

**Description of a new genus and species of Hemisphaeriini
from Brunei with an identification key to the Bornean species
of the tribe (Hemiptera: Fulgoroidea: Issidae)**

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Abstract. *Bruneastrum cardinale* gen. & sp. nov. is described from Brunei. This is the first record of the tribe Hemisphaeriini Melichar, 1906 and second representative of the family Issidae (Hemiptera: Fulgoroidea) from the country. A checklist and an identification key to the species of Hemisphaeriini known from Borneo are given.

Key words. Auchenorrhyncha, Fulgoromorpha, Issinae, planthoppers, taxonomy, fogging, Indo-Malayan Realm

Introduction

The planthopper family Issidae Spinola, 1839 is a worldwide distributed group, represented in the Indo-Malayan Realm by 62 genera with 330 species and subspecies (GNEZDILOV 2013a).

Here I describe a new genus and a new species of Issidae from Brunei. The issid fauna of Brunei, a state situated on the northern coast of the island of Borneo, is still almost unknown. Only one recently described species, *Sundorrhinus bruneiensis* Gnezdilov, 2010 – a member of the tribe Issini Spinola, 1839 – has been recorded from the country so far (GNEZDILOV 2010). Definitely we can expect more species of Issidae in Brunei by analogy with the fauna of the neighbouring regions of Borneo.

The new genus belongs to the tribe Hemisphaeriini Melichar, 1906 which is largely restricted in its distribution to the Indo-Malayan Realm and only marginally extends into the eastern Palearctic Region and Oceania. Currently, the tribe comprises 15 genera with 187 species and subspecies, including 9 genera which are Indo-Malayan endemics (GNEZDILOV 2013a). From Borneo just 2 genera with 6 species were recorded previously. Here below, I provide a checklist and an identification key for the Hemisphaeriini of Borneo including the new genus and species described in this paper.

Material and methods

Morphological terminology follows GNEZDILOV et al. (2014a). The genital segments of the specimen examined were macerated in 10% KOH and figured in glycerine jelly using a Mikmed-1 light microscope. Photographs of the specimen were made using a Leica MZ8 stereomicroscope with a JVC KY F7OB video camera, images were produced using the Synoptics Automontage and Photoshop software.

The holotype of the new species described below is deposited in the Natural History Museum, London, United Kingdom (BMNH). Some additional type specimens figured in the paper are deposited in BMNH and Naturhistoriska riksmuseet, Stockholm, Sweden (NHRS).

Biogeographical regions are named after UDVARDY (1975).

Taxonomy

Family Issidae Spinola, 1839

Subfamily Issinae Spinola, 1839

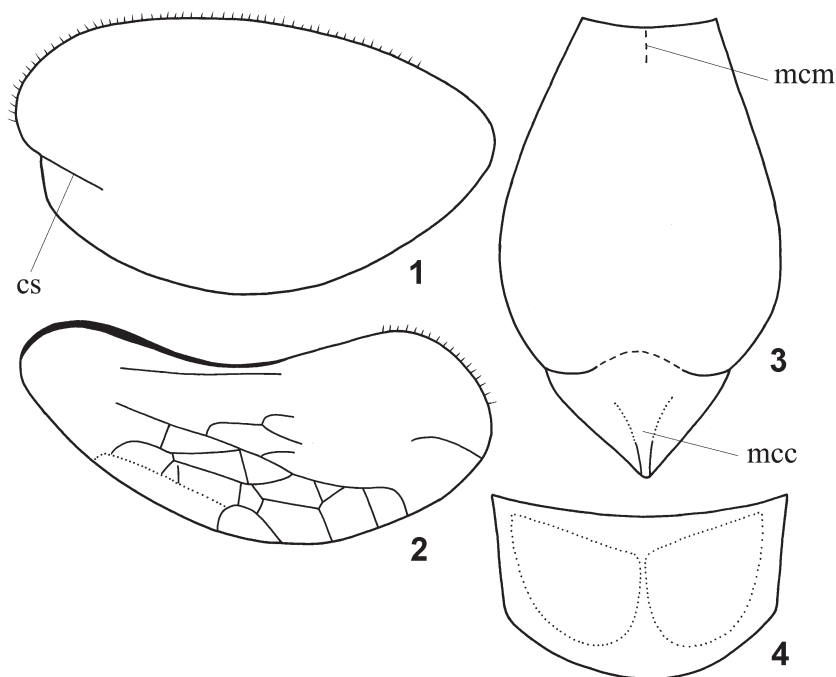
Tribe Hemisphaeriini Melichar, 1906

Bruneastrum gen. nov.

Type species. *Bruneastrum cardinale* sp. nov., here designated.

Diagnosis. Metope smooth, with no intermediate carinae visible (Figs 3, 13). Metope and coryphe joining at obtuse angle in lateral view (Fig. 12). Coryphe transverse (Figs 4, 14). Fore wings without hypocostal plate, with basal angle of costal margin distinctly convex (semicircular) (Figs 1, 12). Hind wings unilobed (Fig. 2), reaching abdominal apex. Hind tibia with 2 lateral spines. First metatarsomere with 5 intermediate spines in full row. Phallobase with a pair of long, curved latero-apical processes, narrowing apically (Fig. 6, laphp) and with a pair of ventro-lateral lobes (Fig. 6, vlphl). Aedeagus lacking ventral hooks.

Description. Metope smooth, with rudimentary median carina only in its apical part and without sublateral carinae, elongate, enlarged above the clypeus (Figs 3, 13). Lateral keels (margins) of metope visor shading the antennae in dorsal view (Figs 11, 14). Metopoclypeal suture distinct, straight. Postclypeus large, smooth, with thick median carina running through the anteclypeus as well. Metope and coryphe joining at obtuse angle (in lateral view); metope visible from above (Figs 11, 12). Coryphe transverse, twice as wide as long medially, with anterior margin convex and posterior margin weakly concave (Figs 4, 14). Ocelli absent. Pedicel 1.5 times as long as wide, cylindrical. Pronotum very short, nearly 5 times shorter than mesonotum, without carinae; anterior and posterior margins keel-shaped. Paradiscal fields of pronotum very narrow, not visible behind the eyes. Paranotal lobes large, without carinae. Tegulae large. Mesonotum smooth, without carinae. Fore wings smooth, wide, narrowing apically, with distinctly convex (semicircular) basal angle of costal margin (Figs 1, 12); fore wings without hypocostal plate, with setae on costal margin. Claval suture of fore wing distinct only basally, disappearing after $\frac{1}{4}$ of wing length (Fig. 1). Hind wings unilobed, well-developed, reaching abdominal apex, with long and dense setae on costal margin (Fig. 2). Hind tibiae with 2 lateral spines distally. First metatarsomere with 2 lateral and 5 inter-



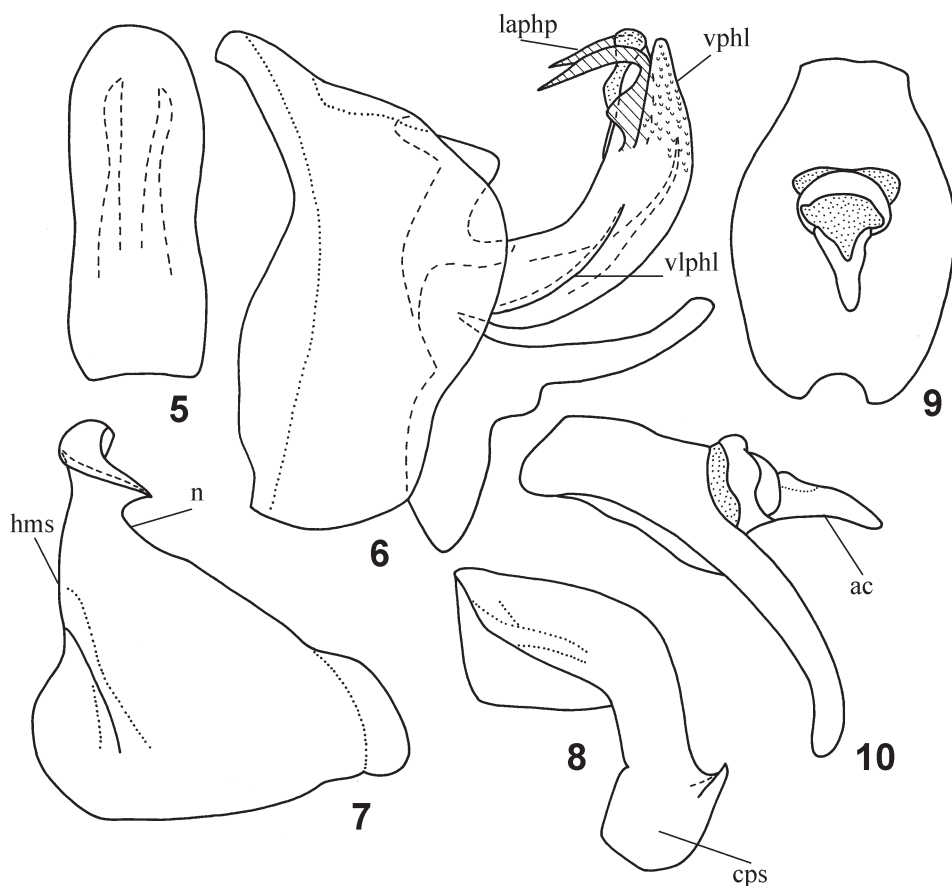
Figs 1–4. *Bruneastrum cardinale* gen. & sp. nov., holotype. 1 – fore wing; 2 – hind wing; 3 – metope and clypeus; 4 – coryphe. Abbreviations: cs – claval suture; mcm – median carina of metope; mcc – median carina of clypeus.

mediate spines in full row apically. Second metatarsomere with only 2 latero-apical spines.

Male genitalia (Figs 5–10). Pygofer wide, with convex hind margin (in lateral view) (Fig. 6). Anal tube wide (in dorsal view), with deep apical concavity (Fig. 9). Anal column long, 0.3 times as long as whole anal tube (Fig. 10). Phallobase curved at obtuse angle (in lateral view), wide (in ventral view) (Fig. 5), with a pair of long latero-apical processes curved at right angle and narrowing apically (Fig. 6, laphp) and with a pair of ventro-lateral lobes (Fig. 6, vlphl). Ventral phallobase lobe wide, reaching phallobase apex. Aedeagus lacking ventral hooks. Style massive, with hind margin concave (Fig. 7, hms). Capitulum of style on short neck (Fig. 7, n), wide (in dorsal view) (Fig. 8), with distinct lateral tooth, apical tooth very weak.

Differential diagnosis. *Bruneastrum* gen. nov. is similar to the genus *Mongoliana* Distant, 1909 with which it shares a distinctly convex (semicircular) basal angle of the fore wing costal margin (Figs 1, 11–12), but differs from the latter by the absence of aedeagal ventral hooks in males. All species of *Mongoliana* (known from mainland China) have well-developed ventral hooks of aedeagus (FENNAH 1956, fig. 18B; CHE et al. 2003). *Bruneastrum* gen. nov. differs from the genera *Hemisphaerius* Schaum, 1850 and *Gergithus* Stål, 1870 (both known from Borneo, see below) by more elongate fore wings (Fig. 12).

Etymology. Derived from the combination of the Greek noun *ἀστρο* (star) and Brunei which means a “star of Brunei” (gender neutrum).



Figs 5–10. *Bruneastrum cardinale* gen. & sp. nov., holotype, male genitalia. 5 – penis, ventral view; 6 – genital block, lateral view; 7 – style, lateral view; 8 – style, dorsal view; 9 – anal tube, dorsal view; 10 – same, lateral view. Abbreviations: ac – anal column; cps – capitulum of style; hms – hind margin of style; laphp – latero-apical processes of phallobase; n – neck of capitulum; vlphl – ventro-lateral phallobase lobe; vphl – ventral phallobase lobe.

***Bruneastrum cardinale* sp. nov.**

(Figs 1–14)

Type locality. Brunei, Bukit Sulang, near Lamunin.

Type material. HOLOTYPE: ♂, labelled: “Brunei, Bukit Sulang, nr Lamunin // N.E. Stork, 20.VIII.–10.IX.82, fogging, B.M. 1982–388 // Tree 3: *Shorea johorensis* Fox. Dipterocarp.” (BMNH, dry-mounted).

Description. Coloration. Metope and coryphe orange yellow, with red brown margins (Figs 11, 14). Clypeus, paranotal lobes, and tegulae red brown. Genae light yellow. Scapus and pedicel dark brown. Pronotum orange yellow, with red brown anterior margin. Mesonotum light yellow medially, with red brown upper angles. Fore wings red brown, each with 3 light



11



13



12



14

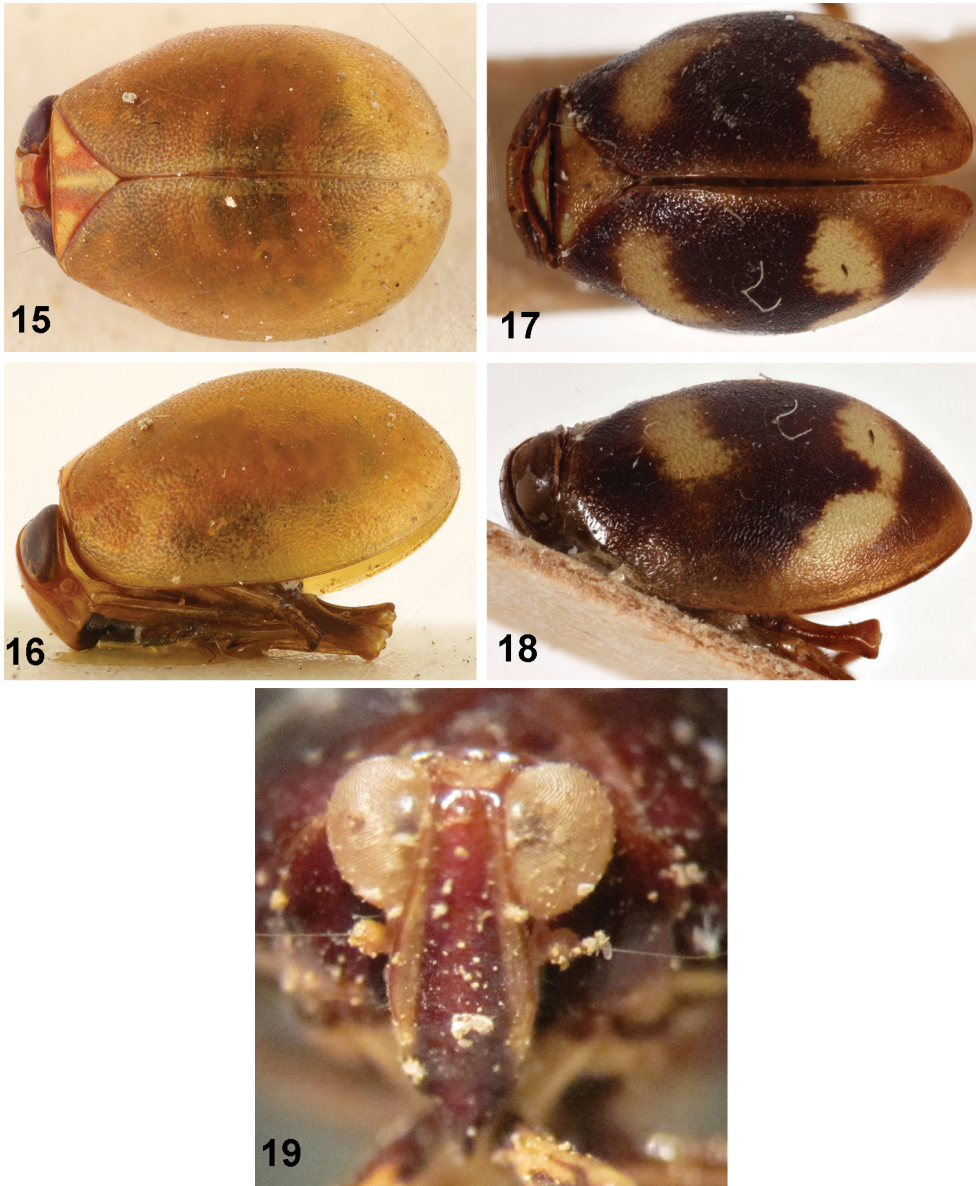
Figs 11–14. *Bruneastrum cardinale* gen. & sp. nov., holotype (BMNH), body length 4.1 mm. 11 – dorsal view; 12 – lateral view; 13 – frontal view; 14 – head in dorsal view.

yellow spots: two oval ones (one on basal cell and another one on clavus near to wing middle) and one elongate and narrow running from wing middle to apex (Figs 11, 12). Fore and middle legs including coxae red brown, corresponding tarsi light brown yellow. Hind tibiae with red brown margins, hind tarsi light yellow, apices of spines black. Abdomen and hind wings light brown yellow. Anal tube brown yellow.

Structure. See the description of the genus.

Measurements. Total body length (male): 4.1 mm.

Etymology. The name is derived from the Latin adjective *cardinalis* (-is, -e), meaning cardinal, referring to somewhat reddish coloration of the head of the species.



Figs 15–19. 15–16 – *Hemisphaerius rufovarius* Walker, 1858, holotype (BMNH), body length 3.5 mm; 17–18 – *H. maculatus* Melichar, 1906, syntype (NHRS), body length 4.5 mm (15, 17 – dorsal view; 16, 18 – lateral view). 19 – *Gergithus niger* (Walker, 1857), syntype (BMNH), frontal view.

Checklist of Hemisphaeriini known from Borneo

Bruneastrum cardinale gen. & sp. nov.

Note. So far only known from Brunei.

Gergithus niger niger (Walker, 1857)

(Fig. 19)

Hemisphaerius niger Walker, 1857: 155.

Gergithus niger: DISTANT (1909: 86).

Hemisphaerius chilacoroides Walker, 1862: 308; synonymized by LIANG (2001: 236).

Hemisphaerius walkeri Butler, 1875: 100; replacement name for *Hemisphaerius chilacoroides* [sic] Walker, 1862 nec *Hemisphaerius chilacoroides* Walker, 1851; synonymized by LIANG (2001: 236).

Note. Described from Sarawak (WALKER 1857), later recorded from Malacca and Java (WALKER 1858). However, WALKER (1858) mentioned that the specimens from Malacca and Java are larger than those from Borneo and differ somewhat in the head coloration. MELICHAR (1906) recorded this species also from Perak. The synonymies with *H. chilacoroides* and *H. walkeri* were established by LIANG (2001) on the basis of examination of corresponding type specimens.

Hemisphaerius bacculinus Butler, 1875

Hemisphaerius bacculinus Butler, 1875: 100.

Note. Described from Borneo (BUTLER 1875). So far known only after the original description and the type specimen.

Hemisphaerius maculatus Melichar, 1906

(Figs 17–18)

Hemisphaerius maculatus Melichar, 1906: 86.

Note. Described from the Balabac Island (Philippines), 50 km north of Borneo (MELICHAR 1906). So far known only after the original description and the type specimens.

Hemisphaerius rufovarius Walker, 1858

(Figs 15–16)

Hemisphaerius rufovarius Walker, 1858: 95.

Hemisphaerius scymnoides Walker, 1862: 309; synonymized by LIANG (2001: 236).

Hemisphaerius testaceus Distant, 1906: 360; synonymized by LIANG (2001: 236).

Hemisphaerius virescens Distant, 1906: 360; synonymized by LIANG (2001: 236).

Note. Described from Burma (WALKER 1858, DISTANT 1906) and later recorded by Walker (1862) from Thailand, MELICHAR (1906) from Borneo, and FENNAH (1956, 1978) from China (Hainan) and Vietnam. The synonymies were established by LIANG (2001) on the basis of examination of corresponding type specimens.

Hemisphaerius torpidus* Walker, 1857Hemisphaerius torpidus* Walker, 1857: 155.

Note. Described from Sarawak (WALKER 1857) and later recorded from the Mysol Island (Raja Ampat Islands in West Papua, formerly Irian Jaya) by MELICHAR (1906).

Hemisphaerius typicus* Walker, 1857Hemisphaerius typicus* Walker, 1857: 155.

Note. Described from Sarawak (WALKER 1857). So far known only after the original description and the type specimen.

Key to species of Hemisphaeriini known from Borneo

- 1 Metope narrow, dark brown red with pale lateral margins (Fig. 19).
..... ***Gergithus niger niger*** (Walker, 1857)
- Metope wide (Fig. 13), with different coloration. 2
- 2 Fore wings elongate, each with three separate light spots (Figs 11, 12).
..... ***Bruneastrum cardinale* gen. & sp. nov.**
- Fore wings relatively wider (Figs 16, 18); if spots are present, then two of them are partly fused posteriorly (Fig. 18). 3
- 3 Fore wings unicoloured, without spots or bands. 4
- Fore wings with spots or bands. 6
- 4 General coloration dark brown to black. ***Hemisphaerius bacculinus*** Butler, 1875
- General coloration pale. 5
- 5 Fulvous, mesonotum with two wide red stripes (Figs 15, 16).
..... ***Hemisphaerius rufovarius*** Walker, 1858
- Brown yellowish, mesonotum without stripes. ***Hemisphaerius torpidus*** Walker, 1857
- 6 Fore wings testaceous with two wide, irregular, parallel, transverse dark brown to black lines (see BUTLER 1875: pl. 4, fig. 14). ***Hemisphaerius typicus*** Walker, 1857
- Fore wings dark brown, each with three large light spots, two of which are partly fused posteriorly (Figs 17, 18). ***Hemisphaerius maculatus*** Melichar, 1906

Discussion

With the description of *Bruneastrum cardinale* gen. & sp. nov., seven species of Hemisphaeriini are currently known from the island of Borneo. The issid fauna of the Indo-Malayan Realm is generally only poorly known with the exception of Taiwan from where 33 species of Hemisphaeriini have been recorded (CHAN & YANG 1994). For comparison, 14 species of Hemisphaeriini are currently known from Vietnam (GNEZDILOV et al. 2014b) and eight species from New Guinea (GNEZDILOV et al. 2015). Such small numbers of described species for these faunistically rich regions indicate that we are just at the beginning

of discovery of the real issid biodiversity there, and descriptions of many additional new species can be expected.

Very little is known about the ecology of Hemisphaeriini. Some species of *Hemisphaerius* were observed to occur and feed on grasses (Poaceae) in open sunny areas or on low vegetation in forests (GNEZDILOV 2013b). *Bruneastrum cardinale* was collected by canopy fogging from the tree *Shorea johorensis* Fox. (Dipterocarpaceae). Otherwise, very few reports have been published on issids collected from the canopy except for *Oronoqua ibisca* Gnezdilov, Bonfils, Aberlenc & Basset, 2010 (Issini) which was collected using flight-interception traps at 7 and 14 m of mid-canopy in Panama (GNEZDILOV et al. 2010) and *Rotundiforma nigrimaculata* Meng, Wang & Qin, 2013 (Hemisphaeriini) collected by canopy fogging in a bamboo plantation (MENG et al. 2013). One more unpublished record of *Tempsa* sp. (Issini) collected by fogging on *Pentaspadon motleyi* Hook. (Anacardiaceae) in the same locality in Brunei as *B. cardinale* is known to me as well.

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