

A NEW SPECIES OF ARBOREAL *LETOPELIS* (ANURA: ARTHROLEPTIDAE) FROM THE FORESTS OF WESTERN KENYA

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A new species of arboreal *Leptopelis* is described from Kakamega Forest, western Kenya. It is a small, brown forest species formerly referred to *L. modestus*, but distinguished by differences in advertisement call and the sequence of the mitochondrial 16S rRNA gene. The specific allocation of certain related populations of *Leptopelis* in East and West Africa is briefly discussed.

Key words: Amphibia, bioacoustics, DNA, systematics, taxonomy

INTRODUCTION

The Kakamega Forest in western Kenya is an isolated forest remnant of the Guineo-Congolean rainforest belt. Its herpetofauna exhibits strong relationships with Central Africa (Köhler *et al.*, 2003). Currently, 27 anuran species are known from the Kakamega Forest and its vicinity (unpubl. data). Among them are two species of the genus *Leptopelis* Günther. Schiøtz (1975) tentatively referred the populations from Kakamega Forest to the terrestrial *Leptopelis bocagii* (Günther, 1864) and the arboreal *L. modestus* (Werner, 1898). The author noted morphological differences in the Kakamega Forest population of *L. bocagii*, which exhibits green instead of the brown dorsal coloration present in other areas. Schiøtz (1975) noted that the sample of *L. modestus* from Kakamega is very similar to *L. modestus* specimens collected by him in Obuda, Nigeria, as well as to specimens from the eastern Democratic Republic of Congo, which were allocated to *L. modestus* by Laurent (1973). Later, Schiøtz (1999) stated that the Nigerian populations are not conspecific with *L. modestus* and argued that East African populations may also be distinct, mainly because such an apparently discontinuous distribution pattern seems unlikely.

Leptopelis modestus was originally described from Cameroon by Werner (1898). The type locality was later restricted to "Buea, Cameroon" by lectotype designation (Perret, 1962). Perret (1962, 1966) considered *L. modestus* a forest species endemic to the southern Cameroon highlands. This view was adopted by Schiøtz (1999), who argued that the name *L. modestus* may refer to more than one species. However, at the same time, Schiøtz (1999) continued to use the name *L. modestus* for the populations from Nigeria and Kakamega Forest, Kenya.

The confusing systematic status of East African *Leptopelis modestus*-like frogs led us to reinvestigate the status of the Kakamega Forest population. We concluded that it represents an unnamed species, which we describe here.

MATERIALS AND METHODS

Specimens examined are deposited at the National Museums of Kenya, Nairobi (NMK), the Zoologisches Forschungsmuseum Alexander Koenig, Bonn (ZFMK) and the Zoologisches Museum Berlin (ZMB).

Field work was carried out in May and July 2004 at Buyangu Hill, northern Kakamega Forest (00°21'20" N, 34°52'40" E, ca. 1650 m above sea level). Adult specimens collected by us were preserved in 70% methanol; the single tadpole collected was stored in 4% formalin. A toe of one adult and the tail tip of the tadpole were clipped and stored in 98% ethanol for genetic analysis.

The terminology and description scheme follow those of Lötters *et al.* (2005). The webbing formula is according to Glaw & Vences (1994). Measurements are in millimetres and were taken as described by Lötters *et al.* (in press) with dial callipers to the nearest 0.1 mm. The snout-vent length is abbreviated SVL. Larval staging follows Gosner (1960). Tadpole body measurements were taken under a stereoscope.

Preserved tissue was used to sequence a 515 bp fragment of mitochondrial DNA, using the 16S rRNA gene; the allocation of the tadpole to the new species was confirmed by comparison of the respective DNA sequences. For methods and primers used see Lötters *et al.* (2004).

In July 2004, we recorded advertisement calls in the field from a chorus of males (recorded male not collected) using a digital Sharp MD-SR70 recorder and a Sennheiser Me-66 directional microphone. Air temperature at approximately 1.0 m above ground was measured with a Greisinger GFTH 95 immediately after recording. Recordings were sampled at a rate of

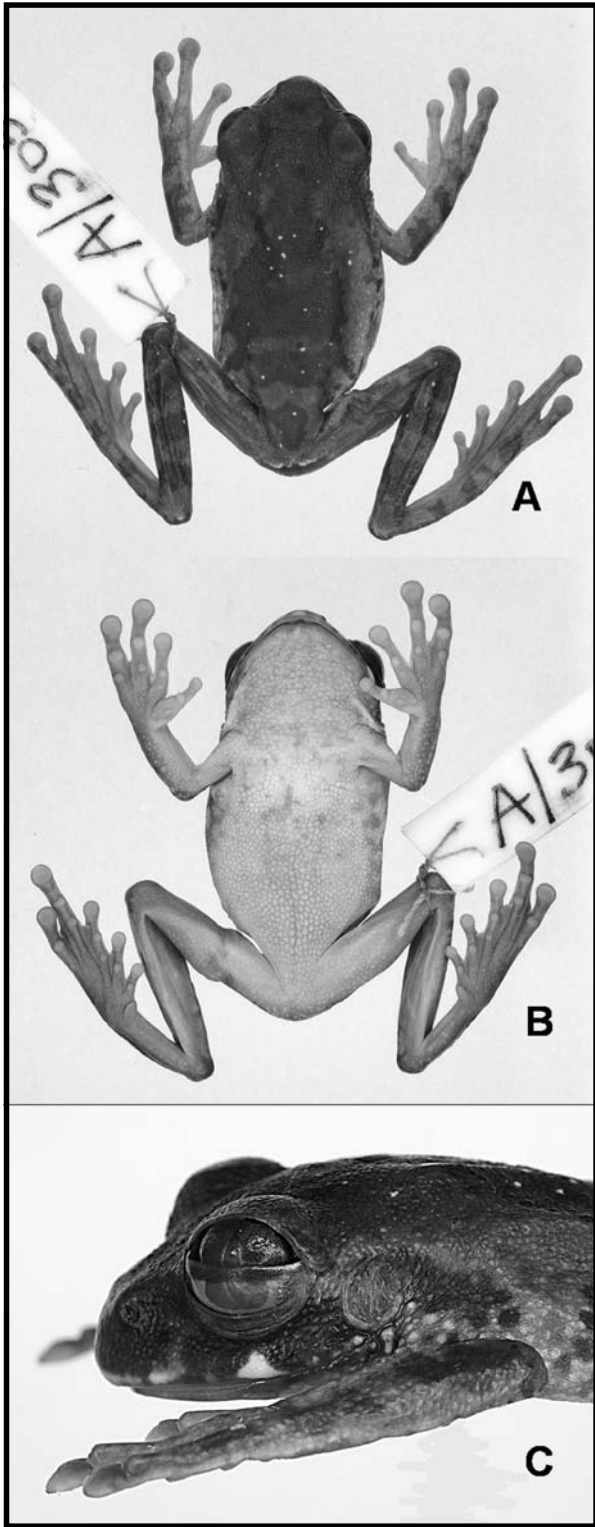


FIG. 1. Dorsal (A) and ventral views (B), as well as lateral view of head (C) of the preserved male holotype of *Leptopelis mackayi* sp. n. (NMK A/3057/1; SVL 34.0 mm). See Schiøtz (1999:271) for colour illustration of a live specimen of *L. mackayi* (as *L. modestus*).

22.05 kHz and 16-bit resolution and analysed with the sound analysis software Cool Edit 96 (Syntrillium Software Corp.). Frequency information was obtained through Fast Fourier Transformation (FFT, width 1024 points). Spectral settings in figures are Hanning window

function with 256 bands resolution. Terminology in call descriptions follows Heyer *et al.* (1990) as extended by Köhler (2000).

SYSTEMATICS

LEPTOPELIS MACKAYI SP. N. (FIG. 1).

Leptopelis modestus (non Werner): Schiøtz, 1975:27 (partim); 1999:269 (partim).

Holotype. NMK A/3057/1, adult male, from Rondo Retreat Centre, Isecheno, 00°12'39" N, 34°46'36" E, 1550 m a.s.l., southern Kakamega Forest, Kakamega District, Western Province, Kenya; collected on 7 November 1994 by K. Howell.

Paratypes. NMK A/1407/1-2, adult and subadult males, NMK A/1407/3, adult female, from Bukura, Kakamega District, Western Province, Kenya, collected on 18 March 1983 by T. Madsen; ZFMK 83304-305, two adult males, from the northern slope of Buyangu Hill, northern Kakamega Forest, Kakamega District, Western Province, Kenya, collected on 18 and 30 May 2004 by B. A. Bwong.

Referred specimens. NMK A/3072/1, male (desiccated), from the Kakamega Forest (no precise locality data), Kakamega District, Western Province, Kenya, collected 1971 by A. Schiøtz; ZFMK 83306, tadpole in Stage 27, from the northern slope of Buyangu Hill, northern Kakamega Forest, Kakamega District, Western Province, Kenya, collected on 3 July 2004 by S. Schick and S. Lötters.

Diagnosis. A small arboreal *Leptopelis* with (1) adult males SVL 29–36 mm; adult female SVL about 40 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 rounded; (5) tympanum distinct, its horizontal diameter slightly less than half the eye diameter; (6) dorsal skin finely granular, with small scattered tubercles; (7) feet one half webbed, hands one fourth webbed; (8) well-developed subarticular tubercles and terminal discs present on all toes and fingers; (9) pectoral glands present in males; (10) colour in life dorsally tan with brown markings; white fleck present below eye; laterally cream with small brown and whitish flecking; ventrally creamy white with few scattered brown flecks; iris bronze with fine black reticulation, eye periphery black; (11) vomerine odontophores distinct, forming two separate short rows, median between choanae; (12) sequence of a 515 bp fragment of the mitochondrial 16S rRNA gene as stored at GenBank (accession number AY940089).

Leptopelis mackayi is most similar to *L. modestus* from Cameroon to which it was formerly referred; the two differ in advertisement call characters and the sequence of the mitochondrial 16S rRNA gene (see below). Furthermore, *L. modestus* usually has lighter dorsal coloration and less tubercular dorsal skin compared to the new species. *Leptopelis fiziensis* Laurent, 1973, a taxon originally described as a subspecies of *L.*

modestus, differs from the new species in its slightly larger size, a somewhat more robust body and a grey vocal sac in life. *Leptopelis christyi* (Boulenger, 1912) from Uganda and the eastern Democratic Republic of Congo differs from the species described herein in its larger size, different dorsal colour pattern, white or yellow finger and toe discs in life and in advertisement call characters (Schiøtz, 1975, 1999; Köhler *et al.*, 2005). Other similar East African *Leptopelis* include *L. kivuensis* Ahl, 1929, and *L. karissimbensis* Ahl, 1929. The latter species inhabits montane grasslands and differs from *L. mackayi* in advertisement call characteristics (Schiøtz, 1975), a smaller tympanum and a more tuberculate dorsum. Like *L. mackayi*, *L. kivuensis* is an East African forest species. The latter mainly differs in having a white vocal sac and reddish iris in life as well as in advertisement call characteristics (Schiøtz, 1975, 1999). The enigmatic *L. fenestratus* Laurent, 1972, from the eastern Democratic Republic of Congo, differs from the new species in displaying full toe webbing (Laurent, 1972). The Central African *L. aubryi* (Duméril, 1856) is similar to *L. mackayi* in size and dorsal coloration, but differs from it in having a red or orange iris in life, smaller discs and in different characteristics of the advertisement call (Schiøtz, 1999). *L. omissus* Amiet, 1992 and *L. calcaratus* (Boulenger, 1906) might both be similar in size and coloration to *L. mackayi*, but differ from it in having a more pointed snout and a calcar on the heel (Amiet, 1991; Schiøtz, 1999).

Description of holotype. Adult male; body moderately robust, head slightly wider than body; snout rounded in dorsal view, rounded in lateral view; vomerine teeth present, in two short rows separated medially, median between choanae; choanae small, round; tongue longer than wide, cordiform, posterior third free; nos-

trils directed laterally, visible from dorsal view; canthus rostralis slightly curved; loreal region concave; eye relatively large with horizontal eye diameter almost twice the distance from nostril to anterior corner of eye; pupil vertical; tympanum distinct, round, its diameter less than half of eye diameter, tympanic annulus present; skin of all dorsal surfaces finely granular, with scattered small tubercles on dorsum; skin on ventral surfaces granular; pectoral glands present; hind limbs relatively long with tibia length reaching almost half SVL, tibiotarsal articulation reaching posterior corner of eye when hind limb adpressed; foot webbing formula 1(0), 2i(1) 2e(0), 3i(2) 3e(1/2), 4i(2) 4e(2), 5(1/2), all toes with lateral fringes; relative length of toes, I < II < III < V < IV; outer metatarsal tubercle indistinct, flat, small, inner well developed, ovoid; plantar surfaces strongly tubercular; well developed, round subarticular tubercles under all toes; tips of all toes bearing round discs, each about 1.5 times wider than width of adjacent phalange; hand webbing formula 1(1/2), 2i(1/2) 2e(1), 3i(2) 3e(1/2), 4(1), all fingers with lateral fringes; relative length of fingers: I < II < IV < III, finger I < II when adpressed; outer metacarpal tubercle absent, inner weak, ovoid; palmar surfaces strongly tubercular; well developed, round subarticular tubercles under all fingers, with distal subarticular tubercles on fingers III and IV each slightly bifid; tips of all fingers bearing discs, each about 1.5 times wider than width of adjacent phalange. For measurements and ratios see Table 1.

In alcohol, dorsal surfaces tan with brown markings consisting of three diffuse transverse bars on forearm, four transverse bars on hind limb, small diffuse scattered flecks on dorsal surfaces of hands and feet, large hourglass pattern on dorsum with triangular blotch in interorbital region extending on to upper eyelid, and two transverse flecks in sacral region; 23 small cream-col-

TABLE 1. Measurements (in mm) and ratios of four adult males and one adult female of the type series of *Leptopelis mackayi* (NMK A/3057/1=holotype).

	NMK A/3057/1 (male)	NMK A/1407/1 (male)	ZFMK 83304 (male)	ZFMK 83305 (male)	NMK A1407/3 (female)
SVL	34.0	34.7	33.6	29.6	40.0
head width	12.7	13.9	13.0	11.2	15.6
head length	11.0	12.9	12.0	10.3	14.4
interorbital distance	5.2	4.1	4.5	4.0	5.2
eye diameter	4.9	5.3	5.5	4.6	6.1
tympanum diameter	2.3	2.5	2.2	2.0	2.9
eye–nostril distance	2.8	3.0	2.7	2.7	3.4
nostril–nostril distance	4.2	3.9	4.0	3.3	4.6
tibia length	16.9	17.4	17.1	16.3	22.0
foot length	14.8	16.2	15.1	13.5	18.1
hand length	11.1	11.2	10.9	9.4	12.8
head length/SVL	0.32	0.37	0.36	0.35	0.36
tibia length/SVL	0.50	0.50	0.51	0.55	0.55
headlength/head width	0.87	0.93	0.92	0.92	0.92
tympanum diameter/ eye diameter	0.47	0.47	0.40	0.43	0.48

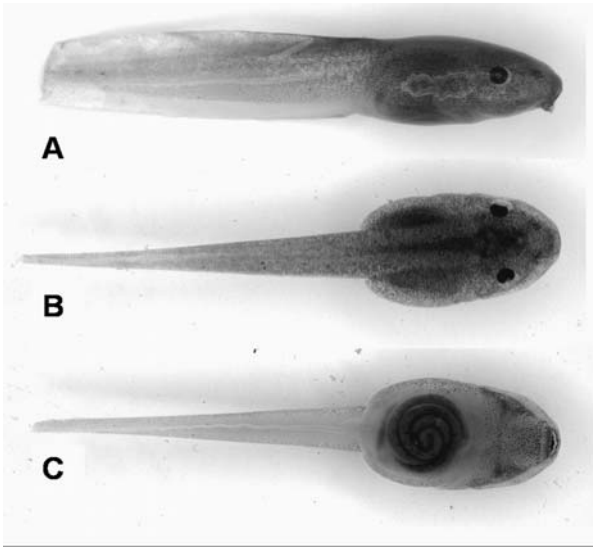


FIG. 2. Lateral (A), dorsal (B) and ventral (C) views (total length 22.4 mm) of tadpole of *Leptopelis mackayi* sp. n. (ZFMK 83306; Stage 27) (tail tip cut off for genetic analysis).

oured spots scattered on dorsum; tympanum tan, surrounded by brown; loreal region dark brown; tip of snout tan; creamy white fleck below eye; flanks tan with irregular brown and white flecks; supracloacal line cream, bordered with brown; all ventral surfaces cream with diffuse indistinct tan flecks on chest, throat and anterior half of belly.

Coloration in life differs only slightly from preserved specimens with ventral surfaces being bluish white and the vocal sac in calling males being blue. A living specimen of *L. mackayi* is figured in colour by Schiøtz (1999:271) under the name *L. modestus*.

Variation. The tympanum appears to be nearly round in most specimens of *L. mackayi*, but may be slightly oval in others. The brown dorsal markings can be more or less distinct. A distinct hour-glass pattern on the dorsum is missing in NMK A/1407/2. However, all specimens of *L. mackayi* exhibit brown flecks and markings. A dark triangular interorbital bar is present in five of the seven specimens. All specimens have a white fleck below the eye. Small creamy white dorsal spots are lacking in NMK A/1407/1-3. In the same specimens, the venter is uniform cream-coloured without brown spots or marbling. Brownish marbling on the throat is most distinct in the two males ZFMK 83304-305. In the same two specimens a white line on the heel is present. In NMK A/1407/1 and 3, the tan dorsum is covered by numerous small but prominent brown tubercles. For variation in measurements and ratios, see Table 1.

Tadpole. The specific allocation of a Stage 27 larva was verified by comparison of the sequence of a 515 bp fragment of the mitochondrial 16S rRNA gene with the respective sequence from adult *L. mackayi*. The larva has a total length of 22.4 mm (Figures 2 and 3; approximately 2 mm of tail tip cut off for tissue sampling), body elongated in dorsal view, ovoid, widest posterior to mid-body; snout truncated. Rounded eyes relatively

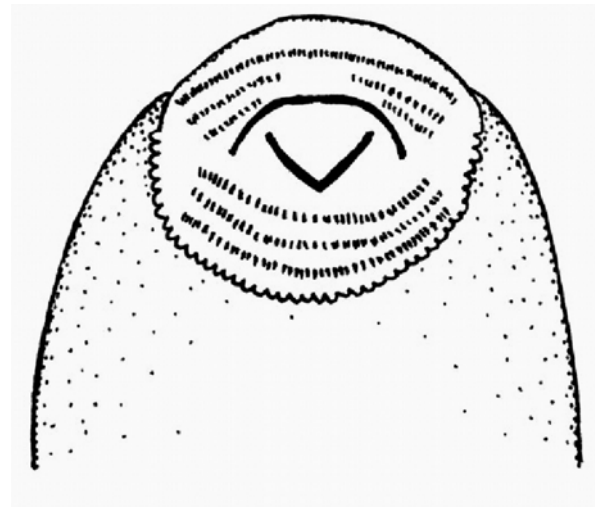


FIG. 3. Schematic drawing of labial tooth rows of tadpole of *Leptopelis mackayi* sp. n. (ZFMK 83306; Stage 27).

large (diameter 0.8 mm), somewhat bulging, separated by distance slightly shorter than shortest distance from eye to tip of snout, positioned laterally and directed dorsolaterally, not visible in ventral view. Nares ovoid (horizontally elongated) and small, positioned dorsolaterally, slightly anterior to half the shortest distance from eye to tip of snout; visible in dorsal and lateral views. In lateral view, body highest at posterior half for about one third of body length; snout rounded. Spiracle sinistral, in length about half eye diameter; attached to body wall, positioned at somewhat anterior and below to half the shortest distance from eye and vent tube, and oriented posteriorly. Tail about two thirds of total length (tail length 14.4 mm), highest at anterior half for about half tail length (maximum tail height 3.1 mm). Caudal musculature equal in height from origin on the body up to half the length of the tail, from there gently decreasing. Fins moderate; dorsal fin

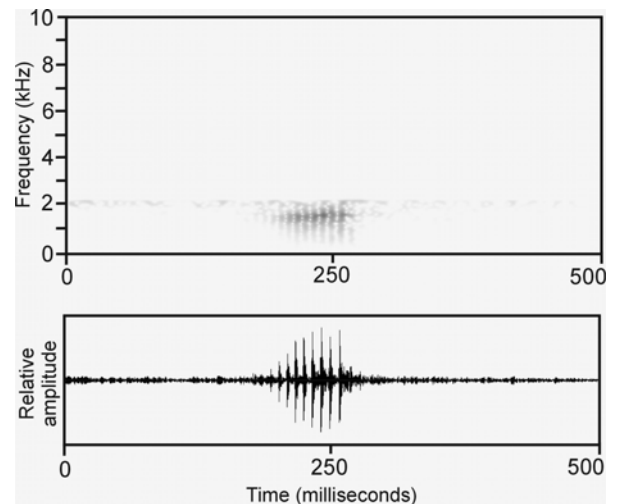


FIG. 4. Sound spectrogram and oscillogram of the advertisement call of *Leptopelis mackayi* sp. n., recorded on 2 July 2004 at Buyangu Hill, Kakamega Forest, Kenya; air temperature 15.0 °C.

not extending onto body, highest at mid-tail and posterior to it; ventral fin almost equally high up to slightly before tip of tail. Vent tube short, dextral, proximally linked to the caudal muscle, directed posteriorly. Oral disc not emarginated ventrolaterally, posteriorly and laterally bordered by a row of heavy, rounded marginal papillae. Submarginal papillae absent. Labial tooth row formula 3(2-3)/3; all rows almost equal in length, occupying almost the entire width of the oral disc. Jaw sheaths serrated, upper inversely U-shaped with a medial indentation, lower V-shaped and shorter.

In preservative, entirely light tan through scattered melanophores, most dense on dorsal surface of body; translucent on posterior venter; fins with fewest melanophores (uniformly arranged); melanophores absent on spiracle. Life coloration was brownish tan; eyes were black.

Few *Leptopelis* tadpoles have been described so far, and these seem not to exhibit great specific differences (e.g. Rödel, 2000; Channing, 2001). The tadpole of *L. mackayi* generally coincides with the characteristics given for the Leptopelinae by Altig & McDiarmid (1999).

Advertisement call. During field work in the Kakamega Forest area since 2001, calls of *L. mackayi* were frequently recognized, mainly during the period of major rainfall between April and July. They always sounded the same. We therefore suggest the vocalizations described below represent the advertisement call of *L. mackayi*. Males usually called from the canopy of small trees. Under these conditions, few individuals could be observed while calling. However, on 2 July 2004 a male (not collected) called in a chorus of conspecific males from a tree trunk approximately 4 m above the ground at the Buyangu area, northern Kakamega Forest. The call (Fig. 4) consists of a short pulsed note repeated at regular intervals and shows the following parameters (range followed by mean \pm standard deviation in parentheses): note duration, 49–92 ms (77.50 \pm 15.96); pulses/note, 6–12 (9.80 \pm 1.99); pulses/second, 120–134 (127.79 \pm 5.06); notes/minute, 8.58–16.31 (13.19 \pm 2.43); frequency range, 350–1800 Hz; maximum call energy at 1507–1787 Hz (1590.56 \pm 81.66). Notes exhibit a moderate amplitude modulation reaching the maximum call energy in the second half of the note. Ten calls of one individual were analysed. The recording was obtained at 21.00 h after a light rain. Air temperature during recording was 15.0 °C.

Apart from advertisement calls, we recorded a single call consisting of a long pulsed note of 474 ms duration. The frequencies and pulse repetition rate of this long note are equal to those observed in short notes. Schiøtz (1975:28) figured a call from the Kakamega Forest, Kenya (as *L. modestus*), having a note duration of approximately 300–400 ms. This note appears to be similar to the single long note recorded by us. Schiøtz (1975, 1999) termed this call a “buzzing call” and doubted that it is a true mating call given the very low

calling activity observed by him. Schiøtz’s (1975, 1999) interpretation is in accordance with our observations, since during regular calling activity we always observed the short notes described as advertisement calls above. The long note figured by Schiøtz (1975) and recorded by us may therefore have a territorial function. Such different call types have already been documented for other species of *Leptopelis* (e.g. Grafe *et al.*, 2000).

Amiet & Schiøtz (1974) and Schiøtz (1999) provided a figure of a call of *L. modestus* from Ongot, Cameroon, which most probably corresponds to the true *L. modestus*. Although numerical parameters are lacking, it is obvious from the figure that the note duration is considerably longer and pulse repetition rate higher compared to the call of *L. mackayi*. In addition, the notes of *L. modestus* are repeated at much shorter intervals, sometimes given as two-note calls. All these characters are lacking in calls reported for *L. mackayi*.

Molecular genetics. The sequence of a 515 bp fragment of the mitochondrial 16S rRNA gene obtained from ZFMK 83304 has been stored at GenBank (accession number AY940089). Comparison of this sequence with the respective one of *L. modestus* from Kodmin, Bakossi Mountains, Cameroon (ZFMK 67976, GenBank accession number AJ437013) revealed that they are less closely related than their morphological similarities would suggest. The samples compared differed in 41 bp (38 substitutions, 3 gaps), which equals a substitution level of about 8 %.

Natural history. The Kakamega Forest area contains highland rain forest at 1500–1700 m a.s.l. Annual precipitation ranges between 1500 and 2000 mm with bimodal rainfall maxima from April to July and September to October. So far, *L. mackayi* is only known from forest habitats. Although this species survives in secondary and disturbed forest, further logging activities may threaten its survival. Because males were heard calling between April and September, i.e. during the rainy season, we assume this period to correspond to the breeding season of *L. mackayi*.

The single tadpole was found in a water-filled puddle with a surface area less than 0.5 by 0.5 m and a depth of approximately 0.2 m in secondary forest. This puddle was part of a very small cascading stream with numerous puddles of different sizes. It seemed that these puddles were recently produced by fast-flowing water, because they did not contain any aquatic vegetation and few organic materials. We were not able to trace additional larvae in the same or nearby puddles. Although males of *L. mackayi* were calling from trees just above this small stream, it seems unlikely that the puddle is equivalent to the oviposition site. More probably, eggs are deposited in the soil and at hatching tadpoles wriggle over the ground to the water to continue their development.

Distribution. The new species is known only from the Kakamega Forest and its vicinity in western Kenya. We will not rule out that it also occurs in adjacent

Uganda and possibly the eastern Democratic Republic of the Congo (see Discussion).

Etymology. The specific name is a patronym for the late Alex Duff-MacKay, curator of Herpetology at the National Museums of Kenya from 1972 to 1995, and one of the pioneer explorers of the East African amphibian fauna.

DISCUSSION

Despite similarities in morphology, Schiøtz (1975; 1999) argued that East African populations and those from Cameroon and Nigeria referred to *Leptopelis modestus* may not be conspecific and that this name possibly includes a complex of cryptic species. We have demonstrated that the Kakamega Forest population tentatively referred to *L. modestus* by Schiøtz (1975; 1999) actually represents a distinct species. The genetic and bioacoustic differences from Cameroonian specimens are obvious.

Laurent (1973) and Schiøtz (1975) assigned East African populations from the eastern Democratic Republic of Congo to *L. modestus*. It seems possible that these populations may also represent *L. mackayi*. However, the genetic and bioacoustic data necessary to verify this hypothesis are lacking and thus the taxonomic status of these populations remains unclear. Due to the close relationship of the anuran fauna of the Kakamega Forest to more western forests, *L. mackayi* may also occur in adjacent Uganda.

Schiøtz (1967) reported *L. modestus* from the Obudu Plateau, Nigeria, but noted that this identification is probably doubtful. Subsequently, Amiet & Schiøtz (1974) and Schiøtz (1975) referred to Nigerian populations as *L. modestus*, whereas Schiøtz (1999) stated that the populations from the Obudu Plateau and high altitudes in Cameroon represent a distinct undescribed form. The dorsal colour pattern exhibited by the preserved specimen from Nigeria figured by Schiøtz (1967:54) is rather similar to that of *L. mackayi*. Furthermore, the figured call of the Obudu population (Schiøtz, 1967:56) appears to be similar to that of *L. mackayi* in duration, pulse rate and frequency. Due to the geographical distance between eastern Nigeria and western Kenya, it seems improbable that Nigerian populations and *L. mackayi* are conspecific. Nevertheless, when referring to the advertisement calls, it is clear that the calls of *L. mackayi* and of populations from eastern Nigeria are both different from calls of *L. modestus* from Cameroon. Although this does not necessarily imply specific distinctness, it is at least highly unlikely that all populations mentioned above are conspecific, especially in light of the great distances between them.

The hitherto unsuspected distinctness of East African and West African populations of the species pair, *Leptopelis modestus* and *L. mackayi* may also hold true for other species complexes currently considered to represent a single widespread taxon. For example, Amiet

(2004) recorded two species of *Leptopelis* from Cameroon, which he referred to as *L. cf. bocagii* and *L. cf. christyi*. In both cases, the author pointed out various differences in populations formerly known of these species. The type locality of *L. christyi* is situated in Uganda, East Africa. Call recordings of *L. christyi* from Uganda (Köhler *et al.*, 2005) differ considerably from Cameroonian call recordings by Amiet (2004) and thus may argue for genetic differentiation of mentioned populations. Concerning sub-Saharan distribution patterns of anurans, an east-west divide at species group level might be more strongly pronounced than currently documented (compare Poynton, 1999). Further studies may possibly discover the presence of more diverse and more endemic anuran faunas in East and West Africa respectively.

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APPENDIX 1

SPECIMENS EXAMINED FOR COMPARISONS

Leptopelis aubryi (12 specimens): GABON: Cap Esterias, ZFMK 73257-258; Barrage de Tchimbélé, ZFMK 73156-157, 73176-177, 73279; Barrage de Kingué, ZFMK 73197; Lambaréné, ZFMK 73127-128; Fougamou, ZFMK 73235-236.

Leptopelis christyi (14 specimens): UGANDA: Semliki National Park: Mt. Ruwenzori, ZFMK 63115, Ntandi, ZFMK 66483; Budongo Forest, ZFMK 64207-212.

Leptopelis fiziensis (18 specimens): DEMOCRATIC REPUBLIC OF CONGO: S-Kivu, Kahuzi-Biega, ZFMK 63935; RWANDA: Nyungwe Forest: Mukina (Kitabi), ZFMK 58769-770, 58798-800, Rwasekoko, ZFMK 58783, Cyamudongo, ZFMK 63912-917; Préf. Gikongoro, Kwagahunga, ZFMK 58687, Mugatamba, ZFMK 58750-751; Gishwati, Gikunbu, ZFMK 63918; UGANDA: Mt. Ruwenzori, Nyakalengijo, ZFMK 63184.

Leptopelis karissimbiensis (4 specimens): RWANDA: NW Gishwati, ZFMK 63919-922.

Leptopelis kivuensis (1 specimen): RWANDA: Kissenje, ZMB 25324 (holotype).

Leptopelis modestus (80 specimens): CAMEROON: Buea, ZMB 28708 (lectotype), 66638 (paralectotype); Kodmin, Bakossi Mountains, 1345 m a.s.l., ZFMK 64408-420, 67922-978; Nguengué, Mt. Nlonako, ZFMK 75456; without precise locality, ZMB 14112, 200046, 66637, 66639-340 (all paralectotypes); EQUATORIAL GUINEA: Makomo, ZMB 20051, 66636 (syntypes of *Hylamabtes rufus* var. *ventrimaculata*).