

## RECORD OF THE LITTLE-KNOWN *RANA NIGROTYMPANICA* DUBOIS, 1992 (AMPHIBIA: RANIDAE) FROM NORTHERN LAOS

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(with three text-figures)

**ABSTRACT.**– *Rana nigrotympanica* is a poorly known species that was originally named based on a literature review rather than on specimen examination. Here we refer to this species 12 male specimens from northern Laos, near the type locality in Yunnan, China, and supplement the original description using the Laos specimens. This is the first report of *R. nigrotympanica* outside of China.

**KEYWORDS.**– Laos, China, amphibians, taxonomy, *Rana nigrotympanica*.

### INTRODUCTION

Liu and Hu (1959, 1961) reported an adult female frog and tadpoles from Yunnan, southern China, as *Rana varians* Boulenger, 1894, a species with type locality of Palawan, Philippines. Dubois (1992) doubted this identification and named *Rana nigrotympanica* as a new species based on Liu and Hu's (1959, 1961) accounts of *R. varians*. Dubois (1992) referred the diagnosis and description of the new species to the text accounts of *R. varians* provided by Liu and Hu (1959, 1961) and Fei et al. (1990) and designated the holotype to be the adult female from Mengyang, Yunnan illustrated as a line drawing in Liu and Hu (1959, 1961).

To our knowledge, new data have been published for only two additional adult specimens of *R. nigrotympanica*, both females from Yunnan (Yang, 1991; as *R. varians*). Fei (1999) reported the species (as *Hylarana nigrotympanica*) from localities across southern China, but did not provide specimen information to support this range. Zhao and Adler (1993) questioned the status of

*R. nigrotympanica* and chose to not include it as part of the Chinese amphibian fauna. Clearly this species is poorly known.

Here we supplement the original description of *R. nigrotympanica* using 12 male specimens collected from northern Laos, near the type locality in Yunnan. These Laos specimens represent the first record of the species outside of China.

### MATERIALS AND METHODS

Specimens were caught in the field by hand, preserved in 10% buffered formalin and later transferred to 70% ethanol. Tissue samples were taken by preserving pieces of liver in 95% ethanol before the specimen was fixed in formalin. Specimens were deposited in the Field Museum of Natural History (FMNH). Measurements were made with dial calipers to the nearest 0.1 mm. Abbreviations used are: SVL = snout-vent length; HDL = head length from tip of snout to rear of the jaws; HDW = maximum head width; SNT = snout length from tip of snout to anterior

corner of the eye; EYE = diameter of the exposed portion of the eyeball; IOD = interorbital distance at narrowest point; TMP = maximum diameter of tympanum; TIB = tibia length; IMT = length of inner metatarsal tubercle.

### SYSTEMATICS

*Rana nigrotympanica* Dubois, 1992

*Rana (Sylvirana) nigrotympanica* Dubois, 1992: 326, 341.

*Rana varians* Liu and Hu, 1959: 518; Liu and Hu, 1961: 201; Yang, 1991: 159.

*Hylarana (Hylarana) varians* Fei, Ye and Huang, 1990: 139-141, 232-234.

*Hylarana (Hylarana) nigrotympanica* Fei, 1999: 172.

**Material Examined.**— Laos, Phongsaly Province, Phongsaly District, Phou Dendin National Biodiversity Conservation Area, hilly evergreen forest, coll. B. L. Stuart and H. F. Heatwole: FMNH 258269, 258352-55, near Nam Khang River, near 22°09'04"N 102°12'19"E, 600 m elev., 12-14 Oct.1999; FMNH 258351, near Nam Ou River, 22°05'38"N 102°12'50"E, 600 m elev., 07 Oct.1999; FMNH 258356-57, near Nam Khang River on Nam Kaw stream, near 22°09'39"N 102°11'07"E, 600 m elev., 15 Oct.1999; FMNH 258358-61, confluence of Nam Ou and Nam Sa Rivers, 22°05'31"N 102°06'19"E, 600 m elev., 18-21 Oct.1999 (figs. 1-2).

**Description (composite of 12 males).**— Habitus slender; head narrow, longer than wide; snout obtusely pointed in dorsal view, projecting beyond lower jaw, round in profile, slightly depressed from level of nostril to tip of snout; nostril slightly closer to tip of snout than eye; canthus dis-

tinct, slightly constricted behind nostrils; lores concave and oblique; eye diameter 72-89% the snout length; interorbital distance less than or greater than width of upper eyelid; pineal body visible or not visible; distinct, round tympanum, 68-82% the eye diameter, not depressed relative to skin of temporal region; vomerine teeth on two oblique ridges, about equal in distance from each other as to choanae; tongue deeply notched posteriorly, free for approximately two-thirds its length; vocal sac opening at corner of mouth; no gular pouch.

Tips of outer three fingers slightly expanded, tips of outer two fingers with circummarginal grooves; relative finger lengths  $II < IV < I < III$ ; one subarticular tubercle on fingers I and II, two subarticular tubercles on fingers III and IV; supernumerary tubercle at base of all four fingers, that on finger I much elongated; two palmar tubercles large, oval, in contact; velvety nuptial pad material covering bulbous structure formed by hypertrophied muscle on medial surface of forearm, extending onto dorsal and medial surface of finger I to the level of the distal edge of the subarticular tubercle; forearm robust.

Tips of all toes expanded, with circummarginal grooves, toe discs larger than finger discs; toe III shorter than toe V; toes I, II and V fully webbed to base of discs; preaxial side of toe III webbed to distal subarticular tubercle, postaxial side of toe III webbed to base of disc; toe IV fully webbed to distal subarticular tubercle with narrow extension to base of disc; heels overlapping when legs are held at right angles to body; tibia length greater than foot length; elongate, oval inner metatarsal tubercle; large, round outer metatarsal tubercle.



Figure 1. *Rana nigrotympanica* from Phongsaly Province, Phongsaly District, Laos, in life.

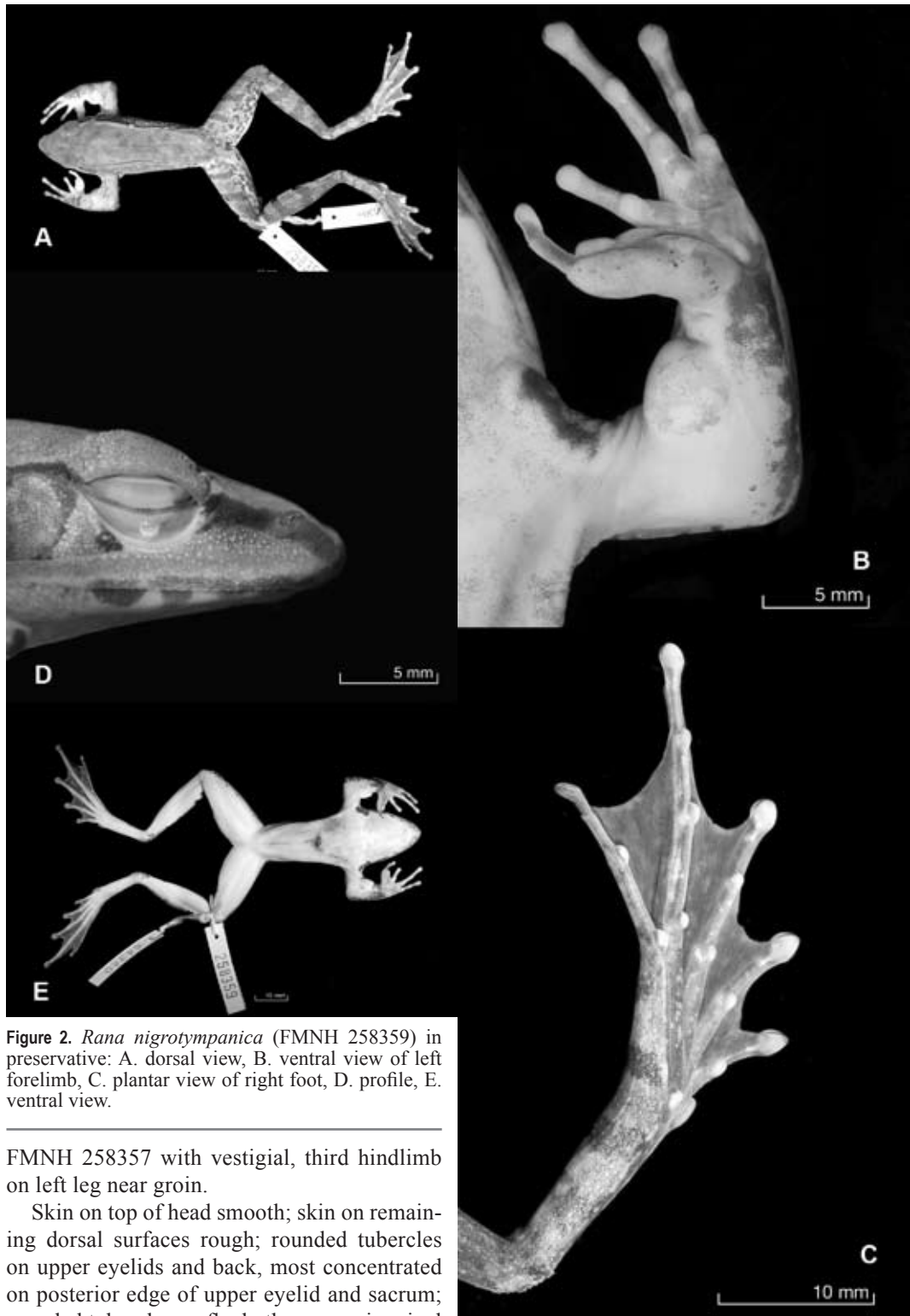


Figure 2. *Rana nigrotympanica* (FMNH 258359) in preservative: A. dorsal view, B. ventral view of left forelimb, C. plantar view of right foot, D. profile, E. ventral view.

FMNH 258357 with vestigial, third hindlimb on left leg near groin.

Skin on top of head smooth; skin on remaining dorsal surfaces rough; rounded tubercles on upper eyelids and back, most concentrated on posterior edge of upper eyelid and sacrum; rounded tubercles on flank, those near inguinal region larger and more ovoid; tubercles forming longitudinal ridges on dorsal surface of

forearm and hindlimbs; distinct dorsolateral fold from rear of eye to sacrum; elongate rectal

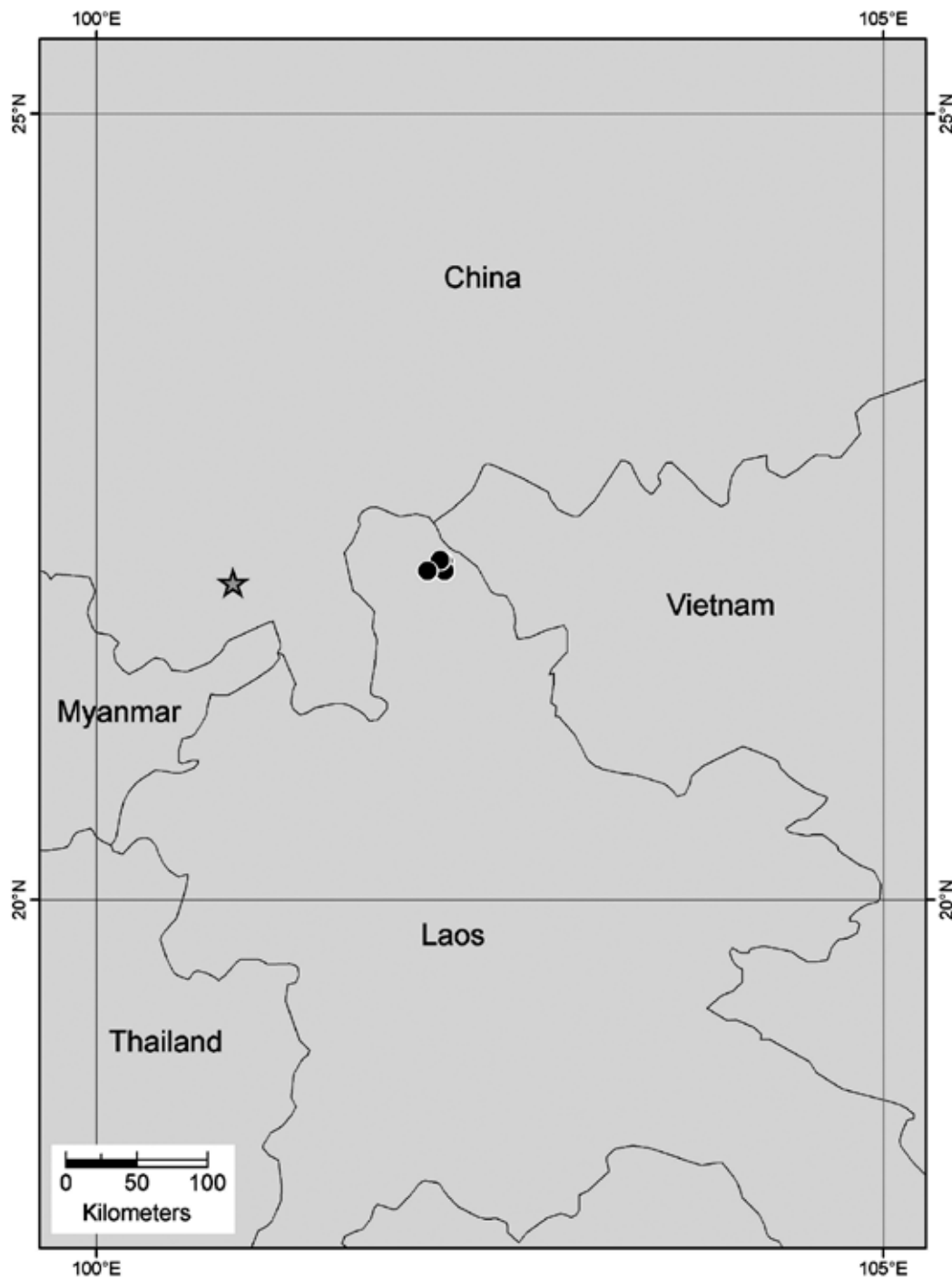


Figure 3. Map showing type locality (star) of *Rana nigrotympanica* at Mengyang, Yunnan, China, and new localities (circles) of specimens from Phongsaly Province, Phongsaly District, Laos.

gland above insertion of forearm; large, rounded humeral gland near corner of throat; ventral surfaces smooth; posterior surface of thigh

granular; fine, whitish spinules on all upper surfaces and underside of feet, those on flank concentrated on tubercles.

Measurements summarized in Table 1.

**Colour in life.**— Upper parts reddish-brown, with olive-gold flecking on back; canthal streak black, bordered below by yellow streak; upper and lower lip cream with grey or black spots; upper one-fifth of iris gold, lower four-fifth reddish-brown; grey spot at postero-ventral margin of eye; dark brown (fading to grey at night) tear drop-shaped marking around tympanum, from below dorsolateral fold to posterior of tympanum above forearm; rectal gland yellow; broad, black streak from base of palm to elbow; flank cream or grey with olive-gold wash; greyish-brown crossbars on upper surface of limbs; posterior surface of thigh greenish-yellow with black marbling; toe webbing dark grey with light brown marbling.

**Colour in preservative.**— Dorsum, dorsal surface of limbs, and ventral surface of hand greyish-brown; canthal streak black; upper and lower lip grey or brown, sometimes with black spots; black spot at postero-ventral margin of eye;

black, tear drop-shaped marking around tympanum, from below dorsolateral fold to posterior of tympanum above forearm; broad, black streak from base of palm to elbow; nuptial pad material cream; flank greyish-brown, darker than back; black, oblique streak on flank slightly posterior to forearm; black spots sometimes on flank; inguinal region cream; throat and chest with dark grey or brown wash or spotting, belly and ventral surface of limbs cream; humeral gland black; distinct black or dark brown crossbars on upper surface of limbs; black spots continuous with crossbars at border of dorsal and ventral surface of tibia; ventral surface of foot dark grey or brown; toe webbing dark grey or brown; posterior surface of thigh cream with black marbling; black spot on vent.

**Distribution and Ecology.**— The Laos localities are approximately 127-137 km straight-line distance from the type locality of Mengyang, Yunnan, China (Fig. 3). Specimens were collected in Laos at 600 m elevation in hilly evergreen forest on and under leaf litter away from streams and on soil and rocky banks of swift streams. The species was frequently encountered day and night. For example, on the Nam Kaw Stream on 15 October 1999 at 2030 h, more than 50 individuals, including an amplexing pair, were observed diving into the water from a 10 m long exposed rocky mid-stream bar.

**Table 1.** Measurements of *Rana nigrotympanica* Dubois, 1992. Data for the holotype female taken from Liu and Hu (1959; as *R. varians*). Data for adult males taken from new Laos specimens reported in this paper. Abbreviations are defined in the text.

Measurement	Holotype female (Yunnan)	Adult males (Laos)
	n = 1	range; mean ± S.D. n = 12
SVL	61.0	51.0-59.3; 55.0 ± 2.7
HDL	22.1	18.4-21.1; 19.9 ± 0.8
HDW	18.9	15.7-17.9; 16.8 ± 0.7
SNT	8.0	7.2-8.7; 8.2 ± 0.4
EYE	8.4*	6.0-6.8; 6.5 ± 0.3
IOD	4.3	4.0-5.0; 4.7 ± 0.3
TMP	5.2	4.5-5.5; 4.9 ± 0.3
TIB	38.0	28.4-33.5; 31.4 ± 1.5
IMT	2.3	2.1-3.0; 2.5 ± 0.2
	n = 1	range; median n = 12
HDL:HDW	1.17	1.15-1.22; 1.19
SNT:HDL	0.36	0.39-0.42; 0.41
TMP:EYE	0.62*	0.68-0.82; 0.77
EYE:SNT	1.05*	0.72-0.89; 0.80
TIB:SVL	0.62	0.54-0.60; 0.58

\* Eye diameter might have been measured differently by Liu and Hu (1959) and the present authors.

## DISCUSSION

The Laos specimens fully agree with the original description by Liu and Hu (1959; as *R. varians*), except in the relative lengths of toes III and V, eye diameter, and presence of spinules. Liu and Hu (1959) stated that toes III and V were equal in length, but in the Laos specimens, toe III is shorter than toe V by a distance equal to about half the length of the toe III disc. The eye diameter provided by Liu and Hu (1959) is relatively much larger than that of the Laos specimens (for example, it exceeds the snout length; Table 1), but this is a “soft measurement” that is taken differently by different workers and is usually not explicitly defined. The presence of spinules in the Laos males might be a male secondary sexual characteristic, which would explain why they were not mentioned in the original description of the Yunnan female. Other species of ra-

nid frogs are known to have spinules in males, but few or none in females (Bain and Stuart, in press).

Previous descriptions in the literature on males of this species are brief and uncertain in origin. Liu and Hu (1961) and Yang (1991) stated that males have internal vocal sacs, a nuptial pad on finger I and a coarse, muscular forearm. Fei (1999) mentioned only the internal vocal sacs and nuptial pad on finger I. The coarse, muscular forearm reported by Liu and Hu (1961) and repeated by Yang (1991) might refer to the distinct bulbous structure covered by nuptial pad material on the forearm that was observed in the Laos males. However, the source of these data on males is unclear, as Liu and Hu (1961) and Yang (1991) provided voucher information and measurements only for females. Despite the lack of explicit description of the distinct bulbous structure covered by nuptial pad material on the forearm or the humeral gland, our observations on the Laos males are not inconsistent with these earlier statements on male secondary sexual characteristics.

*Rana nigrotympanica* may be closely related to *R. cubitalis* Smith, 1917, a species with type locality "Doi Nga Chang," northern Thailand. The descriptions of the two species generally agree, notably in that males of *R. cubitalis* have "a large rounded gland on the inner side of the elbow" (Smith, 1917: 278). However, Smith (1917) reported that the type and paratype males of *R. cubitalis* have gular pouches (absent in *R. nigrotympanica*) and SVL 66-68 (51.0-59.3 in *R. nigrotympanica*). Further study on the relationship of these two species is warranted.

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