Ichneumonidae (Hymenoptera) species from Anatolia, Part III

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\textbf{ABSTRACT:} The objective of this study was to evaluate ichneumonid samples, collected from northeastern Anatolia (Erzurum: Pazaryolu-Kumaşkaya). Samples were collected during the summer period of 2015. Collected 14 species belong to Ichneumonidae, Ophioninae, Orthocentrinae and Pimplinae subfamilies. \textit{Cylloceria sylvestris} (Gravenhorst, 1829) is new record for the Turkish fauna. Individual diversity, collecting locations, distribution data and short zoogeographical notes are given for each species.

\textbf{Keywords:} Hymenoptera, Ichneumonidae, New record, Erzurum, Turkey

\textbf{INTRODUCTION}  
Insects play significant roles in the ecology of the world due to their vast diversity of form, function and life-style; their considerable biomass; and their interaction with plant life, other organisms and the environment (Rico-Gray and Oliveira, 2007). 

In Turkey, there was no detailed information available on Ichneumonidae until 1995. 383 ichneumonid species are listed in a catalog of the Ichneumonidae of Turkey by Kolarov (1995). Today, the number of species Ichneumonidae is 1276 and 287 genera in the past 24 years (Özdan and Gürbüz, 2019; Çoruh et al., 2019). However, with more recent contributions (Çaylak, 2019) and this paper, the number of Ichneumonidae fauna of Turkey has reached to 1287 species and 288 genera. 

As in this study, previous studies have been conducted on plants visited by Ichneumonidae species (Çoruh and Çoruh 2008, 2012; Çoruh, 2016, 2017, 2019). Besides some of the studies were conducted on the dedection of host identification (Çoruh et al., 2004; Çoruh and Tozlu 2008; Özbek et al., 2009; Tozlu et al., 2010; Tozlu and Çoruh 2011; Oktar et al., 2012; Özbek and Çoruh 2012; Çoruh and Çalışma, 2016; Narmanlıoğlu and Çoruh, 2018).

The study was performed to identify ichneumonids in Kumaşkaya and to evaluate their host associations. Our aim is to present the richness of the ichneumonid species in this transition zone, located between two provinces (Rize-Erzurum).

\textbf{MATERIAL AND METHOD}  
\textbf{Study area}  
The present research was conducted in Pazaryolu (Kumaşkaya) locality (Figure 1) located in Erzurum Province (Figure 2) (Northeastern Anatolia). The collecting site, Kumaşkaya, is a bowl shaped area between two mountains and has floral richness. The sampling was carried out in all areas for \textit{Carum carvi L.}, \textit{Chenopodium album L.}, \textit{Malva

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neglecta Wallr., Daucus carota L. and primarily Heracleum pastinacifolium K. Koch.

Sampling method and collection
Specimens used in this study were collected using a standard sweeping net. They were captured using an aspirator and dropped directly into ethyl-alcohol (75%) by second author. The Ichneumonid specimens have been identified by Janko Kolarov (Plovdiv University, Bulgaria). Plant specimens were identified according to Davis (1965-1988) and the herbarium of Atatürk University, Faculty of Agriculture, Department of Plant Protection, by the third author. The identified material are deposited in the insect collection of the Department of Entomology, Erzurum, Turkey (EMET). In table 1, are included valid taxa names, individual numbers, zoogeographical distribution and reference data were shown. The newly recorded species for the fauna of Turkey are indicated by an asterisk (*) in the text. General distributions of the species were taken from Yu et al. (2012).

Figure 1. Study area

Figure 2. Map of the study area
RESULTS AND DISCUSSION

In the current study, a total of 14 species in 11 genera of Ichneumonidae, Ophioninae, Orthocentrinae and Pimplinae subfamilies are listed. All materials were collected near Erzurum, Pazaryolu, Kumaşkaya village (40° 31’ 50.523” N, 40° 45’ 16.686” E) from 1450 m a.s.l. altitude by S. Çoruh. Hosts and associate plants of the new records are given below.

**Subfamily: Ichneumoninae Latreille, 1802**

*Barichneum bilunulatus* (Gravenhorst, 1829)
Material examined: 26.VII.2015, 1 ♀.
Distribution: Algeria, Tunisia, Morocco, Europe, Azerbaijan, Georgia, Turkey, Iran, Kazakhstan and Western Siberia.

Hosts: Coleoptera, Curculionidae: *Lixus elegans*. Hymenoptera, Ichneumonidae: *Opion luteus*. Lepidoptera, Erebidae: *Calliteara pudibunda*. Geometridae: *Bupalus piniarius*. Notodontidae: *Ectropis crepuscularia*, *Lycia hirtaria*. Panolis flaminea; Torricidae: *Sparganothis pilleriana* on *Angelica sylvestris*, *Chaerophyllum bulbosum*, *Daucus carota*, Foeniculum vulgar, *Heracleum sphondylium*, *Medicago sativa*, *Peucedanum oreoselinum*, *Pinus halepensis*.

Remark: This species was collected on *Daucus carota*.

**Coelichneum (Coelichneum) nigritor**
Riedel, Çoruh & Özbek, 2010
Material examined: 27.VII.2015, 1 ♀.
Distribution: Azerbaijan, Turkey.
Hosts: Unknown

**Coelichneum *(Coelichneum) nudicozator* Aubert, 1966**
Material examined: 26.VII.2015, 1 ♀.
Distribution: Turkey, Israel and Kazakhstan.
Hosts: Unknown

**Heterischinus anomalus** (Wesmael, 1857)
Material examined: 29.VII.2015, 1 ♂.
Distribution: Europe and Turkey.
Host: Lepidoptera, Plutellidae: *Platella xylostella* on *Heracleum sphondylium*.

**Heterischinus pulex** (Müller, 1776)
Material examined: 28.VII.2015, 1 ♂.
Distribution: Europe.

Hosts: Lepidoptera, Pterophoridae: *Emmelina monodactyla* on *Fagus sylvatica*, *Peucedanum oreoselinum*, *Pinus sylvestris*, *Quercus sessiliflora*.

**Hoplismenus bidentatus** (Gmelin, 1790)
Material examined: 29.VII.2015, 1 ♀.
Distribution: Algeria, Europe, Turkey and Iran.
Hosts: Lepidoptera, Nymphalidae: *Lasionomata maera* on *Angelica sylvestris*.

**Spilichneum limophilus** (Thomson, 1888)
Material examined: 28.VII.2015, 6 ♀ ♀♀.
Distribution: Europe and Mongolia.
Hosts: Lepidoptera, Noctuidae: *Archana sparganii*, *Gortyna flavago*, *Nonagria typhae*.

**Subfamily: Ophioninae Shuckard, 1840**

**Enicosipitus ramidulus** (Linnaeus, 1758)
Material examined: 27.VII.2015, 1 ♀.
Distribution: Afrotropical, Oriental, Palaearctic region.

Hosts: Hymenoptera, Tenthredinidae: *Nematus salicis*. Lepidoptera, Erebidae: *Catocala electa*, *Hypantria cunea*. Lasiocampidae: *Dendrolimus pini*, *Eriogaster lanestris*, *Poecilocampa populci*. Noctuidae: *Agrotis segetum*, *Axylia putris*, *Cucullia absinthii*, *Dypterygia ivularis*, *Lacanobia oleracea*, *L. pisi*, *Melanchra persiciaria*, *Ochropleurra praecox*, *Panolis flannea*, *Phlogophora meticulosa*. Notodontidae: *Phaleria bucephala*. Sphingidae: *Hyles euphorbiae* on *Alnus glutinosa*, *Carum carvi*, *Oryza sativa*, *Salvia glutinosa*, *Seseli libanotis*.

**Subfamily: Orthocentrinae Förster, 1869**

*Cyloceris sylvestris* (Gravenhorst, 1829)
Material examined: 28.VII.2015, 1 ♀.
Distribution: Palaearctic region.
Remark: This species is new record from Turkey.

**Subfamily: Pimplinae Wesmael, 1845**

*Endromopoda detrita* (Holmgren, 1860)
Material examined: 27.VII.2015, 1 ♀.
Distribution: Holarctic and Oriental Region.
Hosts: Coleoptera, Curculionidae: *Anthonomus pomorum*, *Byctiscus betulae*, *Lixus elegantulus*. Diptera, Chamaemyiidae:
Chamaemyia junctorum; Chloropidae: Lipara lucens, L. similis. Hymenoptera, Chalcidoidea: Tetramesa ariae; Cephidae: Calameuta filiformis, Cephus andrae, C. cinctus, C. nigrinus, C. pygmeus, Janus femoratus; Cynipidae: Andricus lignicolae, Aphelonyx cerrica. Hymenoptera, Tenthredinidae: Euura amerae. Lepidoptera, Coleophoridae: Coleophora laricella; Crambidae: Chilo phragmitiellus; Gelechiidae: Anacampsis populella, Anarsia spartiella; Geometridae: Alcides trifidus; Lasiocampidae: Malacosoma neustria; Noctuidae: Coenobia rufa; Pterophoridae: Adaina microdactyla, Mesoligia literosa; Pyralidae: Diorictria simplicella; Sesiidae: Paranthrene tabaniformis, Synanthedon formicaeformis; Tortricidae: Celypha lacunana, Cydia cosmophorana, C. discretana, C. junebrana, C. ponomella, C. splendanda, Euxoma krygeri, Eupoeccilia ambigua, Hedya nubitana, Lobesia botrina, Phalonia udana, Rhycocia puella, R. resinella, Tortrix viridana; Yponomeutidae: Argyresthia laevigatella on Adonis vernalis, Angelica sylvestris, Chaerophyllum aromaticum, Cnicus paluster, Daucus carota, Daucus carota sativus, Foeniculum vulgare, Juniperus communis, Peucedanum oreoselinum.

Remark: This species was collected on *Heracleum pastinacifolium*.

**Gregopimpla inquisitor** (Scopoli, 1763)

Material examined: 26.VII.2015, 1 ♂, 1 ♀.

Distribution: Holarctic Region.

Hosts: It has 70 host species that belong to various families (Anobiidae, Arctiidae, Argyresthidiidae, Attelabidae, Blastodacridae, Cephidae, Choristidae, Cynipidae, Depressariidae, Diprionidae, Gelechiidae, Geometridae, Lasiocampidae, Lymnaeidae, Momphidae, Noctuidae, Nolidae, Nymphalidae, Oecophoridae, Pieridae, Plutellidae, Psychidae, Pterophoridae, Pyralidae, Tenthredinidae, Tortricidae, Yponomeutidae, Zygaenidae) on *Adonis vernalis*, *Alnus glutinosus*, *Chaerophyllum bulbosum*, *Cnicus paluster*, *Daucus carota*, *Epilobium angustifolium*, *Heracleum spondylium*, *Impatiens parviflora*, *Larix europaea*, *Larix polonica*, *Peucedanum oreoselinum*, *Populus tremula*, *Salvia sylvestris*, *Suaeda maritima*, *Vincetoxicum officinale*.

**Scambus brevicornis** (Gravenhorst, 1829)

Material examined: 29.VII.2015, 2 ♂♂.

Distribution: Holarctic Region.

Hosts: It has 135 host species that belong to various families (Anthomyiidae, Blastodacridae, Braconidae, Buprestidae, Cerambycidae, Choristidae, Coleophoridae, Curculionidae, Cynipidae, Depressariidae, Diprionidae, Gelechiidae, Geometridae, Gracillariidae, Lasiocampidae, Lymnaeidae, Momphidae, Noctuidae, Oecophoridae, Pieridae, Plutellidae, Psychidae, Pyralidae, Tenthredinidae, Tischeriidae, Tortricidae) on *Alnus glutinosus*, *Anethum graveolens*, *Angelica sylvestris*, Aster tripolium, *Cirsium arvense*, *Cirsium vulgare*, *Cnicus paluster*, *Daucus carota*, *Fraxinus excelsior*, *Larix europaea*, *Larix polonica*, *Peucedanum oreoselinum*, *Populus tremula*, *Salvia sylvestris*, *Suaeda maritima*, *Vincetoxicum officinale*.

**Scambus nigricans** (Thomson, 1877)

Material examined: 29.VII.2015, 1 ♂.

Distribution: Palaearctic region.

Hosts: Diptera, Chloropidae: Lipara lucens; Tephritidae: Noeetra pupillata, Oxya parietina. Hymenoptera, Cephidae: Hartiga linearis; Tenthredinidae: *Heptamalus ochroleucus*. Lepidoptera, Depressariidae: Agonopterix heracliana, Depressaria daucella, D.pastinacella; Gelechiidae: Scrobipalpa clintoni; Geometridae: Alsophila aescularia (*Hartigia linearis*), Alnus glutinosa (*Scambus brevicornis*), *Cirsium arvense* (*Agonopterix hispidaria*), *Larix europaea* (*Epiblema scutulana*), *Larix polonica* (*Dioryctria simplicella*), *Lupinus albus* (*Paranthrene*), *Picea abies* (*Lepidoptera*, *Trophiphaga*), *Pinus sylvestris* (*Aethes francillana*).

Remark: This species was collected on *Heracleum pastinacifolium*.
Table 1. Faunistic evaluations of Ichneumonidae species

| Name of species | IN | Distribution in Turkey | References | NR |
|----------------|----|------------------------|------------|----|
| *Barichneumon bilunulus* (Gravenhorst, 1829) | 1 | Erzurum, Kars, Konya | Özdemir, 1996; Çoruh, 2017; Riedel et al., 2010, 2018. | |
| *Coelichneumon (Coelichneumon) nigror* (Riedel & Ozbek, 2010) | 1 | Erzurum | Riedel et al., 2010; Çoruh et al., 2011. | |
| *Coelichneumon (Coelichneumon) nudicoxator* Aubert, 1966 | 1 | Eastern Anatolia, Erzurum | Riedel, 2008; Riedel et al., 2010; Çoruh et al., 2011; Çoruh, 2017. | |
| *Heterischnus anomalus* (Wesmael, 1857) | 1 | Erzurum, Artvin, Erzurum, Trabzon | Özbek et al., 2003; Çoruh et al., 2014b; Çoruh, 2017; Çoruh et al., 2019. | |
| *Heterischnus pulex* (Müller, 1776) | 1 | Erzurum | Riedel et al., 2018. | |
| *Hoplismenus bidentatus* (Gmelin, 1790) | 1 | Erzurum, İstanbul, Tunceli | Kolarov, 1989, 1994, 1995; Kolarov et al., 2000; Kolarov and Gürbüz, 2006; Beyarslan et al., 2006; Ökyar and Yurtcan, 2007; Kolarov et al., 2014b; Çoruh and Çalışan, 2016. | |
| *Spilichneumon limnophilus* (Thomson, 1888) | 6 | Erzurum | Çoruh et al., 2011; Çoruh et al., 2014b, Çoruh, 2017. | |
| **Subfamily: Ichneumoninae Latreille, 1802** | | | | |
| *Enicospilus ramidulus* (Linnaeus, 1758) | 1 | Ankara, Bolu, Erzincan, Erzurum, Isparta, Karabük, Kastamonu, Malatya, Nevşehir, Konya, Rize, Sinop, Tekirdağ, Trabzon, Zonguldak | Kolarov 1989, 1994, 1995; Kolarov et al., 2000; Kolarov and Gürbüz, 2006; Beyarslan et al., 2006; Ökyar and Yurtcan, 2007; Kolarov et al., 2014b; Çoruh and Çalışan, 2016. | |
| **Subfamily: Ophioninae** | | | | |
| *Enicospilus ramidulus* (Linnaeus, 1758) | 1 | New record from Turkey | Present study | X |
| **Subfamily: Orthocentrinae Förster, 1869** | | | | |
| *Scambus brevicornis* (Gravenhorst, 1829) | 2 | Ankara, Artvin, Bingöl, Bitlis, Edirne, Erzincan, Erzurum, Isparta, İstanbul, Kirkkareli, Kars, Rize, Tekirdağ | Kolarov, 1995; Özdemir and Kılınçer, 1990; Öncüer, 1991; Kolarov and Beyarslan, 1994; Kolarov, 1995; Kolarov et al., 1997a, b, 1999; Gürbüz, 2005; Yurtcan, 2007; Çoruh and Kolarov, 2010; Kolarov et al., 2014b; Çoruh, 2016. | |
| **Subfamily: Pimplinae Wesmael, 1845** | | | | |
| *Gregopimpla inquisitor* (Scopoli, 1763) | 1 | Edirne, Erzurum, Kirkkareli, Rize, Tekirdağ | Çoruh, 2005; Yurtcan, 2007; Çoruh et al., 2014a; Çoruh, 2016. | |
| *Itoplectis maculator* (Fabricius, 1775) | 1 | Adana, Ankara, Afiyon, Artvin, Balıkesir, Bitlis, Bolu, Çankakale, Çorum, Denizli, Edirne, Eskişehir, Erzurum, Gümüşhane, Iğdır, Isparta, İstanbul, Izmir, Kars, Kirkkareli, Rize, Tekirdağ, Tunceli | Özdemir and Kılınçer, 1990; Kolarov and Beyarslan, 1994; Kolarov, 1995; Özdemir and Özdennir, 2002; Gürbüz, 2005; Kolarov and Gürbüz, 2004; Çoruh, 2005; Gürbüz, 2005; Yurtcan and Beyarslan, 2005, Gürbüz et al., 2009; Çoruh and Kolarov, 2010; Birol, 2010; Eroğlu et al., 2011, Çoruh et al., 2014b; Ökyar and Yurtcan, 2007; Kolarov et al., 2016, Çoruh, 2016. | |
| *Scambus nigricans* (Thomson, 1877) | 1 | Afyon, Artvin, Balıkesir, Bayburt, Bursa, Çankakale, Denizli, Edirne, Erzincan, Erzurum, Isparta, İstanbul, Izmır, Kahramanmaraş, Kars, Kirkkareli, Tekirdağ | Kolarov and Beyarslan, 1994; Kolarov et al., 1997a; Kolarov et al., 1999; Kolarov and Gürbüz, 2004; Çoruh, 2005; Yurtcan, 2007; Çoruh et al., 2007; Çoruh and Kolarov, 2010; Çoruh and Çalışan, 2011; Çoruh, 2016. | |

(IN): Individual numbers; (NR): New record
The zoogeographical characterization mainly follows the chorotype classification of the Near East fauna proposed by Taglianti et al. (1999).

1) Most wide range has the species *Enicospilus ramidulus*, distributed in 3 zoogeographical regions-Afrotropical, Oriental and Palaeartic region.
2) Ranges in two zoogeographical regions has the species *Endromopoda detrita*.
3) Holartic ranges have the species *Gregopimpla inquisitor* and *Scambus brevicornis*.
4) Most numerous species are the ones which distributed in Palaeartic ranges. Here belong the species *Cylloceris sylvestris*, *Itoplectis maculator* and *Scambus nigricans*.
5) Sibero - europe range has the species *Barichneumon bilunulatus*.
6) *Spilichneum limnophilus* has Centralasian-european range.
7) Turano – europe - mediterranean range has the species *Heterischus bidentatus*.
8) Turanian range has the species *Coelichneumon* (*Coelichneumon*) *nudicoxator*.
9) Two species - *Heterischus anomalus* and *H. pulsex*, have European ranges.
10) One species - *Coelichneumon* (*Coelichneumon*) *nigritor* is now an Anatolian subendemic.

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Authors have declared no conflict of interest.

**Authors’ Contributions**
The contributions of authors are equal.

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