

**A NEW TOAD OF THE GENUS *ANSONIA*
(AMPHIBIA, ANURA, BUFONIDAE)
FROM SUMATRA, INDONESIA**

Djoko T. Iskandar¹ and Mumpuni²

¹Division of Ecology and Biosystematics, Department of Biology,
Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung 10,
Jalan Ganesa, Bandung 40132, Indonesia.

Email: iskandar@bi.itb.ac.id

²Museum Zoologicum Bogoriense, Research and Development Center for Biology,
Indonesian Institute of Sciences, Jalan Raya Jakarta Bogor km 46, Cibinong 16911, Indonesia.

Email: mzb@indo.net.id

(with two text figures)

ABSTRACT.—*Ansonia glandulosa* is described as a new species, and represents a new record of the genus from the island of Sumatra. *A. glandulosa* is a large species, diagnosed in having enlarged rounded tubercles arranged in pairs of rows extending from snout through the interorbital space to the rear end of head and another pairs extending from the scapular area curving through dorsolateral area and ending at the sacrum. The dorsal skin is covered with rounded tubercles. The finger tips are not expanded. The occurrence of this genus in the flat area in eastern Sumatra and not along the Barisan mountains ridge raises the possibility that *Ansonia* is a late invader, arriving around the Pleistocene, crossing the Bangka-Belitung Karimata land bridge to reach Sumatra.

KEY WORDS.— Amphibia, Bufonidae, *Ansonia glandulosa*, new species, biogeography, Sumatra, Indonesia.

SARI.— Kodok *Ansonia glandulosa* dipertelakan di bawah ini sebagai jenis baru berasal dari daerah Sumatra Selatan, dan merupakan catatan baru untuk marga ini di pulau Sumatera. Jenis ini merupakan anggota yang berukuran relatif besar. Ia dapat dengan mudah dibedakan dari kerabat dekatnya dengan memperhatikan adanya sepasang alur kulit oerkelenjar yang terbentang dari ujung moncong hingga ke bagian belakang kepala. Sepasang alur kulit berkelenjar lainnya terbentang dari daerah belikat dan melebar ke daerah sisi atas badan dan berakhir di daerah pinggul. Kulit punggungnya berbintil membulat dan ujung jari tangannya tidak melebar. Keberadaan marga ini di daerah hutan dataran rendah di sebelah Timur Sumatera dan tidak pada Pegunungan Bukit Barisan mengisyaratkan bahwa marga *Ansonia* tiba di Sumatera melalui jalur Bangka Belitung Karimata dari Kalimantan pada zaman Pleistosen.

KATA KUNCI.— Amphibia, Bufonidae, *Ansonia glandulosa*, jenis baru, biogeografi, Sumatera, Indonesia.

INTRODUCTION

Sumatra is a large Sundaic Island which has not been explored intensively since the work of van Kampen (1923). However, the records of Iskandar and Colijn (2000) increased the size of the known fauna of the island by 50%, and about

102 species have been recorded from Sumatra, some of which await formal description (Inger and Voris, 2001). A considerable number of genera that have been recorded from the Malay Peninsula and Borneo, have not yet been reported from Sumatra.

In 1998, we received a single example of a bufonid with relatively slender limbs from southern Sumatra for identification. Upon dissection, it was found to be an adult male. It additionally shows no parotoid gland, characteristic of the genus *Bufo* and subarticular tubercles at the base of each toe not enlarged, as is characteristic of members of the genus *Leptophryne*, leading us to place it in the genus *Ansonia*. Unfortunately, as it is represented by a single specimen, we are reluctant to dissect its skull to examine the quadratojugal and parasphenoid bone in order to confirm its generic position. The genus itself is widely distributed in south and south-east Asia, the greatest diversity being in Borneo and the Malay Peninsula, the genus being unrepresented in other Sundaic regions (Inger, 1960; Frost, 1985; Inger and Stuebing, 1997; Iskandar and Colijn, 2000). This specimen represents the first record of the genus from Sumatra. The Sumatran *Ansonia* representative is a large species, believed to be closely related to species known from Borneo such as *A. anotis*, *A. fuliginea*, *A. leptopus*, *A. longidigita*, *A. torrentis* and *A. spinulifer* or to species known from Peninsular Malaysia such as *A. penangensis*. Although morphologically close to *A. leptopus* and *A. longidigita*, the presence of a continuous pair of glandular ridges between the eyes, combined with a similar one along the sides are not recorded in any species of the genus, supports our conclusion that this specimen represents an undescribed species.

Measurements that follow Inger et al. (2001), include SVL = snout-vent length; UA = Upper arm length; LA = lower arm length; Palm = length of proximal edge of outer palmar tubercle to tip of third finger; Fe = Femoral length; TIB = Tibial length; TAR = Tarsal length; Foot = length of proximal edge of inner metatarsal to tip of fourth toe; HL = Head length; HW = Head width; SNL = Snout length; EN = Eye to nostril distance; NT = Nostril to tip of snout; IO = Interorbital distance; EYE = Eye diameter and TYM = Tympanum diameter.

Materials referred in this study are housed in Muzium Zoologicum Bogoriense, Research and

Development Center for Biology, Indonesian Institute of Sciences, Cibinong (MZB).

SYSTEMATICS

ANSONIA GLANDULOSA NEW SPECIES (FIG. 1)

Holotype.- MZB Amph. 4239, an adult male from Napal Licin, Kabupaten (= District) Musi Rawas, South Sumatra (02°43'S; 102°22'E) by Andiek and Adjat, 23-IX-1998.

Etymology.- Specific name from *glandula* (L.) noun in apposition meaning gland, referring to the glandular ridges at the interorbital and head region as well as the paired rows of glandular ridges on the body.

Diagnosis.- *Ansonia glandulosa* is distinguished from congeneric species in having a pair of rows of interorbital, rounded tubercles extending to tip of snout from occiput and another glandular ridge beginning at the scapular region passing along the sides of the body, fourth toe webbed at base, three phalanges free of webbing, fifth toe webbed at base, tympanum exposed. A light spot is present between the scapulae.

Description.- A medium or large sized species of *Ansonia*, male SVL 39.67 mm, females unknown but presumably larger, habitus slender, head about as wide as long, tympanum small, oval in diameter, eye moderate, slightly smaller than snout length, snout triangular, canthus rostralis distinct, nostril much closer to tip of snout than to eye, lower jaws not extending to tip of snout. Fingers slender and smooth, tips rounded, not expanded and much narrower than tympanum diameter, first finger longer than eye diameter, about as long as second, third longest, fourth finger longer than second, subarticular tubercles barely distinct. A pair of rows of rounded tubercles extending from occiput, passing interorbital area to tip of snout.

Toes webbed at the base, reaching base of disk of first two, third toe with one phalange free of extensive webbing, fifth toe with one and a half phalanges free of web, fourth toe with three phalanges free of extensive webbing, subarticular tubercles obscure, tarsal tubercles small, indistinct, no tarsal ridge. All meristic measurements of the holotype are in Table 1.

Skin above covered with rounded tubercles, no parotoids, a pair of large rounded tubercles extending from occiput to tip of snout, ventral surfaces coarsely granular. Along the body, a pair of rows of rounded tubercles, extending behind the interorbital tubercle rows, from behind head, passing through the scapular region along the dorsolateral margin and ending in the sacral area, not continuing to inguinal region.

Secondary sex characteristics: There is a series of black tubercles beneath the lower jaw, but no distinct spines. The specimen has a subgular vocal sac with one long slit-like opening, located on the left side of the mouth, nuptial pad is a mass of small dark brown spines on the dorsomedial surface of the first finger basal phalange. The left testis is elongated, measuring ca. 7 mm.

COMPARISONS

Among all known *Ansonia* species, there are six large ones from Borneo and the Malay Peninsula that share the general habitus of the new species, and most have a light spot between the scapula, suggesting a close relationship. These are: *A. leptopus*, *A. fuliginea*, *A. longidigita*, *A. spinulifer*, *A. torrentis* and *A. anotis*. Other species are smaller, hence cannot be confused with the new Sumatran species. *A. glandulosa* differs from *A. leptopus* by having only the fifth toe basally webbed. *A. leptopus* has no rows of tubercles between the eyes. *A. longidigita* is similar to *A. glandulosa* in having a pair ridges of skin covered with larger tubercles between the eyes, but such ridges are continuous in *A. glandulosa*, and broken into separate tubercles in *A. longidigita*. In addition, *A. longidigita* has no glandular rows of enlarged tubercles along the sides of the body, and its skin has small pointed tubercles instead of rounded tubercles. *A. glandulosa* and *A. spinulifer* share the light scapular spot, however *A. spinulifer* is distinct in having a large number of large spiny and conical tubercles on the back, but tubercles are relatively smaller, flattened and rounded in *A. glandulosa*. *A. fuliginea* is about the same size of *A. glandulosa*. This species is considered as distinct in the absence of interorbital rows of tubercles. *A. glandulosa* also shares the light scapular spot with the foregoing

species, but differs from *A. torrentis* by having a single pair row of tubercles between eyes and from the glandular ridge at the body margins. Another, the sixth large species has been described recently, *A. anotis* by Inger et al. (2001). Judging from the hidden tympanum and the expanded finger tips, it is clearly distinct from *A. glandulosa*. *A. glandulosa* has a pair rows of tubercles between eyes, a feature lacking in *A. penangensis*. Although *A. glandulosa* has similarly dark coloured venter with white spots as in *A. penangensis*, by having first finger as long as second separates *A. glandulosa*. In addition, *A. penangensis* is much smaller and has a weak tarsal ridge, a characteristic that is absent in *A. glandulosa*. *A. malayana* is a smaller species and lack glandular ridges on flanks and also have a short first finger. *A. tiomanica* is also a smaller species, with black colouration and shows a number of tubercles and spines under the lower jaw and a short first finger. Dring (1979) reported two *Ansonia* specimens from Terengganu to an as yet undescribed species, related to *A. leptopus*, but later included them in that species (Inger and Dring, 1988). This form differs from *A. glandulosa* in having a single row of keratinized tubercles under the mandible and by the presence of rows of tubercles between the eyes and along the sides of the body. *A. siamensis* and *A. inthanon* are two species from Thailand (Kiew, 1984; Matsui et al., 1998). Both attain smaller size as adults, so that no confusions could originate. Based on morphological similarities, we believe that *A. glandulosa* is most closely related to *A. leptopus*. Differences between the closely related large *Ansonia* species are summarized in Table 2.

BIOGEOGRAPHY

The number of amphibian genera that have not been found earlier in Sumatra although well represented in Borneo and Peninsular Malaysia, is growing. At one point, we believed that their absence was due only partially to inadequate sampling, but mainly to natural causes such as volcanism and to the time of separation of the Sunda Shelf into distinct islands related to the ability of frogs to disperse among land masses.

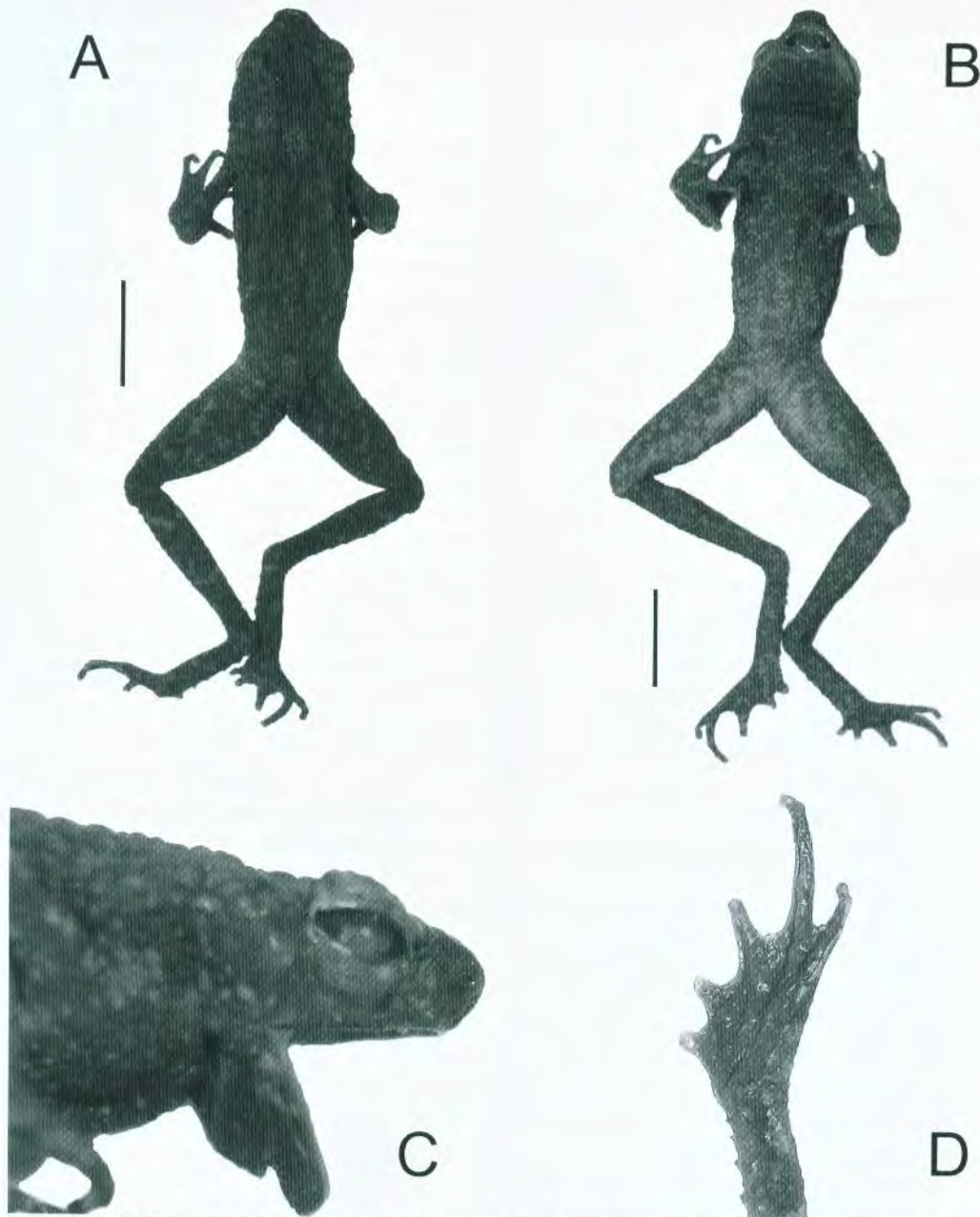


FIGURE 1: The holotype of *Ansonia glandulosa* n. sp. (MZB Amph. 4239). A. dorsal view; B. ventral view. C = lateral view of the head. D = Left foot. Bars = 10 mm.

We believe that Borneo is most probably the source for the Sumatran *Ansonia*, because the Sumatran species appears to be more likely closely related to *Ansonia* of the Bornean component than to the species of the Malay Peninsula. This suggestion is based on the assumption

that Borneo is the main centre of *Ansonia* and most lowland species that supposed to be closely related to *A. glandulosa* occurs in Borneo. As the Sunda Shelf is geologically dynamic, land bridges among the several land masses developed several times during the Miocene-Pleisto-

TABLE 1: The morphometric measurement of the holotype (mm) of *Ansonia glandulosa* n. sp. (MZB Amph. 4239).

SVL	39.67	SNL	4.87
HL	11.56	EN	2.95
HW	11.24	NT	0.82
FE	17.18	IO	4.56
TIB	20.16	EYE	4.08
TAR	12.51	TYM	1.83
Foot	14.02	UA	10.86
Palm	11.12	LA	11.21

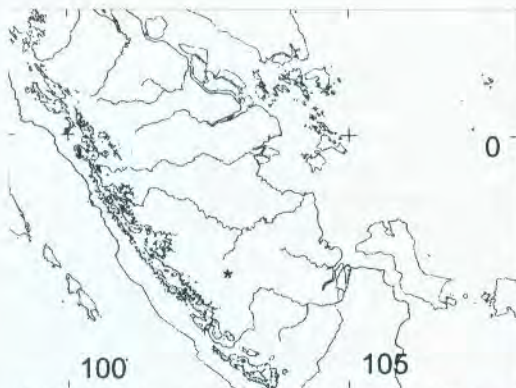


FIGURE 2: The approximate type locality of *Ansonia glandulosa* in Sumatra, indicated by a star.

cene, and for several genera, this provided opportunities to reach Sumatra. This land bridge existed during the Pliocene, ca. 2.3-1.5 million years b.p. (Satir fauna). During this period, the land bridge area is assumed to have been covered with forests, as no land mammals adapted to arid conditions reached Java (Zhi et al., 1996). During this period, it is postulated that orang utans (*Pongo*) could pass the land bridge to Borneo or vice versa to Sumatra and eventually reached Java (Medway, 1972).

The other land bridge stage occurred ca. 1.5-1.2 million years b.p. (Ci-Saat period, Pleistocene) (Voris, 2000). During this period, the vegetation was diverse, mosaic of forest, scrubland and possibly savanna (Heaney, 1991; van den Bergh et al., 1996; Meijard, 2000, pers. comm.). This forest type along the land bridge provide suitable habitat for *Ansonia* to reach Sumatra.

Voris (2000) indicated that during the last 250,000 years b.p., there was a long period when the sea level was as low as 120 to 40 m below the present level, allowing fauna to traverse these land bridges. A distinct land bridge occurred ca. 190-135,000 years b.p. (Meijard, 2000, pers. comm.). However during this period, apparently the land bridge area consisted of pine-grassland savanna and open woodland fauna which resulted in the extinction of the Ngandong fauna, indicating dry conditions (Heaney, 1991; van den Bergh et al., 1996). This condition seems unsuitable for amphibians to pass the land bridge.

More recent land bridges occurred between Sumatra and the Malay Peninsula. Although *A. glandulosa* is superficially most closely related to *A. leptopus*, a species also known from Malay Peninsula, we exclude that option, because we believed that during the last 250 years b.p., the climatic condition was relatively dry (Heaney, 1991; van den Bergh, 1996). If the Malay Peninsula is the main source for the Sumatran *Ansonia*, we expect the genus to be more widely distributed in Sumatra and the species should be found further north at least in the Riau Province and for sure in the North Sumatra Province as well (see Fig. 2).

The invasion of *Ansonia* in Sumatra is speculated to have happened as a later invasion that used the Bangka-Belitung-Karimata land bridge. This contrasts with three other bufonid genera, *Leptophryne*, *Pelophryne* and *Pedostibes*, which, though represented in Sumatra by a single species each, have known, wide distributions in this island. We suggest that these genera occurred in Sumatra much earlier in geologic time. Our preliminary hypothesis that *Ansonia* reached Sumatra from Borneo by a relatively recent land bridge needs to be tested by exploring the area of the land bridge for further evidences, using morphological or molecular characters.

The material that forms the holotype of *Ansonia glandulosa* was sent by non-herpetologist collectors from Napal Licin, Musi Rawas District, northern South Sumatra Province and near the southern border of Jambi Province, and was collected during a short-term expedition for bird study (Fig. 2). It is an area that has never

TABLE 2: Comparative diagnostic characteristics of seven large *Ansonia* species. Abbreviations: + = present, - = absent. Measurements in mm.

Species	Spines under chin	Nuptial pads	Tubercles between eyes	Light spot between scapula	4 th toe phalanx free of wide webbing	Dorsal skin tubercles	Ventrum colouration	Altitudinal distribution	SVL (males)	SVL (females)
<i>anotis</i>	-	-	-	-	2	small	cream	lowlands to midhills	37	52
<i>fuliginea</i>	2-3 rows	black	-	+	2	small	cream	highlands	35	39-42
<i>glanulosa</i>	1 row	dark brown	continuous	weak	3	rounded	grey-brown with light spots	lowlands	40	-
<i>leptopus</i>	2-3 rows	dark brown	-	-	2	rounded	yellowish-brown	lowlands	30-40	45-65
<i>longidigita</i>	3-6 rows	yellow	broken	weak	1-2	pointed	yellowish-brown	lowlands to midhills	35-50	45-70
<i>spinulifer</i>	3 rows	dark brown	-	+	2	enlarged	black with cream spots	lowlands	35-40	40-45
<i>torrensis</i>	1-3 rows	-	-	-	> 2	rounded	grey-brown with light spots	highlands	30-33	-

been explored before, and is essentially a lowland tropical rainforest and influenced by regular flooding during the rainy season. According to the collector, the specimen was collected from near a small stream and only observed during wet season along small streams. J. Holden (Flora Fauna Indonesia, pers. comm., 2000) informed the first author that he has seen a small toad, presumably of the genus *Ansonia* in Sipurak, Mt Kerinci (around 400 m asl.) It is possibly similar to the new species, but voucher specimens are needed, because members of the genus *Ansonia* can be confused with *Leptophryne*. Another convincing record based on a picture, has been transmitted recently from Telentam, Bangko, Jambi Province (Mistar, pers. comm., 2003) reinforced our previous conclusion that the species should be present close to the Bangka Belitung Karimata land bridge.

Unfortunately, this material was not made as a formal museum collection, and only six specimens, including the holotype of this new species, were sent to us for identification. Except for this new species, they represent undescribed material of the families Ranidae and Megophryidae and will be dealt with elsewhere.

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