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**The new Oriental lanternfly genus *Bhaskaraena* gen. nov.
with two new species
(Hemiptera: Fulgoromorpha: Fulgoridae)**

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Abstract

The new lanternfly genus *Bhaskaraena* gen. nov. is described to include two new species: *B. nigrifrons* sp. nov. (type species) from Borneo and *B. webbi* sp. nov. from Peninsular Malaysia. The genus is placed in the Aphaeninae Blanchard, 1847. It is also compared to the superficially close genera *Prolepta* Walker, 1851 and *Hariola* Stål, 1863. The new species are illustrated and keyed, and a distribution map is provided.

Keywords: Lanternbug, planthopper, Malaysia, Indonesia, Fulgoroidea.

Introduction

The study of unidentified material in the accessions of the Natural History Museum (London) revealed a specimen of lanternfly from Malaysia, which could not be attributed to any of the currently recorded genera of Fulgoridae. I recently received a specimen from Borneo which represents another, close species and confirmed the necessity to describe a new genus to accommodate those new taxa.

The identification key proposed by LALLEMAND (1963) for the fauna of Asia and Australia leads to the tribe Aphaenini of the subfamily Aphaeninae. However the examined taxa differ from the genera *Scamandra* Stål, 1863, *Penthicodes* Blanchard, 1845, *Lycorma* Stål, 1863, *Desudaba* Walker, 1858 and *Galela* Distant, 1906 by **(1)** possessing an erected cephalic process (the process is reduced and tuberculiform in the other genera); and **(2)** having a hyaline area on the posterior wing (posterior wings without such a hyaline area in the other genera).

It also differs from *Aphaena* Guérin-Méneville, 1834 and *Kalidasa* Kirkaldy, 1900, as well as from the more recently described genus *Egregia* Chew Kea Foo, Porion & Audibert, 2011, which all possess a cephalic process, by **(1)** having tegmina with costal and sutural margins subparallel, and apical margin obliquely truncate (tegmina progressively broadening from base to apex and with apical margin rounded in the 3 other genera); and **(2)** having a hyaline area on the posterior wing (posterior wings without hyaline area in the 3 other genera).

The key to the genera of New Guinea proposed by FENNAH (1977) leads to *Ulasia* Stål, 1863 or *Bloeteanella* Lallemand, 1959. The new taxa differ from *Ulasia* by, e.g. **(1)** having 2 longitudinal carinae on frons (3 in *Ulasia*); **(2)** the rounded carinae on mesonotum (carinae nearly straight in *Ulasia*); **(3)** missing the numerous parallel transverse cross-veinlets on anal area of posterior wings (characteristic in *Ulasia*). From *Bloeteanella* it differs by, e.g. **(1)** the hind wings coloured with a small hyaline area (mostly hyaline in *Bloeteanella*); **(2)** the apical

margin of tegmina obliquely truncate (rounded in *Bloeteanella*); **(3)** the tegmina fully opaque, coloured (largely hyaline in *Bloeteanella*).

The new taxa superficially resemble *Prolepta* Walker, 1851 (Fig. 1) and *Hariola* Stål, 1863 (Fig. 2). It differs from *Prolepta* by e.g. **(1)** the cephalic process pointing dorsally and not straight (pointing anteriorly and straight in *Prolepta*, Fig. 1 C, D, F); **(2)** the hind wings coloured with a small hyaline area (mostly hyaline in *Prolepta*, Fig. 1 A–B). It differs from *Hariola* by e.g. **(1)** frons with lateral margins bisinuate and with 2 parallel longitudinal carinae (frons with lateral margins concave and with 2 diverging grooves in *Hariola*, Fig. 2 D); **(2)** the hind wings coloured with a small hyaline area (mostly hyaline in *Hariola*, Fig. 2 A–B); **(3)** cephalic process very narrow (broad in *Hariola*, Fig. 2 C–E); **(4)** the tegmina fully opaque, coloured (largely hyaline in *Hariola*, Fig. 2 A–B).

Accordingly, the present paper aims at describing a new genus for these two specimens, each representing a new species.

Material and methods

The measurements were taken as in CONSTANT (2004) and the following abbreviations are used:

- BF = maximum breadth of the frons
- BTg = maximum breadth of the tegmen
- BV = maximum breadth of the vertex
- LF = length of the frons in median line (excluding cephalic process)
- LTg = maximum length of the tegmen
- LT = total length (apex of head to apex of tegmina)
- LV = length of the vertex in median line (excluding cephalic process)

For each picture of the new species, a number of photographs were taken with a Canon 700D camera equipped with a Tamron 90 mm Macro lens and staked with CombineZ software. They were optimized with Adobe Photoshop CS3. Observations were done with a Leica MZ8 stereo- microscope.

Acronyms used for the collections.

BMNH = Natural History Museum, London, United Kingdom.

RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium.



Fig. 1. *Prolepta apicalis* (Westwood, 1838) ♂, Philippines, Luzon, Zambales, 19-20 Apr. 2014 (RBINS). A, habitus, dorsal view; B, habitus, ventral view; C, head and thorax, left lateral view; D, head and thorax, dorsal view; E, habitus, left lateral view; F, frons, normal view. (reproduced from CONSTANT & ALISTO, 2015)

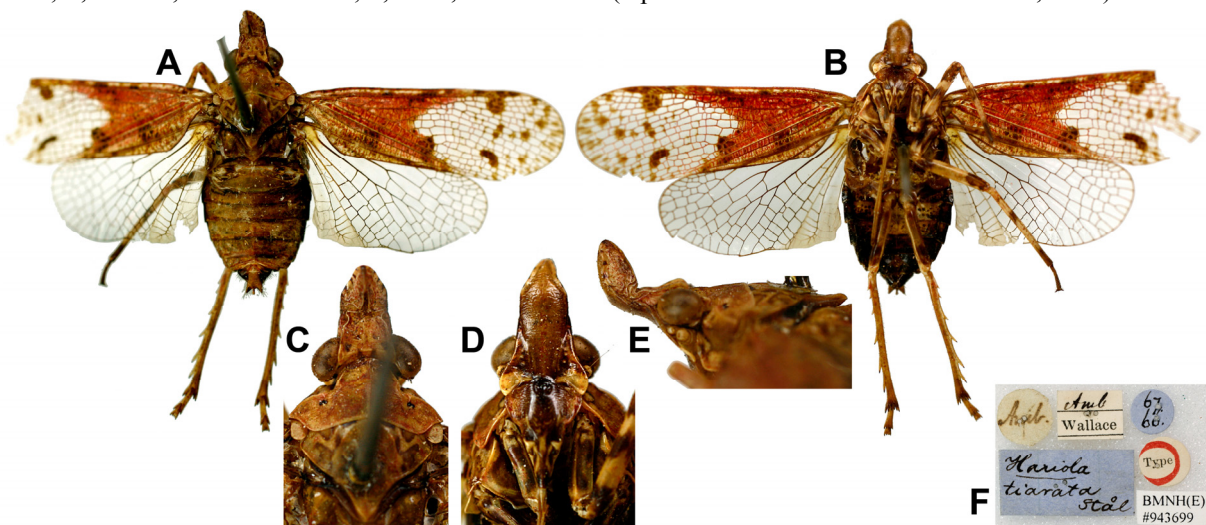


Fig. 2. *Hariola tiarata* Stål, 1863, holotype ♀ (BMNH). A, habitus, dorsal view. B, habitus, ventral view. C, head and thorax, dorsal view. D, frons and clypeus, normal view. E, head and thorax, left lateral view. F, labels.

Taxonomy

Order **Hemiptera** Linnaeus, 1758
 Suborder **Auchenorrhyncha** Duméril, 1806
 Infraorder **Fulgoromorpha** Evans, 1946
 Superfamily **Fulgoroidea** Latreille, 1807
 Family **Fulgoridae** Latreille, 1807
 Subfamily **Aphaeninae** Blanchard, 1847

Bhaskaraena gen. nov.

Type species: *B. nigrifrons* sp. nov.

ETYMOLOGY. The name is modified from “*Bhaskara*”, in acknowledgment of the generous contribution of Mr Edy Bhaskara (Indonesia) to the present work. It is feminine in gender.

DIAGNOSIS. The genus can be recognized on the following combination of characters:

- (1) frons with 2 longitudinal carinae and with lateral margins bisinuate;
- (2) cephalic process short and narrow, shorter than frons, pointed apically, directed dorsally and sinuate basally;
- (3) tegmina opaque and coloured; with costal and sutural margins parallel and apical margin obliquely truncate; with numerous longitudinal veins at nodal line;
- (4) hind wings mostly opaque and coloured, with posterocentral hyaline area;
- (5) pronotum with one median carina;
- (6) paradiscal carinae of mesonotum curved.

DESCRIPTION

Head: (Figs 4 B, D, F; 5 B, D, F) Vertex excavate, subquadrate and with lateral margins carinate; lateral carinae extending along posterodorsal face of cephalic process; hind margin not carinate. Frons narrowing towards dorsum, with 2 longitudinal carinae not reaching frontoclypeal suture ventrally and extending dorsally on the anterolateral margins of cephalic process; lateral margins bisinuate under level of ocelli, extending dorsally on side of cephalic process. Cephalic process shorter than frons, projecting anteriorly at base and pointing dorsally; narrow groove dorsally left by lateral margins of vertex not fused. Clypeus elongate, slightly narrower than frons basally and longer than combined length of frons and cephalic process. Labium very elongate and narrow, surpassing hind trochanters. Ocelli present. Eyes large, about as long in dorsal view as breadth of vertex. Antennae with scape short, ring-shaped and pedicel globulose; not surpassing level of eye.

Thorax: (Figs 4 B, F; 5 B, F) Pronotum with strong median carina with impressed point on each side; dorsolateral carina sinuate; lateral carinae visible in dorsal view along anterior half, angularly rounded anteriorly; anterolateral angles slightly projecting anteriorly. Mesonotum with median carina; peridiscal carinae roundly curved.

Tegmina: (Figs 4 A; 5 A) Elongate and narrow, more than 3 times as long as broad, with costal and sutural margins subparallel, slightly broadening on sutural margin after nodal line; costal margin very slightly emarginate at level of nodal line. Apical margin obliquely truncate. Opaque and coloured. Very dense reticulum of longitudinal veinlets and crossveins, especially posteriorly to nodal line. Clavus open.

Hind wings: (Figs 4 A; 5 A) Well developed, elongate and narrow with apical margin rounded; mostly opaque with postero-central hyaline area; brown with basal, elongate, brightly coloured patches not surpassing level of hyaline area.

Legs: (Figs 4 C; 5 C) Elongate and slender. All femora and pro- and mesotibiae with pale and dark rings. Metatibiae with 6 lateral and 7 apical spines. Basal tarsomere longer than combined length of second and third tarsomeres.

SPECIES INCLUDED

B. nigrifrons sp. nov. (type species) – Borneo

B. webbi sp. nov. – Peninsular Malaysia

DISTRIBUTION. Currently known distribution includes Borneo and Peninsular Malaysia.

BIOLOGY. Nothing is known concerning the biology.

Identification key to the species of *Bhaskaraena* gen. nov.

- Frons and clypeus largely black (Fig. 4 D). Clavus entirely pink (Fig. 4 A). Hind wings with orange elongate basal patches (Fig. 4 A) *B. nigrifrons* sp. nov.
- Frons and clypeus variegated brown (Fig. 5 D). Clavus reddish with brown markings (Fig. 5 A). Hind wings with red elongate basal patches (Fig. 5 A) *B. webbi* sp. nov.

Bhaskaraena nigrifrons sp. nov.

Figs 3, 4

DIAGNOSIS. The species can be easily separated from *B. webbi* sp. nov. using the above key.

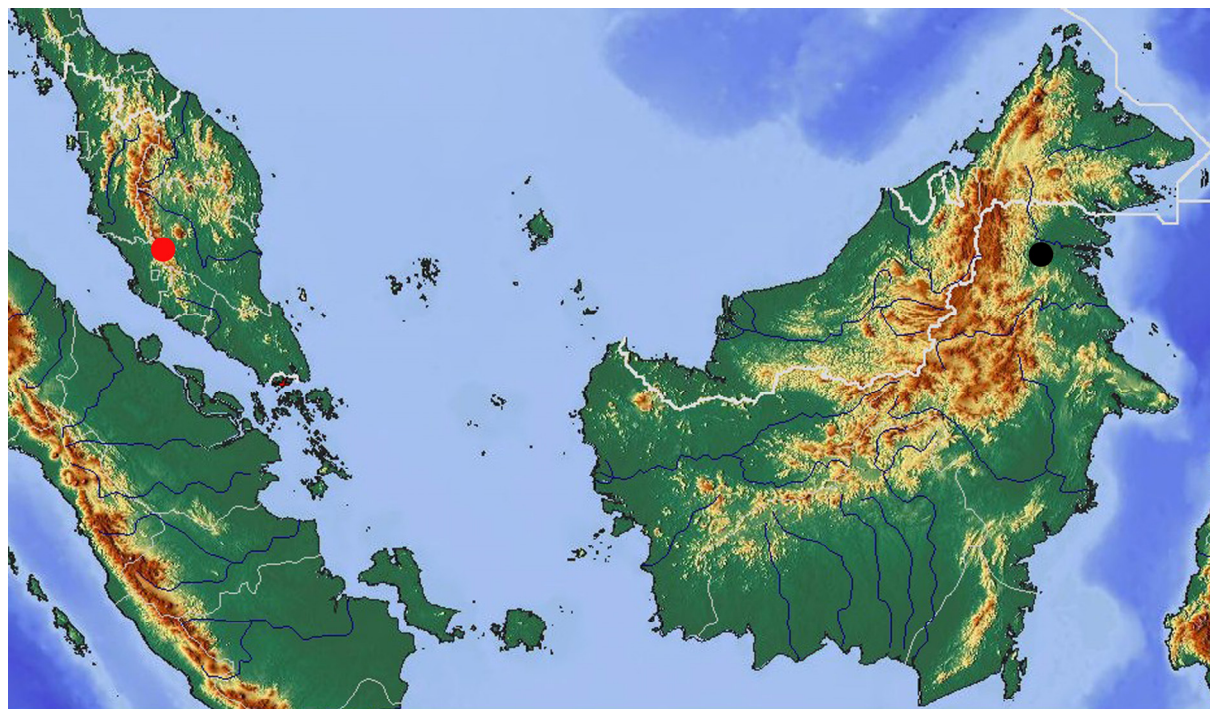
ETYMOLOGY. The species epithet is formed by the juxtaposition of *niger* (adj., Latin) = black and *frons* (Latin) = frons. It refers to the black colour of the frons of the species.

TYPE MATERIAL. Holotype ♀: [Coll. I.R.Sc.N.B., Indonesia, Borneo, East Kalimantan, West Malinau, Tanjung Lapang village, III.2015, gift Edy Bhaskara] (RBINS).

DESCRIPTION

Measurements and ratios: LT: ♀ (n = 1): 22.5 mm. Ratio BV/LV = 1.2; LF/BF = 0.8; LTg/BTg = 3.18.

Head: Vertex slightly longer than broad, excavate, rosy yellow with minute brown points; smooth in middle (Fig. 4 B). Frons mostly black with some brown spots in lateral fields; yellow brown with black points sometimes fused together between carinae (Fig. 4 D); carinae slightly projecting anteriorly; frons slightly convex in side view (Fig. 4 F). Genae black-brown under level of middle of eyes, rosy-yellow above; sides of vertex higher than eye, visible above eye in lateral view and roundly angular at mid-length of eye (Fig. 4 F). Cephalic process pointed, projecting dorsally, greenish yellow above level of middle of eye (Fig. 4 D, F); anterior face with broad black median line (Fig. 4 D). Clypeus convex, carinate on apical half, with sides sinuate; base narrower than frons; black with pale yellow markings along frontoclypeal suture and on apical half (Fig. 4 D). Labium brown, surpassing metacoxae, with last segment narrower and much shorter than penultimate (Fig. 4 C). Antennae black-brown (Fig. 4 D, F).



● *Bhaskaraena nigrifrons* sp. nov.

● *Bhaskaraena webbi* sp. nov.

Fig. 3. Distribution map of the species of *Bhaskaraena* gen. nov.

Thorax: Pronotum rosy-yellow, minutely punctured, with small brown marking at posterior apex of carina; laterodorsal carina brown subapically (Fig. 4 B). Sides of prothorax black under level of lower margin of eye, with few irregular brownish markings (Fig. 4 F). Mesonotum minutely punctured, with black-brown marking along median carina, broader in middle, and small brown markings along peridiscal carinae and at base of scutellum (Fig. 4 B). Scutellum flattened (Fig. 4 F). Tegulae rosy-yellow (Fig. 4 B, F).

Tegmina: (Fig. 4 A) Black-brown, with clavus and large marking on corium along apex of clavus, pink; irregular brownish white markings on corium, along clavus, along costal margin and along sutural margin at level of nodal line; small white spots along apical margin; rosy patch along costal margin at nodal line.

Hind wings: (Fig. 4 A, C) Dark brown with central elongate hyaline patch. Three elongate orange markings originating from base: one extending on anal area to half length; one along claval joint on 2/3 of length and one along costal margin on basal third. Veins black-brown, orange on anal and claval orange areas.

Legs: (Fig. 4 A, C) Elongate and slender. Pro- and mesocoxae black with pale yellow markings; metacoxae black. Pro- and mesofemora black with three oblique pale yellow rings, narrowing from base to apex; metafemora black with pale yellow markings. Pro- and mesotibiae black with 2 pale yellow rings. Pro- and mesotarsi black. Metatibiae and metatarsi dark brown.

Abdomen: (Fig. 4 A, C) Orange dorsally; genital segments and ventral face black-brown.

DISTRIBUTION. Known from the Indonesian part of Borneo: Kalimantan, West Malinau. See map Fig. 3.

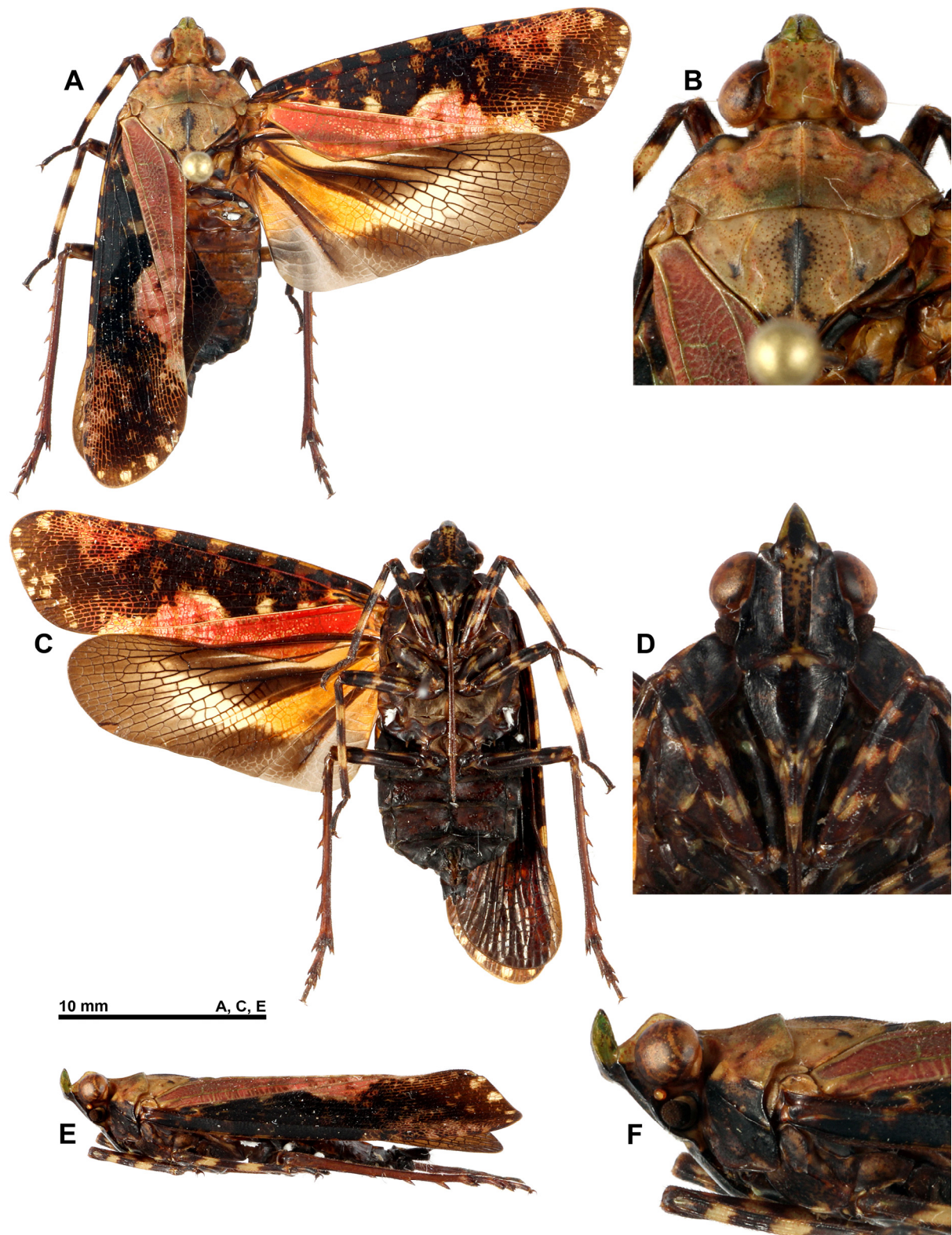


Fig. 4. *Bhaskaraena nigrifrons* sp. nov., holotype ♀. A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

***Bhaskaraena webbi* sp. nov.**

Figs 3, 5

DIAGNOSIS. The species can be easily separated from *B. nigrifrons* sp. nov. using the above key.

ETYMOLOGY. The species is dedicated to Mr Mick Webb (BMNH) in acknowledgement for his help for many years.

TYPE MATERIAL. Holotype ♀: [Malaya, Pahang Nr Karak, Chintamani, Jungle light, Aug. 22nd 1935.] [Ex F.M.S. Museum., B.M. 1955-354] (BMNH).

DESCRIPTION

Measurements and ratios: LT: ♀ (n = 1): 22.8 mm. Ratio BV/LV = 1.15; LF/BF = 0.8; LTg/BTg = 3.21.

Head: Vertex slightly longer than broad, excavate, reddish yellow with small black points (Fig. 5 B). Frons yellow-brown with black points sometimes fused together between carinae (Fig. 5 D); carinae slightly projecting anteriorly; frons slightly convex in side view (Fig. 5 F). Genae pale yellow-brown; sides of vertex higher than eye, visible above eye in lateral view and roundly angular at mid-length of eye (Fig. 5 F). Cephalic process pointed, projecting anterodorsally, pale yellow-brown (Fig. 5 D, F); anterior face with brown median line, darker in middle (Fig. 5 D). Clypeus convex, carinate on apical half, with sides sinuate; base narrower than frons; brown variegated with yellow-brown (Fig. 5 D). Antennae dark brown (Fig. 5 D, F).

Thorax: Pronotum brown variegated with yellow-brown, with small black points, and transverse dark brown marking along posterior margin (Fig. 5 B). Sides of pronotum brown variegated with yellow-brown; pale yellow spot on anterior margin, behind eye (Fig. 5 F). Mesonotum brown variegated with yellow-brown with small black spots, with black-brown markings on lateral fields, one v-shaped along anterior margin and one near posterior margin (Fig. 5 B). Scutellum flattened (Fig. 5 F). Tegulae yellow-brown (Fig. 5 B, F).

Tegmina: (Fig. 5 A) Reddish with irregular brown markings; costal area brown with pale yellow-brown markings; apical half of membrane mostly brown, with white spots along apical margin; small white marking along sutural margin, on nodal line.

Hind wings: (Fig. 5 A, C) Dark brown with central elongate hyaline patch. Three elongate red markings originating from base: one extending on anal area to half length; one along claval joint on 2/3 of length and one along costal margin on basal half; brown areas between red markings tinged with red. Veins black-brown, red on anal and claval red areas and on basal half of costal red area.

Legs: (Fig. 5 A, C) Elongate and slender. Pro- and mesocoxae brown with pale yellow markings; metacoxae brown. Pro- and mesofemora brown with three oblique pale yellow rings, narrowing from base to apex; metafemora brown with pale yellow markings. Pro- and mesotibiae brown with 2 pale yellow rings. Pro- and mesotarsi brown. Metatibiae and metatarsi brown.

Abdomen: (Fig. 5 A, C) Red dorsally; genital segments and ventral face black-brown.

DISTRIBUTION

Known from Peninsular Malaysia in the Pahang state. See map Fig. 3.

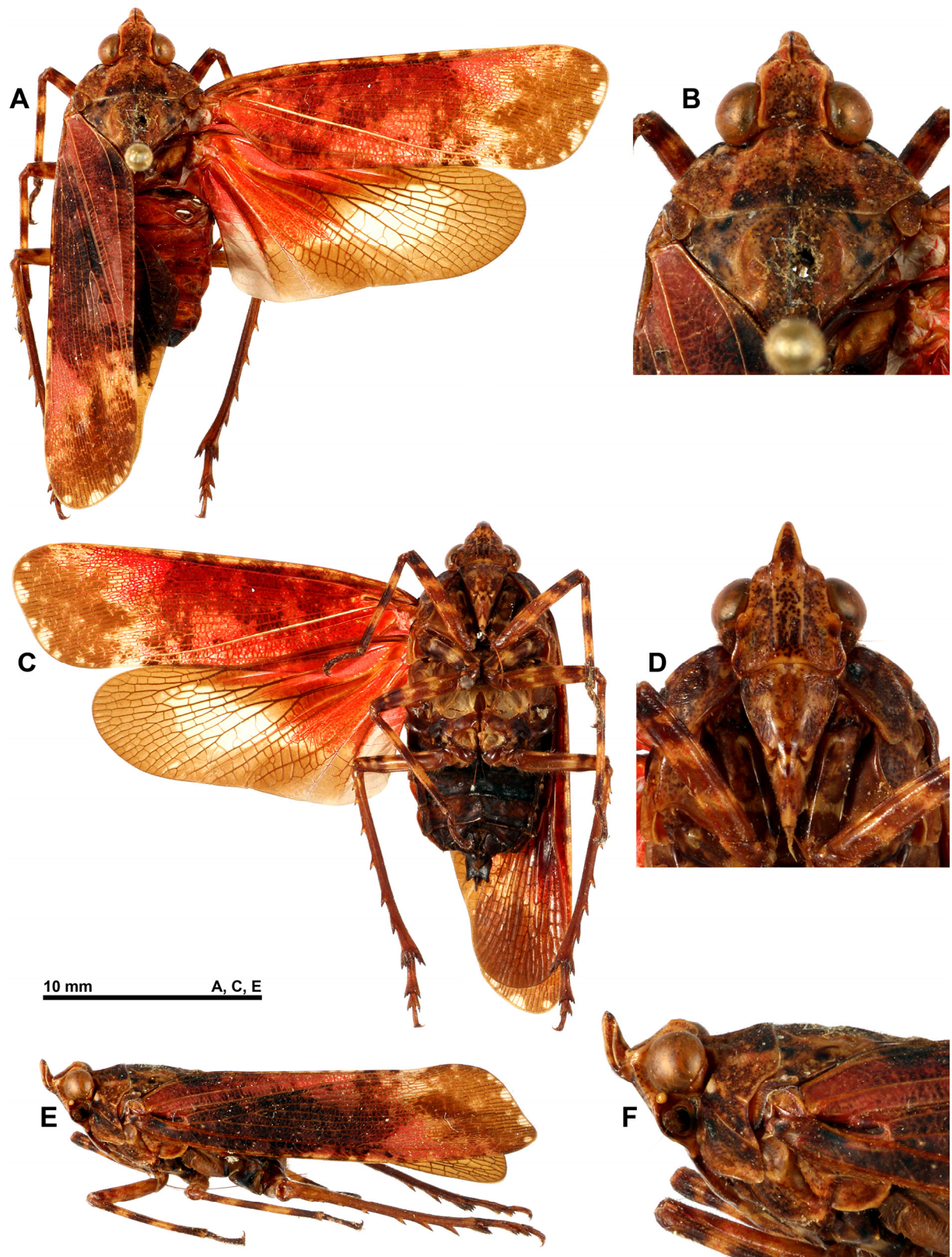


Fig. 5. *Bhaskaraena webbi* sp. nov., holotype ♀. A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

Discussion

The new genus *Bhaskaraena* gen. nov. shows a distribution within Sundaland, a biogeographic region covering Malay Peninsula, Sumatra, Java and Borneo and small surrounding islands. Hence, the presence of the genus in Sumatra and Java can reasonably be expected, probably with new species.

Specimens of *Bhaskaraena* gen. nov. are very scarce in collections. They are probably very difficult to spot in the field because of their cryptic colour when sitting on tree trunks. Nothing is known of the biology of those insects and, despite of their motivation, none of the nature photographers I am in contact with in Malaysia and Borneo has ever observed a specimen.

It is interesting to note that *Bhaskaraena* gen. nov. is, with *Neocalthous* Wang & Huang, 1989 (China) and *Egregia* Chew Kea Foo, Porion & Audibert, 2010 (Borneo and Sumatra), the third recently described genus of Fulgoridae from the Oriental region, all three containing 2 species, 78 years after *Datua* Schmidt, 1911 (BOURGOIN, 2015). Despite their large size and bright colour, lanternflies are not easy to locate in nature and large portions of the region remain unexplored in terms of Fulgoridae. More interesting discoveries may be expected with the continued exploration of the Asian forests. As fulgorids depend on trees of the forest for their food and habitat, it is clear that deforestation is the major threat to those insects.

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