



A Study of Ichneumonidae (Hymenoptera) with New Records to Turkish Fauna

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Abstract

This investigation has been carried out to identification of Ichneumonidae (Hymenoptera) species collected by using sweeping nets and Malaise traps from different localities of Isparta province in Turkey between May 2016 and July 2016. In the current publication 20 species belonging to the subfamilies of Banchinae Wesmael, 1845; Campopleginae Förster, 1869; Cryptinae Kirby, 1837; Diplazontinae Viereck, 1918; Ichneumoninae Latreille, 1802; Orthocentrinae Förster, 1869, Pimplinae Wesmael, 1845 and Tryphoninae Shuckard, 1840 are listed. Among them *Olesicampe geniculella* (Thomson, 1887), *Dicaelotus (Dicaelotus) cameroni* Bridgman, 1881, *Helictes borealis* (Holmgren, 1857) and *Townesia tenuiventris* (Holmgren, 1860) species are four new records for the fauna of Turkey. A short zoogeographical characterization, distribution in Turkey and world distribution are also mentioned for each species.

Keywords: Ichneumonidae; Hymenoptera; New records; Fauna.

1. Introduction

With around 25,000 recognized species and much more likely to be discovered, the Ichneumonidae (Hymenoptera: Insecta) family is one of the richest in terms of species in insect families all over the world [1-3]. Ichneumonidae have a huge variety for biological and morphological characteristics, as well as a global distribution [4]. Ichneumonids can be found in a variety of locations around the world and serve a vital role in earthly environs by controlling the numbers of other insects, especially agricultural pests [5].

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The Ichneumonidae is the one of the biggest group of insects in Turkey, with more than 1,300 species previously recorded for the country [6]. The purpose of this is paper to contribute to the Ichneumonidae fauna of Turkey with new records.

2. Materials and Methods

Collection of Ichneumonid samples were conducted in various habitats, located at districts of Isparta during May to July 2016. Ichneumoids were sampled by using sweeping nets and Malaise traps. Ichneumonid species then moved to ethanol (75%), then they were treated according to AXA protocol [7] with the combination of 60% ethanol and 40% xylene for two 48 hours, in amyl-acetate for 72 hours and at last appropriately dried on a blotter paper. Dried specimens were affixed to triangle shaped cards and properly labelled for identification. Information about world distribution were adapted from the Catalogue of World Ichneumonidae [3]. Ichneumonid specimens are conserved in author's collection.

3. Results

Twenty Ichneumonid species affiliated with eight different subfamilies have been identified in total. Four new records, *Olesicampe geniculella* (Thomson, 1887), *Dicaelotus (Dicaelotus) cameroni* Bridgman, 1881, *Helictes borealis* (Holmgren, 1857) and *Townesia tenuiventris* (Holmgren, 1860), are given with asterisk in the text. The identified species including the new records are listed below.

Subfamily Banchinae Wesmäl, 1845

Exetastes adpressorius (Thunberg, 1822)

Isparta, Kozağacı Yaylası, 1300 m, 6.VI.2016, 1♂; Isparta, Yukarigokdere, 9.VI.2016, 925 m, 1♀.

Distribution in Turkey: Ankara, Bayburt, Erzurum, Edirne, Isparta, Kırıkkale, Kırşehir and Tunceli [8-14]

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3]

Lissonota (Loxonota) flavovariegata (Lucas, 1849)

Isparta, Kozağacı Yaylası, 1300 m, 19.VI.2016, 1♂.

Distribution in Turkey: Bayburt, Bolu, Çankırı, Erzincan, Erzurum, Kars, Kırşehir, Konya, Nevşehir, Trabzon and Yozgat [9,10,15-17].

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

Subfamily Campopleginae Förster, 1869

Campoletis latrator (Gravenhorst, 1829)

Isparta, Kulovası Yaylası, 30.VI.2009, 1634 m, 1♂ 2 ♀.

Distribution in Turkey: Adana, Edirne, Elazığ, Erzurum, Gaziantep, Giresun, Gümüşhane, Isparta, Rize, Trabzon and Tunceli [11,13,18-22].

World Distribution: Europe, Western Palaearctic [3].

Chromoplex picticollis (Thomson, 1887)

Isparta, Kozağacı Yaylası, 1300 m, 30.VI-7.VII.2016, 1♂.

Distribution in Turkey: Çanakkale, Gümüşhane, Hatay, Isparta, İzmir, Muğla and Trabzon [19,22-26].

World Distribution:, Europe, Western Palaearctic [3].

Cymodusa (Cymodusa) longiterebra Dbar, 1985

Isparta, Kozağacı Yaylası, 1300 m, 19-30.VI.2016, 2♂; Isparta, Kulovası Yaylası, 14.V.2016, 1634 m, 5♂ 1 ♀.

Distribution in Turkey: Tunceli [11].

World Distribution: Europe, Western Palaearctic [3].

Meloboris collector (Thunberg, 1822)

Isparta, Kozağacı Yaylası, 1300 m, 11.VI.2016, 2♂ 1♀.

Distribution in Turkey: Adana, Ankara, Erzurum, Gaziantep, Gümüşhane, Hatay, Isparta, Rize and Trabzon [11,18,21,22,27].

World Distribution: Afrotropical, Eastern Palaearctic, Europe, Oceanic, Western Palaearctic [3].

* *Olesicampe geniculella* (Thomson, 1887)

Isparta, Kulovası Yaylası, 1634 m, 14.V.2016, 4 ♂ 1 ♀.

Distribution in Turkey: New record for the Turkish fauna.

World Distribution: Europe, Western Palaearctic [3].

Subfamily Cryptinae Kirby, 1837

Cryptus viduatorius Fabricius, 1804

Isparta, Kozağacı Yaylası, 1300 m, 14.V.2016, 1♂.

Distribution in Turkey: Erzurum, Isparta, İçel, İstanbul, Kırklareli and Rize [16,21,22,27-30].

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

Subfamily Diplazontinae Viereck, 1918

Homotropus elegans (Gravenhorst, 1829)

Isparta, Kozağacı Yaylası, 1300 m, 7.VII.2016, 3♂.

Distribution in Turkey: Afyonkarahisar, Ankara, Antalya, Burdur, Gaziantep and Isparta [31,32].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Western Palaearctic [3].

Homotropus nigritarsus (Gravenhorst, 1829)

Isparta, Kozağacı Yaylası, 1300 m, 19.VI.2016, 1♀.

Distribution in Turkey: Afyonkarahisar, Ankara, Antalya, Ardahan, Çankırı, Denizli, Erzurum, Eskişehir, Gümüşhane, Isparta, İzmir and Kütahya [31,32].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Neotropical, Western Palaearctic [3].

Syrphoctonus tarsatorius (Panzer, 1809)

Isparta, Kozağacı Yaylası, 1300 m, 19.VI.2016, 2♂.

Distribution in Turkey: Afyonkarahisar, Ankara, Bingöl, Erzurum and Kayseri [31-35].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Oriental, Western Palaearctic [3].

Syrphophilus tricinctorius (Thunberg, 1822)

Isparta, Kozağacı Yaylası, 1300 m, 11.VI.2006, 2♂.

Distribution in Turkey: Aydın [32].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Oriental, Western Palaearctic [3].

Subfamily Ichneumoninae Latreille, 1802

Colpognathus divisus Thomson, 1891

Isparta, Kozağacı Yaylası, 1300 m, 5.VI.2016, 1♂.

Distribution in Turkey: Erzurum, Rize and Trabzon [11,36,37].

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

* *Dicaelotus (Dicaelotus) cameroni* Bridgman, 1881

Isparta, Kozağacı Yaylası, 1300 m, 19-30.VI.2016, 1♂.

Distribution in Turkey: New record for the Turkish fauna.

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

Spilichneumon occisorius (Fabricius, 1793)

Isparta, Kozağacı Yaylası, 1300 m, 5-11.VI.2016, 10 ♂ 1♀.

Distribution in Turkey: Erzurum, Eskişehir, Isparta, Kars, Kayseri and Konya [9,38-41].

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

Subfamily Orthocentrinae Förster, 1869

* *Helictes borealis* (Holmgren, 1857)

Isparta, Kasnak Meşesi Ormanı, 1525 m, 23.VI.2016, 2♂.

Distribution in Turkey: New record for the Turkish fauna.

World Distribution: Eastern Palaearctic, Europe, Nearctic, Western Palaearctic [3].

Subfamily Pimplinae Wesmael, 1845

Endromopoda detrita (Holmgren, 1860)

Isparta, Kirazlıdere, 1200m, 30.V.2016, 1♀.

Distribution in Turkey: Afyonkarahisar, Bayburt, Burdur, Bursa, Çanakkale, Denizli, Edirne, Erzincan, Erzurum, Gümüşhane, Iğdır, Isparta, İstanbul, İzmir, Kars, Kırklareli, Rize, Tekirdağ and Tunceli [8,17,20,23,25,27,42-50].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Oriental, Western Palaearctic [3].

Pimpla aquilonia Cresson, 1870

Isparta, Kozağacı Yaylası, 1300 m, 1♂.

Distribution in Turkey: Ardahan, Artvin, Erzurum, Kars, Kırklareli, Rize, Tekirdağ and Trabzon [6,16,50-52].

World Distribution: Eastern Palaearctic, Europe, Nearctic, Western Palaearctic [3].

* *Townesia tenuiventris* (Holmgren, 1860)

Isparta, Kulovası Yaylası, 1634m, 12.VII.2016, 1♀.

Distribution in Turkey: New record for the Turkish fauna.

World Distribution: Eastern Palaearctic, Europe, Nearctic, Western Palaearctic [3]

Subfamily Tryphoninae Shuckard, 1840

Tryphon (Tryphon) atriceps Stephens, 1835

Isparta, Kulovası Yaylası, 1634m, 27.VII.2016, 1♂.

Distribution in Turkey: Afyonkarahisar, Aksaray, Ankara, Antalya, Artvin, Bayburt, Bolu, Denizli, Diyarbakır, Edirne, Elazığ, Erzincan, Erzurum, Eskişehir, Kars, Kırklareli, Isparta, Malatya, Muğla, Niğde, Sivas and Yozgat [31,46,53-58].

World Distribution: Eastern Palaearctic, Europe, Western Palaearctic [3].

All the Ichneumonidae species presented in this study distributed in Europe or in the Palaearctic region. Besides that, few numbers of species whose geographic ranges are probably confined to the Afrotropical, Oceanic (*Meloboris collector*), Nearctic, neotropical and Oriental (*Homotropus elegans*, *Homotropus nigratarsus*, *Syrphoctonus tarsatorius*, *Syrphophilus tricinctorius*, *Endromopoda detrita*, *Pimpla aquilonia*, *Townesia tenuiventris*). Faunistic and sistematics studies on the family Ichneumonidae (Hymenoptera) were reviwed occuring in eastern Turkey for over 30 years [16]. Four species (*Townesia tenuiventris*, *Helictes borealis*, *Dicaelotus (Dicaelotus) cameroni*, *Olesicampe geniculella*) are presented as a new record of the Turkish fauna in this work.

These data, together with the environmental heterogeneity, resulting from complex orography and latitudinal extension, and the western part of Turkey in the Mediterranean region [59], estimated that the number of ichneumonids in Turkey is much higher than that known today.

4. Conclusions

A total of 20 species belonging to the eight subfamilies of Ichneumonidae are presented and discussed in this study. The species belong to the following subfamilies: Banchinae Wesmael, 1845; Campopleginae Förster, 1869; Cryptinae Kirby, 1837; Diplazontinae Viereck, 1918; Ichneumoninae Latreille, 1802; Orthocentrinae Förster, 1869, Pimplinae Wesmael, 1845 and Tryphoninae Shuckard, 1840.

Characterization of zoogeographic distribution usually following the chorotype categorization of the Near East fauna suggested by [60]. After determination of the final geographic distribution of the species listed above, the species can be divided into these groups:

- Palaearctic ranges; *Exetastes adpressorius*
- Turano-European-Mediterranean ranges; *Lissonota (Loxonota) flavovariegata*
- Asiatic-European ranges; *Dicaelotus (Dicaelotus) cameroni*
- Most numerous species with European ranges, *Campoletis latrator*, *Cymodusa (Cymodusa) longiterebra*, *Olesicampe geniculata*
- Europeo-Mediterranean ranges: *Chromoplex picticollis*
- Ranges in two zoogeographical regions: *Meloboris collector*, *Homotropus nigratarsus*, *Syrphoctonus tarsatorius*, *Syrphophilus tricinctorius*, *Endromopoda detrita*, *Pimpla aquilonia*, *Townesia tenuiventris*, *Tryphon (Tryphon) atriceps*
- Ranges in Sibero-European region species; *Cryptus viduatorius*
- With Holarctic ranges are species: *Homotropus elegans*, *Helictes borealis*
- Turano-European ranges; *Colpognathus divisus*

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5. Conflict of Interest

The author hereby declares that there isn't any conflict of interest for this paper.

6. Ethics Committee Approval and Informed Consent

The author hereby declares that ethics committee approval or informed consent statement were not required for this study.

References

- [1] I. D. Gauld, "The Ichneumonidae of Costa Rica. 1, Introduction, keys to subfamilies, and keys to the species of the lower pimpliform subfamilies Rhyssinae, Pimplinae, Poemeniinae, Acaenitinae and

- Cylloceriinae,” *Mem. Amer. Ent. Inst.*, vol. 47, pp. 1-589, 1991.
- [2] D. L. Quicke, N. M. Laurenne, M. G. Fitton and G. R. Broad, “A thousand and one wasps: a 28S rDNA and morphological phylogeny of the Ichneumonidae (Insecta: Hymenoptera) with an investigation into alignment parameter space and elision,” *J. Nat. Hist.*, vol.43, pp. 1305-1421, May, 2009.
- [3] D.S. Yu, C. van Achterberg, K. Horstmann, “Taxapad 2016. Ichneumonoidea 2015 (Biological and Taxonomical Information), Taxapad Interactive Catalogue Database on Flash-Drive”. Internet: www.taxapad.com [Jan. 15, 2016].
- [4] S. Klopstein, B. F. Santos, M. R. Shaw, M. Alvarado, A. M. Bennett, D. Dal Pos, M. Giannotta, A. F. Herrera Florez, D. Karlsson and A. I. Khalaim, “Darwin wasps: a new name heralds renewed efforts to unravel the evolutionary history of Ichneumonidae,” *Entomological Communications*, vol.1 (ec01006), December, 2019.
- [5] T. C. Narendran, “Parasitic Hymenoptera and Biological Control, in *Biocontrol Potential and its Exploitation in Sustainable Agriculture*”, vol. 2. R. K. Upadhyay, K. G. Mukerji and B. Chamola, Ed. New York, Academic/Plenum Publishers, 2012, pp. 435.
- [6] S. Çoruh and J. Kolarov, “New records on the Ichneumonidae fauna (Hymenoptera) of the Black Sea Coast of Turkey,” *J. Entomol. Res. Soc.*, vol.24, pp. 63-74, March, 2022.
- [7] K. van Achterberg, “Can Townes type Malaise traps be improved? Some recent developments,” *Entomol. ber.*, vol.69, pp. 129-135, May, 2009.
- [8] J. Kolarov, and A. Beyarslan, “Notes on the Turkish Ichneumonidae (Hymenoptera) III. Banchinae, Ctenopelmatinae and Tersilonchinae” in *Türkiye III. Biyolojik Mücadele Kongresi Bildirileri*, Ege Üniversitesi Ziraat Fakültesi, Bitki Koruma Bölümü, İzmir, 1994, pp. 93-100.
- [9] Y. Özdemir, “İç Anadolu Bölgesinde tespit edilen Banchinae ve Ichneumoninae (Hym.: Ichneumonidae) türleri,” *Bitki Koruma Bülteni*, vol.36, pp. 91-104, December, 1996.
- [10] S. Pekel, “New and little known Turkish Banchinae (Hymenoptera, Ichneumonidae),” *Acta Entomol. Bulg.*, vol.1 pp. 37-41, November, 1999.
- [11] J. Kolarov, E. Yıldırım, S. Çoruh and M. Yüksel, “Contribution to the knowledge of the Ichneumonidae (Hymenoptera) fauna of Turkey,” *Zool. Middle East*, vol.60, pp. 154-161, May, 2014.
- [12] S. Çoruh and Ö. Çalmaşur, “A new and additional records of the Ichneumonidae (Hymenoptera) from Turkey,” *Turk J Zool.*, vol. 40, pp. 625-629, January, 2016.
- [13] S. Çoruh, J. Kolarov and İ. Çoruh, “Ichneumonidae (Hymenoptera) from Anatolia II,” *Linz. Biol. Beitr.*, vol. 50, pp. 217-224, July, 2018.
- [14] A. Özdan and M. F. Gürbüz, “Ichneumonidae (Hymenoptera) fauna of Kovada Lake National Park, Isparta, Turkey,” *Turk J. Entomol*, vol. 43, pp. 301-312, September, 2019.
- [15] S. Çoruh, H. Özbek and J. Kolarov, “New and little known Anomaloniinae (Hymenoptera, Ichneumonidae) from Turkey,” *Linz. Biol. Beitr.*, vol. 36, pp. 1199-1204., November, 2004.
- [16] S. Çoruh, J. Kolarov and H. Özbek, “The fauna of Ichneumonidae (Hymenoptera) of eastern Turkey with zoogeographical remarks and host data,” *Journal of Insect Biodiversity*, vol.2, pp. 1-21, September, 2014.
- [17] J. Kolarov, S. Çoruh and İ. Çoruh, “A study of Ichneumonidae (Hymenoptera) from Northeastern Anatolia III, with new records and description male of *Temelucha pseudocaudata* Kolarov, 1982,” *Turk*

- J. Entomol., vol. 41, pp. 125-146, April, 2017.
- [18] J. Kolarov and A. Beyarslan, "New and little known Turkish Campopleginae (Hymenoptera, Ichneumonidae). 1821)" in III. National Scientific Conference of Entomology, Sofia, 1995, pp. 18-20.
- [19] S. Çoruh, M. F. Gürbüz, J. Kolarov, M. Yurtcan and A. Özdan, "New and little known species of Ichneumonidae (Hymenoptera) for the Turkish fauna," J. Entomol. Res. Soc., vol.19, pp. 71-83, April, 2017.
- [20] J. Kolarov, S. Çoruh and I. Çoruh, "Ichneumonidae (Hymenoptera) from Anatolia. III," Turk J. Entomol., vol. 38, pp. 377-388, June, 2014.
- [21] J. Kolarov, S. Çoruh and I. Çoruh, "Contribution to the knowledge of the Ichneumonidae (Hymenoptera) fauna of Turkey from northeastern Anatolia, Part I," Turk J. Zool. vol. 40, pp. 40-56, August, 2016.
- [22] S. Çoruh, J. Kolarov and I. Çoruh, "A study of Ichneumonidae (Hymenoptera) from northeastern Anatolia II, with new records," Turk J. Entomol., vol. 40, pp. August, 2016.
- [23] J. Kolarov, A. Beyarslan and M. Yurtcan, "Ichneumonidae (Hymenoptera) from the Gokceada and Bozcaada Islands-Turkey," Acta Entomol. Bulg., vol. 3, pp. 13-15, September, 1997.
- [24] H. Özbek, S. Pekel, and J. Kolarov "New distributional data of the Turkish Ichneumonidae (Hymenoptera) II. Ctenopelmatinae and Campopleginae," J. Entomol. Res. Soc., vol. 2, pp. 17-24, March, 2000.
- [25] J. Kolarov, M. Yurtcan and A. Beyarslan, Ichneumonidae species of the Turkish Aegean region. Ed: Melika, G., Thuroczy, C. Koszeg, 2002, pp. 299-305.
- [26] M. F. Gürbüz, "A survey of the Ichneumonidae (Hymenoptera) of Isparta in Turkey," Linz. Biol. Beitr. vol. 37, pp. 1809-1817, December, 2005.
- [27] J. Kolarov, "A catalogue of the Turkish Ichneumonidae (Hymenoptera)," Entomofauna, vol. 16, pp. 137-188, May, 1995.
- [28] A. Beyarslan and J. Kolarov, "Investigations on Ichneumonidae (Hymenoptera) fauna of Turkey. II. Cryptinae," Turk J. Zool., vol. 18, pp. 227-231, December, 1994.
- [29] İ. Çoruh and S. Çoruh, "Ichneumonidae (Hymenoptera) species associated with some Umbelliferae plants occurring in Palandöken Mountains of Erzurum, Turkey," Turk J. Zool., vol. 32, pp. 121-124, September, 2008.
- [30] A. Özdan, "Gelincik Dağı Tabiat Parkı ve Kovada Gölü Milli Parkı (Isparta) Ichneumonidae (Hymenoptera) Faunası," Doctoral Thesis, Süleyman Demirel University, Turkey, 2014.
- [31] Y. Özdemir, "İç Anadolu Bölgesi'nde saptanan Diplazontinae ve Tryphoninae (Hymenoptera: Ichneumonidae) altfamilyası türleri," Turk. Entomol. Derg., vol. 25, pp. 183-191, June, 2001.
- [32] J. Kolarov, "Diplazontinae species (Hymenoptera, Ichneumonidae) from Balkan Peninsula, Turkey and Iran," Entomofauna, vol. 36, pp. 297-304, January, 2015.
- [33] Z. Düzgüneş, S. Toros, N. Kılınçer and B. Kovancı, "Ankara ilinde bulunan Aphidoidea türlerinin parazit ve predatörleri.," TC Tarım Orman Bakanlığı Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü, 1982, pp. 251
- [34] Y. Özdemir and Y. Güler, "Sultandağı Havzası kiraz bahçelerinde tespit edilen ichneumonidae (Hymenoptera) türleri," Bitki Koruma Bülteni, vol. 49, pp. 135-143, September, 2009.

- [35] J. Kolarov and Ö. Çalmaşur, "A study of Ichneumonidae (Hymenoptera) from North Eastern Turkey," *Linz. Biol. Beitr.*, vol. 43, pp. 777-782, July, 2011.
- [36] S. Çoruh, "Taxonomical and biogeographical evaluation of the subfamily Ichneumoninae (Hymenoptera: Ichneumonidae) in Turkey," *Entomofauna*, vol. 38, pp. 425-476, January, 2017.
- [37] Ü. Sarı and S. Çoruh, "Ichneumonidae (Hymenoptera) from Northeastern Anatolia Region (Erzurum, Aşkale)," *Turk. J. Entomol.*, vol. 42, pp. 215-228, May, 2018.
- [38] H. Özbek, S. Çoruh and J. Kolarov, "A contribution to the Ichneumonidae fauna of Turkey. Subfamily Ichneumoninae (Hymenoptera)," *Entomofauna*, vol. 24, pp. 157-163, March, 2003.
- [39] M. Riedel, S. Çoruh and H. Özbek, "Contribution to the Ichneumoninae (Hymenoptera, Ichneumonidae) fauna of Turkey, with description of three new species," *Turk. Entomol. Derg.*, 34, 133-156, April, 2010.
- [40] A. Özdan and M. F. Gürbüz, "Ichneumonidae (Hymenoptera) fauna of Gelincik Mountain Natural Park (Isparta, Turkey)," *Turk. J. Entomol.*, vol. 40, pp. December, 2016.
- [41] S. Çoruh, M. Riedel and E. Diller, "New Contributions to the Ichneumoninae (Hymenoptera, Ichneumonidae) from Turkey," *J. Entomol. Res. Soc.*, vol. 20, pp. 59-72, April, 2018.
- [42] J. Kolarov, "Ichneumonidae (Hymenoptera) from Balkan peninsula and some adjacent regions. I. Pimplinae, Tryphoninae and Cryptinae," *Turk. J. Entomol.*, vol. 11, pp. 11-26, February, 1987.
- [43] Y. Özdemir and N. Kiliçer, "Species of Pimplinae and Ophioninae (Hym., Ichneumonidae) from Central Anatolia," in *Proceedings of the Second Turkish National Congress of Biological Control, İzmir, 1990*, pp. 309-318.
- [44] C. Öncüer, *Türkiye Bitki Zararlısı Böceklerinin Parazit ve Predatör Kataloğu*. Ege Üniversitesi, Ziraat Fakültesi Yayınları, vol. 505, pp. 354, 1991.
- [45] J. Kolarov, M. Yurtcan and A. Beyarslan, "New and rare Ichneumonidae (Hymenoptera) from Turkey. I. Pimplinae, Tryphoninae, Phygadeuontinae, Banchinae and Ctenopelmatinae," *Acta Entomol. Bulg.*, vol. 3, pp. 10-12, January, 1997.
- [46] J. Kolarov, H. Özbek and E. Yıldırım, "New distributional data of the Turkish Ichneumonidae (Hymenoptera). I. Pimplinae and Tryphoninae," *J. Entomol. Res. Soc.*, vol. 1, pp. 9-15, January, 1999.
- [47] J. Kolarov and M. Gürbüz, "A study of the Turkish Ichneumonidae (Hymenoptera) I," *Pimplinae. Linz. Biol. Beitr.*, vol. 36, pp. 841-845, November, 2004.
- [48] S. Çoruh, "Erzurum ve Çevre İllerdeki Pimplinae (Hymenoptera: Ichneumonidae) Türleri Üzerinde Faunistik, Sistemik ve Ekolojik Çalışmalar." Doctoral thesis, Atatürk University, Turkey, 2005.
- [49] M. Yurtcan, "Ephialtini tribe (Hymenoptera, Ichneumonidae, Pimplinae) of Turkish Thrace region," *Entomofauna*, vol. 28, pp. 389-404, November, 2007.
- [50] S. Çoruh and J. Kolarov, "Ichneumonidae (Hymenoptera) from Northeastern Turkey. I," *Bull. Nat. Hist. Mus.*, vol. 3 pp. 177-186, November, 2010.
- [51] M. Yurtcan and A. Beyarslan, "Polysphinctini and Pimplini (Hymenoptera: Ichneumonidae: Pimplinae) from the Thrace region of Turkey," *Fragm. Faun.*, vol. 48, pp. 63-72, June, 2005.
- [52] S. Çoruh, "Biogeography and host evaluation of the subfamily Pimplinae (Hymenoptera: Ichneumonidae) in Turkey," *J. Entomol. Res. Soc.*, vol. 18, pp. 33-60, March, 2016.
- [53] S. Çoruh, H. Özbek and J. Kolarov, "A contribution to the knowledge of Tryphoninae (Hymenoptera,

- Ichneumonidae) from Turkey,” *Zool. Middle East.*, vol. 35, pp. 93-98, February, 2005.
- [54] M. F. Gürbüz and J. Kolarov, “A Study of the Turkish Ichneumonidae (Hymenoptera). II. Tryphoninae,” *J. Entomol. Res. Soc.*, vol. 8, March, 2006.
- [55] M. Yurtcan, J. Kolarov and A. Beyarslan, “Tryphoninae species from Turkish Aegean Region (Hymenoptera, Ichneumonidae),” *Linz. Biol. Beit.*, vol. 38, pp. 985-990, July, 2006.
- [56] M. Gürbüz, M. Aksoylar and A. Buncukçu, “A faunistic study on Ichneumonidae (Hymenoptera) in Isparta, Turkey,” *Linz. Biol. Beit.*, vol. 41, pp. 1969-1984, December, 2009.
- [57] F. Eroğlu, A. Kırış and O. Birol, “A Faunistic study on Ichneumonidae (Hymenoptera) in Türkmen Mountain, Turkey,” *Linz. Biol. Beit.*, vol. 43, pp. 1219-1228, December, 2011.
- [58] J. Kolarov and S. Çoruh, “Ichneumonidae (Hymenoptera) Established from Northeastern Turkey,” *Acta Zool. Bulg.*, vol. 64, pp. 97-100, March, 2012.
- [59] A. Minelli, S. Ruffo, A. Vigna-Taglianti, “Le province faunistiche italiane. In: S. Ruffo, F. Stoch Eds. *Memorie del Museo Civico di Storia Naturale di Verona*, 2a serie, Sezione Scienze della Vita, 16. Verona, pp. 308, 2005.
- [60] A. V. Taglianti, P. A. Audisio, M. Biondi, M. A. Bologna, G. M. Carpaneto, A. De Biase, et. al., “A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palearctic region,” *Biogeogr.*, vol. 20, pp. 31-59, October, 1999.