Revision of the Eurybrachidae (X). The Oriental genus *Chalia* Walker, 1858 (Hemiptera: Fulgoromorpha)

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Abstract

The Oriental genus of Eurybrachidae (Hemiptera, Fulgoromorpha) *Chalia* Walker, 1858 is redescribed and reviewed and *Frutis* Stål, 1862 is proposed as a synonym of *Chalia*. The following new combinations are proposed: *Chalia pulchra* (Gray, 1832) n. comb. for *Frutis pulchra* (Gray, 1832), *Chalia amplipennis* (Stål, 1870) n. comb. for *Frutis amplipennis* Stål, 1870, *Chalia sanguineovittata* (Stål, 1870) n. comb. for *Frutis sanguineovittata* Stål, 1870 and *Chalia modesta* (Schmidt, 1913) n. comb. for *Frutis modesta* Schmidt, 1913. One new species is described from the Philippines, *Chalia luzonica* n. sp.; the following 4 taxa, *Chalia aphaenoides* Walker, 1858, *Eurybrachys isabella* Walker, 1870, *Frutis sinensis* Distant, 1890, and *Frutis emarginata* Jacobi, 1944, are proposed as synonyms of *Chalia pulchra* (Gray, 1832) and *Frutis pulchra* var. *immaculata* Schmidt, 1913 is proposed as a synonym of *Chalia modesta* (Schmidt, 1913), leaving 5 valid species. Male and female genitalia are illustrated and photos of habitus, a distribution map and biological data are provided with the descriptions of the species. An identification key to the species is also proposed. Lectotypes are designated for *Chalia aphaenoides*, *Lystra pulchra*, *Eurybrachys isabella*, *Frutis sinensis*, *F. pulchra* var. *immaculata*, *F. modesta*, *F. emarginata*, *F. amplipennis* and *F. sanguineovittata*.

Résumé

Le genre oriental d'Eurybrachidae (Hemiptera, Fulgoromorpha) *Chalia* Walker, 1858 est redécrit et révisé et *Frutis* Stål, 1862 est proposé comme synonyme de *Chalia*. Les nouvelles combinaisons suivantes sont proposées: *Chalia pulchra* (Gray, 1832) n. comb. pour *Frutis pulchra* (Gray, 1832), *Chalia amplipennis* (Stål, 1870) n. comb. pour *Frutis amplipennis* Stål, 1870, *Chalia sanguineovittata* (Stål, 1870) n. comb. pour *Frutis sanguineovittata* Stål, 1870 et *Chalia modesta* (Schmidt, 1913) n. comb. pour *Frutis modesta* Schmidt, 1913. Une espèce nouvelle est décrite des Philippines, *Chalia luzonica* n. sp.; les 4 taxons suivants, *Chalia aphaenoides* Walker, 1858, *Eurybrachys isabella* Walker, 1870, *Frutis sinensis* Distant, 1890 et *Frutis emarginata* Jacobi, 1944, sont proposés comme synonymes de *Chalia pulchra* (Gray, 1832) et *Frutis pulchra* var. *immaculata* Schmidt, 1913 est proposé comme synonyme de *Chalia modesta* Schmidt, 1913, ce qui laisse 5 espèces valides. Les genitalia mâle et femelle sont illustrés et des photos d'habitus, une carte de répartition ainsi que des renseignements sur la biologie accompagnent la description des espèces. Une clé de détermination des espèces est également proposée. Des lectotypes sont désignés pour *Chalia aphaenoides, Lystra pulchra*, *Eurybrachys isabella*, *Frutis sinensis*, *Frutis pulchra* var. *immaculata*, *F. modesta*, *F. emarginata*, *F. amplipennis* et *F. sanguineovittata*.

Key words: Oriental region, Eurybrachidae, revision, identification key, *Chalia, Frutis*.

Introduction

This paper is the tenth one of a series intended to revise the family Eurybrachidae. It is the third one dealing with the Oriental fauna (Constant, 2006d, 2007), the others dealing with the Australian (Constant, 2005c, 2006a, b, c) and Afrotropical faunas (Constant, 2004, 2005a, b). The study starts with the necessary preliminary one-by-one revision and redefinition of the genera and is aimed to propose a more natural classification in the family. This will also allow tentative understanding of the phylogeny and zoogeography of the family. The genus *Chalia* Walker, 1858 treated here is one of the larger genera from the Oriental region and the only Oriental genus in which infra-ocular spines are absent. Specimens of the genus are always scarce in collections and males are particularly poorly represented. The large size, bright colour and conspicuousness of the type species *Chalia pulchra* (Gray, 1832), combined with the lack of study of the genitalia, have lead to multiple descriptions of the species although it had been very well illustrated in the description by Gray. An identification key to the species of the genus based on easily observable characters is proposed in order to allow recognition of the known species and also separation of possible new species that are likely to exist, especially in the Philippine Archipelago.

Historical review

Chalia Walker, 1858
In 1858, Walker created the genus *Chalia* for a new species from Penang, Malaysia, *Chalia aphaenoides* Walker, 1858. The following characters were given to define the genus: (**1**) head a little narrower than thorax, (**2**) frons and vertex flat, (**3**) [sides of] face lanceolate and subcarinate, (**4**) thorax short, not carinate, (**5**) genitalia well defined, (**6**) tegmina narrow with apex rounded, not reticulate at base, moderately reticulate in middle and much reticulate apically. Atkinson (1886) erroneously transferred the species to the genus *Polydictya* Guérin, 1844 and in 1903, Melichar erroneously synonymized *Chalia* with *Polydictya*. Later, Muir (1930) moved *Chalia* to the Eurybrachidae and Metcalf (1956) placed it in the tribe Frutini Schmidt, 1908.

Frutis Stål, 1862
In 1862, Stål created the genus *Frutis* for one species from Borneo, *Aphaena verisamor* Walker, 1857, with the following distinctive features for the genus: (**1**) no subocular spine, (**2**) clavus closed, (**3**) posterior tibiae sexspinose, (**4**) scutellum representing about half of thorax length, (**5**) antennae short with second segment subglobular (Stål's statement that the clavus is closed is erroneous).

The genus was described in a key to the genera of Eurybrachidae without subocular spine and with clavus closed. The same key was given in English by Atkinson (1886).

In 1903, Melichar stated that the Eurybrachidae can be divided into 2 main groups, one with a spine under the eyes, the other without a spine, and placed *Frutis* in the latter together with the Australian genera *Dardus* Stål, 1859, *Gedrosia* Stål, 1862, *Olonia* Stål, 1862 and *Platybrachys* Stål, 1859.

Distant (1906) gave a key to the Oriental genera of Eurybrachidae and separated *Frutis* from all other Oriental genera by the lack of a spine under the eye. He gave a description of the genus and its known distribution (Oriental and Malayan regions, and China, the last being erroneous).

Later Schmidt (1908) created the tribe Frutini (main distinctive features: (**1**) clavus not closed, (**2**) claval veins fused, (**3**) no subocular spine) with the only genus *Frutis*, and in 1913, he summarized the history of the genus, stating that specimens are scarce in the collections.

A total of 6 species and one variety were included in the genus by Metcalf (1956):

- *Lystra pulchra* Gray (1832) from «India», a species considered as senior synonym of *Aphaena verisamor* Walker, 1857 by Walker (1858). Stål (1862) designated *Aphaena verisamor* as type-species of his new genus *Frutis*. Faunistic data from Borneo (Sarawak) were given by Lallemand (1939).
- *F. sanguineovittata* Stål, 1870 and *F. amplipennis* Stål, 1870 from the Philippines.
- *F. sinensis* Distant, 1890 from Northern China. The same erroneous data is given by Nast (1972) in his catalogue of the Palaearctic Homoptera
- *F. pulchra* var. *immaculata* Schmidt, 1913 from Nias Island, off Sumatra and *F. modesta* Schmidt, 1913 from Borneo.
- *F. emarginata* Jacobi, 1944 from Pinang (Malaysia). The species is erroneously mentioned from Fukien, China by Metcalf (1956), probably because it was described in a paper mainly dedicated to the homoptera fauna of Fukien province.

Materials and methods

The types of all described species have been studied and as much material as possible has been examined. The genitalia of all the males have been checked. The dissection of the genitalia is done after boiling the abdomen in glacial acetic acid for a few minutes. The pygofer is then separated from the abdomen and boiled for about one hour in a 10% solution of potassium hydroxide (KOH) with some drops of aqueous solution of chlorazol black. It is then placed in glycerin. For routine identification, only the acetic acid boiling has been done as the specific structures on the phallic complex are directly visible after moving aside the gonostyli. The genitalia have been placed under the specimen, in glycerin.

The description of the female genitalia follows Bourgoin (1993) with additions from the studies of Soulier-Perkins (1997) and Soulier-Perkins & Bourgoin (1998) on the family Lophopidae.

Lectotypes have been designated when necessary in order to improve nomenclatural stability in the group. For the valid species described only on female specimen(s), one specimen of the opposite sex has been chosen as reference for the species. Although the term has no value under taxonomic rules, Medler's (1999) policy of labelling those reference specimens as «Plesiotype» with blue labels, has been followed. The useful aspect of those designations for future workers seems evident. For the labels of the types, each single label is limited by square brackets. The etymology of

the scientific names is given whenever possible.

Each species is redescribed and the genitalia as well as other characters useful for identification are figured. A distribution map produced by the software *CFF* (Barbier & Rasmont, 2000) and photos of *habitus* are also provided. If necessary, the current name of the localities is mentioned in parentheses after the one transcribed from the label.

The few indications about the biology of the species are provided, as well as an identification key.

The following acronyms are used for the measurements (measurements are taken as in Constant, 2004): BF, breadth of the frons – BT, breadth of the thorax – BTg, breadth of the tegmen – BV, breadth of the vertex – LF, length of the frons – LM, length of the mesonotum – LP, length of the pronotum – LT, total length – LTg, length of the tegmen – LV, length of the vertex.

Acronyms used for the collections (name of the curator in parentheses).

BMNH: The Natural History Museum, London, United Kingdom (M. Webb)
CAS: California Academy of Sciences, San Francisco, California, U.S.A. (N. D. Penny)
FMNH: Field Museum of Natural History, Chicago, Illinois, U.S.A. (P.P. Parillo)
FSCA: Florida State Collection of Arthropods, Division of Plant Industry, Gainesville, Florida, U.S.A. (S.E. Halbert)
FSAG: Facultés des Sciences Agronomiques de Gembloux, Gembloux, Belgium (E. Haubruge)
IRSNB: Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium (P. Grootaert)
NMBC: Moravske Museum, Brno, Czech Republic (I. Malenovsky)
MNHN: Museum National d'Histoire Naturelle, Paris, France (T. Bourgoin)
NHRS: Naturhistoriska riksmuseet, Stockholm, Sweden (B. Viklund)
OUMNH: Oxford University Museum of Natural History, Oxford, United Kingdom (D. Mann and Z. Simons)
RMNH: Nationaal Natuurhistorisch Museum (Naturalis), Leiden, The Netherlands (J. van Tol)
RSME: National Museum of Scotland, Edinburgh, United Kingdom (A. Whittington)
SMTD: Staatliches Museum für Tierkunde, Dresden, Germany (R. Emmrich)
USNM: National Museum of Natural History, Washington D.C., U.S.A. (S. McKamey)
ZIN: Russian Academy of Sciences, Zoological Institute, St Petersburg, Russia (A. Emeljanov)
ZMPA: Polish Academy of Sciences, Museum of the Institute of Zoology, Warsaw, Poland (J. Szwedo)
ZMAN: Zoölogisch Museum Amsterdam, Amsterdam, The Netherlands (J.P. Duffels)
ZMUC: Zoological Museum of the University of Copenhagen, Copenhagen, Denmark (N.P. Christensen)
ZRC: National University of Singapore, Raffles Museum of Biodiversity Research, Zoological Reference Collection, Singapore (H.K. Lua)

Taxonomic part

Description of the taxa

Genus *Chalia* Walker, 1858

Type-species: *Chalia aphaenoides* Walker, 1858 (junior synonym of *Chalia pulchra* (Gray, 1832)), by monotypy.

Chalia Walker, 1858: 31.
Frutis Stål, 1862: 488 **n. syn.**

Type-species: *Aphaena verisamor* Walker, 1857 (junior synonym of *Chalia pulchra* (Gray, 1832)), by original designation and monotypy.

Frutis Stål, 1862: Atkinson, 1886: 13.
Frutis Stål, 1862: Melichar, 1903: 67.
Chalia Walker, 1858: Melichar, 1903: 71 (erroneously synonymized with *Polydictya* Guérin, 1844)
Frutis Stål, 1862: Distant, 1906: 220 & 234.
Frutis Stål, 1862: Schmidt, 1913:184.
Frutis Stål, 1862: Lallemand, 1939: 71.
Frutis Stål, 1862: Metcalf, 1956: 46.
Chalia Walker, 1858: Metcalf, 1956: 48.

Diagnostic characters: Large size (more than 20 mm), elongate; no infra-ocular spine; clavus narrowly open; hind wings unicolorous. Oriental region.

Description: *Head*: narrower than thorax; vertex about 3 times broader than long, with 2 slight impressions close to hind margin; hind and lateral margins carinate, fore margin carinate or not, fore and hind margins curved; frons 1.6 - 1.7 times broader than long (Plate 1

A); clypeus reaching fore trochanter; labium reaching median trochanter, with last segment strongly dilated, shorter and broader than penultimate (Plate 1 B); no infra-ocular spine; ocelli absent; antennae short, reaching or projecting little beyond level of lateral process of frons; scape short, pedicel subglobular.
Thorax: about 1.4 - 1.7 as broad as length of pro- & mesonotum together; pronotum with fore margin carinate; oblique, obsolete carina on each side of anterior part of disc and median impression on disc; mesonotum smooth.
Tegmina: flat; 2.4 - 3 times longer than broad; maximal breadth near apex; costal margin slightly curved; apex rounded; apical 1/4 with numerous cross-veins; clavus narrowly open.
Venation: vein *C* barely distinct on first 1/3; veins *Sc* & *R* separated close to base; first fork of vein *M* beyond *Sc*-*R* separation; veins *A1* & *A2* fused at about 2/3 of clavus length.
Hind wings: well developed, broad, rounded at apex; reaching apex of tegmina at rest; sutural margin with cut-out before apex; anal area well developed; broader than tegmina.
Legs: I and II slender, elongate, with femur & tibia dorso-ventrally flattened, not foliacous; tibia III with 5-6 lateral and 9 apical spines; first hind tarsomere elongate, without pad of microsetae, bearing apically a group of 12 strong spines on the ventral face (Plate 1 C).
Genitalia ♂: pygofer higher than long in lateral view, with large, latero-posterior, laminate process directed posteriorly; anal tube dorso-ventrally flattened; gonostyli fused basaly, bearing dorsal process divided into slender process curved laterad and larger one curved dorsad; phallic complex with several, more or less developed, spinose processes, and apico-ventral process articulate.
Genitalia ♀: anal tube elongate; beyond anus, projecting postero-ventrad, v-shaped in cross-section and laminate ventrally; anus at first 1/3 to 1/2; gonoplacs unilobous, projecting dorso-laterad, not surpassing anal tube; gonapophysis IX higher than long, subrectangular with ventral margin rounded, inner wall concave; gonocoxae VIII like large, pilose, inflated pouch, largely extending ventrally; gonapophysis VIII elongate, pointed, shorter than gonapophysis IX; anterior vagina positioned ventrally, subtriangular, much smaller than posterior vagina and with spermatheca attached apically; posterior vagina bearing numerous ridges, with bursa copulatrix attached apically; bursa copularix medium to large, longer than posterior vagina, without visible ornamentation on walls.

Sexual dimorphism: males smaller than females and with tegmina more elongate.
Size: ♂: 21-25 mm; ♀: 26-35 mm.

Distribution: South East Asia: from Malaysia to Java, Sumatra, Borneo and the Philippines.

Note: in this genus, stable characters have been observed in the shape of gonocoxae VIII and posterior vagina that can be used for identification of species.

Biology: The species of the genus seem to be associated with undisturbed dipterocarp forests where they live on tree trunks. No host plant is known to date.

1. Chalia amplipennis (Stål, 1870) n. comb.

Figs 4 A, 5 A, Plate 2 A.

Frutis amplipennis Stål, 1870: 754.
Frutis amplipennis Stål, 1870: Metcalf, 1956: 47.

Etymology: *amplipennis* (Latin): from *amplus* = broad and *penna* = wing. The name is assumed to refer to the shape of the tegmina and hind wings.

Type examined: Lectotype ♀ of *Frutis amplipennis* Stål, 1870 **present designation**: labeled [Ins. Phillipp.] [Semper] [Type] [Typus] [*Frutis amplipen- nis* Stål] [Lectotype ♀ *Frutis amplipennis* Stål, 1870, J. Constant des., 2007] [*Chalia amplipennis* (Stål, 1870) Jérôme Constant det. 2007] (NHRS).

Diagnostic characters: (female) Immediately recognized by the 2 maroon patches on tegmina: one semi circular along costal margin at first 1/3 and one discal band at 2/3, and the base of tegmina greenish olivaceous.

Description: LT: ♀ (n = 1): 34.6 mm.
Head: dark red, labium darker; antennae brownish; ratio BV/LV = 2.9; BF/LF = 1.6.
Thorax: entirely dark red; ratio LP+LM/BT = 0.66.
Tegmina: yellowish brown with basal 1/5 greenish olivaceous, semi-circular maroon patch along costal margin at basal 1/3 and at 2/3, maroon transverse band not reaching margins, narrowing from costal to sutural side of tegmen; patches and spots of waxy white secretion mainly on paler zones; ratio LTg/BTg = 2.3.
Hind wings: yellowish brown, paler than tegmina; baso-sutural 1/2 covered with white, waxy secretion.
Legs: all legs dark red, with spines of tibiae III and

tarsomeres of legs III infuscate.
Abdomen: bright red.
Genitalia ♂: unknown.
Genitalia ♀: gonocoxae VIII largely rounded and showing a finger shaped process at inner angle in ventral view; sternite VII strongly produced between gonocoxae VIII.

Notes: (**1**) it is possible that white waxy secretion covers larger parts of tegmina, hind wings and even body in fresh specimens; (**2**) full dissection has not been done for this species because it is known by a single female specimen and valuable distinctive external characters on the genitalia can be used to reliably identify this species.

Biology: The species is known from „the Philippines" without more precise data. No specimen has been collected since the type more than 130 years ago.

2. Chalia luzonica Constant, 2007 n. sp.

Figs 4 B, 5 A, Plate 2 B.

Etymology: *luzonica*: name derivated from Luzon, the Island of the Philipines archipelago where the species was collected.

Material examined: Holotype ♀: labeled [Quezon Park, Tayabas, Luzon, P.I. V-1-31] [F.C. Hadden collector] [F.C. Hadden collection] [Collection of the California Academy of Sciences, San Francisco, Calif.] [Holotype ♀ *Chalia luzonica* n.sp. Jérôme Constant det. 2007] – *dissected, abdomen in glycerine* (CAS).

Diagnosis: (female) Recognized from the other species by its unicolorous, brownish red tegmina.

Description: LT: ♀ (n = 1): 30.0 mm.
Head: yellowish brown with apex of clypeus darker and labium blackish; ratio BV/LV = 3.3; BF/LF = 1.6.
Thorax: entirely yellowish brown; ratio LP+LM/BT = 0.69.
Tegmina: yellowish brown, slightly darker near base, irregularly covered with white waxy secretion; ratio LTg/BTg = 2.5.
Hind wings: pale yellowish brown.
Legs: entirely maroon with apex of tibiae III and hind tarsi darker.
Abdomen: reddish brown.
Genitalia ♂: unknown.
Genitalia ♀: gonocoxae VIII with a process surpassing hind margin in ventral view and with postero-inner angle pointed; posterior vagina longer than broad in ventral view; sternite VII not produced between gonocoxae VIII, showing rounded emargination in middle of hind margin.

Note: the description of the species is based on a specimen that is suspected to have been preserved or collected in not optimal conditions (e.g. in ethanol) that could have affected its colouration.
Biology: Nothing is known of the biology of this

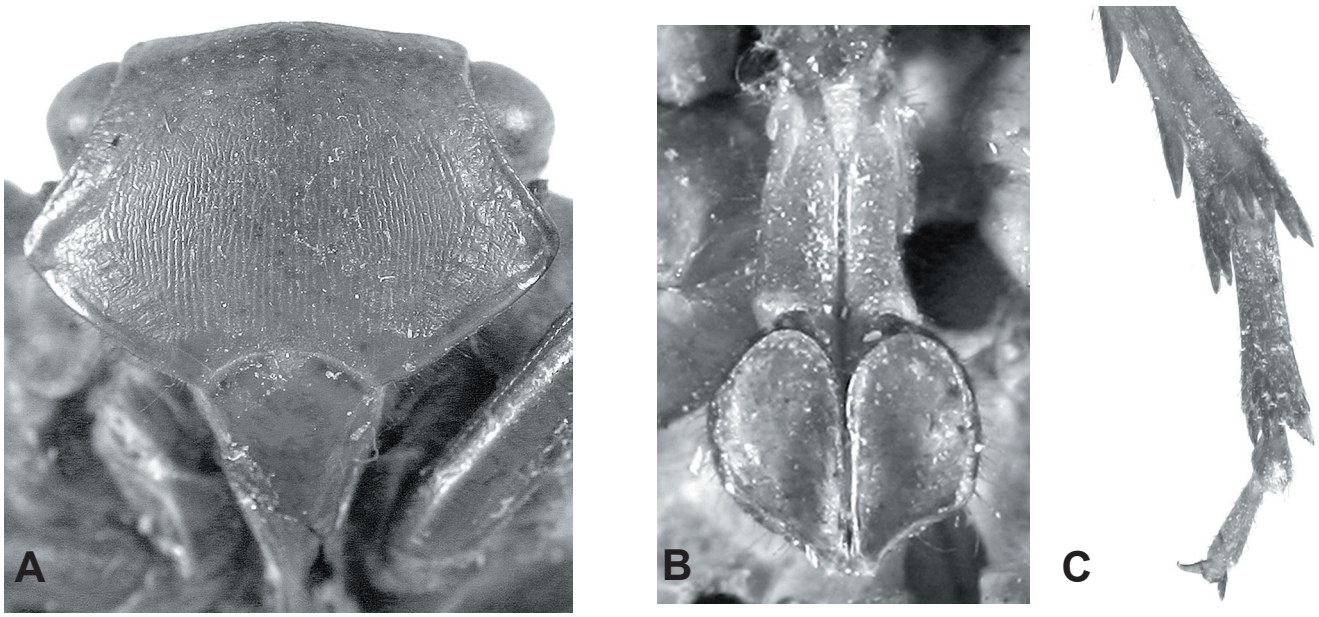

Plate 1 — A-C. *Chalia pulchra*: (**A**) frons, normal view; (**B**) apex of labium, ventral view; (**C**) hind tarsus, ventral view.

species which is only known from the island of Luzon.

3. Chalia modesta (Schmidt, 1913) n. comb.

Figs 1, 4 C, 5 B, Plate 2 C-D.

Frutis modesta Schmidt, 1913: 186.
Frutis pulchra var. *immaculata* Schmidt, 1913: 186 **n. syn.**.
Frutis modesta Schmidt, 1913: Metcalf, 1956: 47.
Frutis pulchra var. *immaculata* Schmidt, 1913: Metcalf, 1956: 48.

Etymology: - *immaculata* (adj., Latin): without spots. The name refers to the lack of yellow markings on the tegmina of the female comparatively to females of *C. pulchra* (Gray, 1832).
- *modesta* (adj., Latin): modest, sober. The name is assumed to refer to the colouration of the species that is much less bright than in the closely related *C. pulchra* (Gray, 1832).

Types examined: - Lectotype ♂ of *Frutis modesta* Schmidt, 1913 **present designation**: labeled [Matang 3200 ft. 17-7-1909] [Type] [*Frutis modesta* Schmidt ♂ Edm. Schmidt determ. 1913] [Mus. Zool. Polonicum, Warszawa, 12/45] [Lectotype ♂ *Frutis modesta* Schmidt, 1913, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♂, Jérôme Constant det. 2007] – *dissected, genitalia in glycerine* (ZMPA).

Note: the description of the species was based on one male and one female. Schmidt (1913) stated that one of the types (the female) is deposited at the Sarawak Museum in Kuching. Despite considerable efforts, the specimen has not been found in the collections of the Sarawak Museum (Zaidi Mohd Isa, *pers. com.*).

- Lectotype ♀ of *Frutis pulchra* var. *immaculata* Schmidt, 1913 **present designation**: labeled [Goenoeng Sitoli, Nias, H. Rolle Berlin S.W. 11.] [Type] [*Fr. pulchra var. immaculata* Schmidt ♀ Edm. Schmidt determ. 1913] [Mus. Zool. Polonicum, Warszawa, 12/45] [Lectotype ♀ *Frutis pulchra var. immaculata* Schmidt, 1913, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♀, Jérôme Constant det. 2007] (ZMPA).

Note: the spelling of the type locality „Goenveng Sitoli" in Schmidt (1913) is erroneous.

Other material examined (2 ♂, 12 ♀) – **Borneo**: 1 ♀: Borneo, Hewitt [RSME]; 1 ♀: Borneo, B. Orfakekkam, XII.1912, Kampmeinert [RMNH]; (***Indonesian part***) 1 ♀: Long Bloeöe (= Longbluu), 1898, Dr. Nieuwenhuis [RMNH]; 5 ♀: Mahakkam, 1894, Dr. Nieuwenhuis [4: RMNH; 1: ZMAN]; 1 ♀: Semberah (= Sembera), 50 km N Mahakam delta, 04.V.1935, Mrs Pijpers-Heynen [ZMAN]; 1 ♀: Sibuku river, I.1954, R. von Hentig, [FMNH]; (***Malaysian part***) 1 ♂: Matang, VIII.1899 [BMNH]; 1 ♂: Sarawak, 1909, C.J. Brooks [BMNH];**Sumatra**: 1 ♀: Seumonjam (= Seumonyam), Menlabok, 1894, Dr. Nieuwenhuis [RMNH]; **Nias Island:** 1 ♀: North Nias, Hili Madjedja (= Hili Maziaya), X-XII.1895, Mitschke [BMNH].

Diagnostic characters: Immediately recognized by the colour of tegmina: in females, green without yellow patches on base of clavus and disc but showing a patch suffused with yellow at 2/3 on the costal cell (green colour can be faded to yellowish in collection specimens); in males dark green. Males are best identified by the genitalia. Sumatra, Nias and Borneo.

Description: LT: ♂ (n = 3): 26.0 mm (25.4 - 26.5); ♀ (n = 8): 28.8 mm (26.9 - 32.5).
Head: olivaceous green; apex of clypeus and labium darker, brownish; antennae blackish; ratio BV/LV = 2.6; BF/LF = 1.7.
Thorax: olivaceous green with tegulae darker, blackish brown; ratio LP+LM/BT = 0.71.
Tegmina: irregularly covered with white, waxy secretion; ♂: olivaceous green with irregular brownish patches: transverse band close to base, 2 patches at first 1/3 and 1/2 along costal margin more or less distinct; yellowish brown zone on apical 1/4 extending along costal and sutural margins; ♀: green with yellowish zone on apical 1/4 extending to 1/2 along costal margin and to 2/3 along sutural margin; costal cell usually covered with white waxy secretion on basal 1/2; ratio LTg/BTg = (♂) 3.2, (♀) 2.7.
Hind wings: yellowish brown, covered with white, waxy secretion.
Legs: femora olivaceous green; tibiae and tarsi darker, reddish brown.
Abdomen: bright red, usually covered with white, waxy secretion.
Genitalia ♂: latero-posterior laminate process of pygofer triangular, pointing postero-dorsally; anal tube in dorsal view elongate, ovoid, constricted at base; gonostyli fused on less than 1/3 of length, elongate in ventral view and externally emarginate on apical 1/3 in ventral view, with dorsal process bearing 2-5 small teeth dorsally; phallic complex: see figs 1 D-E.
Genitalia ♀: gonocoxae VIII slightly emarginate on

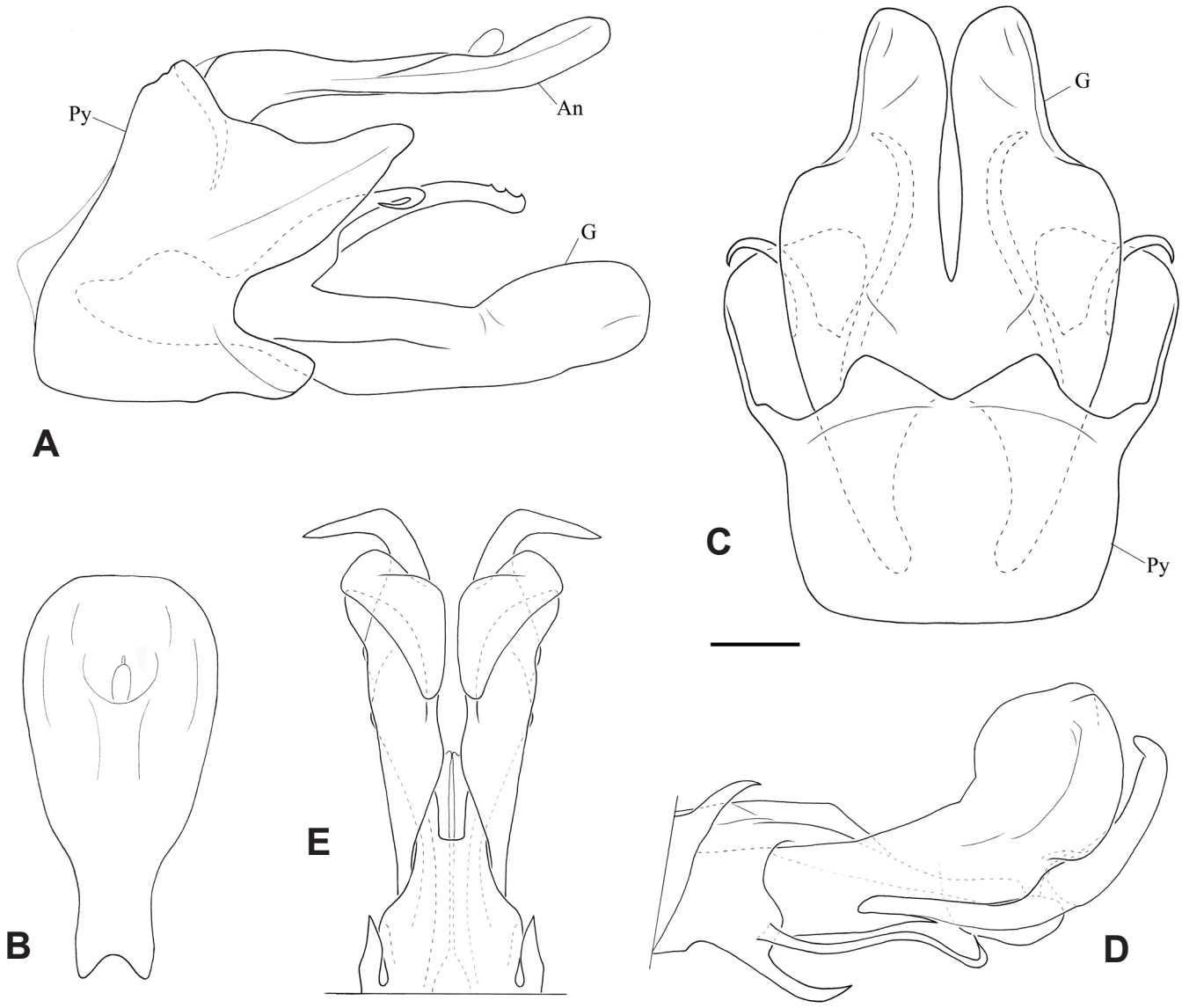

Fig. 1 — A-E. *Chalia modesta*, genitalia ♂. (**A**) pygofer, anal tube and gonostyli, left lateral view (An – anal tube; G – gonostyli; Py – pygofer); (**B**) anal tube, dorsal view; (**C**) pygofer and gonostyli, ventral view; (**D**) phallic complex, left lateral view; (**E**) phallic complex, dorsal view. Scale 1 mm.

inner half of posterior margin in ventral view and with postero-inner angle rounded; posterior vagina broader than long, with sides strongly broadened at level of abdominal segment VII; tergite VII produced between gonocoxae VIII in middle of hind margin.

Note: one female from Borneo (RSME) has tegmina coloured as in males.

Biology: Nothing is known of the biology of this species which is known from Nias, Sumatra and Borneo, except that the type specimen has been collected at altitude of about 975 m. It seems to be present as adults throughout the year but the paucity of data means this cannot be confirmed.

4. Chalia pulchra (Gray, 1832) n. comb.

Figs 2, 4 D, 5 A, Plate 1, 2 E-F.

Lystra pulchra Gray, 1832: 260, pl. 90 fig. 5.
Aphana [sic!] *pulchra* (Gray, 1832): Burmeister, 1835: 398.
Lystra pulchra Gray, 1832: Walker, 1851: 278.
Aphaena verisamor Walker, 1857: 143.
Chalia aphaenoides Walker, 1858: 31 **n. syn.**
Aphaena pulchra (Gray, 1832): Walker, 1858: 316 (synonymy of *Aphaena verisamor*).

Frutis verisamor (Walker, 1857): Stål, 1862: 488.
Frutis verisamor (Walker, 1857): Stål, 1870: 754.
Eurybrachys isabella Walker, 1870: 134 **n. syn.**
Frutis pulchra (Gray, 1832): Atkinson, 1886: 22 (*Aphaena pulchra* transferred to *Frutis* and synonymy of *Aphaena verisamor*).
Polydictya aphaenoides (Walker, 1858): Atkinson, 1886: 255.
Frutis pulchra (Gray, 1832): Distant, 1906: 235, fig. 101.
Frutis pulchra (Gray, 1832): Schmidt, 1908: 243.
Frutis sinensis Distant, 1910: 160 **n. syn.**
Frutis pulchra (Gray, 1832): Schmidt, 1913: 185.
Frutis pulchra (Gray, 1832): Lallemand, 1939: 71.
Frutis emarginata Jacobi, 1944: 11 **n. syn.**
Eurybrachys isabella Walker, 1870: Metcalf, 1956: 21.
Frutis emarginata Jacobi, 1944: Metcalf, 1956: 47.
Frutis pulchra (Gray, 1832): Metcalf, 1956: 47.
Frutis sinensis Distant, 1910: Metcalf, 1956: 48.
Chalia aphaenoides Walker, 1858: Metcalf, 1956: 48.
Frutis sinensis Distant, 1910: Nast, 1972: 136.

Etymology: - *pulchra* (adj., Latin): beautiful. It is here assumed that the name refers to the general aspect of the species.
- *emarginata* (adj., Latin): emarginate. The name is assumed to refer to the shape of the hind wings.
- *aphaenoides* (adj.): from *aphaena*, the name of a genus of Fulgoridae and -*oides*, meaning «similar to». The name surely refers to the superficial similarity of the species with the members of the genus *Aphaena* Guérin-Méneville, 1834. It seems interesting to mention that Walker (1857) described the female of the same species as *Aphaena verisamor*.
- *sinensis* (adj.): from China. The name refers to the (erroneous) origin of the species.

Types examined: - Lectotype ♀ of *Lystra pulchra* Gray, 1832 **present designation**: labeled [*Lystra pulchra* Gray] [type Hem: 480 *Lystra pulchra* Gray in Griffith's. Hope dept Oxford] [Lectotype ♀ *Lystra pulchra* Gray, 1832, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♀, Jérôme Constant det. 2007] (OUMNH).
- Lectotype ♂ of *Chalia aphaenoides* Walker, 1858 **present designation**: labeled [Penang] [*aphaenoides*] [68-4] [Type] [Lectotype ♂ *Chalia aphaenoides* Walker, 1858, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♂, Jérôme Constant det. 2007] (BMNH).
- Lectotype ♀ of *Eurybrachys isabella* Walker, 1870 **present designation**: labeled [S A R.] [56 - 44, *(underside)* Borneo] [*Eurybrachys isabella*] [Type] [Lectotype ♀ *Eurybrachys isabella* Walker, 1870, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♀, Jérôme Constant det. 2007] (BMNH).

Note: this specimen was erroneously described as a male by Walker (1870)

- Lectotype ♀ of *Frutis sinensis* Distant, 1890 **present designation**: labeled [Type] [*sinensis* Dist.] [China (Leech)] [Distant Coll. 1911 - 383.] [Lectotype ♀ *Frutis sinensis* Distant, 1890, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♀, Jérôme Constant det. 2007] (BMNH).
- Holotype by monotypy ♂ of *Frutis emarginata* Jacobi, 1944: labeled [Pinang, nov., Curtis T.] [Rosenberg Kauf 1907] [Type] [*Frutis emarginata* Jac.] [Staatl. Museum für Tierkunde Dresden] [Holotype ♂ *Frutis emarginata* Jacobi, 1944, J. Constant des., 2007] [*Chalia pulchra* (Gray) ♂, Jérôme Constant det. 2007] – *dissected, genitalia in glycerine* (SMTD).

Note: the type specimens (one male and one female according to Walker, 1857) of *Aphaena verisamor* Walker, 1857 are neither in the collections of the OUMNH (Zoë Simmons, *pers. com.*), nor in those of the BMNH (Mick Webb, *pers. com.*). Despite considerable investigation in other collections worldwide, those specimens have not been found and are here considered as lost. However, the original description contains enough details (especially the yellow spots at the base of the tegmina) to confirm the synonymy established by Walker (1858) with *Chalia pulchra* (Gray, 1832).

Other material examined (8 ♂, 60 ♀) – **Malaysia (*Peninsular*):** 1 ♂: Bukit Kutu, IV.1915 [USNM]; 1 ♀: idem, IV.1929, 3300 ft, A.R. Sanderson [BMNH]; 1 ♀: idem, 8.IX.1929, 3500ft, H.M. Pendlebury [BMNH]; 1 ♀: Selangor, Ampang, 12.I.1939, H. Simmonde, ex FMS Museum [BMHN]; 1 ♀: Perak [BMNH]; 2 ♀: idem, ex FMS Museum [BMNH]; 1 ♂, 2 ♀: idem, Doherty [BMNH]; 1 ♀: Gunong Kledang (=Gunong Keledang), Perak, XI.1916 [USNM]; 1 ♀: idem, ex FMS Museum [BMNH]; 1 ♀: Semongok (= Semonggok), 23.XI.1966, on tree, Christopher Chua [BMNH]; 1 ♀: Malay Peninsula, 31.VII.1914, ex F.M.S. Museum [BMNH]; 2 ♀: Baram [BMNH]; 1 ♀: idem, X.1891 [BMNH]; 1 ♀: Johor, Endau Rompin N.P., Janing Ridge Trail, 27.III.2001,day catch, primary lowland forest, leg. M.A. Schouten [ZMAN]; 1 ♀: Malacca [MNHN]; 1 ♀: idem, leg. H. Deyr. [RMNH]; 1 ♀: idem, 1862, leg. Castelneau [OUMNH]; 1 ♀:

idem, leg. Staudinger [NHRS]; 1 ♀: Penang (= Pulau Pinang) [RMNH]; 1 ♀: idem [BMNH]; 1 ♀: Pulo Penang (= Pulau Pinang),leg. van Seylingen [ZMUC]; 1 ♂: Pahang, Kuala Lahan, 900ft, 17.XI.1921, H.M. Pendlebury [BMNH]; **Java:** 1 ♀: java [ZMPA]; 1 ♀: Haù-schild (= Haur, Ci ?) [ZMUC]; 1 ♀: Ledru, 1894, Lab. Ent. Escalera [MMBC]; 1 ♀: Jelebu (=Kuala Kelawang), Bukit Janggu Pass, VIII.1911, H.H. Banks [OUMNH]; **Sumatra:** 1 ♀: Airputih, Singkep/ Riouw, 13.II.1955, leg; Cardinaal [RMNH]; 1 ♂: Ayer Gumai, 28-31.V.1907, leg. O. John [ZIN]; 1 ♀: Deli (= Labuhandeli), leg. Piepers [RMNH]; 1 ♀: Seumonjam (=Seumonyam), Menlabok, 1894, leg. Dr. Nieuwenhuis [RMNH]; 1 ♀: Tengah, 18.IX.1959, leg. Ryberg [ZMUC]; 1 ♀: Lebongtandai, 1920-1923, C.J. Brooks [BMNH]; 1 ♀: idem, IV.1923 [BMNH]; **Borneo:** 1 ♀: Borneo [MNHN]; 1 ♀: Borneo, leg. Hewitt [RSME]; 1 ♀: Borneo [BMNH]; 1 ♀: idem, leg. Boucard [NHRS]; (***Brunei***) 2 ♀: Brunei [ZIN]; 1 ♀: Brunei [NHRS]; 1 ♀: 4,7 km NW of Belait, 31.XII.1988, at light, 19: 00-20:00, mixed Dipterocarp forest, leg. E.F. de Vogel [RMNH]; 1 ♂: Ulu Temburong, 300m, II-III.1982, M.C. Day [BMNH]; (***Indonesian part***) 1 ♀: Lohabang, 1898, R. Oberthur [MNHN]; 6 ♀: , Mahakkam, 1894, leg. Dr. Nieuwenhuis [2: ZMAN; 4: RMNH]; (***Malaysian part***) 1 ♂: Bettotan (= Betotan, Sungai), nr Sandakan, 25.VII.1927, leg. C.B.K. & H.M.P.[BMNH]; 1 ♂: Danum Valley, field camp W5, 14-26.III.1987, alt. 175 m, Malaise trap, C. van Achterberg [RMNH]; 1 ♀: Sarawak, Dulit Mountains (= Banjaran Dulit), 14.VIII.1932, on tree trunk, primitive forest, junction of rivers Tinjar & Lejok, B.M. Hobby and A.W. Moore [BMNH]; 1 ♀: Sarawak, Dulit Mountains (= Banjaran Dulit), 16.XI.1932, primitive primary forest, river Koyan, B.M. Hobby and A.W. Moore [FASG]; 1 ♀: Kinabalu (= Kota Kinabalu) [NHRS]; 1 ♀: Limbang, II.1915, H.W. Smith [ZRC]; **Singapore:** 1 ♀: Singapore, Atkinson coll. [BMNH]; 1 ♀: Singapore, ex FMS Museum [BMNH]; 1 ♀: Singapore [ZRC]; **Unprecise localities:** 1 ♀: Banting, 05.VI.1912, leg. G.D.A. [OUMNH]; 1 ♀: Cantor [OUMNH]; **No locality data:** 1 ♀ [MNHN]; 1 ♀ [RMNH]; 1 ♂ [OUMNH]; 1 ♀: 1863 [RSME]; 1 ♀: Rothschild Bequest [BMNH].

Note: the species has been mentioned from India (Gray, 1832; Schaum, 1850) and from China (Distant, 1890; Nast, 1972). Those data are here considered as erroneous as they have not been confirmed by any more recent data.

Diagnostic characters: Immediately recognized by the colour of tegmina: females green with yellow patches on base of clavus and disc (can be faded to yellowish with paler patches in collection specimens); males reddish and best identified by the genitalia. Malaysia, Java, Sumatra, Borneo and Singapore.

Description: LT: ♂ (n = 6): 21.9 mm (21.0 to 23.0); ♀ (n = 39): 28.4 mm (26.5 to 30.8).
Head: ♂: reddish brown; apex of clypeus darker; ♀: olivaceous green with apex of clypeus darker; ratio BV/LV = 2.7 - 2.9; BF/LF = 1.4 - 1.5.
Thorax: ♂: reddish brown with tegulae darker; ♀: olivaceous green; ratio LP+LM/BT = 0.7.
Tegmina: ♂: reddish brown with veins dark red; apical 1/3 paler; ♀: green with base of clavus yellow and often costal cell, oblique band at apical 1/3, and curved line between apex of clavus and vein *Sc*, yellowish; costal cell often covered with white, waxy secretion; ratio LTg/BTg = (♂) 3, (♀) 2.6.
Hind wings: ♂: brown with veins of anal area whitish and veins of apical 1/2 marked with dark red; ♀: white, covered with white, waxy secretion.
Legs: ♂: reddish brown; ♀: femora olivaceous, tibiae darker, reddish brown.
Abdomen: bright red, often covered with white, waxy secretion.
Genitalia ♂: latero-posterior laminate process of pygofer triangular; anal tube in dorsal view ovoid, constricted with sides parallel at base; gonostyli fused on less than half of length, elongate in ventral view and strongly depressed latero-ventrally, with dorsal process strongly curved apically and bearing 2 teeth; phallic complex: see figs 2 D-E.
Genitalia ♀: gonocoxae VIII slightly emarginate on inner half of posterior margin in ventral view and with postero-inner angle angulously rounded; posterior vagina broader than long, with sides regularly rounded in ventral view; sternite VII produced between gonocoxae VIII in middle of hind margin.

Note: the bright green colour of females is often faded to pale yellowish brown in collection specimens (this maybe due to mode of collection or preservation).

Biology: The species seems to live on tree trunks in primitive dipterocarp forests. It is documented at altitudes from 175 to 1000 m. It has been captured once at light trap between 19:00 and 20:00. Captures occurred throughout the year, with peaks in April and November but the paucity of data does not permit confirmation of any seasonality in the phenology.

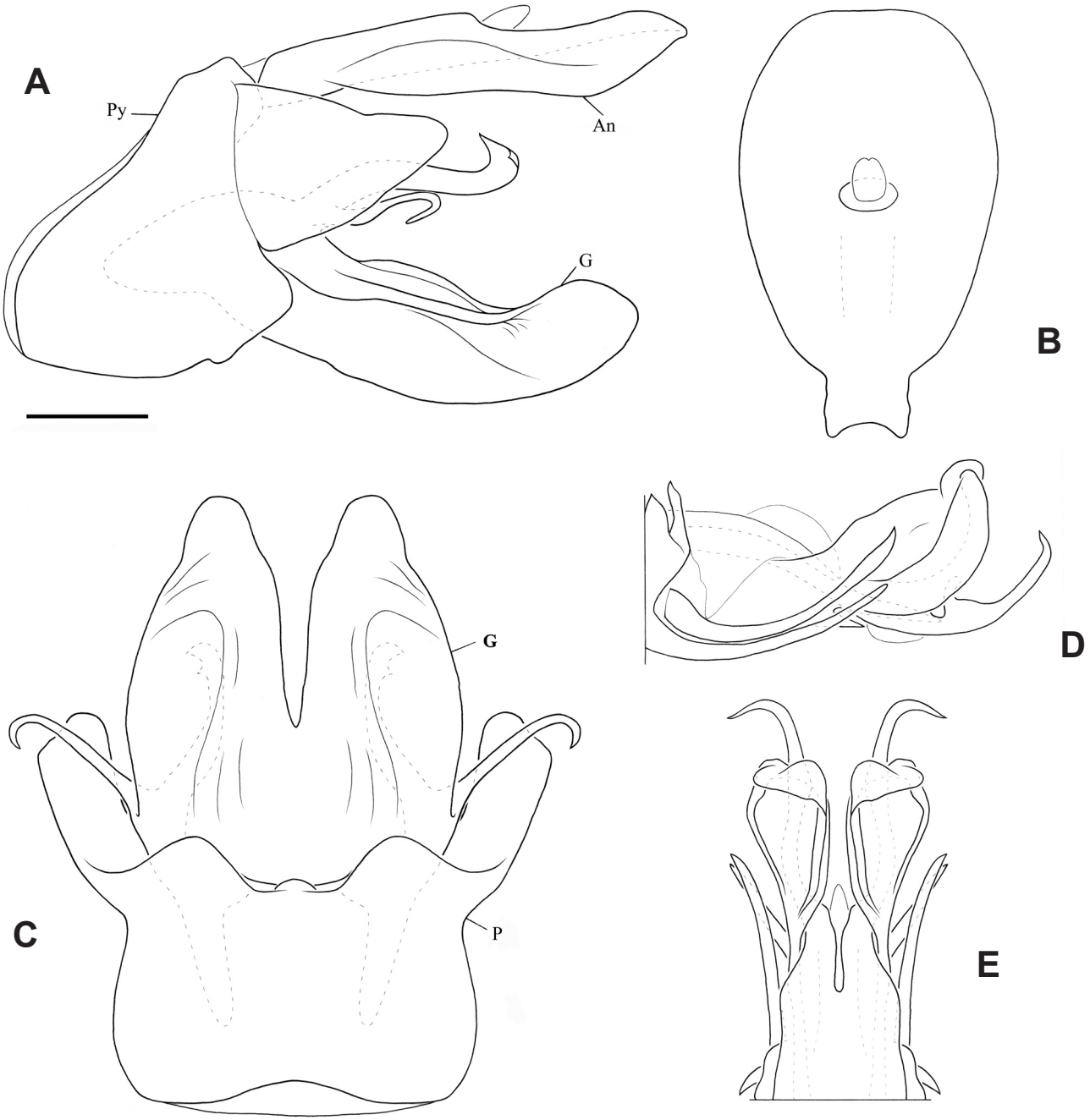

Fig. 2 — A-E. *Chalia pulchra*, genitalia ♂. (**A**) pygofer, anal tube and gonostyli, left lateral view (An – anal tube; G – gonostyli; Py – pygofer); (**B**) anal tube, dorsal view; (**C**) pygofer and gonostyli, ventral view; (**D**) phallic complex, left lateral view; (**E**) phallic complex, dorsal view. Scale 1 mm.

***5. Chalia sanguineovittata* (Stål, 1870) n. comb.**
Figs 3, 4 E, 5 A, Plate 2 G-H.

Frutis sanguineovittata Stål, 1870: 753.
Frutis sanguineovittata Stål, 1870: Metcalf, 1956: 48.

Etymology: *sanguineovittata* (Latin): from *sanguineus* = sanguine, and *vittatus* = banded. The name is assumed to refer to the red band along the costal margin of the tegmina.

Types examined: - Lectotype ♀ of *Frutis sanguineovittata* Stål, 1870 **present designation**: labeled [Ins. Philipp.] [Typus] [*Frutis sanguineo - vittata* Stål] [Lectotype ♀ *Frutis sanguineovittata* Stål, 1870, J. Constant des., 2007] [Chalia sanguineovittata (Stål, 1870), Jérôme Constant det. 2007] (NHRS).
- Paralectotype ♀ of *Frutis sanguineovittata* Stål, 1870: labeled [Ins. Philipp.] [Paratypus] [Paralectotype

♀ *Frutis sanguineovittata* Stål, 1870, J. Constant des., 2007] [Chalia sanguineovittata (Stål, 1870), Jérôme Constant det. 2007] (NHRS).

Other material examined (1 ♂, 5 ♀) – **Philippines: *Mindanao*:** 1 ♂ (plesiotype): Butuan, leg. Baker [USNM]; 1 ♀: Iligan, leg. Baker [USNM]; 2 ♀: Sitio Taglawig, Maco, Tagum, Davao prov., 15.X.1946, at sea level, original dipterocarp forest, CNHM-Philippine Zool. Exped. 1946-47, leg. H. Hoogstraal [FMNH, IRSNB]; 3 ♀: Sitio Taglawig, Maco, Tagum, Davao prov., X.1946, at sea level, original dipterocarp forest, CNHM-Philippine Zool. Exped. 1946-47, leg. H. Hoogstraal [2: FMNH; 1: FSCA].

Diagnostic characters: Immediately recognized by the red stripe on tegmina, parallel to costal margin.

Description: LT: ♂ (n = 1): 22.7 mm; ♀ (n = 5): 28.2 mm (27.5 to 28.7).
Head: ochraceous with antennae and apex of clypeus darker; often 2 patches of white, waxy secretion on vertex; ratio BV/LV = 3.0 - 3.2; BF/LF = 1.6.
Thorax: ochraceous with tegulae little darker; often middle of pronotum and patches on mesonotum covered with white, waxy secretion; ratio LP+LM/BT = 0.6 - 0.7.
Tegmina: pale olivaceous green with base of clavus and longitudinal stripe on basal 2/3, following veins *Sc* & *R*

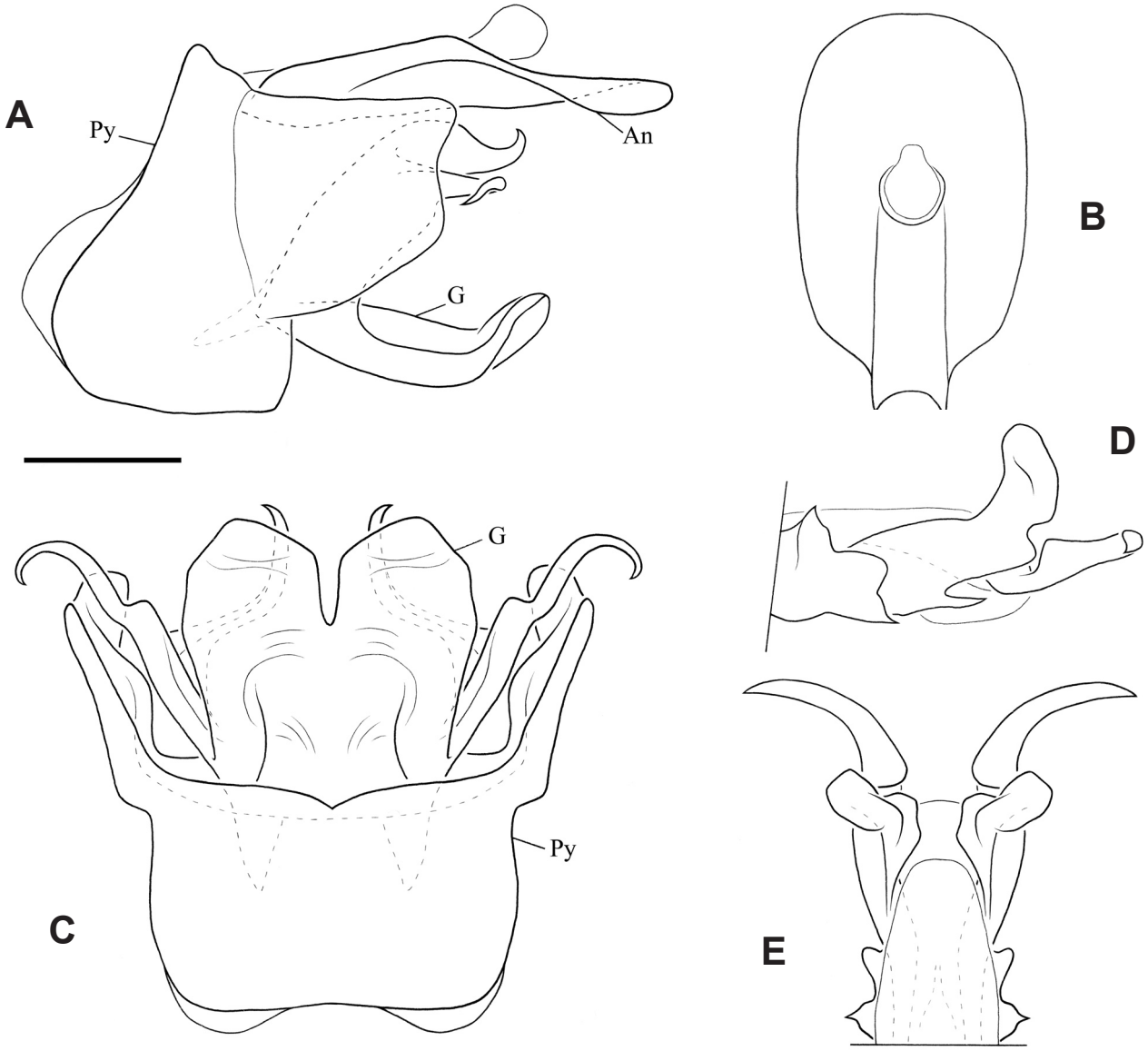

Fig. 3 — A-E. *Chalia sanguineovittata*, genitalia ♂. (**A**) pygofer, anal tube and gonostyli, left lateral view (An – anal tube; G – gonostyli; Py – pygofer); (**B**) anal tube, dorsal view; (**C**) pygofer and gonostyli, ventral view; (**D**) phallic complex, left lateral view; (**E**) phallic complex, dorsal view. Scale 1 mm.

and not reaching costal margin, red; 3 large patches of white, waxy secretion along costal margin and oblique band of waxy secretion at apical 1/4; ratio LTg/BTg = (♂) 2.6, (♀) 2.4.

Hind wings: ochraceous white with apex and costal margin tinged with olivaceous green; slightly covered with white, waxy secretion.

Legs: brownish olivaceous with tibiae darker than femora.

Abdomen: yellowish brown.

Genitalia ♂: latero-posterior laminate process of pygofer subquadrate with hind margin concave in lateral view; anal tube in dorsal view ovoid, with sides subprallel, constricted at base; gonostyli fused on more than half of length, slightly elongate in ventral view, with dorsal process unarmed; phallic complex: see figs 3 D-E.

Genitalia ♀: gonocoxae VIII strongly emarginate at first inner 1/3 in ventral view; posterior vagina about as broad as long, with posterior half narrower in ventral view; sternite VII emarginate in middle of hind margin, not produced between gonocoxae VIII.

Note: green colour is often faded to pale yellowish brown in collection specimens (this maybe due to mode of collect or preservation): among the specimens studied, only the lectotype and paralectotype seem to show «natural» greenish colouration.

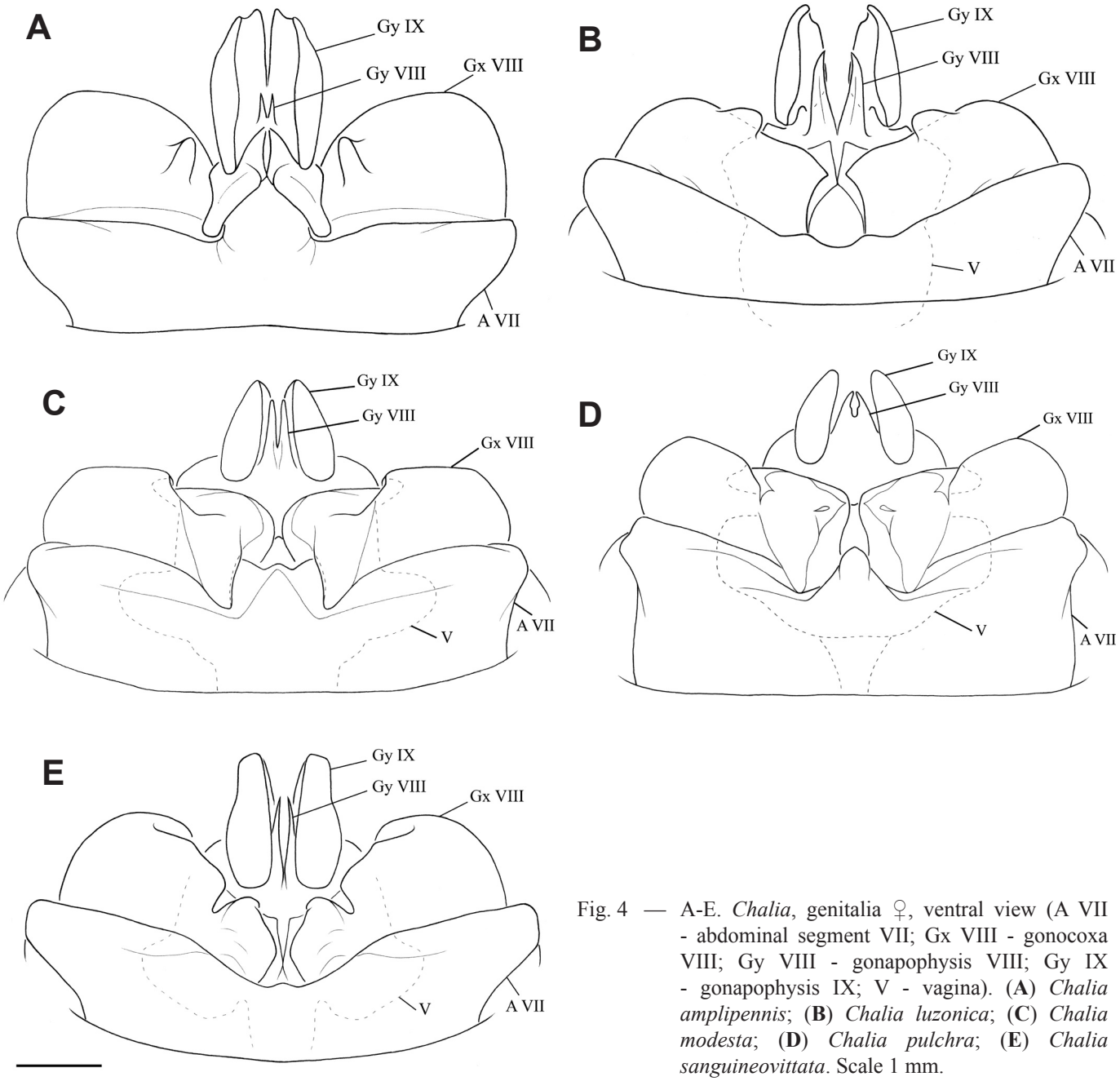

Fig. 4 — A-E. *Chalia*, genitalia ♀, ventral view (A VII - abdominal segment VII; Gx VIII - gonocoxa VIII; Gy VIII - gonapophysis VIII; Gy IX - gonapophysis IX; V - vagina). (**A**) *Chalia amplipennis*; (**B**) *Chalia luzonica*; (**C**) *Chalia modesta*; (**D**) *Chalia pulchra*; (**E**) *Chalia sanguineovittata*. Scale 1 mm.

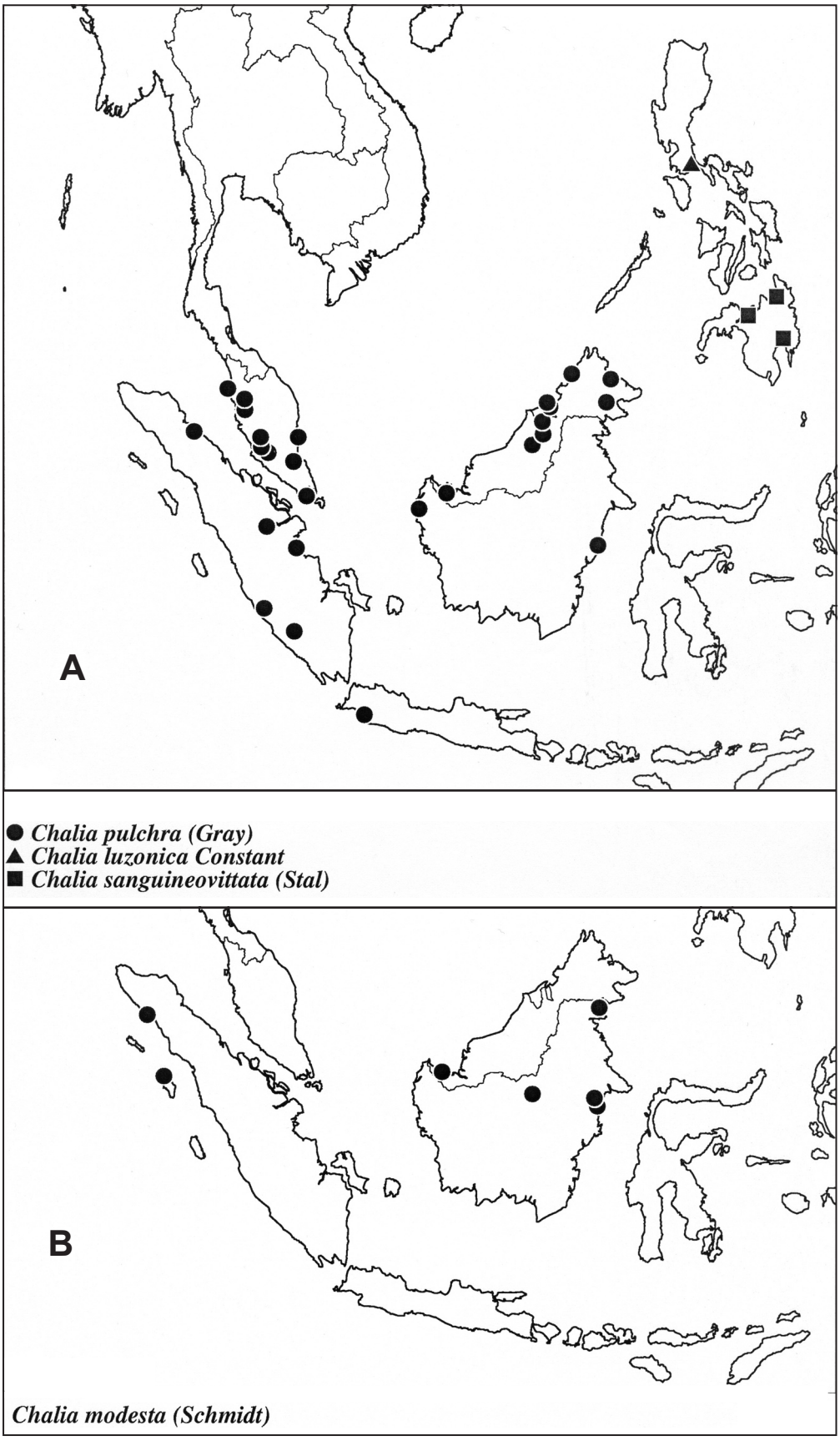

Fig. 5 — A-B. *Chalia*, distribution maps. (**A**) *C. luzonica*, *C. pulchra* and *C. sanguineovittata*; (**B**) *C. modesta*.

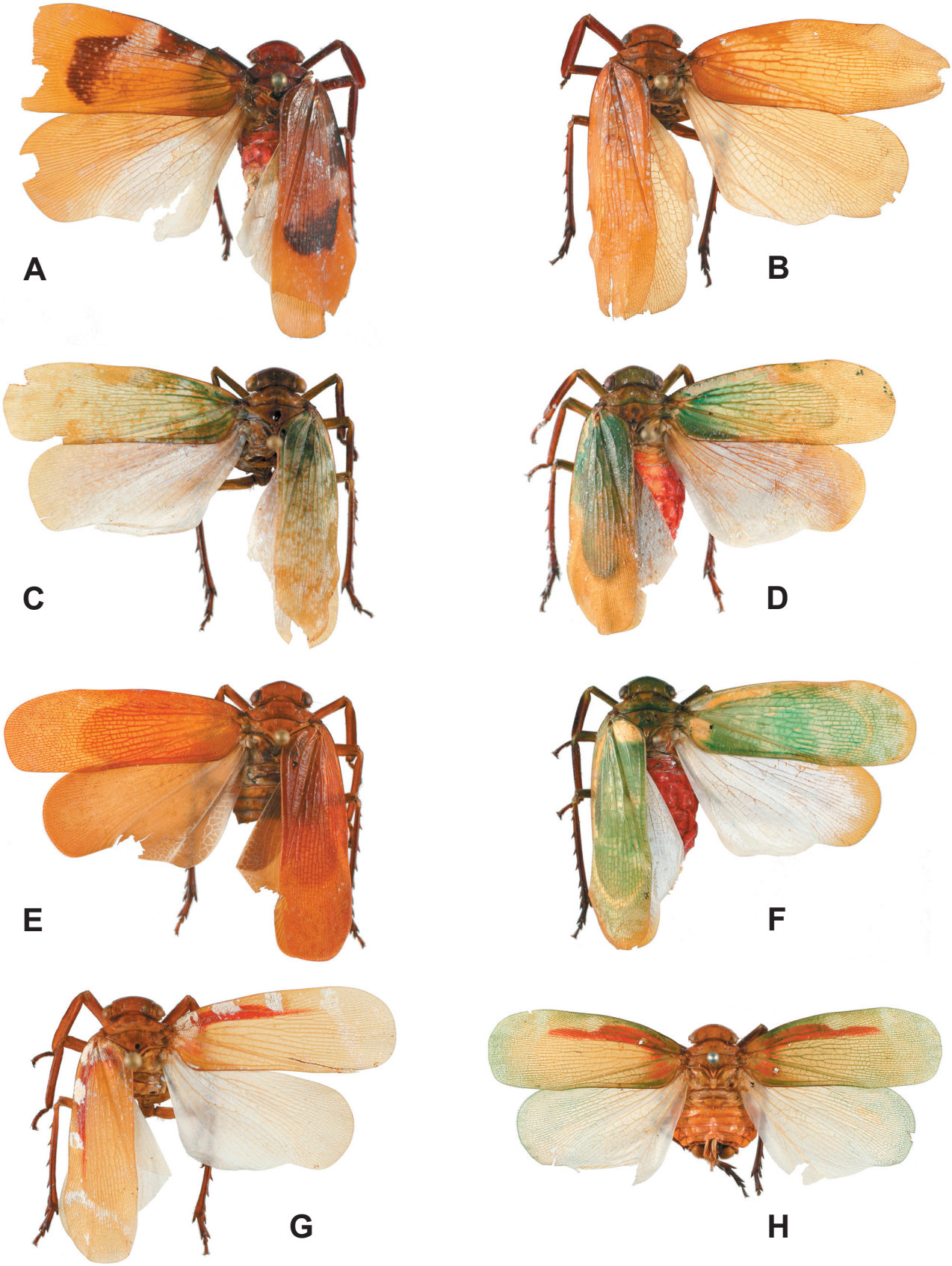

Plate 2 — A-H. *Chalia*, habitus, dorsal view. (**A**) *C. amplipennis* ♀ (LT = 34.6 mm); (**B**) *C. luzonica* ♀ (LT= 30.0 mm); (**C**) *C. modesta* ♂ (LT = 25.4 mm); (**D**) *C. modesta* ♀ (LT = 27.0 mm); (**E**) *C. pulchra* ♂ (LT = 23.0 mm); (**F**) *C. pulchra* ♀ (LT = 29.4 mm); (**G**) *C. sanguineovittata* ♂ (LT = 22.7 mm); (**H**) *C. sanguineovittata* ♀ (wingspan = 55.0 mm).

Biology: The species is known with certainty only from the Island of Mindanao where it has been collected in original forest of Dipterocarpaceae at sea level. However, the paucity of data does not preclude the species being present at higher altitudes.

Discussion

The genus *Chalia* is one of the large, fulgorid-looking genera of Eurybrachidae. Despite their large size and often bright colour, specimens remain scarce in collections. The sex ratio of the collection specimens is largely in favour of females (6 females for 1 male) and this could be due to some unknown aspect of the life-history of those insects.

According to the available data, the species of the genus seem to live in undisturbed, original dipterocarp forests and could be regarded as relevant bio-indicators of well preserved zones of forest that should deserve protection.

According to present classification (Schmidt, 1908; Metcalf, 1956), the genus *Chalia* is the only member of the tribe Frutini Schmidt, 1908 and this is here provisionally followed although it is clear that the suprageneric classification of Eurybrachidae will have to be revised.

Identification key to the species

1. - Tegmina with a dark red line parallel to the costal margin; recorded only from the Philippines ..... ***Chalia sanguineovittata*** (Stål)
- Tegmina without dark red line parallel to the costal margin.....**2.**

2. - Tegmina with base greenish olivaceous, maroon patch along costal margin at basal 1/3 and maroon band at 2/3; recorded only from the Philippines .....***Chalia amplipennis*** (Stål)
- Tegmina not coloured so, unicolorous or green with yellow markings.....**3.**

3. - Tegmina of females yellowish brown; males unknown; recorded only from the Philippines.....***Chalia luzonica*** Constant
- Tegmina of females mainly green, of males dark green or reddish brown; not recorded from the Philippines.....**4.**

4. - Tegmina of females green with yellow basal spot on clavus and yellow patches, of males reddish brown; recorded from Malaysia, Singapore, Sumatra, Java and Borneo.....***Chalia pulchra*** (Gray)
- Tegmina of females green without yellow spot on base of clavus, of males dark green; recorded from Sumatra, Nias and Borneo.....
.....***Chalia modesta*** (Schmidt)

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