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Four new species of the Oriental lanternfly genus *Scamandra* Stål, 1863 from Sulawesi and neighbouring islands with taxonomic notes on the genus (Hemiptera: Fulgoromorpha: Fulgoridae)

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Front cover: Habitus, dorsal view: left, *Scamandra mangolana* sp. nov., holotype ♀ (RBINS); right, *Scamandra sanana* sp. nov., paratype ♀ (RBINS).

**Four new species of the Oriental lanternfly
genus *Scamandra* Stål, 1863 from Sulawesi and
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Abstract

Four new species of the genus *Scamandra* Stål, 1863 from Sulawesi and neighbouring islands are described: *S. castanea* sp. nov. (Central Sulawesi), *S. collaris* sp. nov. (Peleng Island), *S. mangolana* sp. nov. (Mangole Island) and *S. sanana* sp. nov. (Sanana Island). The species are compared with the closely related ones. The type of *S. diana* Distant, 1892 (Sangir Island) is comprehensively illustrated for comparison with *S. sanana* sp. nov. The male genitalia of the latter and *S. collaris* sp. nov. are illustrated and a distribution map is provided for all treated species.

Keywords: Lanternbug, planthopper, Indonesia, Fulgoroidea.

Introduction

The study of unidentified material in the accessions of RBINS revealed 4 new species of the lanternfly genus *Scamandra* Stål, 1863 from Sulawesi and some neighbouring islands, namely Peleng, Mangole and Sanana.

The genus *Scamandra* contains 28 species and 3 subspecies (BOURGOIN, 2017) distributed in Southeast Asia, from southern Thailand and Peninsular Malaysia to the Philippines and to Sulawesi and neighbouring islands, and seems to have developed a number of endemic, insular species.

The fauna of Sulawesi currently comprises 6 species of *Scamandra*: *S. clytaemnestra* Breddin, 1901, *S. marcellae* Porion, Audibert & Nagai, 2016, *S. sanguiflua* (Stål, 1863), *S. selene* Breddin, 1901, *S. thetis* (Stål, 1863) and *S. vanvyvei* Constant, 2013. The neighbouring islands add an additional 5 known species or subspecies: *S. detanii* Nagai & Porion, 2002 (Wowoni), *S. diana* Distant, 1892 (Sangir), *S. huangi* Constant, 2013 (Taliabu), *S. vanvyvei pelengana* Constant, 2013 (Peleng) and *S. voisinae* Nagai & Porion, 2002 (Wowoni and Buton) (BOURGOIN, 2017).

The present paper aims to describe 4 new species from that region and compare them with the closely related ones.

Material and methods

The male genitalia were dissected as follows: the pygofer was cut from the abdomen of the softened specimen with a needle blade, and then boiled in a 10% solution of potassium

hydroxide (KOH) at about 100°C. The pieces were examined in ethanol, and then placed in glycerine with the pinned specimen for preservation. Observations were done with a Leica MZ8 stereo-microscope. Pictures were taken with a Canon EOS 700 D camera with Sigma DG Macro lens, stacked with CombineZ software and optimized with Adobe Photoshop CS3 software. The inflation of the phallus was not done due to the difficulty obtaining good and replicable results and because it is not required to separate species in the genus *Scamandra*. Although post-genitalic, the anal tube is included with genitalia for descriptive purpose. For the transcription of the labels of the types, the wording on each single label is delimited by square brackets.

The distribution map was produced with SimpleMappr (SHORTHOUSE, 2010).

The measurements were taken as in CONSTANT (2004) with the addition of CONSTANT (2013) for the measurement of the vertex in the genus *Scamandra* and the present additions for the measurements of the length of the corium and membrane of the tegmina (Fig. 1). The following abbreviations are used:

BF	=	maximum breadth of the frons
BTg	=	maximum breadth of the tegmen
BV	=	maximum breadth of the vertex
LCo	=	length of corium in median line of tegmen (Fig. 1)
LF	=	length of the frons in median line
LM	=	length of mesonotum in median line
LMe	=	length of membrane in median line of tegmen (Fig. 1)
LP	=	length of pronotum in median line
LTg	=	maximum length of the tegmen
LT	=	total length (apex of head to apex of tegmina)
LV	=	length of the vertex

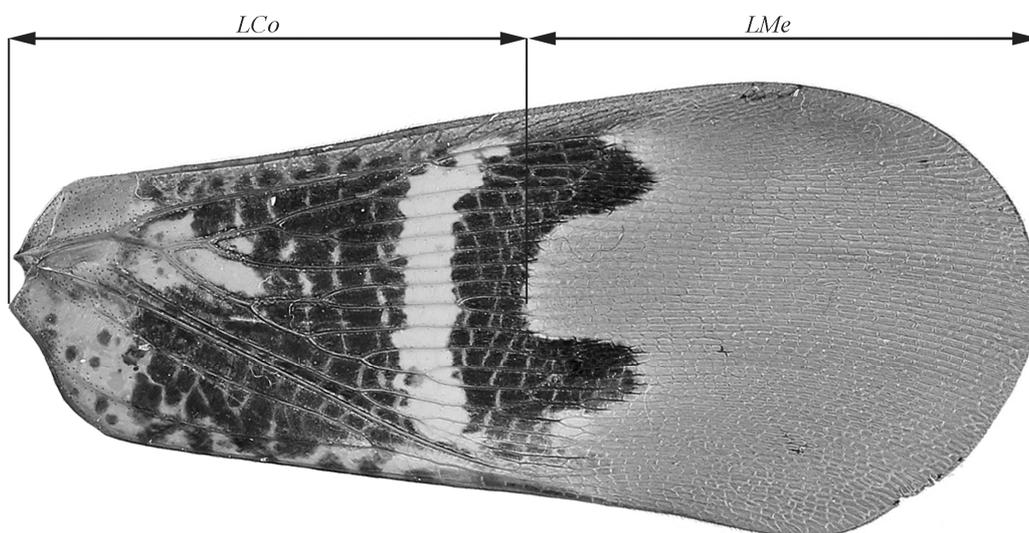


Fig. 1. *Scamandra sanana* sp. nov., right anterior wing, standardized measurements. *LCo* = length of corium – *LMe* = length of membrane.

Acronyms used for the collections.

BMNH	=	Natural History Museum, London, United Kingdom.
CAS	=	California Academy of Science, San Francisco, U.S.A.
RBINS	=	Royal Belgian Institute of Natural Sciences, Brussels, Belgium.
TP	=	Collection of Thierry Porion, Jaujac, France.

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

Genus *Scamandra* Stål, 1863

Type-species: *Aphaena rosea* Guérin-Ménéville, 1834 by subsequent designation by DISTANT (1906).

Scamandra STÅL, 1863: 232 [described]. — STÅL, 1866: 134 [keyed]. — STÅL, 1870: 742 [key to species]. — ATKINSON, 1886: 202 [described]. — DISTANT, 1906: 24 [type species]. — METCALF, 1947: 142 [catalogued]. — LALLEMAND, 1963: 28 [described, key to species]. — NAGAI & PORION, 1996 [catalogued]. — CONSTANT, 2013 [sexual dimorphism].

Scamandra castanea sp. nov.

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Figs 2–3.

ETYMOLOGY. The species epithet, *castaneus* (adj., Latin), refers to the castaneous brown colour of the disc of the tegmina.

MATERIAL EXAMINED.

TYPE MATERIAL. INDONESIA, Sulawesi: Holotype ♀: [Coll. I.R.Sc.N.B., Indonesia, Central Sulawesi, Palolo, 1°17.8'S 120°14.9'E, i.2017, 1250m, local collector, I.G.: 33.475] (RBINS).

Paratype ♀: [INDONESIA, Central Sulawesi, Palu, Palolo, March. 1997] [*Scamandra* sp. det Penny, '00] (CAS).

MATERIAL EXAMINED FROM PHOTOGRAPHS. INDONESIA, Sulawesi: 1 ex.: Lore lindu National Park, no date, D. & F. Knowles.

DIAGNOSIS. (1) head and thorax entirely reddish brown (Fig. 2 B, D, F); (2) nodal line of tegmina with black bracket-shaped marking in middle (Fig. 2 A); (3) tegmina with corium mostly castaneous with greenish venation and costal cell green (Fig. 2 A); (4) hind wings with anal and sutural zones dark brown with greenish white venation (Fig. 2 A); (5) legs entirely red (Fig. 2 C).

DESCRIPTION.

Measurements and ratios. LT: ♀: (n = 1): 33.4 mm; LTg/BTg: 2.16; BV/LV: 3.2; BF/LF: 1.0; BT/LP + LM: 1.14; LM/LP: 1.76; LMe/LCo: 0.78.

Head: (Fig. 2 B, D, F) entirely reddish brown, including antennae; cephalic process reaching posterior margin of vertex (Fig. 2 B); vertex short, with disc wrinkled, and lateral and posterior margins carinate (Fig. 2 B); frons coriaceous with short hairs and 2 longitudinal carinae separated by a shallow groove on ventral 2/3 (Fig. 2 D); labium red-brown, surpassing metatrochanters (Fig. 2 C); pedicel of antennae kidney-shaped with flagellum inserted dorsolaterally.

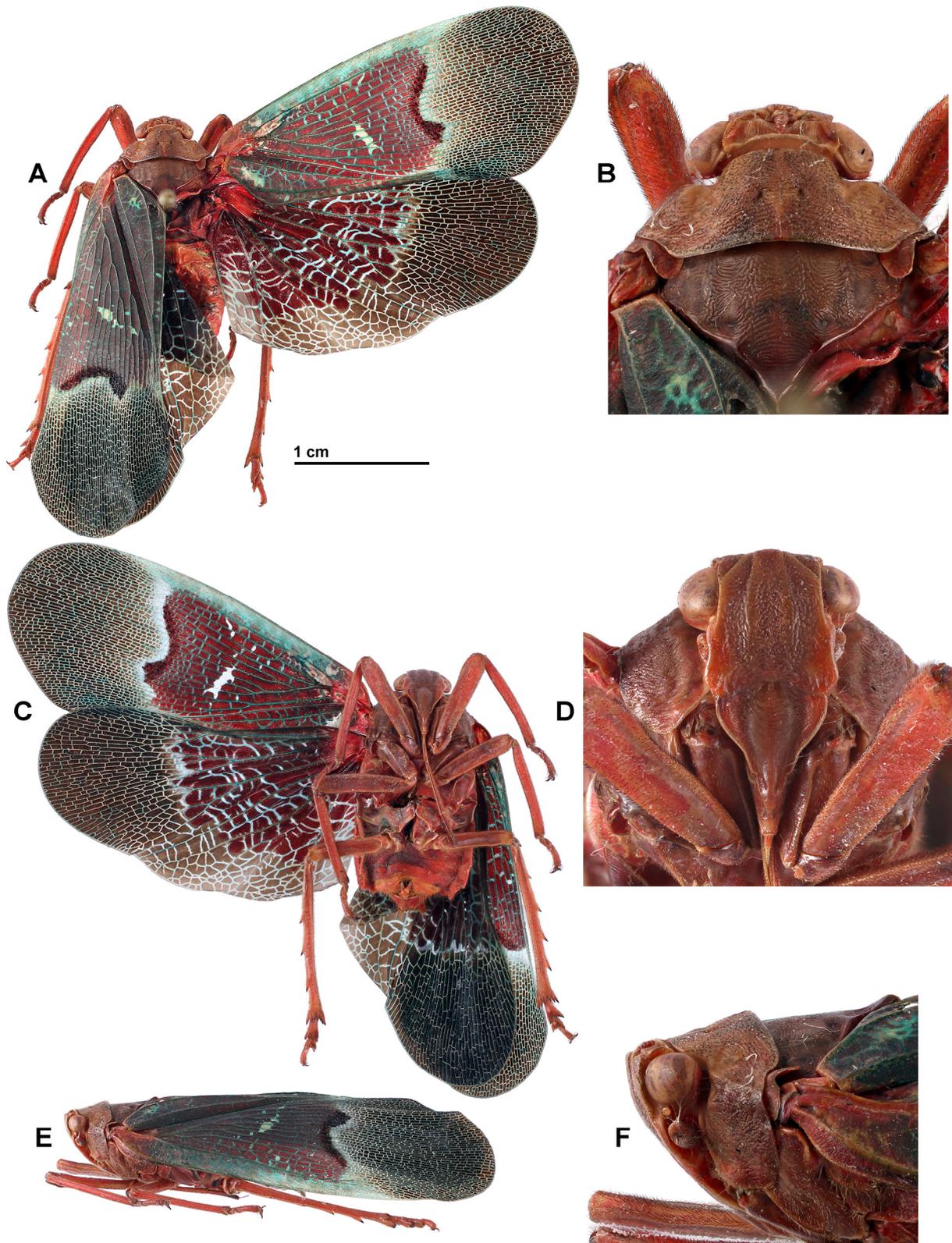


Fig. 2. *Scamandra castanea* sp. nov., holotype ♀ (RBINS). A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

Thorax: (Fig. 2 B, D, F) prothorax reddish brown as head, wrinkled, with short hairs, 2 impressed points on disc of pronotum and numerous minute black points; median carina obsolete, barely distinct (Fig. 2 B). Mesonotum red-brown, slightly darker than pronotum, wrinkled; apex of scutellum slightly projecting dorsally.

Tegmina: (Fig. 2 A, C) costal area green with base bright red; rest of corium and clavus castaneous brown with all veins green; pale yellowish spot on clavus near base; narrow pale yellowish band sometimes reduced to transverse spots at half length of tegmen, marked with white wax on ventral side (Fig. 2 C); nodal line bisinuate and with narrow, bracket-shaped black marking in middle, followed by narrow pale yellowish band extending on all breadth and more visible ventrally; membrane black-brown with veins pale yellowish green. Costal margin slightly curved; posterior margin broadly rounded; sutural margin slightly sinuate after nodal line.

Hind wings: (Fig. 2 A, C) small bright red marking at basicostal angle; largely bright castaneous brown with pale greenish reticulum of veinlets; distal third black-brown with veins and veinlets pale yellowish green; sutural margin broadly black-brown with dense greenish-white reticulum.

Legs: (Fig. 2 A, C) entirely bright reddark red-brown with femora darker, black-brown; profemora slightly inflated apically; metatibiae with 4–5 lateral spines, basal one well developed, and 7 apical spines.

Abdomen: (Fig. 2 A, C) bright red.

DISTRIBUTION. Southwestern portion of Central Sulawesi (Fig. 3).

NOTE. *Scamandra castanea* sp. nov. is rather similar to *S. vanvyvei* Constant, 2013 but differs from the latter and its subspecies *S. vanvyvei pelengana* Constant, 2013 (see CONSTANT, 2013: figs 9–10 for illustrations) by (1) the bracket-shaped black marking on nodal line of tegmina (C-shaped in *S. vanvyvei*); (2) the contrasting greenish venation and costal area of the castaneous corium of tegmina (veins and costal area coloured as the rest of corium in *S. vanvyvei*); (3) the narrow pale band of the nodal line of the tegmina in ventral view (broad pale band extending to nearly half length of membrane in *S. vanvyvei*).

***Scamandra collaris* sp. nov.**

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Figs 3–6.

ETYMOLOGY. The species epithet *collaris* (Latin) means collared and refers to the black-brown collar on the prothorax.

MATERIAL EXAMINED.

TYPE MATERIAL. INDONESIA, Peleng Island: Holotype ♂: [Coll. I.R.Sc.N.B., Indonesia, Peleng Isl., ix.2009, purchased from A. Müller, I.G.: 32.861] (RBINS).

Paratype ♀: same data as holotype (RBINS).

DIAGNOSIS. (1) head yellow-brown with frons and clypeus black except lateral margins (Fig. 4 B, D, F); (2) prothorax with anterior half of pronotum and sides black-brown (Fig. 4 B, D, F); (3) disc of mesonotum largely black-brown (Fig. 4 B); (4) nodal line of tegmina with brown C-shaped marking in middle (Fig. 4 A); (5) tegmina with corium mostly olivaceous brown (Fig. 4 A); (6) hind wings with anal and sutural zones bright red or bright orange (Fig. 4 A); (5) legs black-brown with darker femora (Fig. 4 C).



Fig. 3. Distribution map of *Scamandra castanea* sp. nov., *S. collaris* sp. nov., *S. mangolana* sp. nov., *S. diana* Distant, 1892 and *S. sanana* sp. nov.

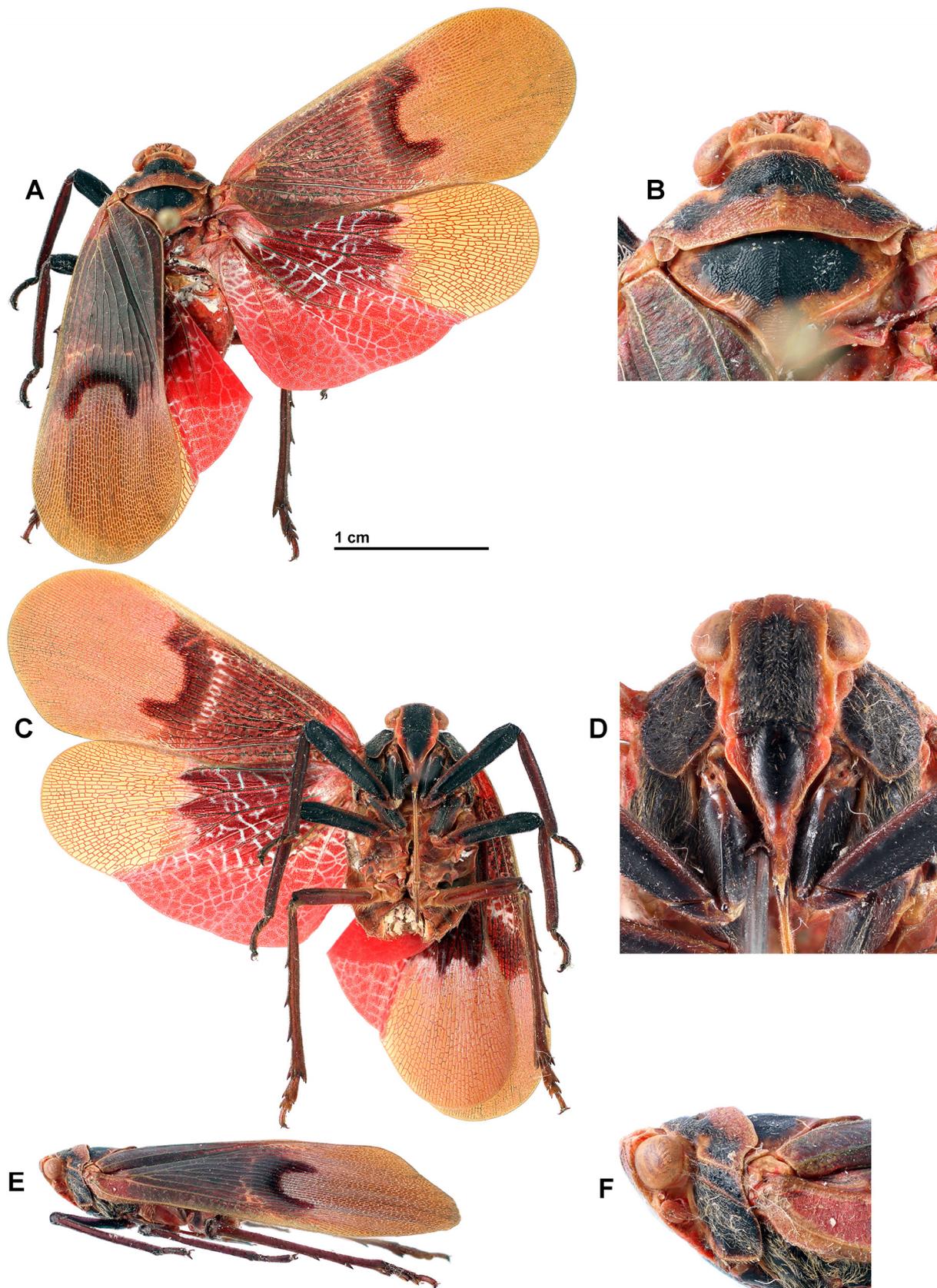


Fig. 4. *Scamandra collaris* sp. nov., holotype ♂ (RBINS). A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

DESCRIPTION.

Measurements and ratios. LT: ♂ (n = 1): 28.0 mm; ♀ (n = 1): 34.2 mm; LTg/BTg: ♂: 2.15; ♀: 2.26; BV/LV: 3.7; BF/LF: 1.0; BT/LP + LM: 1.18; LM/LP: 1.85; LMe/LCo: 1.0.

Head: (Figs 4 B, D, F; 5 B, D, F) yellow-brown with frons and postclypeus black-brown except sides narrowly yellow-brown sometimes with reddish hue; cephalic process reaching posterior margin of vertex (Figs 4 B; 5 B); vertex short, with disc wrinkled, and lateral and posterior margins carinate (Figs 4 B; 5 B); frons coriaceous with short hairs and 2 longitudinal carinae (Figs 4 D; 5 D); very shallow groove between carinae in middle; labium yellow-brown, surpassing metatrochanters (Figs 4 C; 5 C); pedicel of antennae kidney-shaped with flagellum inserted dorsolaterally.

Thorax: (Figs 4 B, D, F; 5 B, D, F) prothorax yellow-brown with anterior half and lateral lobes of pronotum black-brown; lateral carinae yellow-brown; wrinkled, with short hairs and 2 impressed points on disc of pronotum; median carina obsolete, barely distinct (Figs 4 B; 5 B). Mesonotum yellow-brown with large black-brown marking on disc, reaching anterior margin; apex of scutellum very slightly projecting dorsally.

Tegmina: (Figs 4 A, C; 5 A, C) costal area green with base reddish brown; rest of corium and clavus olivaceous brown, sometimes with irregular greenish spots; narrow pale yellowish band sometimes reduced to transverse spots at half length of tegmen, marked with white wax on ventral side (Figs 4 C; 5 C); nodal line strongly bisinuate and with C-shaped dark brown marking in middle; C-shaped marking broadly bordered with greenish proximally; nodal line followed by slight, narrow, yellowish band extending on all breadth; membrane brown. Costal margin straight on most length; posterior margin broadly rounded; sutural margin slightly sinuate after nodal line.

Hind wings: (Figs 4 A, C; 5 A, C) bright red with large vinaceous red marking on corium along costal margin, not reaching basicostal angle; cross-veins pale bluish in vinaceous area, white in red area; membrane yellow-brown with veins reddish.

Legs: (Figs 4 A, C; 5 A, C) anterior and middle legs entirely black-brown with femora darker; posterior legs brown with femora darker distally; profemora slightly inflated apically; metatibiae with 4 lateral spines, basal one well developed, and 7 apical spines.

Abdomen: (Figs 4 A, C; 5 A, C) red dorsally; reddish brown ventrally.

Male genitalia: (Fig. 6) pygofer 3.2 times higher than long in middle in lateral view, with posterior margin slightly sinuate on dorsal $\frac{1}{4}$ (Fig. 6 A). Anal tube short, transverse, about 1.36 times broader than long in dorsal view, and about two times broader at apex than at base (Fig. 6 C); sides straight, diverging from base to apex in dorsal view (Fig. 6 C); apical margin pointed in middle dorsally, strongly projecting downwards ventrally (Fig. 6 A, C); in lateral view, apical margin deeply emarginate with ventral portion strongly surpassing dorsal one (Fig. 6 A). Gonostyli 1.7 times longer than high in lateral view, subtriangular with apical and dorsal angles rather broadly rounded, dorsal angle obtuse (Fig. 6 A); laterodorsal tooth of gonostyli projecting lateroventrally, strong and with apex slightly directed laterally in posteroventral view (Fig. 6 A, B).

DISTRIBUTION. Peleng Island near Sulawesi.

NOTES. Like in its close relatives *Scamandra marcellae* Porion, Audibert & Nagai, 2016 and *S. voisinae* Nagai & Porion, 2002, an orange form exists in *S. collaris* sp. nov. A specimen was illustrated by NAGAI & PORION (2004: fig. 10), identified as a form of *S. thetis* (Stål, 1863).

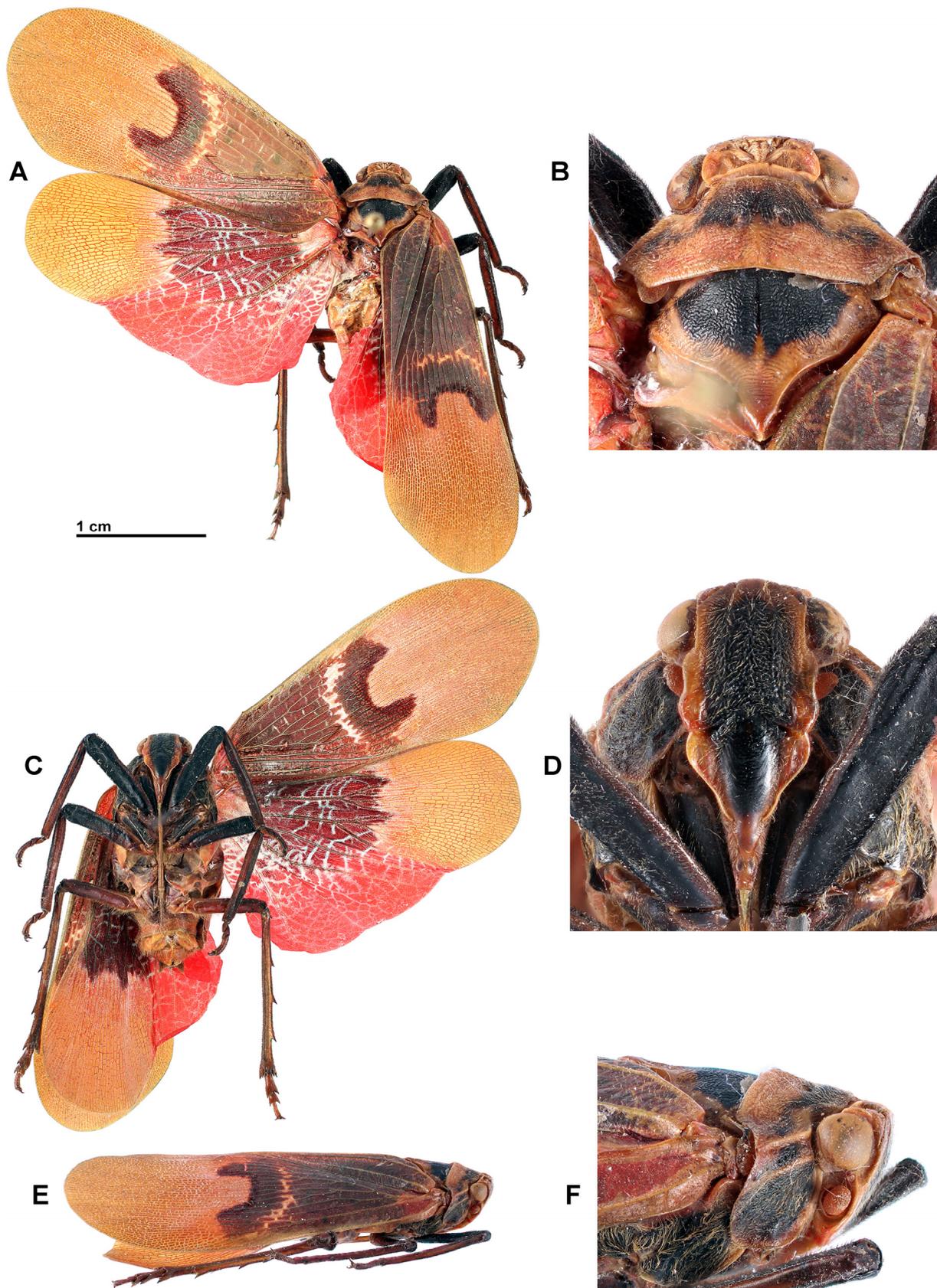


Fig. 5. *Scamandra collaris* sp. nov., paratype ♀ (RBINS). A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

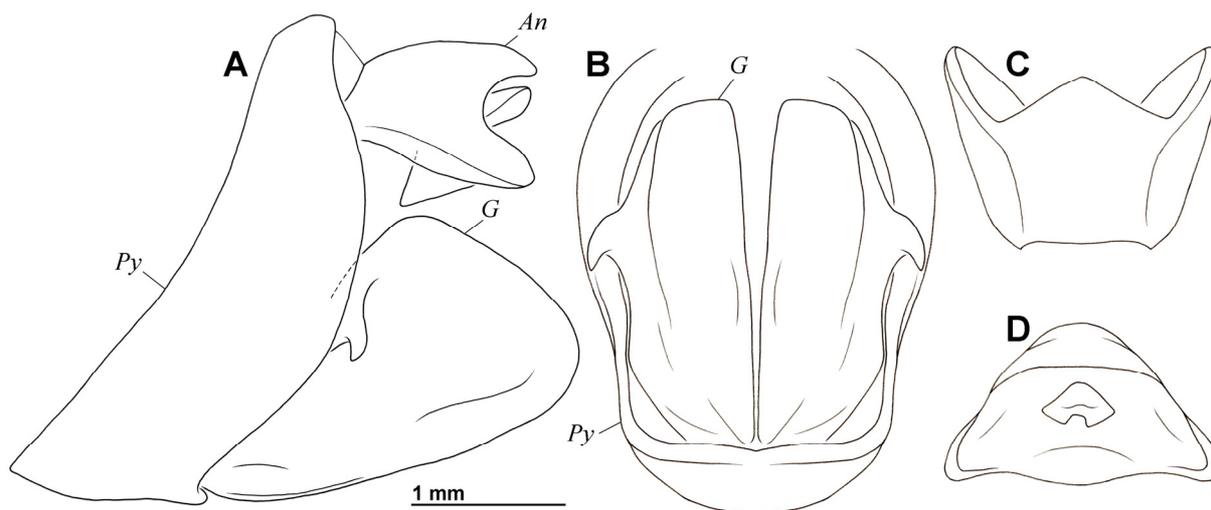


Fig. 6. *Scamandra collaris* sp. nov., holotype ♂ (RBINS), genitalia. A, Pygofer, anal tube and gonostylus, left lateral view. B, gonostyli and pygofer, posteroventral view. C, Anal tube, dorsal view. D, anal tube, posterior view. An, anal tube – Py, pygofer – G, gonostylus.

Scamandra collaris sp. nov. is rather similar to *S. huangi* Constant, 2013 but differs from the latter (see CONSTANT, 2013: figs 2 and 7 for illustrations) by (1) the black-brown collar on the anterior half of the pronotum (pronotum entirely yellow-brown in *S. huangi*); (2) the anal tube less elevated in lateral view and with lateral margins nearly straight in dorsal view (more elevated in lateral view and with lateral margins rounded in dorsal view in *S. huangi*); (3) the gonostyli with posterior and dorsal angles more rounded, and lateral hooks stronger and less curved (posterior and dorsal angles more acutely rounded, and lateral hooks weaker and more strongly curved in *S. huangi*).

It also resembles *S. mangolana* sp. nov. from which it differs by (1) the black-brown collar on the anterior half of the pronotum (pronotum entirely reddish brown dorsally in *S. mangolana* sp. nov.); (2) the olivaceous brown background colour of the corium of the tegmina (bright red in *S. mangolana* sp. nov.); (3) the large vinaceous red marking along the costal margin of the corium of the hind wing (corium of hind wing entirely bright red in *S. mangolana* sp. nov.).

***Scamandra mangolana* sp. nov.**

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Figs 3, 7.

ETYMOLOGY. The species epithet is derived from Mangole Island, referring to the type location of the species.

TYPE MATERIAL. INDONESIA, Mangole Island: Holotype ♀: [Coll. I.R.Sc.N.B., Indonesia, Mangole Isl., 1°48'S 125°48'E, iii.2011, purchased from Benny De Groof, I.G.: 32.276] (RBINS).

Paratypes: 6 ♀♀: same data as holotype (RBINS).

DIAGNOSIS. (1) head reddish brown with frons and most of clypeus black except lateral margins (Fig. 7 B, D, F); (2) pronotum reddish brown with lateral lobes black-brown (Fig. 7 B, D, F); (3) disc of mesonotum largely black-brown (Fig. 7 B); (4) nodal line of tegmina with olivaceous brown C-shaped marking in middle (Fig. 4 A); (5) tegmina with corium mostly bright red (Fig. 7 A); (6) hind wings bright red on basal 2/3 including anal and sutural zones (Fig. 7 A); (5) legs black-brown with darker femora (Fig. 7 C).

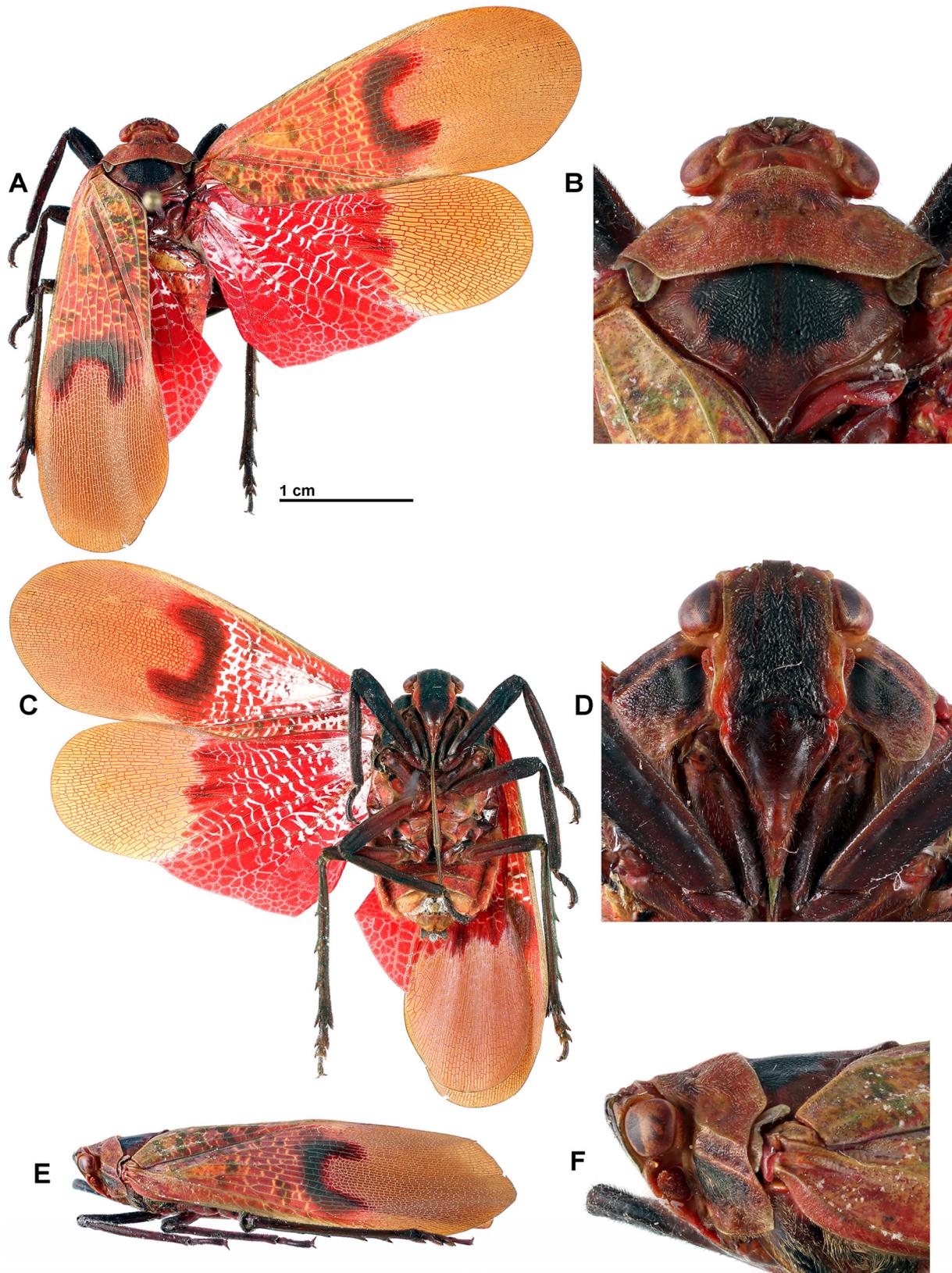


Fig. 7. *Scamandra mangolana* sp. nov., holotype ♀ (RBINS). A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.

DESCRIPTION.

Measurements and ratios. LT: ♀: (n = 7): 33.6 mm (32.9–34.7); LTg/BTg: 2.4; BV/LV: 3.5; BF/LF: 0.98; BT/LP + LM: 1.18; LM/LP: 1.78; LMe/LCo: 1.0.

Head: (Fig. 7 B, D, F) reddish brown with frons and postclypeus black-brown except sides narrowly red-brown; anteclypeus dark red; antennae red; cephalic process not reaching posterior margin of vertex (Fig. 7 B); vertex short, with disc wrinkled, and lateral and posterior margins carinate (Fig. 7 B); frons coriaceous with short hairs, 2 weak longitudinal carinae and one obsolete median carina on dorsal $\frac{1}{4}$ (Fig. 7 D); labium brown, surpassing metatrochanters (Fig. 7 C); pedicel of antennae kidney-shaped with flagellum inserted dorsolaterally.

Thorax: (Fig. 7 B, D, F) prothorax reddish brown with lateral lobes of pronotum black-brown; lateral carinae yellow-brown; wrinkled, with short hairs and 2 impressed points on disc of pronotum; median carina obsolete, barely distinct (Fig. 7 B). Mesonotum reddish brown with large black-brown marking on disc, reaching anterior margin; apex of scutellum slightly projecting dorsally (Fig. 7 F).

Tegmina: (Fig. 7 A, C) corium bright red with yellow veins and cross-veins, and some irregular olivaceous spots; costal bright red on proximal $\frac{1}{4}$ then yellowish along costal margin with yellowish zone broadening towards distal part; yellowish marking at base of radial cell; yellow cross veins more obvious at half length, sometimes forming an unclear transverse band; ventrally, veins and cross-veins marked with white waxy secretion from base to level of dorsal unclear transverse band (Fig. 7 C); nodal line strongly bisinuate and with C-shaped dark olivaceous brown marking in middle; C-shaped marking narrowly bordered with dark red along distal margin; membrane brown with reddish venation. Costal margin straight on most length; posterior margin broadly rounded; sutural margin straight.

Hind wings: (Fig. 7 A, C) basal $\frac{2}{3}$ entirely bright red with cross-veins white; membrane yellow-brown with veins reddish; white waxy secretion near base dorsally, extending to cross-veins on proximal half ventrally.

Legs: (Fig. 7 A, C) dark brown with femora darker distally, sometimes nearly black; profemora slightly inflated apically; metatibiae with 4–5 lateral spines, basal one well developed, and 7 apical spines.

Abdomen: (Fig. 7 A, C) bright red.

DISTRIBUTION. Mangole Island near Sulawesi (Fig. 3).

NOTE. *Scamandra mangolana* sp. nov. is rather similar to *S. huangi* Constant, 2013 but differs from the latter (see CONSTANT, 2013: figs 2 & 7 for illustrations) by (1) the bright red background colour of the corium of the tegmina (olivaceous brown in *S. huangi*); (2) corium of hind wing entirely bright red (large vinaceous red marking along the costal margin of the corium of the hind wing in *S. huangi*); (3) the white wax extending ventrally on most of corium (limited to transverse band at half length in *S. huangi*).

It also resembles *S. collaris* sp. nov. (Figs 4–5) from which it differs by (1) pronotum entirely reddish brown dorsally (black-brown collar on anterior half of the pronotum in *S. collaris* sp. nov.); (2) the bright red background colour of the corium of the tegmina (olivaceous brown in *S. collaris* sp. nov.); (3) the corium of hind wing entirely bright red (large vinaceous red marking along the costal margin of the corium of the hind wing in *S. collaris* sp. nov.).

Finally, it can be separated from the superficially similar *S. voisinae* Nagai & Porion, 2002, which also shows a C-shaped marking on mostly bright red or bright orange tegmina (see PORION *et al.*, 2016: figs 9–10 for illustrations), by (1) the largely brown-black frons (red-brown in *S. voisinae*); (2) the basal $\frac{2}{3}$ of the hind wings entirely bright red (broadly bordered with white along sutural margin in *S. voisinae*); (3) the black-brown legs (red in *S. voisinae*).

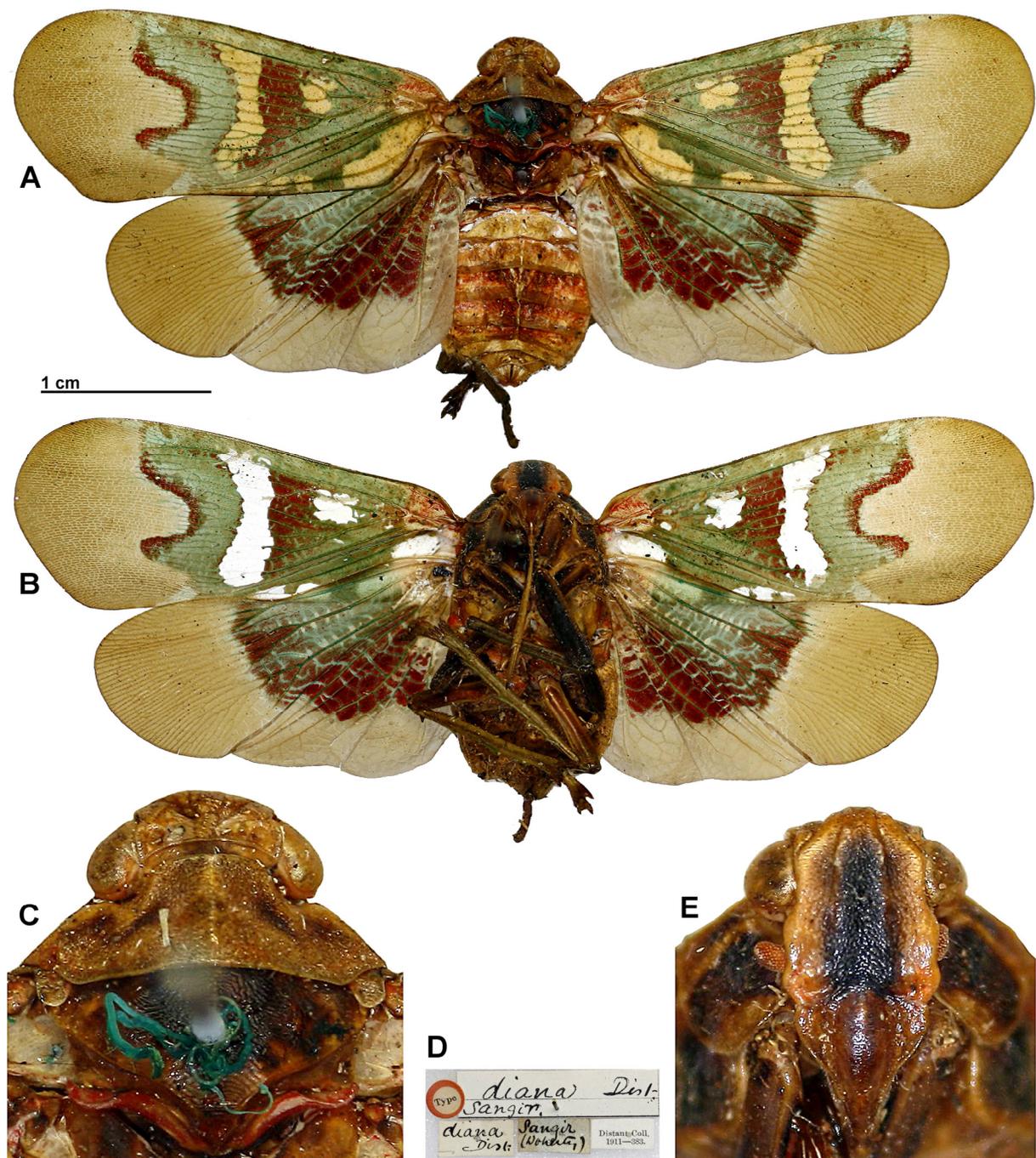


Fig. 8. *Scamandra diana* Distant, 1892, holotype ♀ (BMNH). A, habitus, dorsal view. B, habitus, ventral view. C, head and thorax, dorsal view. D, labels. E, frons and clypeus, normal view. C & E not to scale. (photographs by H. Warner, © BMNH).

Scamandra diana Distant, 1892

Figs 3, 8.

Scamandra diana DISTANT, 1892: 276 [described]; pl. 13, fig. 4–4a [illustrated].

Scamandra diana – GERSTAECKER, 1895: 23 [compared to *S. polychroma* Gerstaecker, 1895].
— COCKERELL, 1921: 242 [compared with *Detyopsis scudderii* ♂ Cockerell, 1921]

(Nogodinidae)]. — METCALF, 1947: 143 [catalogued]. — LALLEMAND, 1963: 29 [keyed, described]. — NAGAI & PORION, 1996: 17 [catalogued]; pl. 5, fig. 82 [type illustrated].

MATERIAL EXAMINED.

TYPE MATERIAL. INDONESIA, Sangir Island: Holotype ♀: [Sangir (Doherty)] [diana Dist.] [Type] [Distant Coll. 1911—383.] (BMNH).

DIAGNOSIS. (1) disc of frons black-brown between carinae (Fig. 8 E); (2) tegmina mostly olivaceous green on corium (Fig. 8 A); (3) nodal line of tegmina C-shaped in middle (Fig. 8 A); (4) membrane of tegmina representing less than 1/3 of LTg (Fig. 8 A); (5) hind wings with anal and sutural zones whitish (Fig. 8 A); (6) femora black-brown (Fig. 8 B).

ADDITIONAL DESCRIPTION.

Measurements and ratios. LT: ♀: (n = 1, extrapolated): 30.0 mm; LTg/BTg: 2.24; BV/LV: 2.74; BF/LF: 0.88; BT/LP + LM: 1.2; LM/LP: 1.7; LMe/LCo: 0.61.

DISTRIBUTION. Currently known only from Sangir Island north of Sulawesi (Fig. 3).

NOTE. *Scamandra diana* Distant, 1892 is rather similar to *S. sanana* sp. nov. but differs from the latter by (1) the narrower black area of frons, very slightly surpassing the longitudinal carinae (broader and largely surpassing carinae in *S. sanana* sp. nov.); (2) the apical margin of tegmina oblique at sutural angle (rounded in *S. sanana* sp. nov.); (3) the membrane of tegmina representing only less than 1/3 of LTg (membrane representing nearly half of LTg in *S. sanana* sp. nov.).

***Scamandra sanana* sp. nov.**

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Figs 1, 3, 9–11.

ETYMOLOGY. The species epithet is the name of the island from which the type material originates. It is used in apposition.

MATERIAL EXAMINED.

TYPE MATERIAL. INDONESIA, Sanana Island: Holotype ♂: [Coll. I.R.Sc.N.B., Indonesia, Sanana Isl., i.2012, local collectors, purchased from A. Müller, I.G.: 32.861] (RBINS).

Paratypes: 5 ♀♀: same data as holotype (RBINS).

ADDITIONAL MATERIAL. INDONESIA, Sanana Island: 2 ♂♂, 3 ♀♀: Sanana Isl., I.2012 (TP).

DIAGNOSIS. (1) disc of frons with large black-brown area surpassing carinae laterally (Fig. 9 D); (2) tegmina mostly dark green or olivaceous green on corium; (3) nodal line of tegmina C-shaped in middle (Fig. 9 A); (4) membrane of tegmina representing about half of LTg; (5) hind wings with anal and sutural zones white (Fig. 9 A); (6) femora brown to black-brown (Fig. 9 B).

DESCRIPTION.

Measurements and ratios. LT: ♂ (n = 1): 27.7 mm; ♀: (n = 5): 33.4 mm (31.6–34.6); LTg/BTg: ♂: 2.11; ♀: 2.25; BV/LV: 3.4; BF/LF: 1.0; BT/LP + LM: 1.2; LM/LP: 1.9; LMe/LCo: 0.97.

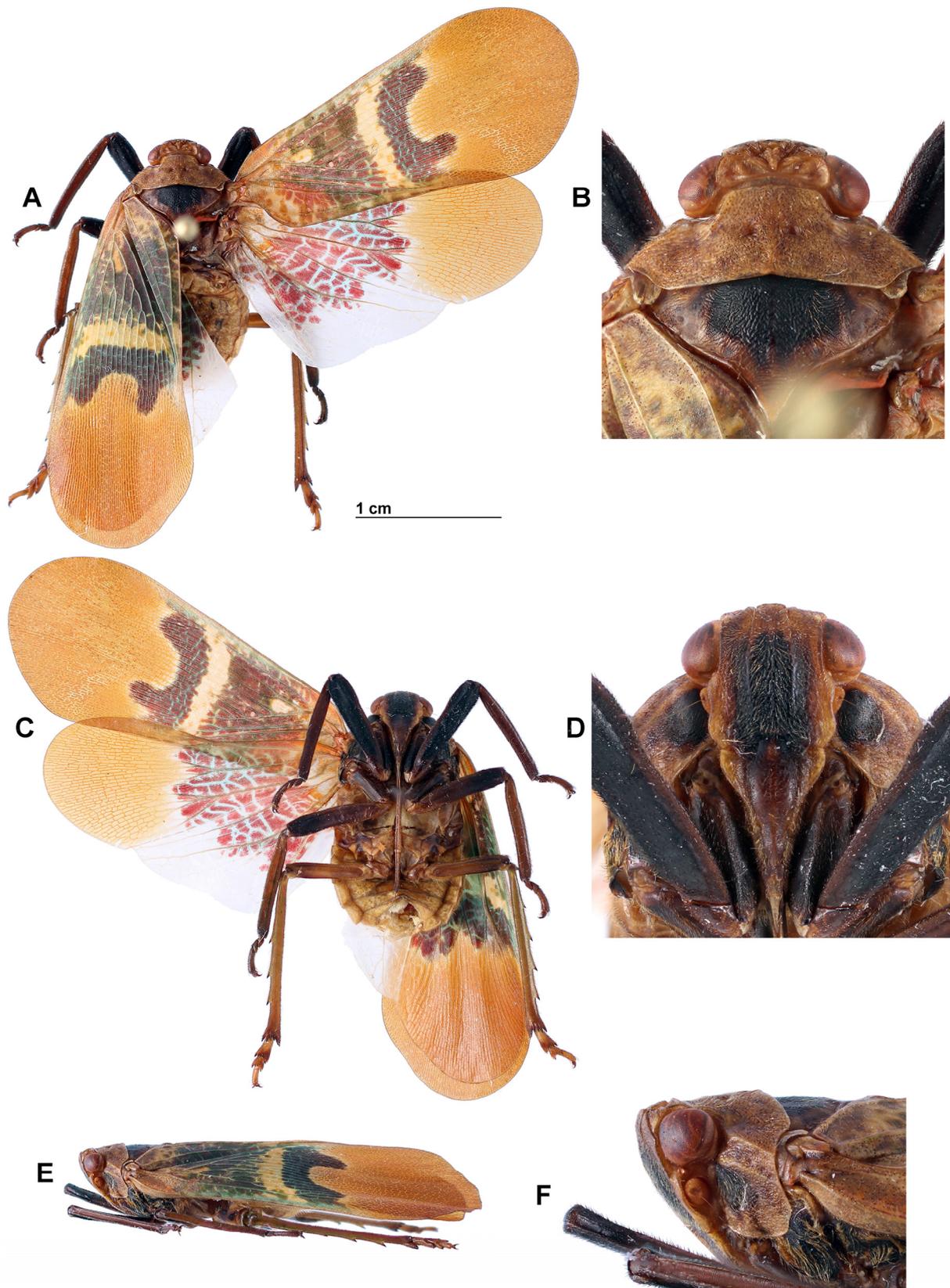


Fig. 9. *Scamandra sanana* sp. nov., holotype ♂ (RBINS). A, habitus, dorsal view. B, head and thorax, dorsal view. C, habitus, ventral view. D, frons and clypeus, normal view. E, habitus, left lateral view. F, head and thorax, left lateral view. B, C, F not to scale.



Fig. 10. *Scamandra sanana* sp. nov., paratype ♀ (RBINS). 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.

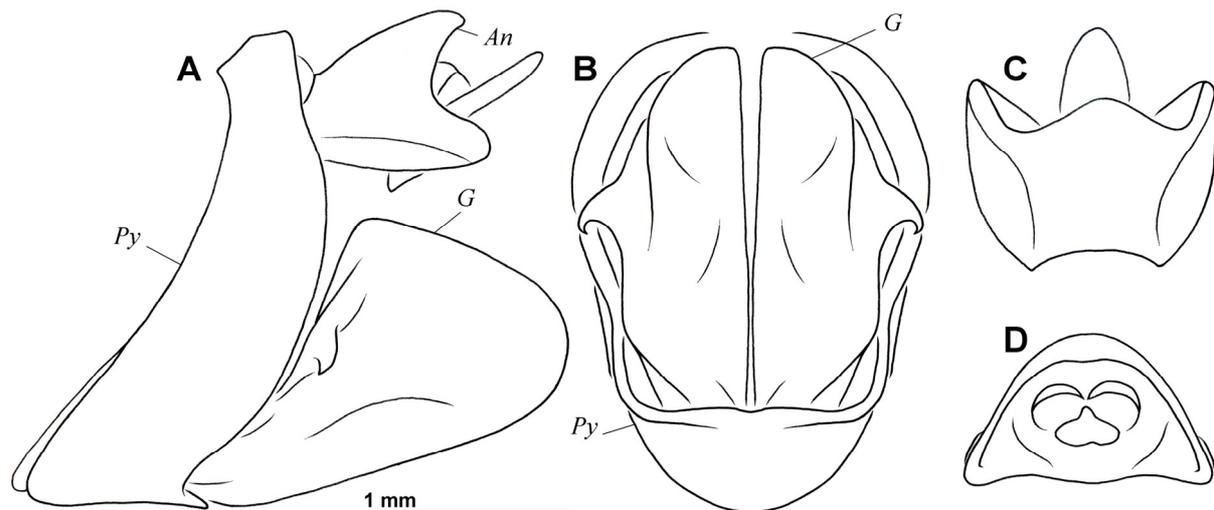


Fig. 11. *Scamandra sanana* sp. nov., holotype ♂ (RBINS), genitalia. A, Pygofer, anal tube and gonostylus, left lateral view. B, gonostyli and pygofer, posteroventral view. C, Anal tube, dorsal view. D, anal tube, posterior view. An, anal tube – Py, pygofer – G, gonostylus.

Head: (Figs 9 B, D, F; 10 B, D, F) yellow-brown with disc of frons black-brown and clypeus brown; black brown area of frons extending laterally well beyond carinae; antennae yellow-brown cephalic process reaching posterior margin of vertex (Figs 9 B; 10 B); vertex short, with disc wrinkled, and lateral and posterior margins carinate (Figs 9 B; 10 B); frons coriaceous with short hairs and 2 longitudinal carinae (Figs 9 D; 10 D); labium brown, surpassing metatrochanters (Figs 9 C; 10 C); pedicel of antennae kidney-shaped with flagellum inserted dorsolaterally.

Thorax: (Figs 9 B, D, F; 10 B, D, F) prothorax yellow-brown with lateral lobes of pronotum largely black-brown anteroventrally; lateral carinae and area between carinae, yellow-brown; wrinkled, with short hairs and 2 impressed points on disc of pronotum; median carina obsolete, barely distinct (Figs 9 B; 10 B). Mesonotum yellow-brown, slightly darker than pronotum, with large black-brown marking on disc, reaching anterior margin; apex of scutellum very slightly projecting dorsally.

Tegmina: (Figs 9 A, C; 10 A, C) yellow basally, with a broad yellow transverse band before middle; yellow zones marked with white wax on ventral side; nodal line strongly bisinuate and with C-shaped narrow darker marking in middle; nodal line followed by very narrow, whitish line extending on all breadth; membrane brown. Corium showing two types of colouration: (1) in green phase (Fig. 10): corium dark green with veins green-blue and costal area green-blue with dark green marking; (2) in olivaceous phase (Fig. 9): corium olivaceous with veins greenish, with irregular darker or reddish markings and costal area paler. Costal margin straight on most length; posterior margin broadly rounded; sutural margin slightly sinuate after nodal line.

Hind wings: (Figs 9 A, C; 10 A, C) basicostal angle yellowish white; anal area and broad band along sutural margin white; membrane yellow-brown. Large coloured marking on corium: (1) in green phase (Fig. 10): dark vinaceous with azureous blue cross-veins; reticulum of cross-veins more dense towards costal margin; (2) in olivaceous phase (Fig. 9) vinaceous red with bluish white cross-veins; reticulum of cross-veins more blue towards costal margin.

Legs: (Figs 9 A, C; 10 A, C) anterior and middle legs entirely brown to black-brown, with femora darker; posterior legs brown with femora darker distally; profemora slightly inflated apically; metatibiae with 4–5 lateral spines, basal one well developed, and 7 apical spines.

Abdomen: (Figs 9 A, C; 10 A, C) yellowish brown with terminalia black-brown.

Male genitalia: (Fig. 11) pygofer 3.5 times higher than long in middle in lateral view, with posterior margin slightly sinuate on dorsal $\frac{1}{4}$ (Fig. 11 A). Anal tube short, transverse, about 1.3 times broader than long in dorsal view, and slightly less than two times broader at apex than at base (Fig. 11 C); sides curved, subparallel on distal half in dorsal view (Fig. 11 C); apical margin pointed in middle dorsally, strongly projecting downwards ventrally (Fig. 11 A, C); in lateral view, apical margin deeply emarginate with ventral portion surpassing dorsal one (Fig. 11 A). Gonostyli 1.67 times longer than high in lateral view, subtriangular with apical angle rounded and dorsal angle roundly right obtuse (Fig. 11 A); laterodorsal tooth of gonostyli projecting lateroventrally, with apex acute and incurved in posteroventral view (Fig. 11 A, B).

DISTRIBUTION. Sanana Island near Sulawesi (Fig. 3).

NOTE. *Scamandra sanana* sp. nov. is rather similar to *S. diana* Distant, 1892 but differs from the latter (1) the black area of frons broader and largely surpassing carinae (narrower and very slightly surpassing the longitudinal carinae in *S. diana*); (2) the apical margin of tegmina rounded at sutural angle (in oblique *S. diana*); (3) the membrane of tegmina representing nearly half of LTg (membrane representing only less than $\frac{1}{3}$ of LTg in *S. diana*).

Discussion

Together with the four species described in the present paper, the genus *Scamandra* Stål, 1863 now contains 32 species, with nearly half of them (15) described within the last 15 years. This is mostly due to the recent entomological exploration of remote islands and locations in Indonesia. It seems obvious that the exploration of yet undocumented islands in the area will reveal more new species.

The natural history of the species of *Scamandra* is mostly unknown, except for *S. hermione* (Stål, 1864) (CONSTANT J. & ALISTO L., 2015).

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References

- ATKINSON E.T., 1886. - Notes on Indian Rhynchota. No. 6. Addenda and Index. *Journal and Proceedings of the Asiatic Society of Bengal, Calcutta*, 55: 143–223.
- BOURGOIN, T., WANG, R.R., ASCHE, M., HOCH, H., SOULIER-PERKINS, A., STROINSKI, A., YAP, S. & SZWEDO, J., 2015. - From micropterism to hyperpterism: recognition strategy and standardized homology-driven terminology of the fore wing venation patterns in planthoppers (Hemiptera: Fulgoromorpha). *Zoomorphology*, 134(1): 63–77.
- BOURGOIN T., 2017. - FLOW (Fulgoromorpha Lists on The Web): A world knowledge base dedicated to Fulgoromorpha. V.8, updated [24.VI.2017]. <http://hemiptera-databases.org/flow/>
- COCKERELL T.D.A., 1921. - Eocene insects from the Rocky Mountains. *Proceedings of the United States National Museum*, 57: 233–260.
- CONSTANT J., 2004. - Révision des Eurybrachidae (I). Le genre *Amychodes* Karsch, 1895 (Homoptera: Fulgoromorpha: Eurybrachidae). *Bulletin de l'Institut royal des Sciences naturelles de Belgique*, 74: 11–28.
- CONSTANT J., 2013. - The Oriental lanternfly genus *Scamandra*: new species and taxonomical notes (Hemiptera: Fulgoromorpha: Fulgoridae). *Zootaxa*, 3709(2): 134–148.

- CONSTANT J. & ALISTO L., 2015. - Contribution to the knowledge of some Lanternflies of the Philippines (Hemiptera: Fulgoromorpha: Fulgoridae). *Belgian Journal of Entomology*, 27: 1–16.
- DISTANT W.L., 1892. - Contribution to a knowledge of the homopterous family Fulgoridae. *Transactions of the Entomological Society of London*: 275–286.
- DISTANT W.L., 1906. - *The fauna of British India, including Ceylon and Burma. Rhynchota*. Vol. 3. Taylor & Francis, London. <http://dx.doi.org/10.5962/bhl.title.48423>.
- GERSTAECKER C.E.A., 1895. - Ueber einige bemerkenswerthe Fulgorinen der Greifswalder zoologischen Sammlung. *Mittheilungen des Naturwissenschaftlichen Vereines für Neu-Vorpommern und Rügen. Greifswald*, 27: 1–50.
- LALLEMAND V., 1963. - Révision des Fulgoridae (Homoptera). Deuxième partie. Faunes asiatique et australienne. *Mémoires de l'Institut royal des Sciences naturelles de Belgique (Séries 2)*, 75: 1–99.
- METCALF Z.P., 1947. - *General Catalogue of the Homoptera. Fascicle IV Fulgoroidea. Part 9 Fulgoridae*. Raleigh (U.S.A.) North Carolina State College, 280 pp.
- NAGAI S. & PORION T., 1996. - *Fulgoridae 2: Catalogue illustré des faunes asiatique et australienne*. Sciences Nat, Compiègne, 80 pp., 236 figs.
- NAGAI S. & PORION T., 2004. - *Fulgoridae 2, supplément 2: Nouveaux Fulgoridae d'Asie du Sud-Est*. Hillside Books, Canterbury, 13 pp., 14 figs.
- PORION, T., AUDIBERT C. & NAGAI S., 2016. - Notes sur le groupe de *Scamandra sanguiflua* (Stål, 1863), avec la description d'une nouvelle espèce de Sulawesi : *Scamandra marcellae* n. sp. (Hemiptera, Fulgoromorpha, Fulgoridae). *Faunitaxys*, 4(3): 1–9.
- SHORTHOUSE D.P., 2010. - SimpleMappr, an online tool to produce publication-quality point maps. [Retrieved from <http://www.simplemappr.net>. Accessed June 13, 2017].
- STÅL C., 1863. - Beitrag zur Kenntnis der Fulgoriden. *Entomologische Zeitung. Herausgegeben von dem entomologischen Vereine zu Stettin*, 24: 230–251.
- STÅL C., 1866. - Hemiptera Homoptera Latr. *Hemiptera Africana* 4: 1–276. <http://biodiversitylibrary.org/page/8695280>
- STÅL C., 1870. - Hemiptera insularum Philippinarum. Bidrag till Philippinska öarnes Hemipter-fauna. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar, Stockholm*, 27: 607–776.