Belgian Journal of Entomology 114: 1–17 (2021) ISSN: 2295-0214
www.srbe-kbve.be

urn:lsid:zoobank.org:pub:B4E732E4-AB49-4BEB-9E46-7AB6CA97E691

Belgian Journal of Entomology

Two new species of the genus *Gergithus* Stål, 1870 from Thailand and Borneo (Hemiptera: Fulgoromorpha: Issidae)

Jérôme CONSTANT

Royal Belgian Institute of Natural Sciences, O.D. Phylogeny and Taxonomy, Entomology, Vautier street 29, B-1000 Brussels, Belgium. E-mail: jerome.constant@naturalsciences.be

Published: Brussels, 09 April 2021

Citation: CONSTANT J., 2021. - Two new species of the genus *Gergithus* Stål, 1870 from Thailand and Borneo (Hemiptera: Fulgoromorpha: Issidae). *Belgian Journal of Entomology,* 114: 1–17.

ISSN: 1374-5514 (Print Edition)
ISSN: 2295-0214 (Online Edition)

The Belgian Journal of Entomology is published by the Royal Belgian Society of Entomology, a non-profit association established on April 9, 1855.

Head office: Vautier street 29, B-1000 Brussels.

The publications of the Society are partly sponsored by the University Foundation of Belgium.

In compliance with Article 8.6 of the ICZN, printed versions of all papers are deposited in the following libraries:

- Royal Library of Belgium, Boulevard de l'Empereur 4, B-1000 Brussels.
- Library of the Royal Belgian Institute of Natural Sciences, Vautier street 29, B-1000 Brussels.
- American Museum of Natural History Library, Central Park West at 79th street, New York, NY 10024-5192, USA.
- Central library of the Museum national d'Histoire naturelle, rue Geoffroy SaintHilaire 38, F-75005 Paris, France.
- Library of the Muséum d'Histoire naturelle de Genève, route de Malagnou 1, CH-1208 Genève, Suisse.
- Zoological Record, Thomson Reuters, Publication Processing, 1500 Spring Garden Street, Fourth Floor, Philadelphia PA 19130, USA.

Front cover: left: *Gergithus dayi* sp. nov., live specimen in Thailand, Nakhon Si Thammarat, Karom Waterfall, 13.II.2016, © Les Day; right: *Gergithus floreni* sp. nov., live specimen in Borneo, Tawau, 2015. © Joanna Yeo.

Belgian Journal of Entomology 114: 1–17 (2021)

Two new species of the genus *Gergithus* Stål, 1870 from Thailand and Borneo (Hemiptera: Fulgoromorpha: Issidae)

Jérôme CONSTANT

Royal Belgian Institute of Natural Sciences, O.D. Phylogeny and Taxonomy, Entomology, Vautier street 29, B-1000 Brussels, Belgium. E-mail: jerome.constant@naturalsciences.be:
urn:lsid:zoobank.org:author:6E6072A1-9415-4C8D-8E60-2504444DB290

Abstract

Two new species of the genus *Gergithus* Stål, 1870 (Issidae, Hemisphaeriini) are described: *G. dayi* sp. nov. from southern Thailand and *G. floreni* sp. nov. from northern Borneo. They are compared with the most similar species and with the species living in the same area. Type specimens, details, male terminalia and live specimens are illustrated, and a distribution map is provided, based on both collection material and photographs provided through "citizen science" sources. The genus *Gergithus* now contains 36 species and its composition is briefly discussed.

Keywords: Fulgoroidea, Homoptera, Malaysia, Planthopper, Sabah, Sarawak

Introduction

The genus *Gergithus* Stål, 1870 was described by STÅL (1870) based on a few characters separating it from *Hemisphaerius* Schaum, 1850, including elongate legs and frons, the frons and clypeus in a continuous plane, the latter extending ventrally in an obtusely rounded process, the vertex narrower than the eyes and the tegmina oval, fully developed and irregularly reticulate. The genus was keyed together with the other genera of "Hemisphaeriidae" by MELICHAR (1906) who added 16 species to the genus, 9 newly described by him, and 7 transferred from *Hemisphaerius*. He simultaneously allowed, based on his key, a broader interpretation of the concept of the genus as defined by the following characters: frons separated from vertex by a carina, surface of tegmina convex, posterior wings developed and irregularly reticulate, legs relatively long, posterior tibiae with two lateral spines, anterior legs not lamellate. A new genus *Ishiraranus* Hori, 1969 was described to accommodate *Gergithus iguchii* Matsumura, 1916 (HORI, 1969) but was later treated as a junior synonym of *Gergithus* by CHE *et al*. (2007). Finally, 62 species were placed in the genus until MENG *et al*. (2017) redescribed it based on the examination of type material and removed 41 species, mostly transferred to their newly erected genus *Gnezdilovius* Meng, Webb & Wang, 2017. Together with the recently described *Gergithus frontilongus* Meng, Webb & Wang, 2017 from southern China, it leaves 22 species in the genus which is widely distributed in Asia, from Sri Lanka and India to Myanmar, Thailand, southern China, Malaysia and Indonesia (including Borneo, Java, Sumatra, Siberut and Kai islands) (MENG *et al*., 2017). Soon after, GNEZDILOV (2017) proposed a series of revisions to the treatment of the group, including the upgrading of a subgenus of *Gergithus*, *Maculergithus* Constant & Pham, 2016, to genus level, the reinstatement of *Ishiharanus* Hori, 1969 as a valid genus and the description of two new genera, *Ceratogergithus* Gnezdilov, 2017 and *Ophthalmosphaerius* Gnezdilov, 2017. He provided an ambiguous treatment for *Gergithus*, by first stating that the genus contains 22 species as proposed by MENG *et al*. (2017) but further in his work, also listing twelve species which he considered "*with an uncertain taxonomic position*" and provisionally retained them in the genus *Gergithus*, hence leading to a total of 34 species currently placed in the genus (GNEZDILOV, 2017; BOURGOIN, 2021). The study of recent material from Thailand and Malaysia (Borneo) led to the discovery

of two undescribed species of *Gergithus*, which are described in the present paper and compared to the most similar species as well as to those found around their distribution range.

Material and methods

The genitalia were extracted after boiling the abdomen for several minutes in a 10% solution of potassium hydroxide (KOH) at about 100°C. Some drops of saturated alcoholic Chlorazol black solution were added for contrasting (CARAYON, 1969) when necessary. The pygofer was separated from the abdomen and the aedeagus dissected with a needle blade for examination. The whole was then placed in glycerine for preservation in a tube attached to the pin of the corresponding specimen. Photographs were taken with a Leica EZ4W stereo-microscope, stacked with CombineZ software and optimized with Adobe Photoshop software. The map was produced with SimpleMappr (SHORTHOUSE, 2010). The external morphological terminology follows O'BRIEN & WILSON (1985), for the male genitalia, it follows BOURGOIN & HUANG (1990). For the transcription of the labels of the types, the wording on each single label is delimited by square brackets. The metatiobiotarsal formula gives the number of spines on (side of metatibia) apex of metatibia/apex of first metatarsomere/apex of second metatarsomere.

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

BB	=	maximum breadth of the body
BF	=	maximum breadth of the frons
BV	=	maximum breadth of the vertex
LF	=	length of the frons in median line
LT	=	total length (apex of head to apex of tegmina)
LV	=	length of the vertex in median line.

Acronyms used for the collections:

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

Taxonomy

Order Hemiptera Linnaeus, 1758
Suborder Auchenorrhyncha Duméril, 1806
Infraorder Fulgoromorpha Evans, 1946
Superfamily Fulgoroidea Latreille, 1807
Family Issidae Spinola, 1839
Subfamily Hemisphaeriinae Melichar, 1906
Tribe Hemisphaeriini Melichar, 1906
Subtribe Hemisphaeriina Melichar, 1906

Genus *Gergithus* Stål, 1870

Gergithus STÅL, 1870: 756 [described; compared with *Hemisphaerius* Schaum, 1850]. Type species: *Hemisphaerius shaumi* Stål, 1855 (Sri Lanka) by original designation.

Gergithus – MELICHAR, 1906: 58 [description, key to the species; description of species]. — MENG *et al*., 2017: 5 [description, checklist of included species]. — GNEZDILOV, 2017: 1339 [diagnosis].

AMENDED DIAGNOSIS. Vertex subquadrate; frons elongate, narrow, widened above clypeus, smooth; clypeus subtriangular, in same plane as frons, with strong prominent median carina

and angularly projecting ventrally; tegmina with costal margin showing a shallow concavity at basal third marking a "shoulder", with costal margin rounded in dorsal view, but not projecting under the eye in lateral view; posterior wing developed, unilobous; male genitalia with posterior margin of pygofer convex, without processes, gonostyli with a short neck and phallobase asymmetrical (based on MENG *et al*., 2017 and GNEZDILOV, 2017).

DISTRIBUTION. Sri Lanka, India, Myanmar, Thailand, China (Yunnan Province), Malaysia, Indonesia (MENG *et al*., 2017; GNEZDILOV, 2017).

NOTE. The distribution of the genus *Gergithus* given above follows MENG *et al*. (2017) and GNEZDILOV (2017) and does not include the 12 species currently placed in *Gergithus* "*with an uncertain taxonomic position*" as listed by GNEZDILOV (2017), which are distributed in China (Hainan Island, Hong Kong, Yunnan), Japan, Taiwan and Vietnam (see also discussion).

***Gergithus dayi* sp. nov.**

urn:lsid:zoobank.org:act:F28ACC95-0E3C-4F23-82FB-E55747F8C64B

(Figs 1–4)

ETYMOLOGY. The species epithet is a patronym referring to Mr Les Day (Thailand) in acknowledgement for all his help in documenting this new species.

TYPE MATERIAL. THAILAND • holotype ♂ (dissected): [Coll. R.I.Sc.N.B., Thailand, Nakhon Si Tham., Khao Ram Rome, 13.V.2019, 8°14'00.7"N 99°47'30.2"E, 985m, Leg. L. Day, I.G.: 34.287] (RBINS).

Paratypes (6♀♀): THAILAND • 2 ♀♀: same collecting data as for holotype except "11.V.2019" (RBINS) • 1 ♀: [Coll. R.I.Sc.N.B., Thailand, Nakhon Si Tham., Yot Lueang, 14.V.2019, 8°37'41"N 99°43'41"E, Leg. L. Day, I.G.: 34.287] (RBINS) • 1 ♀: [Coll. I.R.Sc.N.B., Thailand, Nakhon Si Thammarat, Yot Lueang, 8°37'41"N 99°43'41"E, 29.VI.2018, Leg. L. Day, I.G.: 34.287] (RBINS) • 1 ♀: [Coll. R.I.Sc.N.B., Thailand, Nakhon Si Thammarat, Karom, 13.II.2016, Leg. L. Day, I.G.: 34.287] (RBINS) coordinates of Karom: 8°22'05"N 99°44'02.5"E • 1 ♀ (Fig. 1): [Coll. R.I.Sc.N.B., Thailand, Ranong, TV Hill, 15.XII.2017, Leg. L. Day, I.G.: 33.972] (RBINS) coordinates of "TV Hill": 10°02'01"N 98°40'18"E.

DIAGNOSIS. The species is separated from the other *Gergithus* species by the colouration of the tegmina with a large black marking on anterior half including a paler transverse marking, and basilateral yellowish marking (Fig. 1 A, C), the yellowish mesonotum (Fig. 1 A), and the pattern of the concolorous frons and clypeus with broad median dark red line followed towards the lateral margin by a narrower black line and a white one (Fig. 1 D–E).

DIFFERENTIAL DIAGNOSIS. The most similar species is *G. frontilongus* Meng, Webb & Wang, 2017 from Yunnan Province in southern China (illustrations in MENG *et al*., 2017, figs 2–3) which is separated from *G. dayi* sp. nov. by its clypeus with median line pale yellowish (dark red in *G. dayi* sp. nov.), the red line of frons limited dorsally by a black line and not reaching dorsal margin (red line reaching dorsal margin of frons in *G. dayi* sp. nov.), the male terminalia with gonostyli more produced posteriorly (less produced in *G. dayi* sp. nov.) and the capitulum with a single apical tooth (2 apical teeth in *G. dayi* sp. nov.).

A single species of *Gergithus*, *G. niger* (Walker, 1857) was recorded from Thailand (based on a junior synonym *Hemisphaerius chilocoroides* Walker, 1862 – WALKER, 1862) but is separated by its black dorsal colour and its frons without black lines (illustration in GNEZDILOV, 2015, fig. 19); another species, *G. ignotus* Melichar, 1906 was described from Bago in Myanmar (= Pegu, Burma in MELICHAR, 1906) but it has a black mesonotum (yellowish in

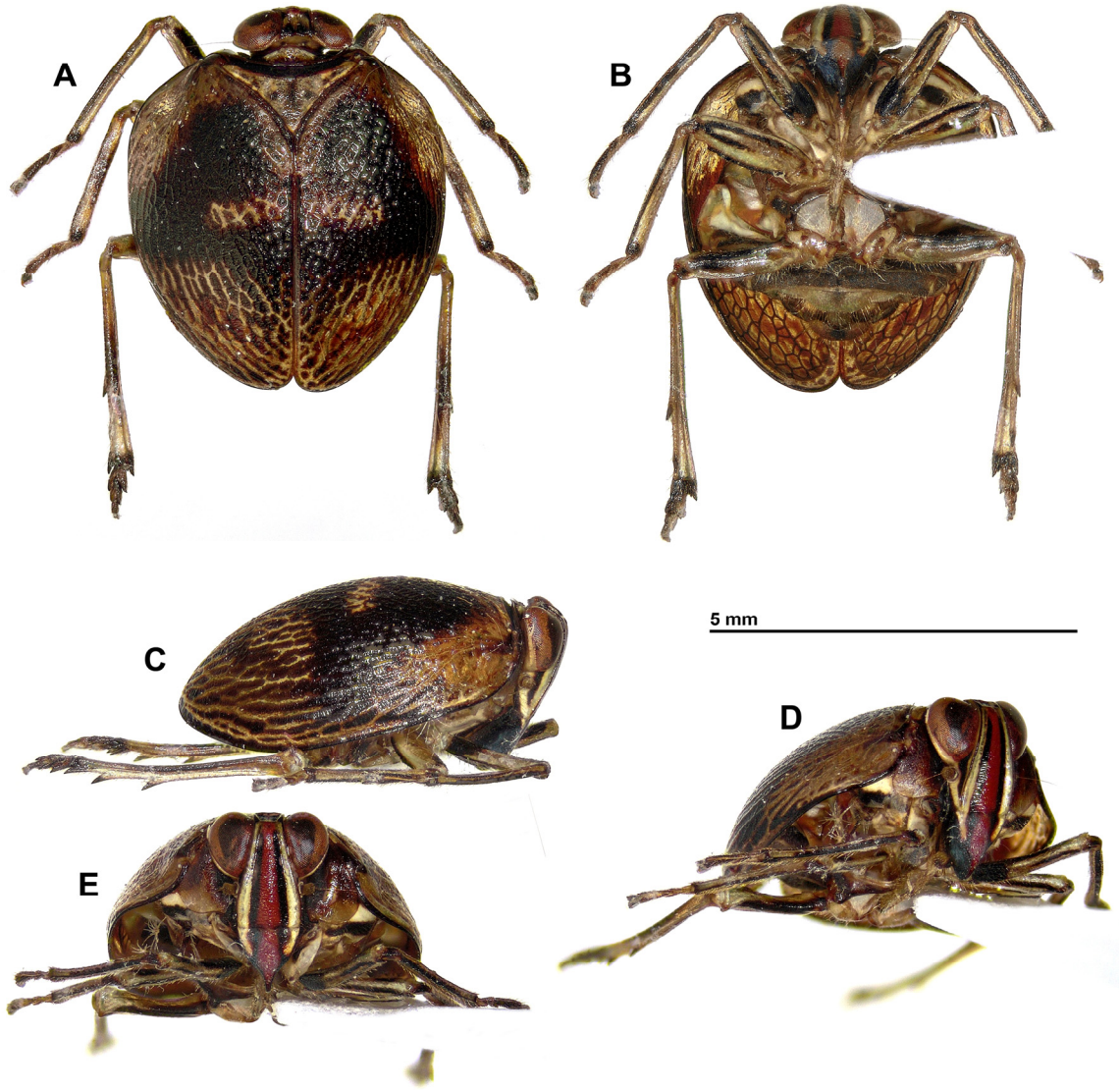

Fig. 1. *Gergithus dayi* sp. nov., paratype ♀ from Ranong Province (RBINS). A, habitus, dorsal view. B, habitus, ventral view. C, habitus, right lateral view. D, habitus, anterolateral view. E, habitus, perpendicular view of frons.

G. dayi sp. nov.) and the frons brown with 2 paler markings in middle of fronto-clypeal suture (frons with red, black and white longitudinal lines in *G. dayi* sp. nov.).

DESCRIPTION. *Measurements and ratios*: LT: ♂ (n = 1): 5.2 mm; ♀ (n = 6): 5.6 mm (5.3–5.8). LT/BB = 1.2; LV/BV = 0.74; LF/BF = 1.6.

Head: vertex subquadrate, about 2/3 as broad as eye in dorsal view; concave with bluntly elevated margins; posterior margin of vertex slightly incurved; disc yellowish with 2 black markings along posterior margin and lateral margins marked with a black line (Fig. 1 A). Posterior face of head pale yellowish. Genae pale yellowish with median black-brown line starting from ventral margin of eye, narrowing distally and not reaching ventral margin of gena (Fig. 1 C–D). Frons elongate, broadest near fronto-clypeal suture, narrowing dorsad, about 2.3 times broader along clypeal margin than dorsal; smooth with 2 shallow longitudinal grooves; fronto-genal margins sharply carinate and with ventral half slightly curved; lateral margins marked by a fine dark brown line; disc with rather wide central dark red line reaching dorsal margin, followed towards the exterior by a black, then a pale yellowish line, each about half as

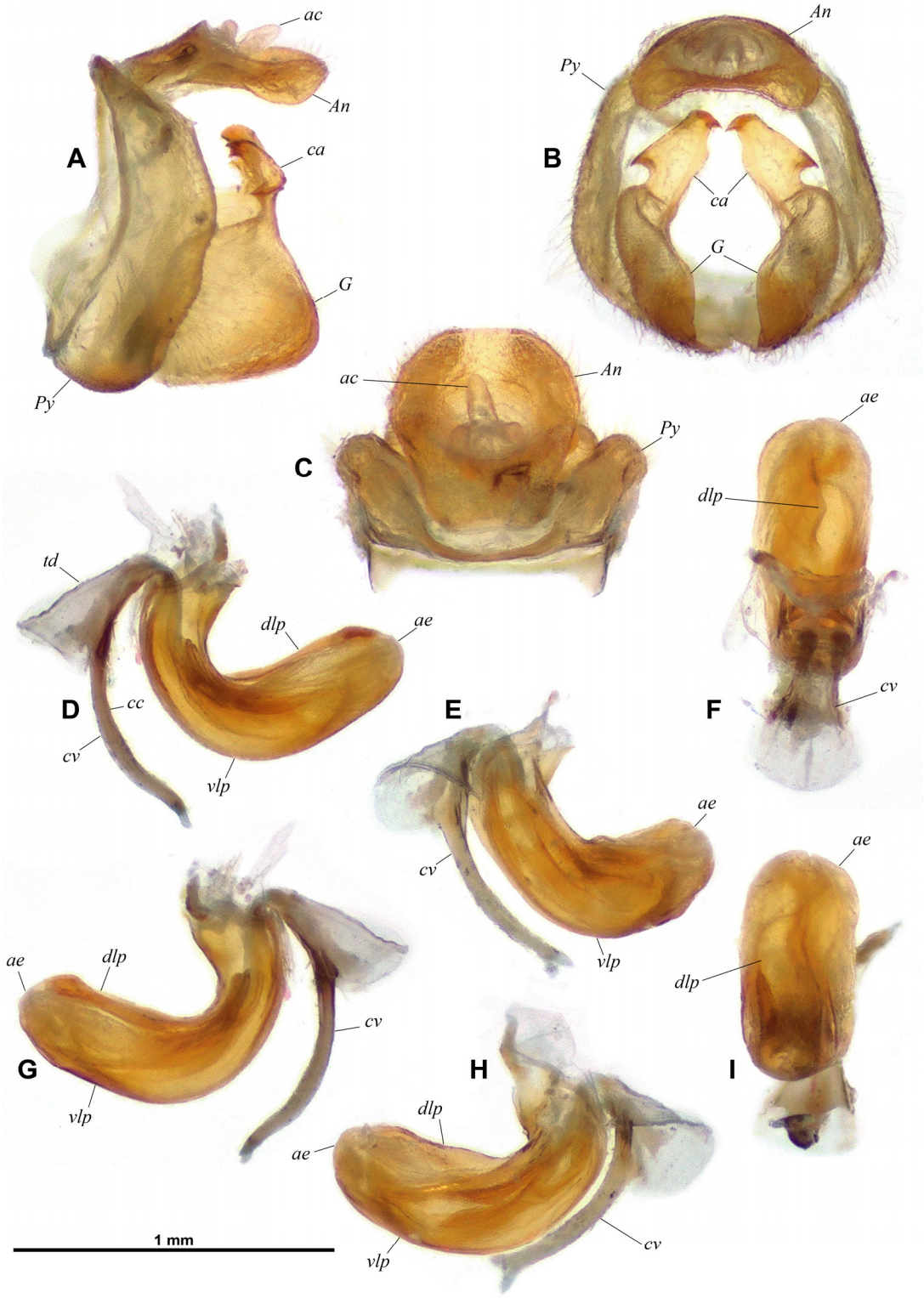

Fig. 2. *Gergithus dayi* sp. nov., holotype ♂ (RBINS), terminalia. A, pygofer, anal tube and gonostylus, left lateral view. B, pygofer, anal tube and gonostyli, caudal view. C, anal tube and pygofer, dorsal view. D, aedeagus, left lateral view. E, aedeagus, left posteroventral view. F, aedeagus, dorsal view. G, aedeagus, right lateral view. H, aedeagus, right posteroventral view. I, aedeagus, caudal view.
ae: aedeagus – *ac*: anal column – *An*: anal tube – *ca*: capitulum of gonostylus – *cc*: corpus connective – *cv*: connective – *dlp*: dorsal lobe of periandrium – *G*: gonostylus – *Py*: pygofer – *td*: tectiductus – *vlp*: ventral lobe of periandrium.

wide as central dark red band; black lines following longitudinal grooves (Fig. 1 C–E). Fronto-clypeal suture straight (Fig. 1 E). Clypeus triangular, in same plane as frons, with carinate ventral projection pointed distally in anterior view, and rounded in lateral view; anterior face of clypeus concolorous with frons, with lines of frons prolongated on clypeus; sides of clypeus black (Fig. 1 C–E). Antennae with scape short, ring-shaped; pedicel subcylindrical, about as long as broad, pale brown (Fig. 1 D–E). Labium elongate, surpassing base of posterior coxae; last segment longer than broad, and shorter than penultimate; entirely pale yellowish (Fig. 1 B).

Thorax: pronotum (dorsal view) very short with anterior margin bisinuate, convex anteriorly between eyes, and posterior margin broadly rounded; disc slightly concave; dark brown with anterior half of disc pale yellowish (Fig. 1 A). Paranotal lobes extending laterally, exceeding basal angle of tegmina; with ventral margin straight and lateroventral angle rounded; black on leading margin, progressively paler posteroventrally (Fig. 1 D–E). Mesonotum smooth, short, triangular with all margins incurved and a blunt carina along anterior margin, stopping before lateral angles; pale yellowish with anterior face blackish, central portion of anterior carina largely dark brown and median line and 2 spots on disc brown (Fig. 1 A). Tegulae dark brown (Fig. 1 E). Episternum pale yellowish with transverse black line (Fig. 1 B, D–E).

Tegmina: broadly semicircular, strongly convex with a marked concavity along costal margin near base (visible behind profemora on Fig. 1 A); apical angle narrowly rounded; subcoriaceous with dense reticulum of veinlets covering all surfaces; basal cell marked with brown; basal 3/5 black with large pale yellowish marking at base along costal margin and transverse marking brown with pale yellowish veins extending from postclaval margin to about middle of tegmen; distal 2/5 brown with pale yellowish veins; costal margin entirely underlined with fine black line (Fig. 1 A–E).

Hind wings: (Fig. 1 B) brown, unilobed, with veins darker, slightly shorter than tegmina. Venation reticulate with main longitudinal veins distinct basally (C, ScP+R, MP, CuA), anal area absent; numerous cross-veinlets; veins thicker and darker along antero-distal margin. Costal and cubital margins sinuate, distal margin rounded.

Legs: elongate and slender with femora wider and shorter than corresponding tibiae (Fig. 1 A–B); mesofemora with sharp posterior margin abruptly roundly emarginate distally; posterior tibiae with 2 lateroventral spines on distal half and 6 apical spines; first metatarsomere rather short, with ventral pad of microsetae, strong apical tooth on each side and 6–7 small teeth along posterior margin; second metatarsomere with ventral pad of microsetae and strong apical tooth on each side. Legs pale yellowish with black markings as follows: elongate marking along basal half of anterior carina of procoxae, 2 small weakly marked dots on pro- and mesotrochanters,

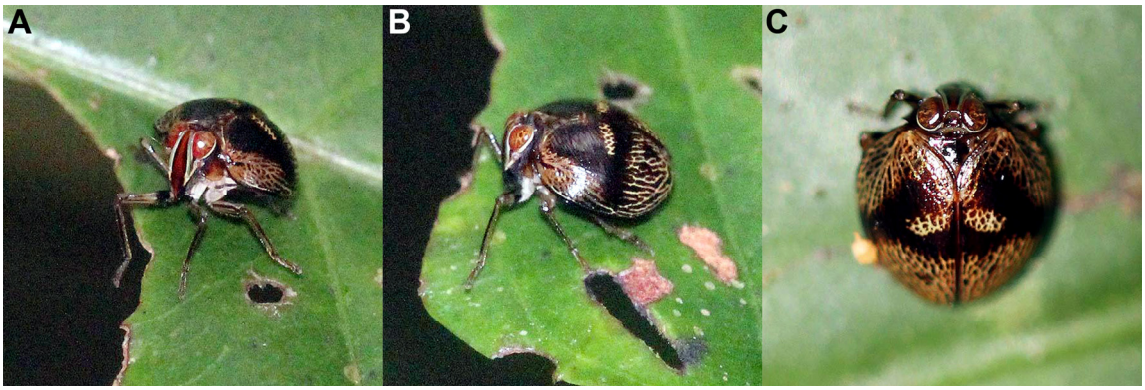

Fig. 3. *Gergithus dayi* sp. nov., live specimens in nature in Thailand. A–B, Nakhon Si Thammarat, Yot Lueang, 29.VI.2018, © Les Day. C, Nakhon Si Thammarat, Karom Waterfall, 13.II.2016, © Les Day.

large basal ring on profemora followed ventrally by 2 longitudinal stripes and dorsally by 1 longitudinal stripe, the stripes not reaching apex of femora, externoventral longitudinal stripe large basal ring on profemora followed ventrally by 2 longitudinal stripes and dorsally by 1 along all length and apical ring on pro- and mesotibiae, mesofemora with 3 longitudinal lines ventrally, anterior one complete, median one only on distal half, posterior one along margin and stopped at distal emargination, mesofemora dorsally with narrow elongate marking along anterior margin on basal half and wider, rather short anteapical elongate marking, wide anteroventral line on metafemora, elongate dorsal marking in middle of metatibiae and apex of latter, metatibial spines; tarsi brown with pro- and mesobasitarsomere paler (Fig. 1 A–B, D). Metatibiotarsal formula: (2) 6/6–7/2.

Abdomen: dark brown ventrally with sternite VII turning yellowish in females (Fig. 1 B); dorsum yellow-brown with terminal segments darker.

Terminalia ♂: pygofer (*Py*) 3.5 times higher than long at mid-height and with posterior margin broadly rounded and slightly sinuate along ventral half in lateral view, anterior margin concave (Fig. 2 A). Gonostyli (*G*) rather short, subtrapezoidal in lateral view with capitulum (*ca*) well developed bearing a narrow neck, elongate and projecting dorsoanteriorly; capitulum with 2 apical teeth directed cephalad, a basolateral laminate process pointed anteroventrally and a deep basal transverse groove (Fig. 2 A–B). Periandrium rather strongly curved posterodorsally, rather simple (Fig. 2 D, G); dorsal lobe (*dlp*) of periandrium asymmetrical, more developed on right side and rounded apically; ventral lobe (*vlp*) rather wide, slightly shorter than aedeagus and rounded apically; aedeagus (*ae*) membranous, without hooks; connective (cv) strongly developed, corpus connective (cc) long and regularly curved in lateral view, tectiductus (td) moderately developed, conical with moderately wide anterior foramen (Fig. 2 E–L) and with crista developed in a weak single carina, not foliate (Fig. 2 D–I). Anal tube (*An*) (Fig. 2 A–C) as broad at maximal breadth as long in median line, slightly sinuate in lateral view, dorsoventrally flattened with sides slightly projecting ventrally and rounded at apicolateral angles; lateral margin rounded in dorsal view; apical margin straight in middle in dorsal view; anal column (*ac*) well developed, rather elongate and narrow, placed at basal 1/3.

BIOLOGY. The specimens were found between 300 and 1000 m a.s.l. at the forest edge or just inside where there is still sun on low growing vegetation (not usually on woody plants), generally less than one metre high (Fig. 3). The habitat at these localities is mainly primary Diptocarpaceae rainforests, but the species seems to prefer more secondary areas such as near small clearings used by locals for orchards, or at roadsides in or near forests. They were not found deep in forests (L. Day pers. com., II.2021).

DISTRIBUTION. Thailand: Nakhon Si Thammarat and Ranong provinces (Fig. 4).

***Gergithus floreni* sp. nov.**

urn:lsid:zoobank.org:act:5C58E829-3171-4823-8138-FB4320CD7360

(Figs 4–8)

ETYMOLOGY. The species epithet is a patronym referring to Dr Andreas Floren (Germany) in acknowledgement for his help in documenting this new species.

TYPE MATERIAL MALAYSIA – SABAH • holotype ♂ (dissected): [Coll. I.R.Sc.N.B., E. Malaysia, Borneo, Tawau Hills, 5.IX.2009, fogging primary forest (T48), Leg. A. Floren, I.G.: 31.494, Code 194-196]; 4°24’00.7”N 117°53’24.4”E (RBINS).

Paratypes (2♂♂, 3♀♀): MALAYSIA – SABAH • 1 ♂, 1 ♀: same collecting data as holotype (RBINS) • 1 ♂: same data as holotype except “T47” (RBINS) • 1 ♂ (Fig. 5; hind wing mounted),

Fig. 4. *Gergithus dayi* sp. nov. and *G. floreni* sp. nov., distribution map.

1 ♀: [Coll. I.R.Sc.N.B., E. Malaysia, Borneo, Tawau Hills, 8.IX.2009, fogging primary forest (T65), Leg. A. Floren, I.G.: 31.494, Code 209-211] 4°24'24.8"N 117°53'33.6"E (RBINS).

MATERIAL EXAMINED FROM PHOTOGRAPHS. MALAYSIA – SABAH • 1 ex. (Fig. 7 A–C): Tawau, VII.2015, J. Yeo • 1 ex. (Fig. 7 D–E): Tawau, 9.VII.2015, N. Bay • 1 ex. (Fig. 7 F): Maliau, 4°44'04"N 116°58'33"E, 27.III.2016, N. Bay. – SARAWAK • 1 ex. (Fig. 8): Mulu National Park, 4°07'55"N 114°55'08"E, 28.IV.2013, A. Anker.

DIAGNOSIS. The species is separated from the other *Gergithus* species by the colouration of the tegmina with 3 parallel black lines along costal margin, separated by yellow lines, and a round yellow spot at mid-length along postclaval margin but not touching the margin (Fig. 5 A, C), the blackish pronotum (Fig. 5 A), the frons with a complete central red line and black lines along lateral margins under the eyes (Fig. 5 D).

DIFFERENTIAL DIAGNOSIS. The most similar species is *G. signatifrons* Melichar, 1906 from Sumatra (MELICHAR, 1906; illustrations in MENG *et al*., 2017, fig. 6) which is separated from *G. floreni* sp. nov. by its yellow pronotum (blackish in *G. floreni* sp. nov.) and uniformly pale

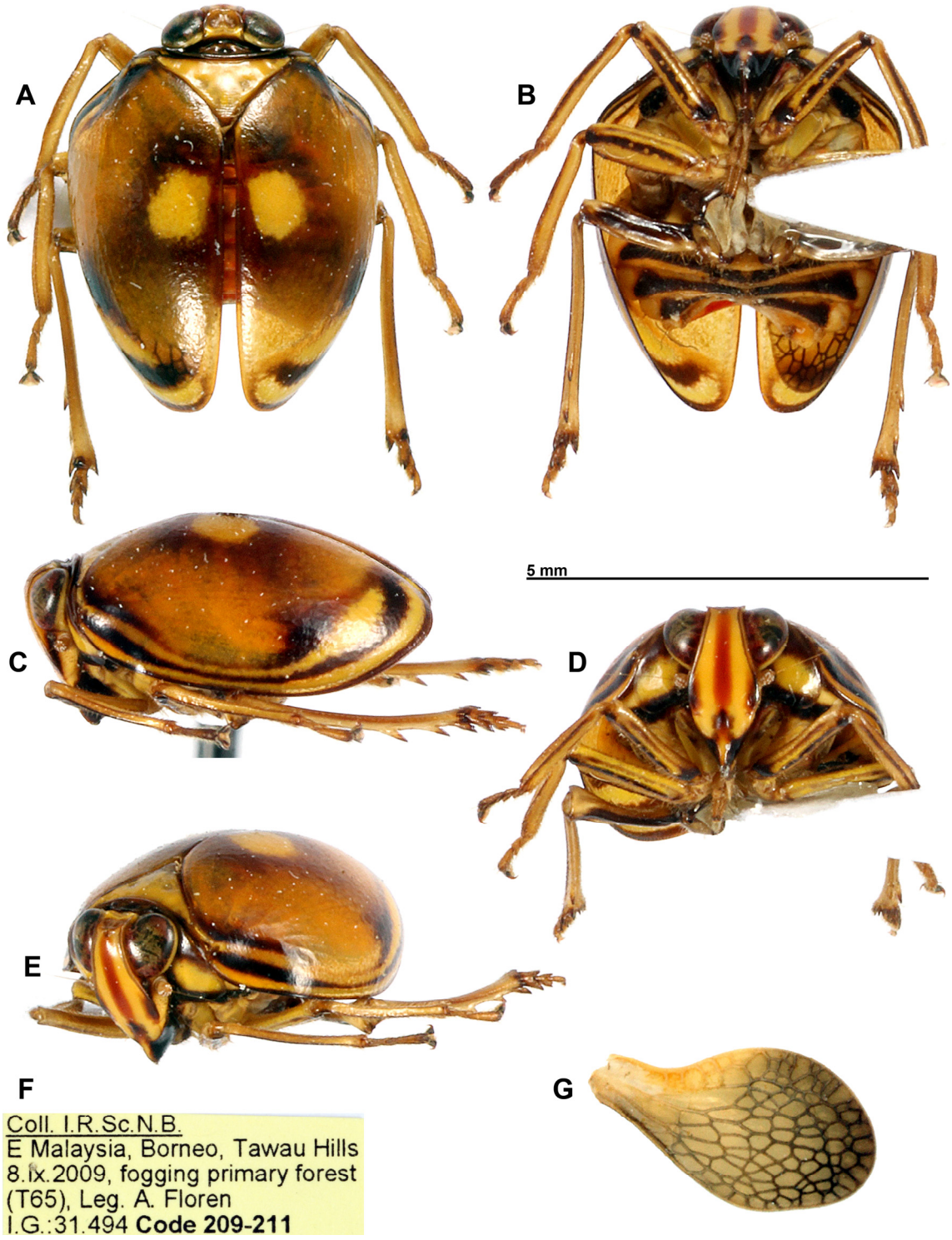

Fig. 5. *Gergithus floreni* sp. nov., paratype ♂ from Tawau (RBINS). A, habitus, dorsal view. B, habitus, ventral view. C, habitus, left lateral view. D, habitus, perpendicular view of frons. E, habitus, anterolateral view. F, label. G, right posterior wing.

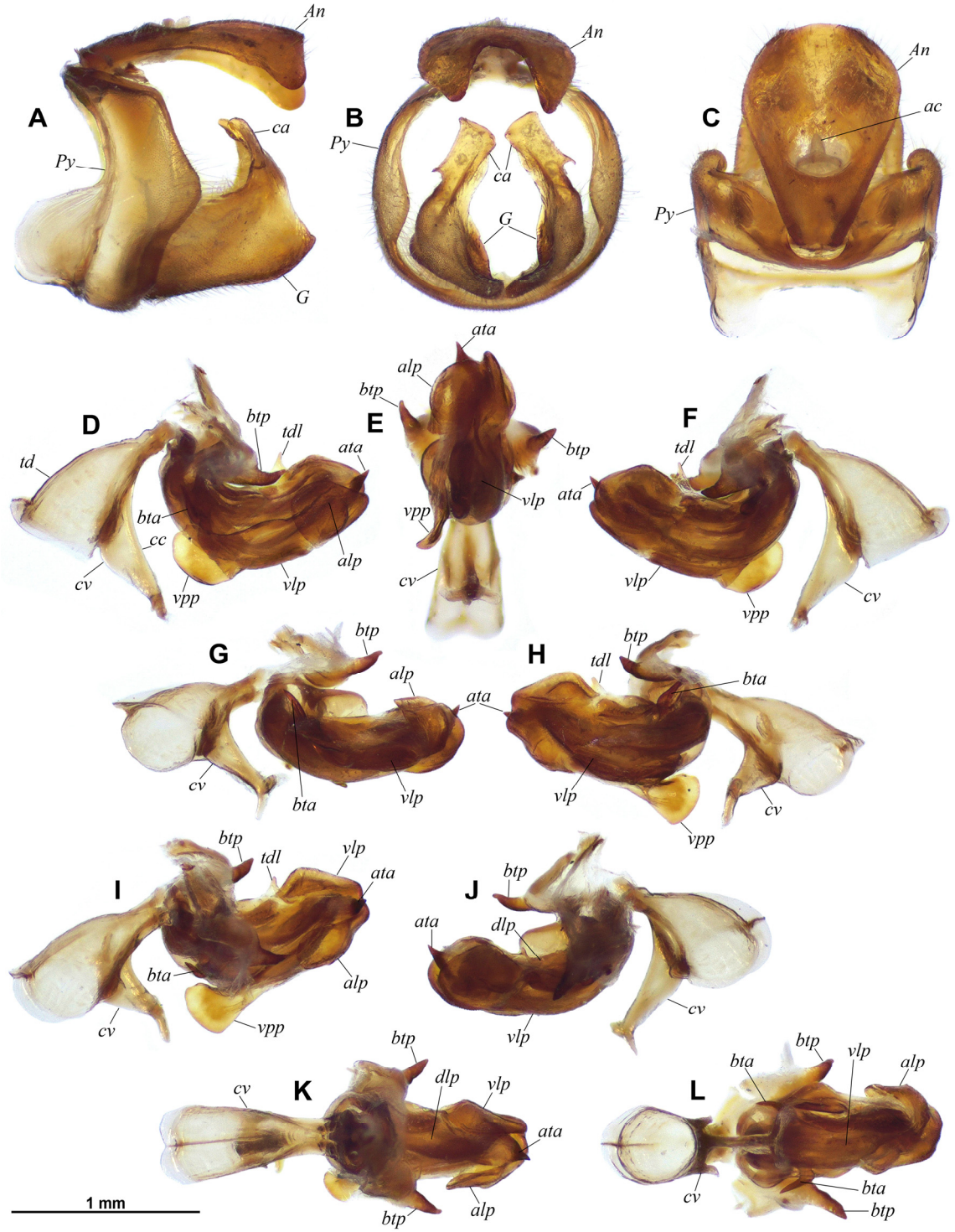

Fig. 6. *Gergithus floreni* sp. nov., holotype ♂ (RBINS), terminalia. A–C, pygofer, anal tube and gonostyli. A, left lateral view. B, caudal view. C, dorsal view. D–L, aedeagus. D, left lateral view. E, caudal view. F, right lateral view. G, left lateroventral view. H, right lateroventral view. I, left laterodorsal view. J, right laterodorsal view. K, dorsal view. L, ventral view.

ac: anal column. *alp*: apicolateral process of ventral lobe of periandrium. *An*: anal tube. *ata*: apical tooth of aedeagus. *bta*: basiventral tooth of aedeagus. *btp*: basal tooth of phallobase. *ca*: capitulum of gonostylus. *cc*: corpus connective. *cv*: connective. *dlp*: dorsal lobe of periandrium. *G*: gonostylus. *Py*: pygofer. *td*: tectiductus. *tdl*: tooth of dorsal lobe of periandrium.*vlp*: ventral lobe of periandrium. *vpp*: ventral process of ventral lobe of periandrium.

yellowish or greenish brown tegmina (3 parallel black lines along costal margin and darker brown area with round yellow spot on the disc in *G. floreni* sp. nov.).

A single species of *Gergithus*, *G. niger* (Walker, 1857) was recorded from Borneo (WALKER, 1857) but is separated by its black dorsal colour and its frons without black lines along lateral margins under eyes (illustration in GNEZDILOV, 2015, fig. 19).

NOTE. A brown variety of *G. niger* was also mentioned from Peninsular Malaysia (Malacca and Perak), by MELICHAR (1906) under the original combination *Hemisphaerius niger* Walker, 1857.

DESCRIPTION. *Measurements and ratios*: LT: ♂ (n = 3): 5.1 mm (5.0–5.2); ♀ (n = 2): 5.6 mm (5.4–5.8). LT/BB = 1.3; LV/BV = 0.57; LF/BF = 1.4.

Head: vertex subrectangular, about as broad as eye in dorsal view; disc concave with bluntly elevated margins and 2 shallow fossulae in middle; posterior margin slightly incurved; yellowish brown with fossulae slightly darker (Fig. 5 A). Posterior face of head yellow. Genae yellow with median black-brown line starting from ventral margin of eye (anterior to antenna), narrowing distally and nearly reaching ventral margin of gena (Fig. 5 C). Frons elongate, broader ventrally and tapering towards dorsal margin, nearly 2 times broader along clypeal margin than dorsal; smooth and very slightly convex (median carina absent); lateral margins sharply carinate and with ventral half slightly curved; lateral margins marked by an elongate brown marking along ventral 1/3, reaching fronto-clypeal suture; disc yellow (turquoise in live specimens – Fig. 7 B, D) with rather wide central bright red line reaching dorsal margin (Fig. 5 D–E). Fronto-clypeal suture straight (Fig. 5 D–E). Clypeus broadly triangular (median carina present), in same plane as frons, with carinate ventral projection pointed distally in anterior view, and angularly rounded in lateral view; anterior face with dorsal half yellow with central line prolongating line of frons, black along fronto-clypeal suture and turning to red towards mid-length of clypeus; ventral half black with central yellow line tapering distally; sides of clypeus black (Fig. 5 C–E). Antennae with scape short, ring-shaped; pedicel subcylindrical, about as long as broad, pale brown (Fig. 5 C–E). Labium elongate, reaching base of posterior coxae; last segment longer than broad, and shorter than penultimate; pale yellowish with black tip (Fig. 5 B).

Thorax: pronotum very short with anterior margin bisinuate, convex between eyes, and with posterior margin broadly rounded; disc slightly concave with two impressed points; dark brown (Fig. 5 A). Paranotal lobes broad, exceeding level of tegmina; with ventral margin straight and lateroventral angle rounded; dark brown like pronotum on dorsal 1/3; ventral 2/3 yellow with black band from eye to posteroventral angle (Fig. 5 C–E). Mesonotum smooth, short, triangular with all margins concave, bearing a carina along anterior margin, reaching lateral angles; yellow with anterior face and carina brown to black-brown, central portion of anterior carina paler (Fig. 5 A). Tegulae brown (Fig. 5 E). Episternum pale yellow with transverse black line prolongating black line of paranotal lobe (Fig. 5 B–E).

Tegmina: broadly semicircular, strongly convex with a marked concavity along costal margin near base (visible behind profemora on Fig. 5 A); apical angle narrowly rounded; entirely smooth with hardly distinct reticulum of veinlets; brown, darker centrally and with round bright yellow spot at mid-length near postclaval margin but not touching the latter; yellow band along costal margin, narrower at middle 1/3; brown and yellow areas separated by dark brown line, dark brown line broader and turning to black along basal 1/4 and broadening in an elongate black marking at distal 2/3; median black line in yellow costal band, narrowing in middle 1/3 portion and broadening and recurving parallel to tegmen margin distally; costal margin entirely underlined with fine black line (Fig. 5 A–C).

Fig. 7. *Gergithus floreni* sp. nov., live specimens in nature in Malaysia, Borneo, Sabah. A–C, Tawau, 2015. © Joanna Yeo. D–E, Tawau, 9.VII.2015. © Nicky Bay. F, Maliau, 27.III.2016. © Nicky Bay.

Hind wings: (Fig. 5 G) brown, yellowish along costal margin on basal half, unilobed, with veins darker, slightly shorter than tegmina. Venation reticulate with main longitudinal veins distinct basally (C, ScP+R, MP, CuA), anal area absent; numerous cross-veinlets; veins thicker and darker along antero-distal margin. Costal and cubital margins sinuate, distal margin rounded.

Legs: elongate and slender with femora wider and shorter than corresponding tibiae (Fig. 5 A–B); mesofemora with sharp posterior margin smoothly roundly emarginate distally; posterior tibiae with 2 lateroventral spines on distal half and 6 apical spines; first metatarsomere rather

short, with ventral pad of microsetae, strong apical tooth on each side and 6–7 small teeth along posterior margin; second metatarsomere with ventral pad of microsetae and strong apical tooth on each side. Legs pale yellow with black markings as follows: small marking at base of anterior carina of procoxae, 2 small weakly marked dots on pro- and mesotrochanters, base of profemora ventrally followed by 2 longitudinal stripes, the posterior one broader, mesofemora with 3 longitudinal lines ventrally, anterior one very narrow, median one broader, posterior one along margin and stopped at distal emargination, wide anteroventral band on metafemora, apex of all metatibial and metatarsal spines; brownish longitudinal stripe along all length of externoventral carina on pro- and mesotibiae; tarsi brown (Fig. 5 A–B, D). Metatibiotarsal formula: (2) 6/6–7/2.

Abdomen: sternites yellow with dark brown transverse band broadening laterally and not reaching lateral margin of sternite (Fig. 5 B); dorsum yellow-orange with terminal segments yellowish.

Terminalia ♂: pygofer (*Py*) 3.5 times higher than long at mid-height, curved in lateral view (anterior margin concave) and with posterior margin roundly produced posteriorly at 2/5 of height with obtuse rounded angle at 4/5 of height; posterior margin dorsally deeply emarginate at base of anal tube (Fig. 6 A, C). Gonostyli (*G*) moderately elongate, convex, slightly broadening from base to apex in lateral view, with ventral margin slightly incurved on basal 2/3 and more strongly upcurving on distal 1/3, apical margin slightly, roundly emarginate in lateral view; capitulum (*ca*) well developed with neck rather broad, tapering in lateral view, elongate, slightly curved anteriorly and anteroposteriorly flattened, subrectangular in posterior view and with exterior margin laminate with a laterobasal process projecting ventrally and projecting dorsointernally (Fig. 6 A–B). Periandrium moderately curved posterodorsally, rather complex and asymmetrical (Fig. 6 D–L); phallobase with 2 strong basal, dorsolateral teeth (*btp*) directed posteriorly and slightly upcurved; dorsal lobe (*dlp*) of periandrium with weak tooth (*tdl*) directed dorsally on right side; ventral lobe of periandrium (*vlp*) strongly developed with a ventral process (*vpp*) on left side directed anteroventrally and roundly foliaceous apically, and an apicolateral laminate process (*alp*) wrapping the apex of aedeagus to the left side, with rounded apical margin and covering base of *vpp*; aedeagus membranous, with 3 teeth: 2 basal, hooked ones (*bta*) directed anteriorly and rather strong apical one (*ata*) directed posterodorsally; connective (cv) strongly developed, corpus connective (cc) elongate and rather broad, curved in lateral view, tectiductus (td) strongly developed, conical with wide anterior foramen and with crista developed in a weak single slightly foliated carina (Fig. 6 D–L). Anal tube (*An*) (Fig. 6 A–C) obovate and about 1.4 times longer than broad in dorsal view, with maximal breadth at distal 2/3, curved ventrally and widening towards apex in lateral view, dorsoventrally flattened with sides slightly projecting ventrally and apicolateral angles incurved ventrally; lateral margins regularly diverging in dorsal view to 2/3, then regularly rounded to apex; apical margin strongly incurved in middle in caudal view; anal column (*ac*) rather short and narrow, placed at basal 1/3.

BIOLOGY. The type series was collected in the primary forest in Tawau by fogging of the following species of tree: *Aporusa confusa* Gage and *Aporusa* sp. (Phyllantaceae), *Mallotus caudatus* Merr. (Euphorbiaceae), *Polyalthia* sp. (Annonaceae), *Aglaia* sp. (Meliaceae) and *Palaquium sericeum* H.J.Lam (Sapotaceae) (A. Floren pers. com., 2010 – see also HORSTMANN *et al*., 2005 for additional information on A. Floren's collecting). In Maliau, the specimen was found in the small spot of forest in front of the Maliau Basin visitor centre and was sitting on the vegetation between 1 and 2 m above the ground (N. Bay pers. com., 2021).

DISTRIBUTION. Malaysia, Borneo: Sabah, Tawau, Maliau; Sarawak, Mulu National Park (Fig. 4).

Fig. 8. A–E, *Gergithus floreni* sp. nov., live specimens in nature in Malaysia, Borneo, Sarawak. A–C, Mulu National Park, 28.IV.2013. © Arthur Anker.

Discussion

The genus *Gergithus* now counts 36 species (BOURGOIN, 2021); the fauna of Thailand includes 8 species of Issidae (CONSTANT & JIARANAISAKUL, 2020) including two *Gergithus* species and that of Borneo, 8 species of Hemisphaeriini (GNEZDILOV, 2015) including two *Gergithus*. This represents however only a fraction of the real diversity of Hemisphaeriini of the area and of the genus *Gergithus* (Constant, unpublished data).

MENG *et al*., (2017) were right when recognizing the new genus *Gnezdilovius* Meng, Webb & Wang, 2017 within the previous group of species placed in *Gergithus* and allowed a clear meaning of the latter genus by moving all the non-*Gergithus* species to *Gnezdilovius*. However, it appeared that a number of species placed in *Gnezdilovius* belonged to other genera and many were transferred to the corresponding genera by GNEZDILOV (2017). Moreover, in order to maintain the consistency of *Gnezdilovius*, 12 species moved to *Gnezdilovius* by MENG *et al*. (2017) were transferred back to *Gergithus* by GNEZDILOV (2017) but hence losing the benefit of having recovered a consistent composition for *Gergithus*. Consequently, *Gergithus* still remains problematic with species for which their genus placement needs to be confirmed or moved to other/new genus/genera. In this framework, GNEZDILOV (2017) provided some useful comments on these 12 species "*with an uncertain taxonomic position*" which include *G. bimaculatus* Zhang & Che, 2009, *G. flaviguttatus* (Hori, 1969), *G. flavimacula* (Walker, 1851), *G. gravidus* (Melichar, 1906), *G. horishanus* (Matsumura, 1916), *G. nonomaculatus* (Meng & Wang, 2012), *G. okinawanus* (Matsumura, 1936), *G. parallelus* (Che, Zhang & Wang, 2007), *G. satsumensis* Matsumura, 1916, *G. taiwanensis* Hori, 1969, *G. tristriatus* (Meng & Wang, 2012) and *G. yunnanensis* Che, Zhang & Wang, 2007.

In the future, the species of this widely spread genus *Gergithus* will need to be properly (re)documented, i.e. including the male genitalia characters which are currently described only for four species: *G. frontilongus* Meng, Webb & Wang, 2017 (MENG *et al*., 2017), *G. herbaceus* (Kirby, 1891) (GNEZDILOV, 2017) and the two species in the present work. This study, especially when the male genitalia of the type species, *G. schaumi* (Stål, 1855) will be described, will induce the necessary assessment of the delimitation and consistency of the genus. This might reveal the necessity of splitting the genus based on some characters already visible when comparing e.g. the very simple aedeagus of *G. dayi* sp. nov. (Fig. 2) and *G. frontilongus* (MENG *et al*., 2017, fig. 3) with the much more complicated one of *G. floreni* sp. nov. (Fig. 6) or the rather reduced posterior wing of *G. herbaceus* (GNEZDILOV, 2017, fig. 8) as compared to that of e.g. *G. frontilongus* (MENG *et al*., 2017, fig. 2 G) and *G. floreni* sp. nov. (Fig. 5 G).

Acknowledgements

I wish to thank Mr Les Day (Thailand), Dr Andreas Floren (University of Würzburg, Germany), Mrs Joanna Yeo (Singapore), Mr Nicky Bay (Singapore) and Mr Arthur Anker (Brazil) for providing the material, observations and/or photographs allowing a very complete documentation of both new species in this paper; Mrs Mado Berthet (RBINS) for her assistance with improving the quality of the collection specimens and genitalia plates; Prof. Thierry Bourgoin (Muséum National d'Histoire Naturelle, Paris, France) and Dr Charles Bartlett (University of Delaware, Newark, U.S.A.) for their helpful review of the manuscript and comments.

References

BOURGOIN T., 2021. - FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha. V.8, updated [iv.2015]. http://hemiptera-databases.org/flow/ [accessed January 30, 2021].

BOURGOIN T. & HUANG J., 1990. - Morphologie comparée des genitalia mâles des Trypetimorphini et remarques phylogénétiques (Hemiptera: Fulgoromorpha: Tropiduchidae). *Annales de la Société entomologique de France, Nouvelle Série*, 26(4): 555–564.

CARAYON J., 1969. - Emploi du noir chlorazol en anatomie microscopique des insectes. *Annales de la Société entomologique de France (N.S.)*, 5: 179–193.

CHE Y.-L., ZHANG Y.-L. & WANG Y.-L., 2007. - Seven new species and one new record of *Gergithus* Stål (Hemiptera: Fulgoroidea:Issidae) from China. *Proceedings of the Entomological Society of Washington*, 109(3): 611–627.

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. & JIARANAISAKUL K., 2020. - A strikingly coloured new species of *Hemisphaerius* Schaum, 1850 from Thailand (Hemiptera: Fulgoromorpha: Issidae). *Belgian Journal of Entomology,* 98: 1–16.

GNEZDILOV V.M., 2015. - Description of a new genus and species of Hemisphaeriini from Brunei with an identification key to the Bornean species of the tribe (Hemiptera: Fulgoroidea: Issidae). *Acta Entomologica Musei Nationalis Pragae*, 55(1): 9–18.

GNEZDILOV V.M., 2017. - Addenda to the revisions of the genera *Gergithus* Stål and *Hemisphaerius* Schaum (Hemiptera, Auchenorrhyncha, Fulgoroidea: Issidae). *Entomological Review* 97(9): 1338–1352. https://doi.org/10.1134/S0013873817090123

HORI Y., 1969. - Hemisphaeriinae of the Japan Archipelago (Hemiptera: Issidae). *Transactions of the Shikoku Entomological Society*, 10(2): 49–66.

HORSTMANN K., FLOREN A. & LINSENMAIR K.E., 2005. - Ichneumonidae (Hymenoptera) from the canopy of tropical forests in Sabah, Malaysia: A comparison between primary and secondary forests. *Ecotropica*, 11, 41–52.

MELICHAR L., 1906. - Monographie der Issiden. (Homoptera). *Abhandlungen der K. K. Zoologisch-botanischen Gesellschaft in Wien,* 3: 1–327.

MENG R., WEBB M.D. & WANG Y.L., 2017. - Nomenclatural changes in the planthopper tribe Hemisphaeriini (Hemiptera: Fulgoromorpha: Issidae), with the description of a new genus and a new species. *European Journal of Taxonomy*, 298: 1–25. https://doi.org/10.5852/ejt.2017.298

O'BRIEN L.B. & WILSON S.W., 1985. - *Planthoppers systematics and external morphology*. *In*: NAULT L.R. & RODRIGUEZ J.G. [eds]. - *The Leafhoppers and Planthoppers*. John Wiley & Sons. New York, 61–102.

SHORTHOUSE D.P., 2010. - SimpleMappr, an online tool to produce publication-quality point maps. http://www.simplemappr.net [accessed February 15, 2020].

STÅL C., 1870. - Hemiptera insularum Philippinarum. Bidrag till Philippinska öarnes Hemipter-fauna. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar*, 27: 607–776.

WALKER F., 1857. - Catalogue of the Homopterous insects collected at Sarawak, Borneo, by Mr A.R. Wallace, with descriptions of new species. *Journal and Proceedings of the Linnaean Society*, 1: 141–175.

WALKER F., 1862. - Characters of undescribed species of Homoptera in the collection of F. P. Pascoe, F. L. S. *The Journal of entomology*: *descriptive and geographical*, 1: 303–319.