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Research article

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Review of the Maluku Islands species of the lanternfly genus *Birdantis* Stål, 1863, with a new species and identification key (Hemiptera: Fulgoromorpha: Fulgoridae)

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Abstract. A new species of the genus *Birdantis* Stål, 1863 (Hemiptera: Fulgoridae), *B. bhaskarai* sp. nov. from Larat Island (Tanimbar), is described. *Birdantis collaris* (Walker, 1870) stat. rev. and *B. trilineata* (Schmidt, 1926) stat. rev. are reinstated as valid species, respectively from status of subspecies and as junior synonym of *B. delibuta* Stål, 1863. These four species, as well as the other one previously described from the Maluku Islands, *B. decens* Stål, 1863, are illustrated from their type specimens. An identification key, a distribution map, illustrations of habitus and details of male genitalia are provided. The synonymy between *Myrilla* Distant, 1888 and *Birdantis* is formally reinstated and all species formerly placed in the subgenus *Birdantis* (*Myrilla*) are transferred to *Birdantis* sensu stricto. *Birdantis* is transferred to the subfamily Aphaeninae Blanchard, 1847 and now contains eighteen species distributed in Maluku (five species), New Guinea and neighbouring islands (ten species) and Australia (three species).

Keywords. Wallacea, Indonesia, planthopper, lanternbug, biodiversity.

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Introduction

The family Fulgoridae counts 143 genera and 762 species, distributed mainly in the tropical and subtropical regions of the world, with some taxa extending to temperate regions. The family contains some of the most spectacular insects, such as the New World 'peanut bug' (*Fulgora* spp.) surrounded by several legends or the species of the genus *Pyrops* Spinola, 1839 in the Oriental Region, which are recognized at first glance by all entomologists (O'Brien 2002). Trophobiotic interactions with other insects (Formicidae, Blattodea, Lepidoptera), geckos (Reptilia: Squamata: Gekkonidae) and even snails (Mollusca: Gasteropoda) have been reported in recent years for several species both from the Old and New World (Naskrecki & Nishida 2007; Constant 2015).

The fauna of Fulgoridae in the Maluku Islands is very poor, with only two genera and six species, compared to the fauna of Sulawesi and adjacent islands to the west (5 genera and 30 species) or that

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of New Guinea (9 genera and 37 species) to the east. Both genera recorded from the Maluku Islands, *Birdantis* Stål, 1863 and *Hariola* Stål, 1863, are also present in New Guinea, but all Malukan species are endemic in the archipelago (Bourgoin 2018). The Maluku Islands lie in Wallacea, the region marking the transition between the Asian and Australian biogeographical blocks, are geologically relatively young (1–15 million years old) and were never attached to larger landmasses. As they lie between the Weber's and Lydekker's lines, their fauna shows greater affinities with Australasia than with Asia as well as a high degree of endemism. The islands are small in size and mountainous, and are covered in rain forest except the Tanimbar Islands and other southeastern islands, which are arid and sparsely vegetated (Monk *et al.* 1997).

The genus *Birdantis* comprises fifteen species distributed in New Guinea, the Maluku Islands and Australia (Cape York Peninsula) (Bourgoin 2018). The description of the first two species of *Birdantis* from the Maluku Archipelago dates from more than 150 years ago, when Stål (1863) described the genus to accommodate *B. decens* Stål, 1863 and *B. delibuta* Stål, 1863. Two additional Malukan species were described, one in the genus *Polydictya*, *P. collaris* Walker, 1870, and one in the genus *Myrilla*, *M. trilineata* Schmidt, 1926. The latter species were considered as a synonym (*trilineata*) and a variety (*collaris*) of *B. delibuta*, respectively, leaving two valid species of *Birdantis* for the Maluku Islands: *B. decens* and *B. delibuta* (Lallemand 1963; Nagai & Porion 1996).

The study of recent material of Fulgoridae in the collections of the Royal Belgian Institute of Natural Sciences revealed one new species of *Birdantis* from Larat Island near Tanimbar and led to a critical review of the type material of all species described from the Maluku Islands.

The present paper aims to propose a new subfamily placement of *Birdantis*, to update the status of the genus, to review the status of all species known from the Maluku Archipelago, to describe the new species from Larat Island and to propose an illustrated identification key to the species of the treated area.

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, then boiled for some minutes in a 10% solution of potassium hydroxide (KOH). The aedeagus was dissected with a needle blade and all pieces examined in ethanol, the whole preparation placed in glycerine for preservation. Observations were done with a Leica MZ8 stereo microscope. Photographs of specimens were taken with a Canon EOS 700 D camera with a Sigma DG Macro lens and of genitalia with a Leica EZ4W stereo microscope with an integrated camera, stacked with CombineZ software and optimized with Adobe Photoshop CS3. The metatibiotarsal formula gives the number of spines on (side of metatibia) apex of metatibia/apex of first metatarsus/apex of second metatarsus. The terminology for the venation follows Bourgoin *et al.* (2015).

For the transcription of the labels of the types, the wording on each single label is delimited by square brackets. My personal comments in the synonym lists of the species are followed by "!".

The distribution map was produced with SimpleMappr (Shorthouse 2010).

The measurements were taken as in Constant (2004) and the following acronyms 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
LT = total length (apex of head to apex of tegmina)
LTg = maximum length of the tegmen
LV = length of the vertex in median line

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Acronyms used for the collections:

BMNH = Natural History Museum, London, UK
EBC = Edy Bhaskara collection, Indonesia
NHRS = Naturhistoriska Riksmuseet, Stockholm, Sweden
RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium
ZMPA = Polish Academy of Sciences, Museum of the Institute of Zoology, Warsaw, Poland

Results

Class Hexapoda Blainville, 1816
Order Hemiptera Linnaeus, 1758
Suborder Auchenorrhyncha Duméril, 1806
Infraorder Fulgoromorpha Evans, 1946
Superfamily Fulgoroidea Latreille, 1807
Family Fulgoridae Spinola, 1839
Subfamily Aphaeninae Blanchard, 1847

Genus ***Birdantis*** Stål, 1863

Birdantis Stål, 1863: 581 (described, compared with *Aphaena* Guérin-Méneville, 1834; type species: *Birdantis decens* Stål, 1863 by subsequent designation in Distant 1906: 26).
Myrilla Distant, 1888*:* 487 (described, compared with *Polydictya* Guérin-Méneville, 1844; type species: *Myrilla obscura* Distant, 1888, by monotypy). syn. rev.

Remarks

Lallemand (1959) synonymized *Myrilla* under *Birdantis* and proposed a key to the species of *Birdantis*. However, Fennah (1977) considered *Myrilla* as a subgenus of *Birdantis*, separating them on characters of the vertex, i.e., anterior margin of vertex straight, without deep transverse sulcus behind it in *Myrilla*; anterior margin of vertex concave, with a deep transverse sulcus behind it in *Birdantis* s. str. It is therefore currently formally divided into two subgenera: *Birdantis* (ten species and one subspecies) and *Myrilla* (two species) (Fennah 1977; Nagai & Porion 1996). The genus is externally close to the Oriental *Polydictya* Guérin-Méneville, 1844 and *Gebenna* Stål, 1863, and the Australian *Desudaboides* Musgrave, 1927 (Lallemand 1963; Nagai & Porion 1996; Constant 2010, 2011). Nagai & Porion (1996) followed the classification in Fennah (1977), but in my paper on the species of *Birdantis* from Australia (Constant 2011), I questioned the value of the subgenera as defined by Fennah (1977), because intermediate species exist, and followed the views of Lallemand (1959) but without formally reinstating the synonymy between *Birdantis* and *Myrilla*. Accordingly, three species remained without subgeneric affiliation (Bourgoin 2018) within the last formally accepted classification of Fennah (1977).

The genus *Birdantis* is currently placed in the Poiocerina Haupt, 1929 of the Poiocerini Haupt, 1929, in the subfamily Poiocerinae Haupt, 1929 (Lallemand 1963; Constant 2011; Bourgoin 2018). However, Urban & Cryan (2009) have shown, based on molecular data, that Fulgoridae can be separated into two main clades, one grouping all New World taxa with strong support, the other containing all Old World taxa. Hence, as the type genus of the Poiocerinae is the Neotropical genus *Poiocera* Laporte, 1832, the suprageneric placement of *Birdantis* needs to be reconsidered.

The classifications proposed by Metcalf (1947), Lallemand (1963) and Nagai & Porion (1996) were based on a very small number of characters of the head, especially the presence/absence and shape of the cephalic process. The genus *Birdantis* is here transferred to the subfamily Aphaeninae, following

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the conclusions of the DNA study by Urban & Cryan (2009), which place the genus close to *Desudaba* Walker, 1858. However, the latter study did not contain any species of the genera *Polydictya*, *Gebenna* or *Desudaboides*, which are putatively considered closely related to *Birdantis* based on morphological characters. Hence, an accurate tribal placement requires a complete study of the suprageneric relations between the genera of Aphaeninae with the inclusion of more Old World taxa in the molecular analysis and the integration of morphological data (Urban & Cryan 2009).

Species included

Birdantis bernhardi Lallemand, 1959 – New Guinea
Birdantis bhaskarai sp. nov. – Larat Island
Birdantis bloetei Lallemand, 1959 – New Guinea
Birdantis collaris (Walker, 1870) – Morotai Island
Birdantis decens Stål, 1863 – Aru Island
Birdantis delibuta Stål, 1863 – Ternate Island
Birdantis dorsinigra Lallemand, 1959 – New Guinea
Birdantis enyo Fennah, 1977 – New Guinea
Birdantis goemansi Constant, 2011 – Australia (N Queensland)
Birdantis hesperugo Fennah, 1977 – New Guinea
Birdantis lineatifrons (Schmidt, 1907) – New Guinea
Birdantis mouldsi Constant, 2011 – Australia (N Queensland)
Birdantis obscura (Distant, 1888) – New Guinea
Birdantis papuana (Distant, 1906) – New Guinea
Birdantis semihyalina (Distant, 1906) – New Guinea
Birdantis similis (Schmidt, 1911) – New Guinea
Birdantis trilineata (Schmidt, 1926) – Ambon, Boano, Buru and Seram Islands
Birdantis virginiae Constant, 2011 – Australia (N Queensland)

Identification key to the species of *Birdantis* of the Maluku Archipelago

1. Frons without longitudinal brown or black lines (Fig. 1D) 2
– Frons with longitudinal brown or black lines (Fig. 6D) 3

2. Abdomen mostly orange dorsally (Fig. 1A); bulge between vertex and frons pale yellow-brown (Fig. 1B) .....***Birdantis bhaskarai*** sp. nov.
– Abdomen mostly black dorsally (Fig. 4A); bulge between vertex and frons black (Fig. 4C) ....***Birdantis collaris*** (Walker, 1870)

3. Frons with five longitudinal black stripes, the three central ones merging into a transverse line along dorsal margin of frons (Fig. 5F); apical half of tegmina hyaline (Fig. 5A) ....***Birdantis decens*** Stål, 1863
– Frons with three longitudinal black stripes limited to about the ventral half of frons (Fig. 8D); apical half of tegmina infuscate (Fig. 8A) 4

4. Anterior margin of frons strongly roundly protruding in dorsal view, the visible portion of frons slightly longer than vertex in median line (Fig. 8B); median carina of pronotum acute (Fig. 8B); posterior wings with basal reddish brown marking (Fig. 8A) ....***Birdantis trilineata*** (Schmidt, 1926)
– Anterior margin of frons convex in dorsal view, the visible portion of frons about ⅔ as long as vertex in median line (Fig. 6C); median carina of pronotum slightly marked (Fig. 6C); posterior wings with basal red marking (Fig. 6A) .....***Birdantis delibuta*** Stål, 1863

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Birdantis bhaskarai sp. nov.
urn:lsid:zoobank.org:act:3424BD5B-34C2-4516-A0CB-9415F485F537
Figs 1–3

Diagnosis

This species can be separated from all other species of *Birdantis* by the following combination of characters:

(1) frons entirely yellow-brown without lines or spots (Fig. 1D)
(2) bulge between frons and vertex coloured as vertex (Fig. 1B)
(3) abdomen mostly orange dorsally (Fig. 1A) and ventrally (Fig. 1C)
(4) tegmina opaque on basal half and infuscate on distal half (Fig. 1A)
(5) hind wings largely smoky, but not hyaline or with a large black area (Fig. 1A)

Etymology

This species is dedicated to Mr Edy Bhaskara (Indonesia) in acknowledgment of his generous contribution to the present work.

Material examined

Holotype

INDONESIA: ♂ (dissected, Figs 1–2), Larat Island, 7°09′17″ S, 131°54′48″ E [Coll. I.R.Sc.N.B., Indonesia, Tanimbar islands, Larat Island, xii.2016, Gift from E. Bhaskara, I.G.: 33.453] (RBINS).

Paratypes

INDONESIA: 1 ♂, 4 ♀♀, same collection data as for holotype (RBINS).

Other material

INDONESIA: 2 ♀♀, same collection data as for holotype (EBC).

Description

Measurements and ratios. LT: ♂ (n = 2): 19.0 mm (18.9–19.2); ♀ (n = 6): 21 mm (20.4–21.2). LTg/BTg = 3.45; BV/LV = 4.45; LF/BF = 0.83.

Head (Fig. 1B, D, F). Pale yellow-brown with small black marking at posterior angles of vertex, a larger black marking behind eyes, median portion of clypeus darker and more reddish, with a yellowish central line, labium pale yellow-brown turning to brown on two apical segments and antennae brown. Vertex with deep transverse groove and all margins carinate, shorter in middle than on sides. Frons finely wrinkled, with two smooth longitudinal carinae slightly diverging towards dorsum and a slight longitudinal groove on each side between carina and lateral margin; broadest near base, above clypeus; convex in dorsal view and with dorsal margin rounded in perpendicular view; bulge between frons and vertex only visible dorsally. Ocelli under eyes. Antennae with scape short and cylindrical, and pedicel inflated and reniform. Clypeus narrower than frons, reaching apex of procoxae. Labium with penultimate segment surpassing hind coxae (Fig. 1C).

Thorax (Fig. 1B, D, F). Pronotum pale yellow-brown, with median carina and impressed point on each side of latter; small back-brown spot on each side of disc, short black-brown line on median carina on anterior half and brown marking behind eye. Mesonotum dark brown, with median and peridiscal carinae well marked, concolorous; wrinkled in the area limited by peridiscal carinae; mesothoracic sternites pale yellow-brown. Metathoracic sternites dark brown. Tegulae yellow-brown.

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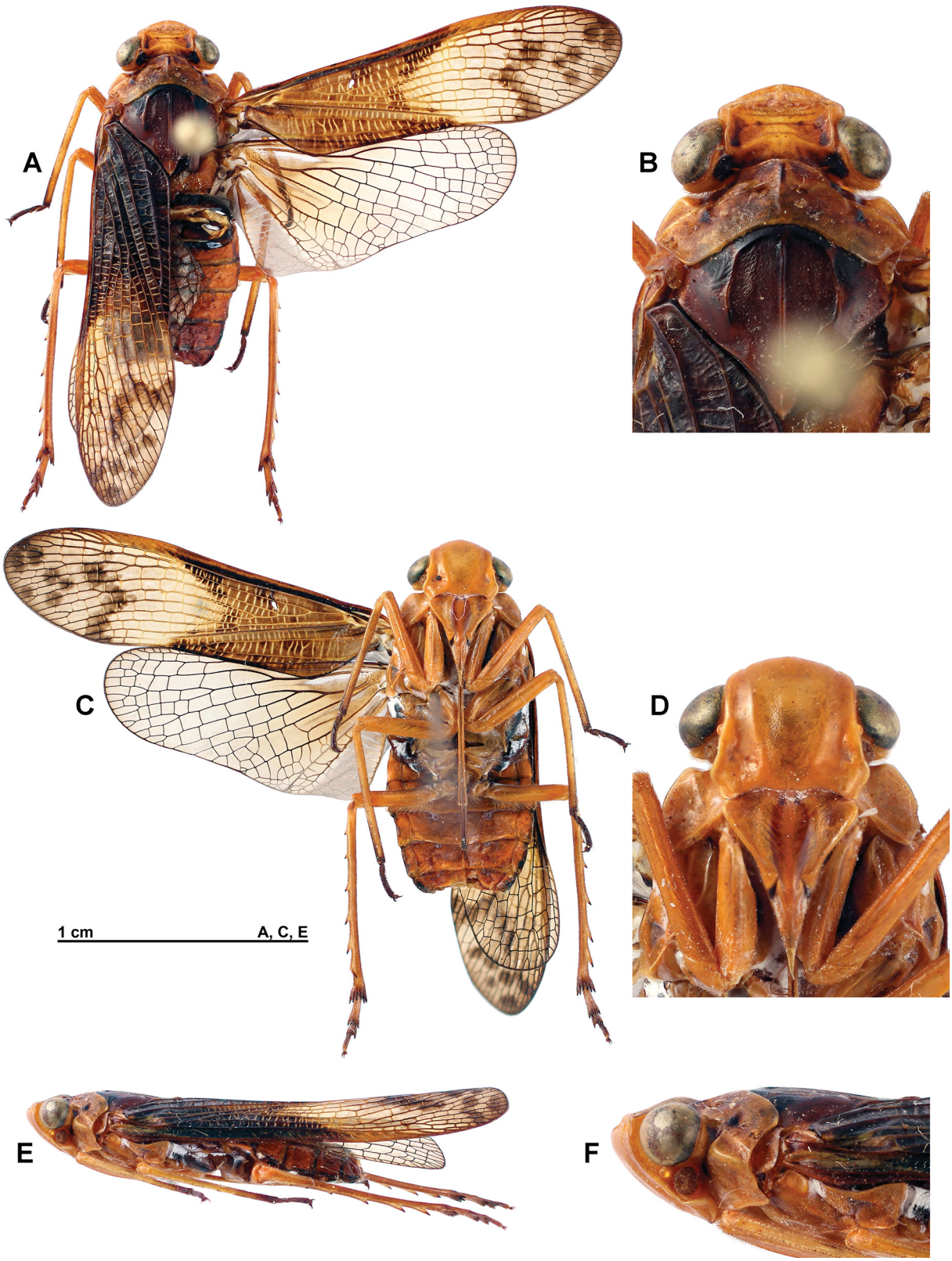

Fig. 1. *Birdantis bhaskarai* sp. nov., holotype, ♂. **A**. Habitus, dorsal view. **B**. Head and thorax, dorsal view. **C**. Habitus, ventral view. **D**. Head, normal view of frons. **E**. Habitus, lateral view. **F**. Head and thorax, lateral view. B, D, F not to scale.

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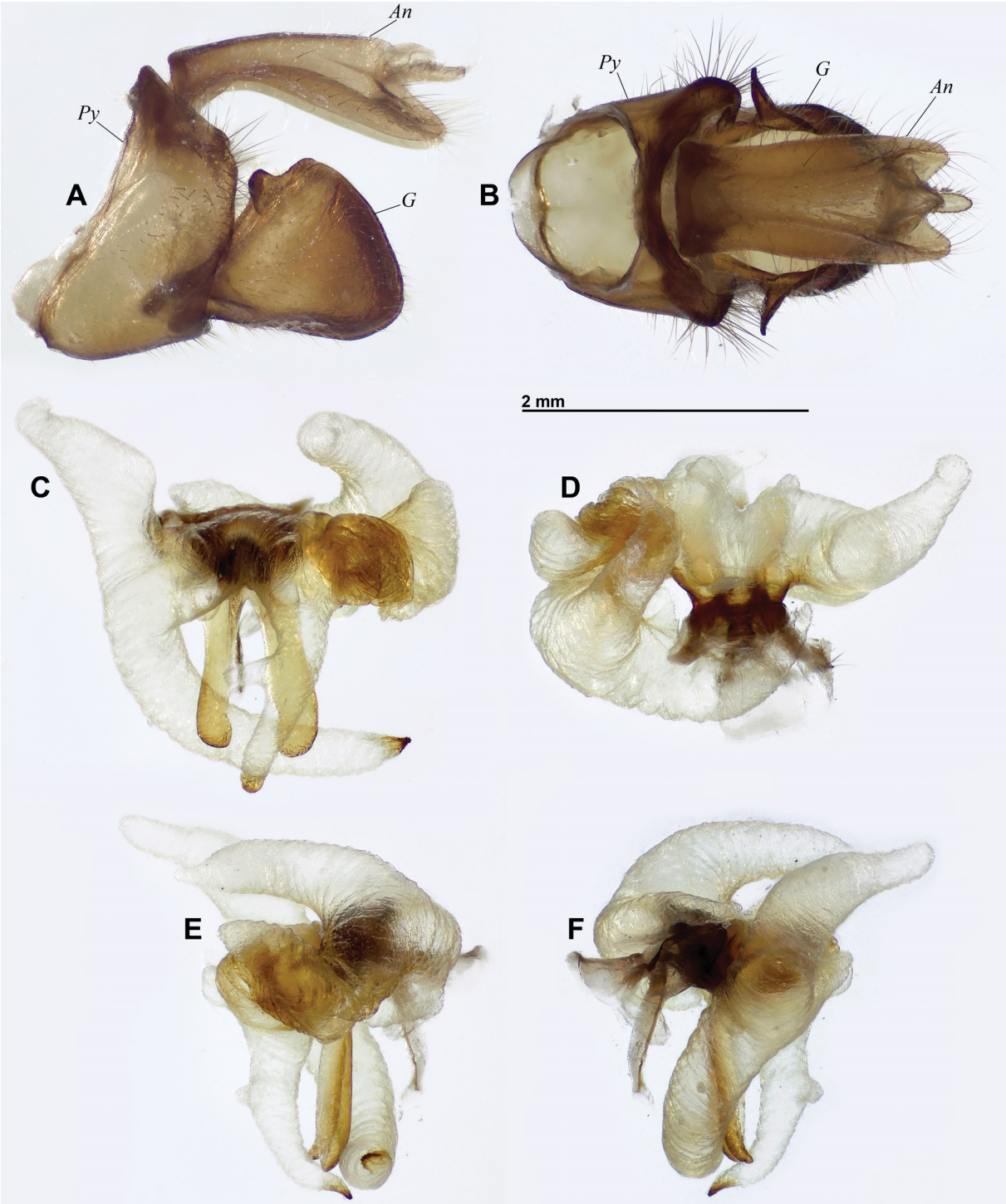

Fig. 2. *Birdantis bhaskarai* sp. nov., holotype, ♂, genitalia. **A**. Pygofer, anal tube and gonostyli, left lateral view. **B**. Pygofer, anal tube and gonostyli, dorsal view. **C**. Aedeagus, posterior view. **D**. Aedeagus, dorsal view. **E**. Aedeagus, right lateral view. **F**. Aedeagus, left lateral view. Abbreviations: *An* = anal tube; *G* = gonostyli; *Py* = pygofer.

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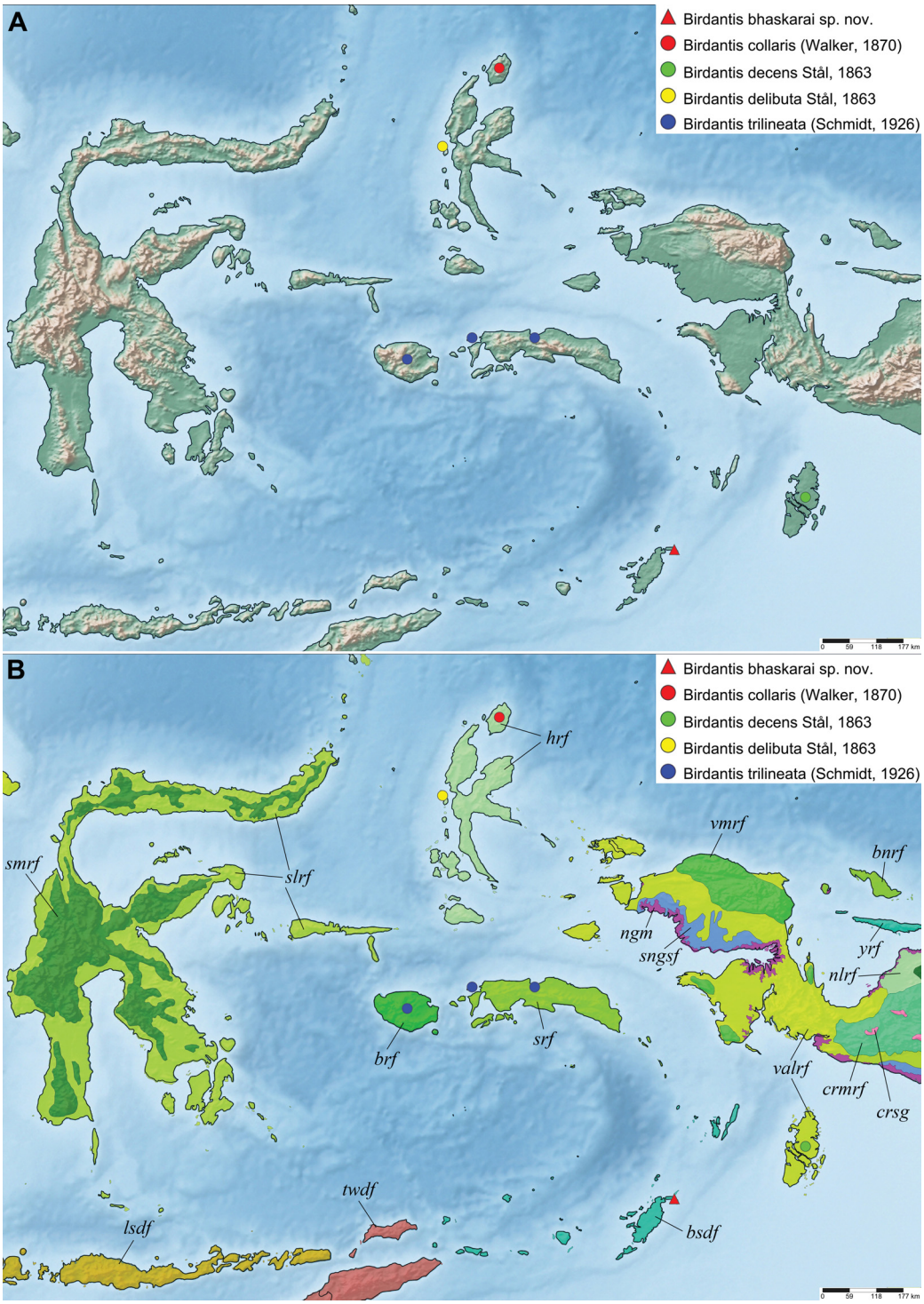

Fig. 3. *Birdantis* spp. from Maluku, distribution map. **A**. Topographic map. **B**. Ecoregions map. Abbreviations: *bnrf* = Biak-Numfoor rain forests; *brf* = Buru rain forests; *bsdf* = Banda Sea Islands moist deciduous forests; *crmrf* = Central Range montane rain forests; *crsg* = Central Range subalpine grasslands; *hrf* = Halmahera rain forests; *lsdf* = Lesser Sundas deciduous forests; *ngm* = New Guinea mangroves; *nlrf* = Northern New Guinea lowland rain forests; *slrf* = Sulawesi lowland rainforests; *smrf* = Sulawesi montane rainforests; *sngsf* = Southern New Guinea freshwater swamp forests; *srf* = Seram rain forests; *twdf* = Timor and Wetar deciduous forests; *valrf* = Vogelkop-Aru lowland rain forests; *vmrf* = Vogelkop montane rain forests; *yrf* = Yapen rain forests.

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Tegmina (Fig. 1A, C). Elongate, broader at nodal line and acutely rounded apically. Corium and clavus with numerous cross-veins, brown variegated with darker patches and a blackish line along external side of vein Pc+CP; veins and cross-veins yellow. Membrane smoky, roundly extending inside corium medially and with brown spots on distal part and brown markings on nodal line; veins yellow turning to black-brown after nodal line.

Hind wings (Fig. 1A, C). Light smoky brown with veins black-brown, darker at basal angle and with anal area with a grey hue and cross-veins whitish; maximal breadth near base; slightly broader than tegmina.

Legs (Fig. 1A, C). Elongate and slender. Pale yellow-brown with apex of pro- and mesofemora black distally; pro- and mesotarsi black; metatibiae brown apically, with six lateral spines and six apical spines, all spines dark brown apically; metatarsi with first tarsomere yellow-brown, brown apically and with nine apical spines ventrally, second and third tarsomeres dark brown, the second one with eight apical spines ventrally. Metatibiotarsal formula: (6) 6/9/8.

Male genitalia

Pygofer higher than long, about 1.4 times as high as maximum length, longer ventrally and abruptly narrowing on dorsal ¼ in lateral view; dorsal margin of pygofer oblique in lateral view (Fig. 2A). Anal tube elongate, about 2.1 times as long as maximum breadth, curved ventrally near base; lateral margins subparallel, only slightly sinuate and with narrowest portion at basal ¼; apical margin strongly emarginate in dorsal view, acutely rounded in lateral view (Fig. 2A–B). Gonostyli subtriangular in lateral view, with posterior margin rounded; anterodorsal margin emarginate after lateral process; lateral process laminate, directed laterally and apically pointed, with apical point directed lateroventrally (Fig. 2A–B). Aedeagus mostly membranous; phallobase with two ventral, elongate processes; aedeagus s. str. strongly reduced but endosoma well developed with six membranous digitiform processes, with posteroventral left process with secondary process directed centrally (Fig. 2C–F).

Distribution

Larat Island (Fig. 3).

Birdantis collaris (Walker, 1870) stat. rev.
Figs 3–4

Polydictya collaris Walker, 1870: 98 (described).

Polydictya collaris – Gerstaecker 1895: 27 (doubt on generic placement in *Polydictya*).
Birdantis collaris – Breddin 1900: 193 (transferred to *Birdantis*; recorded from Halmahera Island: Soah Konorah). — Distant 1906: 26 (listed; = *vittiventris* Walker *in litt*. (error!)). — Metcalf 1947: 91 (catalogued).

non *Birdantis delibuta* f. *collaris* – Lallemand 1959: 196 (keyed; treated as a local form of *B. delibuta* (error!)); 1963: 12 (same as preceding reference).
non *Birdantis delibuta collaris* – Fennah 1977: 376 (keyed), 377 (recorded from Ambon Island (error!); treated as a subspecies of *B. delibuta* (error!); male genitalia illustrated (error!)). — Nagai & Porion 1996: 14 (listed; = *vittiventris* Walker *in litt*. (error!)).

Note

The specimens examined by Lallemand (1959, 1963) and Fennah (1977), erroneously identified as *B. collaris*, were actually specimens of *B. trilineata* (Schmidt, 1926).

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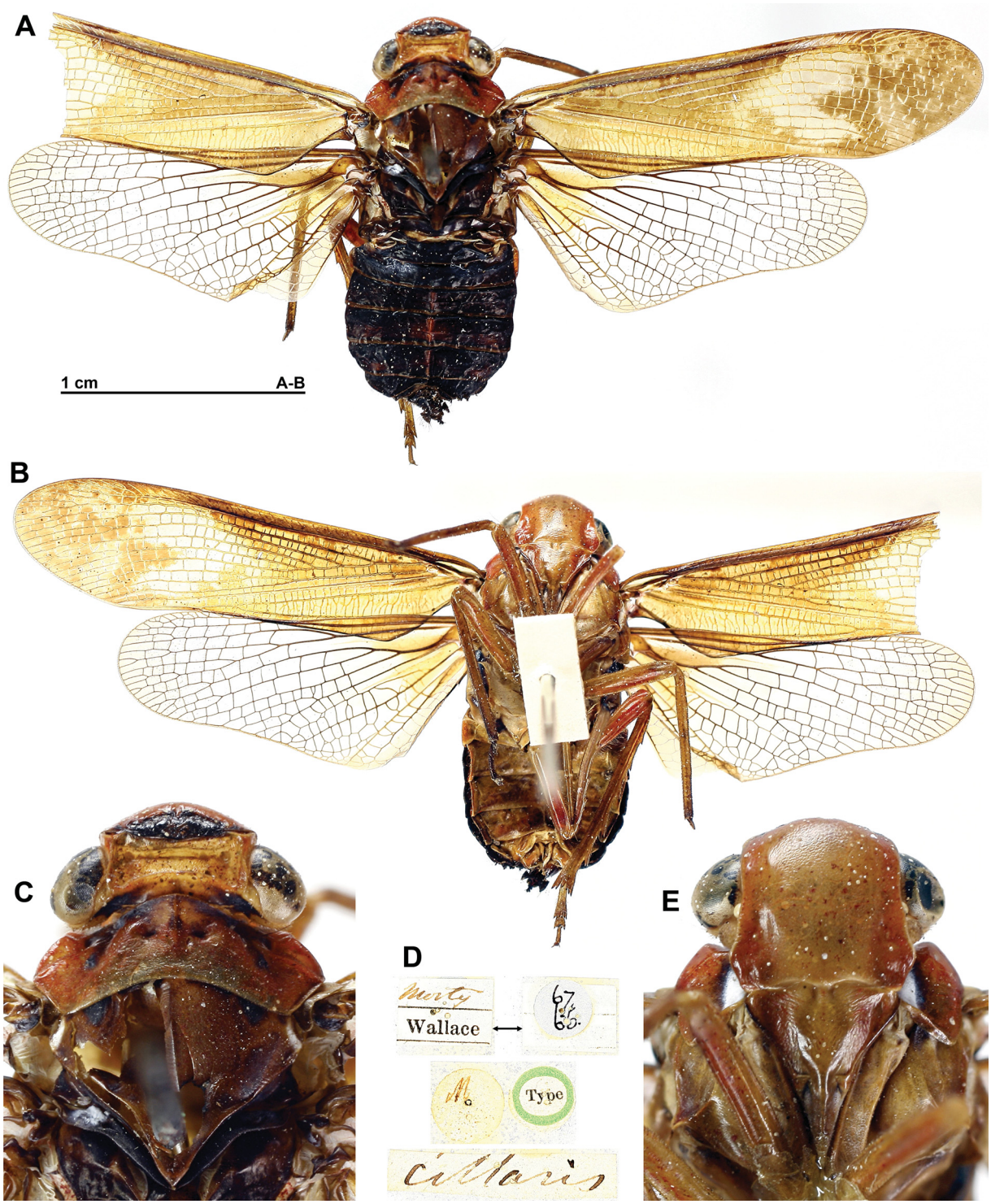

Fig. 4. *Birdantis collaris* (Walker, 1870), holotype, ♀. **A**. Habitus, dorsal view. **B**. Habitus, ventral view. **C**. Head and thorax, dorsal view. **D**. Labels. **E**. Head, normal view of frons. C–E not to scale.

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Diagnosis

This species can be separated from all other species of *Birdantis* by the following combination of characters:

(1) frons entirely yellow-brown, without lines or spots (Fig. 4E)
(2) bulge between frons and vertex black (Fig. 4C)
(3) abdomen mostly black dorsally (Fig. 4A) and brown ventrally (Fig. 4B)
(4) tegmina opaque on basal half and infuscate on distal half (Fig. 4A)
(5) hind wings largely hyaline, with basal angle yellowish (Fig. 4A)

Material examined

Holotype

INDONESIA: ♀ (Fig. 4), Morotai Island, 2°20′52″ N, 128°27′52″ E [Morty, Wallace /*glued on the reverse:* 67 66] [M] [Type] [collaris] [BMNH(E), #651887] (BMNH).

Distribution

Morotai Island (holotype) and Halmahera Island (Breddin 1900) (Fig. 3).

Birdantis decens Stål, 1863
Figs 3, 5

Birdantis decens Stål, 1863: 581 (described; compared with Neotropical genus *Poiocera* de Laporte, 1832), 582 (compared with *B. delibuta* Stål, 1863).

Birdantis decens – Walker 1870: 100 (listed). — Kirkaldy 1913: 11 (compared with a specimen tentatively attributed to *B. delibuta*). — Metcalf 1947: 92 (catalogued). — Lallemand 1959: 194 (keyed), 195 (*B. similis* (Schmidt, 1911) possible junior synonym of *B. decens* (error!)); 1963: 10 (keyed). — Fennah 1977: 376 (keyed), figs 3–4 (male genitalia). — Nagai & Porion 1996: 14 (listed).

Diagnosis

This species can be separated from all other species of *Birdantis* by the following combination of characters:

(1) frons yellowish, with five longitudinal black lines not reaching ventral margin of frons, the three central ones merging together dorsally in a transverse line and central one dilated in middle (Fig. 5F)
(2) bulge between frons and vertex coloured as vertex (Fig. 5C)
(3) abdomen mostly black dorsally (Fig. 5A) and brown ventrally (Fig. 5B)
(4) tegmina opaque on basal half and hyaline on distal half (Fig. 5A)
(5) hind wings largely hyaline, with basal angle red (Fig. 5A)

Material examined

Holotype

INDONESIA: ♂ (Fig. 5), Aru Island, 6°07′14″ S, 134°30′00″ E [Aru Isl /*on the reverse:* 58 48] [Birdantis] [Type] [Birdantis decens Stål] [BMNH(E), #651892] (BMNH).

Distribution

Aru Island (Fig. 3).

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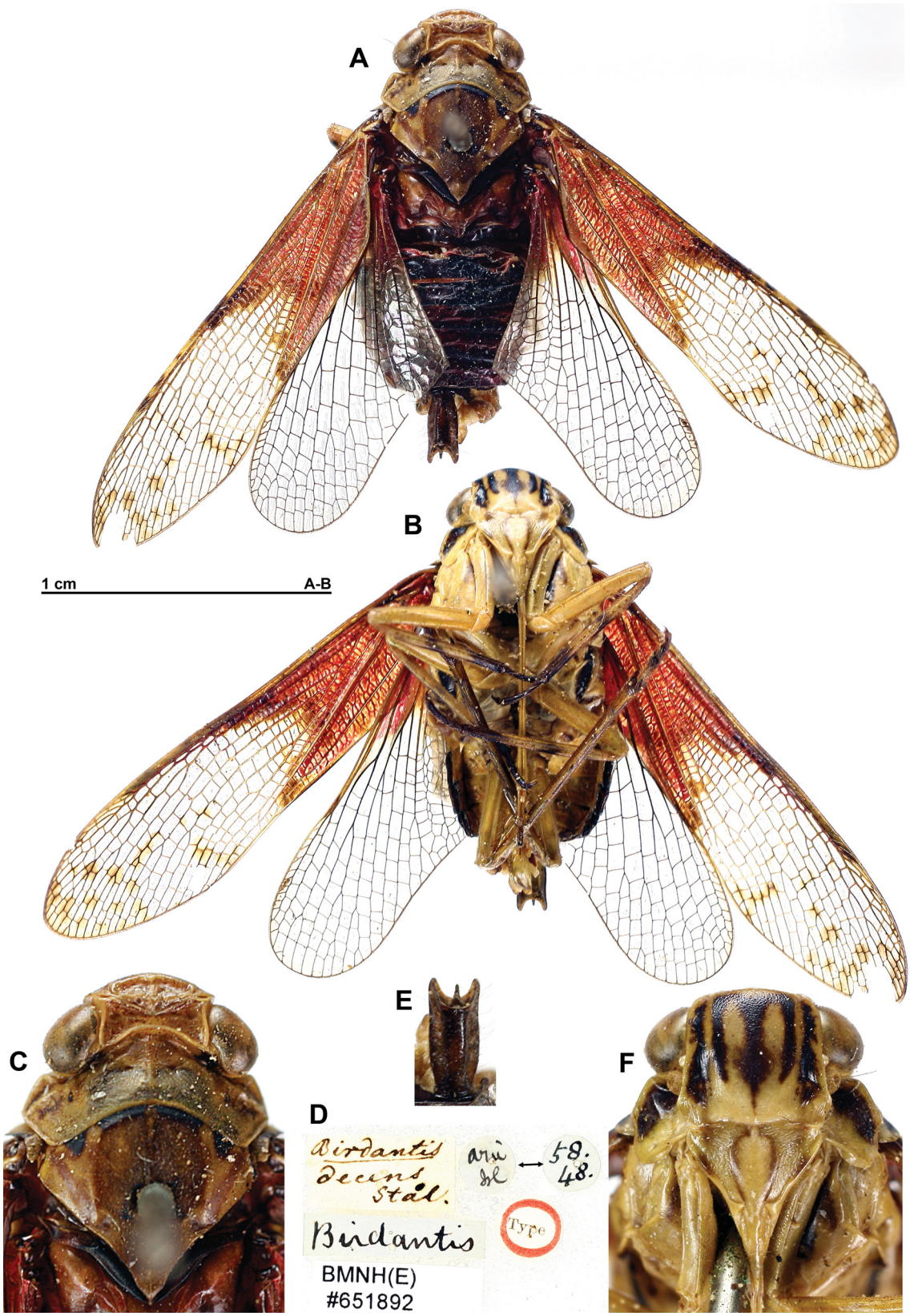

Fig. 5. *Birdantis decens* Stål, 1863, holotype, ♂. **A**. Habitus, dorsal view. **B**. Habitus, ventral view. **C**. Head and thorax, dorsal view. **D**. Labels. **E**. Anal tube, dorsal view. **F**. Head, normal view of frons. C–F not to scale.

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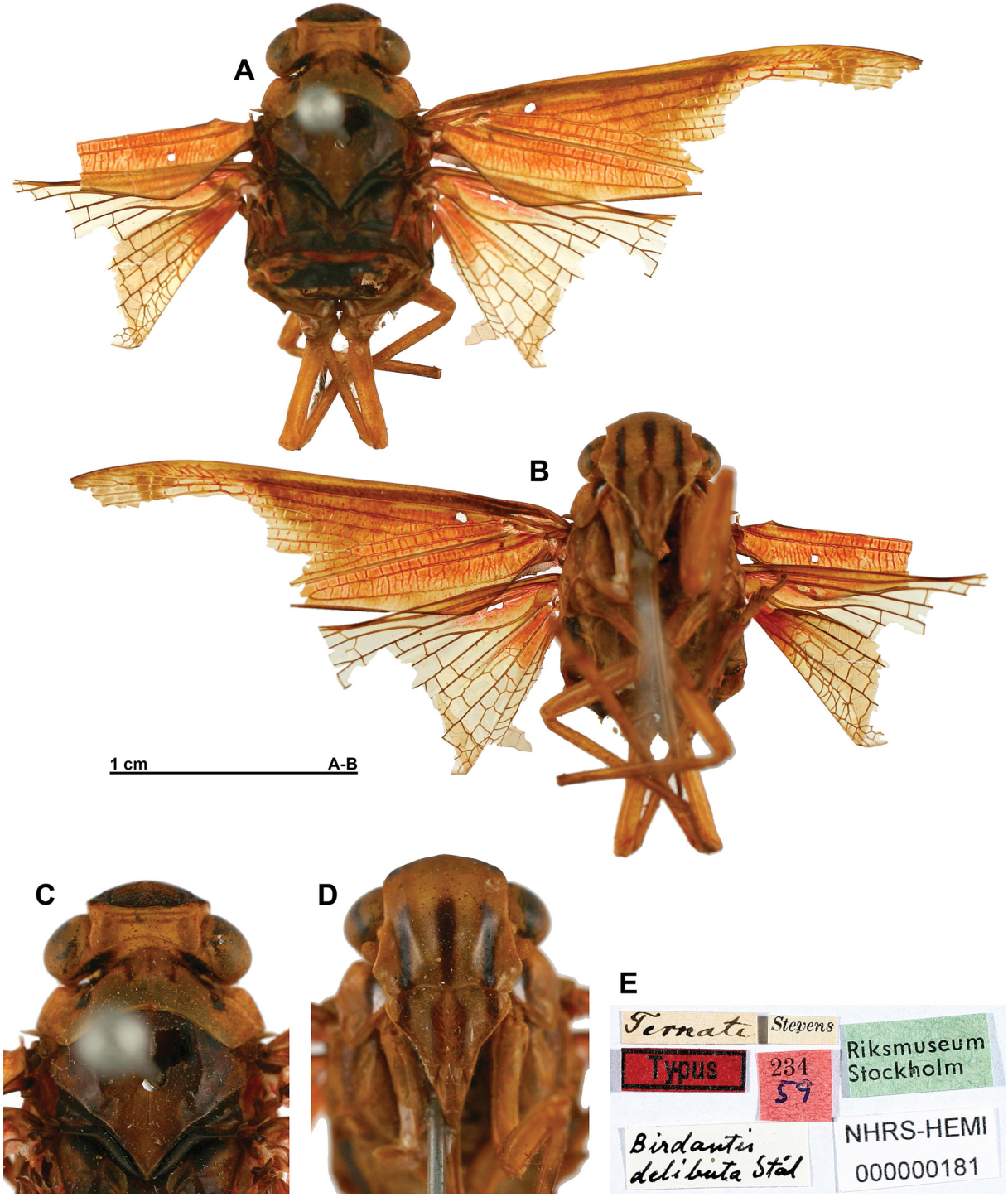

Fig. 6. *Birdantis delibuta* Stål, 1863, holotype. **A**. Habitus, dorsal view. **B**. Habitus, ventral view. **C**. Head and thorax, dorsal view. **D**. Head, normal view of frons. **E**. Labels. C–E not to scale.

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Birdantis delibuta Stål, 1863
Figs 3, 6

Birdantis delibuta Stål, 1863: 582 (described; compared with *B. decens* Stål, 1863).

Birdantis delibuta – Metcalf 1947: 92 (catalogued). — Lallemand 1959: 194 (keyed; senior synonym of *B. trilineata* (Schmidt, 1926) (error!); recorded from Buru and Ambon Islands (errors!)); 1963: 11 (same as preceding reference). — Fennah 1977: 376 (keyed, listed). — Nagai & Porion 1996: 14 (catalogued).

non *Birdantis delibuta* – Kirkaldy 1913: 11 (tentative attribution of an immature specimen from Ambon Island to *B. delibuta*). — Fennah 1977: fig. 7 (anal tube). — Nagai & Porion 1996: pl. 3, fig. 56 (habitus).

Note

The specimen mentioned by Kirkaldy (1913) as well as those illustrated by Fennah (1977) and Nagai & Porion (1996), erroneously identified as *B. delibuta*, were actually specimens of *B. trilineata* (Schmidt, 1926).

Diagnosis

This species can be separated from all other species of *Birdantis* by the following combination of characters:

(1) frons yellow-brown with three dark brown lines limited dorsally to level of middle of eyes, and with the two lateral ones extending on to clypeus (Fig. 6B)
(2) bulge between frons and vertex dark brown and vertex yellow-brown (Fig. 6C)
(3) tegmina opaque on basal half and infuscate on distal half (Fig. 6A)
(4) hind wings largely smoky, with a basal red marking (Fig. 6A)
(5) anterior margin of frons in dorsal view rounded but not strongly protruding (Fig. 6C)

Material examined

Holotype

INDONESIA: abdomen lost (Fig. 6), Ternate Island, 0°48′07″ N, 127°20′41″ E [Ternate] [Stevens] [234, 59] [Birdantis delibuta Stål] [Riksmuseum Stockholm] [NHRS-HEMI 000000181] (NHRS).

Distribution

Ternate Island (Fig. 3).

Birdantis trilineata (Schmidt, 1926) **stat. rev.**
Figs 3, 7–9

Myrilla trilineata Schmidt, 1926: 228 (described).

Myrilla trilineata – Metcalf 1947: 84 (catalogued).
Birdantis delibuta – Lallemand 1963: 11 (treated as a junior synonym of *B. delibuta* (error!)). — Fennah 1977: fig. 7 (anal tube (of a specimen of *B. trilineata* erroneously attributed to *B. delibuta*!)). — Nagai & Porion 1996: 14 (treated as a junior synonym of *B. delibuta* (error!)), pl. 3, fig. 56 (habitus (specimen of *B. trilineata* from Ambon Island erroneously attributed to *B. delibuta*!)).

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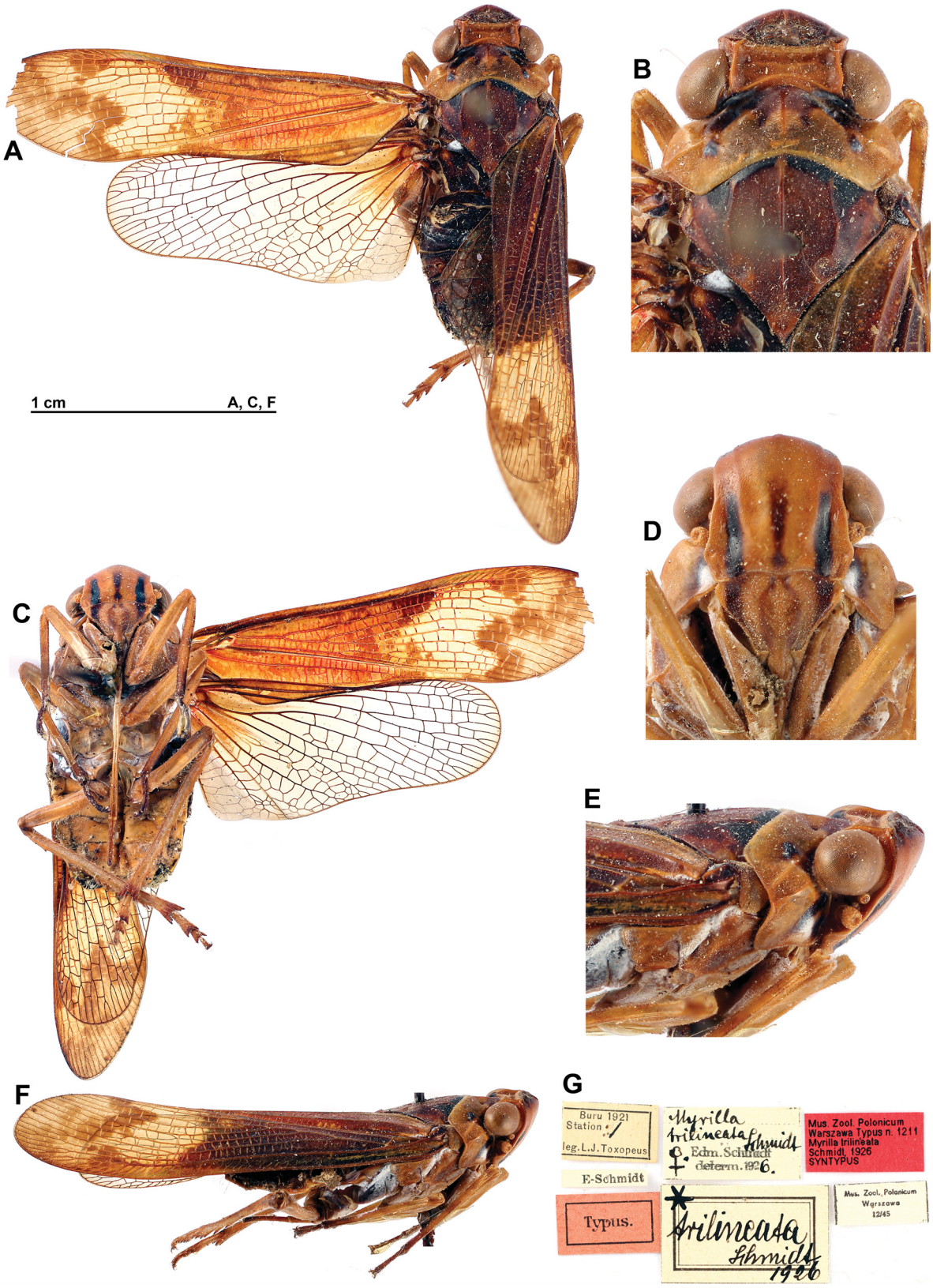

Fig. 7. *Birdantis trilineata* (Schmidt, 1926), lectotype, ♀. **A**. Habitus, dorsal view. **B**. Head and thorax, dorsal view. **C**. Habitus, ventral view. **D**. Head, normal view of frons. **E**. Head and thorax, lateral view. **F**. Habitus, lateral view. **G**. Labels. B, D, E not to scale.

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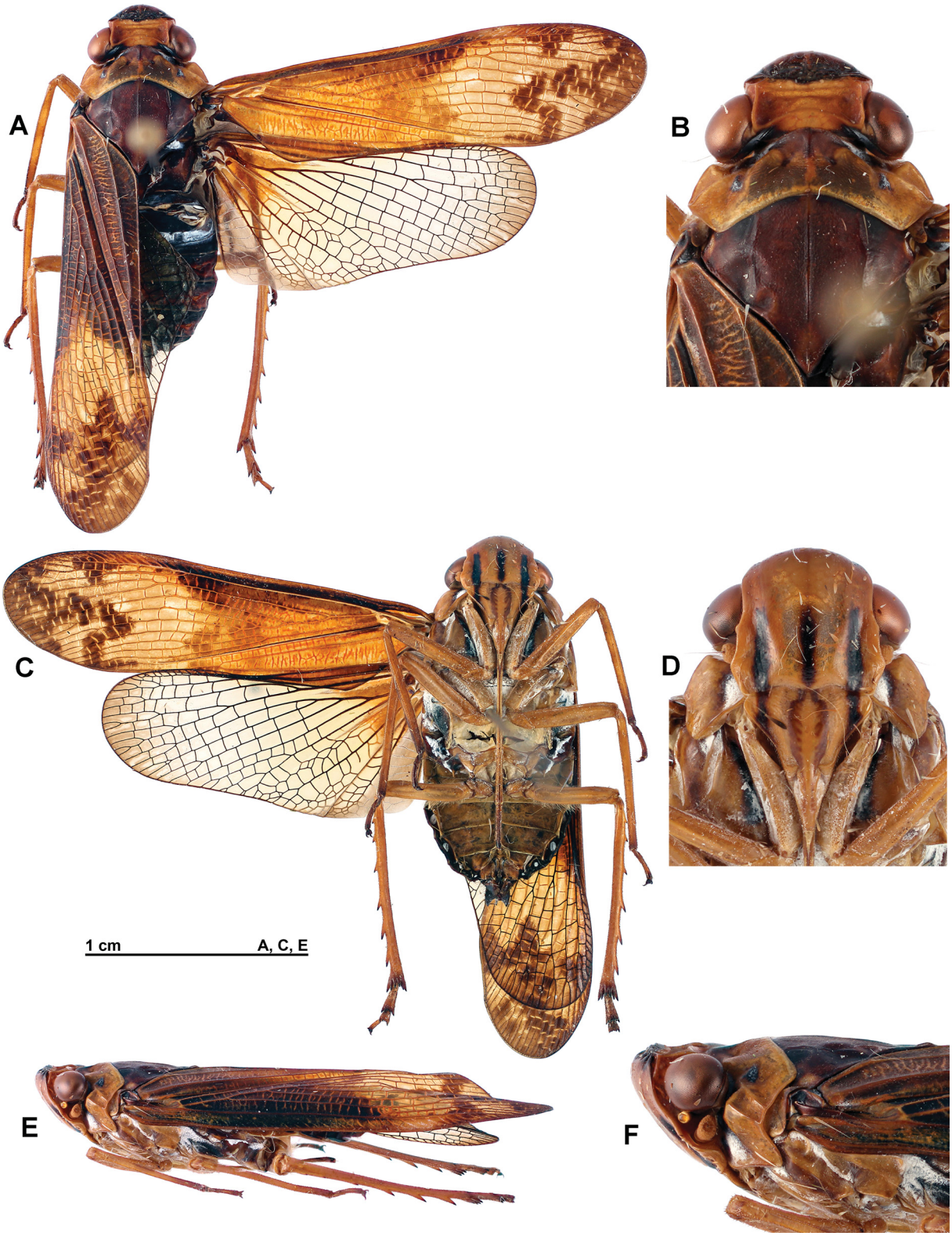

Fig. 8. *Birdantis trilineata* (Schmidt, 1926), ♀, Boano Island. **A**. Habitus, dorsal view. **B**. Head and thorax, dorsal view. **C**. Habitus, ventral view. **D**. Head, normal view of frons. **E**. Habitus, lateral view. **F**. Head and thorax, lateral view. B, D, F not to scale.

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Diagnosis

This species can be separated from all other species of *Birdantis* by the following combination of characters:

(1) frons yellow-brown, with three black-brown lines limited dorsally to level of middle of eyes, and with the two lateral ones extending on clypeus (Figs 7D, 8D)
(2) bulge between frons and vertex dark brown and vertex yellow-brown (Figs 7B, 8B)
(3) tegmina opaque on basal half and infuscate on distal half (Figs 7A, 8A)
(4) hind wings largely smoky, with a basal reddish brown marking (Figs 7A, 8A)
(5) abdomen mostly dark red dorsally (Figs 7A, 8A) and yellow-brown ventrally (Figs 7C, 8C)
(6) anterior margin of frons in dorsal view rounded and strongly protruding (Figs 7B, 8B)

Material examined

Lectotype

INDONESIA: ♀ (designated to improve nomenclatural stability in the group, Fig. 7), Buru Island, 3°23′55″ S, 126°38′54″ E [Buru 1921, Station: 1 leg. L.J. Toxopeus] [E. Schmidt] [Typus] [Myrilla trilineata Schmidt ♀, Edm. Schmidt determ. 1926.] [*trilineata Schmidt 1926] [Mus. Zool. Polonicum Warszawa Typus n. 1211 Myrilla trilineata Schmidt, 1926 Syntypus] [Mus. Zool. Polonicum Warszawa 12/45] (ZMPA).

Paralectotype

INDONESIA: ♀, Buru Island, same collection data as for lectotype (ZMPA).

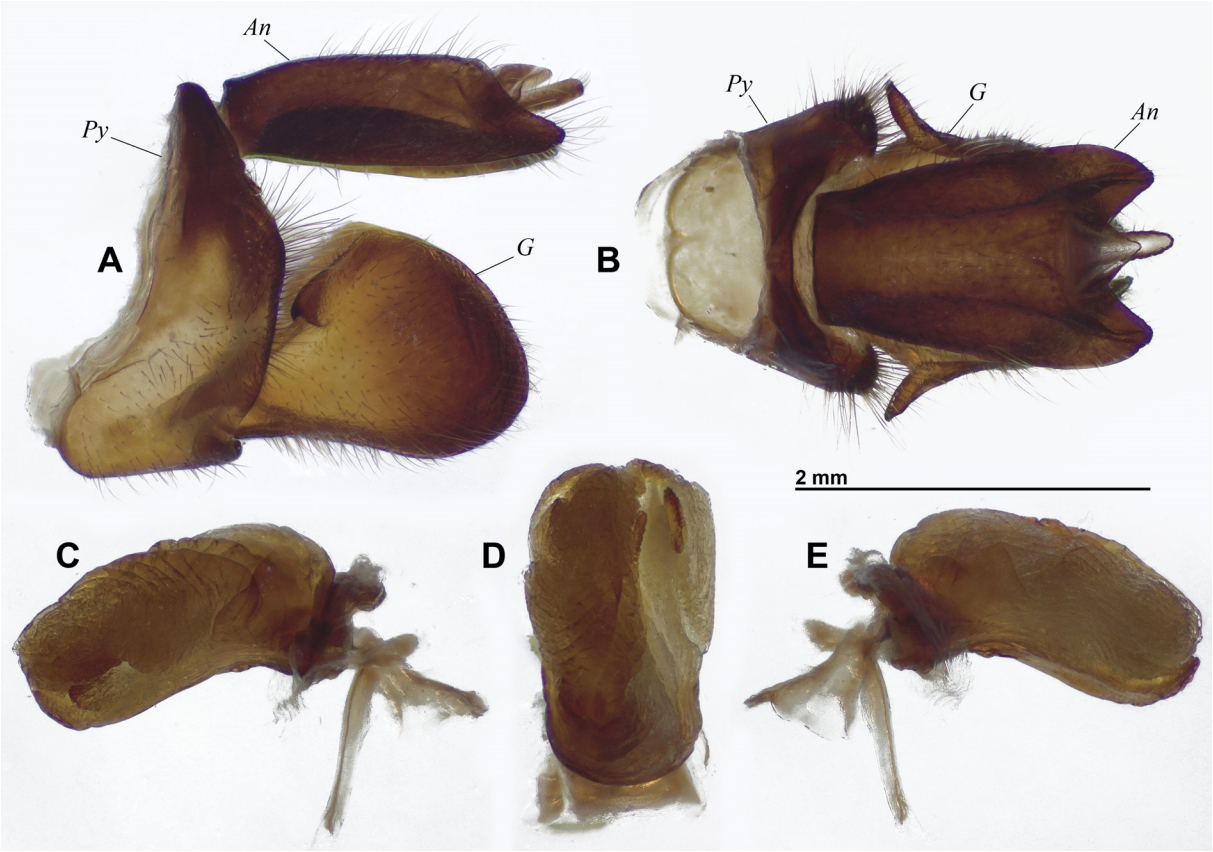

Fig. 9. *Birdantis trilineata* (Schmidt, 1926), ♂, genitalia. **A**. Pygofer, anal tube and gonostyli, left lateral view. **B**. Pygofer, anal tube and gonostyli, dorsal view. **C**. Aedeagus, right lateral view. **D**. Aedeagus, dorsal view. **E**. Aedeagus, left lateral view. Abbreviations: *An* = anal tube; *G* = gonostyli; *Py* = pygofer.

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Other material

INDONESIA: 1 ♀, Boano Island, 2°59′ S, 127°55′ E, Aug. 2013 [I.G.: 32.613] (RBINS); 1 ♂, W Seram Island, Waipia, 2°58′30″ S, 129°09′40″ E, 600–800 m a.s.l., Jun. 2013 [I.G.: 32.613] (RBINS); 1 spec. (abdomen lost; "*vittiventris*" Walker, *in litt*.), Ambon Island, 3°38′ S, 128°07′ E, Wallace leg. (BMNH).

Supplementary description

Male genitalia

Pygofer higher than long, about 2.0 times as high as maximum length, longer ventrally and abruptly narrowing on dorsal ½ in lateral view; dorsal margin of pygofer horizontal in lateral view (Fig. 9A). Anal tube elongate, about 1.5 times as long as maximum breadth, nearly straight with ventral margin sligtly curved in lateral view; progressively broadening from base towards ¾ of length in dorsal view, then with lateral margins converging; apical margin strongly, roundly emarginate in dorsal view, acutely rounded in lateral view (Fig. 9A–B). Gonostyli slightly elongate in lateral view, with ventral margin slightly concave and posterior margin broadly rounded; anterodorsal margin slightly emarginate after lateral process; lateral process laminate, curved laterally and apically pointed, with apical point directed lateroventrally (Fig. 9A–B). Aedeagus mostly membranous (Fig. 9C–F).

Distribution

Buru, Seram, Ambon and Boano Islands (Fig. 3).

Discussion

Together with the previous work on Australian species of *Birdantis* (Constant 2011), a large part of the genus has now been reviewed, although three species from Maluku are still only documented from their female type specimens, which were collected about 150 years ago.

The Papuan species were treated by Fennah (1977), but the conclusions of this work need to be assessed and refined by a thorough study of the type material of the species and their male genitalia, especially the taxa described by Schmidt (1906, 1907, 1911) and Lallemand (1959, 1963), the types of which were not studied by Fennah.

The suprageneric position and the relationships with the other genera, notably the Oriental *Gebenna* and *Polydictya* and the Australian *Desudaba* and *Desudaboides*, will need further study, especially based on molecular data.

The biology of the species of *Birdantis* remains nearly completely undocumented in terms of development, phenology, host plants, behaviour etc., and the male genitalia still need to be described for several species.

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