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Revision of *Xyalophora* Kieffer and description of *Xyalophoroides* gen. n. (Hymenoptera: Figitidae: Figitinae)

MAURICIO JIMÉNEZ, JORDI PARETAS-MARTÍNEZ and JULI PUJADE-VILLAR

Universitat de Barcelona, Facultat de Biología, Departament de Biología Animal, Avda. Diagonal 646, 08028-Barcelona, Spain; e-mail: pujade@porthos.bio.ub.es

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Abstract. The genus *Xyalophora* (Giraud, 1860) is revised herein. The revision includes the type species of *Xyalophora* (*Figites clavatus* Giraud, 1860), the type material and the original descriptions of all the species of *Xyalophora* included in the Weld catalogue, and long series of undetermined material. *Xyalophora clavata* (Giraud, 1860) and *X. singularis* (Ashmead, 1896) are the only currently recognized species that should be included in *Xyalophora*. Four new species are described: *X. belizini* sp. n., *X. giraudi* sp. n., *X. provancheri* sp. n. and *X. zarazagai* sp. n. The type species of *Ceraspidia*, *Ceraspidia japonica* Belizin, 1952, corresponds to males of a species within *Xyalophora*. Thus, *Ceraspidia* is a new synonymy of *Xyalophora*, which results in *Xyalophora japonica* comb. n. *Xyalophora impatiens* (Say, 1836) and *Xyalophora picea* (Spinola, 1853) being considered like incertae sedis, as the latter does not belong to the Figitinae but to the Eucoilinae and is probably a species within *Acantheucoela* Ashmead, 1900. *Xyalophora aciculata* Benoit, 1956 is transferred to the genus *Figites* Latreille, 1802: *Figites aciculata* comb. n. *Xyalophora leviventris* Kieffer, 1908 is a synonym of *Xyalophora quinquelineata* (Say, 1836), which is transferred to *Xyalophoroides* gen. n., a new genus here described. The differences between all the genera of Figitinae with a scutellar spine are discussed and illustrated.

INTRODUCTION

The Figitinae are a cosmopolitan subfamily belonging to the Figitidae (Hymenoptera: Cynipoidea), a family that is biologically characterized as being parasitoids of the larvae of other insects, principally Diptera Cyclorrhapha (Ronquist, 1999). Two large morphological groups can be differentiated inside the Figitinae, according to the presence or absence of a scutellar spine (Weld, 1952). The systematics of the Figitinae with a scutellar spine has always been problematic, with four genera (*Neralsia*, *Xyalophora*, *Xyalosema* and *Solenaspis*) in a state of taxonomic chaos.

Neralsia was created by Cameron (1883) to include a species from Guatemala, *N. rufipes* Cameron, 1883, described as having a closed radial cell. Ashmead (1887) described the genus *Solenaspis* to include a North American species of Figitinae with a open radial cell, *S. hyalinipennis*. This generic name was preoccupied by a genus of Syrphidae (Diptera) described by Osten-Sacken (1881). Due to this, Dalla Torre & Kieffer (1910: 94–95) created the genus *Xyalosema* to include the two species of Cynipoidea previously described as *Solenaspis* (*Xyalosema hyalinipennis* and *X. singularis*). Weld (1930) studied the type species of *Neralsia*, *N. rufipes*, and noticed that this species has a open radial cell, not closed as cited in the original description (Cameron 1883); for this reason, he synonymized *Xyalosema* to *Neralsia* and transferred all the species of X*yalosema* to *Neralsia*, except *Xyalosema singularis* (Ashmead, 1896), which was transferred to *Xyalophora* Kieffer, 1901. *Xyalophora* was described by Kieffer (1901) to include a European species of Figitinae, *Figites clavatus* Giraud, 1860 (now *Xyalophora clavata*); the original description indicates that this species has a scutellum with a longitudinal sulcus and a distal spine, and pubescent eyes, in contrast to *Neralsia* (= *Xyalosema*). This erroneous description (see redescription of *X. clavata* below), together with the fact that *Neralsia* is considered by Dalla Torre & Kieffer (1910) to be a member of the Aspicerinae, confused several authors studying American species of *Xyalophora*.

All this chaos was tackled by Weld (1930, 1944, 1952), who accepted as valid only the genera *Neralsia* and *Xyalophora* (without studying the types of the different species) and transferred all the American species of *Xyalophora* to *Neralsia*. After these studies by Weld, apart from the type species, the only species that were still included in *Xyalophora* were *Xyalophora albipennis* Kieffer, 1909, *Solenaspis singularis* Ashmead, 1896 (transferred in Weld, 1930), *Diplolepis 5-lineata* Say, 1836 (in Weld, 1944) and three dubious species: *Figites impatiens* Say, 1936, *Figites picea* Spinola, 1853, and *Xyalophora leviventris* Kieffer, 1908 (all three in Weld, 1952). Finally, Hellén (1937) described *Figites* (*Xyalophora*) *dentiscuta* and Benoit (1956) described *Xyalophora aciculata*; Weld (1952) considered both species as valid *Xyalophora* species. Hellén himself in a later work (1958) considered his own "*dentiscuta*" as a species of *Figites* and not *Xyalophora* (which he at that time recognised as a distinct genus, not a subgenus of *Figites*). *Xyalophora albipennis* was recently transferred to *Neralsia* by Jiménez et al. (2005b). In summary, the genus *Xyalophora* contains 7 species: *Xyalophora clavata*, *X. singularis*, *X. quinquelineata*, *X. impatiens*, *X. picea*, *X. leviventris* and *X. aciculata*. All are studied in this revision.

In addition, Belizin (1952) erected the genus *Ceraspidia* Belizin, 1952 to include a Japanese species with scutellar spine: *C. japonica* Belizin, 1952. This genus is included by Ronquist (1999) in the Aspicerinae, but a recent study of Ros-Farré (2007) concludes that *Ceraspidia* belongs to the subfamily Figitinae. Thus, currently the Figitinae with a scutellar spine are represented by 3 genera: *Neralsia*, *Xyalophora* and *Ceraspidia*.

In this paper, after examining long series of undetermined *Xyalophora* and studying the type material of *Ceraspidia* and *Xyalophora*, the status of these genera and the species mentioned above is resolved. The consequences of this revision are: (1) the description of *Xyalophoroides* gen. n., which includes a species transferred from *Xyalophora*, (2) the synonymy of *Ceraspidia* with *Xyalophora*, and (3) the description of four new species of *Xyalophora*. The differences between the genera of Figitinae with a scutellar spine (*Neralsia*, *Xyalophora* and *Xyalophoroides* gen. n.) are discussed and illustrated, and figures and descriptions of all the species included in *Xyalophora* and *Xyalophoroides* gen. n. are presented.

MATERIAL AND METHODS

The unidentified material was loaned, mostly, from the Canadian National Collection of Insects (CNCI, Ottawa, Canada), the United States National Museum of Natural History (USNM, Smithsonian Institution, Washington DC, USA), the California Academy of Sciences (CASC, San Francisco, California, USA), the Museo de la Plata (MLPA, La Plata, Argentina) and the Museo Entomológico de León (UNAN, León, Nicaragua). Part of this material has been deposited in the Pujade-Villar collection and is indicated as UB (Universitat de Barcelona, Barcelona, Spain) in the material studied. The types of *Figites clavatus* Giraud, 1860, deposited in MNHN (Muséum National d'Histoire Naturelle, Paris, France), *Xyalophora leviventris* Kieffer, 1908, and *Xyalophora armata* var *nigricornis* Kieffer, 1907, deposited in CASC, *Solenaspis singularis* Ashmead, 1896, deposited in USNM, *Xyalophora aciculata* Benoit, 1956, deposited in MRAC (Musée Royal de l'Afrique Centrale, Tervuren, Belgium) and *Ceraspidia japonica* Belizin, 1952, deposited in ZIN (Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia) were also studied.

The terminology of the morphological structures comes from Gibson (1985) and Ronquist & Nordlander (1989); sculptural terminology from Harris (1979). The measurements and abbreviations used include: F1–F11, first and following flagellomeres; POC (postocellar distance) is the distance between the internal margins of the posterior ocelli; OOC (ocello-ocular distance) is the distance between the external margin of the lateral ocellus and the internal margin of the compound eye; COC (ocellar distance) is the distance between the lateral and frontal ocelli; the diameter of the lateral ocellus is its greater diameter; the transfacial line is the distance between the internal margin of the compound eyes measured at the level of the antennal sockets (toruli). The relation between the scutellum (spine included) and the spine is measured in its dorsal projection.

The features mentioned in the descriptions are present in both sexes; the differences present in the males are indicated in the subheading "Males" of the description; the morphological characters of the male antenna are not relevant to the diagnosis so they are not detailed in each species, only in the generic description.

Scanning electron microscopy (SEM) images were taken on a Leica 360 SEM, at low voltage (700 V) without gold coating in order not to damage the specimens. The images are available from the databank www.morphbank.com.

Thirteen taxa of Figitinae were studied in the phylogenetic analysis, including all the *Xyalophora* species, four *Neralsia* species in order to cover its intrageneric variability, and the only species of *Xyalophoroides* gen. n.; *Amphitectus areolatus* (Hartig, 1840), a figitine without a scutellar spine, was included as an outgroup. The analysis was based on a data matrix of 14 characters (Appendix 1); multistate characters were marked as additive only if the states appeared to form a linear transformation series (characters 1, 3, 8). The analysis was run using uniformly weighted parsimony with TNT v. 1.1. The heuristic search was conducted with 1000 replications and the support of the branches was calculated using jacknife analysis.

RESULTS AND DISCUSSION

The examination of long series of undetermined specimens of *Xyalophora* and the study of the type material of all the species included within *Xyalophora* and *Ceraspidia*, together with the previous studies on *Neralsia* (Jiménez et al., 2005b, c, 2006; Pujade-Villar et al., 2006), reveals several things:

(1) *Xyalophora aciculata* Benoit, 1956 corresponds to *Figites*: *Figites aciculata* (Benoit, 1956) comb. n.

(2) *Ceraspidia japonica* Belizin, 1952 corresponds to the males of *Xyalophora*: *Xyalophora japonica* (Belizin, 1952) comb. n.

(3) *Xyalophora leviventris* Kieffer and *X. quinquelineata* (Say) are synonyms, resulting in only one valid species: *X. quinquelineata* (Say) (see redescription and comments on the synonymy below). This species has some characters present in *Xyalophora* but not in *Neralsia*, and vice versa (Table 1). The combination of characters makes the assignment of this species to any of the two genera impossible. Furthermore, *X. quinquelineata* has three unique characters, not present in either *Xyalophora* or *Neralsia*: (1) radial cell half open, (2) forewing glabrous, without setae, and (3) F1 in male antenna longer than F2. These characters, together with the mixture of characters of *Xyalophora* and *Neralsia*, justify the erection of a new genus, *Xyalophoroides* gen. n., to include this species: *Xyalophoroides quinquelineata* comb. n. Phylogenetic analysis confirms the erection of the new genus (Fig. 8, see comments following the descriptions). The unique apomorphy of this new genus is the glabrous forewing (see details in the diagnosis of *Xyalophoroides* and the redescription of *X. quinquelineata* below).

(4) Some characters mentioned by Weld (1952) to differentiate *Neralsia* and *Xyalophora* are inconsistent (Jiménez et al., 2005a), and some new characters must be used to differentiate these genera and *Xyalophoroides* gen. n. The characters used to define these three genera are detailed in Table 1 and in the descriptions. These are the same characters that constitute the data matrix (Appendix 1) used for the phylogenetic analysis. A key to differentiate the three genera follows the descriptions.

TABLE 1. Characters used to define and differentiate *Xyalophora*, *Xyalophoroides* and *Neralsia*.

	Xyalophora	*Xyalophoroides*	*Neralsia*
Sculpture in face of the males	present in all the face	two big smooth areas	two big smooth areas
Sculpture in face of the females	homogeneous	with radiating carinae	with radiating carinae
F1 in male antenna	clearly shorter than F2	longer than F2	only slightly shorter or subequal to F2
Last segment of female antenna	variable	as wide as previous segments	as wide as previous segments
Sculpture in occiput	with strong and continuous carinae	only some discontinuous carinae in the dorsal area	only some discontinuous carinae in the dorsal area
Internal surface of notauli	with sculpture	without sculpture	without sculpture
Sculpture in scutum	present in the entire scutum/only in areas adjacent to notauli	absent	absent
Interfoveal carina	below foveae level	at the same level	at the same level/above the foveae level
Sculpture in scutellum	rugose	rugose	carinate
Length of scutellar spine	variable	at most 1/10 of scutellum	at least 1/3 of scutellum
Sculpture on mesopleura	strongly striated and irregular in anterior area	with fine strigae	with fine strigae
Metasomal T1	without longitudinal carinae	with longitudinal carinae	with or without longitudinal carinae
Forewing surface	with setae	glabrous	with setae
Radial cell	closed	half open	open

(5) The only described species that remain within *Xyalophora* are: *X. clavata* (from Europe), *X. japonica* comb. n. (from Japan) and *X. singularis* (from USA).

(6) Four new species of *Xyalophora* are described and a key to all *Xyalophora* species is provided.

Descriptions

Figites aciculata (Benoit, 1956) comb. n.

Xyalophora aciculata Benoit 1956: 377.

Examination of the type material reveals that this species does not have a scutellar spine, though it was said to have one in the original description (Benoit, 1956: 378). Actually, the scutellum is margined laterally and the posterior margin is curved upwards, a state that occurs in some species of *Figites*. The absence of a scutellar spine and of transverse sculpture inside the notauli, and the presence of strigae on the metasomal tergum II, makes it clear that *X. aciculata* must not be included in *Xyalophora.* It cannot belong to *Xyalophoroides* gen. n., either, not only because it lacks the scutellar spine but also because the radial cell is completely closed in *X. aciculata*. Thus, we conclude that *X. aciculata* must be transferred to *Figites*, which results in *Figites aciculata* (Benoit, 1956) comb. n.

Genus *Xyalophoroides* Jiménez & Pujade-Villar, gen. n.

Type species: *Diplolepis quinquelineata* Say, 1836: 267; by present designation.

Diagnosis

Xyalophoroides gen. n. can be distinguished from the other two genera of Figitinae with a scutellar spine by the radial cell half open (completely open in *Neralsia*, completely closed in *Xyalophora*), the forewings glabrous (all the species of *Neralsia* and *Xyalophora* have abundant setae on the wing margin and at least some setae on the blade) and the male antenna with F1 longer than F2 (F1 shorter both in *Neralsia* and *Xyalophora*). In addition, it is differentiated from *Neralsia* by its scutellum always rugose, ending in a very short spine, at most 1/10 of the total length of the scutellum, interfoveal carinae always at the same level as the foveae, mesopleura completely striated, strigae strong, and male antenna with F1 larger than the rest of segments. *Xyalophoroides* gen. n. can be distinguished from *Xyalophora* by its mesoscutum without sculpture, an occiput irregularly carinated, and a metasomal tergum II striated at the base; in addition, the females of *Xyalophoroides* gen. n. have moniliform antennae and the males have two smooth areas on the face; this is not the case in *Xyalophora*.

Description

Coloration black. Face of the females (Fig. 1h) with irregular carinae that emanate from clypeus or centre of face towards toruli; surface around eyes coriaceous; interocellar space smooth; genal sulcus present and strongly costulate; occiput with strong irregular carinae (Fig. 2h). Face of male same as females except for two smooth areas (Fig. 7e). Female antennae shorter than body, moniliform, with 13 segments; male antennae much longer than body, filiform and with 14 segments. Pronotal plate weakly incised dorsally; lateral areas of pronotum (Fig. 4h) with sharp carinae in antero-ventral and dorsal part, rest of pronotum smooth. Mesopleura completely sculptured, with broad carinae, transverse, continuous and parallel (Fig. 4h). Scutum (Fig. 5h) smooth; median sulcus of scutum clearly defined, internal surface smooth;

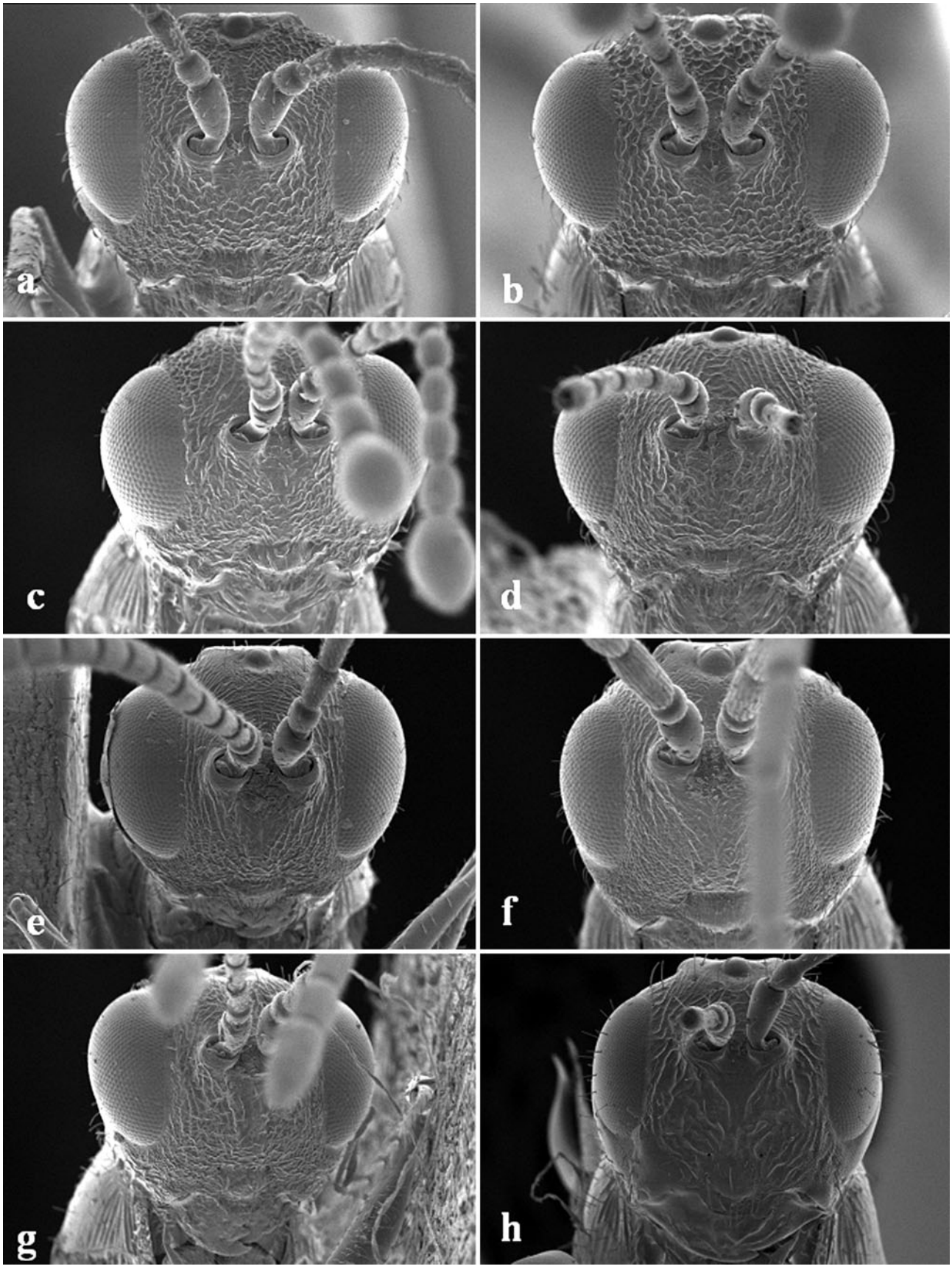

Fig. 1. Head in frontal view of: (a) *Xyalophora clavata*, (b) *X. japonica*, (c) *X. zarazagai* sp. n., (d) *X. provancheri* sp. n., (e) *X. belizini* sp. n., (f) *X. singularis*, (g) *X. giraudi* sp. n. and (h) *Xyalophoroides* gen. n.

notauli percurrent, internal surface smooth. Scutellar disk slightly humped, posterior margin with very short spine (Fig. 4h); scutellar disk (Fig. 5h) with irregular carinae; scutellar foveae (Fig. 5h) with carinae inside and separated by an interfoveal carina at same level as foveae (in lateral view). Tarsal claw simple, long and very arcuate. Forewings glabrous on margin and blade; radial cell half open, areolet absent. Metasoma oval in females, truncated in males; metasomal tergum I finely and densely carinate, metasomal tergum II densely and uniformly carinate at base (Fig. 7c); metasomal tergum III mostly smooth and punctate distally; metasomal tergum VIII with posterior margin concave in lateral view.

Taxonomic comments

Xyalophoroides gen. n. was erected to accommodate the single (type) species. *Figitodes* Ashmead, 1887 is not usable. It was proposed by Ashmead (1887: 150) with no mention of any species. The first species included in this genus was *Figitodes atricornis* Ashmead, 1896, which therefore becomes the type species. Later, Ashmead (1903: 11) erroneously stated that the type species of *Figitodes* was *Figites 5-lineatus* (Say). This error was repeated by Dalla Torre & Kieffer (1910: 98) and was also accepted by Rohwer and Fagan (1917: 367). Weld (1921: 436–7) definitively corrected this mistake. The type species of *Figitodes*, *Figitodes atricornis* (spelled erroneously as *Figites atricornis* in 1910 by Dalla Torre & Kieffer, obviously a typographic mistake), was placed by Dalla Torre & Kieffer (1910: 77) in *Trischiza* Förster, 1869, and *Figitodes* thus becomes a synonym of *Trischiza*. *Xyalophoroides* gen. n. includes one species: *Xyalophoroides quinquelineata* (Say, 1836) comb. n.

Etymology. Related to the genus *Xyalophora*. Gender feminine.

Biology

Xyalophoroides gen. n. is a parasitoid of Diptera: Cyclorrhapha (Sarcophagidae, Muscidae) specifically in cow dung.

***Xyalophoroides quinquelineata* (Say), comb. n.**

Diplolepis 5-lineata Say, 1836: 267, ♂.
Figites quinquelineatus; Provancher, 1881: 258, ♂♀.
Onychia quinquelineata; Ashmead, 1885: 298.
Aspicera quinquelineata; Provancher, 1888: 437.
Figitides quinquelineata; Cockerell, 1899: 213 [typographic mistake].
Figitodes quinquelineata; Ashmead, 1903: 11.
Aspicera quinquelineata; Dalla Torre & Kieffer, 1910: 53, 57.
Xyalophora quinquelineata; Weld, 1944: 60.
Xyalophora leviventris Kieffer, 1908: 64, ♂ syn. n. (type examined).
Xyalophora armata var. *nigricornis* Kieffer, 1907: 157 (synonymyzed in Weld, 1951: 598) (type examined).

Description

Coloration. Black. Antennae dark brown. Legs and ventral area of metasoma reddish.

Head. Face of the females (Fig. 1h) with irregular carinae that emanate from clypeus or centre of face towards toruli; surface around eyes coriaceous; intercellar space smooth; genal sulcus present and strongly costulate; occiput with strong irregular carinae (Fig. 2h). Face of males same as females except for two big smooth areas below toruli (Fig. 7e).

Antennae. Female with F1 1.3 times longer than F2, last segments 1.4 times longer than wide. Males with F1 slightly larger than following segments.

Mesosoma. Pronotal plate weakly incised dorsally; lateral areas of pronotum (Fig. 4h) with sharp carinae in antero-ventral and dorsal part, rest of pronotum smooth. Mesopleura completely sculptured, with broad carinae, transverse, continuous and parallel (Fig. 4h). Scutum (Fig. 5h) smooth; median sulcus of scutum clearly defined, internal surface smooth; notauli percurrent, internal surface smooth. Scutellar disk slightly humped, posterior margin with a very short spine (Fig. 4h), 1/8–1/10 of total length of scutellum; scutellar disk (Fig. 5h) with irregular carinae; scutellar foveae (Fig. 5h) with carinae inside and separated by an interfoveal carina at same level as foveae (in lateral view).

Forewings (Fig. 6j). Glabrous, no setae on wing margin and blade; even if a number of dots can be seen on the wing blade that resemble sockets of broken setae, all specimens of *X. quinquelineata* lack completely setae on the forewings. Radial cell half open, 1.7 times longer than wide, length of vein R1 along the forewing margin reaching half way the width of the cell or beyond; areolet absent.

Metasoma. Metasoma oval in females, truncated in males; metasomal tergum I finely and densely carinate, metasomal tergum II densely and uniformly carinate at base (Fig. 7c); metasomal tergum III mostly smooth and punctate distally; metasomal tergum VIII with posterior margin concave in lateral view.

Variability. The length of vein R1 along the forewing margin is variable. Depending on the specimens, R1 can cover only 1/3, ½ or even ¾ of forewing margin of radial cell. The scutellar spine is also variable. In all the specimens it is short, but its shape, size and length is variable. Nevertheless, scutellar spine length is always 1/8–1/10 of total length of scutellum. The variation observed in these characters is considered here as intraspecific variation. We have not been able to separate groups of specimens with completely different morphological models. For this reason, previous to the erection of the new genus, *Xyalophora leviventris* was synonymyzed to *X. quinquelineata* after examining hundreds of undetermined specimens (see studied material below).

Taxonomic comments

The taxonomic history of *Diplolepis quinquelineata* has been contentious. This species has been included in the genera *Figites*, *Onychia*, *Aspicera* and *Figitodes*. Of these, only *Figites* belongs to the Figitinae (*Aspicera* belongs to the Aspicerinae; *Onychia* and *Figitodes* are not valid genera). *Diplolepis quinquelineata* cannot be included in *Figites* because it has a spine on the apex of the scutellum, even if the spine is sometimes very short. In addition, the examination of a long series of *quinque-*

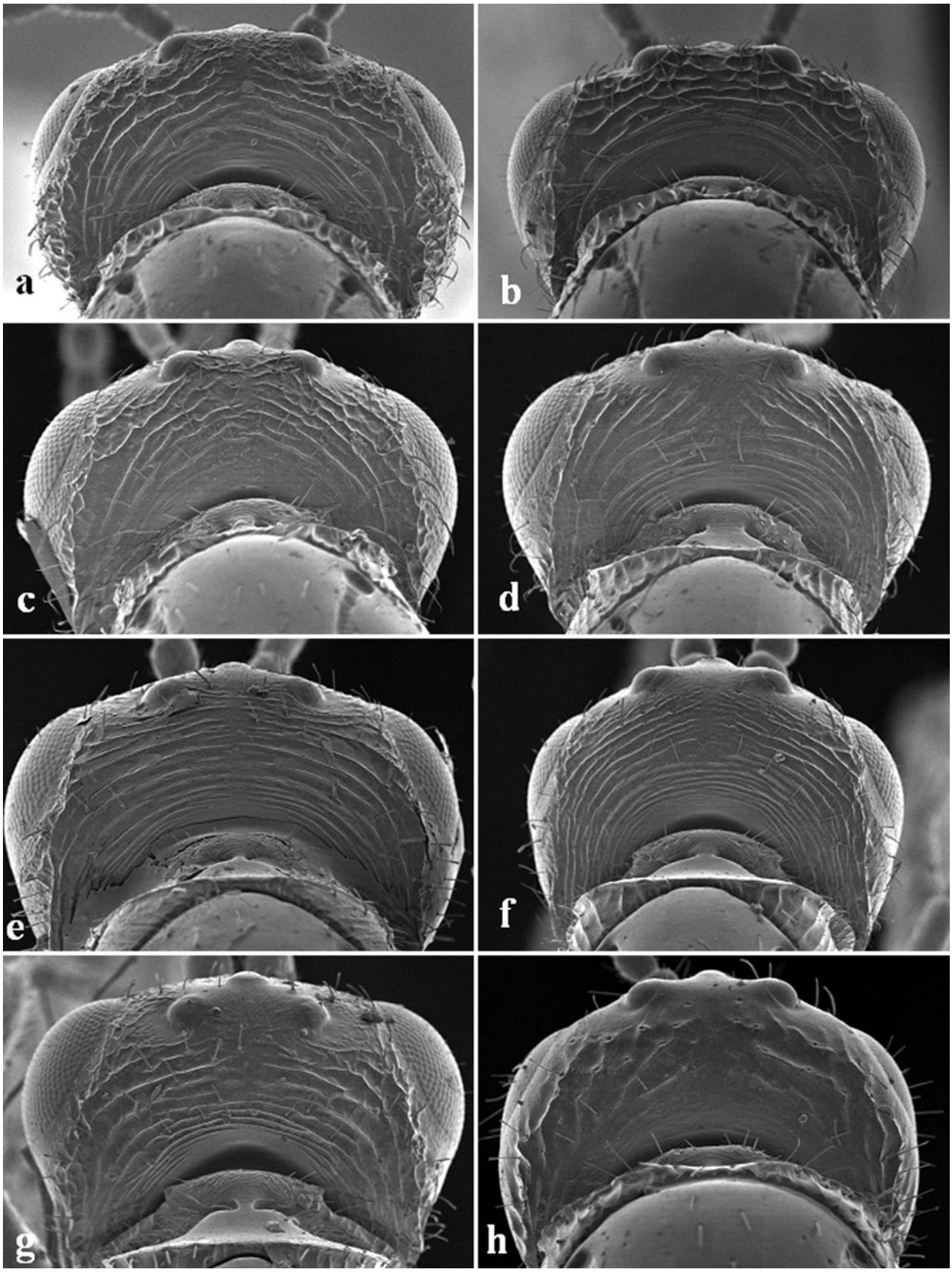

Fig. 2. Occiput of: (a) *Xyalophora clavata*, (b) *X. japonica,* (c) *X. zarazagai* sp. n., (d) *X. provancheri* sp. n., (e) *X. belizini* sp. n., (f) *X. singularis*, (g) *X. giraudi* sp. n. and (h) *Xyalophoroides* gen. n.

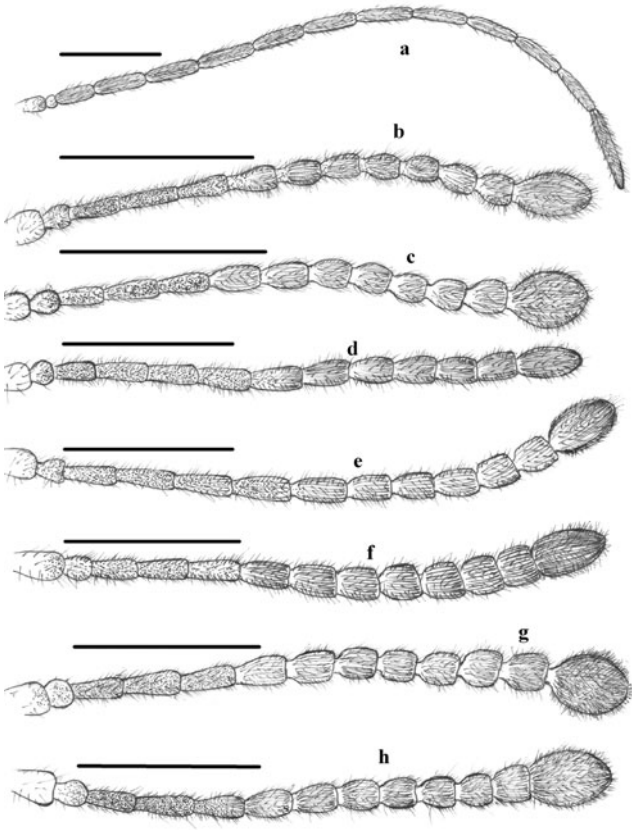

Fig. 3. Antenna of: (a) *Xyalophora belizini* sp. n. m, (b) *X. provancheri* sp. n. f, (c) *X. zarazagai* sp. n. f, (d) *X. singularis* f, (e) *X. giraudi* sp. n. f, (f) *X. belizini* sp. n. f, (g) *X. clavata* f and (h) *X. japonica* ♀ All the scale bars indicate 0.5 mm.

lineata reveals that this species has three unique characters: (1) radial cell half open, (2) forewing glabrous, without setae, and (3) F1 in male antenna longer than F2. Here, we place *quinquelineata* in a new and monospecific genus: *Xyalophoroides* gen. n. The characters that differentiate *X. quinquelineata* from the other two genera of Figitinae with a scutellar spine (*Neralsia* and *Xyalophora*) have already been given in the diagnosis of *Xyalophoroides* gen. n.

Type material of *X. quinquelineata*. Weld (1944: 60) mentioned that the type material of *Diplolepis quinquelineata* Say, 1836 was lost, when he transferred this species to the genus *Xyalophora*. Dr. Smith (USNM, pers. comm.) mentions that the Say collection "is destroyed". Thus, we consider the type material of *X. quinquelineata* as definitively lost, and we are obligated to designate a neotype for this species, according to the article 75.3 of the ICZN. In the Weld collection, deposited in the USNM, there is a specimen collected in 1947 at the same location mentioned by Say in the original description. This specimen fulfils the requirements of the article 75.3 of the ICZN for designating a neotype. In addition, this specimen is a female, as was the original holotype of *Diplolepis quinquelineata*. The data that allow the recognition of the neotype of *Diplolepis quinquelineata*, the type species of *Xyalophoroides* gen. n., are: "Ind. 2185" (white label); "Coll CFBaker" (white label); "*Xyalophora quinquelineata* (Say) det. Weld-1947" (white label, scanned); "Neotype of *Diplolepis quinquelineata* Say, 1836, ♀ desig. Jiménez & Pujade-Villar-2006" (red label); "type species of *Xyalophoroides* n. gen. Jiménez & Pujade-Villar" (red label); "*Xyalophoroides quinquelineata* (Say) Jiménez & Pujade-Villar det. 2006" (white label).

Additional material. USA: Arizona: 1♀ (CNCI); 1♀, 1♂ (USNM). California: 3♂ (CNCI); 25♀, 8♂ (USNM). Colorado: 17♀, 28♂ (CNCI); 6♀, 22♂ (USNM). Idaho: 24♀, 4♂ (USNM). Illinois: 6♀, 8♂ (USNM). Massachusetts: 1♀ (USNM). Michigan: 2♀, 1♂ (USNM). Nevada: 1♂ (USNM). New Jersey: 1♀ (USNM). New Mexico: 3♀, 8♂ (CNCI); 34♀, 1♂ (USNM);. New York: 1♀, 14♂ (CNCI); 2♂ (USNM). Ohio: 1♀ (CNCI). Pennsylvania: 1♂ (USNM). South Dakota: 1♂ (USNM). Texas: 3♂ (CNCI). Utah: 1♀, 7♂ (CNCI); 1♂ (USNM). Washington: 1♀, 1♂ (CNCI). Wyoming: 2♀, 4♂ (CNCI). CANADA: Alberta: 26♀, 11♂ (CNCI). British Columbia: 1♀, 22♂ (CNCI); 1♂ (USNM). Manitoba: 1♀, 2♂ (CNCI). Nova Scotia: 2♂ (CNCI). Ontario: 43♀, 48♂ (CNCI); 4♀, 5♂ (USNM). Quebec: 18♀, 15♂ (CNCI). Saskatchewan: 14♀, 2♂ (CNCI).

Distribution. Holarctic. Present in USA and Canada.

Biology

The only published data corresponds to that in Weld (1944), who cites this species from puparia of *Sarcophaga lherminieri* (Diptera: Sarcophagidae). In the studied material this species is also cited from *Ravinia querula* (Diptera: Sarcophagidae). From all the label data it can be concluded that *X. quinquelineata* attacks cyclorrhaphan Diptera (Sarcophagidae, Muscidae) specifically in cow dung, even though it is cited from *Laspeyresia nigricana* (Lepidoptera, Tortricidae) and *Metator pardalinus* (Acrididae, Orthoptera); these two hosts are highly improbable and should be confirmed.

Genus *Xyalophora* Kieffer, 1901

Figs 1a–g, 2a–g, 3a–h, 4a–g

Xyalophora Kieffer, 1901: 344. Type-species: *Figites clavatus* Giraud, 1860, by original designation.

Ceraspidia Belizin, 1952: 301 syn. n. Type-species: *Ceraspidia japonica* Belizin, 1952, by original designation.

Type species: *Figites clavatus* Giraud, 1860: 153. Holotype female Austria (MNHN, Paris, France) [examined].

Diagnosis

Xyalophora can be distinguished from the other two genera of Figitinae with scutellar spine (*Neralsia* and *Xyalophoroides*) by several characters: radial cell closed, mesopleura strongly striated and irregular in anterior area, interfoveal carina below foveae level, scutum sculptured (at least in areas adjacent to notauli), internal surface of notauli with sculpture, occiput with strong and continuous carinae, F1 of male antenna clearly shorter than F2, sculpture on face of the females homogeneous (without radiating carinae), that on face of the males present all over the face (without two big smooth areas as in *Neralsia* and *Xyalophoroides*).

Redescription

Coloration black. Face rugose (Figs 1a–g). Genal sulcus present, costulate. Occiput with arcuated carinae, parallel or subparallel (Figs 2a–g). Antennae clavate, 13-segmented and shorter than body in females (Figs 3b–h); filiform, 14-segmented and much longer than body in males (Fig. 3a); setae short and abundant in all segments in both sexes. Pronotal plate weakly incised dorsally; lat-

eral areas of pronotum coriaceous, with sharp carinae on anterior dorsal and ventral parts (Figs 4a–g). Mesopleura completely carinated, sometimes carinated-coriaceous (Figs 4a–g). Scutum with coriaceous sculpture more or less extended (Fig. 7a), always present around basal part of notauli. Notauli percurrent, internal surface with dense transverse carinae (Figs 5a–g). Median sulcus of scutum defined, with variable length and depth (Figs 5a–g). Posterior margin of scutellum with spine of variable length; scutellar disk hunchbacked, strongly carinated and often with coriaceous sculpturing (Fig. 5a–g). Scutellar foveae separated by a carina (interfoveal carina) below level of foveae (in lateral view, Figs 4a–g). Coxae with setae long and abundant. Tarsal claw simple, long, arcuated. Forewings with setae on surface and on margin; radial cell closed (Figs 6a–i), longer than wide; areolet absent. Metasoma laterally compressed, usually oval in profile in females and truncated in males; metasomal tergum I finely and densely carinated; metasomal tergum II completely smooth (Fig. 7b); metasomal tergum VIII with posterior margin almost straight in lateral view.

Taxonomic comments

The only previously described species that have the generic characters mentioned above are: *X. clavata* (Giraud) and *X. singularis* (Ashmead). Ionescu (1969) described for the first time the males of *Xyalophora clavata*, which show substantial sexual dimorphism in the antennae. The study of Ionescu (1969) and the examination of a long series from CNCI and USNM confirm that Belizin's (1952) description of *Ceraspidia* corresponds to the males of *Xyalophora*. Thus, we have no doubt in considering *Ceraspidia* a syn. n. of *Xyalophora*, which results in *Xyalophora japonica* (Belizin) comb. n. *Xyalophora armata* var *nigricornis* Kieffer was considered by Weld (1951: 598) to be a synonymy of *Xyalophora quinquelineata* (Say); after the examination of this material, we confirm this synonymy as valid; *X. quinquelineata* (= *Xyalophora leviventris* Kieffer, syn. n.) is now included in the new genus *Xyalophoroides* gen. n. In addition, *Xyalophora aciculata* Benoit belongs to *Figites* and the correct name is *F. aciculata* (Benoit) comb. n. Moreover, *Xyalophora impatiens* (Say, 1836) and *X. picea* (Spinola, 1853) are considered incertae sedis. The reasons for all these taxonomical changes are detailed below. Finally, *Xyalophora armata* (Say, 1836), which was included in *Neralsia* by Weld (1930), is a nomen dubium according to a recent study (Jiménez et al., in press).

Biology

Unknown. There are no records of hosts for *Xyalophora*. The only host ever cited for *Xyalophora* was *Sarcophaga* Meigen 1826 by Ionescu (1969) for the species *X. quinquelineata*, but this species was transferred to *Xyalophoroides* gen. n. in this work. However, *Xyalophora* may be a parasitoid of Diptera: Cyclorrhapha in habitats such as dung and carcasses.

***Xyalophora belizini* Jiménez & Pujade-Villar sp. n.**

Figs 1e, 2e, 3f, 4e, 5e, 6e–f

Diagnosis

The females of *Xyalophora belizini* sp. n., as in *Xyalophora singularis* and *X. giraudi* sp. n. have transverse and continuous carinae more or less parallel over the entire occiput (Figs 2e–g), as well as moniliform antennae, with the last segment subglobular (Figs 3d–f). In *Xyalophora belizini* sp. n., the occipital carinae are parallel and abundant (Fig. 2e), and the mesopleura is transversely carinate without any other type of sculpture (Fig. 4e), while in *X. singularis* and *X. giraudi* sp. n., the occipital carinae are subparallel and not so abundant (Figs 2f, g), and mesopleural carinae are present anteriorly with an alveolate sculpture (Figs 4f, g). *Xyalophora belizini* sp. n. and *X. giraudi* sp. n. are the only species in which the radial cell of the males is longer than in the females (Figs 6e–f, h–i). Finally, in *X. belizini* sp. n., the interfoveal carina is clearly visible (Fig. 5e), while in *X. giraudi* sp. n. it is much below the fovea level (Fig. 5g) and nearly invisible, resulting in apparently only one scutellar fovea.

Description

Length. 2.3–2.8 mm.

Coloration. Black. Antennae reddish. Tarsi, articulations of legs and ventral part of metasoma red-blackish. Venation brown.

Head. Subquadrate in anterior view; in dorsal view 2.2 times longer than wide. Face completely rugose (Fig. 1e), frons with carinae slightly arcuate, more visible close to the toruli, interocellar space weakly coriaceous; transfacial line equal to eye's height. The relation POC : OOC : COC is 8 : 5 : 4.5, diameter of lateral ocellus 2.5. Genal sulcus costulate, projecting behind compound eyes. Occiput completely carinate, except for a small, smooth dorso-apical area; carinae always arcuate and parallel (Fig. 2e).

Antennae (Fig. 3f). Slightly clavate. F2 and F3 1.2 times longer than F1. F8–F10 as long as wide. Last segment subglobular. Sensilla beginning on F4, first segments weakly coriaceous.

Mesosoma (Figs 4e, 5e). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, surface between them coriaceous, rest of pronotum coriaceous. Mesopleura strongly and completely carinate. Scutum with coriaceous sculpture slightly marked in basal part, rest smooth. Median sulcus of scutum clearly defined, carinate. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina below level of foveae. Scutellar foveae irregularly carinate inside. Scutellar disk humped, strongly carinate with coriaceous sculpture. Scutellar spine long, around 1/3 of total length of scutellum.

Forewing. Radial cell closed, 1.7 times longer than wide (Fig. 6e). Setae present on surface and margin.

Males. As in females except: shorter length (1.9–2.7 mm), antennae filiform (Fig. 3a) with 12 flagellomeres, F1 shorter than others (3 times longer than wide), remaining flagellomeres subequal (3.8 times longer than

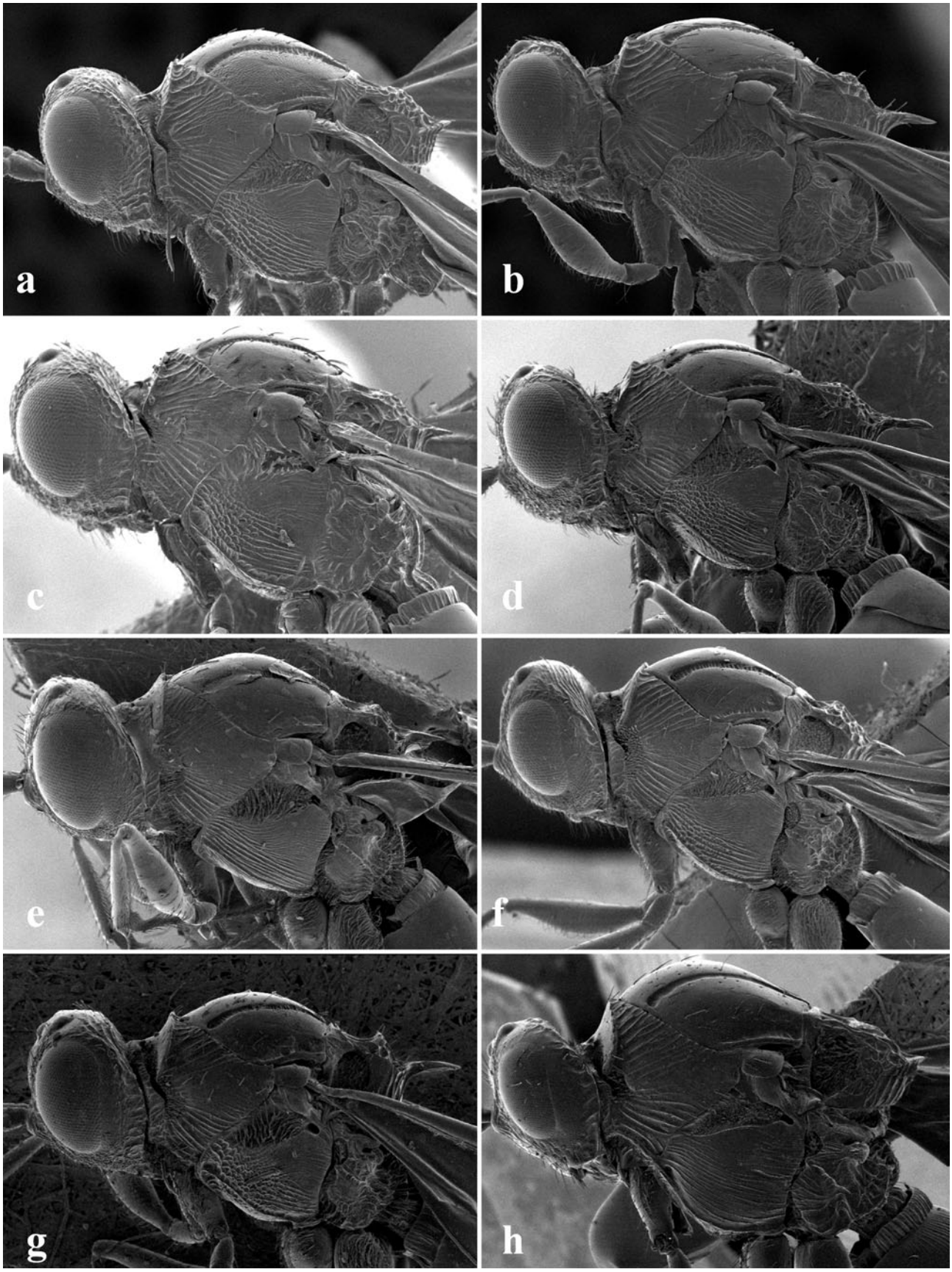

Fig. 4. Mesosoma in lateral view of: (a) *Xyalophora clavata*, (b) *X. japonica*, (c) *X. zarazagai* sp. n., (d) *X. provancheri* sp. n., (e) *X. belizini* sp. n., (f) *X. singularis*, (g) *X. giraudi* sp. n. and (h) *Xyalophoroides* gen. n.

wide). Radial cell longer, 1.9 times longer than wide (Fig. 6f).

Type material. Holotype ♀ from Texas (USA), deposited in the CNCI with the following labels: "C-433, Texas, Patricio Co, Welder Wildlife Refuge, Backberry forest & swamp, 4.xii.1999, L. Masner Sweeping" (white label); "Holotype desig.-2006, Jiménez & Pujade-Villar" (red label); "Xyalophora belizini sp. n. ♀ Jiménez & Pujade-Villar det. 2006" (white label). Paratypes: USA. Texas: same data of the Holotype, 8♂ & 9♀ (5♂, 5♀ CNCI; 3♂, 4♀ UB); Florida: Myakka River, State Port., 1.iv.1955, John C. Martin Collection, 1♂ (CNCI); Paradise Key, 18.iii.19??, E.A. Schwarz, 1♀ (USNM); Illinois: Ravinia, 3.x.1914, 3♂ (USNM); Oklahoma: C-223, Latimer Co. Read Oak anvivons, vi.1994, K. Stephan Fit, 1♂ (CNCI); Georgia: Savannah, 15.iv.1884, Through, C.V. Rilley, Solenaspis coxalis♀ Type Ashm, 1♀ (USNM).

Etymology. In memory of the Russian cynipidologist Vladimir Ivanovich Belizin (1905–1970).

Distribution. Nearctic. Known from USA (Texas, Florida, Illinois, Oklahoma, Georgia).

Xyalophora clavata (Giraud, 1860)

Figs 1a, 2a, 3g, 4a, 5a, 6a, 7a

Figites clavatus Giraud, 1860: 153 (♀).
Xyalophora clavata (Giraud) Dalla Torre & Kieffer, 1910: 93.
Xyalophora clavata Ionescu, 1969: 89–90 (♂).

Diagnosis

The females of *Xyalophora clavata* have clavate antennae (Fig. 3g) like *X. japonica*, *X. zarazagai* sp. n. and *X. provancheri* sp. n. (Figs 3b, c, h); the males and females of these species have irregular and discontinuous occiput carinae just behind the ocelli (Fig. 2a–d). *Xyalophora clavata* can be differentiated from the other species of this genus by its very short scutellar spine, shaped like an equilateral triangle (in dorsal view) in both sexes (Fig. 5a). In addition, *X. clavata* is the species with coriaceous sculpturing more extended on the scutum (Figs 5a, 7a).

Description

Length. 3.0–3.9 mm.

Coloration. Black. Antennae, tarsi, articulations of legs and ventral part of metasoma red-blackish. Veins brown.

Head. Subquadrate in anterior view; 2 times longer than wide in dorsal view. Face and frons rugose (Fig. 1a), transfacial line equal to eye's height. Relation POC : OOC : COC is 7.5 : 5 : 4, diameter of lateral ocellus 2. Genal sulcus defined, completely costulate, projecting behind compound eyes. Occiput with arcuate carinae, subparallel and discontinous, parallel in basal area (Fig. 2a).

Antennae (Fig. 3g). Clavate. F2 and F3 1.1 times longer than F1. From F8 to F10 1.1 times longer than wide, F11 globular. Sensilla beginning on F4, first segments weakly coriaceous.

Mesosoma (Figs 4a, 5a, 7a)**.** Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, with coriaceous sculpturing, rest of pronotum coriaceous. Mesopleura completely carinate, with coriaceous sculpture. Scutum slightly coriaceous, more defined in basal area; median sulcus of scutum defined, smooth. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina below level of foveae; foveae irregularly carinate inside; scutellar disk humpbacked, strongly carinate and with coriaceous sculpturing; scutellar spine very short, 1/6 total length of scutellum.

Forewing. Radial cell closed, 1.7 times longer than wide (Fig. 6a). Setae present on surface and margin. Areolet weakly formed.

Males. As in females except: shorter (2.1–2.2 mm), antennae filiform, with 14 segments, F1 shorter than others (2.5 times longer than wide), following segments subequal (3.6 times longer than wide).

Type material. Holotype ♀ from Austria, deposited in the MNHN with the following labels: "Museum PARIS, 1877, Coll. Giraud" (white label); "Type" (white label); "Holotype" (white circle with red margin); "Holotype of *Figites clavatus*, det. N. D.M. Ferguson, 1983" (white label); "*Xyalophora clavatus*, det. N.D.M. Ferguson, 1983" (white label); "*Xyalophora clavata*, ♀ Jiménez & Pujade-Villar det. 2006" (white label).

Additional material. USA. Arizona: 1♂ (UB). Utah: 1♀ (CNCI); 1♂ (USNM). Colorado: 1♂ (USNM). Illinois: 29♂ (USNM); 2♂ (UB); CANADA. Alberta: 1♀ (CNCI). Quebec: 1♂ (CNCI). Saskatchewan: 2♀, 1♂ (CNCI); 1♀ (UB). MEXICO: 1♀ (USNM); 1♂ (CNCI). EGYPT: 1♀ (USNM); 1♂ (USNM). CYPRUS: 1♀, 1♂ (CNCI).

Distribution. Holarctic. Known from Austria, Sweden, Finland, Great Britain, Romania, USA (Arizona, Utah, Colorado, Illinois), Canada (Alberta, Saskatchewan, Quebec), Mexico, Egypt and Cyprus.

Variability. The specimens collected in the Nearctic have the centre of the scutum smooth, differing from the Palaearctic specimens, which have more or less extended coriaceous sculpture. Two males deposited in the USNM (collected in Arizona and Mexico) have the scutellar spine slightly different than the rest of the specimens; the spine is very short but not point-shaped.

Xyalophora giraudi Jiménez & Pujade-Villar sp. n.

Figs 1g, 2g, 3e, 4g, 5g, 6h–i

Diagnosis

The females of *Xyalophora giraudi* sp. n., *X. singularis* and *X. belizini* sp. n. have transverse and continuous carinae over the entire occiput (Figs 2e–g), as well as moniliform antennae in females, with the last segment subglobular (Figs 3 d–f). In *Xyalophora giraudi* sp. n. and *X. belizini* sp. n., the radial cell is longer in males than in females (Figs 6h–i, e–f); in the other species of this genus this dimorphism is not present. *Xyalophora giraudi* sp. n. is the only species of *Xyalophora* with an interfoveal carina much below the foveae level, nearly invisible, resulting in apparently only one scutellar fovea (Fig. 5g).

Description

Length. 2.8 mm.

Coloration. Black. Antennae reddish. Legs reddish, coxae black. Ventral part of metasoma red-blackish. Venation brown.

Head. In anterior view, subquadrate; in dorsal view, 2 times longer than wide. Face and frons with irregular carinae and coriaceous sculpture (Fig. 1g), interocellar

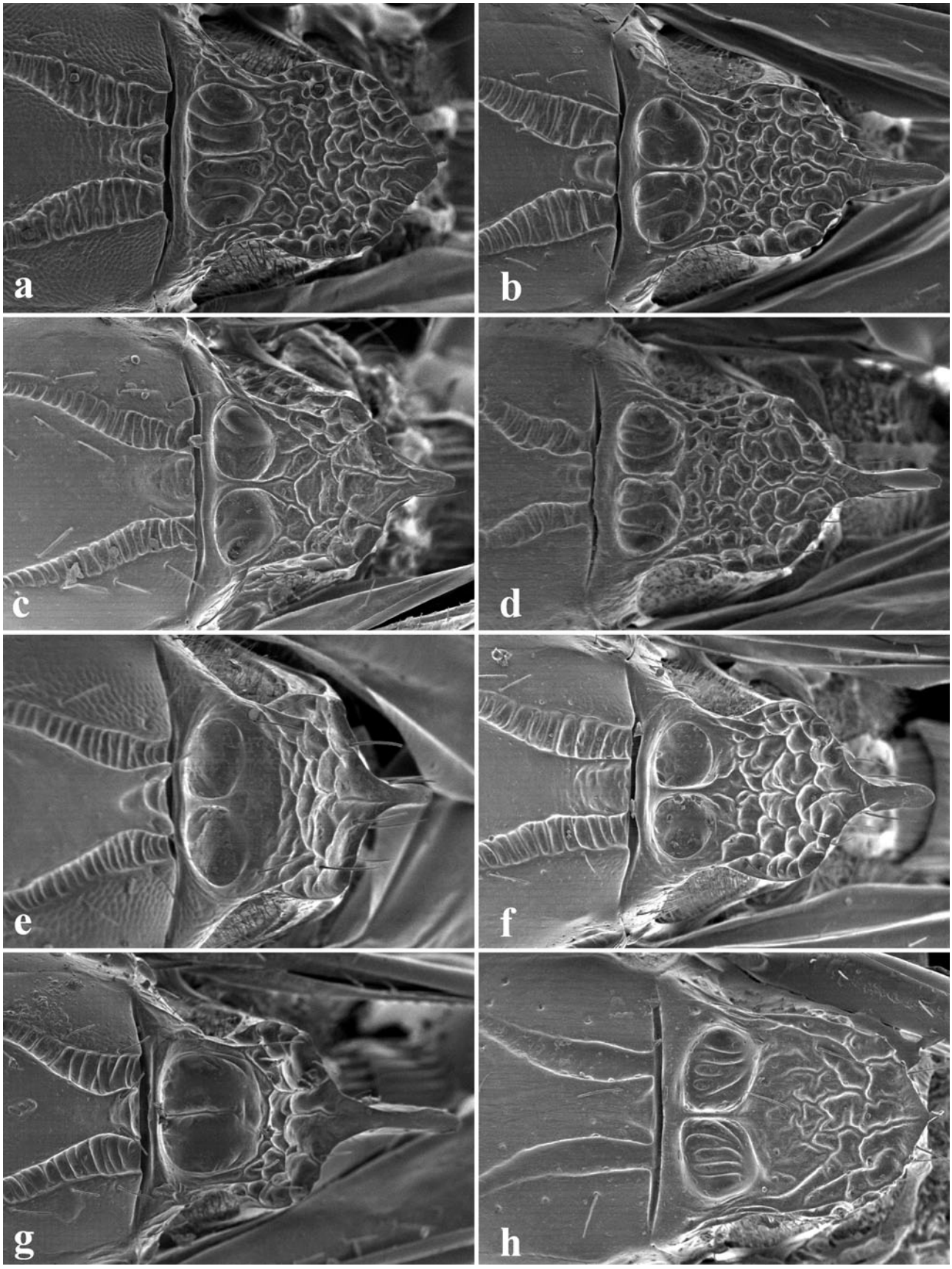

Fig. 5. Scutellum of: (a) *Xyalophora clavata*, (b) *X. japonica,* (c) *X. zarazagai* sp. n., (d) *X. provancheri* sp. n., (e) *X. belizini* sp. n., (f) *X. singularis*, (g) *X. giraudi* sp. n. and (h) *Xyalophoroides* gen. n.

space smooth; transfacial line 1.1 times longer than eye's height. Relation POC : OOC : COC is 6 : 5 : 4, diameter of lateral ocellus 4. Genal sulcus completely costulate, projecting behind compound eyes. Occiput completely carinate, except a small smooth dorsoapical area; carinae always arcuate and subparallel, some irregular but continuous (Fig. 2g).

Antennae (Fig. 3e). Moniliform. F2 and F3 1.1 times longer than F1. F8–F10 1.3 times longer than wide. Last segment subglobular. Sensilla beginning on F3, first segments weakly coriaceous.

Mesosoma (Figs 4g, 5g). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, rest of pronotum slightly coriaceous. Mesopleura completely carinate, anteriorly with an alveolate sculpture. Scutum with weak sculpture next to notauli. Median sulcus of scutum clearly defined, with carinae inside. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina much below level of foveae, resulting in apparently only one large fovea, weakly carinate inside. Scutellar disk humped, with few, irregular, strong carinae, surface between them smooth. Scutellar spine long, slightly longer than 1/3 of total length of scutellum.

Forewing. Radial cell closed, 1.6 times longer than wide (Fig. 6h). Setae present on surface and margin.

Males. As in females except: length (2.5–2.6 mm), antennae filiform, with 12 flagellomeres, F1 shorter than others (3 times longer than wide), remaining flagellomeres subequal (3.9 times longer than wide). Radial cell 1.8 times longer than wide (Fig. 6i).

Type material. Holotype ♀ from Argentina, deposited in the MLPA with the following labels: "San Javier (S.M. Tucumán), 16.11.1981, S/Veg. Herb. Mulvany-Diaz, Fidalgo-Armesto" (white label); "Holotype desig. 2006 Jiménez & Pujade-Villar" (red label); "*Xyalophora giraudi* sp. n. ♀ Jiménez & Pujade-Villar det. 2006" (white label). Paratypes: NICARAGUA: 5 km. N. Matagalpa, viii.1989, Reinboldt, 1♂ (UNAN); ECUADOR: Napo, Prov. San Francisco de Borja, 1610 m., 17.i.1978, W.N. Mathis, 1♂ (UB); Pich, 16 km S.E. Sto. Domingo, 500 m, Tinalandia, 4–14.vi.1976, S. & J. Peck, 1♀ (UB).

Etymology. In memory of the French cynipidologist Joseph-Etienne Giraud (1808–1877).

Distribution. Neotropical. Known from Argentina, Nicaragua and Ecuador.

Xyalophora impatiens (Say, 1836) incertae sedis

Figites impatiens Say, 1836: 268 (male).
Figites impatiens Say, in Provancher, 1887: 169 (male and female).
Figites impatiens Say, in Provancher, 1888: 437 (male and female).
Xyalophora impatiens (Say), in Kieffer, 1901: 344.

The type material of *Figites impatiens* has been destroyed (Dr. Smith, pers. comm.). The original description of *Xyalophora impatiens* (*Figites impatiens* Say, 1836: 268), mentions: "scutel with the margin depressed and rugose, the disk oval, the edge obscurely piceous, with an indentation behind, within the edge". Say (1836: 269) mentions that *Figites impatiens* is very similar to *Diplolepis impatiens* Say, 1836: 269, because in both species the scutellum has an indentation similar to that present in *Cynips scutellaris* Rossi, 1794. *Diplolepis impatiens* was transferred to *Eucoila* Westwood, 1833, by Ashmead (1885), and *Cynips scutellaris* to *Figites* by Latreille (1802). As in neither *Figites scutellaris* or *Eucoila impatiens* does the scutellum terminate in a spine, we must conclude that *Figites impatiens* also lacks this spine, since Say would have otherwise mentioned a spine, and so should not be included in *Xyalophora*.

None of the above confirm that *Figites impatiens* is a *Xyalophora*, nor that this species even belongs in the Figitinae. As a result of this study, *Xyalophota impatiens* (Say, 1836) is considered incertae sedis.

Xyalophora japonica (Belizin, 1952) comb. n.

Figs 1b, 2b, 3h, 4b, 5b, 6b

Ceraspidia japonica Belizin, 1952: 301 (male).

Diagnosis

Xyalophora japonica comb. n. is morphologically similar to *X. clavata*, *X. zarazagai* sp. n. and *X. provancheri* sp. n. (Figs 3b, c, g), since the females of all them have clavate antennae (Fig. 3h), unlike other *Xyalophora* species. *Xyalophora japonica* is easily differentiated from *X. clavata* by the shape of the scutellar spine (Fig. 5b), which is long in *X. japonica* but very short in *X. clavata* (Fig. 5a). *Xyalophora japonica* (Fig. 2b) has stronger and more irregular carinae on the occiput than *X. zarazagai* sp. n. and *X. provancheri* sp. n. (Fig. 2c–d). In addition, the frons and interocellar area have a strong and alveolated sculpture in *X. japonica* (Fig. 1b) but this is weak and less defined in *X. zarazagai* sp. n. and *X. provancheri* sp. n. (Fig. 1c–d)

Description

Length. 2.4–3.0 mm.

Coloration. Black. Antennae red blackish. Tarsi, articulations of legs and ventral part of metasoma red blackish. Venation brown.

Head. In anterior view subquadrate; in dorsal view 2.2 times longer than wide. Face, frons and interocellar space with alveolate sculpture (Fig. 1b); transfacial line 1.2 times longer than eye's height. Relation POC : OOC : COC is 8 : 4.5 : 4, diameter of lateral ocellus 3. Genal sulcus costulate, projecting behind compound eyes. Occiput with irregular and discontinuous carinae behind ocelli, arcuate and parallel in basal area (Fig. 2b).

Antennae (Fig. 3h). Clavate. F2 and F3 1.1 times longer than F1. F8–F10 1.1 times longer than wide. F11 globular. Sensilla beginning on F4, first segments weakly coriaceous.

Mesosoma (Figs 4b, 5b). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, surface between them smooth, rest of pronotum mostly smooth. Mesopleura completely carinate, with coriaceous sculpture. Scutum smooth. Median sulcus of scutum clearly defined, with some small carinae inside. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina below level of foveae. Scutellar disk humped, strongly

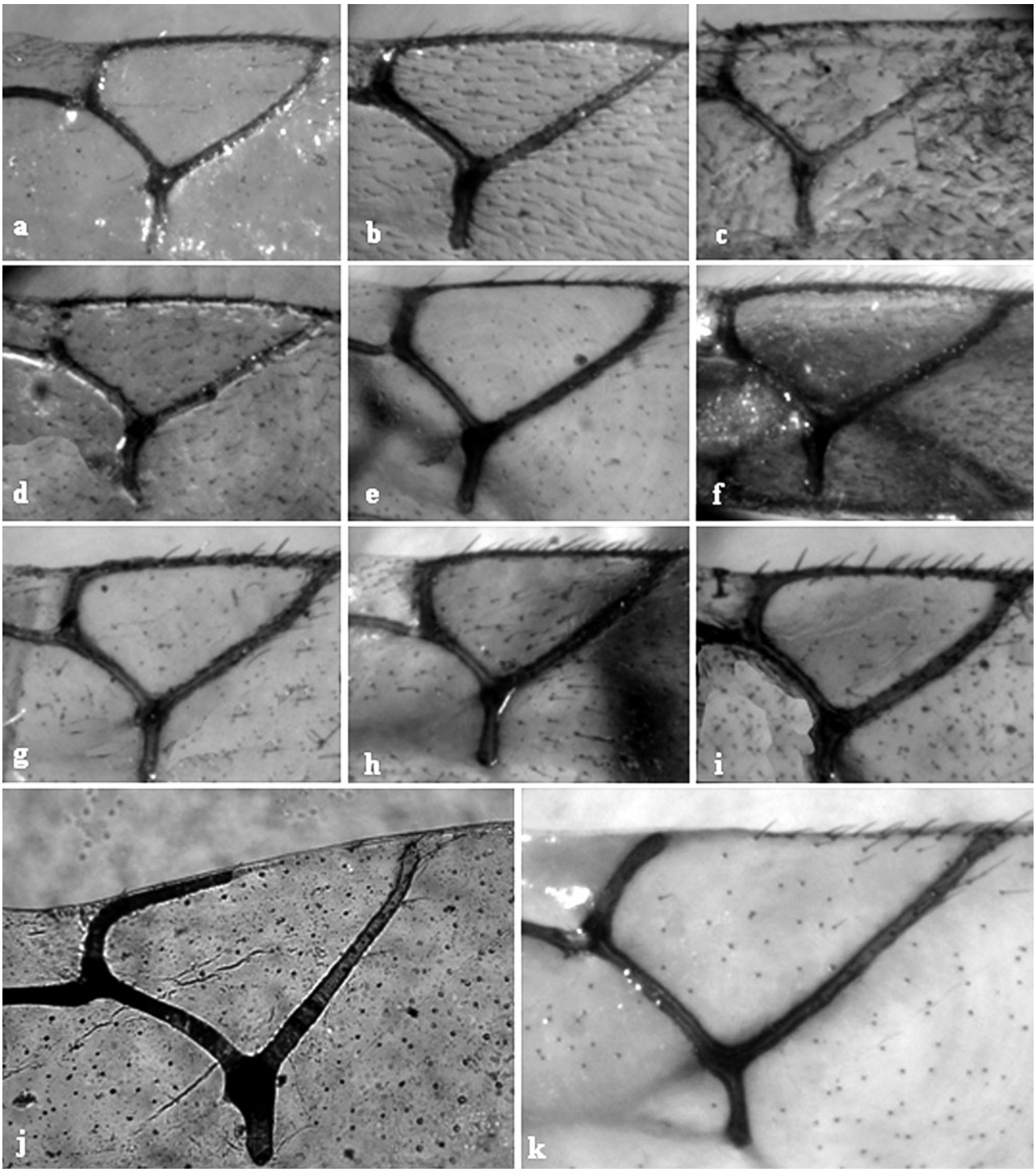

Fig. 6. Radial cell of forewing of: (a) *Xyalophora clavata* f, (b) *X. japonica* f, (c) *X. zarazagai* sp. n. f, (d) *X. provancheri* sp. n. f, (e) *X. belizini* sp. n. f, (f) *X. belizini* sp. n. m, (g) *X. singularis* f, (h) *X. giraudi* sp. n. f, (i) *X. giraudi* sp. n. m, (j) *Xyalophoroides* gen. n. f and (k) *Neralsia* f.

carinate and with coriaceous sculpture. Scutellar spine long, around 1/3 of total length of scutellum.

Forewing. Radial cell closed, 2 times longer than wide (Fig. 6b). Setae present on surface and margin.

Males. As in females except: shorter in length (2.2–2.5 mm), antennae filiform, with 12 flagellomeres, F1 shorter than others (3 times longer than wide), remaining flagellomeres subequal (3.9 times longer than wide).

Taxonomic comments. *Ceraspidia japonica* was described by Belizin (1952) from one male collected in Japan. After studying the material from CNCI and determining for the first time females of this species, we can affirm that this species should be included in *Xyalophora*. Thus, we establish *X. japonica* comb. n.

Type material. Holotype ♂ from JAPAN, deposited in the ZIN with the following labels: “Misaki, Kiu Shiu, Japan,

27.VII.1917, Roshkovsky" (white label); "Holotype, *Cerapidia japonica* ♂ V. Belizin det" (red label); "*Xyalophora japonica* ♂ Jiménez & Pujade-Villar det. 2006" (white label).

Additional material. JAPAN: 1♀ (UB); 1♀.

Distribution. Eastern Palaearctic. Known from Japan.

Xyalophora picea (Spinola, 1853) incertae sedis

Figites picea Spinola, 1853: 42, female.
Figites picea Spinola, *Xyalophora*? ; in Kieffer, 1901: 344.
Xyalophora picea (Spinola), in Dalla Torre & Kieffer, 1910: 93 & 94.

The type material of this species was not located in the Spinola collection, deposited in the Museo Regionale di Scienze Naturali di Piemonte, thus we consider it is lost. However, the original description of *Figites picea* Spinola, 1853 suggests that this species cannot be a *Xyalophora* as the absence of setae on the compound eyes, the presence of whitish spots on the lateral areas of the pronotum, the darkened strips in the forewings and the ring of whitish setae at the base of the metasoma make this placement highly unlikely. These characters, together with the shape of the scutellum (tridentated), the type of carinae on the propodeum and the body coloration (brown polished and bright), described by Spinola (1841: 42), lead us to believe that this species belongs in the Eucoilinae, possibly in *Acantheucoela* Ashmead, 1900. In addition, *Figites picea*, according to the original description, has the scutellar foveae fused. In the revision of *Acantheucoela* done by Díaz (1987), one species was included with foveae fused, *A. brevidens* (Kieffer, 1909); in addition, this species has a neotropical distribution (Peru and Bolivia), as *Figites picea* (Brasil). Despite all the characters mentioned, we cannot affirm the correct placement of this species without examining the type material. Thus, in this study *Xyalophora picea* (Spinola, 1853) is considered an incertae sedis.

Xyalophora provancheri Jiménez & Pujade-Villar sp. n.

Figs 1d, 2d, 3b, 4d, 5d, 6d

Diagnosis

The females of *Xyalophora provancheri* sp. n. have clavate antennae (Fig. 3b), as *X. clavata*, *X. japonica* comb. n. and *X. zarazagai* sp. n. (Figs 3c, g, h); the males and females of these species have the carinae on the occiput irregular and discontinuous, just behind the ocelli (Figs 2a–d). The females of *Xyalophora provancheri* sp. n. are distinguished easily from *X. clavata* by the shape of the scutellar spine, which is very short in the latter (Figs 4a, d). The females of *X. provancheri* sp. n. can be confused with those of *X. japonica*, but the parallel carinae on the occiput, truncated and interrupted by a smooth area in *X. provancheri* sp. n. (Fig. 2d) and the shape of carinae on the frons (Fig. 1d) differentiate them (Figs 1b, 2b). *Xyalophora provancheri* sp. n. has a longer scutellar spine than *X. zarazagai* sp. n. and an interocellar area smooth, while *X. zarazagai* sp. n. has this area sculptured.

Description

Length. 2.5 mm.

Coloration. Black. Antennae brown-reddish. Legs red-blackish, coxae black. Ventral part of metasoma red-blackish. Venation light brown.

Head. In anterior view, triangular; in dorsal view, 2 times longer than wide. Face with barely visible carinae and with wrinkles, emanating from centre of face to frons, reaching ocelli (Fig. 1d); interocellar space smooth; transfacial line 1.5 times longer than eye's height. Relation POC : OOC : COC is 8 : 5 : 4, diameter of lateral ocellus 2.5. Genal sulcus costulate, projecting behind compound eyes. Occiput with some arcuate and parallel carinae in basal area, and with dorsolateral carinae towards lateral ocelli; centre and apical part of occiput smooth (Fig. 2d).

Antennae (Fig. 3b). Clavate. F2 1.2 times longer than F1 and F3. F8–F10 1.3 times longer than wide. F11 globular. Sensilla beginning on F4, first segments weakly coriaceous.

Mesosoma (Figs 4d, 5d). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, surface between them smooth, rest of pronotum nearly smooth. Mesopleura completely carinate, with defined coriaceous sculpture on anterior area. Scutum smooth. Median sulcus of scutum clearly defined, smooth. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina at same level as foveae. Scutellar foveae with carinae inside. Scutellar disk humped, strongly carinate with coriaceous sculpture. Scutellar spine long, around 1/3 of total length of scutellum.

Forewing. Radial cell closed, 2.5 times longer than wide (Fig. 6d). Setae present on surface and margin.

Males. Unknown.

Type material. **Holotype** ♀ from Burkina Faso, deposited in the CNCI with the following labels: "C-335, Burkina Faso, Komprenya, 1–6.VI.1988, Sanborne, Landry & Tou Sarame" (white label); "Holotype desig.-2006 Jiménez & Pujade-Villar" (red label); "*Xyalophora provancheri* sp. n. ♀ Jiménez & Pujade-Villar, det. 2006" (white label).

Etymology. Species dedicated to the Canadian entomologist Leon Provancher (1820–1892).

Distribution. Afrotropical. Known from Burkina Faso.

Xyalophora singularis (Ashmead, 1896)

Figs 1f, 2f, 3d, 4f, 5f , 6g

Solenaspis singularis Ashmead, 1896: 183.
Xyalophora singularis (Ashmead) Weld, 1930: 138.

Diagnosis

Xyalophora singularis, *Xyalophora belizini* sp. n. and *X. giraudi* sp. n. have transverse and continuous carinae on the entire occiput (Figs 2e–g) and the antennae of the female moniliform, with the last segment subglobular (Figs 3 d–f). In *Xyalophora singularis* and *X. giraudi* sp. n. the mesopleura is transversally carinate and anteriorly with alveolate sculpture (Figs 4f, g), which differs from *X. belizini* sp. n., which has a mesopleura completely carinate, without alveolate sculpture (Fig. 4e). The position of the interfoveal carina separates *X. singularis* from *X. giraudi* sp. n., since in the former the interfoveal carina, even if placed below the foveae level, clearly delimits two

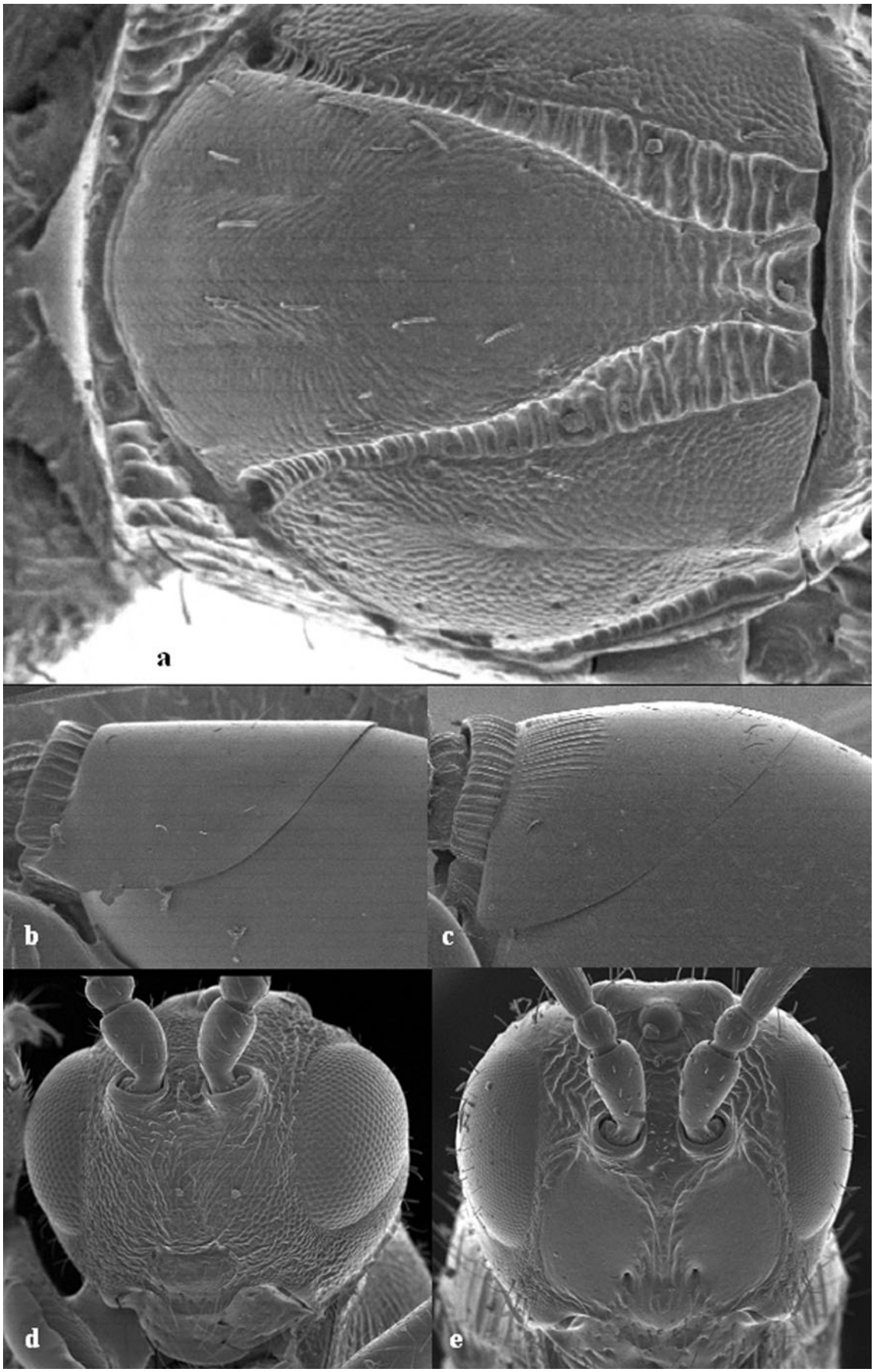

Fig. 7. (a) Scutum of *Xyalophora clavata*, (b) second metasomal tergum of *Xyalophora*, (c) second metasomal tergum of *Xyalophoroides*, (d) head in frontal view of male of *Xyalophora*, (e) head in frontal view of male of *Xyalophoroides*.

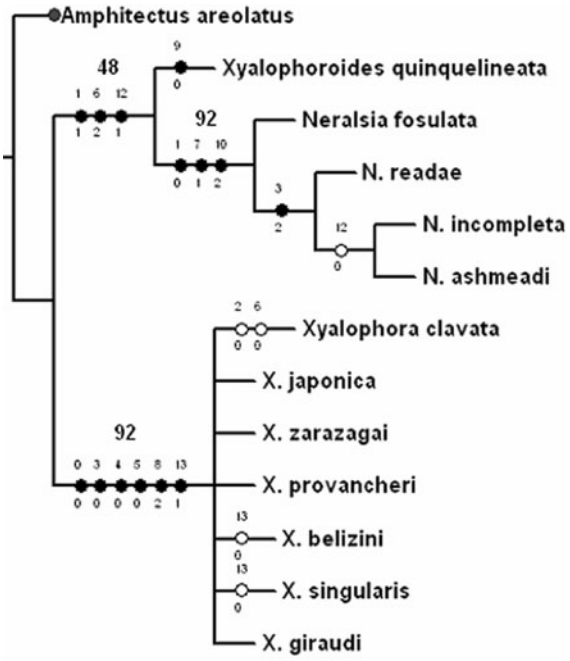

Fig. 8. Strict consensus of three trees with a length of 26 steps, CI: 0.80 RI: 0.91, with the jacknife supports given for *Xyalophora*, *Neralsia* and *Xyalophoroides* + *Neralsia*.

foveae (Fig. 5f), while *X. giraudi* sp. n. has apparently only one scutellar fovea (Fig. 5g) since the interfoveal carina is placed at an extremely low level.

Description

Length. 2.5 mm.

Coloration. Black. Antennae, legs and ventral part of metasoma reddish. Venation brown.

Head. In anterior view, subquadrate; in dorsal view, 2.2 times longer than wide. Face and frons with coriaceous sculpture (Fig. 1f), interocellar space slightly coriaceous; transfacial line 1.3 times longer than eye's height. Relation POC : OOC : COC is 6 : 4.5 : 4, diameter of lateral ocellus 2. Genal sulcus completely defined, costulate, slightly projecting behind compound eyes. Occiput completely carinate, except for a small smooth dorsoapical area; carinae always arcuate and subparallel (Fig. 2f).

Antennae (Fig. 3d). Slightly clavate. F2 and F3 1.2 times longer than F1. F8–F10 longer than wide. Last segment subglobular. Sensilla beginning on F4, first segments weakly coriaceous.

Mesosoma (Figs 4f, 5f). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal part, surface between them coriaceous, like rest of pronotum. Mesopleura completely carinate, with alveolate sculpture anteriorly. Scutum with coriaceous sculpture weakly defined in basal area, rest smooth. Median sulcus of scutum clearly defined, smooth inside. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina below level of foveae. Scutellar foveae with some small carinae inside. Scutellar disk humped, strongly carinate with alveolate sculpture. Scutellar spine long, but less than 1/3 of total length of scutellum.

Forewing. Radial cell closed, 1.8 times longer than wide (Fig. 6g). Disk and marginal setae present.

Males. As in females except: shorter body length (1.9–2.4 mm), antennae with F1 shorter than others (3 times longer than wide), remaining flagellomeres subequal.

Type material. **Holotype** ♀ from Illinois (USA), deposited in the USNM with the following labels: "Algonquin Ill., 31.VIII.1894–99" (white label); "Type No. 23610, U.S.N.M." (red label); "3953" (white label); "*Solenaspis singularis* ♀ Ashm." (white label); "*Xyalophora singularis* ♀ (Ashmead, 1896), Jiménez & Pujade-Villar det. 2006" (white label). Paratypes (same locality of the holotype, all deposited in the USNM): 31.viii.1894–99, Allotype No. 23610, 3954, 1♂ 31.viii.1894–99, Paratype No. 23610, 3947, 1♂ 4.ix.1894–99, Paratype No. 23610, 3944, 1♂ 22.vii.1894–86, Paratype No. 23610, 3934, 1♂ 9.iv.1894–99, Paratype No. 23610, "3941", 1♂

Additional material. USA. Texas: 1♀ (UB); 1♂ (USNM). Colorado: 1♂ (USNM). Alaska: 1♂ (UB). Illinois: 1♂ (USNM). MEXICO: 2♂ (USNM); 1♂ (CNCI). NICARAGUA: 1♂ (CNCI); 1♂ (UB).

Distribution. Nearctic and northern Neotropical. Known from USA (Texas, Colorado, Alaska, Illinois), Mexico and Nicaragua.

Xyalophora zarazagai Jiménez & Pujade-Villar sp. n.

Figs 1c, 2c, 3c, 4c, 5c, 6c

Diagnosis

The females of *Xyalophora zarazagai* sp. n. have clavate antennae (Fig. 3c), as in *X. clavata* (Giraud), *X. japonica* comb. n. and *X. provancheri* sp. n. (Figs 3b, g, h); the males and females of these species have irregular and discontinuous carinae on the occiput just behind the ocelli (Figs 2a–d). The females of *Xyalophora zarazagai* sp. n. can be distinguished easily from *X. clavata* by the shape of the scutellar spine, which is very short in *X. clavata* (Fig. 4a, c). The females of *X. zarazagai* sp. n. can be confused with those of *X. japonica* comb. n., but the strong carinae and the alveolate sculpture on the face, the frons and the occiput in the latter (Figs 1b, 2b) distinguishes them (Figs 1c, 2c). *Xyalophora zarazagai* sp. n. has a shorter scutellar spine than *X. provancheri* sp. n. and an interocellar area sculptured, while this area is smooth in *X. provancheri* sp. n.

Description

Length. 2.2 mm.

Coloration. Black. Antennae brown reddish. Legs redblackish, coxae black. Ventral part of metasoma redblackish. Venation light brown.

Head. Subquadrate in anterior view; 2.2 times longer than wide in dorsal view. Face with irregular carinae and barely visible rugose sculpture, frons with less sculpture, reaching ocelli (Fig. 1c); interocellar space carinate; transfacial line 1.3 times longer than eye's height. Relation POC : OOC : COC is 6 : 4.5 : 3, diameter of lateral ocellus 2. Genal sulcus costulate, projecting behind compound eyes. Occiput with subparallel carinae on basal area, becoming irregular and discontinuous in superior area (Fig. 2c).

Antennae (Fig. 3c). Clavate in females. F2 and F3 1.1 times longer than F1. F8–F10 1.3 times longer than wide. F11 globular. Sensilla beginning on F4, first segments slightly coriaceous.

Mesosoma (Figs 4c, 5c). Pronotal plate weakly incised dorsally; lateral areas of pronotum with sharp carinae on antero-ventral and dorsal areas, surface between them smooth, rest of pronotum nearly smooth. Mesopleura completely carinate, with defined coriaceous sculpture on anterior area. Scutum smooth and shiny, slightly coriaceous on basal area. Median sulcus of scutum clearly defined. Notauli percurrent, internal surface with transverse parallel carinae. Interfoveal carina below level of foveae. Scutellar foveae slightly carinate inside. Scutellar disk humped, strongly carinate and with coriaceous sculpture. Scutellar spine short, 1/4 of total length of scutellum.

Forewing. Radial cell closed, 1.9 times longer than wide (Fig. 6c). Setae present on surface and margin.

Males. Unknown.

Type material. Holotype ♀ from Germany, deposited in the CNCI with the following labels: "C-174, Germany, Mainz Germany, 18.IX–11.X.1965, A.V. Stephan" (white label); "Holotype desig.-2006, Jiménez & Pujade-Villar" (red label); "*Xyalophora zarazagai* sp. n. ♀ Jiménez & Pujade-Villar, det. 2006" (white label).

Etymology. Species dedicated to our friend Dr. Miguel Angel Alonso Zarazaga (Department of Biodiversity and Evolutionary Biology of the National Museum of Natural Sciences of Madrid) for the patience he has shown solving all our nomenclatural and taxonomic doubts over many years.

Distribution. Western Palaearctic. Known from Germany.

Key to Figitinae genera with scutellar spine

1 Internal sulcus of notauli with tranverse carinae (Figs 5a–g). Scutum with coriaceous sculpture at least on the basal area, adjacent to notauli (Figs 5a–g, 7a). Interfoveal carina below the foveae level (Fig. 4a–g). Radial cell closed (Figs 6a–i). Face completely sculptured in both sexes (Figs 1a–g, 7d). . . . . *Xyalophora* Kieffer, 1901

– Internal sulcus of notauli completely smooth (Fig. 5h). Scutum completely smooth (Fig. 5h). Interfoveal carina at the same level as the foveae (Fig. 4h), or exceeding it and shaped like a tooth [Fig. 2e in Jiménez et al. (2005c)]. Radial cell open or partially open (Figs 6j–k). Face of the males with two areas smooth and shiny (Fig. 7e), in the females with radiating carinae. 2

2 Scutellum always rugose, ending in a very short spine, at most 1/10 of the total length of the scutellum (Fig. 5h). Wings always glabrous; radial cell partially closed (Fig. 6j). Male antenna with F1 larger than the rest of segments. . . . . *Xyalophoroides* gen. n. Jiménez & Pujade-Villar

– Scutellum carinate, never rugose, ending with a spine that is around 1/3 or more of the total length of the scutellum, rarely very short. Wings often with setae on the disk and the margin; radial cell open (Fig. 6k), sometimes with the vein R1 reaching a small portion of the wing margin. Male antenna with F1 smaller than the remaining segments or at most subequal. . . . . *Neralsia** Cameron, 1883

Males of *Xyalophora* can be differentiated from the males of *Neralsia* and *Xyalophoroides* gen. n. by their completely sculptured face; in *Neralsia* and *Xyalophoroides* gen. n. there are two smooth and shiny areas below the toruli.

Key to *Xyalophora* species

1 Scutellum point-shaped (Fig. 4a); scutellar spine very short, at most 1/6 of the total length of the scutellum. Scutum often completely coriaceous, more so the posterior area. Antennae clavate in females (Fig. 3g). . . . . *Xyalophora clavata* (Giraud, 1860)

– Scutellum ending in a sharp spine; scutellar spine longer, at least 1/4 of the total length of the scutellum (Figs 4b–g). Surface of the scutum variable, never completely coriaceous. Antennae variable in the females. 2

2 Occiput behind the ocelli rugose, with discontinuous carinae, or with carinae directed towards the ocellar area; laterals of the occiput and basal area with parallel carinae (Figs 2b–d). Females with clavate antennae (Figs 3b, c, h). 3

– Occiput, even behind the ocelli, with transverse carinae, continuous and parallel or subparallel, with a slightly visible, weak incision on the dorsomedian part (Figs 2e–g). Females with moniliform antennae (Figs 3d–f). 5

3 Frons and interocellar area with strong alveolate sculpture (Fig. 1b). Occiput with strong irregular carinae and with alveolate sculpture (Fig. 2b). . . . . *Xyalophora japonica* (Belizin, 1952)

– Sculpture on the frons and interocellar area different (Figs 1c–d). Occiput with parallel carinae, sometimes continuous (Figs 2c–d). 4

4 Scutellar spine short, 1/4 of the total length of the scutellum (Fig. 3c). Occiput with irregular and discontinuous carinae in the superior area (Fig. 2c). Interocellar area carinate (Fig. 2c). . . *Xyalophora zarazagai* Jiménez & Pujade-Villar sp. n.

– Scutellar spine longer, a bit more than 1/3 the total length of the scutellum (Fig. 3d). Occiput with some arcuate carinae, parallel in the inferior area, and with dorsal carinae towards the lateral ocelli, separated in the middle by a smooth surface (Fig. 2d). Interocellar area smooth (Fig. 2d). . . . . *Xyalophora provancheri* Jiménez & Pujade-Villar sp. n.

5 Mesopleura completely carinate transversally with no other kind of sculpture (Fig. 4e). Occipital carinae parallel, fine and dense (Fig. 2e). Female antenna with F8–F10 subquadrate (Fig. 3f). . . . . *Xyalophora belizini* Jiménez & Pujade-Villar sp. n.

– Mesopleura completely carinate, anteriorly with an alveolate sculpture (Figs 4f–g). Occipital carinae subparallel, broad and less dense (Figs 2f–g). Female antenna with F8–F10 1.3 times longer than wide (Figs 3d–e). 6

6 Interfoveal carina visible, but placed below the level of the foveae, slightly delimiting two distinct scutellar foveae (Fig. 5f). Median sulcus of the scutum very short, forming an equilateral triangle (Fig. 5f). . . . . *Xyalophora singularis* (Ashmead, 1896)

* In some species the wing margin of the radial cell is more or less intensely shaded, which can be confused with a vein. Careful examination reveals that the marginal vein of the radial cell is completely absent in all the species of *Neralsia*. For this reason, we must rectify the description of the radial cell in Jiménez et al. (2005c) for *Neralsia ellongata* and *N. paraellongata*, and in Jiménez et al. (2006) for *N. hermaphrodita*; these species have the radial cell open and not closed, as is stated in these studies.

– Interfoveal carina much below the level of the foveae, almost insignificant, scutellar foveae appear to be fused (Fig. 5g). Median sulcus of the scutum long, forming an isosceles triangle (Fig. 5g). . . . . *Xyalophora giraudi* Jiménez & Pujade-Villar sp. n.

Phylogenetic analysis

The results of the phylogenetic analysis presented in figure 8, consists of a strict consensus of three trees with a length of 26 steps, CI: 0.80 RI: 0.91, with the jacknife supports given. Two clear clades are separated: one with all the species of *Xyalophora* (well supported, jacknife value 92), and another with *Xyalophoroides* + *Neralsia*. The only species of *Xyalophoroides*, *X. quinquelineata*, was not included in *Neralsia* because this genus is well supported (jacknife 92) and well defined by three synapomorphies: a radial cell open (1 : 0), a scutellum carinate (7 : 1) and a F1 in male antenna only slightly shorter or subequal to F2 (10 : 2). In addition, the support value for the *Xyalophoroides* + *Neralsia* branch is weak (jacknife 48). The unique apomorphy of *Xyalophoroides* is the glabrous forewing (9 : 0). Thus, *Xyalophoroides* is phylogenetically well distinguished from both *Neralsia* and *Xyalophora*, and the erection of a new genus for *X. quinquelineata* is in our opinion justified.

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