

New Records of Chalcidoid Parasitoids (Hymenoptera: Chalcidoidea) Associated with Cynipid Galls in Türkiye

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ABSTRACT

Field surveys conducted between 2020 and 2023 yielded samples of cynipid galls (Hymenoptera: Cynipoidea: Cynipidae), which were subsequently reared under controlled laboratory conditions. Parasitoid wasps emerging from these galls were identified, and eight chalcidoid wasp species (Hymenoptera: Chalcidoidea) are reported here for the first time from Türkiye. For each new record, data on collection localities, associated cynipid galls, host plants, global distribution, and relevant taxonomic remarks are provided.

Keywords: Eurytomidae, Torymidae, Eupelmidae, Eulophidae.

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INTRODUCTION

Oak galls constitute complex microsystems that harbor multilayered insect communities, including gall-inducing Cynipini, associated inquilines, and diverse chalcidoid parasitoids (Hymenoptera: Chalcidoidea). The cynipid inhabitants of these galls are intensively exploited by species-rich assemblages of chalcidoid parasitoids (Askew et al., 2013; Ward et al., 2022). Chalcidoidea is one of the most diverse hymenopteran superfamilies, currently comprising more than 27,000 described species in 53 families (Woolley & Heraty, 2025), of which approximately 100 are known as parasitoids specifically associated with Cynipini galls in the Western Palearctic (Askew et al., 2013).

In recent years, several studies have substantially enriched the knowledge of the Turkish Chalcidoidea fauna by documenting new records across different families. In İstanbul, for example, 11 parasitoid species and one seed-feeding species were recorded, including two new records for the Chalcidoidea fauna of Türkiye, *Torymus cerri* (Mayr, 1874) and *T. notatus* (Walker, 1833) (Mete, Azmaz, Lotfalizadeh & Katılmış, 2018). Similarly, surveys conducted in Antalya Province, Türkiye, documented 13 parasitoid species, among which *T. scutellaris* (Walker, 1833) was reported as a new record (Ayın, Azmaz & Katılmış, 2021). In addition, cynipid galls collected from the Eastern Black Sea region of Türkiye yielded 10 species of Eulophidae, three of which (*Aprostocetus levadiensis* Graham, 1987; *Euderus albitarsis* (Zetterstedt, 1838); and *Steganovia rosae* Boyadzhiev & Todorov, 2013) were recorded for the first time in the Turkish fauna (Mete, Tataroğlu & Katılmış, 2025).

In this study, parasitoid wasps associated with cynipid galls on host plants collected in Türkiye were identified, with the aim of documenting new records for the Turkish Chalcidoidea fauna and providing basic information on their host galls and distributions.

MATERIAL AND METHODS

Cynipid galls (Hymenoptera: Cynipoidea) were collected from oak host plants (*Quercus* spp.) in Türkiye between 2020 and 2023. Galls were identified following Melika (2006), Azmaz (2015; 2021), Demirel, Azmaz, & Katılmış (2022), Demirel, Tataroğlu, & Katılmış (2023), and Tataroğlu & Katılmış (2024a; 2024b; 2025). Collected galls were cleaned of extraneous plant material where possible, placed individually in 1-litre glass jars, and maintained under laboratory conditions. Jars were checked weekly for parasitoid emergence. Emerged parasitoid specimens reared from these galls were preserved in 70% ethanol. Specimens required for detailed morphological examination were critical-point dried using hexamethyldisilazane (HMDS) following successive immersion in 95% and absolute ethanol, then card-mounted.

RESULTS

Family: EURYTOMIDAE Walker, 1832

Remarks: Published checklists of the Eurytomidae in the Turkish fauna have reported varying numbers of species. Çam (2011) reported 87 species based on an evaluation of available data, while Stojanova, Civelek, Yörük, Sarı, & Atahan (2012)

listed 82 species the following year. In the most recent updated checklist includes 101 species (Kaplan & Lotfalizadeh, 2024).

Subfamily: Eurytominae Walker, 1832

Genus: *Sycophila* Walker, 1871

***Sycophila binotata* (Fonscolombe, 1832)**

Distribution: Bulgaria, Croatia, England, France, Greece, Iran, Italy, Montenegro, Spain (UCD Community, 2023).

Material examined: TÜRKİYE, AYDIN, Karacasu, Dikmen, 37°43' N, 28°49' E, 930 m, ex gall of *Plagiotrochus quercusilicis* (Fabricius, 1798) (sexual generation) on *Quercus coccifera*, 02.06.2023, 1♀.

Remarks: Principally a parasitoid in galls of *Plagiotrochus* species, but occasionally associated with galls of other oak cynipids (Askew et al., 2013).

Family: TORYMIDAE Walker, 1833

Genus: *Torymus* Dalman, 1820

***Torymus affinis* (Fonscolombe, 1832)**

Distribution: Andorra, Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, France, Georgia, Germany, Hungary, Iran, Ireland, Italy, Moldova, Nakhchivan (Azerbaijan), Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Ukraine, United Kingdom (UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Altınyayla, İbecik, 36°58' N, 29°26' E, 1300 m, ex gall of *Biorhiza pallida* (Olivier, 1791) (sexual generation) on *Quercus infectoria*, 06.09.2020, 1♀; Yeşilova, Niyazlar, 37°28' N, 29°43' E, 1310 m, ex gall of *B. pallida* (sexual generation) on *Q. infectoria*, 27.02.2021, 8♀♀ & 2♂♂.

Remarks: Commonly a parasitoid in galls of *B. pallida* (sexual generation), but occasionally associated with galls of other oak cynipids (Askew et al., 2013).

Family: EUPELMIDAE Walker, 1833

Subfamily: Eupelminae Walker, 1833

Genus: *Eupelmus* Dalman, 1820

Remarks: The Palaearctic species of *Eupelmus* were revised by Gibson & Fusu (2016).

***Eupelmus cerris* Förster, 1860**

Distribution: Austria, Bulgaria, Hungary, Iran, Italy, Moldova, Romania, Spain, Sweden (UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Altınyayla, Dirmilcik Pass, 37°02' N, 29°32' E, 1335 m, ex gall of *Synophrus politus* Hartig, 1843 (sexual generation) on *Quercus trojana*, 04.04.2021, 2♀♀; Tefenni, Beyköy, 37°13' N, 29°40' E, 1150 m, ex gall of *S. politus* (sexual generation) on *Q. trojana*, 01.11.2020, 1♀; Yeşilova, Doğanbaba, 37°32' N, 29°36' E, 1235 m, ex gall of *S. politus* (sexual generation) on *Quercus cerris*, 27.02.2021, 1♀.

Remarks: *Eupelmus cerris* appears to be restricted to hosts in galls of *Synophrus* spp. and *Aphelonyx* on *Quercus* section *Cerris*.

***Eupelmus matranus* Erdős, 1947**

Distribution: Bulgaria, France, Hungary, Italy, Romania, Spain (Antov & Stojanova, 2020; UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Bucak, Kızılören, 37°22' N, 30°49' E, 365 m, ex gall of *Cynips cornifex* Hartig, 1843 (asexual generation) on *Q. infectoria*, 27.09.2020, 2♀♀; Gölhisar, Yusufça, 37°12' N, 29°31' E, 990 m, ex gall of *Andricus istvani* Melika, 2008 (sexual generation) on *Q. ithaburensis*, 06.09.2020, 1♀; Tefenni, Beyköy, 37°13' N, 29°40' E, 1115 m, ex gall of *Andricus miriami* Shachar, 2015 (sexual generation) on *Q. trojana*, 01.11.2020, 1♀; Yeşilova, Niyazlar, 37°28' N, 29°43' E, 1320 m, ex gall of *Andricus musaazmazi* Tataroğlu & Katılmış, 2024 (sexual generation) on *Q. trojana*, 12.06.2022, 1♀; Yeşilova, Salda, 37°32' N, 29°36' E, 1225 m, ex gall of *B. pallida* (sexual generation) on *Q. infectoria*, 05.09.2020, 1♀; Yeşilova, Salda, 37°32' N, 29°36' E, 1225 m, ex gall of *Andricus vindobonensis* Müllner, 1901 (sexual generation) on *Q. ithaburensis*, 05.09.2020, 3♀♀ & 3♂♂.

Remarks: *Eupelmus matranus* is known only as a parasitoid of cynipid galls in *Quercus*. Gibson & Fusu (2016) recorded it from galls of several oak cynipids, but none of the six host species reported here from Burdur Province were included in their study. Prior to Gibson & Fusu (2016), *E. matranus* was frequently misidentified as *Eupelmus splendens* Giraud.

Family: EULOPHIDAE Westwood, 1829

Remarks: One of the earliest faunistic studies on Turkish Chalcidoidea recorded 60 species of Eulophidae (Doğanlar, 1985). Subsequent contributions increased the known number of eulophid species in the Turkish fauna to 197 (Yefremova, Civelek, Boyadzhiev, Dursun, & Eskin, 2010).

Subfamily: Eulophinae Westwood, 1829

Genus: *Aulogymnus* Förster, 1851

Remarks: Species of *Aulogymnus* have larvae that feed, apparently exclusively it seems, as solitary ectoparasitoids of cynipid larvae (Askew, 1961).

***Aulogymnus testaceoviridis* (Erdős, 1961)**

Distribution: Czechia, France, Hungary, Iran, Jordan, Romania, Spain (UCD Community, 2023).

Material examined: TÜRKİYE, AYDIN, Karacasu, Dikmen, 37°43' N, 28°49' E, 930 m, ex gall of *A. istvani* (sexual generation) on *Q. ithaburensis*, 02.06.2023, 1♂; Karacasu, Yeşilköy, 37°38' N, 28°44' E, 940 m, ex gall of *A. istvani* (sexual generation) on *Q. ithaburensis*, 03.06.2023, 1♀ & 2♂♂; Karacasu, Yeşilköy, 37°38' N, 28°44' E, 940 m, ex gall of *A. vindobonensis* (sexual generation) on *Q. ithaburensis*, 03.06.2023, 1♀ & 3♂♂; BURDUR, Gölhisar, Yusufça, 37°12' N, 29°32' E, 995 m, ex gall of *A. istvani* (sexual generation) on *Q. ithaburensis*, 23.05.2021, 1♂.

Remarks: *Aulogymnus testaceoviridis* has a predominantly southern European and Mediterranean distribution but was not previously recorded from Türkiye. The sexual generation galls of *Andricus istvani* and *A. vindobonensis* represent new host associations.

Subfamily: Tetrastichinae Förster, 1856**Genus: *Aprostocetus* Westwood, 1833*****Aprostocetus biorrhizae* (Szelényi, 1941)**

Distribution: Austria, France, Greece, Hungary, Italy, Russia, Spain (UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Altınyayla, Ballık, 36°57' N, 29°27' E, 1175 m, ex gall of *B. pallida* (sexual generation) on *Q. infectoria*, 23.05.2021, 2♀♀; Yeşilova, Niyazlar, 37°28' N, 29°43' E, 1310 m, ex gall of *B. pallida* (sexual generation) on *Q. infectoria*, 27.02.2021, 3♀♀.

Remarks: *Aprostocetus biorrhizae* is known with certainty only as a parasitoid of the sexual generation of *B. pallida* in central and southern Europe.

***Aprostocetus domenichinii* (Erdős, 1969)**

Distribution: Former Czechoslovakia, France, Hungary, Iran, Romania, Russia, Slovakia, Sweden (UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Yeşilova, Niyazlar, 37°28' N, 29°43' E, 1310 m, ex gall of *A. musaazmazi* (sexual generation) on *Q. trojana*, 12.06.2022, 1♀.

Remarks: New record for the Turkish fauna; the sexual generation gall of *Andricus musaazmazi* represents a new host association.

Genus: *Baryscapus* Förster, 1856***Baryscapus diaphantus* (Walker, 1839)**

Distribution: Belgium, Croatia, Czechia, England, France, Germany, Greece, Hungary, Iran, Italy, Madeira, Netherlands, Russia, Slovakia, Spain, Sweden (UCD Community, 2023).

Material examined: TÜRKİYE, BURDUR, Akyayla, 37°30' N, 30°19' E, 1430 m, ex gall of *S. politus* (sexual generation) on *Q. cerris*, 28.02.2021, 6♀♀; Yeşilova, Horozköy, 37°29' N, 29°35' E, 1340 m, ex gall of *Andricus quercustozae* (Bosc, 1792) (asexual generation) on *Q. infectoria*, 05.09.2020, 2♀♀; Yeşilova, Niyazlar, 37°28' N, 29°43' E, 1310 m, ex gall of *A. quercustozae* (asexual generation) on *Q. infectoria*, 05.09.2020, 2♀♀ & 1♂; Yeşilova, Niyazlar, Salda Ski Resort, 37°29' N, 29°41' E, 1455 m, ex gall of *A. quercustozae* (asexual generation) on *Q. infectoria*, 05.09.2020, 3♀♀.

Remarks: New record for the Turkish fauna; the association with galls of *Andricus quercustozae* (asexual generation) is newly reported.

DISCUSSION

The present study, conducted in southwestern Türkiye, has identified eight species as new records for the Turkish Chalcidoidea fauna, all associated with cynipid galls: *Sycophila binotata* (Eurytomidae); *Torymus affinis* (Torymidae); *Eupelmus cerris* and *E. matranus* (Eupelmidae); *Aulogymnus testaceoviridis*, *Aprostocetus biorrhizae*, *A. domenichinii* and *Baryscapus diaphantus* (Eulophidae).

These findings indicate that the diversity of parasitoids associated with cynipid galls in Türkiye is greater than previously recognized. Furthermore, the results underscore that cynipid galls serve as important microhabitats supporting a diverse array of parasitoid species from multiple families.

Notably, six of the eight newly recorded species (*Sycophila binotata*, *Torymus affinis*, *Eupelmus cerris*, *Aulogymnus testaceoviridis*, *Aprostocetus domenichinii*, and *Baryscapus diaphantus*) include Iran in their known distributions (as detailed in the distribution sections of the results above), highlighting a substantial faunistic overlap in the chalcidoid parasitoid communities of cynipid oak galls between Türkiye and neighboring Iran. This overlap is especially pronounced within the Eurytomidae, where Saghaei, Fallahzadeh, & Lotfalizadeh (2018) documented 89 species in Iran—including *S. binotata*, recorded from East Azarbaijan Province in association with cynipid galls on *Quercus*—and noted that the Turkish fauna exhibits the greatest similarity to Iran (sharing 46 species, or 51.68%) among all adjacent countries. The updated Turkish Eurytomidae checklist of 101 species (Kaplan & Lotfalizadeh, 2024), combined with the present record of *S. binotata*, elevates this shared count and reinforces the strong biogeographical linkage, presumably driven by contiguous Mediterranean and Irano-Turanian oak-dominated ecosystems extending from southwestern Anatolia across the Zagros Mountains into northwestern Iran.

Askew et al. (2013) reported that *Baryscapus diaphantus* is associated with *Andricus caputmedusae*, *A. grossulariae*, *Biorhiza pallida*, and *Synophrus politus*. These findings suggest that the species may have a broad host range. In the present study, the association of *B. diaphantus* with galls of *Andricus quercustozae* (asexual generation) is reported for the first time, thereby expanding the known host range of the species. This new record supports the ecological plasticity of the species and contributes to a better understanding of parasitoid–host interactions in cynipid gall systems.

This study enhances our understanding of the chalcidoid parasitoid fauna associated with cynipid galls in Türkiye and emphasizes the significant potential of future comprehensive faunistic surveys across diverse regions and gall types to uncover additional new records.

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