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Belgian Journal of Entomology

**Two new species of *Polydictya* from Borneo and Siberut,
and notes on *P. chewi* Nagai & Porion, 2004
and *P. tanjiewhoei* Bosuang, Audibert & Porion, 2015
(Hemiptera: Fulgoromorpha: Fulgoridae)**

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Abstract

Two new species of *Polydictya* Guérin-Méneville, 1844 are described from the Greater Sunda: *P. barclayi* sp. nov. from Borneo and *P. jakli* sp. nov. from Siberut Island in the Mentawai Archipelago, and compared with the close species. New data are provided for *P. chewi* Nagai & Porion 2004 and *P. tanjiewhoei* Bosuang, Audibert & Porion, 2015 and the male genitalia of *P. chewi* are described and illustrated for the first time. Distribution maps are provided for all treated species.

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

Introduction

The genus *Polydictya* (Hemiptera: Fulgoridae) was erected by GUÉRIN-MÉNEVILLE (1844) to accommodate one species, *Polydictya basalis* (Hope, 1843), described from Sylhet in Bengladesh (HOPE, 1843). The species was later recorded from Penang Island in Malaysia (GUÉRIN-MÉNEVILLE, 1844).

Thaumastodictya Kirkaldy, 1902, based on one species, *T. krisna* Kirkaldy, 1902 from Sri Lanka, was synonymized under *Polydictya* by DISTANT (1906). More recently, LALLEMAND (1963), NAGAI & PORION (1996, 2004), CONSTANT & PHAM (2008), CONSTANT (2009, 2010, 2015) CHEW KEA FOO *et al.* (2010) and BOSUANG *et al.* (2015) added new species and proposed nomenclatural changes within the genus.

The genus presently contains 26 species (BOURGOIN, 2016). It is distributed in the Oriental region, from Sri Lanka it extends over northern India, Thailand, Vietnam, and southwards to Sulawesi and its adjacent islands through the Greater and Lesser Sunda. It is not recorded from the Philippines.

Six *Polydictya* species are currently known in Borneo: *P. uniformis* (Walker, 1857), *P. chewi* Nagai & Porion, 2004, *P. kuntzi* Nagai & Porion, 2004, *P. ornata* Chew Kea Foo, Porion & Audibert, 2010, *P. tanjiewhoei* Bosuang, Audibert & Porion, 2015 and *P. triumphalis* Bosuang, Audibert & Porion, 2015. The genus was not yet recorded from Mentawai Archipelago, but 4 species are recorded from the nearby island of Sumatra: *P. basalis* (Hope,

1843) (WALKER, 1870), *P. robusta* Gerstaecker, 1895, *P. sumatrana* Schmidt, 1910 and *P. duffelsi* Constant, 2009.

The study of collections in the BMNH and RBINS led to the discovery of two new species which are here described and illustrated. A male specimen of *P. chewi* was also found in the collections of MHNL, allowing the description of the male genitalia for the first time, and detailed illustration of the species, and an additional specimen was of *P. tanjiewhoei* was added in the collections of RBINS, allowing an update of the original description and of the distribution of the species.

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 about one hour in a 10% solution of potassium hydroxide (KOH). The aedeagus was dissected with a needle blade and all pieces examined in ethanol, and subsequently placed in glycerine with the pinned specimen for preservation. Tegmina and wing terminology follows BOURGOIN *et al.* (2015).

Observations were done with a Leica MZ8 stereomicroscope. Pictures were taken with a Canon EOS 700D camera with Sigma DG Macro lens, staked with the software CombineZ and optimized with Adobe Photoshop CS3.

The inflation of the phallus was not done due to the difficulty to obtain good and replicable results and because it is not required to separate species in the genus *Polydictya*. 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 measurements were taken following CONSTANT (2004) and the following abbreviations are used:

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

Acronyms used for the collections.

BMNH = Natural History Museum, London, United Kingdom

MHNL = Muséum d'Histoire Naturelle de Lyon, France

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

Taxonomy

Order **Hemiptera** Linnaeus, 1758
Suborder **Auchenorrhyncha** Duméril, 1806
Infra-order **Fulgoromorpha** Evans, 1946
Superfamily **Fulgoroidea** Latreille, 1807
Family **Fulgoridae** Latreille, 1807

Genus ***Polydictya*** Guérin-Méneville, 1844

Polydictya GUÉRIN-MÉNEVILLE, 1844: 358.

Type species: *Polydictya basalis* (Hope, 1843) by monotypy.

Thaumastodictya KIRKALDY, 1902: 307; synonymized by DISTANT, 1906: 215.

Type species: *Polydictya krisna* Kirkaldy, 1902 by original designation [junior synonym of *Polydictya pantherina* Gerstaecker, 1895, see NAGAI & PORION, 1996]

Polydictya — WALKER, 1851: 289 [list of species]. — STÅL, 1866: 135 [key]. — ATKINSON, 1885: 155 [described]. — DISTANT, 1888: 487 [compared to *Myrilla* Distant, 1888]. — KARSCH, 1890: 63 [compared to *Anecphora* Karsch, 1890]. — GERSTAECKER, 1895: 10 [compared to *Holodictya* Gerstaecker, 1895]. — KIRKALDY, 1902: 307 [compared to *Thaumastodictya* Kirkaldy, 1902]. — MELICHAR, 1903: 71 [erroneous synonymy with *Chalia* Walker, 1858]. — DISTANT, 1906: 199 [key to Oriental genera], 215 [described, senior synonym of *Thaumastodictya*]. — KIRKALDY, 1907: 59 [note on publication date]. — SCHMIDT, 1907: 113 [compared to *Myrilla*, copied from Distant 1888]. — JACOBI, 1910: 101 [compared to *Coelodictya* Jacobi, 1910]. — SCHMIDT, 1912: 71 [compared to *Coelodictya* and *Holodictya*, comments on species]. — METCALF, 1947: 84 [catalogued]. — LALLEMAND, 1963: 7 [key to genera], 14 [key to species]. — NAGAI & PORION, 1996: 13 [list of species, synonymies]. — CONSTANT & PHAM, 2008 [notes]. — CONSTANT, 2009 [notes, key to species with hind wings red basally]. — CONSTANT, 2010 [notes].

Thaumastodictya — MELICHAR, 1903: 71 [description]. — DISTANT, 1906: 215 [junior synonym of *Polydictya*].

The characters defining the genus were given by LALLEMAND (1963), i.e., head broad, slightly narrower than the pronotum; frons as long as broad, not carinate, largely rounded dorsally, broadened above clypeus and strongly broader than the latter; vertex at least 4 times broader than long, excavate; tegmina at least 2.5 times longer than broad, densely reticulate; clavus closed with vein Pcu+A1 extending to sutural margin; hind wings almost entirely reticulate; anterior tibiae as long as femora, sometimes slightly foliaceous; hind tibiae with 4–6 lateral spines.

***Polydictya barclayi* sp. nov.**

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Figs 1, 2, 8

ETYMOLOGY. The species name is a patronym dedicated to Mr Max Barclay (BMNH) in acknowledgment for his assistance with my work.

TYPE MATERIAL. Holotype ♂: [Sabah, Gunung Lutong, 15 18 April 88, Ento FRC] [Malaysia CIE A20315] [L NO 20] (BMNH).



Fig. 1. *Polydictya barclayi* sp. nov., male holotype. A, habitus, dorsal view; B, vertex, pro and mesonotum, dorsal view. C, habitus, ventral view. D, frons, normal view. E, head and prothorax, lateral view. F, habitus, lateral view. G, labels.

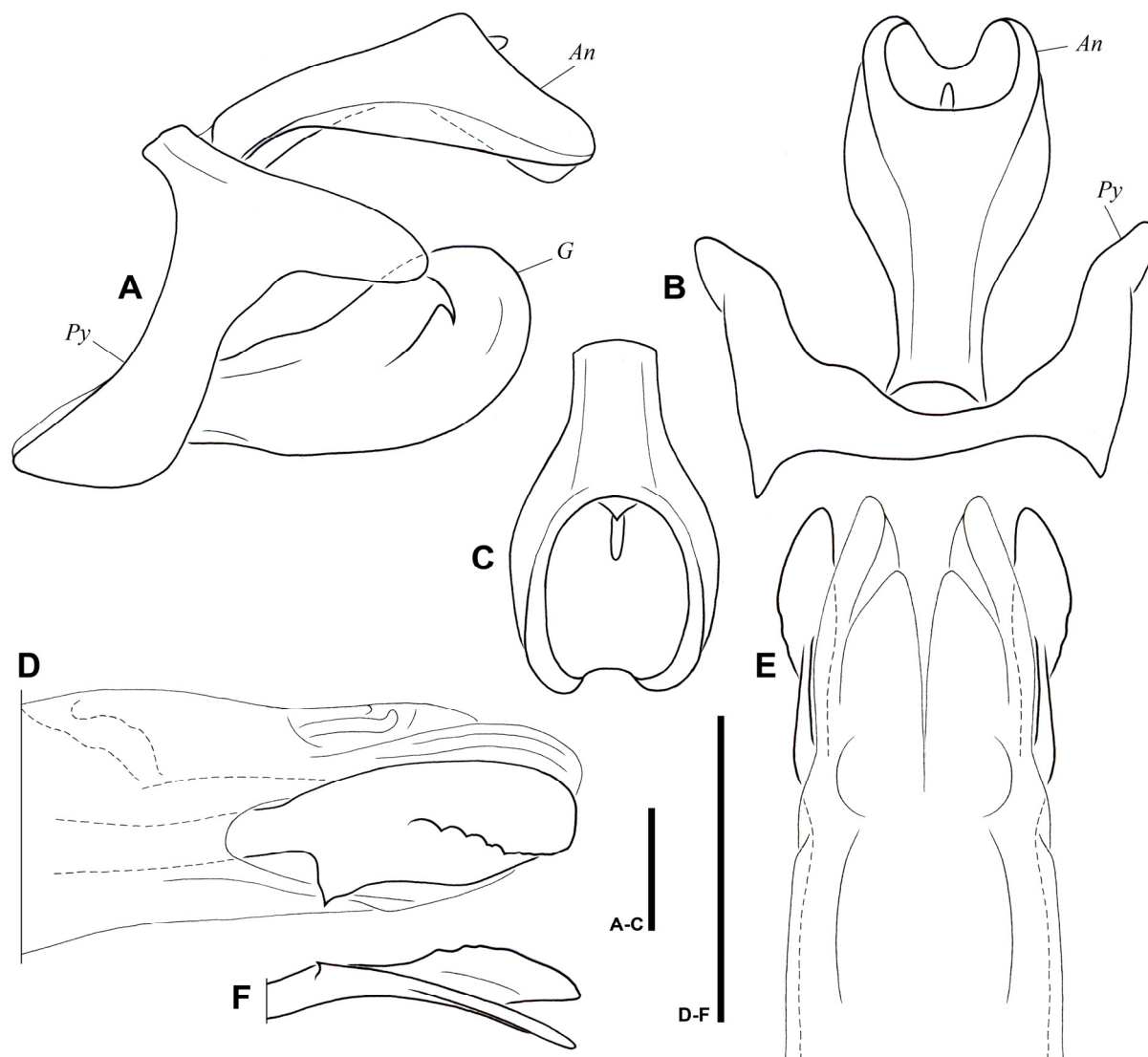


Fig. 2. *Polydictya barclayi* sp. nov., holotype, male genitalia. A, Pygofer, anal tube and gonostylus, left lateral view. B, Anal tube and pygofer, dorsal view. C, apex of anal tube, postero-dorsal view. D, aedeagus, lateral view. E, aedeagus, dorsal view. F, apex of endosomal process, ventral view. An, anal tube – Py, pygofer – G, gonostylus. Scale: 1 mm.

NOTE. “88” stands for 1988 as year of collecting; “Ento FRC” for Entomology: Forset Research centre”, referring to a facility near Sandakan in Sabah; “CIE” for Commonwealth Institute of Entomology. The code “L NO 20” probably refers to a collecting event about which no further information is available (pers. comm. M. Barclay, Dec. 2015).

DIAGNOSIS. The species can be separated from all other *Polydictya* species by the following combination of characters: (1) Tegmina orange brown with numerous small black spots on corium; membrane without spots (Fig. 1 A); (2) hind wings orange with apical and sutural margins, and anal area brown (Fig. 1 A); (3) frons regularly rounded in dorsal view, not projecting anteriorly (Fig. 1 B), orange-brown (Fig. 1 D); (4) anterior tibiae not laminate (Fig. 1 A, C); (5) abdomen black dorsally (Fig. 1 A); (6) terminalia orange.

DESCRIPTION

Measurements and ratios ♂ (n = 1): LT: 19.7 mm; LTg/BTg = 2.54; BV/LV = 4.86; LF/BF = 0.79.

Head: entirely orange-brown (Fig. 1 B, D); vertex curved and deeply grooved transversely with transverse carina in middle, not reaching lateral margins, and all 4 margins carinate (Fig. 1 B); frons slightly visible from above (Fig. 1 B), convex, smooth, subquadrate with impressed, bisinuate longitudinal groove along lateral margin, starting in front of eye (Fig. 1 D); clypeus narrower and shorter than frons, brown apically (Fig. 1 D); labium elongate, brown, reaching posterior trochanter (Fig. 1 C); antennae orange-brown with scape cylindrical; pedicel bulbous (Fig. 1 D).

Thorax: orange-brown (Fig. 1 B, E); pro-, meso- and metasternites brown (Fig. 1 C); pronotum rugulose, with pair of impressed points on disc; mesonotum smooth with disc slightly wrinkled longitudinally; scutellum slightly impressed on disc (Fig. 1 B); tegulae orange-brown (Fig. 1 B, E).

Tegmina: (Fig. 1 A, C, F) orange-brown with small black spots on corium: 4–5 spots in postcostal cell, 6–7 spots on clavus including a smaller one at apex of clavus and 8 spots distributed between claval suture and vein CA; membrane unicolorous; veins orange-brown, slightly paler than cells on membrane. Tegmina elongate, slightly broadening near apex; apex obliquely cut; costal margin straight.

Hind wings: (Fig. 1 A, C) orange with apex and sutural margins bordered with brown. Anal area brown; slightly broader than tegmina.

Legs: (Fig. 1 A, C) orange-brown with coxae and trochanters brown. Base and apex of femora and tibiae, and tarsi, dark brown. Metatibiae with 5 lateral and 7 apical spines.

Abdomen: (Fig. 1 A, C) black dorsally; brown ventrally; terminalia orange.

Male genitalia: pygofer, anal tube and gonostyli orange. Pygofer higher than long, with posterior margin showing digitiform, laterally flattened process at dorsal margin, directed posteriorly, and anterior margin strongly concave in lateral view (Fig. 2 A, B). Gonostyli (Fig. 2 A) elongate, 1.64 times longer than high in lateral view with posterior half broader and subbasal constriction in lateral view; strong lateral tooth directed posteroventrally at 2/3 of length, under dorsal margin; apical margin strongly rounded; dorsal margin slightly bisinuate and ventral margin broadly rounded in lateral view. Aedeagus (Fig. 2 D-F) with endosomal process strongly laminate and broadening on posterior half; showing a strong ventral tooth and a deep narrow ventral groove on posterior half of broadened part; ventral margin of lamina resulting from groove furnished with small teeth; corpus and lamina separated and diverging apically; apical margin of corpus and lamina rounded. Anal tube elongate, 1.86 times longer than broad, broader at 2/3 of total length in dorsal view; curved ventrally near base in lateral view (Fig. 2 A, B); lateral margins strongly sinuate in dorsal view and mostly straight in lateral view (Fig. 2 B); apical margin strongly notched in dorsal view (Fig. 2 C) and rounded in lateral view.

DISTRIBUTION. Currently known from a single location on Borneo, Maliau Basin in the southern-central part of the state of Sabah (Fig. 8 B).

REMARKS. The most similar species is *P. kuntzi* Nagai & Porion, 2004 but the latter lacks the black spots on tegmina and has the dorsum of the abdomen largely bright red instead of entirely black.



Fig. 3. *Polydictya chewi* Nagai & Porion, 2004, male from Mt Trus Madi (MHNL). A, habitus, dorsal view; B, vertex, pro and mesonotum, dorsal view. C, habitus, ventral view. D, frons, normal view. E, habitus, lateral view. F, head and prothorax, lateral view.

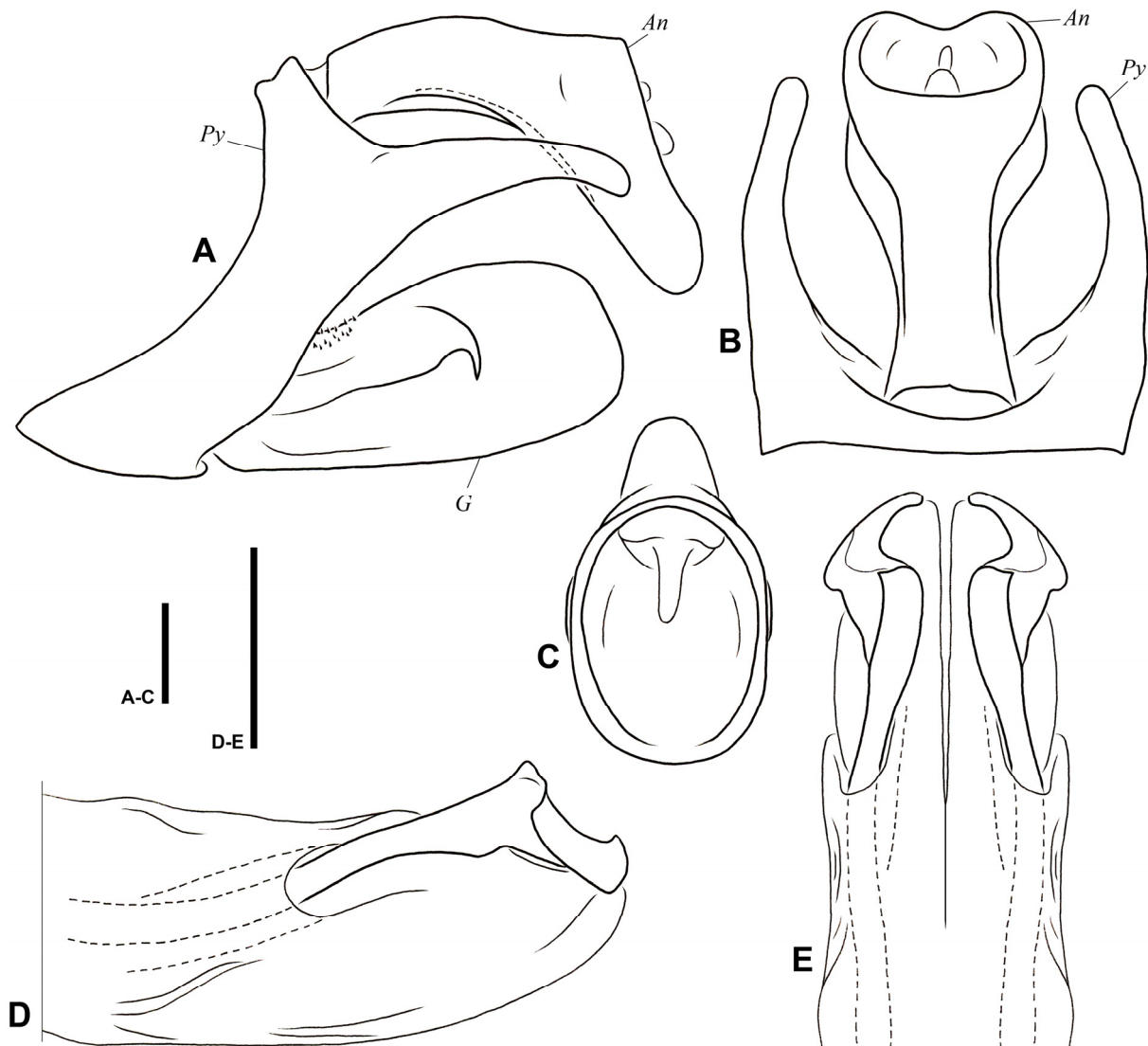


Fig. 4. *Polydictya chewi* Nagai & Porion, 2004, male from Mt Trus Madi (MHNL), male genitalia. A, Pygofer, anal tube and gonostylus, left lateral view. B, Anal tube and pygofer, dorsal view. C, apex of anal tube, postero-dorsal view. D, aedeagus, lateral view. E, aedeagus, dorsal view. An, anal tube – Py, pygofer – G, gonostylus. Scale: 1 mm.

***Polydictya chewi* Nagai & Porion, 2004**

Figs 3, 4, 8

Polydictya chewi NAGAI & PORION, 2004: 4, pl. 2, fig. 14 [described and illustrated].

Polydictya chewi – CONSTANT, 2009: 294 [note]. — BOSUANG *et al.*, 2015: 2 [compared with *P. triumphalis* Bosuang, Audibert & Porion, 2015].

MATERIAL EXAMINED.

TYPE MATERIAL. Holotype ♀: Crocker Range, Sabah, East Malaysia, June 2001 (MHNL).

ADDITIONAL MATERIAL. Malaysia: 1 ♂: Mt Trus Madi, Sabah, Borneo, III.2005, coll. Thierry Porion (MHNL).

SUPPLEMENTARY DESCRIPTION.

Male genitalia: pygofer, anal tube and gonostyli red. Pygofer higher than long, with posterior margin showing elongate, laterally flattened process at dorsal margin, directed interno-posteriorly, and anterior margin strongly concave in lateral view (Fig. 4 A, B). Gonostyli (Fig. 4 A) elongate, 1.94 times longer than high in lateral view with posterior half broader in lateral view; strong lateral tooth directed posteroventrally after half of length, under dorsal margin; apical margin broadly rounded; dorsal margin slightly sinuate and ventral margin broadly rounded in lateral view. Aedeagus (Fig. 4 D-F) with endosomal processes foliaceous and curved ventrally towards apex; foliaceous lamina curved latero-ventrally; internal margin of endosomal processes strongly sinuate. Anal tube elongate, 1.93 times longer than broad, broader at 2/3 of total length in dorsal view; curved ventrally in lateral view (Fig. 4 A, B); lateral margins strongly sinuate in dorsal view and curved in lateral view (Fig. 4 B); apical margin notched in dorsal view (Fig. 4 C) and rounded in lateral and postero-dorsal views.

DISTRIBUTION. The species is currently known from two locations in the state of Sabah (Fig. 8 B).

***Polydictya jakli* sp. nov.**

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Figs 5, 6, 8

ETYMOLOGY. The species name is a patronym dedicated to Mr Stanislav Jakl (Czech Republic) who collected the specimens.

TYPE MATERIAL. INDONESIA: Holotype ♂: [Coll. I.R.Sc.N.B., Indonesia, Mentawai Isls, Siberut Isl., Bojakan village env., v. 2004, 100m, leg. S. Jakl] (RBINS).

Paratype ♂: same data as holotype (RBINS).

DIAGNOSIS. The species can be separated from all other *Polydictya* species by the following combination of characters: (1) Tegmina uniformly brown with basal transverse black-brown band (Fig. 5 A); (2) hind wings dark brown with basocostal whitish elongate marking (Fig. 5 A); (3) frons regularly rounded in dorsal view, not projecting anteriorly (Fig. 5 B), yellow-brown (Fig. 5 D); (4) anterior tibiae slightly laminate, black-brown with yellowish ring (Fig. 5 A, C); (5) abdomen red dorsally (Fig. 5 A); (6) terminalia orange-brown.

DESCRIPTION.

Measurements and ratios ♂ (n = 2): LT:26.7 mm; LTg/BTg = 2.71; BV/LV = 3.46; LF/BF = 0.71.

Head: entirely yellow-brown (Fig. 5 B, D, F); vertex curved and deeply grooved transversely, and with all 4 margins carinate (Fig. 5 B); frons slightly visible from above (Fig. 5 B), convex, smooth, subquadrate with impressed, curved longitudinal groove along lateral margin, starting in front of eye (Fig. 5 D); clypeus narrower and shorter than frons, darker apically (Fig. 5 D); labium elongate, brown, reaching posterior trochanter (Fig. 5 C); antennae dark brown with scape cylindrical and pedicel bulbous (Fig. 5 D, F).

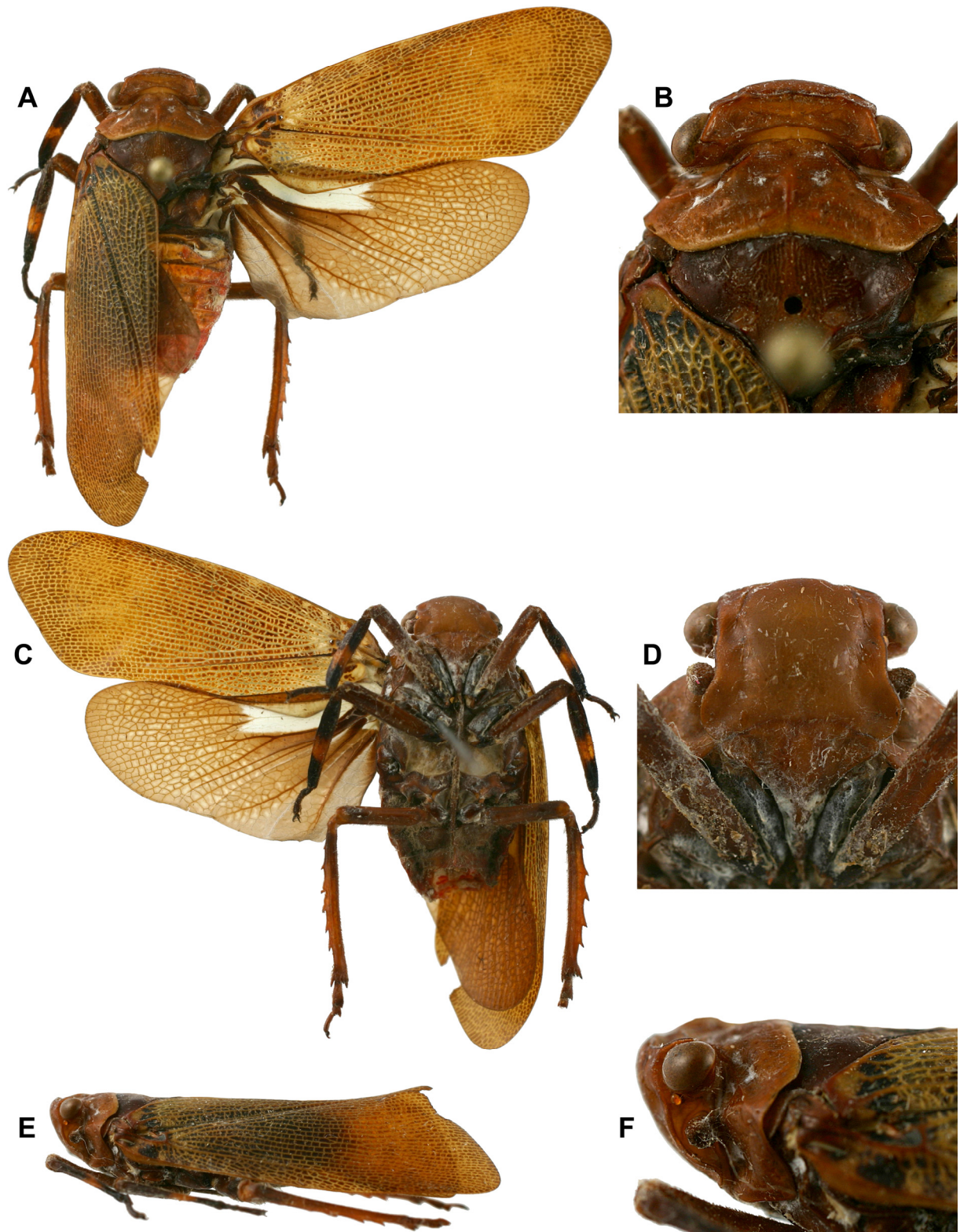


Fig. 5. *Polydictya jakli* sp. nov., male holotype. A, habitus, dorsal view; B, vertex, pro and mesonotum, dorsal view. C, habitus, ventral view. D, frons, normal view. E, habitus, lateral view. F, head and prothorax, lateral view.

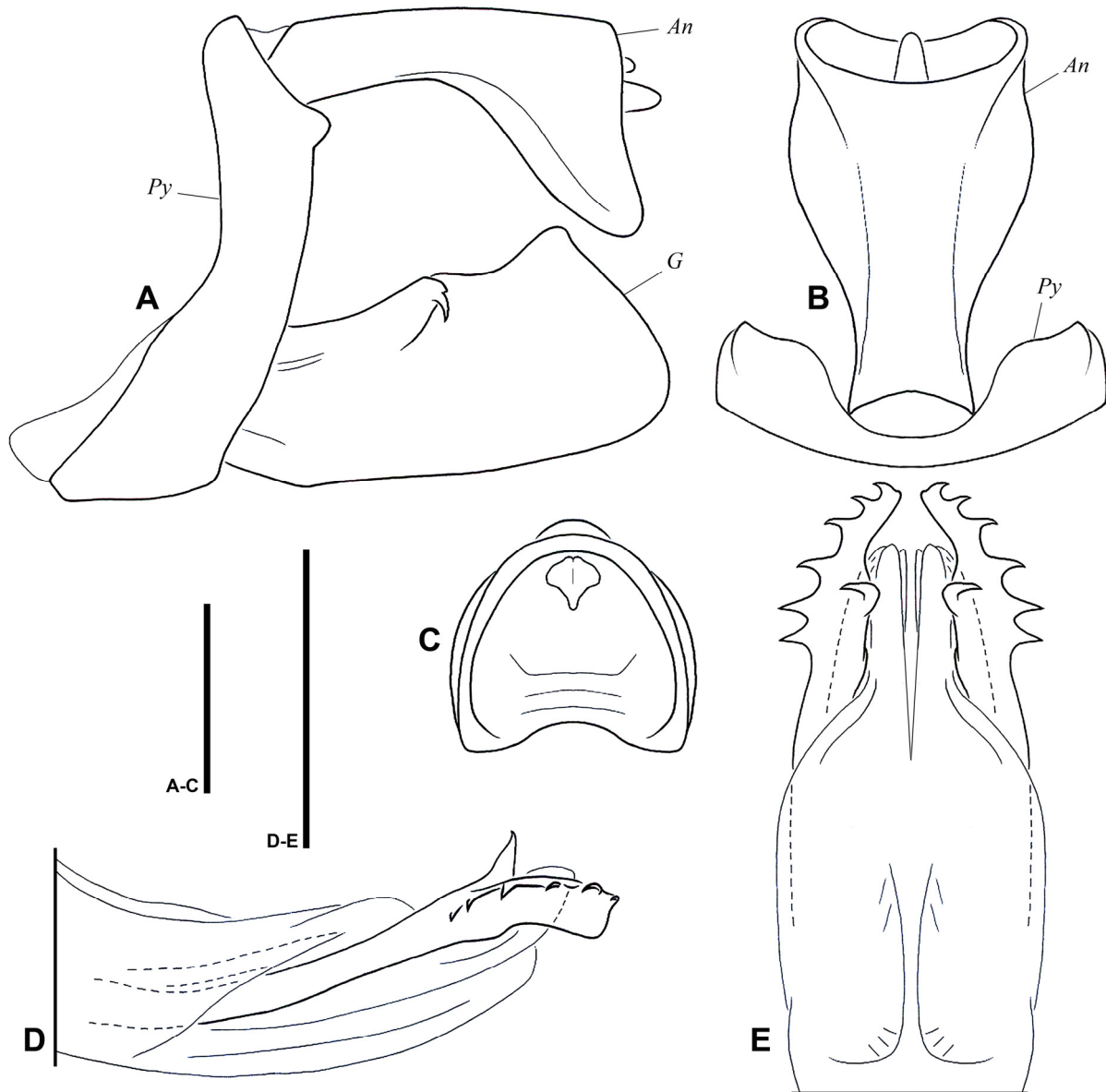


Fig. 6. *Polydictya jakli* sp. nov., male holotype, genitalia. A, Pygofer, anal tube and gonostylus, left lateral view. B, Anal tube and pygofer, dorsal view. C, apex of anal tube, postero-dorsal view. D, aedeagus, lateral view. E, aedeagus, dorsal view. An, anal tube – Py, pygofer – G, gonostylus. Scale: 1 mm.

Thorax: prothorax yellow-brown; mesonotum dark brown (Fig. 5 B, F); pro-, meso- and metasternites brown (Fig. 5 C); pronotum rugulose, with strong median carina and pair of impressed points on disc; mesonotum slightly rugulose with disc slightly wrinkled longitudinally; scutellum slightly impressed on disc (Fig. 5 B); tegulae brown (Fig. 5 B, F).

Tegmina: (Fig. 5 A, C, E) brown with veins paler than cells and basal darker area. Tegmina elongate, with costal and sutural margins subparallel, slightly broadening near apex; apex obliquely cut; costal margin nearly straight; apical margin slightly concave in middle.

Hind wings: (Fig. 5 A, C) dark brown with center of cells often paler and conspicuous basocostal subrectangular whitish patch extending to half length; slightly broader than tegmina.

Legs: (Fig. 5 A, C) coxae, trochanters and femora dark brown; femora slightly darker towards apex. Pro- and mesotibiae black-brown with broad yellow-brown ring at mid-length;

metafemora brown, darker basally. Pro- and mesotarsi black-brown; metatarsi brown. Metatibiae with 6 lateral and 7 apical spines.

Abdomen: (Fig. 5 A, C) red dorsally; brown ventrally; terminalia orange-brown.

Male genitalia: pygofer, anal tube and gonostyli orange-brown. Pygofer higher than long, with posterior margin showing small digitiform process near dorsal margin, directed posteriorly, and anterior margin concave in lateral view (Fig. 6 A, B). Gonostyli (Fig. 6 A) elongate, 1.88 times longer than high in lateral view, slightly broadening towards apex with apicodorsal projection directed dorsally; dorsal margin excavate on apical half in lateral view; apical margin rounded and slightly sinuate dorsally in lateral view; strong lateral acute tooth directed lateroventrally at half length, along dorsal margin; second, smaller tooth on dorsal margin of main tooth, at half length of the latter. Aedeagus (Fig. 6 D, E) with endosomal process elongate, slightly broadening towards apex in lateral view. Endosomal process in dorsal view innerly curved, with external margin showing 6 strong teeth directed externally and slightly curved ventrally; strong hooked tooth on internodorsal margin, directed dorsoexternally; inner margin emarginate posteriorly to dorsointernal hook; ventral margin bisinuate, at level of hooked tooth; posterior margin in lateral view slightly sinuate, with ventral angle angularly rounded. Anal tube elongate, 1.63 times longer than broad, broader at 2/3 of total length in dorsal view; strongly curved ventrally and with ventral margin sinuate in lateral view (Fig. 6 A, B); lateral margins strongly bisinuate in dorsal view, with apex much broader than base (Fig. 6 B); apical margin concave in dorsal view and slightly concave, subvertical in lateral view (Fig. 6 A).

DISTRIBUTION. Currently known from Siberut Island in the Mentawai archipelago, off Sumatra in Indonesia (Fig. 8 A).

REMARKS. The species is close to the others showing a basal whitish rectangular marking on the posterior wings: *P. basalis* (Hope, 1843), *P. uniformis* Walker, 1857, *P. negrito* Distant, 1906, *P. johanna*e Lallemand, 1956 and *P. ornata* Chew Kea Foo, Porion & Audibert, 2010. *P. ornata* differs by its variegated pale yellow and black tegmina; *P. negrito* by the partly black dorsum of the abdomen and the anterior margin of the vertex more convex; *P. uniformis* by the partly black dorsum of the abdomen and reddish legs; *P. johanna*e and *P. basalis* by the reddish legs and *P. basalis* also by the pale subbasal area of the tegmina and the basal red area of the posterior wings, under the whitish marking.

***Polydictya tanjiewhoei* Bosuang, Audibert & Porion, 2015**

Figs 7-8

Polydictya tanjiewhoei BOSUANG *et al.*, 2015: 1; fig. 1 [described, illustrated].

MATERIAL EXAMINED: 1 ♀ (Fig. 7): Malaysia, Borneo, Sarawak, Gunung Mulu National Park, 4.023°N 144.81°E, 30.VI-28.VII.2009, J. Urban & K. Kinser (RBINS).

NOTES. The species was described based on a single female from Kipandi in the Crocker Range. This new data from Gunung Mulu National Park extends southwards the distribution of the species (see Fig. 8 B).

In order to complete the original description (BOSUANG *et al.*, 2015), it is necessary to mention that the frons of the examined specimen is black-brown with the ventral angles yellowish, and the clypeus is black-brown (Fig. 7 D). The apex of the scutellum is strongly protruding dorsally (Fig. 7 E).



Fig. 7. *Polydictya tanjiewhoei* Bosuang, Audibert & Porion, 2015, female from Gunung Mulu National Park (RBINS). A, habitus, dorsal view; B, vertex, pro and mesonotum, dorsal view. C, habitus, ventral view. D, frons, normal view. E, head and prothorax, lateral view. F, habitus, lateral view. G, habitus, ventral view before 2 legs and the abdomen were extracted for study.

DISTRIBUTION. The species is currently known from the states of Sabah and Sarawak (Fig. 8 B).

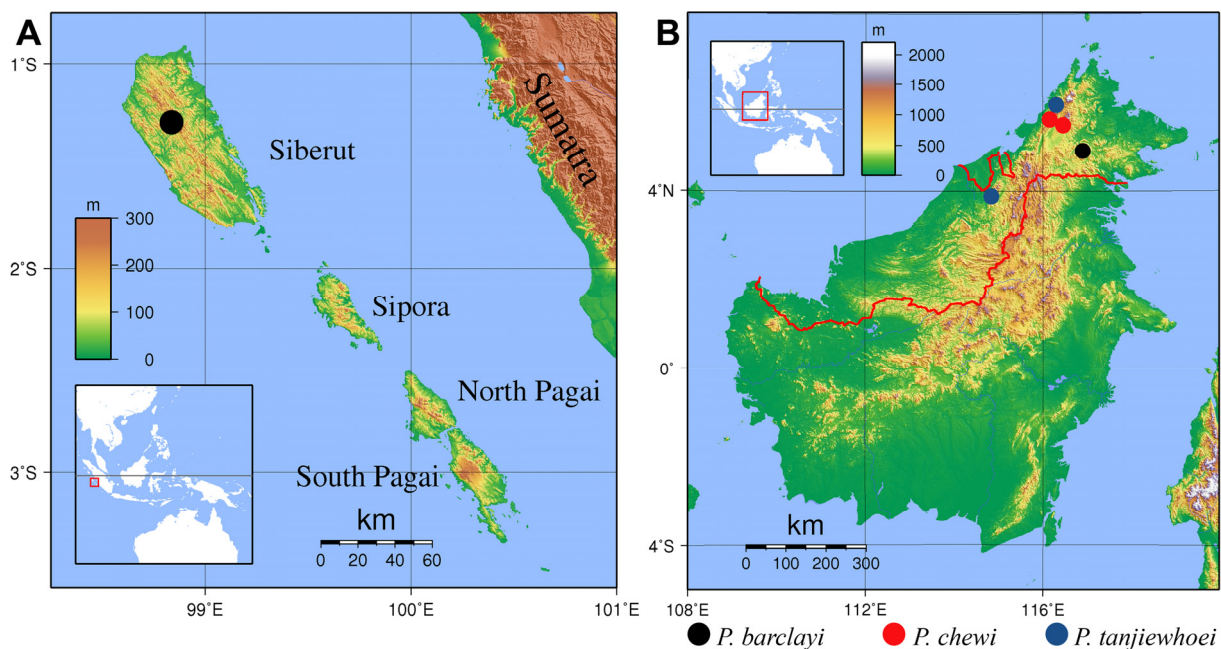


Fig. 8. Distribution maps. A, *Polydictya jakli* sp. nov. B, *Polydictya barclayi* sp. nov., *P. chewi* Nagai & Porion, 2004 and *P. tanjiewhoei* Bosuang, Audibert & Porion, 2015.

Discussion

The discovery of a new species of *Polydictya* in the Mentawai Archipelago extends the distribution of the genus but is not surprising considering the previous records. The addition of two new species leads to a total of 28 described species of *Polydictya*; however, more species are awaiting description, including a number of species from India currently documented only by photographs (CONSTANT, unpublished). The necessary description of the male genitalia coupled with the restrictive Indian rules concerning the collecting of natural history specimens impede the progress of our knowledge of those insects and many others.

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