

## Revision of *Alloxysta* from the Curtis collection (Hymenoptera: Figitidae: Charipinae) deposited in Museum Victoria (Australia)

MAR FERRER-SUAY<sup>1,\*</sup>, JESÚS SELFA<sup>2</sup>, MIGUEL A. ALONSO-ZARAZAGA<sup>3</sup> AND JULI PUJADE-VILLAR<sup>1</sup>

<sup>1</sup> Universitat de Barcelona, Facultat de Biologia, Departament de Biologia Animal, Avda. Diagonal, 645, 08028-Barcelona, Spain (jpujade@ub.edu; mar.ferrer.suay@gmail.com)

<sup>2</sup> Universitat de València, Facultat de Ciències Biològiques, Departament de Zoologia, Campus de Burjassot-Paterna, Drive Moliner 50, 46100-Burjassot, València, Spain (jesus.selfa@uv.es)

<sup>3</sup> Museo Nacional de Ciencias Naturales, Departamento de Biodiversidad y Biología Evolutiva, José Gutiérrez Abascal, 2, 28006-Madrid, Spain (zarazaga@mncn.csic.es)

\* To whom correspondence and reprint requests should be addressed. E-mail: mar.ferrer.suay@gmail.com

### Abstract

Ferrer-Suay, M., Selfa, J., Alonso-Zarazaga, M.A. and Pujade-Villar, J. 2013. Revision of *Alloxysta* from the Curtis collection (Hymenoptera: Figitidae: Charipinae) deposited in Museum Victoria (Australia). *Memoirs of Museum Victoria* 70: 11–16.

*Alloxysta* types from the Curtis collection have been examined. Three species of this genus are deposited in Museum Victoria: *Alloxysta fulviceps* (Curtis, 1838), *A. pallidicornis* (Curtis, 1838) and *A. pedestris* (Curtis, 1838). *A. fulviceps* was treated in a previous work. *A. pallidicornis* and *A. pedestris* are here considered valid species. Redescription and complete plates are presented for each species.

### Keywords

Charipinae, *Alloxysta*, Curtis, Museum Victoria

### Introduction

Subfamily Charipinae, with its many described species, has always been characterised by problematic taxonomy. In some cases the borders between species are not very clear. This subfamily comprises very small wasps with smooth and shiny bodies. Eight different genera are currently considered valid: *Alloxysta* Förster, 1869 (cosmopolitan), *Apocharips* Fergusson, 1986 (Palaeartic and Neotropic), *Dilapothor* Paretas-Martínez and Pujade-Villar, 2006 (Australia), *Dilyta* Förster, 1869 (cosmopolitan except Australia), *Lobopterocharips* Paretas-Martínez and Pujade-Villar, 2007 (Nepal), *Lytoxysta* Kieffer, 1909 (North America), *Phaenoglyphis* Förster, 1869 (cosmopolitan) and *Thoreauana* Girault, 1930 (Australia).

*Alloxysta* is the most speciose genus within this subfamily, with more than 100 valid species (Ferrer-Suay *et al.*, 2012a). They are widely distributed throughout the world. *Alloxysta* is a very complicated genus with a large number of species that are very difficult to identify, their small size and few diagnostic features making this task difficult. The most important characters for distinguishing between *Alloxysta* species are: (i) proportion of flagellomeres; (ii) presence or absence of pronotal carinae; (iii) presence or absence of propodeal carinae, and, if present, their shape; and (iv) size and shape of the radial cell. *Alloxysta* species are hyperparasitoids of aphids viz Aphidiinae (Hymenoptera: Ichneumonoidea: Braconidae)

and Aphelininae (Hymenoptera: Chalcidoidea: Aphelinidae). The first step in revising each species is to examine the type material on which the original descriptions are based to determine whether the species can be considered valid. Recently, other important collections of the genus *Alloxysta* have been studied: the Belizin collection deposited at the Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia (Ferrer-Suay *et al.*, 2012b); the Ionescu collection deposited at the ‘Grigore Antipa’ National Museum of Natural History, Bucharest, Romania (Ferrer-Suay *et al.*, 2012c); the Thomson and Zetterstedt collections deposited at the Lund Museum of Zoology, Sweden (Ferrer-Suay *et al.*, 2013); the Hartig collection deposited at the Zoologische Staatssammlung Museum, München, Germany (Ferrer-Suay *et al.*, in prep.); the Hellén collection deposited at the Finnish Museum of Natural History, Helsinki, Finland (Ferrer-Suay *et al.*, in prep.); the Cameron and Fergusson collections deposited at the British Museum (Natural History), London, England (Ferrer-Suay *et al.*, in prep.); and the Andrews, Ashmead and Baker collections deposited at the United States National Museum of Natural History (Smithsonian Institution), Washington DC, USA, and at the Canadian National Collection of Insects, Ottawa, Canada (Ferrer-Suay *et al.*, in press).

Only three species of those deposited in Curtis’s collection at Museum Victoria (MV) belong to *Alloxysta*: *A. fulviceps*

(Curtis, 1838), *A. pallidicornis* (Curtis, 1838) and *A. pedestris* (Curtis, 1838). *Alloxysta fulviceps* was treated in a previous work (Pujade-Villar *et al.*, 2011). Here the other two *Alloxysta* species are revised and considered to be valid. A redescription and a complete plate of each species are presented.

### Material and methods

To preserve type material specimens they were studied using stereomicroscopy (NIKON SMZ-1), and photographed in a Zeiss Discovery V8 compound microscope with an attached INFINITYX-21C digital camera that fed image data to a notebook or desktop computer; the program DeltaPix View-Pro AZ was then used to merge an image series (typically representing 20 focal planes) into a single in-focus image.

All photographs have been taken from type specimens. The decision of whether to consider *A. pallidicornis* and *A. pedestris* as valid species was taken after comparing them with known *Alloxysta* species. In the *A. pedestris* plate, the male antenna is covered by glue so the boundaries between flagellomeres have been marked to allow easier differentiation.

The morphological terms used are drawn from Paretas-Martínez *et al.* (2007). Abbreviations for the first and subsequent flagellomeres are F1–F12. Measurements in antennal formulae are given as length (width); these are listed from pedicel to F4. The width of the forewing radial cell is measured from the margin of the wing to the beginning of the Rs vein. The transfacial line is the distance between the inner margins of the compound eyes, measured across the face through the antennal sockets, divided by the height of the eye. The malar space is the measured distance from the lower part of the gena from the mouthparts to the ventral margin of the compound eye, divided by the height of the eye. Females and males of the species described have the same characters except where indicated in the redescrptions.

### Results and discussion

#### *Alloxysta pallidicornis* (Curtis, 1838)

Figure 1

**Combinations of *Cynips pallidicornis*** Curtis, 1838 (Curtis, 1838, p. 688); *Alloxysta pallidicornis* (Curtis) Quinlan and Fergusson, 1981 (Quinlan and Fergusson, 1981, p. 254).

**Type material of *Cynips pallidicornis*** Curtis. Lectotype ♀ (deposited in MV) with the following labels: ‘Holotype’ (round label with red margins), ‘Holotype of *Cynips pallidicornis* Curt. det. Fergusson and Quinlan 1980’, ‘*Alloxysta forticornis* (Gir.) ♀ det. J. Quinlan, 1980’, ‘MUS. VIC. ENTO 2011-IIL’ (green label), ‘Lectotype *Cynips pallidicornis* Curtis ♀ design. M. Ferrer-Suay 2013’, ‘*Alloxysta pallidicornis* (Curtis, 1838) ♀ M. Ferrer-Suay det. 2011’.

#### Redescription

**Colouration.** Head yellowish brown; mesosoma and metasoma dark brown; scape brown, pedicel and all flagellomeres yellowish brown; legs and veins yellowish brown.

**Head.** Transversally ovate, smooth and shiny, slightly wider than high in front view; with setae below, between and a few

above toruli; with few setae on vertex and with many setae on face; transfacial line 1.2 times height of eye; malar space 0.6 times height of eye (fig. 1c).

**Antenna.** Female: 13-segmented, filiform; all antennomeres covered with sparse setae; F1 thinner and smoother than remaining flagellomeres, F2–F11 with rhinaria and club shaped; antennal formula: 2.3 (1.6); 6.5 (1.2); 4.5 (1.5); 4.0 (1.5); 4.0 (1.5) (fig. 1d). Male unknown.

**Mesosoma.** Pronotum entirely covered by setae, with two long, thick carinae clearly visible (fig. 1e); mesoscutum smooth and shiny, round in dorsal view with scattered setae; scutellum also smooth and shiny with scattered setae, which are more abundant on apex of scutellum; height of mesopleural triangle along anterior margin 1.6 times height of mesopleuron; propodeum covered with abundant pubescence, with carinae well defined and separated by setae in anterior half and forming a plate in posterior half (fig. 1f).

**Forewing.** Longer than body, 1.4 times as long as mesosoma and metasoma together (fig. 1a); covered with dense pubescence; marginal setae present. Open radial cell, 2.6 times as long as wide; R1 short and slightly curved; Rs long and also slightly curved (fig. 1b).

**Metasoma.** Anterior part with an incomplete ring of setae, glabrous at centre, wider laterally; metasoma smooth and shiny, T3 and T4 clearly visibly distinguished.

**Distribution.** Holarctic.

**Comments.** According to Quinlan and Fergusson (1981), *Alloxysta pallidicornis* (Curtis) is represented in the Curtis collection by four specimens, but only one fits the original description; the other three are *Synergus* species. Quinlan and Fergusson’s (1981) ‘holotype’ designation is to be considered a lectotype designation according to Article 74.6 of the International Code of Zoological Nomenclature (ICZN, 1999), since the original description gives no information about the number of specimens used by Curtis for his description. We hereby consider this specimen to be a lectotype.

#### *Alloxysta pedestris* (Curtis, 1838)

Figure 2

**Combinations of *Cynips pedestris*** Curtis, 1838 (Curtis, 1838, p. 688); *Allotria pedestris* (Curtis) (Cameron, 1886, p. 88); *Nephycta pedestris* (Curtis) (Kieffer, 1900, p. 114); *Alloxysta pedestris* (Curtis) (Hellén, 1963, p. 19).

**Type material of *Cynips pedestris*** Curtis. Lectotype ♂ designated by Quinlan and Fergusson (1981, p. 255) (deposited in MV) with the following labels: ‘Lectotype’ (round label with blue in the margin), ‘Holotype of *Cynips pedestris* Curt. det. Fergusson and Quinlan 1980’, ‘ENT-936’, ‘*Alloxysta pedestris* (Curtis, 1838) ♂ M. Ferrer-Suay det. 2011’. Paralectotype with the following labels: ‘Paralectotype’ (round label with blue in the margin), ‘Type’ (round label with red in the margin), ‘Type of *Cynips pedestris* Curt., G.J. Kerrich det. 1948, = *Pezophycta* p. ♀’, ‘MUS. VIC. ENTO 2011-IIL’ (green label), ‘*Alloxysta pedestris* (Curtis, 1838) ♀ M. Ferrer-Suay det. 2011’.



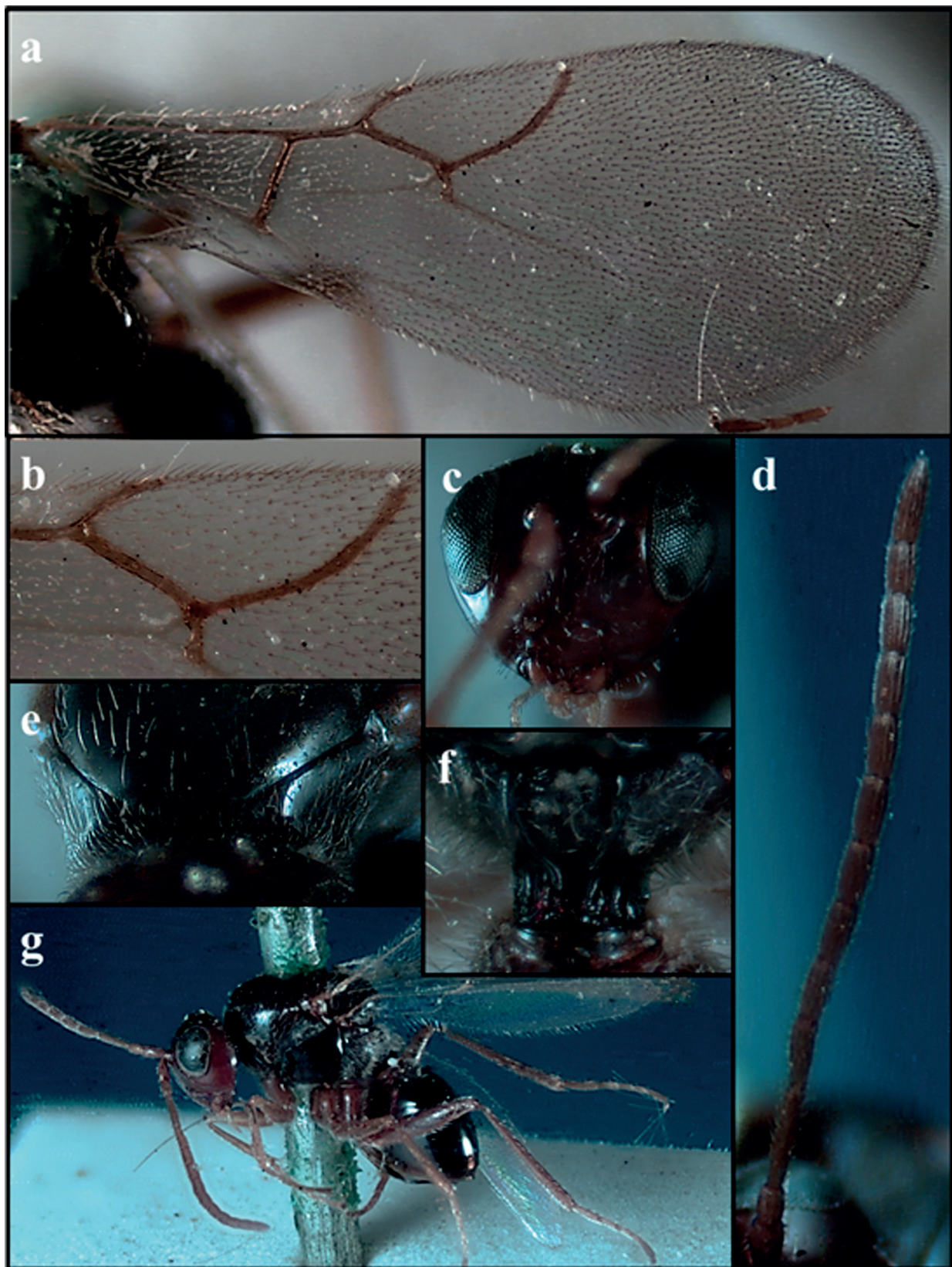


Figure 1. *Alloxysta pallidicornis* (Curtis, 1838): (a) forewing; (b) radial cell; (c) head; (d) antenna; (e) pronotum; (f) propodeum; (g) body.



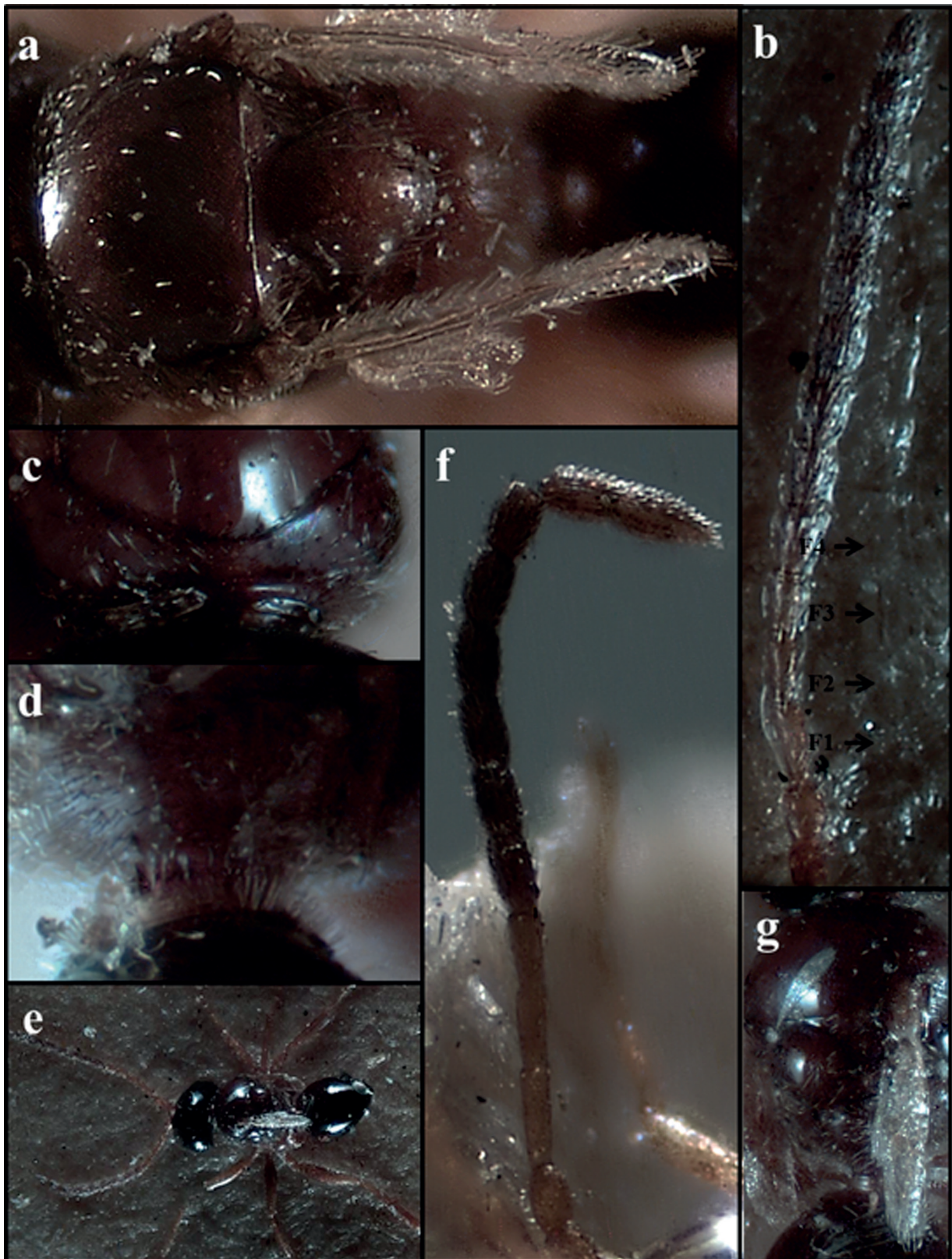


Figure 2. *Alloxysta pedestris* (Curtis, 1838): (a) mesoscutum female; (b) antenna male; (c) pronotum; (d) propodeum; (e) body male; (f) antenna female; (g) mesoscutum male.

## Redescription

**Colouration.** Head and metasoma dark brown; mesosoma brown; scape yellowish brown; pedicel–F3 dark yellow, and F4–F12 brown; legs dark yellow.

**Head.** It cannot be seen.

**Antenna.** Female: 13-segmented, filiform; all antennomeres covered with sparse setae; F1–F3 thinner and smooth than remaining flagellomeres; F4–F11 with rhinaria and club shaped; antennal formula: 2.7 (1.8); 4.0 (1.1); 3.5 (1.1); 3.0 (1.1); 3.5 (1.6) (fig. 2f). Male: 14-segmented, filiform; all antennomeres covered with sparse setae; F1–F3 thinner and smooth than remaining flagellomeres; F4–F12 with rhinaria and club shaped; antennal formula: 2.5 (2.0); 3.6 (1.1); 3.0 (1.2); 3.0 (1.2); 3.0 (1.5) (fig. 2b).

**Mesosoma.** Pronotum covered by few setae, almost absent on distolateral corners and in central area; without carinae present (fig. 2c); mesoscutum smooth and shiny, round in dorsal view with few scattered setae; scutellum also smooth and shiny with scattered setae, which are more abundant on apex of scutellum; height of mesopleural triangle along anterior margin 1.4 times height of mesopleuron; propodeum covered with setae, without carinae (fig. 2d).

**Forewing.** Shorter than body length, 2.8 times as short as mesosoma and metasoma together in both male and female (fig. 2a and g); covered with dense pubescence; marginal setae present; without radial cell.

**Metasoma.** Anterior part with an incomplete ring of setae, glabrous at centre, wider laterally; metasoma smooth and shiny, T3 and T4 clearly visibly distinguished.

**Distribution.** Palaearctic.

**Comments.** According to Quinlan and Fergusson (1981), *Alloxysta pedestris* (Curtis) is represented by three specimens in the Curtis collection (two males and one female). One male was designated by Quinlan and Fergusson (1981) as the lectotype because it corresponds more precisely with the original description; the female is considered to be a paralectotype; the other male cannot be a syntype because of the date. As a result of this, the type series of *Alloxysta pedestris* consists of just two specimens, lectotype male and paralectotype female, here studied.

***Alloxysta victrix*** (Westwood, 1833)

(= *Cynips fulviceps* Curtis, 1838)

**Combinations of *Cynips fulviceps*** Curtis (Curtis, 1838, p. 688); *Allotria fulviceps* (Curtis) (Kieffer, 1900, p. 114); *Allotria (Allotria) fulviceps* (Curtis) (Dalla Torre and Kieffer, 1902, p. 41); *Charips (Charips) fulviceps* (Curtis) (Dalla Torre and Kieffer, 1910, p. 288); *Alloxysta fulviceps* (Curtis) (Fitton, 1978, p. 65); *Alloxysta victrix* (Westwood) (Pujade-Villar *et al.*, 2011, p. 68).

The study of *Alloxysta fulviceps* (Curtis) type material was recently treated in a previous paper (Pujade-Villar *et al.*, 2011). The type series consists of three specimens; Kerrich designated the holotype in 1948 without publishing it. Quinlan and

Fergusson (1981) published Kerrich's conclusions. This specimen cannot be the holotype but must be the lectotype, according to Article 74.6 of the International Code of Zoological Nomenclature (ICZN, 1999), because Curtis did not mention the number of specimens used for its description. On the other hand, this specimen was considered lost according to Catriona McPhee (pers. comm., 21 Feb 2011). For this reason Pujade-Villar *et al.* (2011) designated a new lectotype for this species after thoroughly studying the original description by Curtis. In the same paper, *A. fulviceps* was considered to be a new synonym of *Alloxysta victrix* (Westwood, 1833).

However, after revising the Curtis collection the 'holotype' designated by Kerrich has been found. Due to several characters differing from Curtis's original description it cannot be considered a syntype of *Cynips fulviceps* and it is here rejected as such: (i) the mesosoma and metasoma are not dark as Curtis mentioned in his description, they are brown; (ii) the base of the antennae are not ochre, they are yellowish; (iii) the club shape and brown colour of antennae begin on F4, not at the base as Curtis mentioned in his description; (iv) F1 is much longer than F2, not merely 'scarcely longer' as Curtis described; (v) in Curtis's description, the shape of the radial cell is not mentioned, so the decision of choosing a specimen with closed or partially open radial cell is not decisive to design the lectotype. For all these reasons, and according to Article 74.2 of the International Code of Zoological Nomenclature (ICZN, 1999), this specimen loses its status as lectotype, and the true lectotype of *Cynips fulviceps* Curtis is the specimen designated by Pujade-Villar *et al.* (2011). So, this species is a synonym of *Alloxysta victrix*, as Pujade-Villar *et al.* (2011) proposed.

## Acknowledgements

We are very grateful to Catriona McPhee, Collection Manager, Insects and Spiders, Museum Victoria (Melbourne, Australia) for sending us the Curtis types. This research was supported by Projects CGL2008-00180 and CGL2011-22889 of the Science and Innovation Ministry of Spain, and Grant AP2009-4833 of the Education Ministry of Spain.

## References

- Cameron, P. 1886. The fauna of Scotland, with special reference to Clydesdale and the western district. *Proceedings of the Natural History Society of Glasgow* 3: 53–95.
- Curtis, J. 1838. *British entomology; being illustrations and descriptions of the genera of insects found in Great Britain and Ireland: containing coloured figures of nature of the most rare and beautiful species, and in many instances of the plants upon which they are found*. Privately published: London. 15: 674–721.
- Dalla Torre, K.W., and Kieffer, J.J. 1902. *Cynipidae*. In: P. Wytsman, *Genera Insectorum, Vol. I*. Brussels, pp. 1–84.
- Dalla Torre, K.W., and Kieffer, J.J. 1910. *Das Tierreich XXIV: Cynipidae*. R. Friedlander and Sons: Berlin. 24: 891 pp.
- Fergusson, N.D.M. 1986. Charipidae, Ibalidae and Figitidae (Hymenoptera: Cynipoidea). *Handbook of Identification British Insects* 8(1c): 1–55.

- Ferrer-Suay, M., Paretas-Martínez, J., Selfa, J., and Pujade-Villar, J. 2012a. Taxonomic and synonymic world catalogue of the Charipinae and notes about this subfamily (Hymenoptera: Cynipoidea: Figitidae). *Zootaxa* 3376: 1–92.
- Ferrer-Suay, M., Selfa, J., and Pujade-Villar, J. 2012b. Revision of Belizin collection of *Alloxysta* (Hymenoptera: Figitidae: Charipinae) deposited in Zoological Institute of the Russian Academy of Sciences. *Zoosystematica Rossica* 21(2): 279–290.
- Ferrer-Suay, M., Selfa, J., and Pujade-Villar, J. 2012c. Revision of Ionescu type material related with *Alloxysta* genus (Hym., Figitidae: Charipinae) deposited in the Muzeul de Istoria Naturala “Grigore Antipa”, Bucharest, Romania. *Travaux du Museum d’Histoire Naturelle «Grigore Antipa»* 55(2): 277–284.
- Ferrer-Suay, M., Selfa, J., and Pujade-Villar, J. 2013. Revision of Thomson and Zetterstedt collections of *Alloxysta* genus deposited in Lund Museum of Zoology (Sweden). *Entomologisk Tidskrift* 134: 77–102.
- Fitton, M.G. 1978. A check list of British insects by George Sidney Kloet and the late Walter Douglas Hincks, second edition (completely revised). Part 4: Hymenoptera. *Handbooks for the identification of British insects*, 11(4): 159 pp.
- Hellén, W. 1963. Die Alloxystininen Finnlands (Hymenoptera: Cynipidae). *Fauna Fennica* 15: 1–23.
- ICZN (International Commission on Zoological Nomenclature). 1999. *International code of zoological nomenclature*, 4th edition. The International Trust for Zoological Nomenclature: London.
- Kieffer, J.J. 1900. Ueber Allotrinen. *Wiener Entomologische Zeitung* (in German) 19: 112–115.
- Paretas-Martínez, J., Arnedo, M.A., Melika, G., Selfa, J., Seco-Fernández, M.V., Fülöp, D., and Pujade-Villar, J. 2007. Phylogeny of the parasitic wasp subfamily Charipinae (Hymenoptera, Cynipoidea, Figitidae). *Zoologica Scripta* 36: 153–172.
- Pujade-Villar, J., Ferrer-Suay, M., Selfa, J., and Alonso-Zarazaga, M.A. 2011. What is *Alloxysta fulviceps* (Curtis, 1838) (Hymenoptera: Cynipoidea: Figitidae: Charipinae)? *Memoirs of Museum Victoria* 68: 67–70.
- Quinlan, J., and Fergusson, N.D.M. 1981. The status and identity of the Cynipoidea (Hymenoptera) described by J. Curtis. *Entomological Gazette* 32: 251–256.
- Westwood, J.O. 1833. Notice of the habits of a Cynipidous insect parasitic upon the *Aphis rosae* with descriptions of several other parasitic Hymenoptera. *Magazine of Natural History* 6: 491–497.