A New Species Of *Leptolalax* (Anura: Megophryidae) from Borneo

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Abstract.- A new species of frog of the genus *Leptolalax* is described from high elevation in Sabah, northern Borneo. The new species is remarkable for its small size and the large size of its ova.

Key words: Borneo, Amphibia, Salientia, *Leptolalax*

Figure 1. Dorsal view of holotype of *Leptolalax maurus*, new species. The scale line equals 10 mm.

Introduction

Sabah Parks (Sabah, Malaysia) has initiated a program monitoring populations of amphibians at three sites at differing elevations in Kinabalu Park. One of these sites is at Mesilau (1850-1950 m, 6°04'N/ 116°34'E), southeast of the peaks. At this elevation, the vegetation changes from lower montane to upper montane and the climate is temperate in Köppen's system with mean temperature near 16.5° (Kitayama, 1992).

During the course of our initial survey at this site, we collected a gravid female, which we describe below as the holotype of a new species of *Leptolalax*. On our next visit to the same site, we found an additional adult, one juvenile and two metamorphosing individuals of the same species. This is not the first *Leptolalax* to be found at montane elevations in Borneo. *Leptolalax dringi* Dubois was collected at 1800 m on Mt. Mulu, Sarawak (Dubois, 1987), and *L. dringi* and *L. pictus* Malkmus at 1230-1560 m in Sabah (Inger *et al.*, 1995). However, as will be detailed below, the Mesilau species is smaller than any other yet found in Borneo, has larger ova and smaller clutch than females of other Bornean species, and has a distinct coloration.

Material and Methods

The specimens were preserved in 10% formalin after being euthanized and transferred to 70% ethanol after four days. Comparisons with other species of *Leptolalax* were made using the collections of Field Museum (FMNH) and by reference to Dubois (1983, 1987). We use the following abbreviations: SVL, snout-vent length; T, tibia length; HW, head width; HL, head length; TYM, diameter of tympanum.

Leptolalax maurus new species

Material examined.–Holotype: Sabah Parks 2531, an adult female, collected by the authors July 1, 1995, at Mesilau Station, 1860 m, Kinabalu Park, Sabah, in floor litter of oak-chestnut forest (Fig. 1).

Paratypes: FMNH 252425-26, Sabah Parks 2305-06, one male, one juvenile, and two stage 45 metamorphic individuals.

Diagnosis.–A small species of *Leptolalax*, adult female 32 mm, male 26 mm SVL; dorsal and ventral surfaces dark, dorsally without visible pattern, belly with narrow network of small light spots; underside of hind limb dark; a superficial, round pectoral gland.

Description.–Habitus moderately stocky, width of head and body subequal. Snout obtusely pointed, rounded in profile, not projecting; nostril lateral, slightly nearer tip of snout than to eye; canthi distinct, weakly constricted; lores weakly sloping, concave; diameter of eye slightly longer than length of snout; interorbital equal to eyelid, slightly wider than internarial; tympanum visible, slightly more than half diameter of eye; no vomerine teeth. Finger tips

rounded; first finger shorter than second; no subarticular tubercles, but long cornified strips under fingers; a large inner palmar tubercle, a much smaller one at base of fourth finger. Tips of toes like those of fingers; third toe longer than fifth; toes webbed at base only; subarticular tubercles replaced by long strips of cornified tissue; low, oval inner metatarsal tubercle, no outer one; heels overlapping when limbs are flexed. Back with many low, rounded tubercles, homogeneous in shape and size; sides with more elevated, round tubercles; similar but smaller tubercles on limbs; a strong angular supratympanic fold; ventral surfaces smooth; a large superficial, circular, pectoral gland on each side, gland diameter 1.8-2.5 mm.

Color in life almost black without visible pattern dorsally; limbs slightly lighter, with dark crossbars; sides black with light dots, reddish ventrolaterally in one individual; venter black or dark gray brown, with indistinct small light areas; limbs ventrally dark olive brown to black. In preservative dark purplish brown dorsally, without visible pattern; obscure crossbars on calf; sides dark brown, with small light spots (ca. size of finger tips); venter dark brown with narrow network of small light spots on belly; entire underside of hind limb dark brown.

Measurements (mm) of holotype: SVL 31.8, T 15.9, HW 10.7, HL 13.0, TYM 2.7, interorbital 3.3.

Variation.–Male paratype: SVL 26.1, T 12.3, TYM 2.2, interorbital 3.3. Male with very large testis, but no vocal sac opening visible. Newly transformed frog: SVL 20.6, T11.0, HW 7.4, HL 8.2. Metamorphosing individuals in stage 45: 20.4, 22.0, tail lengths 27.0, 18.2, respectively. The light network on the venter of the stage 45 frogs is wider than in the others, but still occupies less than 20% of the total area.

Female with 45 large, white ova in left ovary; ova 1.83-2.33 mm (13 measured).

Etymology.–*maurus*, from *mauros*, Greek, meaning dark.

Comparisons.–The new species differs from all previously known Bornean *Leptolalax* in size, skin surface, coloration, pectoral gland, and size and number of ova. The size range of females of other Bornean species is 36.1-48.3 mm (n=77) and of males 28.7-38.9 m (n=136) (Inger *et al.*, 1995), compared to 31.8 (female) and 26.1 (male) in *L. maurus*. The back and sides of *L. maurus* are covered with homogeneous, round tubercles; in two of the other Bornean species *[L. pictus* and "unspotted Sarawak" (Inger *et al.*, 1995)] the dorsal skin is smooth and in the two others *(L. gracilis* and *L. dringi)* the dorsal tubercles are heterogeneous in size and smaller than those on the sides.

Leptolalax maurus is the darkest of the Bornean species of the genus. It is the only species that is uniformly dark brown on the ventral surface of the head and hind limbs, and the only one in which no dark pattern is evident on some portion of the dorsal surface. It is also the only Bornean species with a conspicuous, superficial, round pectoral gland. A pectoral gland is usually present in the other species, but the skin must be cut and rolled over before the gland becomes visible on the interior surface.

Leptolalax maurus also differs from the three currently recognized species (Dubois, 1983) from Southeast Asia, *L. pelodytoides* (Boulenger), *L. heteropus* (Boulenger), and *L. bourreti* Dubois, in having a very heavily pigmented belly and in lacking distinct dorsal markings. The new species is much smaller than *L. bourreti* [SVL males 36 mm, females 42-45 (Dubois, 1983), but similar to the other two in size.

The enlarged but not yet ovulated ova of *L. maurus* are distinctly white; ova in the same stage of development are yellow in the other Bornean species and in *L. pelodytoides*. The left ovary of *L. maurus* had 45 enlarged ova, compared to 112-210 in *L. gracilis* (n=1), *dringi* (2), *pelodytoides* (1) and *pictus* (2). Mean diameter of 10 large ova in each of the last four species ranged from 1.60±0.027 to 1.78±0.050 mm; in *L. maurus* the mean of 13 ova was 2.0±0.049. The volume of ova in the left ovary (ovum volume, based on mean ovum diameter, times number of ova) for *L. gracilis*, *dringi*, *pelodytoides*, and *pictus* varied from 255.5 to 542.3 mm^3, but only 188.5 mm^3 in *L. maurus*. However, if the cube root of ovarian volume is divided by SVL of females to obtain a relative measure of ovarian volume, there is very little difference among the species; the ratio of cube root of ovarian volume to SVL varies from 0.152 to 0.179 in *L. gracilis, dringi, pelodytoides*, and *pictus* and 0.180 in *maurus*. Although relative reproductive effort measured in this manner is approximately the same in all these species, the division of the material into ova is quite different in *L. maurus*. The enlargement of ova in the high altitude species *L. maurus* is consistent with the general trend in other Bornean anurans. The montane frogs listed by Inger and Stuebing (1992) include a high proportion with enlarged ova: species of *Philautus* and *Pelophryne* with direct development and species of *Ansonia* with normal larval development. Together, species of those three groups compose 50% of the montane frog fauna of northwestern Borneo.

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