

Orijinal Araştırma (Original article)

**Contribution to the knowledge of the *Aprostocetus* Westwood, 1833
(Hymenoptera: Tetrastichinae) from Kırıkkale and Çankırı (Turkey)
with some new records¹**

Kırıkkale ve Çankırı (Türkiye)'dan bazı yeni kayıtlar ile *Aprostocetus* Westwood, 1833
(Hymenoptera: Tetrastichinae)'a ait bilgilere katkılar

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Summary

In this study species of genus *Aprostocetus* of Kırıkkale and Çankırı provinces are identified and data about some ecological aspects (locations, hosts, their distributions in the world) of the species are given. Samples were picked up on the plants between months June-August of 2010-2012. In this study 154 (147 ♀♀, 7 ♂♂) samples have been evaluated. 29 species of genus *Aprostocetus* have been detected by identifying the samples from locations. 11 species of them are new records for the Turkish fauna. These species are; *Aprostocetus aartseni* Graham, 1987, *A. artemisicola* Graham, 1987, *A. balasi* (Erdös, 1954), *A. constrictus* Graham, 1987, *A. flavifrons* (Walker, 1849), *A. incassatus* Graham, 1961, *A. ligus* (Walker, 1839), *A. micantulus* (Thomson, 1878), *A. nubigenus* Graham, 1986, *A. palustris* Graham, 1987, *A. serratularum* Graham, 1987. With this study the number of *Aprostocetus* species were updated to 60 species that was previously 49 species.

Key words: Tetrastichinae, *Aprostocetus*, Kırıkkale and Çankırı, Fauna, Turkey

Özet

Bu çalışmada Kırıkkale ve Çankırı'dan *Aprostocetus* cinsine ait türler tespit edilmiş ve türlerin bazı ekolojik özellikleri (toplama yapılan yerler, konukçuları, yayılışları) hakkında bilgiler verilmiştir. Örnekler 2010-2012 Haziran-Ağustos ayları arasında bitkiler üzerinden toplanmıştır. Bu çalışmada 154 (147 ♀♀, 7 ♂♂) örnek değerlendirilmiştir. Çalışma alanından toplanan örneklerin teşhislerinin yapılmasıyla *Aprostocetus* cinsine ait 29 tür tespit edilmiştir. Bunlardan 11 tür Türkiye için yeni kayıttır. Bu türler; *Aprostocetus aartseni* Graham, 1987, *A. artemisicola* Graham, 1987, *A. balasi* (Erdös, 1954), *A. constrictus* Graham, 1987, *A. flavifrons* (Walker, 1849), *A. incassatus* Graham, 1961, *A. ligus* (Walker, 1839), *A. micantulus* (Thomson, 1878), *A. nubigenus* Graham, 1986, *A. palustris* Graham, 1987, *A. serratularum* Graham, 1987. Bu çalışmayla daha önce 49 olan *Aprostocetus* tür sayısı 60 olmuştur.

Anahtar sözcükler: Tetrastichinae, *Aprostocetus*, Kırıkkale ve Çankırı, Fauna, Türkiye

¹ This work is part of doctoral thesis submitted on 26 December 2013 in Ankara University Biology Department

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Alınış (Received): 24.09.2014

Kabul edilmiş (Accepted): 19.01.2015

Introduction

Tetrastichinae is the most extensive subfamily of Eulophidae family of Hymenoptera (LaSalle, 1999). It is represented all over the world by over 1900 species in 110 genus and in Palearctic region 878 species in 48 genus (Noyes, 2014). Although most of it previously was grouped into *Tetrastichus* genus, this genus was divided into several natural groups later (Graham, 1987, 1991; Boucek, 1988). Hosts of this subfamily are grouped into 100 families of 10 different orders. Besides it has hosts that have features such as mites, spider eggs, phytophagous and even nematod (Graham, 1987; LaSalle, 1994; Sakaltaş & Gençer, 2005). Some species of Tetrastichinae are used in biological control programs in various regions of the world. Some species of it are accepted as harmful since they attack to useful plants and insects. For this reason accurate diagnosis of Tetrastichinae used in biological control programs and found in ecosystems need to be conducted and also its biology and host need to be determined correctly. There are studies (Doğanlar, 1982, 1992a, 1992b, 1993a, 1993b, 1993c, 1993d, 1994, 2011; Gençer & Doğanlar, 1995; Graham, 1987, 1991; Öncüer, 1991; Gençer, 2004; Sakaltaş & Gençer, 2005; Çıkman & Doğanlar, 2006; Doğanlar & Doğanlar, 2008; Doğanlar et al., 2009; Gençer, 2009; Güler & Kodon, 2010; Cebeci et al., 2011; Yegorenkova & Yefremova, 2011; Koçak & Özdemir, 2012) related to Tetrastichinae in our country. Fauna Tetrastichinae has reached 142 species in 16 genus in our country with the addition of this study (Sakaltaş, 2014).

Aprostocetus has the most species and is the most spread out genus of Tetrastichinae all over the World (Graham, 1987; Boucek, 1988; Noyes, 2014). *Aprostocetus* displays a wide range in host and biology. Many species of the subgenus *Aprostocetus* are primary parasitoids of hosts in plant galls, as Diptera Cecidomyiidae in particular, but also Hymenoptera, Cynipoidea, Coleoptera, Coccoidea, and eriophyid mites. Moreover, some species are occasional parasitoids of Diptera and Lepidoptera leafminers (Reina & LaSalle, 2003). In various studies *Aprostocetus* Westwood, 1833 has been considered as a different genus besides it has been indicated that it was a synonym of *Tetrastichus* Haliday, 1844 by some authors (Doğanlar, 1992a). Recent studies provide synonyms, combinations, hosts, new records and new species of genus *Aprostocetus* (Doğanlar, 1992c, 1994, 2011; Gençer & Doğanlar, 1995; Gençer, 2004; Sakaltaş & Gençer, 2005; Yefremova & Yegorenkova, 2005; Yefremova et al., 2007; Viggiani & Monaco, 2014).

In this study 29 species of genus *Aprostocetus* of Kırıkkale and Çankırı provinces have been detected. 11 species of them are new records for the Turkish fauna. Detected species are written alphabetically and data about some ecological aspects of the species are given.

Materials and Methods

The materials for this study were collected by the first author from different localities in Kırıkkale and Çankırı between June 2010-August 2012. Basically samples were collected by sweeping net on plants and mouth aspirator was used. Samples' localities were recorded by using GPS. Collected samples were placed into glass tubes that have 70 % ethyl alcohol in it. Diagnostic keys of Boucek (1988), Graham (1987), LaSalle (1994) were used for the diagnosis of the samples. Graham's diagnostic key that was developed for European fauna was used mostly among those diagnostic keys. Diagnostic keys have been formed by revising this diagnostic key. Leica S8 APO stereozoom microscope has been used to diagnose samples. Species diagnosis keys have been formed after species have been diagnosed and preparations have been formed in order to show characters, lastly their pictures were taken by Nikon E 4500 digital camera.

Spread out of the species and their hosts identifications were made by using diagnostic keys and other related literature (Doğanlar, 1994; Gençer & Doğanlar, 1995; Gençer, 2004; Sakaltaş & Gençer, 2005; Doğanlar, 2011; Noyes, 2014). Samples are preserved in Entomology Museum of Ankara University Biology department.

Results

In this study 29 species of genus *Aprostocetus* Westwood, 1833 (Hymenoptera: Eulophidae: Tetrastichinae) of Kırıkkale and Çankırı provinces have been identified. 11 species of them are new records for fauna of the Turkish fauna. Some ecological aspects like distribution in the World, hosts of the species detected in working fields are given.

Aprostocetus aartseni Graham, 1987

Material Examined: Turkey, Çankırı: Akçakavak village, 24.06.2012, 1♀; Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: Greece (Graham, 1987; Noyes, 2014).

New record for Turkey.

Aprostocetus annulatus (Förster, 1861)

Material Examined: Turkey, Çankırı: Atkaracalar, 1237 m, N:40°81'16"/E:33°07'35", 23.VII. 2011, 2♀♀; Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E:33°67'71", 15.VII.2012, 1♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀; Bahşılı/Celal Bayar Park, 686 m, 08.VII. 2012, N:39°81'72"/E:33°48'06", 1♀, (Leg. Sakaltaş Arıyak).

Host: *Asphondylia sarothamni* (Diptera: Cecidomyiidae), *Eulecanium corni*, *Sphaerolecanium prunastrı* (Hemiptera: Coccidae) (Noyes, 2014).

Distribution: France, Germany, Hungary, Russia, Sweden, Switzerland, Ukraine, England (Noyes, 2014), Turkey; Sivas: Campus (Gençer, 2004).

Aprostocetus artemisicola Graham, 1987

Material Examined: Turkey, Çankırı: Ilgaz/Kırkpınar plateau, 1794 m, N:41°00'49"/E:33°61'85", 15.VII.2012, 1♀; Ilgaz/Ödemiş village, 969 m, N:40°93'74"/E:33°56'97", 15.VII.2012, 1♀; Kırıkkale: Bahşılı/Celal Bayar Park, 686 m, N:39°81'72"/E:33°48'06", 08.VII.2012, 1♀; Keskin, 1056 m, N:39°70'69"/E:33°57'91", 13.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Contarinia artemisiae* (Diptera: Cecidomyiidae), *Artemisia* sp., *A. arborescens*, *A. vulgaris* (Asteraceae) (Noyes, 2014).

Distribution: Germany, Italy, Russia, Spain, Sweden, England (Noyes, 2014).

New record for Turkey.

Aprostocetus bakkendorfi Graham, 1987

Material Examined: Turkey, Çankırı: Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI. 2012, 1♀, (Leg. Sakaltaş Arıyak).

Distribution: Denmark, Russia, Sweden (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994).

Host: Cecidomyiidae, *Astragalus glycyphyllos* (Fabaceae) (Noyes, 2014).

Aprostocetus balasi (Erdös, 1954)

Material Examined: Turkey, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 4♀♀, (Leg. Sakaltaş Arıyak).

Host: *Phyllocnistis suffusella*, *Phyllocnistis unipunctella* (Lepidoptera: Gracillariidae), *Pseudargyrotoza conwagana* (Lepidoptera: Tortricidae), *Fraxinus* sp. (Oleaceae) (Noyes, 2014).

Distribution: Austria, France, Hungary, Italy, Sweden (Noyes, 2014).

New record for Turkey.

***Aprostocetus catius* (Walker, 1839)**

Material Examined: Turkey, Çankırı: Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI. 2012, 3♀♀; Akçakavak village, 24.06.2012, 1♀; Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E: 33°67'71", 15.VII.2012, 4♀♀; Ilgaz/Ödemiş village, 969 m, N:40°93'74"/E:33°56'97", 15.VII.2012, 1♀; Kırıkkale: Çelebi, 1093 m, N:39°45'31"/E:33°55'03", 13.VII.2010, 1♀; Keskin, 1056 m, N:39°70'69"/E: 33°57'91", 13.VII.2010, 5♀♀; Merkez, 802 m, N:39°87'41"/E:33°58'46", 19.VII.2010, 1♀; Yahşihan, 685 m, 19.VII.2010, N:39°84'03"/E:33°45'51", 1♀, (Leg. Sakaltaş Arıyak).

Host: In some types graminæ Cecidomyiidae (Diptera) was collected over (Doğanlar, 1994).

Distribution: Czech Republic, Czechoslovakia, Ireland (North and South), Russia, Sweden, Turkey, England (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994), Ankara: Altındağ/Altınova, Elmadağ: Hasanoglan, Haymana, Güdül, Söğütözü (Sakaltaş & Gençer, 2005), Sivas: Campus, Kırşehir: Mucur (Gençer, 2004).

***Aprostocetus cerricola* (Erdős, 1954)**

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 4♀♀, (Leg. Sakaltaş Arıyak).

Host: *Macrodiplosis dryobia* (Diptera: Cecidomyiidae), *Andricus grossulariae* (Hymenoptera: Cynipidae), *Arnoldiola cerris* (Diptera: Cecidomyiidae), *Quercus cerris* (Fagaceae) (Noyes, 2014).

Distribution: Austria, Belgium, Czechoslovakia, France, Greece, Hungary, Russia, Slovakia, Spain, Sweden, Yugoslavia (pre 1991) (Noyes, 2014), Turkey; Konya: Ereğli, Tokat: Almus (Gençer, 2004).

***Aprostocetus crino* (Walker, 1838)**

Material Examined: Turkey, Çankırı: Eldivan, 915 m, N:40°54'21"/E:33°50'61", 23.VII.2011, 6♀♀; Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀; Şabanözü, 1109 m, N:40°47'78"/E: 33°30'02", 23.VII.2011, 2♀♀; Kırıkkale: Çelebi, 1093 m, N:39°45'31"/E:33°55'03", 13.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Yponomeuta padellus* (Lepidoptera: Yponomeutidae), *Oecanthus* sp., *O. nigricornis*, *O. pellucens*, *O. quadripunctatus* (Orthoptera: Gryllidae), *Padus racemosa* (Rosaceae) (Noyes, 2014).

Distribution: Andorra, Bulgaria, Croatia, Czech Republic, Czechoslovakia, Denmark, France, Germany, Hungary, Iceland, Ireland (North and South), Italy, Moldova, Nearctic, Netherlands, Peoples' Republic of China, Russia, Slovakia, Sweden, Turkey; Ankara: Altındağ/Altınova (Sakaltaş & Gençer, 2005), England, USA, Yugoslavia (Federal Republic), Yugoslavia (pre 1991) (Noyes, 2014).

***Aprostocetus constrictus* Graham, 1987**

Material Examined: Turkey, Çankırı: Atkaracalar, 1237 m, N:40°81'16"/E:33°07'35", 23.VII. 2011, 1♀; Merkez, 713 m, 24.06.2012, N:40°58'24"/E:33°62'10", 4♀♀; Ilgaz/Eksikkıymık village, 1305 m, 15.07.2012, N:41°01'04"/E:33°67'71", 1♀; Kırıkkale: Çelebi, 1093 m, N:39°45'31"/E:33°55'03", 13.07.2010, 1♀; Keskin, 1056 m, N:39°70'69"/E:33°57'91", 13.VII.2010, 6♀♀, (Leg. Sakaltaş Arıyak).

Host: *Apion* sp. (Coleoptera: Apionidae), *Oligotrophus* sp., *O. skuhravae*, *O. tarda* (Diptera: Cecidomyiidae), *Betula pontaninii*, *B. pubescens* (Betulaceae) (Noyes, 2014).

Distribution: Netherlands, Norway, Russia, Sweden, England (Noyes, 2014).

New record for Turkey.

***Aprostocetus emesa* (Walker, 1839)**

Material Examined: Turkey, Çankırı: Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI. 2012, 3♀♀; Kırıkkale: Bahşılı/Celal Bayar Park, 697 m, N:39°81'57"/E:33°47'71", 08.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Dasineura alopecuri* (Diptera: Cecidomyiidae) (Noyes, 2014).

Distribution: Czech Republic, Czechoslovakia, France, Germany, Hungary, Ireland (North and South), Netherlands, Norway, Russia, Slovakia, Sweden, England (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994), Sivas: Yıldızeli, Yozgat-Kayseri main road, Düver (Gençer, 2004).

Aprostocetus flavifrons (Walker, 1849)

Material Examined: Turkey, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Cerodontha pygmaea* (Diptera: Agromyzidae), *Brachypodium sylvaticum* (Poaceae) (Noyes, 2014).

Distribution: Italy, Madeira (Noyes, 2014).

New record for Turkey.

Aprostocetus forsteri (Walker, 1847)

Material Examined: Turkey, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀; Keskin, 1056 m, N:39°70'69"/E:33°57'91", 13.VII.2010, 2♀♀, (Leg. Sakaltaş Arıyak).

Distribution: Austria, Bulgaria, Cyprus, Czech Republic, Czechoslovakia, France, Hungary, Iran, Italy, Palaeartic, Russia, Slovakia, Spain, Sweden, Switzerland (Noyes, 2014), Turkey; Tokat: Artova, Gürcüköy, Erzurum, Adana: Belededik, Karaisalı (Doğanlar, 1992a), Sivas: Hara, Campus, Paşabahçe, Türk-İş Blocks (Gençer & Doğanlar, 1995), Ankara: Ayaş, Beypazarı, Çankaya/Beytepe village, Çayırhan, Güdül, Haymana, Sincan (Sakaltaş & Gençer, 2005).

Host: *Tephritis neesii* (Diptera: Tephritidae), *Aulax rogenhoferi*, *A. salviae*, *Aylax jaceae*, *A. rogenhoferi*, *A. salviae*, *Barbotinia oraniensis*, *Diplolepis mayri*, *Isocolus jaceae*, *I. rogenhoferi*, *I. scabiosae* (Hymenoptera: Cynipidae), *Urophora* sp. (Diptera: Tephritidae), *Centaurea jacea*, *C. nigra*, *C. paniculata*, *C. pannonica*, *C. sadleriana*, *C. scabiosa*, *Leucanthemum vulgare* (Asteraceae), *Salvia lavandulifolia*, *S. nemorosa*, *S. officinalis*, *S. pratensis* (Lamiaceae), *Papaver dubium*, *P. rhoeas* (Papaveraceae), *Rosa* sp. (Rosaceae) (Noyes, 2014).

Aprostocetus fusificola Graham, 1987

Material Examined: Turkey, Çankırı: Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI. 2012, 1♀; Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E:33°67'71", 15.VII.2012, 1♀; Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♂, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♂, (Leg. Sakaltaş Arıyak).

Host: *Plagiotrochus cardiguensis*, *P. fusifex*, *P. quercusilicis* (Hymenoptera: Cynipidae), *Quercus coccifera*, *Q. ilex* (Fagaceae) (Noyes, 2014).

Distribution: France, Spain (Noyes, 2014), Turkey; Yozgat, Düver (Gençer, 2004).

Aprostocetus incrassatus Graham, 1961

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Carex* sp. (Cyperaceae) (Noyes, 2014).

Distribution: Russia, Sweden, England (Noyes, 2014).

New record for Turkey.

***Aprostocetus larzacensis* Graham, 1987**

Material Examined: Turkey, Çankırı: Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI. 2012, 1♀; Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E:33°67'71", 15.VII.2012, 5♀♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: France, Moldova, Russia, Sweden (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994).

***Aprostocetus levadiensis* Graham, 1987**

Material Examined: Turkey, Kırıkkale: Delice/Alcılı village, 639 m, N:39°99'73"/E:34°06'45", 12.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: Greece, Sweden (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994), Ankara: Bağlum (Sakaltaş & Gençer, 2005), Sivas: Campus, Kırşehir: Hirfanlı Dam (Gençer, 2004).

***Aprostocetus ligus* (Walker, 1839)**

Material Examined: Turkey, Çankırı: Eldivan, 965 m, N:40°52'31"/E:33°49'80", 23.VI.2012, 3♀♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: Russia, Sweden, England (Noyes, 2014).

New record for Turkey.

***Aprostocetus micantulus* (Thomson, 1878)**

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 6♀♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Dasineura abietiperda* (Diptera: Cecidomyiidae), *Pinus* sp. (Pinaceae) (Noyes, 2014).

Distribution: France, Hungary, Italy, Russia, Sweden, United Kingdom (Noyes, 2014).

New record for Turkey.

***Aprostocetus nubigenus* Graham, 1986**

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 2♀♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: Madeira, Peoples' Republic of China (Noyes, 2014).

New record for Turkey.

***Aprostocetus palustris* Graham, 1987**

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀; Bahşılı/Karaahmetli Dam, 718 m, N:39°66'64"/E:33°44'47", 14.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: Sweden, England (Noyes, 2014).

New record for Turkey.

***Aprostocetus pausiris* (Walker, 1839)**

Material Examined: Turkey, Çankırı: Atkaracalar, 1237 m, N:40°81'16"/E:33°07'35", 23.VII. 2011, 1♂; Eldivan, 915 m, N:40°54'21"/E:33°50'61", 23.VII.2011, 1♀; Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E:33°67'71", 15.VII.2012, 1♀; Ilgaz/Kırkpınar plateau, 1794 m, N:41°00'49"/E:33° 61' 85", 15.VII.2012, 1♀, 1♂; Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀, 2♂♂; Şabanözü, 1109 m, N:40°47'78"/E:33°30'02", 23.VII.2011, 2♀♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33° 71'15", 12.VII.2010, 5♀♀, (Leg. Sakaltaş Arıyak).

Host: *Dasineura leguminicola* (Diptera: Cecidomyiidae), *Lipara* sp. (Diptera: Chloropidae), *Phragmites australis* (Poaceae) (Noyes, 2014).

Distribution: Canada, Czech Republic, Czechoslovakia, Denmark, France, Germany, Greece, Hungary, Ireland (North and South), Madeira, Nearctic, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Turkey; Tokat (Doğanlar, 1994), Ankara: Akyurt, Altınova, Bağlum, Batıkent, Çubuk Highways Park, Söğütözü (Sakaltaş & Gençer, 2005), Sivas: Campus, Kırşehir-Kayseri mainroad 130 km (Gençer, 2004) England, USSR, Yugoslavia (pre 1991) (Noyes, 2014).

***Aprostocetus phineus* (Walker, 1839)**

Material Examined: Turkey, Çankırı: Eldivan, 915 m, N:40°54'21"/E:33°50'61", 23.VII.2011, 1♀; Eldivan, 965 m, N:40°52'31"/E:33°49'80", 23.VI.2012, 3♀♀; Hasakçe village, 845 m, N:40°65'87"/E:33°76'62", 23.VI.2012, 2♀♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 10♀♀, (Leg. Sakaltaş Arıyak).

Host: These species generally occur in grassy habitats (Gençer & Doğanlar, 1995).

Distribution: Czech Republic, Czechoslovakia, Denmark, France, Germany, Hungary, Slovakia, Sweden, England, USSR, Yugoslavia (pre 1991), Turkey; Sivas: Campus, Hara, Paşabahçe (Gençer & Doğanlar, 1995).

***Aprostocetus pygmaeus* (Zetterstedt, 1838)**

Material Examined: Turkey, Çankırı: Eldivan, 915 m, N:40°54'21"/E:33°50'61", 23.VII.2011, 1♀; Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 3♀♀, 1♂, Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀; Merkez, 802 m, N:39°87'41"/E:33°58'46", 19.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Cecidomyiidae unspecified*, *Dasineura alopecuri* (Diptera: Cecidomyiidae), *Megachile centuncularis*, *Osmia coerulescens* (Hymenoptera: Apidae), *Diplolepis rosae* (Hymenoptera: Cynipidae), *Alopecurus pratensis* (Poaceae), *Rosa* sp. (Rosaceae) (Noyes, 2014).

Distribution: Canada, Czech Republic, Czechoslovakia, Denmark, Europe, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Russia, Sweden, Turkey; Kars: Ardahan, Aralık, Tokat: Fidanlık, Taşçiftlik, Zile, Pazar (Doğanlar, 2004; Gençer & Doğanlar, 1995), Ankara: Çamlıdere, Lalahan, Ayaş, Şereflikoçhisar, Mamak/Kayaş, Hasanoğlu (Sakaltaş & Gençer, 2005), Ukraine, England (Noyes, 2014).

***Aprostocetus productus* Graham, 1987**

Material Examined: Turkey, Çankırı: Ilgaz/Eksikkıymık village, 1305 m, N:41°01'04"/E:33°67' 71", 15.VII.2012, 4♀♀; Kırıkkale: Keskin, 1056 m, N:39°70'69"/E:33°57'91", 13.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: Unknown.

Distribution: France, Russia, Sweden (Noyes, 2014), Turkey; Tokat (Doğanlar, 1994), Sivas: Paşabahçe, Campus, Tuzlugöl (Gençer & Doğanlar, 1995).

Aprostocetus serratularum Graham, 1987

Material Examined: Turkey, Kırıkkale: Balışeyh, 865 m, 12.VII.2010, N:39°90'91"/E:33°71'15", 1♀, (Leg. Sakaltaş Arıyak).

Host: *Terellia serratulae*, *Urophora cuspidata*, *U. jaceana*, *U. solstitialis* (Diptera: Tephritidae), *Metzneria* sp. (Lepidoptera: Gelechiidae), *Carduus nutans*, *Centaurea lanceolatum*, *C. nigra*, *C. scabiosa*, *Cirsium* sp., (Asteraceae) (Noyes, 2014).

Distribution: Czech Republic, Germany, Greece, Italy, Netherlands, Russia, Sweden, England (Noyes, 2014).

New record for Turkey.

Aprostocetus tymbor (Walker, 1839)

Material Examined: Turkey, Çankırı: Şabanözü, 1109 m, N:40°47'78"/E:33°30'02", 23.VII.2011, 2♀♀, (Leg. Sakaltaş Arıyak).

Host: *Helicomyia saliciperda*, *Lasioptera rubi* (Diptera: Cecidomyiidae), *Rubus* sp., *R. idaeus* (Rubiaceae), *Salix* sp. (Salicaceae) (Noyes, 2014).

Distribution: Czech Republic, France, Ireland (North and South), Italy, Netherlands, Poland, Russia, Slovakia, Sweden, Turkey; Ankara: Söğütözü (Sakaltaş & Gençer, 2005), England, Yugoslavia (Federel Republic), Yugoslavia (pre 1991) (Noyes, 2014).

Aprostocetus toddaliae (Risbec, 1958)

Material Examined: Turkey, Çankırı: Ilgaz/Eksikkıymık Village, 1305 m, N:41°01'04"/E:33°67' 71", 15.VII.2012, 1♀; Ilgaz/Ödemiş village, 969 m, N:40°93'74"/E:33°56'97", 15.VII.2012, 4♀♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 1♀, (Leg. Sakaltaş Arıyak).

Host: *Ceroplastes* sp. (Hemiptera: Coccidae) (Noyes, 2014), *C. rusci* L., *Citrus paradisi* Matc., *Citrus sinensis* Del Guer, *Ficus carica* (*Tetrastichus ceroplastae*) (Doğanlar, 1994).

Distribution: Israel, Madagascar, Turkey; Antalya, İzmir, Muğla (Doğanlar, 1994; Noyes, 2014).

Aprostocetus venustus (Gahan, 1914)

Material Examined: Turkey, Çankırı: Akçakavak Village, 24.VI.2012, 1♀; Merkez, 713 m, N:40° 58'24"/E:33°62'10", 24.VI.2012, 1♀; Kırıkkale: Keskin, 1056 m, N:39°70'69"/E:33°57'91", 13.VII.2010, 2♀♀, (Leg. Sakaltaş Arıyak).

Host: *Asphondylia websteri*, *Contarinia sorghicola* (Diptera: Cecidomyiidae), *Aulacidea freesei* (Hymenoptera: Cynipidae), *Bruchophagus* sp., *B. gibbus*, *B. onobrychidis*, *B. roddi* (Hymenoptera: Eurytomidae), *Notobasis syriaca*, *Silybum marianum* (Asteraceae), *Medicago sativa*, *Onobrychis* sp. (Fabaceae), *Sorghum* sp. (Poaceae) (Noyes, 2014).

Distribution: Bulgaria, Canada, Canary Islands, Czech Republic, Czechoslovakia, Europe, France, Germany, Hungary, Iran, Italy, Nearctic, Netherlands, Palaeartic, Russia, Slovakia, Spain, Sweden, USA, USSR, Yugoslavia (pre 1991) (Noyes, 2014), Turkey; Erzurum (Doğanlar, 1994).

***Aprostocetus viridinitens* Graham, 1987**

Material Examined: Turkey, Çankırı: Merkez, 713 m, N:40°58'24"/E:33°62'10", 24.VI.2012, 1♀; Kırıkkale: Balışeyh, 865 m, N:39°90'91"/E:33°71'15", 12.VII.2010, 2♀♀, (Leg. Sakaltaş Arıyak).

Host: *Artemisia vulgaris*, collected on Dolden and Betula (Doğanlar, 1994).

Distribution: Czech Republic, France, Russia, Sweden, England (Noyes, 2014), Turkey; Tokat: Taşlıçiftlik, Fidanlık, Turhal, Şenyurt, Ö. Sunar Farm (Doğanlar, 1992a; Doğanlar, 1994).

Conclusion

Turkey, a rich country in the sense of biological variety, is a bridge country at the intersection area of Asia, Europe and Africa continents and also has fauna and flora elements of these three continents because of its different climate conditions (Gülperçin & Tezcan, 2010).

Kırıkkale and Çankırı located in the middle of Central Anatolia, are at the intersection points between east-west, north-south regarding their topographical structures, climatic conditions, vegetations, temperatures etc. For this reason, effects of climatic condition and vegetation of Black Sea can be seen in most parts of the regions in addition to their own terrestrial climate. This situation increases their flora and fauna richness. Fauna *Aprostocetus* of Kırıkkale and Çankırı has been identified with this study. 11 new records have been identified for Turkey [*Aprostocetus aartseni* Graham, 1987, *A. artemisicola* Graham, 1987, *A. balasi* (Erdős, 1954), *A. constrictus* Graham, 1987, *A. flavifrons* (Walker, 1849), *A. incrassatus* Graham, 1961, *A. ligus* (Walker, 1839), *A. micantulus* (Thomson, 1878), *A. nubigenus* Graham, 1986, *A. palustris* Graham, 1987, *A. serratularum* Graham, 1987] and Turkish *Aprostocetus* species number has become 60. Turkish *Aprostocetus* species number was 49 prior to this study (Table 1). There are 704 species in the World and 324 species in Palearctic of this genus (Noyes, 2014). Turkish *Aprostocetus* species are 8.5 % of total *Aprostocetus* species in the World and 18.5 % of *Aprostocetus* species in Palearctic considering the new records in this study. These ratios are relatively low compared to the World and Palearctic regions. More faunistical studies must be conducted in order to discover the richness of Turkish *Aprostocetus* fauna.

Aprostocetus are parasitic or hiperparasitic in Lepidoptera (Yponomeutidae, Gelechiidae, Gracillariidae, Tortricidae), Orthoptera (Gryllidae), Diptera (Cecidomyiidae, Chloropidae, Tephritidae), Hymenoptera (Cynipidae, Eurytomidae, Apidae), Coleoptera (Apionidae) and Hemiptera (Coccidae). As a result, diagnoses of samples pertaining to *Aprostocetus* species which are used in biological control programs and also exist in ecosystems need to be done very well and to be determined their biologies and hosts.

Aim of this study is to contribute to the fauna Tetrastichinae in Turkey and help researchers who are to apply biological control program using ecological observations related to the samples' natural habitats and their pick up time.

Table 1. Previously recorded *Aprostocetus* species and literatures in Turkey

Species Name	Literature
<i>Aprostocetus agevilleae</i> Graham, 1987	Gençer, 2004; Sakaltaş & Gençer, 2005
<i>Aprostocetus agrus</i> (Walker, 1839)	Doğanlar, 1994; Sakaltaş & Gençer, 2005
<i>Aprostocetus annulatus</i> (Förster, 1861)	Gençer, 2004
<i>Aprostocetus arenarius</i> (Erdős, 1954)	Doğanlar, 1994
<i>Aprostocetus artemisiae</i> (Erdős, 1954)	Doğanlar, 1994
<i>Aprostocetus bakkenborfi</i> Graham, 1987	Doğanlar, 1994; Sakaltaş, 2014
<i>Aprostocetus brachycerus</i> (Thomson, 1878)	Doğanlar, 1994
<i>Aprostocetus bruzzonis</i> (Masi, 1930)	Doğanlar, 1994
<i>Aprostocetus bucculentus</i> (Kostjukov, 1978)	Graham, 1987; Doğanlar, 1994
<i>Aprostocetus catus</i> (Walker, 1839)	Doğanlar, 1994; Gençer, 2004; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus caudatus</i> Westwood, 1833	Sakaltaş & Gençer, 2005
<i>Aprostocetus ceroplastae</i> (Girault, 1916)	Domenichini, 1966; Graham, 1987, OILB, 1971; Öncüer, 1991; Özsemerci & Akşit, 2003, Prinsloo, 1984.
<i>Aprostocetus cerricola</i> (Erdős, 1954)	Gençer, 2004; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus citrinus</i> (Förster, 1841)	Gençer, 2004
<i>Aprostocetus coccidiphagus</i> Graham, 1987	Gençer, 2004
<i>Aprostocetus cracens</i> Graham, 1987	Kaya & Kovancı, 2001
<i>Aprostocetus emesa</i> (Walker, 1839)	Doğanlar, 1994; Gençer, 2004; Sakaltaş, 2014
<i>Aprostocetus epicharmus</i> (Walker, 1839)	Graham, 1987; Doğanlar, 1994
<i>Aprostocetus eriophyes</i> (Taylor, 1909)	Öncüer, 1991
<i>Aprostocetus forsteri</i> (Walker, 1847)	Doğanlar, 1994; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus fusificola</i> Graham, 1987	Gençer, 2004; Sakaltaş, 2014
<i>Aprostocetus gaus</i> (Walker, 1839)	Gençer, 2004
<i>Aprostocetus grandii</i> (Domenichini, 1965)	Gençer, 2004
<i>Aprostocetus grylli</i> (Erdős, 1954)	Gençer, 2004
<i>Aprostocetus holoxanthus</i> Graham, 1987	Graham, 1987
<i>Aprostocetus larzacensis</i> Graham, 1987	Doğanlar, 1994; Sakaltaş, 2014
<i>Aprostocetus lasiopterus</i> Doganlar, 2011	Doğanlar, 2011
<i>Aprostocetus levadiensis</i> Graham, 1987	Doğanlar, 1994; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus longicauda</i> (Thomson, 1878)	Graham, 1987; Doğanlar, 1994
<i>Aprostocetus lycidas</i> (Walker, 1839)	OILB, 1971
<i>Aprostocetus mimulus</i> Graham, 1987	Gençer, 2004
<i>Aprostocetus neglectus</i> (Domenichini, 1957)	Graham, 1987; Öncüer, 1991; Doğanlar, 1994
<i>Aprostocetus pausiris</i> (Walker, 1839)	Doğanlar, 1994; Gençer, 2004, Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus phineus</i> (Walker, 1839)	Gençer & Doğanlar, 1995; Gençer, 2004; Sakaltaş, 2014
<i>Aprostocetus phragmiticola</i> Graham, 1987	Gençer, 2004
<i>Aprostocetus productus</i> Graham, 1987	Doğanlar, 1994; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus pygmaeus</i> (Zetterstedt, 1838)	Doğanlar, 1994; Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus rumicis</i> Graham, 1987	Doğanlar, 1994
<i>Aprostocetus samandagus</i> Doganlar, 2011	Doğanlar, 2011
<i>Aprostocetus subcylindricus</i> Graham, 1987	Doğanlar, 1994
<i>Aprostocetus tenuiradialis</i> Graham, 1987	Doğanlar, 1994
<i>Aprostocetus terebrans</i> Erdős, 1954	Sakaltaş & Gençer, 2005
<i>Aprostocetus toddaliae</i> (Risbec, 1958)	Graham, 1987; Doğanlar, 1994
<i>Aprostocetus tompanus</i> (Erdős, 1954)	Doğanlar, 1994; Gençer, 2004
<i>Aprostocetus trjapitzini</i> (Kostjukov, 1976)	Ülgentürk, 2001; Karaca, et al., 2003; Ülgentürk & Toros, 2001
<i>Aprostocetus tymber</i> (Walker, 1839)	Sakaltaş & Gençer, 2005; Sakaltaş, 2014
<i>Aprostocetus venustus</i> (Gahan, 1914)	Doğanlar, 1994; Sakaltaş, 2014
<i>Aprostocetus viridinitens</i> Graham, 1987	Doğanlar, 1994; Sakaltaş, 2014
<i>Aprostocetus westwoodii</i> (Fonscolombe, 1840)	Doğanlar, 1994

Acknowledgements

This work is part of doctoral thesis submitted on 26 December 2013 in Ankara University Biology Department. I would like to thank Prof. Dr. Mikdat DOĞANLAR for his significant contributions for this study and also my family for their support.

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