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Contribution to the knowledge of the Tetrastichinae (Hymenoptera: Eulophidae) from Kırıkkale and Çankırı, Turkey, with some new records

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Abstract: In this study species of Tetrastichinae from Kırıkkale and Çankırı are identified. Samples were picked from plants between June and August of 2010–2012. Of these, *Baryscapus pilicornis* Graham, 1991; *B. pospelovi* (Kurdjumov, 1912); *Neotrichoporoides bulgaricus* Graham, 1987; *N. gordensis* Graham, 1987; *Oomyzus anomalus* Graham, 1991; *O. ellisorum* Graham, 1991; *O. gallerucae* (Fonscolombe, 1832); *O. sokolowskii* (Kurdjumov, 1912); *Tamarixia monesus* (Walker, 1839); *T. poddubnyi* (Kostjukov, 1978); *T. pronomus* (Walker, 1839); *T. upis* (Walker, 1839); and *Tetrastichus halidayi* (Graham, 1961) are new records for Turkey. Names and references of species discovered in this study are shown in a table. The Tetrastichinae fauna in Turkey reaches 147 species in 19 genera with the addition of the species in this study.

Key words: Hymenoptera, Tetrastichinae, new records, Kırıkkale, Çankırı, Turkey, fauna

Tetrastichinae is the most extensive subfamily of the family Eulophidae of Hymenoptera (LaSalle, 1999) and is represented all over the world by over 1980 species in 110 genera (Noyes, 2015). Hosts of this subfamily are found in 100 families of insects in 10 different orders, in addition to spider eggs, gall-forming mites, and even nematodes; a few species are partially or completely phytophagous. The subfamily includes both ectoparasitic and endoparasitic species, although the latter appear to be more prevalent (Graham, 1987; LaSalle, 1994; Sakaltaş and Gençer, 2005; Sakaltaş Ariyak and Tüzün, 2014). Within the Tetrastichinae, there are only a very few genera that appear to be restricted to leaf-mining hosts (e.g., *Minotetrastichus*, *Mischotetrastichus*). More frequently, species that attack leafminers belong to genera with very wide host ranges (e.g., *Aprostocetus*, *Baryscapus*, *Pronotalia*, *Quadrastichus*) (Reina and LaSalle, 2003).

Some species of Tetrastichinae are used in biological control programs in various regions. Some species of the subfamily are accepted as harmful since they attack useful plants and insects. As a result, diagnoses of Tetrastichinae species need to be done very well and their biology and hosts need to be determined. There are studies (Doğanlar, 1982, 1992, 1993a, 1993b, 1993c, 1993d, 1993e, 1993f, 1994, 2011; Gençer and Doğanlar, 1995; Graham, 1987, 1991; Öncüer, 1991; Gençer, 2004, 2010; Sakaltaş and

Gençer, 2005; Çıkman and Doğanlar, 2006; Doğanlar and Doğanlar, 2008; Doğanlar et al., 2009, 2011; Güler and Kodan, 2010; Cebeci et al., 2011; Yegorenkova and Yefremova, 2011; Yegorenkova et al., 2011; Koçak and Özdemir, 2012; Sakaltaş Ariyak and Tüzün, 2014) related to the Tetrastichinae in Turkey. The fauna of Tetrastichinae has reached 147 species in 19 genera in Turkey with the addition of this study (Sakaltaş, 2014).

The aim of this study is primarily to contribute to the Turkish Tetrastichinae fauna by investigating its existence in Kırıkkale and Çankırı, and also to help researchers who are to apply biological control programs using ecological observations related to the samples' natural habitats and sampling times.

The materials for this study were collected by the first author from different localities in Kırıkkale (Merkez, Bahşili, Balışeyh, Çelebi, Delice, Karakeçili, Keskin, Sulakyurt, Yahşihan) and Çankırı (Merkez, Atkaracalar, Çerkeş, Eldivan, Ilgaz, Korgun, Kurşunlu, Orta, Şabanözü) between June 2010 and August 2012. In this study 209 (151 ♀♀, 58 ♂♂) samples were examined and 37 species were identified. From *Anaprostocetus* 5 ♀♀, from *Baryscapus* 161 (107 ♀♀, 54 ♂♂), from *Neotrichoporoides* 8 (7 ♀♀, 1 ♂), from *Oomyzus* 7 (6 ♀♀, 1 ♂), from *Pronotalia* 1 ♀, from *Sigmophora* 3 ♀♀, from *Tamarixia* 19 (17 ♀♀, 2 ♂♂), and from *Tetrastichus* 5 ♀♀ samples have been examined.

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Samples were collected by sweeping-net from plants and a mouth aspirator was also used. Sampling localities were recorded by GPS. Collected samples were placed into glass tubes containing 70% ethyl alcohol. The diagnostic keys of Boucek (1988), Graham (1987, 1991), and LaSalle (1994) were used for diagnosis of the samples. Of those, Graham's diagnostic key that was developed for European fauna was used most. Diagnostic keys were formed by revising that diagnostic key. A Leica S8 APO stereo zoom microscope was used to diagnose samples. Samples are deposited in the Entomology Museum of the Ankara University Biology Department.

In this study 37 species of Tetrastichinae were identified in Kırıkkale and Çankırı provinces. Thirteen of these species are new records for the Turkish fauna. Names and references of species discovered in this study are shown in the Table.

Anaprostocetus acuminatus (Ratzeburg, 1848)

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 2♀♀. Çankırı: Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 1♀; Hasakçe village, 845 m, 23.06.2012, 40°65'87"N, 33°76'62"E, 1♀; Merkez, 713 m, 24.06.2012, 40°58'24"N, 33°62'10"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Austria, Canada, Czech Republic, Czechoslovakia, Europe, France, Germany, Hungary, India, Italy, Japan, Nearctic, Netherlands, Sweden, Turkey, Ukraine, England (Noyes, 2015).

Baryscapus adalia (Walker, 1839)

Material examined: Turkey: Çankırı: Akçakavak village, 24.06.2012, 1♀; Merkez, 713 m, 24.06.2012, 40°58'24"N, 33°62'10"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, France, Germany, Hungary, Italy, Russia, Serbia, Sweden, Turkey, England (Noyes, 2015).

Baryscapus berhidanus Erdős, 1954

Material examined: Turkey: Çankırı; Hasakçe village, 845 m, 23.06.2012, 40°65'87"N, 33°76'62"E, 1♀; Kırıkkale: Bahşili/Celal Bayar Park, 686 m, 08.07.2012, 39°81'72"N, 33°48'06"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, Europe, France, Hungary, Italy, Jordan, Spain, Turkey (Noyes, 2015).

Baryscapus bruchidii (Erdős, 1951)

Material examined: Turkey: Kırıkkale: Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 1♂; Merkez, 802 m, 19.07.2010, 39°87'41"N, 33°58'46"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Hungary, Moldova, Russia, Turkey (Noyes, 2015).

Baryscapus bruchivorus (Gahan, 1942)

Material examined: Turkey: Kırıkkale: Delice/Alcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♀.

Çankırı: Atkaracalar, 1237 m, 23.07.2011, 40°81'16"N, 33°07'35"E, 1♂; Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: France, Italy, Nearctic, Spain, Turkey, United States of America (Noyes, 2015).

Baryscapus bruchophagi (Gahan, 1913)

Material examined: Turkey: Kırıkkale; Balıseyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 3♀♀; Karakeçili, 755 m, 14.07.2010, 39°58'43"N, 33°40'89"E, 1♀; Yahşihan, 685 m, 19.07.2010, 39°84'03"N, 33°45'51"E, 1♀; Delice / Alcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♀; Keskin, 1056 m, 13.07.2010, 39°70'69"N, 33°57'91"E, 1♀; Bahşili/Karahahtmetli Dam, 718 m, 14.07.2010, 39°66'64"N, 33°44'47"E, 1♀. Çankırı: Eldivan, 965 m, 23.06.2012, 40°52'31"N, 33°49'80"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Afrotropical, Argentina, Armenia, Austria, Belgium, Bulgaria, Canada, Germany, Hungary, India, Kirgizia, Mexico, Nearctic, Neotropical, New Zealand, Russia, Sweden, Turkey, United States of America, Uruguay, USSR, Uzbekistan (Noyes, 2015).

Baryscapus crassicornis (Erdős, 1954)

Material examined: Turkey: Kırıkkale; Karakeçili, 755 m, 14.07.2010, 39°58'43"N, 33°40'89"E, 1♂ (Leg. Sakaltaş Ariyak).

Distribution: Germany, Hungary, Israel, Russia, Spain, Turkey (Noyes, 2015).

Baryscapus endemus (Walker, 1839)

Material examined: Turkey: Kırıkkale; Bahşili/Celal Bayar Park, 697 m, 08.07.2010, 39°81'57"N, 33°47'71"E, 1♀, 1♂; Balıseyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♀; Delice/Alcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♂; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 5♂♂; Karakeçili, 755 m, 14.07.2010, 39°58'43"N, 33°40'89"E, 2♀♀, 1♂; Balıseyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 1♂. Çankırı: Eldivan, 915 m, 23.07.2011, 40°54'21"N, 33°50'61"E, 2♂♂; Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 2♀♀; Hasakçe village, 845 m, 23.06.2012, 40°65'87"N, 33°76'62"E, 2♀♀; Merkez, 713 m, 24.06.2012, 40°58'24"N, 33°62'10"E, 1♂; Ilgaz/Eksikkıymık village, 1305 m, 15.07.2012, 41°01'04"N, 33°67'71"E, 1♀, 1♂; Ilgaz/Kırkpınar plateau, 1794 m, 15.07.2012, 41°00'49"N, 33°61'85"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Austria, Bulgaria, Czechoslovakia, Denmark, France, Germany, Hungary, Iran, Ireland, Moldova, Netherlands, Norway, Palearctic, Poland, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine, England, USSR, Yugoslavia (pre-1991) (Noyes, 2015).

Baryscapus fossarum Graham, 1991

Material examined: Turkey: Kırıkkale; Delice Alcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♀;

Table. Identified Tetrastichinae species in this study and references.

Identified Tetrastichinae species	Sample Numbers	Kırıkkale	Çankırı	References
<i>Anaprostocetus acuminatus</i> (Ratzeburg, 1848)	5♀♀	+	+	Doğanlar, 1993b; Sakaltaş, 2003; Sakaltaş and Gençer, 2005; Doğanlar, 2011; Doğanlar et al., 2011; Sakaltaş, 2014
<i>Baryscapus adalia</i> (Walker, 1839)	2♀♀		+	Gençer, 2004; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. berhidanus</i> Erdös, 1954	2♀♀	+	+	Gençer, 2004; Sakaltaş, 2014
<i>B. bruchidii</i> (Erdös, 1951)	1♀, 1♂	+		Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. bruchivorus</i> (Gahan, 1942)	2♀♀, 1♂	+	+	Graham, 1991; Doğanlar, 1994; Sakaltaş, 2014
<i>B. bruchophagi</i> (Gahan, 1913)	8♀♀	+	+	Doğanlar, 1994; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. crassicornis</i> (Erdös, 1954)	1♂	+		Doğanlar, 1994; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. endemus</i> (Walker, 1839)	10♀♀, 13♂♂	+	+	Boyadzhiev, 2003; Graham, 1991; Doğanlar, 1994; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. fossarum</i> Graham, 1991	2♀♀	+		Gençer, 2004; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. gradwelli</i> Graham, 1991	1♀	+		Gençer and Doğanlar, 1995; Sakaltaş, 2014
<i>B. impeditus</i> (Nees, 1834)	64♀♀, 22♂♂	+	+	Graham, 1991; Öncüer, 1991; Boyadzhiev, 2003; Sakaltaş and Gençer, 2005
<i>B. nigroviolaceus</i> (Nees, 1834)	14♂♂	+	+	Sakaltaş and Gençer, 2005; Özbek and Çoruh, 2010; Cebeci et al., 2011; Sakaltaş, 2014
<i>B. oophagus</i> (Otten, 1942)	7♀♀	+	+	Özbek and Çoruh, 2010; Sakaltaş, 2014
<i>B. pallidae</i> Graham, 1991	2♀♀, 1♂	+	+	Gençer, 2004; Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>B. pilicornis</i> Graham, 1991	1♀	+		New record for Turkey
<i>B. pospelovi</i> (Kurdjumov, 1912)	4♀♀, 1♂	+		New record for Turkey
<i>B. spartifoliellae</i> Graham, 1991	1♀		+	Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>Neotrichoporoides biogradensis</i> Graham, 1987	1♀, 1♂	+	+	Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>N. bulgaricus</i> Graham, 1987	1♀		+	New record for Turkey
<i>N. cavigena</i> Graham, 1987	1♀	+		Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>N. gordensis</i> Graham, 1987	3♀♀	+		New record for Turkey
<i>N. viridimaculatus</i> (Fullaway, 1955)	1♀	+		Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>Oomyzus anomalus</i> Graham, 1991	1♀, 1♂	+		New record for Turkey
<i>O. ellisorum</i> Graham, 1991	1♀	+		New record for Turkey
<i>O. gallerucae</i> (Fonscolombe, 1832)	1♀	+		New record for Turkey
<i>O. sokolowskii</i> (Kurdjumov, 1912)	3♀♀	+		New record for Turkey
<i>Pronotalia fiorii</i> Domenichini, 1958	1♀	+		Doğanlar, 1993c; Sakaltaş and Gençer, 2005
<i>Sigmophora brevicornis</i> (Panzer, 1804)	3♀♀	+	+	Doğanlar, 1993a; Sakaltaş and Gençer, 2005
<i>Tamarixia monesius</i> (Walker, 1839)	4♀♀	+	+	New record for Turkey
<i>T. pallicornis</i> (Walker, 1872)	1♀	+		Doğanlar, 1994; Sakaltaş, 2014
<i>T. poddubnyi</i> (Kostjukov, 1978)	4♀♀	+		New record for Turkey
<i>T. pronomus</i> (Walker, 1839)	2♀♀		+	New record for Turkey
<i>T. upis</i> (Walker, 1839)	6♀♀, 2♂♂	+	+	New record for Turkey
<i>Tetrastichus decrescens</i> Graham, 1991	2♀♀	+	+	Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>T. halidayi</i> (Graham, 1961)	1♀	+		New record for Turkey
<i>T. melasomae</i> Graham, 1991	1♀		+	Sakaltaş and Gençer, 2005; Sakaltaş, 2014
<i>T. sinope</i> (Walker, 1839)	1♀		+	Kılınçer, 1982; Doğanlar, 1993b

Keskin, 1056 m, 13.07.2010, 39°70'69"N, 33°57'91"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Czechoslovakia, France, Italy, Netherlands, Russia, Sweden, Turkey, England (Noyes, 2015).

Baryscapus gradwelli Graham, 1991

Material examined: Turkey: Kırıkkale; Bahşili/Celal Bayar Park, 697 m, 08.07.2010, 39°81'57"N, 33°47'71"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Czechoslovakia, France, Germany, Netherlands, Russia, Spain, Sweden, England (Noyes, 2015), Turkey (Gençer and Doğanlar, 1995).

Baryscapus impeditus (Nees, 1834)

Material examined: Turkey: Kırıkkale: Bahşili Celal Bayar Park, 697 m, 08.07.2010, 39°81'57"N, 33°47'71"E, 2♀♀; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 4♀♀; Delice Alıcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♀; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 13♀♀, 1♂; Keskin, 1056 m, 13.07.2010, 39°70'69"N, 33°57'91"E, 32♀♀, 12♂♂; Karakeçili, 755 m, 14.07.2012, 39°58'43"N, 33°40'89"E, 3♀♀, 3♂♂; Balışeyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 2♂♂; Sulakyurt, 802 m, 16.07.2010, 40°16'53"N, 33°73'03"E, 2♀♀, 3♂♂; Merkez, 802 m, 19.07.2010, 39°87'41"N, 33°58'46"E, 5♀♀; Yahşihan, 685 m, 19.07.2010, 39°84'03"N, 33°45'51"E, 1♀, 1♂. Çankırı: Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Andorra, Bulgaria, Croatia, Czech Republic, Czechoslovakia, France, Germany, India, Italy, Moldova, Netherlands, Pakistan, Russia, Serbia, Slovakia, Sweden, Turkey (Noyes, 2015).

Baryscapus nigroviolaceus (Nees, 1834)

Material examined: Turkey: Kırıkkale: Bahşili/Celal Bayar Park, 697 m, 08.07.2010, 39°81'57"N, 33°47'71"E, 1♂; Delice /Alıcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♂; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 1♂; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 2♂♂; Sulakyurt, 802 m, 16.07.2010, 40°16'53"N, 33°73'03"E, 4♂♂. Çankırı: Kurşunlu, 1337 m, 22.07.2011, 40°77'09"N, 33°36'75"E, 1♂; Eldivan, 915 m, 23.07.2011, 40°54'21"N, 33°50'61"E, 2♂♂; Hasakçe village, 845 m, 23.06.2012, 40°65'87"N, 33°76'62"E, 1♂; Merkez, 713 m, 24.06.2012, 40°58'24"N, 33°62'10"E, 1♂ (Leg. Sakaltaş Ariyak).

Distribution: Austria, Bulgaria, Czech Republic, Czechoslovakia, France, Germany, Hungary, Iran, Italy, Moldova, Montenegro, Palearctic, Russia, Serbia, Spain, Sweden, Switzerland, Turkey, Ukraine, England, USSR, Yugoslavia (pre-1991) (Noyes, 2015).

Baryscapus oophagus (Otten, 1942)

Material examined: Turkey: Kırıkkale: Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♀; Çelebi, 1093

m, 13.07.2010, 39°45'31"N, 33°55'03"E, 3♀♀; Keskin, 1056 m, 13.07.2010, 39°70'69"N, 33°57'91"E, 1♀; Balışeyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 1♀. Çankırı: Eldivan, 965 m, 23.06.2012, 40°52'31"N, 33°49'80"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, Europe, France, Germany, Iran, Palearctic, Poland, Russia, Sweden, Turkey (Noyes, 2015).

Baryscapus pallidae Graham, 1991

Material examined: Turkey: Kırıkkale: Bahşili/Celal Bayar Park, 697 m, 08.07.2010, 39°81'57"N, 33°47'71"E, 1♀; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 1♂. Çankırı: Ilgaz/Eksikkıymık village, 1305 m, 15.07.2012, 41°01'04"N, 33°67'71"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Finland, France, Germany, Hungary, Iran, Italy, Spain, Sweden, Turkey, England (Noyes, 2015).

Baryscapus pilicornis Graham, 1991

Material examined: Turkey: Kırıkkale; Yahşihan, 685 m, 19.07.2010, 39°84'03"N, 33°45'51"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: France, Sweden, England (Noyes, 2015). New record for Turkey.

Baryscapus pospelovi (Kurdjumov, 1912)

Material examined: Turkey: Kırıkkale; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♂; Delice/Alıcılı village, 639 m, 12.07.2010, 39°99'73"N, 34°06'45"E, 1♀; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 1♀; Bahşili/Karaahmetli Dam, 718 m, 14.07.2010, 39°66'64"N, 33°44'47"E, 1♀; Merkez, 802 m, 19.07.2010, 39°87'41"N, 33°58'46"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: France, Hungary, Italy, Netherlands, Russia, Spain, Sweden, Ukraine, United Kingdom, USSR (Noyes, 2015).

New record for Turkey.

Baryscapus spartifoliellae Graham, 1991

Material examined: Turkey: Çankırı; Çerkeş, 1146 m, 23.07.2011, 40°81'74"N, 32°89'35"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Czech Republic, Germany, Netherlands, Turkey, England (Noyes, 2015).

Neotrichoporoides biogradensis Graham, 1987

Material examined: Turkey: Kırıkkale; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♀. Çankırı: Eldivan, 915 m, 23.07.2011, 40°54'21"N, 33°50'61"E, 1♂ (Leg. Sakaltaş Ariyak).

Distribution: Czechoslovakia, Moldova, Slovakia, Sweden, Turkey, Yugoslavia (pre-1991) (Noyes, 2015).

Neotrichoporoides bulgaricus Graham, 1987

Material examined: Turkey: Çankırı; Hasakçe village, 845 m, 23.06.2012, 40°65'87"N, 33°76'62"E, 1♀ (Leg. Sakaltaş Ariyak).

Distribution: Bulgaria (Noyes, 2015).

New record for Turkey.

Neotrichoporoides cavigena Graham, 1987

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Czechoslovakia, France, Russia, Slovakia, Turkey (Noyes, 2015).

Neotrichoporoides gordensis Graham, 1987

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 3♀♀ (Leg: Sakaltaş Ariyak).

Distribution: Czech Republic, Czechoslovakia, France, Slovakia, United Kingdom (Noyes, 2015).

New record for Turkey.

Neotrichoporoides viridimaculatus (Fullaway, 1955)

Material examined: Turkey: Kırıkkale; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'03"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Argentina, Bermuda, Bulgaria, Caribbean, Colombia, Cuba, Czechoslovakia, Europe, France, Hawaii, Hungary, India, Italy, Madeira, Nearctic, China, Portugal, Russia, Slovakia, Sweden, Turkey, United States of America, USSR, Yugoslavia (pre-1991) (Noyes, 2015).

Oomyzus anomalus Graham, 1991

Material examined: Turkey: Kırıkkale; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♂; Keskin, 1056 m, 13.07.2012, 39°70'69"N, 33°57'91"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Czechoslovakia, France, Sweden, United Kingdom, England, Yugoslavia (pre-1991) (Noyes, 2015).

New record for Turkey.

Oomyzus ellisorum Graham, 1991

Material examined: Turkey: Kırıkkale; Balışeyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Greece (Noyes, 2015).

New record for Turkey.

Oomyzus gallerucae (Fonscolombe, 1832)

Material examined: Turkey: Kırıkkale; Keskin, 1056 m, 13.07.2012, 39°70'69"N, 33°57'91"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Argentina, Australia, Austria, Bulgaria, Czech Republic, Europe, France, Germany, Hungary, India, Iran, Italy, Montenegro, Nearctic, Romania, Russia, Sweden, USA, Yugoslavia (pre-1991) (Noyes, 2015).

New record for Turkey.

Oomyzus sokolowskii (Kurdjumov, 1912)

Material examined: Turkey: Kırıkkale; Balışeyh, 865 m, 12.07.2010, 39°90'91"N, 33°71'15"E, 1♀; Balışeyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 1♀; Merkez, 802 m, 19.07.2010, 39°87'41"N, 33°58'46"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Antigua, Antilles, Argentina, Australia, Azerbaijan, Bangladesh, Brazil, Bulgaria, Canada, Chile,

Dominican Republic, Egypt, Europe, Fiji, France, Guam, Hungary, India, Italy, Jamaica, Japan, Kenya, Korea, South Leeward Islands, Malaysia, Mexico, Montserrat, Nearctic, Neotropical, Pakistan, Palearctic, China, Romania, Russia, South Africa, Switzerland, Taiwan, Ukraine, USA, USSR (Noyes, 2015).

New record for Turkey.

Pronotalia fiorii Domenichini, 1958

Material examined: Turkey: Kırıkkale; Karakeçili, 755 m, 14.07.2012, 39°58'43"N, 33°40'89"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Czechoslovakia, Hungary, Italy, Turkey (Noyes, 2015).

Sigmophora brevicornis (Panzer, 1804)

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 2♀♀. Çankırı: Eldivan, 915 m, 23.07.2011, 40°54'22"N, 33°50'62"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Andorra, Austria, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Czechoslovakia, Denmark, Finland, France, Georgia, Germany, Greece, Hungary, India, Iran, Ireland, Israel, Italy, Korea, Lebanon, Macedonia, Moldova, Montenegro, Morocco, Netherlands, Norway, Pakistan, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, England, USSR, Vietnam, Yugoslavia (Federal Republic), Yugoslavia (pre-1991) (Noyes, 2015).

Tamarixia monesius (Walker, 1839)

Material examined: Turkey: Kırıkkale; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'04"E, 1♀; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 1♀; Yahşihan, 685 m, 19.07.2010, 39°84'04"N, 33°45'51"E, 1♀; Çankırı: Atkaracalar, 1237 m, 23.07.2011, 40°81'16"N, 33°07'35"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, France, Germany, Hungary, Ireland, Italy, Kazakhstan, Moldova, Netherlands, Russia, Slovakia, Slovenia, Sweden, England, USSR, Yugoslavia (pre-1991) (Noyes, 2015).

New record for Turkey.

Tamarixia pallicornis (Walker, 1872)

Material examined: Turkey: Kırıkkale; Yahşihan, 685 m, 19.07.2010, 39°84'04"N, 33°45'51"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Madeira (Noyes, 2015), Turkey (Doğanlar, 1994).

Tamarixia poddubnyi (Kostjukov, 1978)

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 2♀♀; Bahşili/Karaahmetli Dam, 718 m, 14.07.2010, 39°66'65"N, 33°44'47"E, 1♀; Sulakyurt, 802 m, 16.07.2010, 40°16'53"N, 33°73'03"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Moldova, China, Russia, Uzbekistan (Noyes, 2015).

New record for Turkey.

Tamarixia pronomus (Walker, 1839)

Material examined: Turkey: Çankırı; Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 1♀; Eldivan, 965 m, 23.06.2012, 40°52'31"N, 33°49'80"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Canary Islands, Czech Republic, Czechoslovakia, France, Germany, Greece, Hungary, Ireland, Italy, Madeira, Norway, Portugal, Russia, Slovakia, Sweden, England (Noyes, 2015).

New record for Turkey.

Tamarixia upis (Walker, 1839)

Material examined: Turkey: Kırıkkale; Balışeyh/Kösedurak village, 1065 m, 16.07.2010, 40°05'88"N, 33°72'54"E, 1♀; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 1♀. Çankırı: Korgun, 902 m, 22.07.2011, 40°73'29"N, 33°52'31"E, 2♀♀, 2♂♂; Şabanözü, 1109 m, 23.07.2011, 40°47'78"N, 33°30'02"E, 2♀♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, France, Germany, Iran, Italy, Madeira, Moldova, Netherlands, Palaeartic, Russia, Slovakia, Sweden, England (Noyes, 2015).

New record for Turkey.

Tetrastichus decrescens Graham, 1991

Material examined: Turkey: Kırıkkale; Çelebi, 1093 m, 13.07.2010, 39°45'31"N, 33°55'39"E, 1♀. Çankırı: Eldivan, 915 m, 23.07.2011, 40°54'21"N, 33°50'61"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: France, China, Sweden, Turkey, England (Noyes, 2015).

Tetrastichus halidayi (Graham, 1961)

Material examined: Turkey: Kırıkkale; Merkez, 802 m, 19.07.2010, 39°87'42"N, 33°58'46"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Bulgaria, Czech Republic, Czechoslovakia, Germany, Netherlands, Norway, Slovakia, Slovenia, Sweden, England, Scotland (Noyes, 2015).

New record for Turkey.

Tetrastichus melasomae Graham, 1991

Material examined: Turkey: Çankırı: Hasakçe village, 845 m, 23.06.2012, 40°65'88"N, 33°76'62"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Czech Republic, Sweden, Turkey (Noyes, 2015).

Tetrastichus sinope (Walker, 1839)

Material examined: Turkey: Çankırı; Eldivan, 965 m, 23.06.2012, 40°52'31"N, 33°49'81"E, 1♀ (Leg: Sakaltaş Ariyak).

Distribution: Algeria, Canada, France, Germany, Hungary, Ireland, Italy, Lithuania, Moldova, Nearctic,

Netherlands, New Zealand, Sweden, Turkey, Ukraine, England, United States of America, Yugoslavia (pre-1991) (Noyes, 2015).

Turkey, a rich country in the sense of biological variety, is a bridge at the intersection of the Asian, European, and African continents and also has faunal and floral elements of these three continents because of its different climate conditions (Gülperçin and Tezcan, 2010). Kırıkkale and Çankırı, located in the middle of Central Anatolia, are at the intersection points between east-west and north-south regarding their topographical structures, climatic conditions, vegetation, temperature, etc. For this reason, effects of the climatic conditions and vegetation of the Black Sea region can be seen in most parts of these regions in addition to their own terrestrial climate (Sakaltaş Ariyak and Tüzün, 2014). This increases their floral and faunal richness. The Tetrastichinae fauna of Kırıkkale and Çankırı has been identified with this study.

In this study, 209 (151 ♀♀, 58 ♂♂) samples were examined and 37 species were identified. Six species out of 37 identified species in this study were diagnosed from Çankırı, 17 species were diagnosed from Kırıkkale, and 14 species were diagnosed from both provinces. Samples were collected on plants by using a sweeping-net. These samples belong to *Anaprostocetus*, *Baryscapus*, *Neotrichoporoides*, *Oomyzus*, *Pronotalia*, *Sigmophora*, *Tamarixia*, and *Tetrastichus* species. Thirteen of them are new records for Turkey (Table).

The Fauna of Tetrastichinae is represented in Turkey (with the addition of the new records in this study) by 147 species in 19 genera, in the Palearctic by at least 903 species in 45 genera, and in the world by at least 1987 species in 109 genera. Turkish Tetrastichinae species are 7.4% of the total Tetrastichinae species in the world and 16.3% of Tetrastichinae species in the Palearctic considering the new records in this study. These rates are relatively low compared to the world and Palearctic regions. More faunistic studies must be conducted in order to discover the full richness of the Turkish Tetrastichinae fauna.

The aim of this study was to contribute to knowledge of the Tetrastichinae fauna and help researchers who are to apply biological control programs using ecological observations related to the samples' natural habitats and their sampling times.

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References

- Boucek Z (1988). Australasian Chalcidoidea (Hymenoptera): A Biosystematic Revision of Genera of Fourteen Families, with a Reclassification of Species. Wallingford, UK: CAB International.
- Boyadzhiev PS (2003). New records to the fauna of Eulophidae in Bulgaria (Hymenoptera: Chalcidoidea) with a checklist of all the Bulgarian species. Plovdivski Universitet "Paisij Khilendarski" Nauchni Trudove Biologiya Animalia 39: 79-96.
- Cebeci HH, Grabenweger G, Ayberk H (2011). Eulophid parasitoids (Hymenoptera: Eulophidae) of the horse chestnut leafminer, *Cameraria ohridella* (Lepidoptera: Gracillariidae), from İstanbul, Turkey. Turk J Zool 35: 777-780.
- Çıkman E, Doğanlar M (2006). Parasitoids of natural populations of *Phytomyza orobanchia* (Kaltenbach, 1864) (Diptera: Agromyzidae) in southeastern Anatolia. J Appl Sci Res 2: 327-330.
- Doğanlar M (1982). Hymenopter parasites of some lepidopterous pests in eastern Anatolia. Turk Entomol Derg-Tu 6: 197-205.
- Doğanlar M (1992). Notes on the species of the nominal subgenus *Aprostocetus* s.str. of *Aprostocetus* Westwood, 1833, from Europe and Turkey (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 13: 513-521.
- Doğanlar M (1993a). Systematic works on *Sigmophora* Rondani, 1867 (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 179-186.
- Doğanlar M (1993b). Notes on the species of *Tetrastichus* Haliday, 1844, with descriptions of a new subgenus and two new species (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 197-206.
- Doğanlar M (1993c). Notes on *Pronotalia* Gradwell, 1957 with description of two new species from Turkey (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 361-368.
- Doğanlar M (1993d). Notes on the species of *Neotrichoporoides* Girault, 1913, with descriptions of some new species from Ghana and Turkey (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 369-380.
- Doğanlar M (1993e). Notes on *Baryscapus* Förster, 1856, with description of four new species (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 381-389.
- Doğanlar M (1993f). Two new species of *Puklina* Graham, 1991, (Hymenoptera: Eulophidae; Tetrastichinae). Zeitschrift für Entomologie 14: 390-396.
- Doğanlar M (1994). Ülkemiz Tetrastichinae (Hymenoptera: Eulophidae) türleri üzerinde bazı tesbitler. In: Türkiye III. Biyolojik Mücadele Kongre Bildirileri; 25-28 January 1994; İzmir, Turkey, pp. 83-91 (in Turkish).
- Doğanlar M (2011). Parasitoids complex of the olive leaf gall midges, *Dasineura oleae* (Angelini, 1831) and *Lasioptera oleicola* Skuhrová, 2011 (Diptera: Cecidomyiidae) in Hatay Turkey, with descriptions of new genus and species from Tetrastichinae (Hymenoptera: Eulophidae). Turk Entomol Derg-Tu 35: 245-264.
- Doğanlar M, LaSalle J, Sertkaya E, Doğanlar O (2009). A new species of *Quadrastichus* Girault, 1913 (Hymenoptera: Eulophidae: Tetrastichinae) from Hatay, Turkey. Turk J Zool 33: 309-314.
- Doğanlar M, Sertkaya E, Skuhrová M (2011). Pest status of olive leaf gall midge *Dasineura oleae* (Angelini, 1831), description of *Lasioptera oleicola* Skuhrová sp. new (Diptera: Cecidomyiidae) and effectiveness of parasitoids on their populations in Hatay, Turkey. Turk Entomol Derg-Tu 35: 265-284.
- Doğanlar O, Doğanlar M (2008). First record of the eucalyptus seed gall wasp, *Quadrastichodella nova* Girault, 1922, (Eulophidae: Tetrastichinae) from Turkey. Turk J Zool 32: 457-459.
- Gençer L (2004). Contribution to the knowledge of the family Eulophidae (Hymenoptera: Chalcidoidea) from Turkey, with some new records. Phytoparasitica 32: 264-273.
- Gençer L (2010). A new species of *Anaprostocetus* Graham 1987 (Hymenoptera: Eulophidae) from Turkey. Entomol Fennica 20: 225-227.
- Gençer L, Doğanlar M (1995). Sivas-Merkez'de Tetrastichinae (Hymenoptera: Eulophidae) üzerine faunistik bir araştırma. Cumhuriyet Üniversitesi Fen-Edebiyat Fakültesi Fen Bilimleri Dergisi 18: 32-42 (in Turkish).
- Graham M (1987). A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. Bulletin of the British Museum (Natural History) Entomology Series 55: 1-392.
- Graham M (1991). A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae). Revision of the remaining genera. Memoirs of the American Entomological Institute 49: 1-322.
- Güler Y, Kodan M (2010). A new record of ectoparasitoid *Melittobia acasta* (Walker, 1839) (Hymenoptera: Eulophidae) from Turkey. Mellifera 10: 34-36.
- Gülperçin N, Tezcan S (2010). Türkiye Elateridae (Coleoptera) faunasının endemizm yönünden değerlendirilmesi. BİBAD (Biyoloji Bilimleri Araştırma Dergisi) 3: 111-113 (in Turkish).
- Kılınçer N (1982). Investigations on the parasite complex of the small cabbage white butterfly (*Pieris rapae* L.) (Lepidoptera: Pieridae) in the Ankara region. Bitki Koruma Bülteni 22: 107-119.
- Koçak E, Özdemir M (2012). Parasitic Hymenoptera reared from the insects on *Heraclium platytaenium* Boiss. (Apiaceae) with new faunistic and biological records. Turk J Zool 36: 201-208.
- LaSalle J (1994). North American genera of Tetrastichinae (Hymenoptera: Eulophidae). J Nat Hist 28: 109-236.
- LaSalle J (1999). Ekonomik önemi olan Hymenopterler. Biyoloji ve taksonomi kurs notları. Sivas, Turkey: Cumhuriyet Üniversitesi Fen-Edebiyat Fakültesi Biyoloji Bölümü (in Turkish).
- Noyes JS (2015). Universal Chalcidoidea Database. Available online at <http://www.nhm.ac.uk/>.
- Öncüer C (1991). A Catalogue of the Parasites and Predators of Insect Pests of Turkey. Agricultural Faculty Paper 505. İzmir, Turkey: Ege University.

- Özbek H, Çoruh S (2010). Egg parasitoids of *Malacosoma neustria* (Linnaeus, 1758) (Lepidoptera: Lasiocampidae) in Erzurum province of Turkey. *Turk Entomol Derg-Tu* 34: 551-560.
- Reina P, LaSalle J (2003). Key to the World Genera of Eulophidae Parasitoids (Hymenoptera) of Leafmining Agromyzidae (Diptera). Available online at http://www.ento.csiro.au/science/eulophid_key/eulophids.htm/.
- Sakaltaş E (2014). Kırıkkale, Çankırı Tetrastichinae (Hymenoptera: Eulophidae) türleri. PhD, Ankara University, Ankara, Turkey (in Turkish).
- Sakaltaş E, Gençer L (2005). Contribution to the knowledge of the Tetrastichinae (Hymenoptera: Eulophidae) from Ankara, Turkey, with some new records. *Acta Phytopathol Hun* 40: 383-390.
- Sakaltaş Ariyak E, Tüzün A (2014). Contribution to the knowledge of the *Aprostocetus* Westwood, 1833 (Hymenoptera: Tetrastichinae) from Kırıkkale, Çankırı, Turkey, with some new records. *Turk Entomol Derg-Tu* 38: 415-426.
- Yegorenkova EN, Yefremova ZA (2011). *Baryscapus babi* Doğanlar, 1993 (Hymenoptera: Eulophidae) is parasitoid of *Lasiosina devitata* (Diptera: Chloropidae) in Turkey: description of male and discovery of host. *Zoosystematica Rossica* 20: 325-329.
- Yegorenkova EN, Yefremova ZA, Strakhova IS, Zotov AA (2011). The parasitic wasp *Baryscapus crassicornis* (Erdös) (Hymenoptera, Eulophidae) developing in larvae of the weevil genus *Larinus* Germar (Coleoptera, Curculionidae). *Entomological Review* 91: 889-897.