

## A new species of *Hypsiboas* (Amphibia: Anura: Hylidae) from Kaieteur National Park, eastern edge of the Pakaraima Mountains, Guyana

by Philippe J. R. KOK

### Abstract

A new hylid frog tentatively assigned to the *Hypsiboas punctatus* group is described from Kaieteur National Park, west-central Guyana. The type locality lies on the Kaieteur Plateau at the edge of primary rainforest and savannah, not far from Kaieteur Falls. The new species is diagnosed by medium size (SVL 32.5-37.1 mm in adult males), tympanum half the horizontal diameter of eye, green colouration in life, whitish colouration in preservative, thickly granular skin, small mental gland in males, absence of prepollical spine and presence of nuptial excrescences in males, distinct ulnar fold, and by its ecology and characteristic advertisement call consisting of a long series of loud percussive notes gradually increasing in speed and loudness (call length about 60 seconds, up to seven notes per second). Males of the new species were found calling at night from high positions in trees and in the phytotelm of large terrestrial bromeliads *Brocchinia micrantha*; females were not observed but the species probably breeds in large bromeliads.

**Key Words:** Advertisement call, Hylidae, *Hypsiboas*, new species, Guyana, Systematics.

### Résumé

Une nouvelle grenouille de la famille des Hylidae, provisoirement assignée au groupe *Hypsiboas punctatus*, est décrite du Parc National de Kaieteur, centre ouest du Guyana. La localité type se situe sur le plateau de Kaieteur, à la limite entre forêt primaire et savane, non loin de Kaieteur Falls. La nouvelle espèce est caractérisée par une taille moyenne (32,5-37,1 mm du museau au cloaque chez le mâle adulte), un tympan approximativement égal à la moitié du diamètre horizontal de l'œil, une coloration verte in vivo, une coloration blanchâtre dans le liquide conservateur, une peau très granuleuse, une petite glande mentale chez le mâle, l'absence d'épine sur le prépollex et la présence d'excroissances nuptiales chez le mâle, un repli cutané distinct sur l'avant-bras, et par son écologie et un chant caractéristique qui consiste en une longue série de notes puissantes augmentant graduellement en vitesse et en intensité (durée du chant ca. 60 secondes, jusqu'à sept notes par seconde). Les mâles de la nouvelle espèce ont été récoltés alors qu'ils chantaient depuis de hautes branches dans les arbres et dans le phytotélme de broméliacées terrestres géantes *Brocchinia micrantha*; aucune femelle n'a été observée, mais l'espèce se reproduit probablement dans de grandes broméliacées.

**Mots-clés:** Chant, Guyana, *Hypsiboas*, nouvelle espèce, Hylidae, Systématique.

### Introduction

The genus *Hypsiboas* WAGLER, 1830 was recently resurrected by FAIVOVICH *et al.* (2005) on the basis of molecular data and includes about 70 South American nominal species (FROST, 2006). With 21 species, the genus is well represented in the Guiana Shield and currently includes 12 species from Guyana (SEÑARIS & MACCULLOCH, 2005). The *Hypsiboas punctatus* species group comprises eight species mainly distributed in northern South America; four of these are reported from Guyana: *H. cinerascens* (SPIX, 1824) [formerly *H. granosus*, see FROST (2006) for synonymy], *H. ornatissimus* (NOBLE, 1923), *H. punctatus* (SCHNEIDER, 1799), and *H. sibleszi* (RIVERO, 1972 "1971") (SEÑARIS & MACCULLOCH, 2005; FROST, 2006).

The Pakaraima Mountains, formed by the tabular Roraima sandstone formation, extend from west to east for over 800 km in the Guiana Highlands along the border between Brazil, Venezuela, and Guyana (KELLOFF, 2003). Kaieteur National Park lies at the eastern edge of this remote mountainous region and is well known for its impressive single drop waterfall: Kaieteur Falls. The region has a unique fauna and has proved to harbour a very interesting and diverse herpetofauna. Many new species of amphibians and reptiles have been recently described from the eastern Pakaraimas in Guyana (COLE & KOK, 2006; KOK, 2005; KOK *et al.*, 2006; MACCULLOCH & LATHROP, 2001, 2002, 2004, 2005; NOONAN & BONETT, 2003; NOONAN & HARVEY, 2000; SMITH & NOONAN, 2001), most of them endemics. Recently, during ongoing herpetofaunal surveys at Kaieteur National Park, another apparently undescribed species of frog was discovered on the Kaieteur Plateau. The newly discovered species is superficially similar to *Hypsiboas cinerascens* and is tentatively assigned to the *Hypsiboas punctatus* group (sensu FAIVOVICH *et al.*, 2005). Upon comparison with published descriptions and examination of comparative material it was determined that the species is new, and the new taxon is described herein.

### Materials and methods

All specimens were located at night, by call, and collected by hand at the type locality. Elevation and coordinates of the

collecting site were determined using a hand-held Garmin 12 Map GPS unit and were referenced to map datum WGS84. All individuals were collected according to approved animal use and care protocols (HEYER *et al.*, 1994), euthanized in Xylocaïne solution prior to fixation in 10% formalin, then transferred to 70% ethanol for permanent storage. Prior to fixation, muscle or liver samples were removed and preserved in 95% ethanol. Both specimens and tissues are housed in the Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (IRSNB); some of the specimens will be returned to the Centre for Study of the Biological Diversity (CSBD) at the University of Guyana (UG) after study. Colour pattern in life was taken from field notes and colour digital photographs. Sex was confirmed by dissection. Specimens were compared to published descriptions and museum material (see Appendix). Measurements were made on preserved specimens to the nearest 0.01 mm with electronic digital callipers, and, following HAYEK *et al.* (2001), rounded to 0.1 mm. Anatomical terminology follows DUELLMAN (1970). Twelve standard measurements were recorded: (1) snout-vent length (SVL); (2) head length from corner of mouth to tip of snout (HL); (3) head width at corner of mouth (HW); (4) snout length from anterior corner of eye to tip of snout (SL); (5) eye to naris distance from anterior corner of eye to centre of naris (EN); (6) internarial distance (IN); (7) eye length (EL); (8) interorbital distance (IO); (9) diameter of tympanum (TYM); (10) width of disc on Finger III (WFD); (11) tibia length from outer edge of flexed knee to heel (TL); (12) foot length from proximal edge of inner metatarsal tubercle to tip of Toe IV (FL). Webbing formula notation follows SAVAGE & HEYER (1967), with modifications proposed by MYERS & DUELLMAN (1982) and SAVAGE & HEYER (1997). Vocalisations of the holotype and one paratype (IRSNB 1967) were recorded at a distance of 20-100 cm from the frog using a Sony ECM-MS907 microphone attached to a DAT Sony TCD-D100 recorder on a Maxell DM60 digital audio tape. Advertisement calls were analyzed on a Macintosh PowerBook G4 computer using Raven version 1.2.1 software (CHARIF *et al.*, 2004). The vocalisations were digitized with a sampling frequency of 44.1 kHz and a sample size of 16 bits; audiospectrograms were created (Window type: Hann; DFT size: 512; 3 dB filter bandwidth: 124 Hz) and call duration (sec), notes/sec, notes/call, intercall interval (sec), internote interval (sec), and lower and upper frequencies (kHz) were measured. Temperature during recordings was taken with an Oregon Scientific thermo-hygrometer and varied from 23-25°C. Acoustic terminology follows DUELLMAN & TRUEB (1986).

*Hypsiboas liliae* sp. nov.

Figs 1-4

HOLOTYPE

Institut Royal des Sciences Naturelles de Belgique (IRSNB) 1965 (field n° PK1290), an adult male collected by Philippe J. R. KOK and Paul BENJAMIN, 14 March 2006, between Boy Scout View and Johnson View on the Kaieteur Plateau (5°10'51"N, 59°28'57"W), ca. 400 m elevation, Kaieteur National Park, Potaro-Siparuni district, Guyana.

PARATYPES

IRSNB 1966 (field n° PK1197), an adult male collected on 12 March 2006, IRSNB 1967 (field n° PK1282) and IRSNB 1968 (field n° PK1283), two adult males collected on 13 March 2006. All with the same data as holotype.

ETYMOLOGY

The specific epithet is a noun in the feminine genitive case, and is dedicated to my daughter Lili KOK.

DIAGNOSIS

The new species is tentatively referred to the *Hypsiboas punctatus* group (sensu FAIVOVICH *et al.*, 2005) because of its morphological similarity to other members of the group. *Hypsiboas liliae* is superficially similar to *H. cinerascens* and is characterized by the following combination of characters: (1) medium size (SVL 32.5-37.1 mm in adult males; unknown in females); (2) skin of dorsum and belly thickly granular; (3) body slender; (4) head slightly wider than long, wider than body; (5) snout truncate in dorsal view and slightly protruding in lateral view, with strongly protuberant nostrils; (6) large prominent eyes, palpebral membrane lacking reticulations; (7) tympanum large, round, approximately half the horizontal diameter of the eye; (8) supratympanic fold strongly visible, not or feebly obscuring the upper margin of the tympanum; (9) limbs long and slender; (10) axillary membrane absent; (11) subarticular tubercles on fingers single; (12) enlarged prepollex without prepollical spine; (13) nuptial excrescences present in males; (14) small mental glands in males; (15) hands about one-fifth webbed, feet about four-fifths webbed; (16) distinct ulnar fold; (17) weak inner tarsal fold, tarsal tubercles absent; (18) heel tubercles and calcars absent; (19) cloacal sheath absent or very short; (20) in life, dorsal surfaces bright green to bright yellowish green during the day, greenish brown at night, ventral surfaces blue, translucent in the central portion of abdomen, iris silver with black periphery during the day, bronze at night; in preservative all surfaces become whitish; (21) peritoneum white; (22) breeding call consisting of a long series of loud percussive notes gradually increasing in speed and loudness (call length about 60 seconds, up to seven notes per second). In the Guiana Shield, the only green treefrogs becoming whitish in preservative are *H. cinerascens*, *H. fuentei*, *H. ornatissimus*, *H. punctatus*, and *H. sibleszi* (HOOGMOED, 1979; SEÑARIS & MACCULLOCH, 2005; FROST, 2006). By lacking a prepollical spine in males, *Hypsiboas liliae* is readily distinguished from *H. cinerascens*, *H. ornatissimus*, *H. punctatus*, and *H. sibleszi*. It further differs from *H. cinerascens* by more granular skin in males (especially visible in life, this character is subject to changes in preservative), less webbing between Finger III and IV, and by more prominent nostrils (snout obviously truncate in *H. liliae*, round in *H. cinerascens*); from *H. ornatissimus*, and *H. sibleszi* by granular skin on dorsum (smooth in *H. ornatissimus* and *H. sibleszi*), and less webbing between Finger III and IV; from *H. punctatus* by granular skin on dorsum (shagreened to smooth in *H. punctatus*), and absence of dor-



Fig. 1. Holotype of *Hypsiboas liliae* sp. nov., IRSNB 1965, adult male, SVL 36.0 mm.

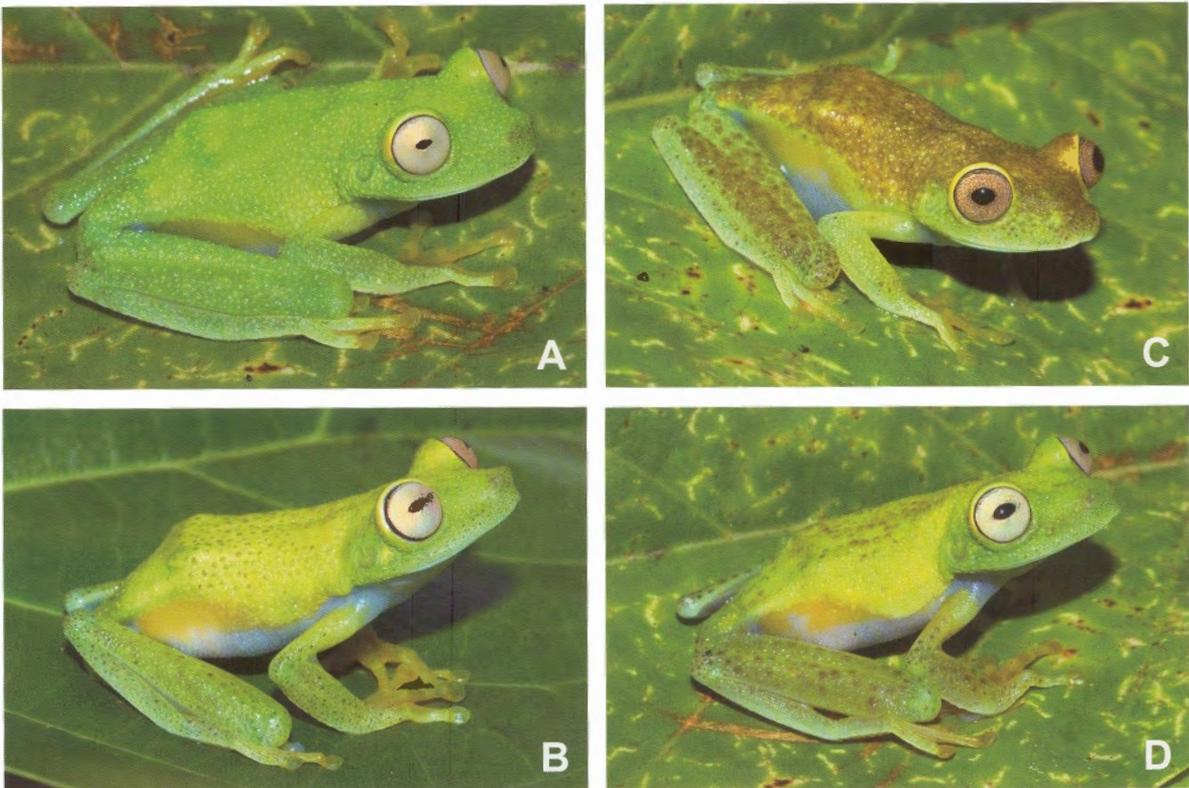
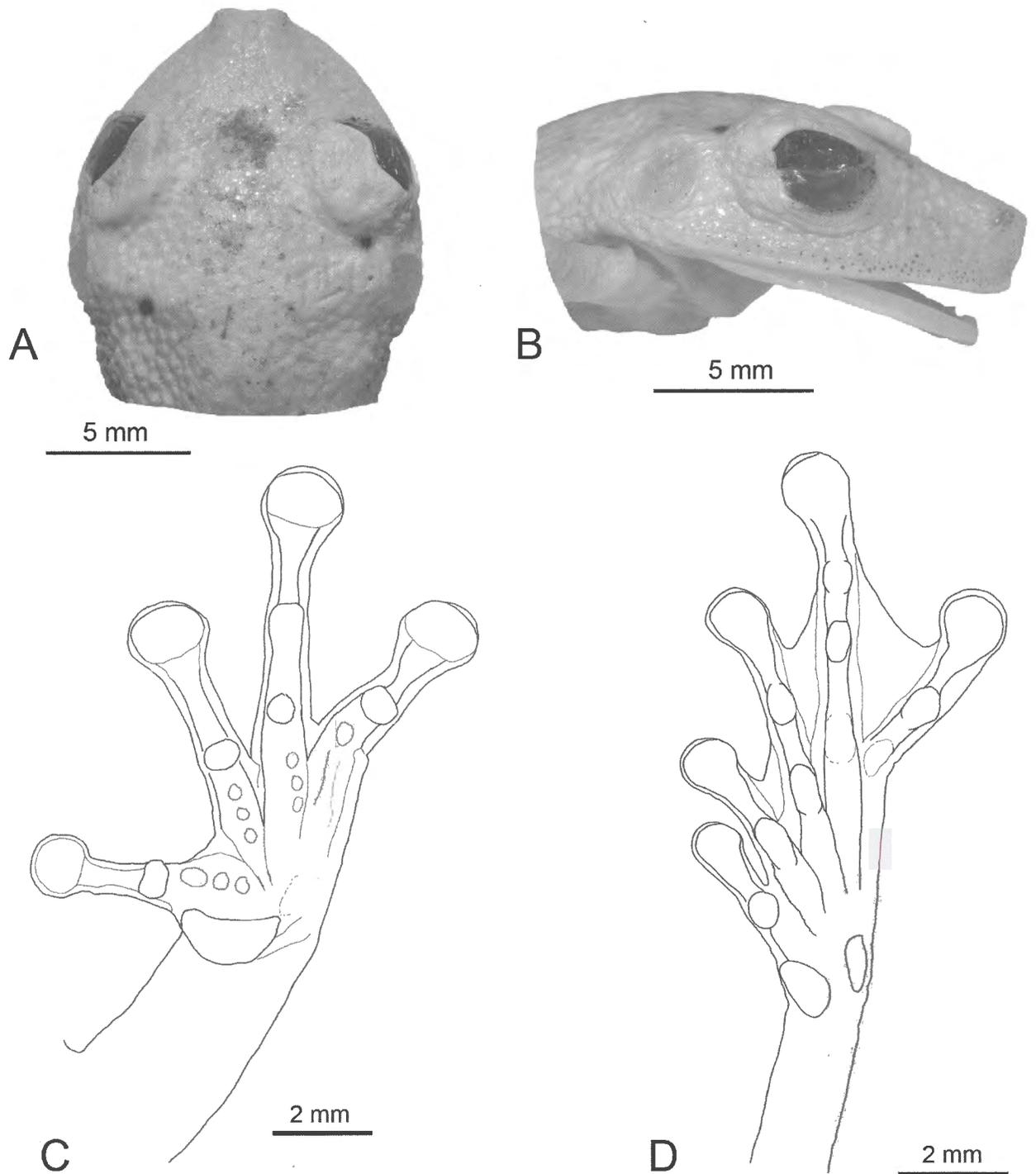
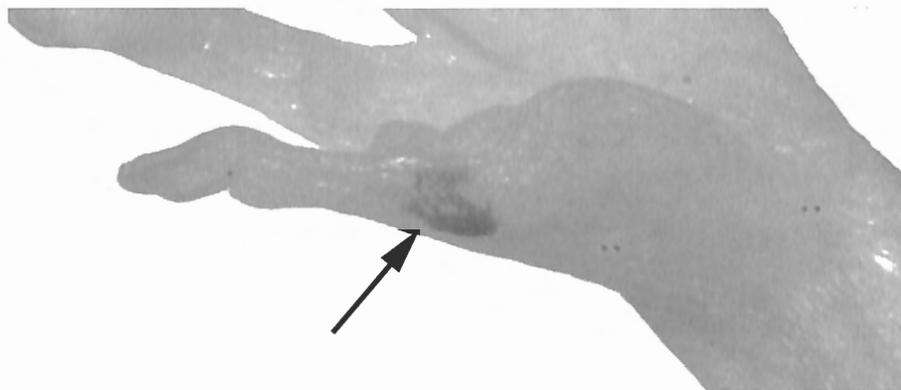


Fig. 2. Colour pattern variation in paratypes *Hypsiboas liliae* sp. nov. (A) IRSNB 1968, male, 32.5 mm SVL, photographed by day; (B) IRSNB 1966, male, 35.0 mm SVL, photographed by day; (C) IRSNB 1967, male, 37.1 mm SVL, photographed at night; (D) same specimen (IRSNB 1967) photographed by day.



**Fig. 3.** *Hysiboas liliae* sp. nov., IRSNB 1965, holotype, adult male. (A) dorsal, and (B) lateral views of head; (C) hand, and (D) foot.



**Fig. 4.** *Hypsiboas liliae* sp. nov., IRSNB 1965, holotype, adult male. Lateral view of left prepollex showing nuptial condition. Arrow shows nuptial excrescence, situated dorsolaterally on the thumb.

solateral fold (feeble but present in *H. punctatus*); *Hypsiboas liliae* differs from *H. fuentei* (GOIN & GOIN, 1968) by its thickly granular skin (smooth in *H. fuentei*), smaller size (maximum size 37.1 mm in *H. liliae*, 57.0 mm in *H. fuentei*), smaller tympanum (approximately half the horizontal diameter of the eye in *H. liliae*, nearly equal the diameter of eye in *H. fuentei*), large prominent eyes (moderate in size and not particularly prominent in *H. fuentei*), truncate snout in dorsal view (pointed in *H. fuentei*), and distinct ulnar fold (absent in *H. fuentei*). The only other *Hypsiboas* belonging to the *punctatus* group present in the Guiana Shield is *Hypsiboas hobbsi* (COCHRAN & GOIN, 1970), which is pale grey to brown in preservative and differs from *H. liliae* by distinct dorsolateral glandular folds (absent in *H. liliae*), no webbing on fingers (present in *H. liliae*), and pointed snout in dorsal view (truncate in *H. liliae*). *Hypsiboas albomarginatus* (SPIX, 1824), a species that has been wrongly reported from the Guiana Shield on several occasions (see HOOGMOED, 1979; LESCURE & MARTY, 2001 "2000") is also green in life and whitish in preservative but has a white dorsolateral stripe in life (absent in *H. liliae*), small dermal appendages on heel (absent in *H. liliae*), a smooth dorsum (thickly granular in *H. liliae*), and lacks a mental gland in males (present in *H. liliae*). In addition, the very distinctive advertisement call of *H. liliae* distinguishes it from all known *Hypsiboas* species occurring in the area.

#### DESCRIPTION OF HOLOTYPE

Measurements of the holotype (in mm) – SVL 36.0; HL 11.4; HW 12.8; SL 5.1; EN 3.8; IN 2.5; EL 3.6; IO 4.0; TYM 2.1; WFD 1.5; TL 19.3; FL 12.3.

Adult male (Fig. 1); SVL 36.0 mm; body and limbs slender; head wider than body, slightly wider than long; HW/HL = 1.12, widest below eyes; snout truncate in dorsal view, slightly protruding in lateral view; eye to naris distance approximately equal to eye length, EN/ED = 1.06; canthus rostralis indistinct, round, concave; loreal region concave; lips flaring slightly; internarial region distinctly depressed; nostrils strongly protuberant, directed dorsolaterally; interorbital region slightly convex, IO/EL = 1.11, IO/HW = 0.31, no cranial crests; eyes large and protuberant; EL/HL = 0.32, EL/HW = 0.28; upper eyelid width 3.2 mm; palpebral membrane translucent, not reticulated; pupil horizontally oval;

supratympanic fold strongly visible, semi-circular in outline, feebly obscuring the upper margin of the tympanum, extending to arm insertion; tympanum large, distinct, directed dorsolaterally, separated from eye by a distance approximately equal to one-third of its length; TYM 140% of WFD. Arm slender, lacking an axillary membrane, forearm slightly hypertrophied; distinct ulnar fold along length of forearm and extending onto Finger IV; relative length of fingers I < II < IV < III; width of disk on Finger III 1.5 mm; lateral fringes present; subarticular tubercles present, round, single, most prominent on Finger I; supernumerary tubercles present, rather large and round, arranged in a single row on the proximal segments of each digit; inner and outer metacarpal tubercles barely distinguishable, flat; nuptial excrescences present, situated dorsolaterally, not visible from below (Fig. 4); prepollex enlarged, sharp, no prepollical spine; webbing basal between Finger I and II; manus webbing formula I 3-3 II 2<sup>+</sup>-3 III 3<sup>+</sup>-2<sup>1/2</sup> IV (Fig. 3). Hind limb long and slender; TL/SVL = 0.54; heels slightly overlapping when hind limbs flexed perpendicular to axis of body; tarsal fold weak, calcars and heel tubercles absent; relative length of toes I < II < III < V < IV; terminal disks on toes smaller than those on fingers; subarticular tubercles distinct, ovoid, single; supernumerary tubercles few, hardly distinguishable on the proximal segments of each toe; outer metatarsal tubercle absent; inner metatarsal tubercle large, ovoid; pes webbing formula I 2-2<sup>+</sup> II 1-2 III 1-2 IV 2-1 IV (Fig. 3). Skin on dorsum, head, and dorsal surfaces of limbs coarsely granular; skin on flanks granular, a smooth patch posteriorly; skin on belly and ventral surfaces of thighs granular; oval mental gland. Cloacal opening directed posteriorly at upper level of thighs; cloacal sheath absent; cloacal tubercles present, large. Tongue cordiform, barely free behind and laterally; prevomerine process present; vomerine odontophores large, prominent, about same size as choanae, in two fairly straight series forming a broad inverted "V", not in contact but narrowly separated; each odontophore bearing about 14 teeth; choanae large, elongate, kidney-shaped; vocal slits moderately long, extending from midlateral base of tongue and almost reaching angle of jaws; vocal sac single, median, subgular.

#### COLOUR IN LIFE

Colouration is highly dependent on light intensity. By day:

dorsal surfaces bright yellowish green; irregular brown blotch between the eyes; throat and venter blue; central portion of abdomen translucent, white peritoneum visible through ventral skin; posterior part of flank yellowish orange; ventral surfaces of limbs translucent greenish blue; webbing, fingers and disks greenish orange; palm greenish orange; sole greenish blue; upper eyelid yellow; iris silver with black periphery; bones green (Fig. 1). At night: dorsum and dorsal surfaces of hind limbs greenish brown and iris bronze. At intermediate light levels, the granules may be greenish brown and brown dots may appear on snout, lips, and upper surfaces of arms and legs.

#### COLOUR IN PRESERVATIVE

Shortly after fixation the entire body colour changed to vivid yellow, then gradually discoloured to white in less than 24 h, with the exception of the brown blotch between the eyes. Scattered melanophores are visible on dorsum, snout, tympanum, lips, around eyes, on upper surfaces of arms and legs, and in the pericloacal area, especially under magnification. Bones faded to white. See HOOGMOED (1979) for further discussion on colour change in preservative.

#### VARIATION

The type specimens are similar in general morphology, but colour pattern is variable, ranging from vivid green to yellowish green in daytime to greenish brown at night and is highly dependent on light intensity (Fig. 2). Throat and venter are always blue. The number of scattered melanophores visible in preservative is variable. All the type specimens became vivid yellow shortly after fixation and gradually discoloured to white in less than 24 h. One of them, IRSNB 1967, retained a few yellow spots for a few days. The shape of the vomerine odontophores is variable. In the holotype and in IRSNB 1968 they are fairly straight, forming a broad inverted "V", while in IRSNB 1966 and IRSNB 1967 they are slightly S-shaped. Number of vomerine teeth is 13-17. Size of mental gland is consistent. No noticeable variation in web-

bing. Aspect of the third subarticular tubercle on Toe IV and the second subarticular tubercle on Toe V is variable and may be more or less distinct. A few small, hardly distinguishable, supernumerary tubercles are present on the proximal segments of toes in all specimens. Variation of measurements and body proportions is given in Table 1.

#### ADVERTISEMENT CALL

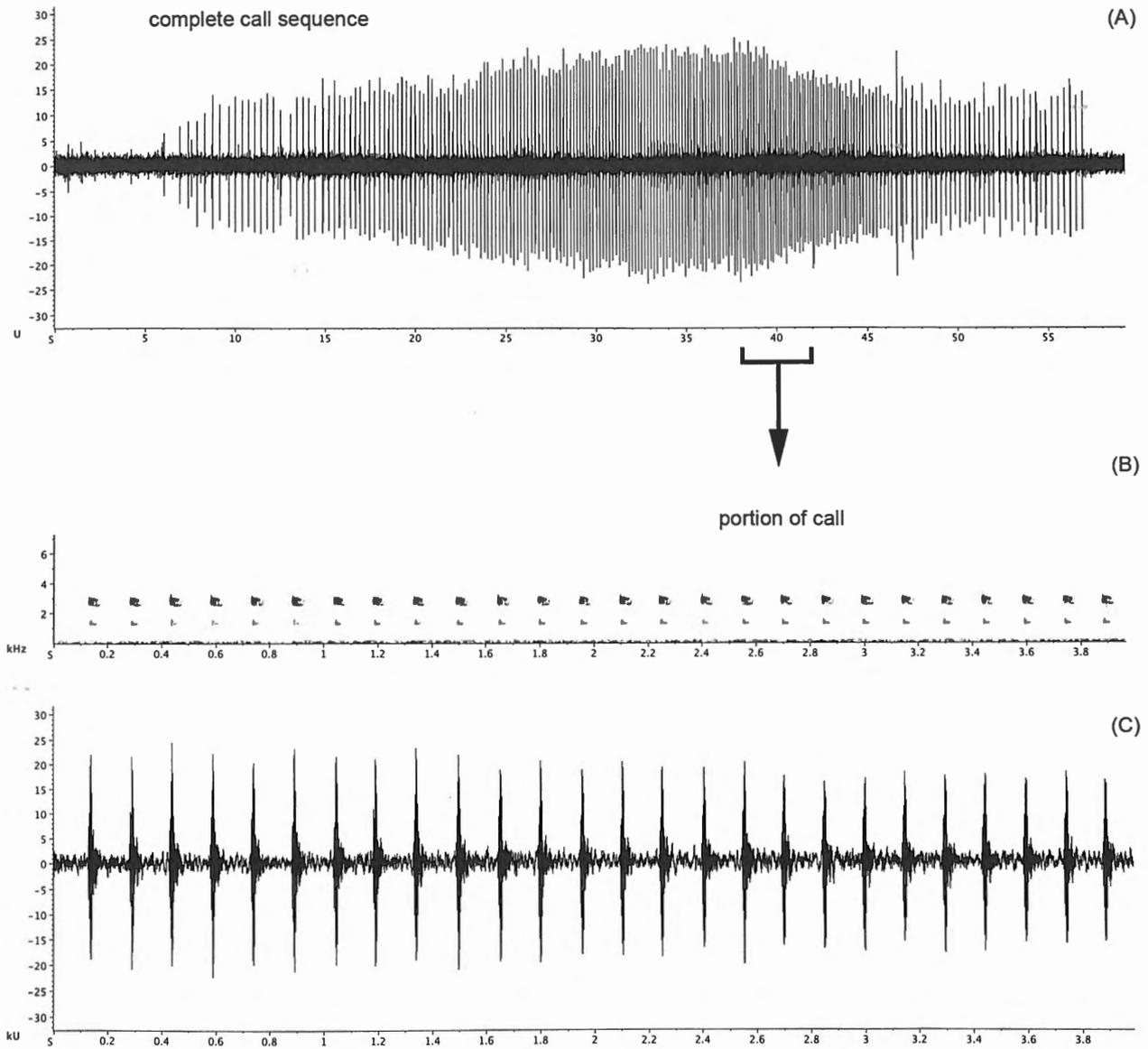
The following description is based on the advertisement calls from two males. Four complete call sequences were analysed. The advertisement call of *H. liliae* consists of a long series of loud percussive notes "tuk tuk tuk tuk tuk..." gradually increasing in speed and loudness, and repeated up to seven times per second (Fig. 5). The call, audible over great distances, is often preceded by a groan or several isolated notes. A complete call sequence is understood to consist of the uninterrupted call excluding the groan and isolated notes, which are variable in length and sometimes probably caused by disturbance. Quantitative measures of spectral parameters exhibited low variation for lower (0.75-0.82 kHz) and upper (3.24-3.49 kHz) frequencies. Temporal parameters of the call were substantially variable for intercall interval (34.7-53.4 sec), and internote interval (110-622 ms). Note rate in a complete call sequence is almost constant with 4.4-4.6 note/sec. Call duration (45.8-51.3 sec), notes/call (214-222), and note duration (26-39 ms) exhibited slight variation.

#### DISTRIBUTION AND ECOLOGY

*Hypsiboas liliae* is known only from Kaieteur National Park, at the eastern edge of the Pakaraima Mountains (Figs 6-7). Besides the type locality, the new species has been detected in the vicinity of Elinkwa River in the southeastern part of the park (5°10'06"N 59°23'41"W; elev. 550 m) (Fig. 7) where several individuals were heard calling from high elevations in trees. Interestingly, this locality is close to a small *Brocchinia micrantha* field in the remnant of an old savannah, which corresponds to the habitat of the species at the type locality. A detailed description of the surrounding forest

**Table 1.** Variation of measurements and measurement ratios of the four type specimens of *Hypsiboas liliae*, sp. nov. Abbreviations are in the text. All measurements in mm.

Measurement	Mean ± SD	Range	Ratio	Range
SVL	35.15 ± 1.70	32.5-37.1	TL/SVL	0.54-0.57
HL	11.15 ± 0.65	10.2-12.0	FL/SVL	0.34-0.38
HV	12.85 ± 0.47	12.1-13.3	HL/SVL	0.31-0.32
SL	5.13 ± 0.36	4.7-5.7	HW/SVL	0.36-0.38
EN	3.95 ± 0.21	3.8-4.3	IO/HW	0.31-0.36
IN	2.63 ± 0.11	2.5-2.8	HW/HL	1.10-1.20
EL	4.25 ± 0.44	3.6-4.7	EN/EL	0.83-1.06
IO	4.25 ± 0.15	4.0-4.4	IO/EL	0.93-1.11
TYM	2.20 ± 0.07	2.1-2.3	EL/HL	0.32-0.43
WFD	1.53 ± 0.08	1.4-1.6	EL/HW	0.28-0.35
TL	19.23 ± 0.51	18.6-20.0	TYM/EL	0.48-0.58
FL	12.73 ± 0.38	12.3-13.2		



**Fig. 5.** (A) amplitude waveform of a complete call sequence of *Hypsiboas liliae* (holotype, recorded 14 March 2006, 24°C air temperature); (B) audiospectrogram of a four seconds portion of the complete call; (C) amplitude waveform of the same four seconds portion of the complete call.

at the type locality is provided by KOK (2005). *Hypsiboas liliae* seems to prefer primary forest and proximity of large bromeliads. The holotype was collected at night (20h40), calling from a water-filled phytotelm of a *Brocchinia micrantha* at the edge of primary forest and savannah (Fig. 8). All paratypes were collected at the same locality, between 20h00 and 21h00, from phytotelms of *B. micrantha*, except IRSNB 1966, which was calling from a branch about 300 cm above the ground, just above a small patch of *B. micrantha*. When disturbed, the frogs rapidly left the phytotelm and climbed to the apex of the bromeliad's leaves to escape into the surrounding higher vegetation. The observation of calling males high in trees (more than 10-15 m above the ground)

along Elinkwa River suggests that the species lives not far from the treetop and descends only to breed in giant bromeliads. However, the species could also breed in large arboreal bromeliads.

#### Comments

Other species of the *H. punctatus* group found in Kaieteur National Park are *H. cinerascens* and *H. sibleszi*. As pointed out by HOOGMOED (1979), the study of the small green treefrogs in the *Hypsiboas punctatus* group is problematical due to their strong similarity in preservative and few discri-

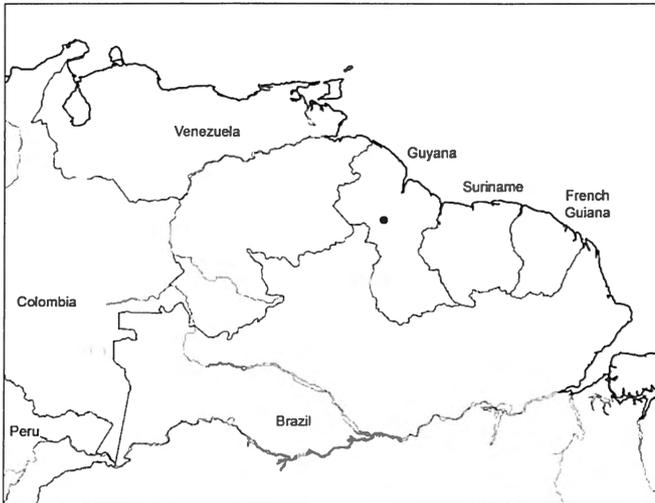


Fig. 6. Map of northeastern South America showing the distribution of *Hypsiboas liliae* sp. nov. (dot = type locality).

minant morphological characters. Bioacoustics and ecological data are necessary to separate these similar species. The inclusion of *Hypsiboas liliae* in the *H. punctatus* group is tentative because no morphological synapomorphy is known for the group (FAIVOVICH *et al.*, 2005), and is based on the close resemblance of *H. liliae* to *H. cinerascens* and other species of the group. An evidence in potential conflict with a relationship of *H. liliae* with the *H. punctatus* group is the absence of projecting spine on the prepollex. The presence of a small mental gland in males is shared by species of the *H. benitezi* group (FAIVOVICH *et al.*, 2006) and relationship with this group is possible (however species of the *H. benitezi* group have a prepollical spine). Lack of known morphological synapomorphies is a problem when taxa are defined on molecular data only. More morphological studies are clearly needed to avoid the problematical allocation of a new species to a species group, or even to a genus, without DNA sequencing.

*Hypsiboas cinerascens* is clearly a complex of at least two different species in Kaieteur National Park (pers. obs.), and probably elsewhere (M.S. HOOGMOED, pers. com.). In Kaieteur National Park, the two species referred to *H. cinerascens* are barely distinguishable by morphological

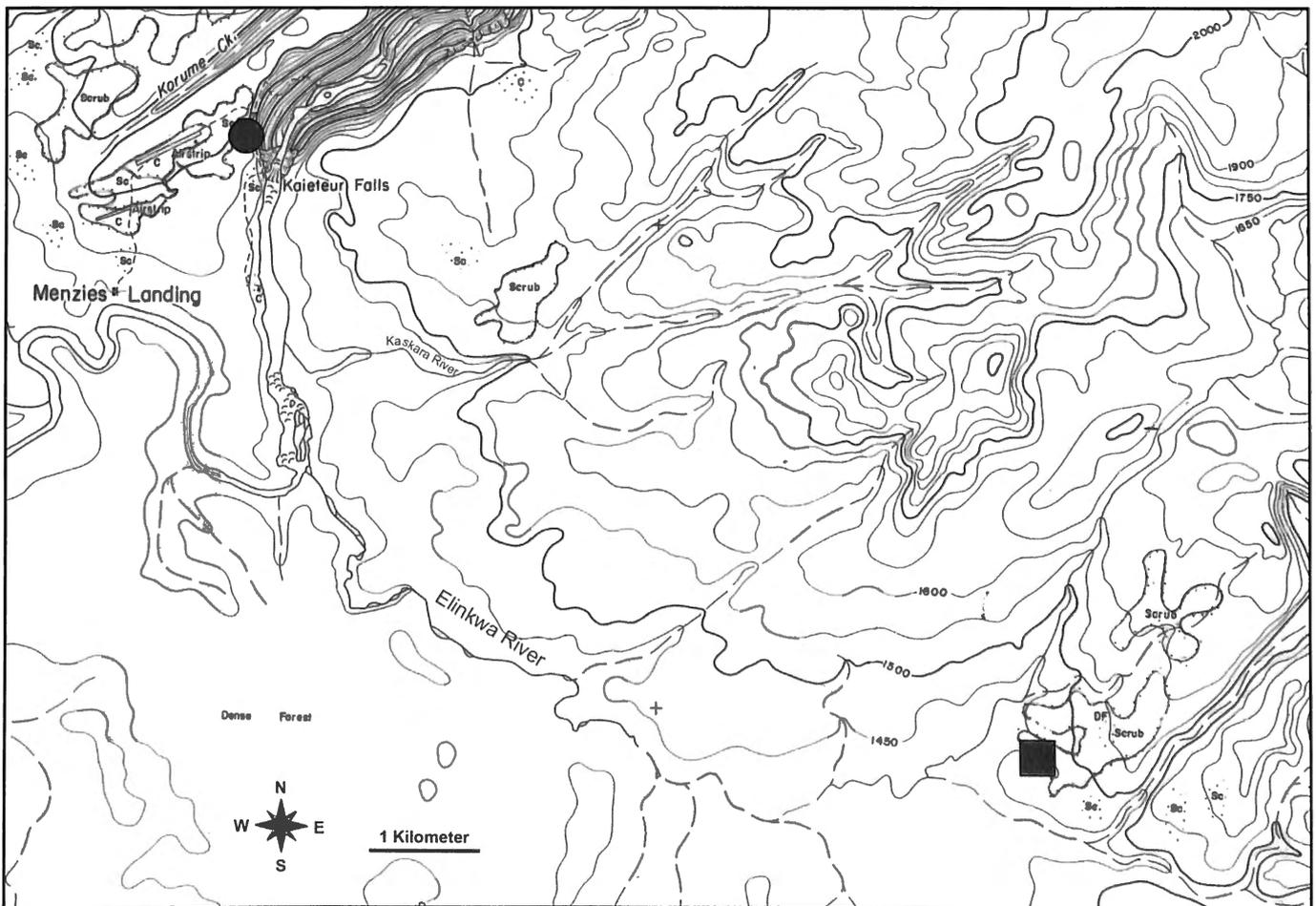


Fig. 7. Area map of the eastern part of Kaieteur National Park showing the collection site of *Hypsiboas liliae* sp. nov. (dot), and another locality where the species was detected, along Elinkwa River (square). Map after "Kaieteur Sheet 43 SW" published by the Survey Department of Guyana, 1972.



**Fig. 8.** Calling site of *Hypsiboas liliae* sp. nov. at the type locality on the Kaieteur Plateau, ca. 400 m elevation. Most of the frogs were found in the phytotelm of *Brocchinia micrantha*.

characters, but have distinct calls. In this case, molecular data will certainly be invaluable.

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#### Appendix: additional material examined

*Hypsiboas cinerascens*.- Guyana: *Potaro-Siparuni*: Kaieteur National Park, Kaieteur Plateau (IRSNB 13808-826).

*Hypsiboas punctatus*.- No locality: IRSNB 356. Suriname: No other locality (IRSNB 356B).

*Hypsiboas sibleszi*.- Guyana: *Potaro-Siparuni*: Kaieteur National Park, Kaieteur Plateau (IRSNB 13827-836).