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New Guinean Issidae: description of new taxa in a poorly known island fauna (Hemiptera, Fulgoroidea)

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Abstract

In the framework of the recent expedition results of “Our Planet Reviewed Papua-New-Guinea 2012–2013” we provide here the first Issidae (Hemiptera, Fulgoroidea) fauna review of New Guinea with the description of three new taxa: one new genus *Papunega* Gnezdilov et Bourgoin **gen. nov.** with two new species: *Papunega magnifacies* Gnezdilov et Le Cesne, **sp. nov.** (type species), *Papunega armocula* Gnezdilov et Soulier-Perkins, **sp. nov.** *Tetrica fasciatifrons* Melichar, 1906 is transferred to the genus *Papugena* **gen. nov.** to become *Papugena fasciatifrons* (Melichar, 1906) **comb. nov.** New Guinean Issidae fauna now includes 7 genera and 16 species.

Key words: taxonomy, Issini, new genus, new species, new combination, Papua New Guinea

Introduction

The New Guinea Highlands, also known as the Central Range or Central Cordillera, forms a chain of mountain ranges and intermountain river valleys running along the island of New Guinea. Papua New Guinea (PNG) occupies the eastern half of New Guinea island where also occurs the highest peak of the range: Mount Wilhelm (4,509 m), an extinct volcano with a crater lake. In the framework of the recent expedition of “Our Planet Reviewed Papua-New-Guinea 2012–2013” a transect was carried out on Mount Wilhelm in October–November 2012.

The family Issidae Spinola, 1839 is known from New Guinea by only 6 genera: *Sarima* Melichar, 1903, *Tetrica* Stål, 1866, *Gabaloeca* Walker, 1870, *Hemisphaerius* Schaum, 1850, *Hysteropterissus* Melichar, 1906, and the monotypical genus *Gilda* Walker, 1870 which taxonomic position remains uncertain (Gnezdilov, 2013a). With the new taxa described below, Issidae of New Guinea totalise only 16 species, an obvious underestimated number of the real biodiversity of the group in this area. Moreover, their taxonomic account is also inadequate as recently Gnezdilov (2013b) showed that the genus *Sarima* Melichar, 1903 is apparently an endemic taxon of Sri Lanka and that the generic position of other species described in this genus from other regions, needs to be revised. The same observation is also valid for the genus *Tetrica* Stål, 1866, two species of which are presented in New Guinea. The taxonomic status of these two genera and species included needs further study and deep revision (Gnezdilov, in preparation). Accordingly, we describe below two new species for which we erect a new genus to accommodate them in advance of a more complete taxonomic revision of the genus *Tetrica* and to which we also transfer one of the two species described by Melichar from the island: *Tetrica fasciatifrons*; the second Melichar’s species, *Tetrica suffusa*, actually belongs to another new genus that will be described later with the revision of the genus *Tetrica* sensu lato (Gnezdilov, in preparation).

Material and methods

Specimens were collected by Malaise traps organised for a transect from 200 m to 3700 m on Mount Wilhelm. Four Malaise traps were placed every 500 m between the 16th October and the 1st November 2012 allowing to sample in the different major biotopes observed in New Guinea from the coastal vegetation to the Central Range mountain rain forests (from 1,000 to 3,000 m) that can be further categorised into three broad vegetation zones: 1) the lower mountain forests that extend from 1,000 to 1,500 m elevation; 2) the upper mountain forests (1,500–2,500 m); 3) the high mountain forest (2,500–3,000 m). Above 3,000 m elevation, the high mountain forest yields to remote the Central Range sub-alpine grasslands.

Within the 3353 Hemiptera specimens collected and sorted to morpho-species, only two specimens were Issidae. These two were collected in the coastal zone, 200m, (sampled until mid November 2012) and in the lower mountain rain forest, 1200m.

Morphological terminology follows Anufriev & Emeljanov (1988) and Emeljanov (2001) for head and body, Gnezdilov et al. (2014) for male genitalia, and Bourgoïn (1993) for female genitalia. The type specimens of the described species are deposited in the Muséum national d'Histoire naturelle, Paris, France (MNHN).

Taxonomy

Family Issidae Spinola, 1839

Subfamily Issinae Spinola, 1839

Tribe Issini Spinola, 1839

Papunega Gnezdilov et Bourgoïn, gen. nov.

Type species: *Papunega magnifacies* sp. nov.

Description. Metope wide, with thick subapical transverse carina (Figs 2, 14). Metope convex (visible from above), but in the same time flattened together with clypeus. Lateral margins (keels) of metope raised, slightly leaf-shaped above pedicel. Metopoclypeal suture distinct, complete, widely convex. Pedicel elongate and cylindrical. Coryphe transverse, usually with two large tubercles near its posterior margin besides of median line (Figs 1, 13). Paradiscal fields of pronotum behind the eyes very narrow. No ocelli. Fore wings elongate (Figs 3, 15), weakly narrowing to rounded apices, without hypocostal plate. R 2 M 4–5 CuA 2, with many transverse veins. Hind wings well developed, 3-lobed (Fig. 4). Hind tibia with 2 lateral spines distally and 7 spines apically. First metatarsomere with 2 lateral and 5–7 intermediate (in entire row) spines apically.

Etymology. Generic name is derived from the combination of words "Papua", "New", and "Guinea". Gender feminine.

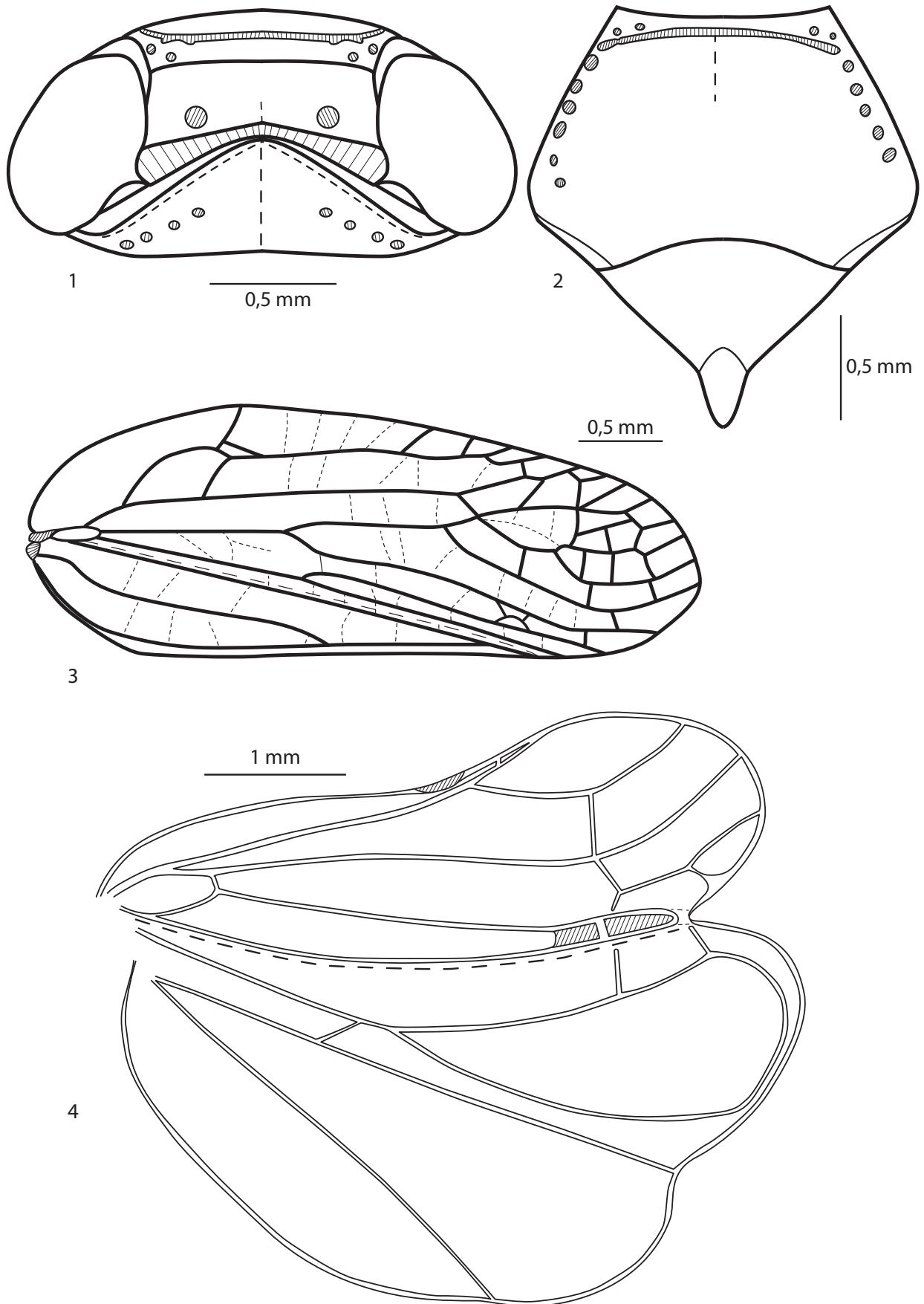
Comparison. Related to the genus *Tetrica* Stål (type species: *Tetrica fusca* Stål, 1870), but distinguished as follows: metope with tiny or without median carina (strong median carina which runs through whole metope (Figs 20, 21) from its upper margin in *T. fusca*); postclypeus without median carina (distinct carina in *T. fusca* (Fig. 21); fore wings without hypocostal plate (present in *T. fusca* (Fig. 22); basal cell of fore wings oval and elongated (wide in *T. fusca* (Fig. 22)).

Papunega magnifacies Gnezdilov et Le Cesne, sp. nov.

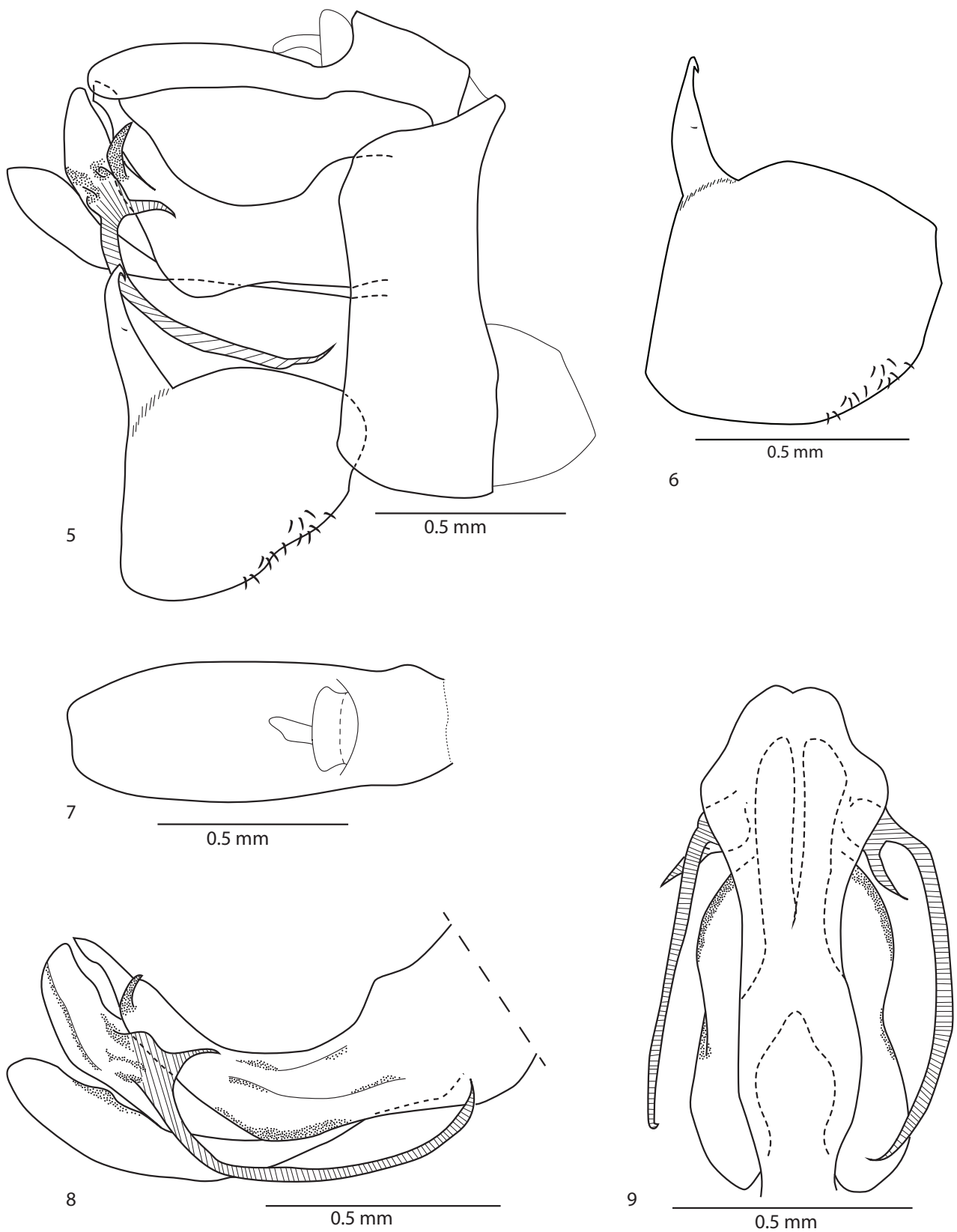
(Figs 1–12)

Type material. ♂, holotype, Papua New Guinea, Wilhelm Mt, 1200 m, 5°44'28"S 145°19'38"E, 25.X.2012, Malaise trap. MNHN(EH) 22060.

Description. Metope wide, particularly above the clypeus, with thick subapical transverse carina and trace of median carina (Figs 2, 12). Metope without sublateral carinae, but with two incomplete sublateral rows of tubercles. Lateral margins (keels) of metope raised, slightly leaf-shaped above the pedicel. Metopoclypeal suture



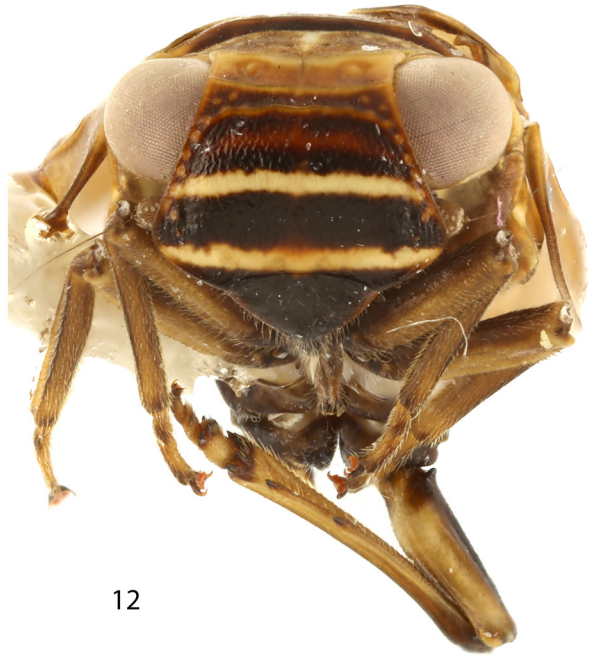
FIGURES 1–4. *Papunega magnifacies* **gen. et sp. nov.** 1—head, pro-, and mesonotum, dorsal view; 2—face; 3—fore wing; 4—hind wing.



FIGURES 5–9. *Papunega magnifacies* **gen. et sp. nov.**, male genitalia. 5—genital segments, in lateral view; 6—gonostyle, in lateral view; 7—anal tube, in dorsal view; 8—penis, lateral view; 9—penis, ventral view.



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12



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FIGURES 10–12. *Papunega magnifacies* gen. et sp. nov., 10—habitus, dorsal view; 11—habitus, lateral view; 12—frontal view.

distinct, complete, widely convex. Postclypeus large. No ocelli. pedicel elongately cylindrical. Coryphe transverse, anterior margin almost straight, posterior margin obtusely angulately concave (Figs 1, 10). Coryphe with two large tubercles near its posterior margin besides of median line. Lateral and posterior margins of coryphe keel-shaped. Rostrum reaching hind coxae. Pronotum longer than mesonotum, with trace of median carina, anterior margin keel-shaped obtusely angulate, posterior margin almost straight. Paradiscal fields of pronotum very narrow behind the eyes. Paranotal lobes of pronotum rather narrow. Mesonotum with weak median and lateral carinae. Tegulae large. Fore wings elongate, slightly narrowing to rounded apices, without hypocostal plate. Basal cell narrowly oval. Radius with 2 branches (furcates near the basal cell), median with 5 main branches (first furcation near wing middle), cubitus anterior with 2 branches (furcates near wing middle) (Fig. 3). Fore wing with many transverse veins in its distal part. Clavus closed (postcubitus + first anal vein joining cubitus posterior before apex of clavus). Hind wings 3-lobed (Fig. 4), with coupling lobe. Posterior branch of cubitus anterior (CuA₃) and CuP terminating in deep clef of wing margin and becoming flattened apically (Fig. 4). Anterior branch of first anal vein (A₁) joining Pcu in middle. Posterior branch of first anal vein (A₁₂) running to weak cleft of wing margin. Hind tibia with 2 lateral spines distally (Fig. 12) and 7 spines apically. First metatarsomere with 2 lateral and 5 intermediate (in entire row) spines apically.

Coloration. General coloration light brown yellowish (Figs 10–12). Metope in frontal view with 4 peculiar bands (from its upper margin to clypeus): first band dark brown with a transverse paler brown band in middle (upper one, between the eyes); second thinner whitish band (between ventral sides of the eyes); from dark brown to black widest third band between antennae; whitish thinner straight fourth band above the metopoclypeal suture (Fig. 12). Postclypeus dark brown to black frontally, with light brown yellowish lateral parts. Anteclypeus totally black. Apices of rostrum and spines of legs black. Fore wings distally with dark brown cells (Figs 10, 11). Hind wings with dark brown veins. Hind coxae with large black spots. Fore and middle trochanters dark brown yellowish. Hind trochanters dark brown to black. Hind femorae with inner surfaces dark brown. Fore and middle legs with third tarsomeres dark brown. Claws of fore and middle legs dark brown. Claws of hind legs brown.

Male genitalia (Figs 5–9). Anal tube elongate, narrow (2.5 times as long as wide medially) in dorsal view (Fig. 7). Anal column short (Fig. 5). Pygofer with slightly concave hind margin in lateral view (Fig. 5). Each dorso-lateral phallobase lobe with a simple short subapical hook-shaped process directed apically (Fig. 8). Aedeagus with pair of furcated ventral hooks directed basally (one long branch almost reaching phallobase bottom and another one short) (Fig. 8). Ventral phallobase lobe wide, enlarged subapically in ventral view (Fig. 9). Gonostyles with straight hind margin; capitulum on long neck; lateral tooth small, apical tooth distinct (Fig. 6).

Total length. Male—5.6 mm.

Etymology. Species name is derived from the combination of Latin "magna" (large) and "facies" (face) referring to the wide metope of the species.

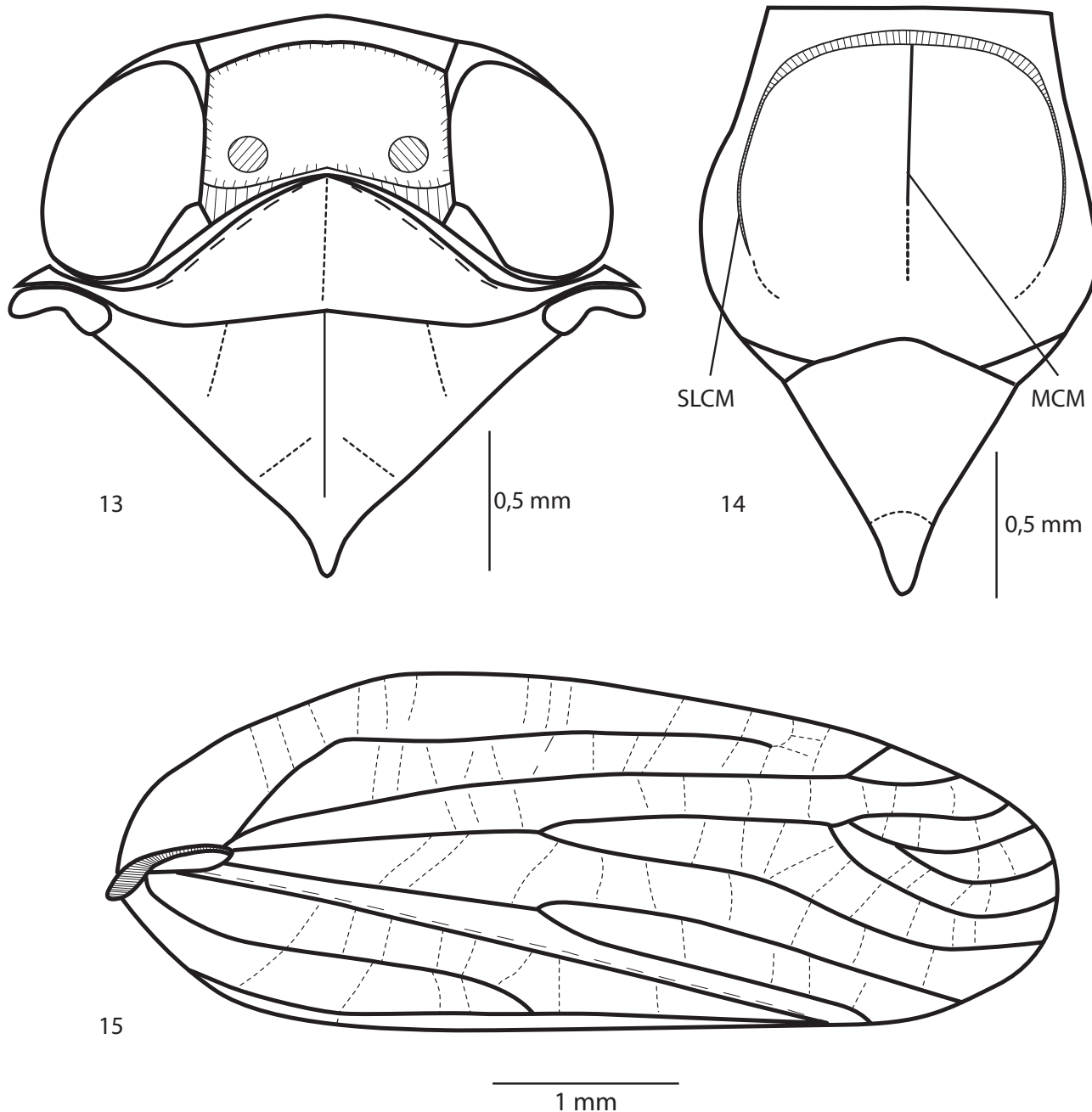
***Papunega armocula* Gnezdilov et Soulier-Perkins, sp. nov.**

(Figs 13–19)

Type material. ♀, holotype, Papua New Guinea, Wilhelm Mt, 200 m, 5°44'28"S 145°19'46"E, 7.XI.2012, Malaise trap. MNHN(EH) 22061.

Description. Metope wide, slightly enlarged above the clypeus, with thick subapical transverse carina and distinct sublateral carinae altogether horseshoe-shaped, also with a tiny median carina reaching almost middle of metope (Figs 14, 19). Median and sublateral carinae not reaching metopoclypeal suture. Two indistinct rows of tubercles between lateral margins (keels) and sublateral carinae of metope present. Lateral margins (keels) of metope raised, slightly leaf-shaped above the pedicel. Metopoclypeal suture complete, distinct. Postclypeus large, with weak medial groove. Pedicel elongately cylindrical. No ocelli. Coryphe transverse, nearly 1.5 times as wide as long medially, anterior margin widely convex, posterior margin obtusely angulately concave (Figs 13, 16). Coryphe with two large tubercles near its posterior margin besides of median line. All margins of coryphe keel-shaped. Pronotum 1.3–1.5 times as long as mesonotum, with weak median carina, anterior margin obtusely angulately convex, keel-shaped, posterior margin slightly concave (Figs 13, 16). Paradiscal fields of pronotum very narrow behind the eyes. Paranotal lobes of pronotum wide. Mesonotum with weak median and lateral carinae. Fore wings elongate, slightly narrowing to rounded apices, without hypocostal plate (Figs 15, 17). Basal cell elongately

oval. Radius with 2 main branches (furcates near to basal cell, posterior branch (R_2) also shortly furcates apically), median with 5 branches (first furcation near wing middle), cubitus anterior with 2 branches (furcates near wing middle). Many transverse veinlets are present between main longitudinal veins. Clavus opened (postcubitus + first anal vein joining cubitus posterior at apex of clavus). Hind wings well developed (3-lobed). Hind tibia with 2 lateral spines distally (Fig. 17) and with 7 spines apically. First metatarsomere with 2 lateral and 7 intermediate (in entire row) spines apically.



FIGURES 13–15. *Papunega armocula* gen. et sp. nov. 13—head, pro-, and mesonotum, dorsal view; 14—face; 15—fore wing. MCM—median carina of metope; SLCM—sublateral carinae of metope.

Coloration. General coloration light brown yellowish (Figs 16–19). Metope in frontal view black between its upper margin and subapical transverse carina; brown below; with a wide median whitish band bordered with darker brown one between sublateral carinae at the level of antennae (Fig. 19). Two tubercles on coryphe, median carina of pronotum, lateral carinae of mesonotum and scutellum, and legs light yellow. Postclypeus brown frontally. Anteclypeus totally brown. Paranotal lobes of pronotum each with large black spot. Fore wings with brown or dark



16



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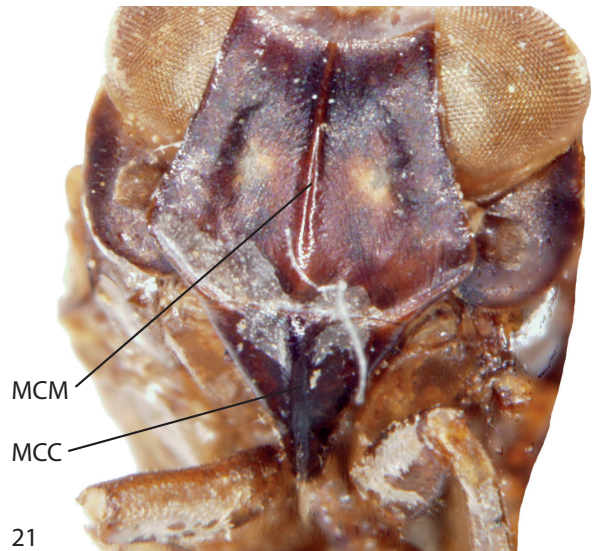


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FIGURES 16–19. *Papunega armocula* gen. et sp. nov. 16—habitus, dorsal view; 17—habitus, lateral view; 18—habitus, ventral view; 19—habitus, frontal view.



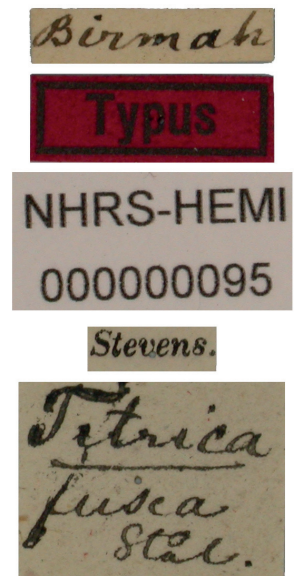
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FIGURES 20–23. *Tetrica fusca* Stål, 1870, holotype. 20—dorsofrontal view; 21—frontal view; 22—habitus, dorsal view; 23—holotype labels. MCC—median carina of clypeus, MCM—median carina of metope.

brown cells disseminated (Figs 16, 17). Hind wings with dark brown veins. Abdominal sternites IV–VI dark brown medially (Fig. 18). Hind margin of sternum VII dark brown. Gonoplasts with dark brown margins. Apices of rostrum and anal tube dark brown. Apices of leg spines black. Apices of third tarsomeres of middle and hind legs and claws of all legs dark brown.

Female genitalia. Hind margin of VII sternum almost straight, weakly convex (Fig. 18). Gonoplasts convex. Anal tube long and narrow. Anal column short.

Total length. 6.2 mm.

Etymology. Species name is derived from Latin “armus” (shoulder) and “oculus” (eye) referring to the large black spots on the paranotal lobes of the pronotum.



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FIGURES 24–25. *Papunega fasciatifrons* (Melichar, 1906), **comb. nov.**, syntype. 24—habitus, lateral view; 25—frontal view.

***Papunega fasciatifrons* (Melichar, 1906), comb. nov.**
(Figs 24, 25)

Tetrica fasciatifrons Melichar, 1906: 298.

Note. The photos of *Tetrica fasciatifrons* syntype (Figs 24, 25) deposited in the Hungarian Natural History

Museum (Budapest, Hungary) were examined. The species is placed in the genus *Papunega* **gen. nov.** as it corresponds to the diagnostic characters of the genus mentioned above.

We do not include currently *Tetrica suffusa* Melichar, 1906 to the genus *Papunega* **gen. nov.** as this species is characterised by coryphe with distinctly convex anterior margin and glib fore wings with multibranched median vein (Melichar, 1906, Fig. 72 and unpublished data of V.M. Gnezdilov). The taxonomic position of this species will be solved later (Gnezdilov, in preparation).

Key to *Papunega* species

1. Metope rather narrow, with distinct sublateral carinae (Figs 14, 19, 25) 2
- Metope rather wide, with no distinct sublateral carinae, with 2 whitish transverse bands (Figs 2, 12)
..... *P. magnifacies* **sp. nov.**
2. Metope with a single whitish transverse band (Fig. 14). Paranotal lobes of pronotum each with large black spot (Fig. 19). Fore wings slightly narrowing apically (Figs 15, 17) *P. armocula* **sp. nov.**
- Metope with 3 whitish transverse bands (Fig. 25). Paranotal lobes of pronotum without black spots. Fore wings distinctly narrowing apically (Fig. 24) *P. fasciatifrons* (Melichar, 1906), **comb. nov.**

Discussion

Planthoppers of New Guinea have been variously studied according to the families, but Issidae has never been reviewed. According to the literature only 14 identified species representing 6 genera have been recorded from New Guinea in the last 140 years (FLOW: Bourgoïn, 2014). Moreover, with only two over 3.353 Hemiptera specimens collected during this project one would think that the results should be congruent with a very poorly represented family in PNG.

However, this is not the case and obviously, many more taxa remain to be described. Firstly because Malaise traps (as light traps) are not the best method to collect issids that use to be trapped in few numbers only by these methods (A. Soulier-Perkins and T. Bourgoïn, unpublished observations), sweeping vegetation remaining in general the best collecting method for this planthopper family. Secondly because just in one other area (4 sites only distant to 25 km from each other) from the lowlands of Madang Province, Novotný and Basset (1998) were able to recognized 14 issid morpho-species (over 3226 specimens collected just from 15 species of *Ficus* trees during one year) showing that one has to expect a much greater diversity of this group and that the only two specimens collected during our project were therefore clearly not representative. Finally because the same conclusion is also reached if one tries to compare the New Guinean issid fauna with the only other well known fauna in this region: the Taiwanese one for which 80 issid species have been reported (Chan & Yang, 1994; Chan et al., 2013). Indeed, based on the surface area occupied by these two islands, the fauna of New Guinea would be known by just 0.7 % (Gnezdilov, 2013a)!

Including the new taxa described above, the issid New Guinean fauna now includes 7 genera with 16 species as follow:

Issidae Spinola, 1839

 Issinae Spinola, 1839

 Issini Spinola, 1839

Sarima Melichar, 1903

Sarima bimaculata Melichar, 1906

Sarima notata Melichar, 1906

Tetrica Stål, 1866

Tetrica suffusa Melichar, 1906

Gabaloea Walker, 1870

Gabaloea retifera Walker, 1870

Papunega Gnezdilov et Bourgoïn **gen. nov.**

Papunega magnifacies Gnezdilov et Le Cesne, **sp. nov.**

Papunega armocula Gnezdilov et Soulier-Perkins, **sp. nov.**

Papunega fasciatifrons (Melichar, 1906), **comb. nov.**

Hemisphaeriini Melichar, 1906

Hemisphaerius Schaum, 1850

Hemisphaerius cervinus Walker, 1870

Hemisphaerius collaris Walker, 1870

Hemisphaerius concolor Walker, 1870

Hemisphaerius lunaris Walker, 1870

Hemisphaerius nigrinus Melichar, 1906

Hemisphaerius nigrolimbatus Melichar, 1906

Hemisphaerius similis Melichar, 1906

Hysteropterissus Melichar, 1906

Hysteropterissus conspergulus Melichar, 1906

Issidae incerta sedis

Gilda Walker, 1870

Gilda vittiventris Walker, 1870

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