

NOTE ON THE SECOND SPECIMEN
OF *BARBOURULA KALIMANTANENSIS*
(AMPHIBIA: ANURA: DISCOGLOSSIDAE)

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ABSTRACT. - A second specimen of *Barbourula kalimantanensis* has recently been collected near the type locality. It is compared here to the holotype and the species is redescribed based on additional information of the second specimen.

The Indonesian discoglossid, *Barbourula kalimantanensis* was described based on a single male specimen (Iskandar, 1978). This is the second member of the genus, representing one of the most primitive frogs of the Family Discoglossidae in Southeast Asia. The first member of the genus, *B. busuagensis* occurs in Palawan and Busuanga, but there are only four published records. As for *B. kalimantanensis*, there is practically no additional data, so that any new information is desirable. Mr. Kelvin P.K. Lim from the Zoological Reference Collection, National University of Singapore, informed me that ZRC recently inadvertently obtained a second specimen not far from the type locality. We examined the specimen, the first female specimen, and compared it to the holotype.

Abbreviations - SVL = snout-vent length; HW = head width; HL = head length; SL = snout length; SWE = snout width at anterior of the eye level; SWN = Snout width at the nostril level; N-Tip = distance from nostril to tip of snout; EN = eye narial distance; IN = internarial distance; IO = interorbital distance; EY = outer border of eye diameter; FE = femoral length; TI = tibial length; Tub = length of inner metatarsal tubercle; TOE1 = length of the first toe. MZB = Museum Zoologicum Bogoriense; ZRC = Zoological Reference Collection, National University of Singapore.

Material examined. - 1 female (ZRC 1.3219) Sungai [= river] Kelawit, Melawi river basin, about 1 km upstream Nanga Pintas (0°36'44"S 111°47'22"E), West Kalimantan, Indonesia, coll. M. Kottelat.

Redescription. - A medium sized frog (68 mm in the male, 78 mm in the female), body stocky, depressed, much longer than broad. Head wider than long in male, longer than wide in female, snout very flat, no canthus rostralis, no lores; nostril midway between tip of snout and the eyes; snout rounded and wide, SWE/SL 3-3.6, SWN/IN more than 4 in the male specimen; eyes point obliquely upwards, interorbital much wider than eyelid. Vomerine teeth merely seen as a pair of tubercles just behind the level of choanae; tympanic annulus absent.

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Table 1. Some morphometrical characters of *Barbourula kalimantanensis* (for abbreviations see text)

NO CAT.	SEX	SVL	HW	HL	SL	SWE	SWN	N-Tip
MZB-A-2330	Male	68	25	23.8	5.2	15.8	12.7	4.2
ZRC-1.	Female	77.7	27.9	29.2	5.1	18.5	15.7	4.3

NO CAT.	EN	IO	EY	FE	TI	FL	TUB	TOE1
MZB-A-2330	2.8	5.5	4.5	28.0	27.8	43.8	5.2	14.8
ZRC-1.	4.7	8.3	6.5	30.0	29.3	42.3	5.2	14.2

Limbs stout, fingers short, lengths of fingers 3>2>4>1, all fingers fully webbed to the tips, no deep excision, a distinctive flap of skin along outer fingers; no subarticular tubercles. Tips of finger distinctively enlarged, devoid of circum-marginal groove. Palms with three pads, the two inner ones are well developed and yellowish, the outer one not well developed. Hindlimbs short, heels slightly overlapping when legs flexed at right angle to the body; tibia about one-half of SVL, length of toes 3=4>2>5>1; no subarticular tubercles; all toes fully webbed up to swollen tips without deep excision; toe disks distinctly enlarged, first tip larger than second which is in turn larger than third; a narrow, light or yellowish stiff fold along the first toe; an oval, inner light coloured metatarsal tubercle, compressed, about one third of the first toe length; no outer metatarsal tubercle. Other detailed morphometrical characters are figured in Table 1.

Skin rugose, no distinctive folds, with tubercles on the body, spinules or small tubercles, especially on the posterior part of the back and on the legs. Upper eyelids with folds, supra-tympanic fold absent; lower parts smooth.

Colour in alcohol. - The dorsum is completely black as reported for the male specimen. The ventrum is distinctively brownish black with yellow mottling. In contrast, in the male specimen it is brownish black with brown mottling. Otherwise no significant differences could be found between the two specimens. Hinder part of the thigh uniformly black without mottling.

Secondary sex characters. - The male specimen is smaller than the female, but it is too early to conclude that there is sexual dimorphism in size based on single specimen of each sex only. Aside from the lighter colouration, the only significant difference lies in the presence of a triangular muscle projection in each side of the cloaca, known as anal clasper in the female specimen. This structure is absent in *Alytes* and *Discoglossus*, but similar to the same structure found in females of *Xenopus laevis*, however this structure is less developed in *Barbourula*. It is difficult to conclude whether this structure is really different, because it might also indicate that the female is out of the active reproductive cycle. This suggestion was confirmed by the fact that the oviduct is empty. Some morphometrical characters and ratios between the two specimens differ, but without more specimens, no conclusion can be reached about sexual dimorphism.

Discussion. - When describing the male specimen (holotype), I found that the sides of the body, femur and tibia are armed with a ridge or skin fold. At that time I had no clear idea whether these structures are present in living specimens or if they were an artifact of preservation. As these structures are also present in the female specimen, it is clear that these folds are really present in living specimens. These structures make this species extremely flat and streamlined, serving to avoid pressure in the fast flowing water. The flattened head, body and legs make this species extremely flat, suitable for living in streams and to stay among stones or crevices in swift flowing water. The length of the fingers and toes are unusual; the second finger is nearly as long as the third, the third and fourth toes are practically equal. This unusual formula makes the hands and feet like symmetrical paddles, so that the swimming capability of this species is more efficient. Both specimens were collected in relative shallow water of swift stream by turning the boulders over, indicate that the species hides itself under stones.

Further specimens are badly needed to confirm its relationships either with *B. busuangensis*, *Alytes*, *Bombina* or *Discoglossus*, because *B. kalimantanensis* appeared to be even more closely related to *Bombina* than *B. busuangensis* as suggested for the last mentioned species by Taylor & Noble (1924) or Inger (1954).

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