TAXONOMIC REVISION OF THE ALLOYSTA BREVIS GROUP
(HYMENOPTERA, CYNIPOIDAEA, FIGITIDAE, CHARIPINAE)

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Introduction

The members of subfamily Charipinae (Hymenoptera: Cynipoidea: Figitidae) are biologically characterized as hyperparasitoids of aphids (Hemiptera: Aphididae) via Aphidiinae (Hymenoptera: Ichneumonoidea: Braconidae) and Aphpelini- nae (Hymenoptera: Chalcidoidea: Aphiolinidae) and hyperpara- rasitoids of psyllids (Hemiptera: Psyllidae) via Encyrtidae (Hymenoptera: Chalcidoidea). They are very small wasps widely distributed around the world. As hyperparasitoids, they have a significant harmful effect on biological control programs carried out by primary parasitoids on their hosts (Müller et al., 1999).

The identification of Charipinae species is problematic because of their small size, usually smooth integument and low interspeciﬁc variability. Alloysta Förster, 1869 is the most abundant, diverse and widely distributed genus within this subfamily, and sometimes misidentifications and errone- ous synonymsies occur. For this reason, we have embarked on the study of the type material of the Charipinae. Alloysta brevis (Thomson, 1862) is one of the problematic cases and, in this paper, we clarify its status. Recently, the status of Alloysta fulviceps (Curtis, 1838) was clarified (Pujade-Villar et al., 2011).

Alloysta brevis was described by Thomson (1862) as Allotria brevis. Dalla Torre & Kieffer (1910) transferred this species to Charips and Andrews (1978) to Alloysta. Fergus- son (1986) synonymized three species with A. brevis: A. mullensis (Cameron, 1883), A. arcuata (Kieffer, 1902) and Charips (Charips) castaneiceps (Kieffer, 1904). On the other hand, Evenhuis (1976) described Alloysta ligustri, a species which according to its author is morphologically similar to A. arcuata, now named A. brevis after Fergusson (1986).

Our studies indicate that the taxon A. brevis as currently delimited is heterogeneous and might include several species. For this reason, the type material was examined. This “brevis group” is defined by very small specimens, with small closed radial cells, small flagellomeres very similar to each other and a propodeal plate in the center of the propodeum.

Material and methods

Type material of Alloysta brevis, A. arcuata, A. mullensis, A. darci (Girault, 1933) and A. ligustri has been examined. Unfortunately, the type material of Charips castaneiceps, deposited in the Muséum d’Histoire Naturelle (Amiens, France) according to Dessart (1969), is not currently available (Villemant pers. comm.). Also, we have examined specimens determined by Evenhuis as A. arcuata, A. brevis and A. mullen- sis and specimens collected in different countries related to the “brevis group”. Finally, we have examined the type material and additional material from Mary Carver’s collection of A. darci.

The institutions mentioned in this study and their abbreviations are:

ANIC: Australian National Insect Collection (CSIRO) (Canberra, Australia).
QM: Queensland Museum (Brisbane, Australia).

Abstract: The validity of Alloysta brevis (Thomson, 1862) and its synonyms is investigated. After studying the relevant types, Alloysta arcuata (Kieffer, 1902) and A. mullensis (Cameron, 1883) have been considered valid species and are removed from syn- onymy with A. brevis, while A. castaneiceps (Kieffer, 1904) is considered as a nomen inquirendum. Lectotypes of A. arcuata, A. brevis and A. mullensis are designated. Alloysta darci (Girault, 1933) has been confirmed as a valid species. Finally, Alloysta ligu- stri Evenhuis, 1976 is synonymized with A. arcuata n. syn. Morphological features of these species are discussed and illustrated. A key for all valid species involved in this study is given.

Key words: Hymenoptera, Figitidae, Charipinae, Alloxysta brevis, Alloxysta arcuata, Alloxysta mullensis, Alloxysta darci, taxonomy.

Revisión taxonómica del grupo Alloxysta brevis (Hymenoptera, Cynipoidea, Figitidae, Charipiniae)

Resumen: Se analiza la validez de Alloxysta brevis (Thomson, 1862) y sus sinónimos. Tras el estudio de los tipos pertinentes, Alloxysta arcuata (Kieffer, 1902) y A. mullensis (Cameron, 1883) se consideran especies válidas y no como sinónimos de A. brevis, mientras que A. castaneiceps (Kieffer, 1904) se considera nomen inquirendum. Se designan lectotipos para A. arcuata, A. brevis y A. mullensis. Se confirma Alloxysta darci (Girault, 1933) como especie válida, y se sinonimiza Alloxysta ligustri Evenhuis, 1976 con A. arcuata n. syn. Se comentan e ilustran los rasgos morfológicos de estas especies, y se incluye una clave para todas las espe- cies válidas implicadas en este estudio.

Palabras clave: Hymenoptera, Figitidae, Charipinae, Alloxysta brevis, Alloxysta arcuata, Alloxysta mullensis, Alloxysta darci, taxonomía.
To preserve the type material, the specimens were photographed by a Zeiss Discovery.V8 compound microscope with an attached INFINITY2-21C digital camera. The computer program DeltaPix View-Pro AZ was used to obtain a single in-focus image starting from a series of 20 focal planes (Fig. 1-4). Other specimens were photographed using a field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) for high-resolution imaging without gold-coating of specimens (Fig. 5).

Traditionally the features used by authors to distinguish Charipinae species are very superficial; their small size and shiny-smooth body have made the taxonomy of Charipinae very complicated. There are two characters that are very important to separate species, which were not taken into account by the first authors who described a large number of species and established a lot of synonyms: pronotal carinae and propodeal carinae. These morphological structures should be given special attention. Charipinae rarely have a defined pronotal plate but many species have two lateral carinae of variable length, which correspond to the lateral limits of the pronotal plate. In some species these carinae are completely absent, so the pronotal plate is not defined. Propodeal carinae are also variable between Charipinae species and, as with the pronotal carinae, they have great taxonomic importance. Although these propodeal carinae are not present in some species, they are present in the majority of them. They can be narrow, straight or curved. In most Alloxysta species the propodeal carinae are widened and joined at the base, forming a more or less defined propodeal plate. We have especially used these features as a basis in order to revise the “brevis” group (A. arcuata = A. brevis = A. castaneiceps = A. mullensis) and the related species (A. ligustri and A. darci). Morphological features of A. arcuata, A. brevis, A. darci and A. mullensis are illustrated in Fig. 1-4. Fig. 5 shows the detail of the propodeum and pronotum of each valid species described here.

Descriptions are based on type material and the range of geographical variability is included. The material from Andorra was collected by Dr. Juli Pujade-Villar [this material has been mentioned in Ferrer-Suay et al. (2011)]. The material from Iran was collected by E. Rakhshani; this material (including hosts) will be dealt with in Ferrer-Suay et al. (2007); the most important taxonomic characters are:

- Pronotal carinae present (Fig. 1g). Propodeal carinae strongly curved and very divergent anteriorly, angulated posteriorly (Fig. 5e) ................. A. arcuata (Kieffer, 1902)
- Pronotal carinae absent (Fig. 2e, 3e, 4e). Propodeal carinae slightly curved or subparallel or, less commonly, divergent anteriorly (Fig. 5f-h) .......................... 2

1 F1 subequal to pedicel and longer than F2; F2 subequal to F3 (Fig. 4e); propodeal carinae subparallel anteriorly and very slightly curved posteriorly (Fig. 5h) .............. A. mullensis (Cameron, 1883)
- F1 shorter than pedicel, F1-F3 subequal or sometimes F1 very slightly longer than F2 and F2 equal to F3; propodeal carinae variable ........................................ 3

3 Antennae subequal or longer than body length (Fig. 3f). Forewing with long setae in all marginal apices (Fig. 3a); propodeal carinae subparallel anteriorly and very slightly curved posteriorly (Fig. 5g) .... A. darci (Girault, 1933)
- Antennae shorter than body length (Fig. 2d). Forewing with long setae in basal half of marginal apex (Fig. 2a); propodeal carinae slightly curved and divergent anteriorly (Fig. 5f) ................................. A. brevis (Thomson, 1862)

Alloxysta arcuata (Kieffer, 1902) stat. rev.

Fig. 1, 5.
Alloxysta minuta (Hartig, 1840) det. Cameron (misidentification).
Allotria (Allotria) arcuata Kieffer, 1902: 12.
Charips (Charips) arcuata (Kieffer) Dalla Torre & Kieffer, 1910: 277.

MATERIAL EXAMINED.


Fig. 1. Alloxysta arcuata (Kieffer, 1902), female: a) forewing; b) antenna; c) radial cell; d) propodeum; e) body; f) detail of antenna; g) pronotum.

Fig. 1. Alloxysta arcuata (Kieffer, 1902), hembra: a) ala anterior; b) antena; c) celda radial; d) propodeo; e) cuerpo; f) detalle de antena; g) pronoto.

**REDESCRIPTION**

**Length.** Female: 0.9-1.2 mm. Male: 0.8-1.2 mm.

**Coloration.** Head yellowish brown to brown in females (more yellowish in males). Mesosoma and metasoma dark brown. Scape, pedicel, F1 and F2 dark yellow, rest of flagellomeres brown. Legs yellowish. Veins yellowish brown.

**Head.** Transversally ovate, smooth and shiny, slightly wider than high in front view. With setae below and between toruli and with a few setae above toruli. Setae scarce or absent on vertex but abundant on face. Transfrontal line 1.2 times the height of compound eye. Malar space 0.5 times the height of compound eye.

**Antennae.** Female: 13-segmented, filiform. All antennomeres covered with sparse setae. Clava begins at F3 (more evident on F4); F4-F11 with clava and rhinaria. All antennomeres covered with sparse setae. F1 smooth and thinner than remaining ones; F2-F12 with clava and rhinaria. Antennal formula: 6 (3.5); 6 (2); 5 (2.5); 5 (3) (Fig. 1b, 1f). Male: 14-segmented, filiform. Male: 14-segmented, filiform. Antennal formula: 6 (4.5); 7 (4); 7 (3.5); 8 (3.5); 9 (3.5). Proximal part with an incomplete ring of setae; F1 subequal to pedicel in both sexes. Club-shaped and with rhinaria, in the male from F2 onwards, club-shaped and with rhinaria, in the male from F2 onwards; F1 subequal to pedicel in both sexes.

**Mesoroma.** Pronotum covered with sparse setae except a small area of the center, few setae on distolateral corners; with two lateral carinae clearly visible (Fig. 1g, 5a). Mesoscutum smooth and shiny, round in dorsal view with few scattered setae. Scutellum also smooth and shiny, with setae which are more abundant at apex of scutellum. Height of mesopleural triangle along anterior margin 1.7 times the height of mesopleuron. Propodeum covered with abundant pubescence; two wide propodal carinae, separated by setae at the top and forming a plate at the bottom, with sides much curved and very divergent anteriorly, angulated posteriorly (Fig. 1d, 5e).

**Forewings.** Longer than body, 1.5 times as long as mesosoma and metasoma together. Covered with dense pubescence; marginal setae present (Fig. 1a). Radial cell closed, 2.1-2.2 times as long as wide (Fig. 1c). R1 short and straight; Rs longer than R1 and slightly curved.

**Metasoma.** Proximal part with an incomplete ring of setae which is glabrous in the center and wider laterally. Remainder of metasoma smooth and shiny with terga clearly visible.

**DIAGNOSIS.** *Alloxysta arcuata* is mainly characterized by: a closed radial cell (Fig. 1c); pronotal carinae (Fig. 1g, 5a); a propodeal plate (Fig. 1d, 5e); female flagella, from F4 onwards, club-shaped and with rhinaria, in the male from F2 onwards; F1 subequal to pedicel in both sexes.

**DISTRIBUTION:**

**Confirmed distribution.** Western Palearctic. Species known from Spain (Kieffer 1902: 12), the Netherlands (Evenhuis 1976: 143), Andorra (mentioned here), Iran (mentioned here), Germany (mentioned here) and Mexico (mentioned here).


**CONFIRMED HOSTS.** Myzus liguistri (Mosley) on Ligustrum ovalifolium Hassk (according to Evenhuis 1976: 143); unidentified aphids collected through Euphorbia persicae Foggatt and possibly also other Euphorbia species, and Dysaphis plantaginina (Passerini) through Euphorbia persicae Foggatt (according to Evenhuis & Barbotin 1977: 189). *Aphis fabae* Scopoli through Lysiphlebus fabarum (Marshall), *Aphis fabae* Scopoli on Phaseolus vulgaris Linneaus, *Myzus cerasi* (Fabricius) through Prunus cerasus Linneaus, Prunus avium Linneaus, Stobion avaneus (Fabricius) through Aphis idus ervi Haliday on Triticum aestivum Linneaus, Zea mays Linneaus, Brachycoridus cilicchrysi (Kaltenbach) through Aphisidus matricariae Haliday on Zinia elegans, Capitophorus similis van der Goot on Eleagnus angustifolia Linneaus, Schizaphis graminum (Rondani) through Aphis rhopalosiphi De Stefani Perez on Triticum aestivum Linneaus, Macrosiphum rosae (Linneaus) through Aphis rosae Haliday on Rosa sp., *Aphis craccivora* Koch through Biondoxyx acalpephae (Marshall) on Glycyrrhiza glabra Linneaus, Brevicoryne brassicae (Linneaus) through Diacretietta rapae (M’Intosh) on Brassica oleracea Linneaus, Rhopalosiphum padi (Linneaus) on Zea mays Linneaus, *Aphis fabae* Scopoli through Euphorbia persicae Foggatt on Solanum lycopersicum Linneaus, *Aphis craccivora* Koch through Lysiphlebus fabarum (Marshall) on Glycyrrhiza glabra Linneaus, Aphis gossypii Glover on Solanum melongena Linneaus, Aphis ideai van der Goot on Rubus idaeus Linneaus, *Aphis nerii* Boyer de Fonsecolbe on Nerium oleander Linneaus, Aphis urticae Fabricius on Urtica dioica Linneaus, *Aphis craccivora* Koch on Robinia pseudoacacia Linneaus, *Therioaphis trifoli* (Monell) through Praon exsoletum (Nees) on Medicago sativa Linneaus, *Aphis fabae* Scopoli through Praon volucre (Haliday) on Solanum dulcamara Linneaus, Uroleucon sonchi (Linneaus) on Sonchus asper (Linneaus), Macrosiphum sp. on Lilium sp., Macrosiphum euphorbiae (Thomas) on Canna sp., Aphis fabae Scopoli, Rhopalosiphum padi (Linneaus) on Zea mays Linneaus, Rhopalosiphum padi (Linneaus) on Bromus sp., Lysiphlebus testaceipes (Cresson), *Aphis gossypii* Glover on Gossypium sp., *Myzus persicae* (Sulzer) on Citrus limon (Linnaeus), *Aphis gossypii* Glover on Haliaeetidae sp., Thalliphora sp. on Populus tremuloides Michx., *Aphis nerii* Boyer de Fonsecolbe on Nerium oleander Linneaus, *Aphis fabae* Scopoli on Malva sp., *Aphis gossypii* Glover through Lysiphlebus testaceipes (Cresson), *Dysaphis* sp. on Iris sp., Mentha piperita var. citrate Ehrh., Mentha pulegium var. spathulata Linneaus, Mentha spicata var. tashkent Linneaus (unpublished data).

**COMMENTS.** The type series of *Alloxysta arcuata* is represented by four specimens in BMNH, but only one of them is
considered to be *A. arcuata* according to the original description. Quinlan labelled a lectotype, but since the designation was not published, it is invalid, so we designate this specimen as a lectotype here. The other three specimens of the type series do not belong to *A. arcuata*; two of them (male and female) have an open radial cell which is completely incompatible with the description of this species and the third specimen (female) has a closed radial cell but differs in curvature of Rs vein and proportions of flagellomeres. These last three specimens are considered here to be non-conspecific paralectotypes.

The specimens determined by Cameron as *Allotria minuta* (Hartig) and deposited in the BMNH were considered by Kieffer (1902) as *Alloxysta arcuata* because he did not agree with Cameron’s conception of *A. minuta*. The characters that Hartig gave for *A. minuta* were very few and therefore this species has been differently interpreted by various authors (Evenhuis & Barbotin 1977). For this reason, the type material of *A. arcuata* should be sought among Cameron’s specimens in the London Museum (BMNH).

*Alloxysta arcuata* was synonymized by Fergusson (1986) with *A. brevis* without any explanation. After studying both type series we conclude that they are different species. *Alloxysta brevis* differs from *A. arcuata* by not having pronotal carinae (Fig. 5b) whereas *A. arcuata* does (Fig. 5a), and in antennae length, which is subequal or shorter than body length in *A. brevis*, but longer than body length in *A. arcuata*; the relative proportion of the antennomeres is also different in both species: F1-F3 are subequal and shorter in *A. arcuata* whereas *A. brevis* differs from *A. arcuata* in shape of propodeal carinae and size and shape of radial cell.

Moreover, Evenhuis (1976) described *A. ligustri*, a species which looks similar to *A. arcuata*. According to Evenhuis & Barbotin (1977) both species were differentiated by their size, color and bent keels on the propodeal carinae. After studying the type series of *A. ligustri* in comparison with the type series of *A. arcuata*, we concluded that they are similar in: proportions of flagellomeres, presence of pronotal carinae, shape of propodeal carinae and size and shape of radial cell.

**Material examined.**


Santa Coloma (ANDORRA), Trampa Malaise, VIII.92: 2♀; VI.93: 1♀; VII.93: 3♀; VIII.93: 1♀. Kerman (IRAN), X.2008: 1♀; Shanaq (IRAN), VI.2009: 1♀.

**Redescription.**

**Length.** Female: 0.8-0.9 mm. Male: 0.6-0.7 mm.

**Coloration.** Head, mesosoma and metasoma brown to dark brown. Scape brown; pedicel, F1-F3 dark yellowish, rest of flagellomeres brown. Legs yellowish brown. Veins yellowish brown.

**Head.** Transversally ovate, smooth and shiny, slightly wider than high in front view. With setae below and between toruli, absent above toruli. With few or no setae on vertex and with many setae on face. Transfacial line 1.1 times the height of compound eye. Malar space 0.5 times the height of compound eye.

**Antennae.** Female: 13-segmented, filiform. Antennal length subequal or shorter than body length. All antennomeres covered with sparse setae. F1-F3 smooth and thinner than remaining ones; F4-F11 with rhinaria and club-shaped. Antennal formula: 5 (2.5); 3 (1.6); 2.5 (1.6); 2.7 (1.6); 4 (2) (Fig. 2c). Male: as female, without any curved flagellomeres.

**Mesosoma.** Pronotum covered with sparse setae except for a small area in the center, few setae on distolateral corners; without carinae (Fig. 2e, 5b). Mesoscutum smooth and shiny, round in dorsal view with few scattered setae. Scutellum also smooth and shiny with setae present on lateral margins and on apex of scutellum. Height of mesopleural triangle along anterior margin more or less 1.4 times the height of mesopleuron. Propodeum covered with abundant pubescence; there are two wide carinae, separated by setae in the first third and forming a plate in the lower two thirds; sides of the plate slightly curved and divergent anteriorly (Fig. 2f, 5f).

**Forewings.** Longer than body, 1.5 times as long as mesosoma and metasoma together. Forewing covered by abundant pubescence; marginal setae present (Fig. 2a). Radial cell closed, 2.2 times as long as wide (Fig. 2b). R1 short and straight; R3 longer than R1 and curved.

**Metasoma.** Proximal part with an incomplete ring of setae which is glabrous in the center and wider laterally. Remainder of metasoma smooth and shiny with terga clearly visible.

**Diagnosis.** *Alloxysta brevis* is mainly characterized by: a small closed radial cell (Fig. 2b); pronotal carinae absent (Fig. 2e, 5b); a propodeal plate (Fig. 2f, 5f); in both sexes flagellar
Fig. 2. *Alloxysta brevis* (Thomson, 1862), female: a) forewing; b) radial cell; c) antenna; d) body; e) pronotum; f) propodeum.

Fig. 2. *Alloxysta brevis* (Thomson, 1862), hembra: a) ala anterior; b) celda radial; c) antena; d) cuerpo; e) pronoto; f) propodeo.
Alloxystra darci (Girault, 1933)

Fig. 3, 5.
Alloxystra d’arci Girault, 1933: 2.
Charips d’arci (Girault) Weld, 1952: 252.
Alloxystra darci (Girault) Carver, 1992: 777.

MATERIAL EXAMINED.
Type material of Alloxystra d’arci Girault: Holotype ♀ (deposited in QM) with the following labels, First label: “Alloxystra d’arci Girault ♀ type” (handwritten, in front), “Forest, Wynnnum” (handwritten, behind), Second label: “Charips d’arci (Gir.) EF Riek det 1953”, Third label: “Alloxystra darci (Girault) Mary Carver det. 1992”.


HOSTS:

Unconfirmed hosts. Aphis spp. through Lysephedrus sp., Myzus cerasi (Fabricius) and Dysaphis plantaginea (Passet-rini) through Epheirus persicae Frogatt (according to Fergusson 1986: 18); Aphis spp. through Lysephedrus sp., Myzus cerasi (Fabricius) and Dysaphis plantaginea (Passet-rini) through Epheirus sp. (according to Barczak 1991: 92); Hyperomyzus lactucae (Linnaeus) through Praon volucrum (Haliday) (according to Tizado & Núñez-Pérez 1993: 97); Capitophora cardui (sic) (Walter), Sitobion spp. (according to Müller et al. 1999: 346); Aphis fabae Scopoli through Trioxys angelicae (Haliday) on Eucapnos europeus Linnaeus (according to Hübner et al. 2002: 508); Uroleucon nigroterebulatum (Olive) through Aphelinus albipodus Hayat & Fatima on Solidago altissima (Linnaeus) (according to Takada & Nakamura 2010: 270).

COMMENTS. The type series of Alloxystra brevis is represented by nine specimens in MZLU. Only five of them are considered to be A. brevis because they match the original description, of which two are here established as a lectotype and a paralecotype respectively, because they were collected in Lund as mentioned in the original description. Two of them were also collected in Sweden, but in Båstad and Helsingborg, and the last one has no labels. As for the other four specimens, which cannot be considered as belonging to A. brevis, two of them are identified as A. arcuata and the other two have not been identified, but it is clear that they do not belong in the “brevis group” because the radial cell is longer, they have a different proportion of flagellomeres and one of them has pronotal carinae. Accordingly, the type series of A. brevis consists of the lectotype, the paralecotype, three A. brevis specimens and four non-conspecific paralecotypes.

Fergusson (1986) synonymized Charips (Charips) castaneiceps (Kieffer) with A. brevis without examining the type material. It is deposited in the Natural History Museum of Amiens (France) but it is not available for study (Villemant pers. comm.); after studying the description, we cannot say if this species belongs to A. brevis, A. arcuata, A. mullensis or any of them; for this reason we consider A. castaneiceps as a “nomen inquirendum”.

Segments, from F4 onwards, club-shaped and with rhinaria; F1 shorter than pedicel in both sexes; antennae subequal or shorter than body length in both sexes (Fig. 2c).

CONFIRMED DISTRIBUTION. Palaearctic and Neotropical.
**REDESCRIPTION.**

**Length.** Female: 0.7-1.1 mm. Male 0.7-1.1 mm.


**Head.** Transversally ovate, smooth and shiny, slightly wider than high in front view. With setae below and a few between toruli, absent above toruli. With few or no setae on vertex and with many setae on face. Transfacial line 1.2 times the height of compound eye. Malar space 0.5 times the height of compound eye (Fig. 3g).

**Antennae.** Female: 13-segmented, filiform. All antennomeres covered with sparse setae. Forewing is mainly characterized by: a) small closed radial cell (Fig. 3b); pronotal carinae absent (Fig. 3c, 5c); the propodeal carinae form a plate (Fig. 5f, 5g), the radial cell is closed and very small (Fig. 2b, 3b) and F1-F3 are slightly subequal (Fig. 2c, 3c). Carver (1992: 778) mentions two characters to differentiate these species: the orange-brown coloration of A. brevis (Fig. 2d), and the longer apical marginal hairs in the anterior margin of the forewing of A. darci (Fig. 3a), shorter in A. brevis (Fig. 2a). After studying the material mentioned, other different features have appeared: A. darci has antennae longer or sometimes subequal to body length, while in A. brevis the antennae are shorter or subequal to body length; the relation between the length (from the midpoint) and the width of the forewing is bigger in A. darci than in A. brevis (Fig. 3a, 2a); in A. darci the forewing has long setae in all marginal apices (Fig. 3a) but in A. brevis the forewing has long setae only in the basal half of the marginal apices (Fig. 2a). For all these reasons, we conclude that these species are different and A. darci remains a valid species.

**Alloxysta mullensis** (Cameron, 1883) stat. rev.

Fig. 4, 5.

**Alloxysta mullensis** Cameron, 1883: 366.

**Alloxysta (Allotria) mullensis** Cameron: Dalla Torre & Kieffer, 1902: 40.

**Charips (Charips) mullensis** (Cameron) Dalla Torre & Kieffer, 1910: 284.

**Alloxysta mullensis** (Cameron) Quinlan, 1974: 8.

**Alloxysta brevis** (Thomson, 1862). Synonymized by Fergusson (1986: 10).

**MATERIAL EXAMINED.**

Fig. 3. *Alloxysta darci* (Girault, 1933), female: a) forewing; b) radial cell; c) pronotum; d) propodeum; e) antenna; f) body; g) head.

Fig. 3. *Alloxysta darci* (Girault, 1933), hembra: a) ala anterior; b) celda radial; c) pronoto; d) propodeo; e) antena; f) cuerpo; g) cabeza.
**Redescription.**

**Length.** Female: 0.9-1.0 mm. Male: 0.8-0.9 mm.

**Coloration.** Head brown, mesosoma and metasoma dark brown. Pedicel, scape and F1-F3 dark yellow; F4-F11 yellowish brown. Legs and veins yellow.

**Head.** Transversally ovate, smooth and shiny, wider than high in front view. With setae below and between toruli. Setae absent from vertex and abundant on face. Transficial line 1.3 times the height of compound eye. Malar space 0.5 times the height of compound eye.

**Antennae.** Female: 13-segmented, filiform. All antennomeres covered with sparse setae. F1-F3 smooth and thinner than remaining ones; F4-F11 with rhinaria and club-shaped. Antennal formula: 3.7 (2); 3.5 (1.2); 2.5 (1.2); 2.5 (1.2); 3.5 (1.5) (Fig. 4e). Male: as female, without any curved flagellomeres.

**Mesosoma.** Pronotum covered by sparse setae except for a small area of the center, few setae on distotalar corners; without carinae (Fig. 4e, 5d). Mesoscutum smooth and shiny, round in dorsal view, with few scattered setae. Scutellum also smooth and shiny, and also with sparse setae. Height of mesopleural triangle along anterior margin more or less 1.3 times the height of mesopleuron. Propodeum covered by abundant pubescence; two wide propodeal carinae separated by 1.3 times few setae at the top and forming a plate at the bottom; sides subparallel anteriorly and very slightly curved posteriorly (Fig. 4d, 5h).

**Forewing.** Longer than body, 1.5 times as long as mesosoma and metasoma together. Forewing covered by abundant pubescence; marginal setae present (Fig. 4a). Radial cell closed, 2.2 times as long as wide (Fig. 4b). R1 short and straight; Rs longer than R1 and curved.

**Metasoma.** Proximal part with an incomplete ring of setae, setae absent in the center but present laterally. Remainder of metasoma smooth and shiny with tergites clearly visible.

**Diagnosis.** *Alloxysta mullensis* is mainly characterized by: a closed radial cell (Fig. 4b); pronotal carinae absent (Fig. 4c, 5d); a propodeal plate (Fig. 4d, 5h); in both sexes flagellar segments, from F4 onwards, club-shaped and with rhinaria; F1 subequal to pedicel in both sexes (Fig. 4e).

**Distribution:**

**Confirmed distribution.** Species known from Scotland (Cameron 1883: 366, Cameron 1886: 86).

**Unconfirmed distribution.** Iran (Lotfalizadeh 2002: 36) and Russia (Bokina 1997: 435).

**Hosts:**


**Unconfirmed hosts.** *Praon* sp. and *Ephedrus* sp. (according to Bokina 1997: 435).

**Comments.** The type series of *Alloxysta mullensis* is represented by one specimen in BMNH. It was considered as a holotype by Quinlan (1974: 8) but we establish it here as a lectotype because the original description does not say that it was based on only one specimen, so there may have been more specimens under this name. This specimen is a female but, inexplicably, in his original description (1883: 366) Cameron established it as a male, and the description does not mention the number of flagellomeres. Nevertheless, this material is the type of this species (D. Notton, pers. comm.). The description and figures provided by Evenhuis (1978: 173) are very close to *A. brevis* (except shape of propodeal plate), so they may play an important role in the "brevis group" problem.

*Alloxysta mullensis* was synonymized by Fergusson (1986) with *A. brevis* without any explanation. After studying both type series, we concluded that they are different species. *Alloxysta brevis* differs from *A. mullensis* in the proportions of the antennomeres: F1 shorter than pedicel in *A. brevis* (Fig. 2c) but subequal to pedicel in *A. mullensis* (Fig. 4e), and F1 subequal to F2 in *A. brevis* (Fig. 2c) while longer than F2 in *A. mullensis* (Fig. 4e). Furthermore, *A. mullensis* differs from *A. arcuata* by the absence of pronotal carinae (Fig. 5d), present in *A. arcuata* (Fig. 5a).

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Fig. 4. *Alloxysta mulleisi* (Cameron, 1883), female: a) forewing; b) radial cell; c) pronotum; d) propodeum; e) antenna; f) body.

Fig. 4. *Alloxysta mulleisi* (Cameron, 1883), hembra: a) ala anterior; b) celda radial; c) pronoto; d) propodeo; e) antena; f) cuerpo.
Fig. 5. Details of pronotum and propodeum: a) pronotum of *A. arcuata*; b) pronotum of *A. brevis*; c) pronotum of *A. darci*; d) pronotum of *A. mullensis*; e) propodeum of *A. arcuata*; f) propodeum of *A. brevis*; g) propodeum of *A. darci*; h) propodeum of *A. mullensis*.

Fig. 5. Detalles del prono y el propodeo: a) prono de *A. arcuata*; b) prono de *A. brevis*; c) prono de *A. darci*; d) prono de *A. mullensis*; e) propodeo de *A. arcuata*; f) propodeo de *A. brevis*; g) propodeo de *A. darci*; h) propodeo de *A. mullensis*.
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