

## ***Bagauda zetteli* sp.n., a new cavernicolous thread-legged bug (Insecta: Heteroptera: Reduviidae: Emesinae) from Borneo**

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### **Abstract**

*Bagauda zetteli* sp.n. collected near the entrance in Bat Cave, near Bilit, North Borneo, Malaysia, is described and figured. The new species is closely related to *B. lucifugus* MCATEE & MALLOCH, 1926 and *B. furcosus* RIBES, 1987.

**Key words:** Heteroptera, Reduviidae, Emesinae, Leistarchini, *Bagauda*, new species, Borneo, cavernicolous

### **Zusammenfassung**

*Bagauda zetteli* sp. n., gesammelt im Eingangsbereich der "Bat Cave" bei Bilit, Nord-Borneo, Malaysien, wird beschrieben und abgebildet. Die neue Art ist mit *B. lucifugus* MCATEE & MALLOCH, 1926 und *B. furcosus* RIBES, 1987 nächstverwandt.

### **Introduction**

*Bagauda* BERGROTH, 1903 is a moderately species-rich genus distributed in the Oriental and Ethiopian Regions. Species described before 1965 with two newly described ones were keyed and surveyed by WYGODZINSKY (1966). Few years later VILLIERS (1970) also described two new species from Sri Lanka and presented a key to the Oriental fauna. RIBES (1987) complemented our knowledge on the genus with a further new species from Malaysia. At present, 18 species of the genus are known, nine of which are distributed in the Oriental Region (RIBES 1987, MALDONADO-CAPRILES 1990). Only *B. furcosus* RIBES, 1987 has hitherto been known from Borneo.

Many species of the genus were reported to occur in caves. The Ethiopian *B. adami* VILLIERS, 1962, *B. smithersi* WYGODZINSKY, 1966 and *B. tenebricolus* HORVÁTH, 1910 as well as the Oriental *B. aelleni* VILLIERS, 1970, *B. cavernicola* PAIVA, 1919, *B. furcosus* RIBES, 1987, *B. lucifugus* MCATEE & MALLOCH, 1926 and *B. strinatii* VILLIERS, 1970 are known exclusively from caves. The Ethiopian *B. creppei* LHOSTE, 1939 was collected in and outside of caves (WYGODZINSKY 1966).

While identifying Reduviidae in the Hemiptera Collection of the Naturhistorisches Museum in Wien (NHMW), Vienna, Austria, I also found two specimens of an undescribed *Bagauda*, collected in Borneo. The new species is described in this paper.

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## Materials and methods

External structures were examined using a stereoscopic microscope. Drawings were made by using a camera lucida. Measurements were taken using a micrometer eyepiece. Male genitalia were studied after short boiling in 10 % KOH solution.

For comparing the new species to the most closely related ones, two male specimens of *B. lucifugus* (Malacca, Selangor, Batu Cave, leg. L. Biró, det. P. Wygodzinsky, 1961, in the Hungarian Natural History Museum, Budapest, Hungary) and the original description and figures of *B. furcosus* (RIBES 1987: 252) were used.

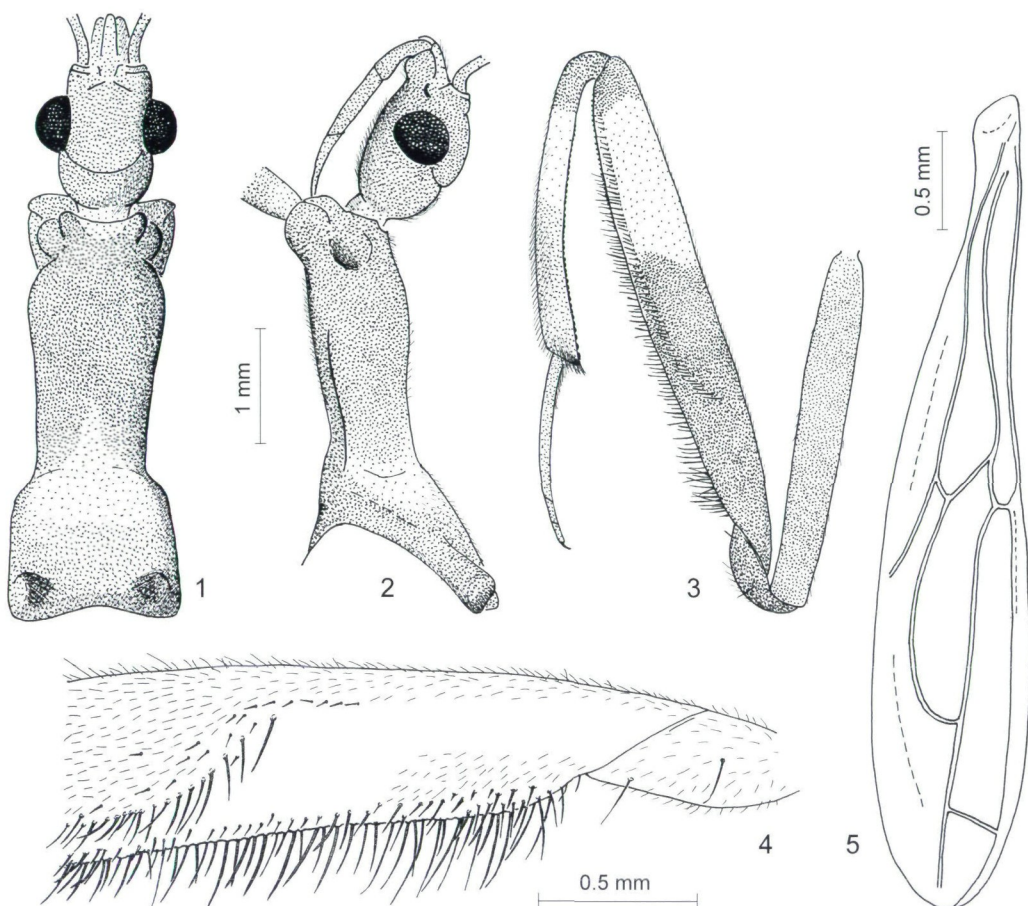
## Taxonomic part

### *Bagauda zetteli* sp.n. (Figs. 1 - 12)

**Type material:** Holotype (male) and one paratype (male): Malaysia: Borneo, Prov. Sabah, Kinabatangan River, near Bilit, in "Bat Cave", near the entrance, 17.II.1997, leg. H. Zettel, deposited in the NHMW.

**Description of macropterous male:** Measurements (in mm): When not indicated, the values of the holo- and paratype are equal. Total length of body to apex of genital capsule 14.4 (holotype) - 14.2 (paratype), to apex of fore wings 13.2 (holotype) - 13.0 (paratype). Length of head (without neck) 1.47, preocular 0.62, postocular 0.43; width across eyes 1.09, interocular distance 0.57. Length of antennal joints I 11.7 (holotype) - 12.9 (paratype) : II 9.5 (holotype) - 9.9 (paratype) : III 3.8 (holotype) - 4.2 (paratype) : IV 2.2. Length of labial joints I 0.56 : II 0.62 : III 0.57. Length of pronotum 3.08, anterior lobe 1.88 (holotype) - 1.92 (paratype), posterior lobe 1.20 (holotype) - 1.16 (paratype), greatest width of fore lobe 1.88 (holotype) - 1.92 (paratype), width across humeral angles 1.50 (holotype) - 1.45 (paratype). Length of abdomen from base to apex of tergite VII 6.9, greatest width 1.60 (holotype). Length of fore wings 8.8 (holotype) - 8.5 (paratype). Length of fore coxa 2.88 (holotype) - 2.85 (paratype), greatest width 0.34, length of fore trochanter 0.84, length of fore femur 4.40, greatest width 0.55 (holotype) - 0.53 (paratype), length of fore tibia 2.55, greatest width 0.30, length of fore tarsus without claw 1.54, tarsal joints I 1.18 : II 0.29 : III 0.31; length of mid femur 11.7 (holotype) - 12.3 (paratype), tibia 17.1 (holotype) - 17.6 (paratype), tarsus 0.56 (holotype) - 0.55 (paratype); length of hind femur 15.5 (holotype) - 16.1 (paratype), tibia 20.4 (holotype) - 22.1 (paratype), tarsus 0.60 (holotype) - 0.58 (paratype).

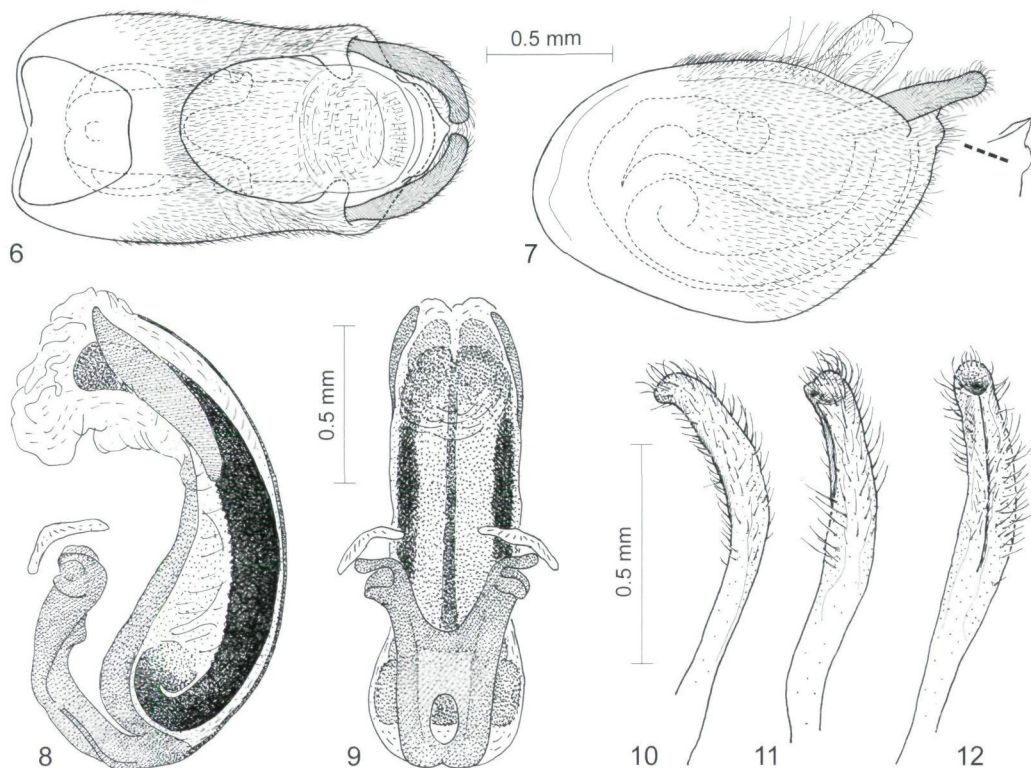
**Colour:** General colour fuscous. Head rather unicoloured, rostrum dark ochraceous, antennae uniformly fuscous. Pronotum fuscous, basal part of fore lobe with short medial stripe projecting forward as well as anterior half of hind lobe yellowish brown; scutellum yellowish brown. Fore wings as general body colour, their apical half slightly lighter; apparent, extensive spot basal of discal cell – laterally delimited by M+Cu – light stramineous. Fore leg conspicuously bicolorous, coxa fuscous but base very narrowly slightly lighter; femur with very wide subapical annulus light stramineous; basal half of fore tibia stramineous except extreme basis; tarsi very slightly lightening towards apex. Mid and hind legs as general body colour, basal parts of coxae as well as femoro-tibial articulation stramineous, apical third of mid, apical half of hind tibiae as well as



Figs. 1 - 5: *Bagauda zetteli* sp.n.: (1) head and pronotum, dorsal aspect; (2) same, lateral aspect; (3) right fore leg, medial view; (4) armature of base of right fore femur; (5) right fore wing.

tarsi light brown. Dorsal side of abdomen rather uniformly testaceous; pro-, meso- and metasternum as well as ventral side of abdomen stramineous. Body surface subshining, covered with minute granules and very short, yellowish, adpressed pubescence.

Structural characteristics: General appearance as characteristic for genus, moderately elongate, rather stout. Head as shown in Figs. 1 and 2, relatively short, about 1.35 times longer than diatone, fusiform in lateral view; preocular part about 1.45 times longer than postocular, anteriorly declivent, tylus slightly surpassing apices of jugae, antenniferous tubercles small; postocular part short, feebly globose, distinctly separated from short neck. Eyes semiglobular, laterally prominent, remote from dorsal and ventral surfaces of head in lateral aspect; diatone approximately 1.9 times as wide as interocular space. Interocular suture curving backward behind posterior border of eyes. Antennae extremely gracile, joint I longest, about as long as or slightly shorter than body, about twice as long as joints III + IV taken together; joint II about 0.8 times as long as joint I. Rostrum slender, gradually narrowing apically, labial joints I and III subequal in length, each



Figs. 6 - 12: *Bagauda zetteli* sp.n.: (6) genital capsule, dorsal aspect; (7) same, lateral aspect; (8) phallus, lateral aspect; (9) same, dorsal aspect; (10 - 12) left paramere, three different orientations.

somewhat shorter than joint II; joint I approaching anterior border, joint II surpassing posterior border of eyes, joint III projecting between bases of fore coxae.

Pronotum as shown in Figs. 1 and 2, elongate, about 2.1 times longer than its greatest width, divided into fore and hind lobe. Fore lobe about 1.55 - 1.65 times as long as hind lobe, elongate, anteriorly slightly swollen, posteriorly with fine lateral carinae. Hind lobe short, posteriorly elevated, lateral outline slightly diverging posteriorly, posterior margin concave, humeral angles slightly elevated. Scutellum subtriangular. Fore wings as in Fig. 5, elongate, approaching but not reaching apex of genital capsule, PCu cross vein meeting discal cell slightly basad of level of R-M cross vein.

Fore leg as in Fig. 3, rather stout. Fore coxa long, subcylindrical, about 8.4 - 8.5 times longer than its greatest width, unarmed. Fore trochanter simple, with a spinigerous process near the middle and a somewhat smaller one near the apex of its medial surface. Fore femur stout, laterally flattened, about 8 times longer than its greatest width (near middle of its apical half), about 1.5 times longer than fore coxa, about 1.7 times longer than fore tibia, considerably longer than tibia and tarsus taken together. Fore femur with three rows of spinigerous processes (in base of joint as in Fig. 4): posteroventral series composed of about 90 - 100 processes, basally with many additional ones; anteroventral



series composed of about 55 - 65 processes, with some small additional ones at basis of the series; accessory series also present consisting basally of about 60 spinigerous processes, apically of about 25 minute denticles, with some additional denticles at extreme apex of femur. Fore tibia short, arched, ventral surface with single row of 33 - 38 deflexed spines, dorsal surface with rather long, semi-erect hairs. Fore tarsus about 0.6 times as long as femur, arched, ventral side with fine hairs basally, otherwise smooth, three-segmented, joint I about 2.4 times longer than joints II + III taken together, joints II and III subequal in length. Mid and hind legs extremely elongate and delicate, apex of femora far surpassing apex of abdomen, tibiae far longer than length of body, extremely slender, tarsi minute.

Abdomen of male elongate oval, about 4.3 times longer than its greatest width, posterior margin of abdominal tergite VII widely rounded, ventral part of segment VIII widely projecting posteriorly, excised medially. Genital capsule as shown in Figs. 6 and 7, elongate in dorsal aspect, superoposterior margin forming wide, dorsoventrally flattened, medially slightly projecting keel. Parameres as shown in Figs. 10 - 12, elongate, deflexed near to their middle, their proximal and distal halves more or less straight; medial surface with fine keel and small subapical tubercle. Phallus as shown in Figs. 8 and 9, symmetrical, robust, with extremely narrow dorsal and one pair of long, parallel-sided, band-like ventral sclerotisations, furthermore one pair of apically narrowing superolateral sclerotised processes slightly surpassing apices of ventral sclerotisations; endosoma symmetrical, consisting of 1 + 1 elongated groups of small, tooth-like projections. Articulatory apparatus robust, basal plates directly joined dorsally, basal foramen small, oval, dorsal connectives projecting caudad, enclosing sharp angle.

**Comparative notes:** *Bagauda zetteli* sp.n. is a moderately large species of the genus, but is ranked as a relatively large one among the Oriental fauna. The new species is externally very similar and undoubtedly closely related to *B. lucifugus* (Malaysia: Selangor) and *B. furcosus* (Malaysia: Sarawak).

The three species can be distinguished by their male genitalia first of all. The phallus of *B. lucifugus* is asymmetrical, the right group of small, tooth-like projections of the endosoma is well-developed, projecting between the superolateral sclerotised processes of the phallosoma in uneverted position, the left group strongly reduced, small. The superolateral sclerotised processes are apically rounded, each has a robust, pointed apical tooth. The articulatory apparatus is highly specialised, nearly T-shaped, basal plates greatly fused forming a long, rod-like structure, connectives strongly diverging enclosing an angle of almost 180°. The shape of parameres is also different, their apical part is strongly curved.

The phallus of *B. furcosus* is symmetrical like that of *B. zetteli* sp.n., but the superolateral sclerotised processes are apically rounded, not pointed, furthermore the articulatory apparatus is differently formed. This species can also be easily distinguished from *B. zetteli* sp.n. by the presence of two apparent, robust, spine-like processi in the lateral side of the genital aperture (which are entirely absent in *B. zetteli* sp.n.), the differently structured rostrum (labial joints II and III subequal in length, joint I somewhat shorter) and fore legs (femur about as long as tibia and tarsus taken together) and its considerably greater size (body length 15.5 - 17 mm).

**Remarks:** The type specimens of *B. zetteli* sp.n. were collected in the "Bat Cave" near the entrance. Like most Oriental species of the genus, the new species seems to be

cavernicolous like its two closest relatives, *B. lucifugus* (known only from Batu Cave, Selangor) and *B. furcosus* (known only from Niah Cave, Sarawak). Although the morphological adaptation to the cavernicolous life habit of the species mentioned above is insignificant, they seem to occur strictly in the caves mentioned above and they are probably endemic species in these caves. It is also probable that the cave dwelling life habit plays part in the isolation and speciation of the species.

**Etymology:** It is a great pleasure to dedicate this new species to its collector, Dr. Herbert Zettel, Curator of Hemiptera of the Naturhistorisches Museum, Vienna, who has contributed so much to our knowledge on Oriental aquatic and semi-aquatic Heteroptera.

#### Acknowledgement

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