

A NEW LARGE TREE FROG FROM NORTH-WESTERN GABON (HYPEROLIIDAE: *LETOPELIS*)

S. LÖTTERS¹, M.-O. RÖDEL² AND M. BURGER³

¹Zoological Institute, Department of Ecology, Mainz University, Germany

²Department of Animal Ecology and Tropical Biology, Biocenter, Würzburg University, Germany

³Zoology Department, University of the Western Cape, South Africa

A new large, green species of *Leptopelis* from the Monts de Cristal, north-western Gabon, is described. It is similar to the sympatric *L. brevirostris*. The most striking character to distinguish these two taxa is the absence of a tympanum in the new species in contrast to the presence of a tympanum in *L. brevirostris*.

Key words: Africa, Anura, *Leptopelis brevirostris*, systematics

INTRODUCTION

Little is known about the amphibians from most parts of western Central Africa (Poynton, 1999). Field surveys by different workers at the Monts de Cristal, north-western Gabon, revealed several new country records and species new to science. Currently, we are aware of about 50 species of anurans from this region (Lötters *et al.*, 2001; Rödel & Pauwels, 2003; unpubl. data). The genus *Leptopelis* Günther, 1859 contains 49 recognized species, spread out through most of sub-Saharan Africa as far south as the eastern Cape Province in South Africa (Frost, 2002). Our amphibian collections from the Monts de Cristal comprise six *Leptopelis* forms (see below). One *Leptopelis* specimen, a large, green arboreal frog, is not assignable to any described species (e.g. Perret, 1958, 1962, 1973; Laurent, 1973; Lagen, 1977; Amiet, 1991, 2001). This specimen is most similar to *L. brevirostris* (Werner, 1898), a species also represented in our collection from the Monts de Cristal. However, it differs in several characters from *L. brevirostris*, especially the absence (versus presence) of a tympanum. We thus regard it as a representative of a large *Leptopelis* species new to science.

MATERIAL AND METHODS

We examined material from MHNG (Muséum d'Histoire Naturelle, Genève), IRSNB (Institut Royal des Sciences naturelles de Belgique, Brussels: field numbers of O.S.G. Pauwels), RMCA (Royal Museum for Central Africa, Tervuren), ZFMK (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn), ZMB (Zoologisches Museum der Humboldt-Universität, Berlin) and MOR (research collection of M.-O. Rödel: field numbers of O.S.G. Pauwels). Specimens investigated for comparison are listed in the Appendix.

The holotype of the new species was preserved in 70% ethanol after taking colour slides for the life colour description. To determine sex and reproductive status as

well as to examine if a tympanum is hidden behind thickened skin, the holotype was dissected. We took measurements with dial callipers (± 0.1 mm). The snout-vent length is abbreviated SVL. Drawings were done with the aid of a camera lucida, attached to a dissecting microscope (Zeiss Stemi SV 6). Webbing formulae follow the system used by Glaw & Vences (1994).

A finger tip was removed as a tissue sample and used to sequence a 500 bp fragment of mitochondrial DNA, using the gene 16S rRNA gene. For methods used see Lötters *et al.* (2004).

DESCRIPTION

LETOPELIS CRYSTALLINORON SP. N. (FIGS. 1; 2A,B,E,G,H)

LETOPELIS BREVIROSTRIS (NON WERNER, 1898):
LÖTTERS *ET AL.*, 2001: 32.

Holotype. ZFMK 73139 (field number SL 1061), adult female, in forest in the vicinity of the Barrage de Tchimbélé (ca. 0°37'N, 10°24'E; about 560 m above sea level), Monts de Cristal, Gabon, 22 January 2000, M. Frankenstein, V. Gossmann, S. Lötters and F. Obame.

Diagnosis. An arboreal *Leptopelis* (sensu Schiøtz, 1999) resembling *L. brevirostris*, with (1) adult female SVL about 57 mm; (2) head wider than long; (3) eye relatively large with horizontal eye diameter almost twice the distance from nostril to anterior corner of eye; (4) dorsal snout shape truncate; (5) tympanum absent; (6) dorsal skin granular; (7) foot webbing formula as far as known 1(0), 2i+e(½), 3i(1) 3e(½), 4i (1) 4e (½), 5(0), hand webbing formula 1(½), 2i(1) 2e(½), 3i+e(1), 4 (1); (8) well developed subarticular tubercles and terminal discs present on all toes and fingers; (9) colour in life dorsally brilliantly green with a few diffused tan to brown markings; no white spot present below eye (often present in several other *Leptopelis* species); laterally whitish-tan spots; ventrally creamy white, iris bronze with a black ring at periphery; (10) vomerine teeth massive and fused to U-shaped structure; (11) sequence a 500 bp fragment of the mitochondrial 16S rRNA gene as stored at GenBank (accession number AY702652).

DESCRIPTION OF HOLOTYPE

Adult female in non-reproductive state; body robust (Fig. 1), head narrower than body and head width; snout appears truncate in dorsal view (Fig. 2b), and rounded in lateral view (Fig. 2a); maxillary and vomerine teeth present, the latter massive and fused to U-shaped structure (Fig. 2e); choanae rounded; tongue as long as wide, free for about half its length; nares lateral, visible from dorsal view (Fig. 2a,b); canthus rostralis straight; loreal region slightly concave; eye relatively large with horizontal eye diameter almost twice the distance from



FIG. 1. Female holotype of *Leptopelis crystallinoron* in life (ZFMK 73139). Note absence of tympanum. Photo: V. Gossmann.

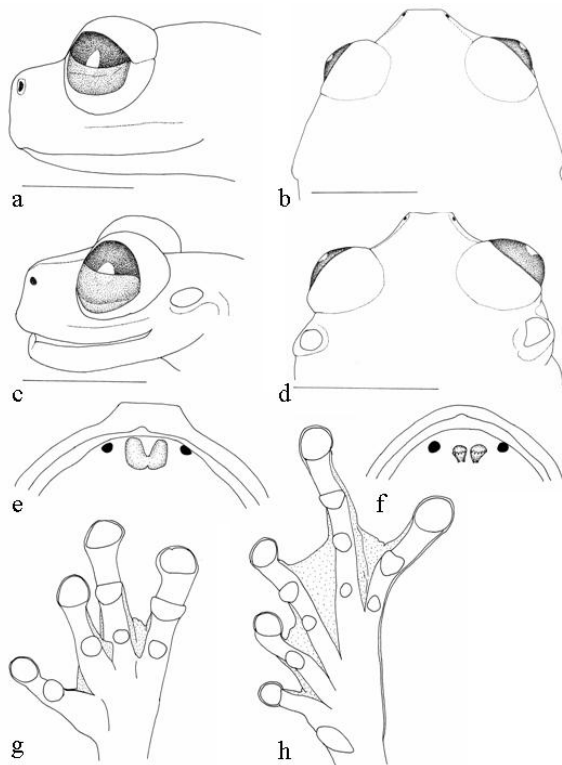


FIG. 2. Morphological aspects of *Leptopelis crystallinoron* (female holotype, ZFMK 73139) and *L. brevirostris* (female, MOR-P578): lateral and dorsal views of head of *L. crystallinoron* (a, b) and *L. brevirostris* (c, d); position and shape of vomerine teeth in *L. crystallinoron* (e) and *L. brevirostris* (f), and ventral views of left hand (g) and foot (h) of *L. crystallinoron*. Scale bar = 1 cm.

nostril to anterior corner of eye; pupil vertical; tympanum absent (Fig. 2a,b), not even hidden; absence from behind thickened skin confirmed by dissection; skin of all surfaces granular (except parts of inner leg and arm), most prominently so at the angles of jaws, and on head and flanks; hind limbs relatively long with tibia length reaching almost half SVL; foot webbing formula 1(0), 2i+e(½), 3i(1) 3e(½), 4i (1) 4e (½), 5(0), all toes with lateral fringes; relative length of toes: I < II < V = III < IV; outer metatarsal tubercle absent, inner well developed, ovoid; rest of sole tubercular; well developed subarticular tubercles at joints of most phalanges of toes, with most distal subarticular tubercle on toe IV and V each slightly bifid; tips of all toes with discs, each about 1.5 times wider than width of adjacent phalange; hand webbing formula 1(½), 2i(1) 2e(½), 3i+e(1), 4 (1), all fingers with lateral fringes; relative length of fingers: I < IV < II < III, Finger I < Finger II when adpressed; outer metacarpal tubercle absent, inner weak, rounded; rest of sole tubercular; well developed subarticular tubercles at joints of most phalanges of fingers, with most distal subarticular tubercle on Finger III and IV each slightly bifid; tips of all fingers with discs, each about 1.5 times wider than width of adjacent phalange.

In life, the holotype (see Lötters *et al.*, 2001: 31) was overall brilliantly green dorsally and creamy white ventrally. Few diffused tan to dark brown markings were present on the back, outer extremities and around the cloacal region. Outer parts of feet and arm were whitish. The lower parts of the flanks had white spots. Discs on toes and fingers had a more clear green than the dorsum. The area around the nares was dark brown. Lips were pale. The iris was bronze with a black ring around it. In preservative, all dorsal surfaces became brownish tan and all ventral surfaces brownish.

Measurements (mm) and ratios. SVL, 56.9; head length from tip of snout to angle of jaws, 20.3; head width at angles of jaws, 25.3; interorbital distance, 7.4; distance between nares, 4.3; distance from nostril to anterior corner of eye, 4.3; horizontal eye diameter, 7.2; tibia length, 25.2; foot length from tip of longest toe to proximal outer metatarsal tubercle, 24.1; hand length from tip of longest finger to proximal outer metacarpal tubercle, 17.2; head length/SVL, 0.4; head length/head width, 0.8; head width/SVL, 0.4; distance from nostril to eye/eye diameter, 0.6; tibia length/SVL, 0.4.

Etymology. The specific name is the Latinized form of the Greek words *krystallinos*, (=crystal) and *oroon* (=mountains), thus referring to the region in which the new species was found, the Monts de Cristal.

DISTRIBUTION AND ECOLOGY

Leptopelis crystallinoron is known only from the type locality in the central Monts de Cristal and thus falls within the recently declared Monts de Cristal National Park. The only specimen available was collected in altered but good standing forest, while active at 1-3 m

above ground during night time. There was apparently no open water in close vicinity. Other species of *Leptopelis* known from the same general area include *L. aubryi* (Duméril, 1856), *L. brevirostris*, *L. calcaratus* (Boulenger, 1906), *L. millsoni* (Boulenger, 1894) and *L. rufus* (Reichenow, 1874).

The female holotype contained numerous yellow ovarian eggs, not ready for oviposition. The stomach was empty. The rectum was completely filled with a brown unidentifiable mass and also contained several (>10) nematodes.

DISCUSSION

The characters that distinguish between members of the genus *Leptopelis* are life style, adult SVL, skin texture, webbing, subarticular tubercles, colour and pattern (e.g. Schiøtz, 1999). We add another character, the absence versus presence of a tympanum. So far, *L. crystallinoron* is the only member of the genus in which a tympanum is absent. In some East African species (e.g. *L. barbouri* Ahl, 1929; *L. karissimbensis* Ahl, 1929; *L. parkeri* Barbour & Loveridge, 1928; *L. uluguruensis* Barbour & Loveridge, 1928) the tympanum may be very small and indistinct but not absent (Schiøtz, 1999).

The new species can readily be distinguished from all other known *Leptopelis* species by a combination of characters which include head wider than long, dorsal snout shape truncate, tympanum absent, granular skin, foot well webbed, toe and finger discs present and green dorsal colour in life (cf. Schiøtz, 1999). Exceptions are *L. brevirostris* from western Central Africa (see Perret 1958) and *L. brevipes* Boulenger, 1906 from Bioko probably a synonym of *L. brevirostris* (Mertens, 1965, but see Frost, 2002). The most striking difference between these two forms and *L. crystallinoron* is the presence (versus absence in *L. crystallinoron*) of a clearly distinct, obliquely placed tympanum (Fig. 2a-d). We examined 45 specimens of *L. brevirostris* from different localities (see Appendix 1) scattered throughout its geographical range (cf. Frost, 2002) including the holotype and material from the Monts de Cristal in Gabon (i.e. the region from which we here describe *L. crystallinoron*). In all of them, the tympanum was well developed. In addition, *L. brevirostris* appeared to be more slender with a less granular dorsum. Another striking difference was the completely different shape of vomerine teeth (Fig. 2e,f). However, more material needs to be examined (especially of *L. crystallinoron*) to confirm the latter differences.

A comparison of sequences each of a 500 bp fragment of mitochondrial DNA of the 16S rRNA gene of the new species and *L. brevirostris* (ZFMK 72065, GenBank accession number AF215447), revealed that they are closely related. The samples compared differed in 14 bp, which equals a substitution level of 2.8 %.

Leptopelis brevirostris is believed to be a snail-feeding specialist (Perret, 1966), and so might be *L. crystallinoron* as is suggested by the presence of massive fused vomerine teeth. However, the stomach of the

holotype was empty and several anatomical adaptations to snail eating (cf. Drewes & Roth, 1981) were absent.

Leptopelis crystallinoron is likely to be endemic to the Monts de Cristal, firstly because it has not been recorded from other regions despite several surveys, and secondly because the Monts de Cristal may represent a regional centre of endemism (e.g. Cribb *et al.*, 1989; Sosef, 1994; Rödel & Pauwels, 2003; own unpubl. data). In contrast, *L. brevirostris* is widely distributed in southern Nigeria, Cameroon, Equatorial Guinea, Gabon, northern Republic of Congo and western Central African Republic (cf. Frétey & Blanc, 2000; Frost, 2002).

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APPENDIX 1

SPECIMENS EXAMINED FOR COMPARISONS *Leptopelis brevirostris* (45 specimens)

GABON: MHNG 2214.14-15, Makokou; IRSNP P757, Tchimbélé, Monts de Christal; IRSNB P662, Moudouma, Massif du Chaillu; MOR P578, Itsiba, Massif du Chaillu.

CAMEROON: MHNG 1545.77, 1545.92, Yaoundé; ZFMK 61305-311, 61313, Mt. Cameroon; MHNG 1545.86, Mt. Manengouba; MHNG 1545.80-85, Nkondjock; MHNG 1545.90-91, Ototomo; MHNG 1545.89, Njazeng; MHNG 2094.23, Nlong; MHNG 1545.78-79, 1545.87, Yungué; MHNG 1545.88, ZFMK 1906, Kribi; MHNG 953.25-26, 993.54-60, Foullassi; RMCA 77-32B-4, SE Cameroon; RMCA 73-18-B-55, Eboga River, Nyona; ZMB 13913 (holotype), Victoria; ZFMK 72065-066, no exact data.