Acta Biologica Turcica, 34(1), 38-45, 2021 Received 06 Jun. 2020; Accepted 26 Dec. 2020

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.com

Review article

New species of Euphorinae (Hymenoptera, Braconidae) for the fauna of Turkey

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Abstract: In order to determine fauna of Turkey, adult specimens of Euphorinae (Hymenoptera, Braconidae) were collected from different habitats of Turkey using sweeping nets between 2007 and 2019. The collected materials were prepared and labeled. In addition, relevant literature and comparison materials available in our collection were used for taxonomical examiation of the obtained material. The altitudes and coordinates of localities and collection dates were presented. A total of 16 species in 7 genera were determined. All species are first records in the fauna of Turkey.

Keywords: Agromyzidae, Podomelas, Parasitoid, malasie, Braconidae, Yu, Tobias

Citation: Beyarslan, A. (2021). New species of Euphorinae (Hymenoptera, Braconidae) to fauna of Turkey. *Acta Biologica Turcica,* 34(1), 38-45.

Introduction

Anatolia (also known as Asia Minor), located at a point at the junction of Asia, Africa and Europe continents has been under the influence of complex geological changes in the past and is considered a rich biodiversity area as a result of mixed biota of these continental areas. Particularly, east-west and north-south oriented mountains in Anatolia might have served as a distribution corridor for cold-adapted species (Kaya, 2015).

Euphorinae Foerster, 1863 (Hymenoptera, Braconidae) iss considered a large subfamily after the Meteorinae subfamily was included. Euphorinae is represented worldwidewith about 1270 described species within 59 genera. Approximately 1502 host species were determined to be used by the subfamilye known. Members of Euphorinae are distributed in 306 countries in zoogeographical regions of Afrotropical, Australasian, Nearctic, Neotropical, Oceania, Oriental and Palaearctic. 59 countries have imported Euphorinae species and introduced them into their countries for biocontrol of agricultural pests (Yu et al., 2016). Members of Euphorinae can be recognized by the petiolated metasoma, fore wing with a short marginal cell, two to three cubital cells and an open brachial cell. These wasps are small to medium sized and generally yellow or black in colour (Shaw and Huddleston, 1991).

Euphorinae includes parasitoid wasps that are morphologically and biologically very diverse (Ameri et al., 2014). Species of Euphorinae are endoparasitoids of adults and immature stages of Coleoptera, Diptera, Hymenoptera, Lepidoptera, Neuroptera, Psocoptera and Hemiptera, thus this subfamily has a very broad host range compared with other braconids. Most genera are rather unusual parasitoids attacking the adult stage of various insects (Shaw 1985; Wharton et al. 1997).

The endopterygote hosts are attacked as adults (at least predominantly), while the exopterygote ones are attacked either as adults or much more often, in the nymphal stage and then killed as final-instar nymphs or sometimes adults. The endopterygote host groups used by euphorines tend to have overwintering, or at any rate long-lived, adults that engage in considerable feeding.

In general, euphorines ovipositing into mobile and well-armoured beetles face considerable difficulties in

inserting the ovipositor through an unsclerotised membranous area, and various interesting behavioural sequences are described. Although oviposition is between abdominal sclerites, often near the anus, some species exhibit a well-pronounced preference for oviposition into other sites, such as the mouth, the base of an antenna, or between particular thoracic or head sclerites. Ovulation behavior of others is very flexible. Wherever the egg is placed there may be a tendency for it to drift towards the abdomen in the haemolymph, and in any case the first-instar larva usually rapidly moves to the abdominal cavity, where subsequent development takes place (Shaw and Huddleston, 1991).

The first data on Euphorinae fauna of Turkey was given by Fahringer (1922) and since then 74 species were recorded from the country (Achterberg and Haeselbarth 2003; Beyarslan, 2016; Beyarslan et al., 2004; Çetin and beyarslan, 2005, 2015; Çıkman and Beyarslan, 2009; Güçlü and Özbek, 2011; Koldas et al., 2007, 2013; Yılmaz and Beyarslan, 2008, 2009; Yılmaz et al., 2010). The basic taxonomic and faunistic researches on Turkish Euphorinae has been carried out since 1979. Koldaş et al. (2007) identified 19 species from the Thrace region. Seventeen of them are new records for the Turkish fauna. Yilmaz et al. (2010) evaluated samples collected from different regions of Turkey between 1979 and 2007 and identified 63 species of which 22 were first records for Turkish fauna. A total of 33 species were later reported, 10 of which are first records for Turkish fauna (Koldaş et al., 2013). Beyarslan (2016) described a new species (*Elasmosoma geylanae* Beyarslan, 2016) from Denizli-Kale in western part of the country. In the present study, we added a total of 15 species to the Euphorinae fauna of Turkey.

Materials and Methods

Adult specimens of Euphorinae were collected from different vegetation locations of eastern Anatolia region, but 7 localities belong to other provinces of Turkey. Malaise and light traps and sweeping nets were used to obtain samples on grasstype plants. Collected samples were then pinned and labeled according to taxonomic rules and regulations. The specimens are deposited in the collection of the Zoological Museum of Department of Biology, Bitlis Eren University.

Taxonomic Examination: Comparison material in our personal collection and related literature (Achterberg van, 1976, 1988, 1993, 1994; Achterberg van and Haeselberth, 2003; Achterberg van and Quicke, 2000; Belokobylskij, 1992, 2000, 2004; Shaw and Huddleston, 1991; Tobias, 1986) were used when evaluating the study materials. Information on parasitoids, hosts, general distributions (in terms of zoogeographical region) and host species of each parasitoid species are given (Tobias, 1986), Yu et al. 2016). In the text, the host plants of host species are shown in brackets. The genera and species are tabulated alphabetically therein.

Results

In this study, the collected and prepared materials were carefully analyzed and a total of 16 species were identified under 7 genera.

1. Genus: *Blacus* Nees, 1819

1.1. *Blacus (Tarpheion) achterbergi* Haeselbarth, 1976 (Syn. *Ischnotron*)

Blacus achterbergi Haeselbarth 1976

New name for primary homonym: *Blacus gracilis* Haeselbarth, 1976, *Blacus (Ischnotron) achterbergi* Papp, 1985, *Blacus (Tarpheion) achterbergi* Achterberg, 1988, *Ischnotron achterbergi* Tobias, 1986

Synonym: *Blacus gracilis*

Material examined: Bitlis, Yolalan köyü, (38° 16´ 12.94"K, 42° 18´ 26.26"D), 1656 m., 13.6.2015, 1♂.

Host: Unknown.

Zoogeography: Palaearctic region.

1.2. *Blacus (Ganychorus) nitidus* Haeselbarth, 1973

Blacus nitidus Haeselbarth, 1973

Synonym: *Blacus petiolatus*.

Material examined: Erzurum, İspit, Devedağı, Köyü, 26.06.2013, 1♂.

Erzurum, Şenkaya, Değirmenlidere köyü (40°30'29.83"K, 43°16'11.33"D,), 2249 m., 20.8.2013, 1♂.

Host: Unknown.

Zoogeography: Oriental and Palaearctic regions.

1.3. *Blacus (Hysterobolus) robustus* Haeselbarth, 1973

Blacus robustus Haeselbarth, 1973

Blacus (Hysterobolus) robustus: van Achterberg, 1976.

Synonym: *Blacus conifer.*

Material examined: Kars, Kağızman, Aydın Kavak (40°11'9.17"K, 43°19'20.89"D), 1410 m., 20.9.2012, 1♂.

Host: Unknown.

Zoogeography: Holarctic region.

2. Genus: *Centistes* Haliday, 1835

2.1. *Centistes (Ancylocentrus) edentatus* (Haliday, 1835)

Leiophron edentatus Haliday, 1835

Centistes (Ancylocentrus) *edentatus:* Belokobylskij, 1992.

Material examined:

Bingöl, Sancak, Büyükbaşköy, (*Allium* sp., *Anchusa* sp., *Astragallus* sp., *Cyperus* sp., *Euphorbia* sp., *Hypericum* sp., *Juniperus* sp., *Quercus* sp., *Pinus* sp.), (39° 05´ 42.87"**K**, 40° 24´ 05.91"D), 1591 m., 06.07.2012, 1♀.

Host: Unknown.

Zoogeography: Palaearctic region.

3. Genus: *Meteorus* Haliday, 1835

3.1. *Meteorus hirsutipes* Huddleston, 1980

Meteorus hirsutipes Huddleston 1980

Material examined: Siirt, Baykam Çıkışı (38° 9'35.86"K, 41°43'54.76"D), 953 m., 16.6.2019, 1♂.

Host: Unknown.

Zoogeography: Oriental and Palaearctic region.

3.2. *Meteorus obsoletus* (Wesmael, 1835)

Perilitus obsoletus Wesmael 1835

Meteorus (Meteorus) obsoletus: Tobias, 1976.

Synonym: *Meteorus pachypus, Meteorus viridanae.*

Material Examined: Bitlis, Merkez, Buzlupınar (38° 17´ 53.23"**K**, 42° 00´ 04.12"D), 1196 m., 26.06.2019, 1♀.

Hosts: Lepidoptera, Noctuidae: **Agrotis ipsilon** (Hufnagel, 1766). **Tortricidae:** *Choristoneura jezoensis* Yasuda & Suzuki, 1987; *Epinotia crenana* (Hübner, [1817]).

Gypsonoma dealbana (Frolich, 1828). *Hedya nubiferana (*Haworth, 1811). *Rhopobota ustomaculana* (Curtis, 1831). *Tortrix Tortrix viridana* Linnaeus, 1758. *Zeiraphera griseana* (Hübner, [1796-1799]). *Zeiraphera rufimitrana* (Herrich-Schäffer, 1847).

Diptera: Tephritidae *Carpomya schineri* Loew, 1856.

Plant on which the host feeds: *Abies sachalinensis*.

Zoogeography: Palaearctic region.

3.3. *Meteorus radialis* Tobias, 1986

Meteorus radialis Tobias, 1986

Material examined: Erzurum, Aşkale, Çayköy (39°56'51.60"K, 40°49'15.68"D), 1734 m., 18.8.2013, 1♀.

Host: Unknown.

Zoogeography: Western Palaearctic region.

3.4. Meteorus abscissus Thomson, 1895

Meteorus abscissus Thomson, 1895

Material examined: Iğdır, Karakonunlu, Gökçeli (39°59'46.10"K, 44°10'55.70"D), 847 m., 26.6.2012, 1♀.

HOST: Lelpidoptera.

Crambidae: *Eudonia truncicolella* (Stainton, 1849).

Erebidae: *Paidia murina* (Hübner, 1790);

Setina irrorella (Linnaeus, 1758).

Geometridae: *Agriopis leucophaearia* (Denis & Schiffermuller, 1775);

Alsophila aescularia ([Denis & Schiffermüller], 1775);

Epirrita dilutata (Denis & Schiffermüller, 1775);

Operophtera brumata (Linnaeus, 1758) [Betula].

Noctuidae: *Anaplectoides prasina* ([Denis & Schiffermüller], 1775);

Lycophotia porphyrea ([Denis & Schiffermüller], 1775), *Xestia agathina* (Duponchel, 1827). Xestia agathina;

Orthosia stabilis (Denis & Schiffermüller 1775).

Oecophoridae: *Alabonia geoffrella* (Linnaeus, 1767).

Coleopter. Scolytidae: *Ips acuminatus* (Gyllenhal, 1827).

Zoogeography: Holarctic region.

4. Genus: *Perilitus* Nees, 1819

4.1. *Perilitus dubius* (Wesmael, 1838)

Microctonus dubius Wesmael, 1838

Perilitus dubius: Kirchner, 1867.

Synonym*: Perilitus rutilus*.

Material examined:

Ardahan, Posof, (41°30'33.85"K, 42°43'39.87"D), 1547 m., 4.09.2012, 1♀.

Bitlis, Tatvan, Sapur, (38°31'48.13"K, 42°18'36.03"D) 1662 m., .07.2016, 1♀.

Erzurum, Olur, (40°49'40.11"K, 42° 7'42.80"D), 373 m., 2.9.2012, 1♀.

Eskişehir, Mihalicik (39°51'57.49"K, 31°29'43.25"D), 1324 m., 9.7.2007, 1♀.

Host: Coleoptera. Chrysomelidae: *Gonioctena olivacea* (Forster, 1771) [*Sarothamnus scoparius*]

Zoogeography: Palaearctic region.

4.2. *Perilitus longiradialis* Tobias, 1986

Perilitus longiradialis Tobias, 1986

Material examined:

Bitlis, Ahlat, Abdurrahmangazi, (*Allium* sp., *Anchusa* sp., *Astragallus* sp., *Cyperus* sp., *Hypericum* sp.) (38°45'37.73"K1; 42°31'17.94"D), 1675 m., 7.2017, 1♂.

Elazığ, Keban, Aşogen (40°23'54.31"K, 42°43'1.82"D), 1903 m., 04.06.2007, 1♂.
Erzurum, Narman (40°20'37.27"K, 41°52'12.71"D), 1634 m., 27.06.2013, 1♂.
Erzurum, olur (40°49'40.11"K, 42° 7'42.80"D), 373 m**.,** 12.9.2012, 1♂.
Host: Unknown.
Zoogeography: Palaearctic region.

4.3. *Perilitus riphaeus* (Tobias, 1986)
***Microctonus riphaeus* Tobias 1986**
***Perilitus riphaeus:* Heaselbarth, 1999.**
Material examined:
Bitlis, Tatvan, Güntepe (38° 21´ 58.80"K, 42° 37´ 40.69**"**D), 1710m., 30.9.2019, 1♂**.**
Host: Unknown.
Zoogeography: Eastern Palaearctic region.

5. Genus*: Peristenus* Foerster, 1863
5.1. *Peristenus accinctus* (Haliday, 1835) (syn. *Leiophoron laeviventris*) new
Microctonus laeviventris Ruthe, 1856
Peristenus accinctus: Lan, 1974.
Synonym: *Leiophoron laeviventris, Peristenus spretus*.
Material examined:
Bitlis, Tatvan, Küçüksu K, (38° 25´ 21.73"K, 42° 19´ 27.11"D), 2219m.21.06.2017, 1♂.
Erzurum, Aziziye, Yoncalık (39°56'44.84"K, 41° 6'18.68"D), 1768 m., 26.06.2013, 1♀.
Erzurum, İspir, Devedağı, Demirgöze (40°33'56.68"K, 41°16'17.16"D), 1708 m., 6.06.2013, 3♀, 1♂.
Kars, Sarıkamış, Söğütlü çeşme (40°23'41.50"K, 42°40'22.79"D), 1950 m., 24.06.2013, 6♀.
Kars, Sarıkamış, Asboğa (40°23'54.31"K, 42°43'1.82"D), 1903 m., 28.06.2013, 1♀.
Kastamonu, Ilgaz Dağı, Doruk Hotel, (41° 6'49.00"K2, 33°55'8.00"D0), 2061 m., .07.2015, 1♀, 2♂.
Hosts: Hemiptera. Miridae: *Lygocoris pabulinus* (Linnaeus, 1761).
Coleoptera. Nitidulidae: *Meligethes aeneus* (Fabricius , 1775).
Zoogeography: Palaearctic region.

5.2. *Peristenus kazak* (Tobias, 1986)
Leiophron kazak Tobias 1986
***Peristenus kazak*: Tobias, 1986**
Material examined:
Bitlis, Merkez, Buzlupınar (38° 17´ 53.23"**K**, 42° 00´ 04.12"D), 1196 m., 17.6.2017, 1♀
Host: Unknown.
Zoogeography: Western Palaearctic region.

5.3. *Peristenus picipes* (Curtis, 1833)
Leiophron picipes Curtis, 1833
Peristenus picipes: Marshall, 1872**.**
Synonym: *Euphorus coactus, Leiophron antennalis*.
Nomen nudum: *Leiophron picipes* Curtis, 1829;
Material examined:
Ardahan, Hanak, Kent Ormanı, (38°37'8.57"K, 42°25'17.14"D) 1916 m., 3.06.2012, 1♂.
Bitlis, Tatvan, oncabaşı, (38° 26´ 27.93"K, 42° 20´ 59.63**"**D**),** 1781m 27.07.2016, 3♀, 2♂.
Antalya, Aksu (36°56'38.91"K, 30°50'0.01"D), 60 m., 25.7.1980, 1♂.
Host: Hemiptera. Miridae: *Adelphocoris lineolatus* (Goeze, 1778).
Zoogeography: Palaearctic region.

6. Genus: *Pygostolus* Haliday, 1833
6.1. *Pygostolus multiarticulatus* (Ratzeburg, 1852)
Blacus multiarticulatus Ratzeburg, 1852.
Pygostolus multiarticulatus: Ruthe, 1861.
Synonym: *Blacus falcatus, Pygostolus septentrionalis.*
Material examined:
Bitlis, Kireç ocakları (38°30'0.55"K, 42°16'29.84"D), 1700 m., 16.6.2019, 1♀.
Erzurum, Aziziye, Yoncalık (39°56'44.84"K, 41° 6'18.68"D), 1768 m., 26.6.2013, 7♂.
Erzurum, Narman (40°20'37.27"K, 41°52'12.71"D), 1634 m., 27.6.2013, 6e.
Erzurum, Narman, Demirdağ (40°19'16.15"K, 41°41'59.82"D), 2082 m., 27.6.2013, 6♂.
Erzurum, İspir, Devedağı Köyü 40°33'56.68"K, 41°16'17.16"D), 1708 m., 26.6.2013, 1♂.
Erzurum, Olur (40°49'40.11"K, 42° 7'42.80"D), 373 m**.,** 12.9.2012, 1♀.
Kars, Sarıkamış, Karakurt 40°10'0.78"K, 42°36'24.40"D), 1648 m., 24.8.2013, 2♂.
Erzurum, Tortum, Sedarlı Köyü (40°28'21.89"K, 41°18'47.72"D), 1674 m., 19.06.2012, 1♂.
Manisa, Kula (38°32'35.64"K, 28°38'40.52"D), 665 m., 30.6.1998, 1♂.
Muğla, Milas, Korucık (37°17'54.08"K, 27°54'41.89"D), 609 m., 24.6.1998, 1♂.

Hosts: Lepidoptera. Psychidae: *Megalophanes viciella* (Denis & Schiffermüller, 1775);
Coleoptera. Cerambycidae: *Saperda populnea* (Linné, 1758).
Curculionidae:
Brachyderes (Thylacites) incanus (Linnaeus, 1758)
Otiorhynchus niger (Fabricius, 1775) [Picea excelsa];
Otiorhynchus (Otiorhynchus) laevigatus (Fabricius, 1792).
Biology: Attracted to light; emerge from adult host.
Zoogeography: Palaearctic region.

7. Genus: *Wesmaelia* Foerster, 1863
7.1. *Wesmaelia petiolata* (Wollaston, 1858)
Euphorus petiolatus Wollaston, 1858.
Wesmaelia petiolata: Graham, 1986.
Synonym: *Wesmaelia asiatica, Wesmaelia cremasta, Wesmaelia pendula.*
Material examined:
Bingöl, Solhanı, (38° 56´ 00.32"K, 40° 45´ 23.41"D), 1351 m., 29.07.2016, 1♀.
Bitlis, Tatvan, Güntepe, (38° 21´ 58.80"K, 42° 37´ 40.69"D), 1710 m., 30.09.2017, 2♀.
Bitlis, Tatvan, Küçüksu, (38° 25´ 21.73"K, 42° 19´ 27.11"D), 2219 m., 05.08.2014, 1♀.
Erzurum, İspir, Yeşilyurt köyü (40°33'15.49"K, 41° 2'24.42"D), 1517 m., 26.6.2013, 1♀.
Van, Gevaş, Değirtaş, (38° 17´ 52.05"K, 43° 06´ 20.12"D), 1687 m., 30.09.2017, 3♂.
Hosts: Hemiptera: Heteroptera, Nabidae: *Nabis alternatus* (Parshley, 1922); *N. americoferus* (Carayon, 1961) [*Medicago sativa*]; *N. americoferus* (Carayon, 1961) [*Medicago sativa*]; *N. americoferus* Carayon, 1961 [*Medicago sativa*]; *N. capsiformis* (Germar, 1838).
Biology: This species emerges the adults host and endoparasitoid and lives solitary.
Zoogeography: Nearctic, Neotropical, Oriental, Palaearctic region

A total of 16 species within 7 genera were identified in the studied region. The determined genues and their species are *Blacus* 3, *Centistes* 1, *Meteorus* 3, *Perilitus* 3, *Peristenus* 3, *Pygostolus* 1 *and Wesmaelia* 1 species (Table 1 and Fig. 1). All of these species are new records for the fauna of Turkey.

The following species are the most common species in the research area. *Pygostolus multiarticulatus* was sampled from 10, *Peristenus accinctus* from 7 and *Wesmaelia petiolata* from 5 localities in the studied area.

The host of 9 of the recorded species is unknown. *Meteorus abscissus* is the parasitoid of the species of the following families of Lepidoptera: Crambidae: 1, Erebidae: 2, Geometridae: 4, Noctuidae: 4 and Oecophoridae: 1.

Table 1. The recorded genera and species of Euphorinae with the number of hosts species and distribution of species (zoogeographical)

Genera	The number of species	Host	Zoogeographical region
Blacus	*Blacus (Tarpheion) achterbergi*	-	Palaearctic
	Blacus (Ganychorus) nitidus	-	Oriental, Palaearctic
	Blacus (Hysterobolus) robustus	-	Holarctic
Centistes	*Centistes (Ancylocentrus) edentatus*		Palaearctic
Meteorus	*Meteorus abscissus*	Lep.: Crambidae: 1, Erebidae: 2, Geometridae: 4, Noctuidae: 4, Oecophoridae: 1, Col.: Scolytidae: 1	Oriental , Palaearctic
	Meteorus hirsutipes	-	Oriental, Palaearctic
	Meteorus obsoletus	Lep.: Noctuidae:1, Tortricidae: 8, Dip.: Tephritidae**: *1.***	Palaearctic
	Meteorus radialis		Western Palaearctic
Perilitus	*Perilitus dubius*	Col.: Chryso melidae: 1	Palaearctic
	Perilitus longiradialis	-	Palaearctic
	Perilitus riphaeu	-	Eastern Palaearctic
Peristenus	*Peristenus accinctus*	Hem.: Miridae:1, Col.: Nitidulidae:1	Palaearctic
	Peristenus kazak	-	Palaearctic
	Peristenus picipes	Hem.: Miridae: 1	Palaearctic
Pygostolus	*Pygostolus multiarticulatus*	Lep.: Psychidae: 1, Col.: Cerambycidae: 1, Curculionidae: 3	Palaearctic
Wesmaelia	*Wesmaelia petiolata*	Hem.: Nabidae: 1	Nearctic, Neotropical, Oriental, Palaearctic

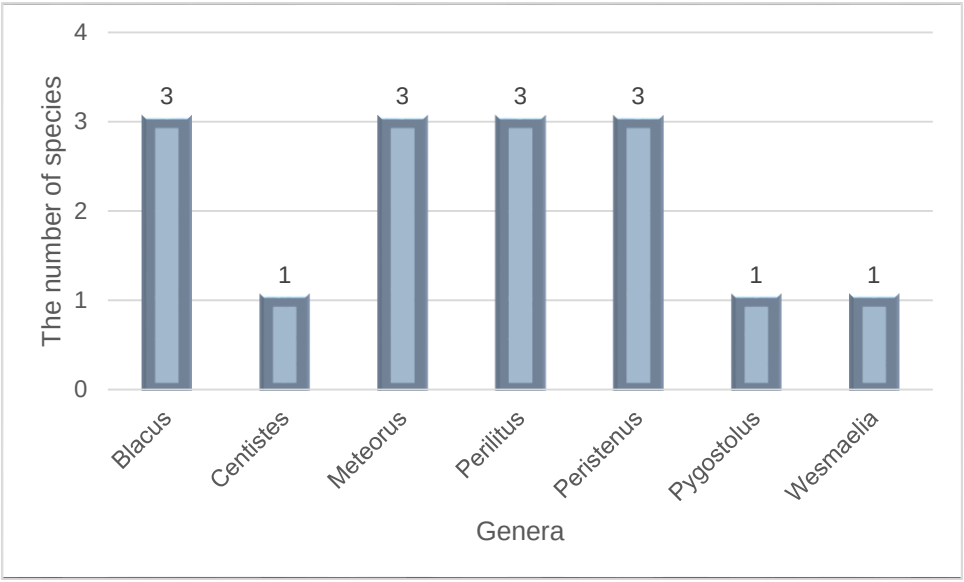

Figure 1. The recorded genus and species of Euphorinae in the research area

It is also the *Ips acuminatus* (Coleopter. Scolytidae) parasitoid, which damages various pines. Adults and larvae of *Ips acuminatus* bore under the bark making galleries in the cambium. Various *Ips* species may infest pines along the entire trunk. Tops of infested trees fade, brown, and shed needles. This fading usually progresses downward from the tree top. Treetops and sometimes whole trees die. Damage may progress over an extended period of time (from a few weeks to several months). Therefore, *Meteorus abscissus* can be used in biological control of *Ips acuminatus*.

Perilitus dubius is parasitoid of *Gonioctena olivacea* (Col.: Chrysomelidae).

Peristenus accinctus is parasitoid of one species of Miridiidae (Hemiptera) and one species of Nitidulidae (Coleoptera).

Pygostolus multiarticulatus is parasitoid of one species of Psychidae (Lep.), one species of Cerambycidae (Col.) and three species of Curculionidae (Col.).

Five species of Nabidae are known as the parasitiod of *Wesmaelia petiolata.*

The host of *Peristenus picipes* is also known as one species of Miridae (Hem.).

Peristenus picipes is known as parasitoid of the one species of Miridae (Hem.).

Macrocentrus collaris is distributed in Afrotopical, Neotropical, Oceanic, Oriental ve Palaearctic regions and *Hormius moniliatus* is distributed in Holarctic and Oriental regions. *Macrocentrus collaris*, *Meteorus rubens* and *Bracon (Glabrobracon) osculator* are potential species that can be used in biological control. *Macrocentrus collaris* was introduced in New Seland for biological control of Anobiidae and Elateridae (Coleoptera), Geometridae, Lymantriidae, Noctuidae, Nymphalidae, Tortricidae and Yponomeutidae (Lepidoptera). This species is distributed in Adana, Adapazarı, Adıyaman, Aksaray, Ankara, Antalya, Balıkesir, Bursa Çanakkale, Çankırı, Edirne, Elazığ, Erzurum, Gaziantep, Hatay, İçel, Kahramanmaraş, Karabük, Kastamonu, Kayseri, Kırklareli, Kırşehir, Malatya, Nevşehir, Niğde, Sivas, Şanlıurfa and Yozgat provinces of Turkey (Beyarslan ve Aydogdu, 2012).

Meteorus rubens is distributed in Neatctic, NeotropiCal, Oriental ve Palaearctic regions and use a total of 65 species of Chloropidae (Diptera), Coleophoridae, Gelechiidae, Geometridae, Lasiocampidae, Lymantriidae, Noctuidae, Nymphalidae, Thaumetopoeidae, Tortricidae and Yponomeutidae (Lepidoptera) as hosts. It is also the parasioid of the pine moth *Thaumetopoea pityocampa* which causes great damages in pine forests in Mediterranean, Aegean and Marmara regions of Turkey.

B. (G.) osculator is parasitoşd of -30 species in: Coleophoridae, Cosmopterigidae, Tortricidae, Nepticulidae, Elachistidae, Elachistidae, Elachistidae, Momphidae and Tortricidae (Lepidoptera). This species

was also introduced in New Zeland for biological control of these species. It is also possible to use this species also in Turkey for the same purposes.

The region based distribution of the rest of the species is as follows: Palaearctic 11 species, Western Palaearctic 5 species, Oriental and Palaearctic 3 species, Afrotropical and Palaearctic 1 species, Holarctic 1 species. The currently know distribution of *Bracon chagrinicus* is Turkey and it may be an endemic species for the country. *Opius (Ilicopius) solymosae* was described in Hungary (Fischer, 1989) and reported in the present study in Gürün (Sivas).

Acknowledgments

This research was carried out with the support of Scientific Research projects of Bitlis Eren University (partially) (BEBAP 2019.001). I thank the BEBAP their financial support.

Ethical Approval

The authors don't declare ethical approval.

Conflicts of Interest

The authors declare that they have no conflict of interest.

Funding Statement

This research was carried out with the support of Scientific Research projects of Bitlis Eren University (partially) (BEBAP 2019.001).

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