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New genus and species of ant-like true bug (Hemiptera: Miridae) from the Canary Islands

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Abstract

Perenotus **gen. nov.** is described based on males and females from the Canary Islands, Spain. This new genus is easily recognized by having a myrmecomorphic appearance and a scutellar hump in both sexes. *Systellonotus stysi* J. Ribes, Pagola-Carte et Heiss, 2008, was described based on females collected in Tenerife and La Palma, but careful examination showed that specimens from each island belong to different species, and can be transferred to the new genus *Perenotus*. As a result, *Perenotus* includes two species, *P. stysi* comb. n. for specimens from Tenerife and *P. malobae* **sp. nov.** for specimens from La Palma. In the present publication *Perenotus* **gen. nov.** and *P. malobae* **sp. nov.** are described, *P. stysi* female is redescribed, and *P. stysi* male is described for the first time. Illustrations of male and female general habitus and genitalia are provided.

Key words: Species delimitation, endemism, taxonomy, myrmecomorphy, Heteroptera, Miridae, Phylinae, Macaronesia, Canary Islands

Resumen

Se describe *Perenotus* **gen. nov.** basándose en ejemplares machos y hembras de las islas Canarias. Este género es fácilmente reconocible porque ambos sexos presentan apariencia mirmecomórfica y una protuberancia o joroba en el escudete. La especie *Systellonotus stysi* J. Ribes, Pagola-Carte et Heiss, 2008, fue descrita a partir de hembras recolectadas en las islas de Tenerife y de La Palma. Después de revisarlos, se concluye que los ejemplares de cada isla corresponden a especies diferentes y que deben transferirse al nuevo género *Perenotus* **gen. nov.** Como consecuencia *Perenotus* **gen. nov.** incluye dos especies: *P. stysi* comb. n. para los ejemplares de Tenerife, y *P. malobae* **sp. nov.** para los ejemplares de La Palma. En este artículo se dan las descripciones de *Perenotus* **gen. nov.** y *P. malobae* **sp. nov.** así como una redescripción de la hembra y la del macho, hasta ahora desconocido de *P. stysi.* Se incluyen las ilustraciones del habitus general y de las genitalias de ambos sexos.

Palabras clave: Delimitación de especies, endemismo, taxonomía, mirmecomorfía, Macaronesia, Islas Canarias, Miridae, Heteroptera, Phylinae

Introduction

The Canary Island archipelago includes seven islands and various islets of volcanic origin situated between 100 and 550 kilometres off the northwest coast of Africa. The short distance to this continent facilitates colonization by North African and Palaearctic species. Within the archipelago, species distribution is partly determined by the proximity to the African continent, and speciation is enhanced by insularity, the reduced genetic flow between the islands and the high habitat diversity in a small geographic extension ranging from arid lowlands to humid subtropical forests and alpine zones. Vicariance patterns between species living in the same kind of habitat is

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another factor that acts as an isolation system generating a high level of endemism (Enghoff & Báez 1993; Emerson 2002).

Systematic study of the Heteroptera from the Canary Islands began at the end of XIX century, and since then several campaigns have taken place, with numerous species described and reported. Most actualized information may be consulted in Aukema *et al.* (2013). Four hundred and thirty four species of true bugs are reported from the Canary Islands (Báez & Zurita 2001; Báez *et al.* 2004; Goula & Mata 2015), with a total of 92 endemic species, including *P. malobae* **sp. nov.**

Myrmecomorphy is a recurrent morphological feature in true bugs that occurs within seven families, although it has probably evolved no less than 20 times (Schuh & Slater 1995). Resemblance to ants in some of the cases is just superficial, though in other cases their quick, furtive movements and palpating antennae make them astonishing ant-like even in their behavior. Some of the best ant mimics are the heterogastrid lygaeoids, various mirids, and most nymphal stages of alydids, whose bodies are very antlike in form (China 1936; Cobben 1986; Dellapé & Melo 2005; Grimaldi & Engel 2005). Usually this phenomenon involves the loss of flight, a feature very frequently related to insularity. The most common condition involving myrmecomorphism is the shortening of wings, the enlargement of the abdomen with a constriction at first abdominal segment, and a modification of the shape of the head, leading to an ant-like habitus. Sometimes the morphological adaptions are enhanced by specific ant mimic color patterns (Schuh & Slater 1995). Concerning myrmecomorphic mirids, in some cases it is evident that they are associated with ants, even with a particular ant species, whereas in other cases, the association cannot be proved.

Material and methods

The study is based on dry specimens collected in the field and by direct observation under stones (M. Roca-Cusachs leg.). In addition, pinned specimens were borrowed from the National Museum of Natural Science (Madrid, Spain), the S. Pagola-Carte (Donosti, Spain) and E. Heiss (Innsbruck, Austria) collections.

Specimens were examined under a Leica MZ160A (10–115X) and a Leica MZ 125 binocular stereoscopes. The male genitalia were treated with a 30% solution of potassium hydroxide in order to dissolve non-sclerotized tissues, rinsed with distilled water and mounted in water-soluble resin on an entomological cardboard. The female genitalia were prepared following the same protocol, but prior to mounting, the genitalia were dyed with black chlorazol to stain less chitinized areas.

All measurements given in the text are in millimetres with decimal numbers according to the presumed accuracy.

Pictures of the habitus were made using a Leica DFC450 camera coupled to a Leica MZ160A binocular stereoscope, combining between 40 and 60 photographs. The images of the male genitalia were made using a microscope Zeiss LabA1AX10 with a coupled camera CMEX5.0 5.0MP. Images were obtained by combining between 20 and 30 photographs. Combination and image processing were made with the Helicon Focus 6.2.2. image-stacking and processing free software. Female genitalia were ink hand-drawn, using a *camera lucida* attached to the Leica MZ160A binocular stereoscope.

Perenotus gen. nov.

Type species. *Perenotus* **gen. nov.** *malobae* **sp. nov.** Roca-Cusachs & Goula 2016

Etymology. The generic name honours Dr. P. Oromí, Professor of Entomology at the Universidad de La Laguna, Tenerife, as a recognition of his many and great contributions to the entomological knowledge of the Macaronesia. The genus name is composed by the combination of Dr. Oromí's Catalan first name (Pere) and the latin adjective—notus (= "known"). Gender is masculine.

Diagnosis. *Perenotus* is diagnosed from other Hallodapini genera based on the following characters: General coloration reddish brown. Ventral and dorsal vestiture composed by thin, semierect, scattered setae. No sexual dimorphism. Male and female myrmecomorphic, micropterous. Rostrum long, reaching base of abdomen.

Metatarsal segment (Mt) I shorter than Mt II. Antennal segment (At) III shorter than At II. At II slightly shorter than At III+ At IV, Antennomers cylindrical, robust, all of them equally thick. Head globose, jugae (mandibular plate), and genae (maxillary plate) not inflated. Eyes oval, distant from both anterior margin of pronotum and antennal tubercle. Front and vertex convex, vertex emarginated. Propleural acetabulae bilobate and laterally protruded. Pronotum ring-shaped, dorsally convex. Scutellum triangular slightly longer than wide, with a distinctive conical hump on posterior half, not surpassing dorsal level of head or pronotum. Micropterous hemelytra lacking membrane, with lateral margins slightly convex, posteriorly divergent and curved upwards, with longitudinal pale stripe along the external margin, missing any transversal pale stripes (Fig. 1).

It was already stated by Ribes *et al.* (2008) and Wyniger (2006) that in dorsal view the gynatrial complex of *P. stysi* **n. comb.** show a general appearance like that of *Systellonotus discoidalis* Horváth, 1894, *S. alpinus* Frey-Gessner, 1871, and *S. triguttatus* (Linnaeus, 1767). However, in *P. stys*i sclerotized rings are more rounded, lateral oviducts are less voluminous, and the U-shaped antero-medial fold lateral oviducts are more similar to the illustration for *Omphalonotus quadriguttatus* (Kirschbaum, 1856) found in Wyniger (2006). In *Perenotus* the most distinctive features are the transversal position of seminal depository, the absence of spermatecal gland, the regularly oval sclerotized rings and the thick U-shaped antero-medial fold.

Discussion. *Perenotus* **gen. nov.** belongs to the Macaronesian fauna, which is composed by endemic Palaearctic and Paleotropic fauna. Hallodapini fauna from the Canary Islands may be identified using Wagner (1974).

Our specimens key to couplet 6(9) in Wagner (1974), which includes *Alloeomimus* Reuter, 1910, *Systellonotus* Fieber, 1858, and part of *Hallodapus* Fieber, 1858 (the part of *Hallodapus* species formerly belonging to *Plagiorrhama* Fieber, 1870, according to Kerzhner & Josifov (1999)). Females of the three genera are either brachypterous or myrmecomorphic, while males are always macropterous. *Alloeomimus* and *Systellonotus* have only transverse pale stripes on the hemelytra. *Hallodapus* species keyed in this point show wide longitudinal irregular pale stripes along the hemelytral external margins. In *Hallodapus* eyes are big and close to the pronotum, scutellum is flat, and general habitus does not match that of *Perenotus*. The rest of Palaearctic Hallodapini genera have transverse pale marks in the hemelytra, thus not fitting the Canarian specimens under study, in which those marks are longitudinal. Compared with *Perenotus*, all myrmecomorphic Hallodapini have much bigger eyes which are close to the pronotum (*Omphalonotus* Reuter, 1876, *Laemocoris* Reuter, 1879), or scutellum is flat (*Omphalonotus*, *Mimocoris* Scott, 1872, females of *Systellonotus* and some *Hallodapus*). In *Alloeomimus*, *Glaphyrocoris* Reuter, 1903, *Linoceraea* Horváth, 1913, *Laemocoris*, *Mimocapsus* and *Ribautocapsus* Wagner, 1962, scutellum is humped as in *Perenotus*. However, in those genera males (and sometimes also females, as in *Alloemimus*, *Glaphyrocoris*), are macropterous, eyes are much bigger and vertex is marginated except in the case of *Alloeomimus* and *Ribautocapsus*.

Schuh (1974) and Linnavuori (1996) provide keys for the identification of African Miridae. Using any of those keys, studied Canarian specimens happen to fall under *Skukuza* Schuh, 1974. However, among other differences, in *Skukuza* the rostrum extends only to the middle coxae, the pronotum is dorsally slightly triangular and the scutellum is flattened, and the male is macropterous. *Aspidacanthus* Reuter, 1901 and *Myombea* China & Carvalho, 1951 are African genera with an apical hump on the scutellum, but the hump shape is different from that in *Perenotus*, head has a distinct neck, rostrum does not reach base of abdomen, pale marks in the hemelytra are not along exterior margin of coria, and male is macropterous.

Generic relationships. Linnavuori (1996) defined several generic groups within African Hallodapini. *Perenotus* **gen. nov.** most probably fits within the African *Systellonotus* generic group, according to the scutellar hump, color pattern, myrmecomorphy, male genitalia, and lack of a stridulatory device.

Distribution. *Perenotus* **gen. nov.** is at present only known from the Canary Islands.

Included species. Currently this genus includes two species, *Perenotus* **gen. nov.** *malobae* **sp. nov.**, *and Perenotus* **gen. nov.** *stysi* comb. n. (Ribes, Pagola-Carte & Heiss 2008).

Ecology. According to the data on the labels, and the authors' personal field observations, genus *Perenotus* seems to have a preference for dry lowlands with *Euphorbia balsimifera* and *Euphorbia canariensis* associations (*Aeonio-Euphorbion canariensis*). In this dry habitat, it is common that ground dwelling species refuge under stones, to protect themselves from hot weather and potential predators.

Proposed key to genus

Though *Perenotus* **gen. nov.** belongs to the African *Systellonotus* group, and its probable origin and sister species are from the African continent, we propose to include it, as it has traditionally been made with Macaronesian fauna, within the Palaearctic species keys, following Wagner's keys to tribe Hallodapini (1974, p. 320). The emendation to the present key is as follows:

1 posterior tarsus with tarsomere I longer than tarsomere II (Fig. 568i). Eyes distant from pronotal anterior margin, neck-like (Fig. 569a) . . . . . *Myrmecomimus* Reuter
- posterior tarsus with tarsomere I shorter than tarsomere II (Fig. 568k–m). 2
2 Antennomere III almost as long as or longer than antennomere II; antennomere II much shorter than ant III+ ant IV. Antennomere III seldom shorter than antennomere II, then eyes separated from anterior margin of pronotum 3
- Antennomere III at most 0.8x length of antennomere II; antennomere II as long as or slightly shorter than ant III+ ant IV . . 7
3 Pronotal calli protruded (Fig. 568f). Sides of the pronotum concave behind [posterior to] calli . . . . . *Omphalonotus* Reuter
- Pronotal calli indistinct. Sides of pronotum concave or not 4
4 Hemelytra with longitudinal pale stripes at margin 5
- Hemelytra with transversal pale stripes 6
5 Scutellum humped. Both sexes myrmecomorphic . . . . . *Perenotus* **gen. nov.** Roca-Cusachs & Goula
- Scutellum flat. Male macropterous, female brachypterous. . . . . *Hallodapus* (part) Fieber
6 Hemelytra with a single transverse stripe . . . . . *Alloeomimus* Reuter
- Hemelytra with two or three transverse stripes. . . . . *Systellonotus* Fieber
7 Antennomeres III and IV distinctly thicker than antennomere I, at least as thick as antennomere II. . . . . *Glaphyrocoris* Reuter
- Antennomeres III and IV thinner than antennomere I, usually thinner than antennomere II . . . . . [point 13 in Wagner's key (p. 321)] …

***Perenotus stysi* (J. Ribes, Pagola-Carte et Heiss, 2008), new combination.**

Systellonotus stysi Ribes, Pagola-Carte, and Heiss 2008: 424, figs. 1–3 (sp. n., diag., descr. (of female), discussion, habitus photos, female genitalia)

Material examined. Type material. (All female) HOLOTYPE: 'TENERIFE / Los Cristianos / 7-II-57 J. de Ferrer' [white, handwritten label] // 'HOLOTYPE / *Systellonotus stysi* **sp. nov.** / J. Ribes, Pagola-Carte / & Heiss, 2008' [red, typewritten label]. PARATYPES: 1. 'Isl. Can., Tenerife / Adeje, Bco. del In- / fierno, 400m, / *Euphorbia cararíensis*/ 9.IV.1992,leg. Zerche' [white, typewritten label].

Male: Tenerife/ San Andrés/ 27. IV. 1930/ Sobre los cardones // MNCN_ENT 146550 // *Perenotus* **gen. nov.** *stysi/* Roca-Cusachs & Goula det. 2016; Barrco. de Tahodio/ (Tenerife) - IV - 1928 // MNCN_Ent 146549 // *Perenotus* **gen. nov.** *stysi/* Roca-Cusachs & Goula det. 2016.

Female: Tenerife/ Aguirre/ 7. V. 1927 // MNCN_ENT 146548 // *Perenotus* **gen. nov.** *stysi/* Roca-Cusachs & Goula det. 2016.

Male description. Length: 3.08–3.50 mm. Body surface shiny. Dorsal coloration brownish red or golden brown, abdomen dark brown. Dorsal vestiture of head, pronotum, scutellum and hemelytra with scattered, pale, short setae, shorter than diameter of anterior tibia. Vestiture of abdomen composed of two types of pilosity: short hairs adpressed to surface, plus semierect, short, uniformly scattered setae, each abdominal segment dorsally with one row of around 10 setae (Fig. 1d–e). Head dorsally almost pentagonal shape, 0.65–0.75 mm long and 0.80–0.81 mm wide. Eyes small and flattened, postocular region rounded and strongly constricted towards pronotal collar. Ocular index = 4.32–4.65 mm. Head in frontal view subtriangular, approximately as high as wide; distant from antennal fossae to inferior margin of eye and base of clypeus equal. Head laterally ovoid, slightly curved gulae, gulae and jugae bearing erect short scattered setae; clypeus slightly protruding and separated from frons by a slight transversal sulcus; maxillary plates small.

Rostrum 1.78–1.84 mm long, reaching base of abdomen, reddish brown. Segment I thick, nearly as thick as antennomere I, its basal half concealed by small inflated bucculae, latter antero-laterally projected, and visible in frontal view; segments II, III and IV thinner than I.

Antennae stout; segment I thick, cylindrical, pale brown; segment II brownish with darker apex, slightly to distinctly arched in its basal half and somewhat enlarged apically; segment III cylindrical, its basal third whitish and apex blackish; segment IV fusiform, long ovate and dark. Antennae covered by dense, short, adpressed pilosity. Length of antennomeres I-II-III-IV = 0.28-1.12-0.595-0.429 (all in mm). Ratio of segments III/II = 0.52.

Pronotum 0.52–0.57 mm long, 0.52–0.55 mm wide, and 1.15–1.2 times as long as scutellum, dorsally globose with rounded lateral margins; collar depressed, flattened. Propleural acetabula bilobate, lobes separate and divergent, laterally protruded, visible from dorsal view. Evaporatory area of metathoracic scent glands very prominent, transverse, ivory-whitish color, with robust peritreme and large orifice bordering the metacoxa.

Scutellum longer than wide, lateral margins slightly convex. Disc with a distinctive acute conical hump on posterior half, as high as the upper level of head and pronotum.

Hemelytra shiny, distinctly surpassing the apex of scutellum, sub parallel at base and then divergent, posterior external apex, angularly shaped and strongly turned upwards. Clavus indistinct. Exocoria with longitudinal translucent whitish band not reaching anterior and posterior apex of coria, contrasting with reddish coloration in central corium. In lateral view, margin of coria convex upwards in first third and concave downwards posteriorly, thus resulting in sinuous profile.

Legs long, slender and concolored with head, pronotum and scutellum except middle and posterior coxae whitish. Femora and tibiae with short, reclining, brownish setae. Short, isolated spines along inner side of posterior tibiae. Length of metatarsus = 0.279 mm; claw of metatarsus = 0.07 mm; length of metatarsal segments I-II-III = 0.097-0.124-0.097 (all in mm.).

Abdomen swollen; coloration brown with darker terminal segments; connexivum reflexed dorsally. Pygophore constricted, as long as half the length of abdomen.

Male genitalia: Both male parameres are about the same size. Left paramere in dorsal view (Fig. 1h): basal process robust, supporting thick body paramer with posterior acute prominence. External surface of paramere body provided with long setae. Sensory lobe short, ending in a sharp point. Apical process wide at base, abruptly narrowing from the middle onwards in a parallel sided expansion. Right paramere (Fig. 1 f, g) very robust and falcated. Basal process and paramere body almost of same width. Apical process not apparent. In the internal view (Fig. 1 f), external profile is notched, while in dorsal view (Fig. 1 g) external profile is continuos. Vesica (Fig. 1 i) tube-like, long and thin, coiled on itself, secondary gonopore is located at base of apical third of vesica, surrounded by a sclerotized ring; inward orientated tooth next to vesical base.

Female Description: Coloration, vestiture, and general habitus as in male; however, middle and posterior tibae are whitish yellow and length is: 3.12–3.78 mm. Original description of "*Systellonotus stysi"* is not to be taken into consideration as it was based on a mixture of samples (see discussion below) (Fig. 1c).

Female genitalia shown in Fig. 2. Most distinctive features are transverse seminal depository, the absence of spermathecal gland, the regularly oval sclerotized rings and the thick U-shaped antero-medial fold.

Distribution. At present only known from to the island of Tenerife.

Discussion. *Perenotus stysi* (Ribes, Pagola-Carte & E. Heiss 2008) was described on a mixture of female specimens, one from La Palma and two from Tenerife. The study revealed that all specimens belong to the new genus *Perenotus*, but each island hosts a different species. *Perenotus stysi* includes only the specimens from Tenerife Island. Therefore, La Palma specimens are transferred to *P. malobae* **sp. nov.**, described below.

Perenotus malobae sp. nov. Roca-Cusachs & Goula 2016

Type locality. Canary Islands, La Palma, Garafia, Costa Juan Adalid.

Material examined. Type material. [female] HOLOTYPE: Costa Juan Adalid/ Garafia, La Palma/ Canarias. 25 May 2014/ Roca-Cusachs leg./ cardonal-tabaibal dulce // *Perenotus* **gen. nov.** *malobae* **sp. nov.** / Roca-Cusachs & M. Goula det. 2016// MNCN_Ent 157856

[All females]: 1, 'La Palma / Volcán Martín / VIII-86 / P. Oromí' [white, handwritten label] / 'PARATYPE / 1, *Systellonotus stysi* **sp. nov.** / J. Ribes, Pagola-Carte / & Heiss, 2008' [red, typewritten label]. // *Perenotus* **gen. nov.** *malobae* **sp. nov.** / Roca-Cusachs & Goula det. 2016.

Etymology. This species is dedicated to Marta López-Balcells, first author's mother, as recognition for all her unconditional help, patience and support. The specific epithet is composed of the first two letters of the first name (ma) and the two family names (lo/ba) of the honoured person. Gender is female.

Description. Length: 3.363 mm. Body surface shiny. Dorsal coloration brownish red, abdomen darker brown. Dorsal vestiture of head, pronotum, scutellum and hemelytra of erect, pale, long setae, as long as diameter of anterior tibia. Dorsal vestiture of abdomen of semi-erect, stout, pale, uniformly scattered setae, twice as long as diameter of anterior tibia, arranged in more than one row of setae on each abdominal segment of circa 20 setae per row (Fig. 1a–b).

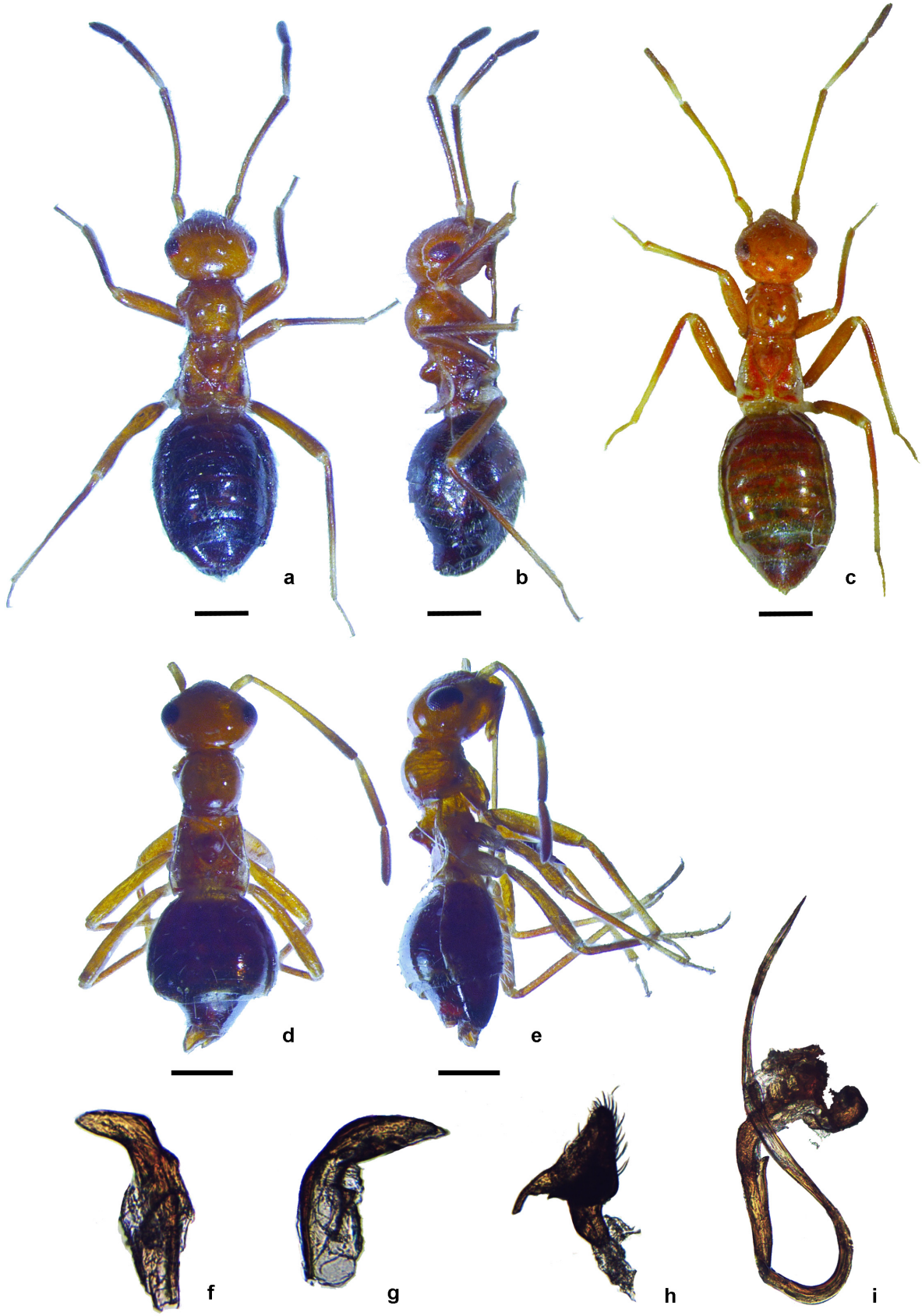

FIGURE 1. *Perenotus* **gen. nov.** a, *P. malobae* **sp. nov.** female holotype dorsal habitus; b, *P. malobae* **sp. nov.** female holotype lateral habitus; c, *P. stysi* female paratype dorsal habitus; d, *P. stysi* male dorsal habitus; e, *P. stysi* male lateral habitus; f, *P. stysi* male left paramere in frontal view; g, *P. stysi* male left paramere in dorsal view; h, *P. stysi* male right paramere; i, *P. stysi* male theca. Scale bar 0.5 mm. Photographs: M. Roca-Cusachs.

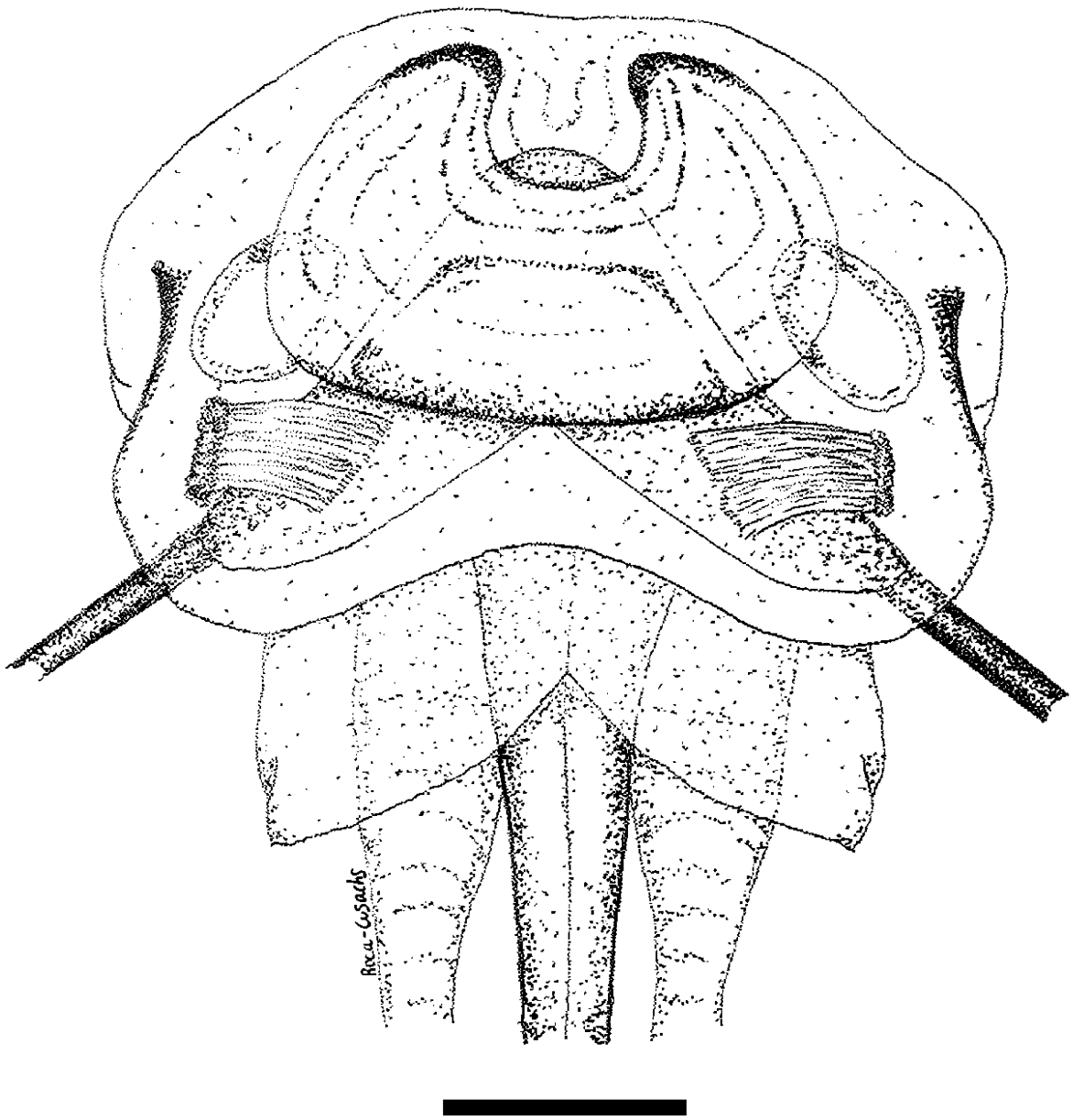

FIGURE 2. *Perenotus stysi* **n. comb.** female genitalia. Scale bar 0.2 mm.

Head dorsally pentagonal, globose, 0.67 mm long and 0.93 mm wide. Eyes small and flattened, postocular region rounded and strongly constricted towards pronotal collar. Ocular index = 5.86. Head in frontal view subtriangular and slightly higher than wider; antennal fossae equally distant from the inferior margin of eye and the base of clypeus. Head in lateral view ovoid, gulae slightly curved; gulae and jugae bearing erect setae; clypeus weakly protruding and separated from frons by a weak transversal sulcus; maxillary plates small.

Rostrum brownish red in color, reaching base of abdomen. Segment I thick and nearly as wide as antennomere I, base concealed by inflated small bucculae, latter antero-laterally projected and visible in frontal view; segments II, III and IV thinner than rostromere I.

Antennae stout; segment I thick, cylindrical, brown; segment II brownish with darker apex, slightly to distinctly arched in basal half and somewhat enlarged apically; segment III cylindrical, basal third whitish and apex blackish; segment IV fusiform, long ovate and dark. Antennae covered by erected brownish setae as long as diameter of antennomers. Length of antennal segments I-II-III-IV = 0.27-1.09-0.56-0.43 mm. Ratio of segments III/II = 0.53.

Pronotum 0.62 mm long and 0.612 m wide, 1.2 times as long as wide and 1.53 times as long as scutellum,

dorsally globose with rounded lateral margins; anteriorly and posteriorly slightly constrained as a collar. Propleural acetabulae bilobate, laterally protruded, visible from dorsal view; acetabular lobes contiguous but not fused.

Scutellum triangular, 0.41 mm long, 0.49 mm wide, lateral margins slightly convex, disc with a distinctive conical blunted hump on posterior apex of scutellum, as high as upper level of head and pronotum. Evaporatory area of metathoracic scent gland very prominent, transversal, ivory-whitish in color, with a robust peritreme and a large orifice bordering the metacoxa.

Hemelytra shiny, smooth, distinctly surpassing the apex of scutellum, sub parallel at base and then divergent, posterior external apex right-angle-shaped and strongly turned upwards. Hemelytra 0.63 mm long and 0.74 mm maximal width. Clavus indistinct. Exocoria with longitudinal whitish band, anteriorly narrow, and posteriorly widening, not reaching posterior apex of coria. In lateral view, margin of coria sinuated.

Legs long, slender and concolored with head, pronotum and scutellum except whitish apex of middle coxa and posterior coxa completely whitish. Tibiae and femora with long, erect, scattered, brownish setae. Length of metatarsus = 0.4 mm; claw of metatarsus = 0.07 mm; length of metatarsal segments I-II-III = 0.16-0.1-0.18 (all measures in mm).

Abdomen swollen; coloration brown with darker terminal segments; connexivum reflexed dorsally.

Female genitalia illustrated in Ribes *et al.* (2008).

Male remains unknown.

Distribution. At present only known from to the island of La Palma.

Discussion. *P. malobae* **sp. nov.** includes one paratype female specimen from La Palma used by Ribes *et al.* (2008) to describe *P. stysi* (Ribes, Pagola-Carte & Heiss 2008). After revision of new material from La Palma, it is clear that all *Perenotus* specimens from La Palma belong to *P. malobae* **sp. nov.** Figure of female genitalia of *P. malobae* **sp. nov.** may be consulted in Ribes *et al*. (2008).

Key to *Perenotus* gen. nov. species

1 Dorsal vestiture composed by long scarce setae shorter than the diameter of anterior tibiae. Antennae with adpressed vestiture, shorter than diameter of antennomere. Abdomen covered by short adpressed setae plus long scattered setae arranged in one row of setae per segment, each row approximately 10 setae. Posterior angle of coria acute. Lobes of propleural acetabulae separated and divergent . . . . . *P. stysi* **n. comb.** (J. Ribes, Pagola-Carte *&* Heiss, 2008).

- Dorsal vestiture composed by long scarce setae twice as long as diameter of anterior tibiae. Antennae with scattered erected setae, as long as diameter of antennomere. Abdomen covered only by long setae organized in several rows of setae per segment, each row approximately 25 setae. Posterior angle of coria square. Lobes of propleural acetabulae contiguous but not fused . . . . . *P. malobae* **sp. nov.** Roca-Cusachs & Goula

Discussion and conclusion

According to the first author's one-year field research in La Palma Island, *Perenotus* is not an abundant taxon. Under-stone collecting was preeminent in his work, and only one specimen came to light. Its high resemblance to ants may be one reason, that it has been overlooked by hemipterists, and furthermore myrmecology is poorly developed in Canary Islands. Therefore, the real number of *Perenotus* species, and their distribution among the islands, is still to be unveiled.

Though being so close to the African continent and so far apart from Europe, the Macaronesian species belong mainly to European Palaearctic genera. However, some Macaronesian species are present also and only on African continent (i.e. the lygaeid *Marmottania simonis* Puton, 1887), or endemic Macaronesian species are related to African genera (i.e. the coreid *Cercincthus elegans* (Brullé, 1884)). *Perenotus* is a new exemple of Macaronesian elements related to African taxa, supporting that African taxa are also very important in this biogeographic area.

In order to delimit the species diversity from an integrative taxonomical point of view (Dayrat, 2005), more studies are needed on behavior, comparative morphology, development, ecology, genetics, and biogeography of Heteroptera.

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