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A NEW SPECIES OF RANID FROG FROM LAOS

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ABSTRACT. - A new ranid frog of the genus *Amolops* is described from Laos. The new species is distinguished by its small size, males without gular pouches, presence of vomerine teeth and a tarsal gland, and by tadpoles having a very large number of rows of labial teeth and a divided upper jaw sheath.

KEYWORDS. - Ranid frog, Laos, *Amolops*.

INTRODUCTION

Bourret (1942), in his review of the amphibian fauna of Indochina, reported a few species from Laos. But there has never been any systematic attempt to sample this fauna. It is not surprising, therefore, that a new species of the ranid genus *Amolops* would be discovered during the course of ichthyofaunal sampling. We present a description of this new taxon below. The genus *Amolops* includes about 20 species distributed from northeastern India and Nepal to south-central China to Peninsular Malaysia (Yang, 1991). These species are associated with swift-flowing, rocky streams and the larvae are adapted to clinging to rocks in strong currents by means of a large abdominal sucker. Fortunately, the sample on which the new species is based includes both adults and larvae.

MATERIAL AND METHODS

Specimens were caught by hand and preserved in 4% buffered formalin within a few hours. Adult frogs were transferred to 70% ethanol after several days, but larvae and eggs have remained in formalin. Besides the specimens from Laos, we examined comparative material

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of related taxa in the collections of Field Museum of Natural History (FMNH); these are listed below. Information on some species was obtained from Yang (1991).

We use the following abbreviations: SVL= snout-vent length, T=tibia length, HW=head width at the tympanum, HL=head length measured from the commisure of the jaws to the tip of the snout, TY=horizontal diameter of tympanum, E=diameter of eye, SN=length of snout, F3D=width of disc of third finger, HB=headbody of tadpole, HBL=headbody length of tadpole. We use Altig's (1970) terminology and system for counting labial tooth rows of larvae.

Amolops cremnobatus new species

(Fig. 1)

Material examined. - Holotype. FMNH 252861, 32.2 SVL, adult male; Laos, Khammouan Prov., Nam Phao River, just downstream from border post on Lak Sao/Vinh Road (18°23'N/105°09'20"E); coll. Maurice Kottelat, 19 Mar.1996.

Paratype: FMNH 252862, 33.9 mm SVL, adult male, same data as holotype. Temporarily deposited in Field Museum; to be transferred to an institution in Laos.

Other material: Larvae FMNH 252863 and ova FMNH 252864 collected with the holotype.

Comparative material examined: *Amolops hongkongensis* FMNH 64157 holotype, male, HongKong. Michael Lau collection, no no., 3 larvae, HongKong, 24 Oct.1994. *Amolops larutensis* FMNH 132536, 134539, Malaysia, Selangor, Templer Park. FMNH 172332, Malaysia, Selangor, Simpang Gambir. FMNH 212884, larvae, Malaysia, Selangor, Genting Simpan.

Diagnosis. - A small species of *Amolops* (males 32-34 mm); tarsal gland present; vomerine teeth present; tympanum visible; discs of fingers very wide; males without gular pouch, but nuptial pad present.

Description. - Habitus slender; head wider than trunk. Snout short, almost truncate, weakly projecting, sloping obliquely back to lip in profile; nostril slightly closer to tip of snout than to eye; canthus distinct, very short, constricted; lores weakly oblique, concave; eye diameter longer than snout; interorbital equal to or narrower than eyelid; tympanum distinct, entire rim obvious, less than half diameter of eye; vomerine teeth in small oval groups midway between choanae, 2-4 teeth per group.

Fingers short, first much shorter than second; third 1.3-1.5 times length of snout; discs wide, with circummarginal groove and a sharply defined transverse margin ventrally; disc of first finger about half width that of second; disc of third finger 1.5 times diameter of tympanum; subarticular tubercles conspicuous, supernumerary tubercles present on two outer fingers; narrow, distinct fold of skin on medial edges of second and third fingers.

Discs of toes smaller than those of two outer fingers; fifth toe longer than third; fourth toe only slightly longer than fifth, which reaches distal edge of distal subarticular tubercle of fourth; all toes fully webbed to discs; a narrow fold of skin along median edge of first toe; low oval inner metatarsal tubercle; a small round outer metatarsal tubercle present or absent; a distinct, though partially interrupted glandular tarsal ridge.

Eyelids and entire back behind occiput with small, homogeneous, white spinose granules; an interrupted, glandular dorsolateral fold; sides with low, rounded tubercles; entire venter behind throat, including under side of thighs, coarsely granular; white, conical pustules on rear of thigh near vent.

Color in preservative dorsally and laterally black with irregular, small, light markings (yellowish brown in life); series of short, light bars marking dorsolateral folds; limbs with wide black crossbars dorsally; rear of thigh black with thin light network; ventral surfaces white, with weak black suffusion in one.

Nuptial pad velvety, gray, covering entire dorsal and medial surfaces of first finger from base of finger to level of distal edge of subarticular tubercle. Vocal sac openings near corners of mouth; both males with weakly stretched and wrinkled skin at angles of throat, but without pouches such as occur in, e.g., *Amolops chunganensis, Huia nasica,* or *Meristogenys orphnocnemis*.

Measurements (mm), holotype first: SVL 32.2, 33.9; T 19. 19.6; HW 10.6, HL 11.4, 12.4; TY 1.7, 1.9; E 4.9, 5.2; SN 4.8, 4.6; F3D 2.7, 2.8.

Tadpole. - These tadpoles are assigned to this species because they have the diagnostic features of larval *Amolops,* because they were collected with the types, which were the only frogs seen at this site, and because they do not match larvae of any other known species of *Amolops.*

HB oval, broadly rounded with weak constriction anterior to line through nares; HB width 0.57-0.58 of HBL, widest anterior to eyes; HB flat below, with large abdominal sucker. Eyes dorsolateral, pointed laterad; nares dorsolateral, closer to eyes than to tip of snout;

Fig. 1. Holotype of *Amolops cremnobatus*. Bar equals 5 mm.

interorbital equal to internarial. Spiracle low on side; tube free of body wall. Tail lanceolate, margins subparallel, tapering gradually in distal third to narrowly rounded tip; muscle deeper than fins in proximal three-fifths; dorsal fin origin behind HB, origin of ventral fin distal to that of dorsal; tail length 0.64 of total, tail depth 0.21 of tail length. HB without spinules. Glands postocular 9-16, laterally at end of body 1, no glands ventrally or in fins.

Oral disc as wide as HB, ventral; labial teeth 9-10(5-9, 5-10)/6(1-2, 1-3); denticles of A1 small, others subequal within and between rows; A1 at margin of upper lip, short, about one-third length of A2; A2<A3<A4. Groove between upper lip and snout confined to lateral thirds of lip; papillae short, thick, in single row; papillae in lateral two-thirds of upper lip, across entire lower lip. Jaw sheaths with outer surface smooth; upper sheath divided, gap between black halves about equal to depth of keratinized portions; lower jaw sheath in single piece; jaw sheaths with fine serrae, 25-26/45.

Color (in preservative) of HB black dorsally and laterally, white ventrally without spots; caudal muscle black proximally, with increasing amounts of lighter mottling distally, with white strip ventrally; fins very heavily dusted with melanophores, almost black.

HBL (stages 28-31) 18.3-19.6 mm, total length 49.0-50.5 mm.

Eggs. - Non-pigmented ova were found adherent to the substrate adjacent to the tadpoles and frogs; we assume these ova belong to this species. Removed from the gelatinous capsule, the ova measured 3.3-3.6 mm. The diameter with the capsule measured 4.3-5.0 mm.

Ecological notes: All specimens were collected at a clear, rocky stream in disturbed evergreen rain forest. The specimens were on the wet rock face of a waterfall (Fig. 2) with the water column 20-30 cm from the rock. The bottom of the waterfall was about two meters below

Fig. 2. Type locality of *Amolops cremnobatus.*

the attachment site of tadpoles. All specimens, adults, tadpoles, and ova, were obtained within an area less than 2 m sq. Eggs were disposed in irregular, vertically elongated patches, about 5-10 cm long. Several patches, arranged parallel to one another, were grouped to form several clusters, which we assume represented separate clutches. While ova were being removed from the rock, several adults crawled upwards on the rock face. Only two were preserved.

Etymology. - Specific name *cremnobatus* from *kremnobates* (Gr.), meaning frequenter of steep places, referring to the steep waterfall from which specimens were collected.

Comparisons. - According to Yang (1991) only three other species of *Amolops* have a distinct glandular ridge under the tarsus: *A. hainanensis* (Boulenger), *A. hongkongensis* (Pope & Romer), and *A. torrentis* (Smith). *Amolops cremnobatus* also resembles these three species in having very wide discs on the fingers, but differs from all three in having a distinct, though interrupted, dorsolateral fold and in having vomerine teeth. *Amolops cremnobatus* further differs from *A. hainanensis* in having spinose pustules on the back and the venter relatively smooth. Larval *A. cremnobatus* differ from those of *A. hainanensis* (Boulenger, 1899; Liu et al., 1973) in having many more rows of labial teeth (9-10/6 versus 5/3) and in having a divided upper beak. In coloration, *A. hainanensis* (Boulenger, 1899; Liu *et al.*, 1973) and *A. cremnobatus* are very similar.

Amolops cremnobatus is smaller than *A. hongkongensis* (male 41.7 mm) and is more slender (HW/SVL 0.32-0.33 in *A. cremnobatus* and 0.39 in *A. hongkongensis*›. In addition, *A. cremnobatus* differs from *A. hongkongensis* in its sharply defined tympanum (partially obscured by the skin and with hidden rim in *A. hongkongensis*), dermal folds on the second and third fingers (absent in *A. hongkongensis*), and spinose granules on the back (smooth, round tubercles in *A. hongkongensis*). The tadpoles of *A. hongkongensis* differ strikingly from those of *A. cremnobatus* in having far fewer rows of labial teeth [4(2-4)/3(1)], the upper jaw sheath undivided, and a large number of glands ventrally near the end of the body.

Amolops cremnobatus is similar to *A. torrentis* in size (male *A. torrentis* 29-30 mm), but differs from that species in having more extensive webbing [fourth toe of *A. torrentis* with one phalanx free according to Smith (1923)], spinose instead of smooth tubercles on the back, and both nuptial pads and vocal sacs (absent in males of *A. torrentis*). The tadpole of *A. torrentis* has a divided upper jaw sheath (Liu *et al.*, 1973) as does the larva of *A. cremnobatus*, but tadpoles of the two species differ in number of labial tooth rows [only 5/3 in *A. torrentis* (Liu *et al.* 1973)] and in ventral glands of the body (present only in *A. torrentis*).

Amolops cremnobatus is similar to *A. larutensis* in size, habitus, and general color pattern, but *A. larutensis* has more light color on the back, lacks the dense spinules on the back, has narrower finger discs, and lacks dorsolateral folds.

The large number of labial tooth rows (9-10/6) of larval *A. cremnobatus* is one of the distinctive characters of this species. Other larval *Amolops* that approach, but do not equal, the counts of *A. cremnobatus* include *A. afghanus* (8/3), *A. chunganensis* (7/3), *A. larutensis* (8/5), *A. lifanensis* (7/3), and *A. loloensis* (7/3). In all of these other tadpoles, the upper jaw sheath is not divided and glands are present in the posteroventral region. (Information on *A afghanus, A. lifanensis* and *A. loloensis* from Yang, 1991.)

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