

Research Article

New Charipinae records from central Asia (Hymenoptera: Cynipoidea: Figitidae)

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Abstract. Previous studies on the Charipinae fauna in Central Asia are limited. Charipinae (Hymenoptera: Cynipoidea: Figitidae) specimens deposited in the Peter Starý personal collection from Central Asia have been revised. The material was collected from Azerbaijan, Uzbekistan, Tajikistan and Iraq. Eight species are identified: *Alloxysta arcuata* (Kieffer, 1902), *A. brevis* (Thomson, 1862), *A. citripes* (Thomson, 1862), *A. consobrina* (Zetterstedt, 1838), *A. mullensis* (Cameron, 1883), *A. victrix* (Westwood, 1833), *Phaenoglyphis longicornis* (Hartig, 1840), and *P. villosa* (Hartig, 1841). Among these, five species are reported for the first time in Uzbekistan, four in Tajikistan, two in Azerbaijan and two in Iraq. Habitus of some identified specimens are provided. This study enhances the understanding of the biogeographical distribution of these important hyperparasitoid wasps.

Keywords: *Alloxysta*, *Phaenoglyphis*, Azerbaijan, Uzbekistan, Tajikistan, Iraq

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Introduction

The subfamily Charipinae (Hymenoptera: Cynipoidea: Figitidae) comprises very small wasps with limited morphological features for species identification (Ferrer-Suay *et al.*, 2021). Biologically, they are hyperparasitoids of aphids, (Menke & Evenhuis, 1991) parasitizing primary parasitoids such as members of the subfamily Aphidiinae (Hymenoptera: Braconidae). So, they could potentially affect aphid biological control programs. Charipinae exhibit a near-global distribution, recorded across all continents except Antarctica (Ferrer-Suay *et al.*, 2023). *Alloxysta* is the most species-rich genus and widely distributed in the Charipinae (Ferrer-Suay *et al.*, 2012). Europe has the highest species richness, followed by the Nearctic region, and Asia. While, Australia has the lowest number of species (Ferrer-Suay *et al.*, 2023). However, many new records and new species are still waiting for discover.

Research on Charipinae in Asia are very limited, especially in Central Asia (Ferrer-Suay *et al.*, 2013a, 2015). Ferrer-Suay *et al.* (2013b) revised Charipinae fauna in this region and established many new records and new species. The Charipinae material collected by P. Starý (Starý, 1971, 1979) was previously revised (Ferrer-Suay *et al.*, 2017) with many new host associations. This collection, as an important resource for global Charipinae diversity, led to description of four new species (Ferrer-Suay *et al.*, 2023). In this study we focus on the specimens collected from Central and Western Asia, including Azerbaijan, Uzbekistan, Tajikistan and Iraq. We identified eight species: *Alloxysta arcuata* (Kieffer, 1902), *A. brevis* (Thomson, 1862), *A. citripes* (Thomson, 1862), *A. consobrina* (Zetterstedt, 1838), *A. mullensis* (Cameron, 1883), *A. victrix* (Westwood, 1833), *Phaenoglyphis longicornis* (Hartig, 1840), and *P. villosa* (Hartig, 1841). This study aims to revise Charipinae specimens from Central Asia housed in the Peter Starý collection and to identify the species present. It also seeks to expand the known biogeographical distribution of these hyperparasitoid wasps by reporting new country records.

Materials and methods

The methodology implemented in the field focused on studying tritrophic associations (plant –aphid –parasitoid) across different ecosystems and habitats. Aphid-infested plant sections were carefully excised using scissors and transferred into a plastic jar (250 – 500ccm) covered by nylon mesh. Host plants were either identified at the spot or preserved in herbarium. Also, a part of the aphids, along with any attending ants, was preserved in 70% ethanol for subsequent identification in the laboratory. The jars were then transferred to the laboratory and maintained at ambient temperatures or in a temperature-controlled room under +18-24°C. Samples were checked daily to collect emerged parasitoids. However, the samples were maintained for about the next two weeks, after which all samples were re-examined to collect emerging (hyper) parasitoids and, any other natural enemies present in the litter at the bottom. Each sample was numbered targeting the future database or records (Ferrer-Suay *et al.*, 2017). Each specimen is identified by a specific code at the beginning of the material examined section, referring to the year of collection and number of samples.

Specimens were studied using a stereo microscope (OPTIKA ZSM-2) and environmental scanning electron microscope (Hitachi S4800) in the scientific technical services (SCSIE) at the University of Valencia. The field-emission gun environmental scanning electron microscope was used for high-resolution imaging without gold-coating of the specimens. Habitus images of representative specimens for each identified species are provided in Figures 1–7.

Results

Alloxysta arcuata (Kieffer, 1902) (Fig. 1)

Material examined: Uzbekistan: 62/66, *Aphis farinosa* Gmelin, 1790 (Hem.: Aphididae), *Salix* sp., Jangi. Julskij rayon, Tashkent, obl., Uzbekistan, June/1962, 1♀.

Iraq: 68/19, *Aphis craccivora* Koch, 1854 (Hem.: Aphididae), *Glycyrrhiza glabra* L., Jadidat Ish Shat, Baghdad, Iraq, 18.4.1968, 4♀♀; 68/56, *Myzus* sp., *Vitex agrunus castuc* L., Baghdad, Iraq, 20.4.1968, 1♀; 68/59, *Aphis craccivora*, Baghdad, Sulaiikh, Iraq, 25.4.1968, 1♂; 68/9, *Aphis craccivora*, Baghdad, Iraq, 17.4.1968, 4♀♀.

Distribution: Nearctic, Neotropical, Australiana, Oriental, Afrotropical and Palaearctic regions (Ferrer-Suay *et al.*, 2023). Iraq (Ferrer-Suay *et al.*, 2021) and Uzbekistan (**new record**).



Fig. 1. Habitus of *Alloxysta arcuata* (Kieffer, 1902), male (Hymenoptera: Cynipoidea: Figitidae).

***Alloxysta brevis* (Thomson, 1862) (Fig. 2)**

Material examined: Uzbekistan: 62/71, *Aphis craccivora*, *Carduus* sp., Jangi-Julskij r., Tashkent, obl., Uzbekistan 56, no date, 1♀; 76/115, *Aphis intybi* Koch, 1855, *Cichorium intybus* L., ChumSan, Bostandyk. r., Uzbekistan, 31.5.1962, 2♀♀.

Iraq: 68/121, *Aphis* sp., *Malva nigriflora* L., Baghdad, Bot. Garden, Iraq, 4.5.1968, 1♀; 68/56, *Myzus* sp., *Vitex agrunus castuc*, Baghdad, Iraq, 20.4.1968, 1♂; 68/73, *Aphis* sp., *Zizyphus nummularia* Mill., 1754, Baghdad, Iraq, 26.4.1968, 3♂ & 1♀; 68/84, *Aphis punicae* Passerini, 1863, *Punica granatum* L., Baghdad, Abu Ghraib, Iraq, 28.4.1968, 1♀.

Distribution: Neotropical, Nearctic, Oriental, Afrotropical and Palaearctic (Ferrer-Suay *et al.*, 2023). Uzbekistan and Iraq (**new record**).

***Alloxysta citripes* (Thomson, 1862) (Fig. 3)**

Material examined: Uzbekistan: 76/108, *Aphis catalpae* Glover, 1877, *Catalpa* sp., Tashkent, Uzbekistan, 22.5.1976, 1♂; 76/66, *Chromaphis juglandicola* (Kaltenbach, 1843), *Juglans regia* L., Tashkent, Botanika, Uzbekistan, 26.5.1976, 1♂; 76/70, *Chromaphis juglandicola*, *Juglans regia*, Su-Kok, Catkliskij chr., Uzbekistan, 27.5.1976, 1♂ & 1♀.

Iraq: 68/299, *Tuberculatus* sp., *Quercus aegilops* Kotschy, Salahuddin, nr. Shaqlawah, Iraq, 10.7.1968, 1♂.

Hosts records: New record on *Aphis catalpae* Mamontova, 1953.

Distribution: Afrotropical, Neotropical, Nearctic, Oriental and Palaearctic (Ferrer-Suay *et al.*, 2023). Uzbekistan and Iraq (**new record**).

***Alloxysta consobrina* (Zetterstedt, 1838) (Fig. 4)**

Material examined: Tajikistan: 59/401, *Brevicoryne brassicae* (Linnaeus, 1758), Brassicaceae, Dushanbe, Tajikistan, 29.10.1959, 1♀.

Uzbekistan: 62/75, *Therioaphis* sp., *Acyrtosiphon* L., *Medicago sativa* L., Jangi-Julskij chr., Uzbekistan, 2♀♀

Distribution: Oriental, Australian, Neotropical, Nearctic and Palaearctic (Ferrer-Suay *et al.*, 2023). Tajikistan and Uzbekistan (**new record**).



Fig. 2. Habitus of *Alloxysta brevis* (Thomson, 1862), female (Hymenoptera: Cynipoidea: Figitidae).



Fig. 3. Habitus of *Alloxysta citripes* (Thomson, 1862), female (Hymenoptera: Cynipoidea: Figitidae).

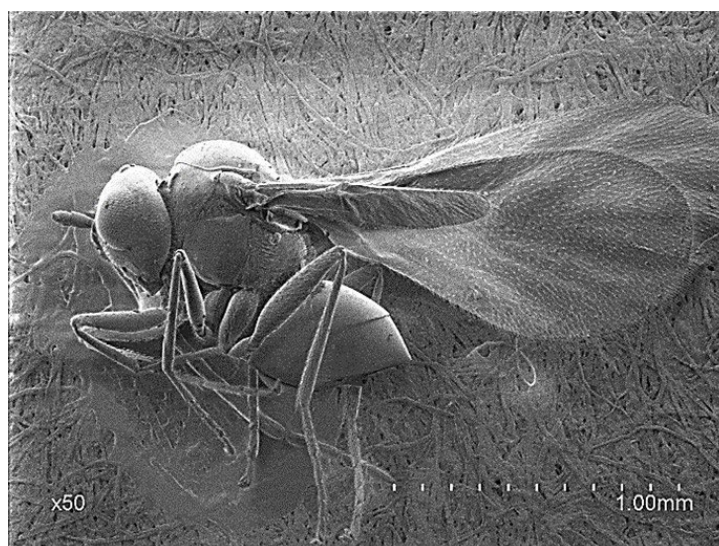


Fig. 4. Habitus of *Alloxysta consobrina* (Zetterstedt, 1838), female (Hymenoptera: Cynipoidea: Figitidae).

***Alloxysta mullensis* (Cameron, 1883) (Fig. 5)**

Material examined: Tajikistan: 62/120, *Aphis* sp., "bobrsYhnik", Dushanbe, Tajikistan, June 1962, 1♀.

Distribution: Oriental, Neotropical, Afrotropical, Nearctic and Palaearctic (Ferrer-Suay *et al.*, 2023). Tajikistan (new record).

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

Material examined: Tajikistan: 62/185, *Aphis craccivora*, *Medicago* sp., Ziddy, Ghissarskij chrebet, Tajikistan, June 1962, 1♀; 62/96, *Medicago* sp., Kondara, Chissarskoj chr., Tajikistan, June 1962, 1♀.

Azerbaijan: 62/231, undet., Kuba, Azerbaijan, 5♀♀.

Uzbekistan: 76/36, *Lipaphis* sp., Brassicaceae, Su-Kok, Catkalskij chr., Uzbekistan, 27.5.1976, 4♀♀.

Distribution: Neotropical, Oriental, Australiana, Nearctic, Afrotropical and Palaearctic (Ferrer-Suay *et al.*, 2023). Tajikistan, Azerbaijan and Uzbekistan (**new record**).

***Phaenoglyphis longicornis* (Hartig, 1840) (Fig. 6)**

Material examined: Azerbaijan: 62/231, undet., Kuba, Azerbaijan, 1♀.

Distribution: Oriental and Palaearctic (Ferrer-Suay *et al.*, 2023). Azerbaijan (**new record**).

***Phaenoglyphis villosa* (Hartig, 1841) (Fig. 7)**

Material examined: Tajikistan: 62/113, *Aphis craccivora*, *Robinia pseudoacacia* L., Dushanbe, Tajikistan, June 1962, 2♀♀.

Iraq: 68/117, *Hyalopterus pruni* (Geoffrey, 1762), *Prunus armeniaca* L., Baghdad, Sulaihk, Iraq, 1.5.1968, 1♂; 68/133, *Hyalopterus pruni*, *Prunus persica* (L.) Stokes, 1812 non Batsch, 1801, Baghdad, Sulaihhk, Iraq, 5.5.1968, 1♀; 68/2, *Hyalopterus pruni*, *Prunus armeniaca*, Baghdad, Iraq, 17.4.1968, 2♂♂ & 5♀♀; 68/3, *Hyalopterus pruni*, *Prunus persica*, Baghdad, Iraq, 17.4.1968, 1♂; 68/85, *Hyalopterus pruni*, *Prunus persica*, Baghdad, Abu Ghraib, Iraq, 28.4.1968, 1♀; 68/97, *Hyalopterus pruni*, *Prunus persica*, Baghdad, Iraq, 30.4.1968, 2♂♂. Iraq (Al-Jassani & Al-Adil, 1986).

Distribution: Neotropical, Oriental, Australiana, Nearctic, Afrotropical and Palaearctic (Ferrer-Suay *et al.*, 2023). The first record from Tajikistan.

Discussion

Recent revision of the Peter Starý collection have substantially advanced understanding of Charipinae diversity, revealing novel trophic associations (Ferrer-Suay *et al.*, 2017) and new species were described from the Palaearctic region (Ferrer-Suay *et al.*, 2023). In this work we present new (distribution and hosts) records from some regions of Central Asia (Azerbaijan, Uzbekistan, Tajikistan and Iraq). All species identified in this study were previously recorded from the Palaearctic region. *Alloxysta arcuata*, *A. brevis* and *A. mullensis* were formerly grouped within a complex of species separated using diagnostic morphological features.

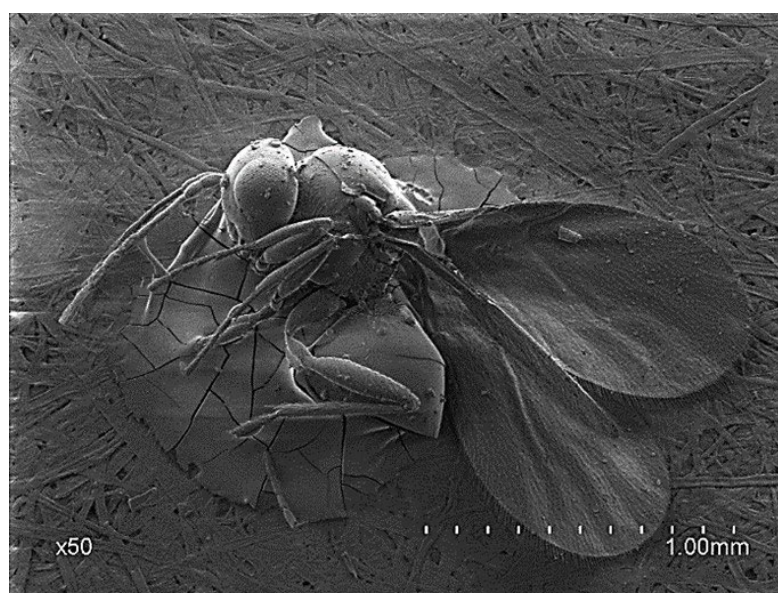


Fig. 5. Habitus of *Alloxysta mullensis* (Cameron, 1883), female (Hymenoptera: Cynipoidea: Figitidae).



Fig. 6. Habitus of *Phaenoglyphis longicornis* (Hartig, 1840) (Hymenoptera: Cynipoidea: Figitidae).



Fig 7. Habitus of *Phaenoglyphis villosa* (Hartig, 1841) (Hymenoptera: Cynipoidea: Figitidae). Photo taken by Rudy Soethof.

These taxa have been continuously found in different studies from different regions, underscoring their wide distribution. *Alloxysta citripes* is well established as a valid species, while *Alloxysta consobrina* and *A. victrix* both cosmopolitan species, frequently collected in field studies, are currently under reevaluation using integrative morphological and molecular data (Ferrer-Suay *et al.*, 2025). Within the genus *Phaenoglyphis*, *P. villosa* is the most common Charipinae species collected on field works around the world, and this species affects a wide variety of aphid species known as important pests (Ferrer-Suay *et al.*, 2012). In contrast, *Phaenoglyphis longicornis* first described from Germany (Hartig, 1840), is not very common on samples from field work. Within the genus *Phaenoglyphis* there are some species whose collection is more difficult than *Alloxysta* species. These findings highlight the necessity of sustained taxonomic and biogeographic studies on Charipinae. Enhanced sampling efforts, coupled with molecular tools, are critical for refining species boundaries, clarifying distribution patterns, and elucidating ecological roles. Such advances will directly inform integrated pest management strategies and

conservation initiatives, particularly in regions like Central Asia where biodiversity documentation remains incomplete.

Studies on Charipinae are very scarce due to the difficulty of their identification. They have proved to be very important on aphid biological control programs (Gomez-Marco *et al.*, 2015), thus they have economic importance. This group of hyperparasitoids have a wide distribution pattern (Ferrer-Suay *et al.*, 2023), but there are still some regions with low reports, because for example field works or sampling have been scarce. It is important to continue with this type of research to improve the distribution limits and progress on the quality of information about this subfamily.

Author's Contributions

Mar Ferrer-Suay: conceptualization, methodology, funding acquisition and writing-original draft. **Jesús Selfa:** supervision, writing, review & editing. **Juli Pujade-Villar:** supervision, writing, review & editing.

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Data Availability Statement

All data supporting the findings of this study are available on paper. The specimens examined in this study are deposited in the first author's collection at the (University of Valencia, Valencia, Spain) and are available by the curator upon request.

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Ethics Approval

Insects were used in this study. All applicable international, national, and institutional guidelines for the care and use of animals were followed. This article does not contain any studies with human participants performed by the author.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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گزارش گونه های جدید Charipinae (Hymenoptera: Cynipoidea: Figitidae) از آسیای مرکزی

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چکیده: مطالعات قبلی در مورد گونه های Charipinae در آسیای مرکزی اندک است. در این مطالعه، نمونه های شخصی Peter Stary نگهداری شده، مورد بازبینی قرار گرفتند. این نمونه ها از آذربایجان، ازبکستان، تاجیکستان و عراق جمع آوری شده بودند. این بررسی به شناسایی هشت گونه انجامید. *Alloxysta arcuata* (Kieffer, 1902)، *A. consobrina* (Zetterstedt, 1838)، *A. citripes* (Thomson, 1862)، *A. brevis* (Thomson, 1862)، *Phaenoglyphis longicornis*، *A. victrix* (Westwood, 1833)، *A. mullensis* (Cameron, 1883) و *A. mullensis* (Hartig, 1840) و *P. villosa* (Hartig, 1841). در این میان، پنج گونه برای اولین بار از ازبکستان، چهار گونه از تاجیکستان، دو گونه از آذربایجان و دو گونه از عراق گزارش شده است. زیستگاه برخی از نمونه های شناسایی شده ارائه شده است. این مطالعه، شناخت ما را در مورد پراکنش و جغرافیای زیستی این گروه زنبورهای هیپرپارازیتوید افزایش می دهد.

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