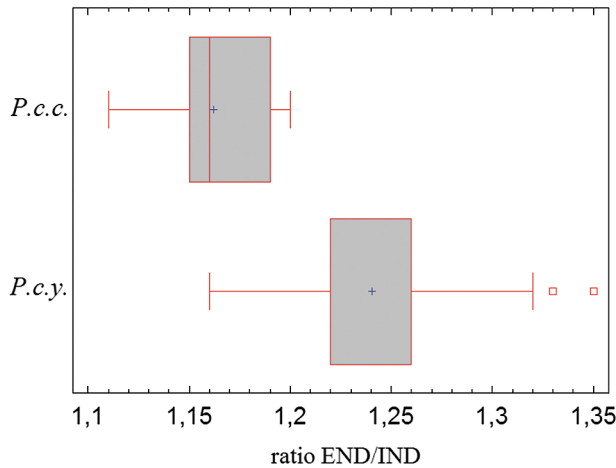


Fig. 18. Box-Whisker-Plot of the ratio END/IND in *Platymantis cryptotis cryptotis* (*P. c. c.*) in comparison to this ratio in *P. cryptotis yapeni* ssp. nov. (*P. c. y.*).

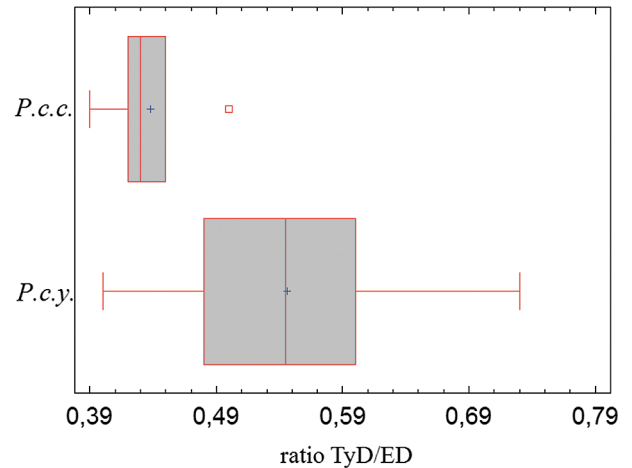


Fig. 19. Box-Whisker-Plot of the ratio TyD/ED in *Platymantis cryptotis cryptotis* (*P. c. c.*) in comparison to this ratio in *P. cryptotis yapeni* ssp. nov. (*P. c. y.*).

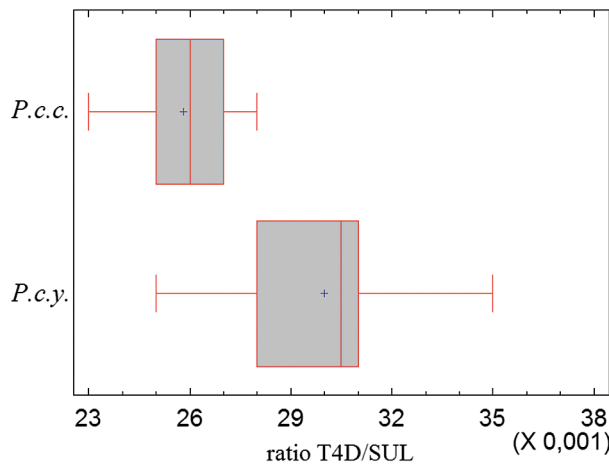


Fig. 20. Box-Whisker-Plot of the ratio T4D/SUL in *Platymantis cryptotis cryptotis* (*P. c. c.*) in comparison to this ratio in *P. cryptotis yapeni* ssp. nov. (*P. c. y.*).

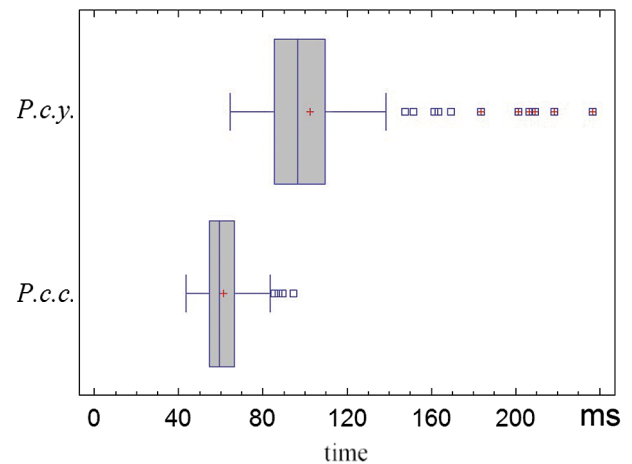


Fig. 21. Box-Whisker-Plot of internote interval length in *Platymantis cryptotis yapeni* ssp. nov. (*P. c. y.*) and *P. cryptotis cryptotis* (*P. c. c.*).

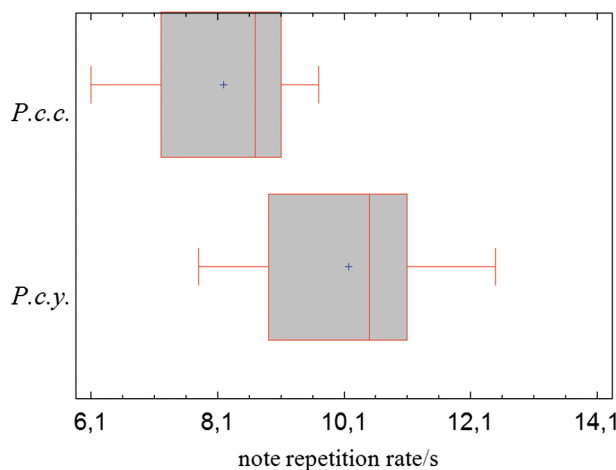


Fig. 22. Box-Whisker-Plot of note repetition rate per second in *Platymantis cryptotis yapeni* ssp. nov. (*P. c. y.*) and *P. cryptotis cryptotis* (*P. c. c.*).

mean note length 57 ms, range 43–89 ms; mean internote interval length 104 ms, range 66–238 ms; mean note repetition rate 8.2 notes/s, range 6.1–9.7 notes/s. Interestingly, both species are morphologically almost identical. I found significant differences only in the ratios HL/HW and END/IND when 22 males of *P. cryptotis yapeni* were compared with 24 sympatric males of *P. papuensis*. Mean ratio HL/HW was 1.11, range 1.05–1.18 in the former and 1.08, range 1.02–1.16 in the latter, $p=0.010$. Mean ratio END/IND 1.24, range 1.16–1.35 vs. 1.28, range 1.19–1.45, $p=0.012$.

The new subspecies differs from *P. papuensis* from the type locality mainly by biochemical traits (see above) and by the advertisement call. Morphometric features of both are largely overlapping (compare Tables 2 and 4). Mean note length of *P. papuensis* from Biak is 88 ms, SD 15.1, range 63–128 ms, $n=181$; mean internote length is 125 ms, SD 33.6, range 89–304 ms,

n=156; and mean note repetition rate is 5.2 notes/s, SD 0.40, range 3.9–5.9, n=40.

Platymantis cryptotis yapeni seems to be most closely related to *P. cryptotis cryptotis*. According to KÖHLER *et al.* (2008) it differs from that species in the 12S rRNA gene by a p-distance of 3 % (unfortunately we do not dispose of results concerning the 16S rRNA gene in *P. c. cryptotis*) and by the following body ratios (first values from 5 male *P. cryptotis cryptotis* and the second from 22 male *P. cryptotis yapeni*):

- HL/SUL, mean 0.40, range 0.38–0.41 vs. mean 0.43, range 0.40–0.45; p=0.004;
- END/IND, mean 1.16, range 1.11–1.20 vs. mean 1.24, range 1.16–1.35; p=0.005 (Fig. 18);
- TyD/ED, mean 0.44, range 0.39–0.50 vs. mean 0.55, range 0.40–0.73; p=0.005 (Fig. 19);
- TL/SUL, mean 0.51, range 0.50–0.52 vs. mean 0.53, range 0.51–0.56; p=0.007;
- TaL/SUL, mean 0.29, range 0.27–0.30 vs. mean 0.31, range 0.28–0.33; p=0.008;
- MTL/T1L, mean 0.43, range 0.41–0.46 vs. mean 0.38, range 0.33–0.44; p=0.002;
- T4D/SUL, mean 0.026, range 0.023–0.028 vs. mean 0.030, range 0.025–0.035; p=0.007 (Fig. 20);
- F3D/SUL, mean 0.021, range 0.017–0.023 vs. mean 0.023, range 0.019–0.029; p=0.05.

Moreover, there are significant differences in the advertisement calls:

- Mean note length of *P. cryptotis yapeni* 57 ms, range 43–89 ms, n=214 vs. mean 50 ms, range 25–77 ms, n=224 in *P. cryptotis cryptotis*; p<0.0001;
- Mean internote interval length in the former species 104 ms, range 66–238 ms, n=184 vs. mean 63 ms, range 45–96 ms, n=202 in the latter; p<0.00001 (Fig. 21).
- Mean note repetition rate in *P. cryptotis yapeni* 8.2, range 6.1–9.7, n=39 vs. mean 10.2, range 7.8–12.5, n=67 in *P. cryptotis cryptotis*; p<0.00001 (Fig. 22).

Concluding remarks. *Platymantis cryptotis cryptotis* and *P. cryptotis yapeni* differ in quite a number of morphological, bioacoustic and molecular features. These features, which are largely independent from one another, indicate that both forms are on divergent evolutionary pathways. Whether both forms have already reached species-specific status remains unclear. In order to express this uncertainty it seems appropriate to declare both population groups as subspecies.

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