

Contribution to the Rogadinae (Hymenoptera, Braconidae) fauna of Turkey

*AHMET BEYARSLAN¹ & MIKAIL ÇAKICI²

¹Department of Biology, Faculty of Science, Trakya University, Edirne, Turkey. TR

²Bitlis Eren University Graduate Education Institute Department of Biology. TR-13000, Bitlis, Turkey

*Corresponding author: abeyars@gmail.com

BEYARSLAN, A. & ÇAKICI, M.: *Contribution to the Rogadinae (Hymenoptera, Braconidae) fauna of Turkey.*

Abstract: This study was carried out to determine Rogadinae (Hymenoptera, Braconidae) fauna of Turkey. Adult specimens were collected from different habitats of the Eastern Anatolia Region and a few localities from other parts of Turkey, using sweeping nets and Malaise traps. The obtained material was prepared and appropriately labeled. A total of 20 species of genus *Aleiodes* Wesmael, 1838 were recorded. The following species are new record for fauna of Turkey: *Aleiodes (Aleiodes) arnoldii* (Tobias, 1976), *A. (A.) modestus* (Reinhard, 1863) and *Aleiodes (Neorhogas) fortipes* (Reinhard, 1863).

Keywords: Rogadinae, endoparasitoid, Braconidae, taxonomy, fauna

Introduction

Rogadinae is a cosmopolitan, species-rich braconid wasp subfamily whose species are endoparasitoids that attack larvae of a number of lepidopteran families. The members of this subfamily are characterized by pupating within the mummified host larval skin (SHAW & HUDDLESTON 1991, SHIMBORI & SHAW 2015), posteroventral margin of 1st tergite and anteroventral margin of 2nd tergite distinct and usually propodeum, 1st and 2nd abdominal tergites with fine medial longitudinal ridge (SHIMBORI et al. 2016, SULCA et al. 2017, TOBIAS 1986). The subfamily contains six tribes whose relationships have only been partially clarified: Aleiodini, Betylobraconini, Clinocentrini, Rogadini, Stiropiini and Yeliconini. The limits and composition of the closely related subfamilies to the Rogadinae, Hormiinae and Lysiterminae, also remain unclear (JASSO-MARTINEZ et al. 2020). Ultraconserved element data to reconstruct an almost fully resolved phylogeny for the members of Rogadinae and related subfamilies were generated. The monophyly of Rogadinae was confirmed: Betylobraconini synonymize *Xenolobus* Fahringer and *Bequartia* Cameron within the species-rich genus *Aleiodes* Wesmael based on DNA, and synonymize *Promesocentrus* van Achterberg with *Pilichremylus* Belokobylskij based on morphology (JASSO-MARTINEZ et al. 2020). The framework is still important for the necessity of revising the limits and evolutionary relations of some groups (TOWNSEND & SHAW 2009, ZALDIVAR-RIVERON et al. 2008). Worldwide, about 1243 described species of Rogadinae have been under 62 genera. Approximately 632 host species are known. It is distributed in 306 countries in zoogeographical regions of Afrotropical, Australasian,

Nearctic, Neotropical, Oceania, Oriental and Palearctic. Also California, Connecticut, Hawaii, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont and Washington of U.S.A.; Canada-Ontario; Yugoslavia; Yugoslavia-Serbia have imported species of Rogadinae and introduced them into their countries for the biocontrol of Agricultural pests (BUTHER et al. 2012, SHIMBORI & SHAW 2014, YU et al. 2016).

The ancestral host preference for Rogadinae was probably attacking concealed lepidopteran larvae, with the occurrence of at least two main subsequent transitions to attack both concealed and exposed hosts, one within Rogadini and a second within Aleiodini (SULCA et al. 2017).

The first records for the Turkish fauna of Rogadinae is *Aleiodes (Aleiodes) pallidator* (Thunberg, 1822). This species was obtained from beet pest (*Laphygma exigua* Hb.) larvae (Steiner, 1936). The studies to determine Rogadinae fauna of Turkey was started in 1979.

22 rogadine species were recorded within 1 genus and 4 subgenera until now (AYDOĞDU & BEYARSLAN 2005, 2006, BEYARSLAN 2015, BEYARSLAN et al. 2002). However, *Aleiodes (Chelonorhogas) gasterator* (Jurine) by PAPP (1985) and *Aleiodes (Neorhogas) dissector* (Nees) by QUICKE et al. (2006) were recorded from Turkey (YU et al. 2016).

Anatolia, which has been under the influence of complex geological changes, is a rich biodiversity area. At the junction of the continents of Asia, Africa and Europe, Anatolia or Asia Minor led to the mixing of biota. Anatolia has east-west and north-south oriented mountains that can serve as a distribution corridor for cold-adapted species (ÇIPLAK, 2003). However Rogadinae fauna of Turkey is represented by a small number of species of genus *Aleiodes* Wesmael, 1838 (BEYARSLAN 2015).

Material and methods

Adult samples of Rogadinae were collected from different habitats of Turkey. Most of the studied localities belong to the provinces of the eastern Anatolian region (Fig. 1). Material was collected from May to October, using sweeping net. Adult individuals were separated from the other material, and was brought to the laboratory in storage containers and in 70% ethylalcohol medium.

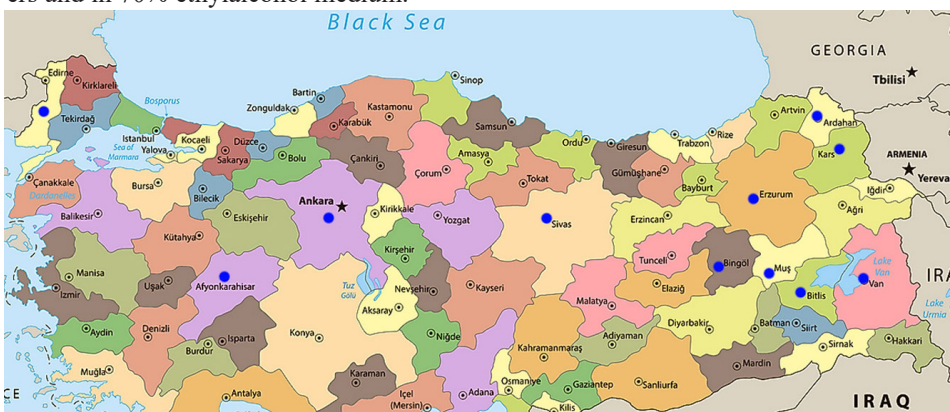


Fig. 1. The provinces marked with blue points where the material was collected

Samples were put into pure water in the laboratory, purified from ethylalcohol, dried and corrected so that the morphological features that are important in diagnosis can be seen on plain paper. The triangle attached to insect needles is glued to cartons and is labeled with locality labels.

The prepared material was identified with the aid of the encounter material found in our collection and the relevant literature: BELOKOBYSKIJ 1996, 2000, MARSH & SHAW 2003, QUICKE et al. 2006, SHAW 1983, 2002, 2006, SHAW & MARSH 1997, SHAW et al. 2006, TOBIAS 1986, VAN ACHTERBERG 1985, 1991, 1993, VAN ACHTERBERG & POLASZEK 1996. The identified species were recorded with their habitat characteristics, namely their locality address, height and coordinates. New species for the Turkish fauna are marked with asterisks (*). The specimens are stored in Trakya University, Faculty of Sciences, Department of Biology, Zoology collection.

Results

Subfamily: **Rogadinae**, Foerster, 1862
 Genus: **Aleiodes** Wesmael, 1838
 Subgenus: **Aleiodes** s. str. Wesmael, 1838

Aleiodes (Aleiodes) albitibia (Herrich-Schäffer, 1838)

Rogas albitibia Herrich-Schäffer, 1838

Aleiodes (Aleiodes) albitibia: Belokobylskij 2000.

Synonym: *Aleiodes heterogaste*.

Material examined: Erzurum-İspir, Yeşilyurt, (40°31'29"N, 41°04'55"E), 1570 m, 26.6.2013, 1♀.

Distribution: Palaearctic, Nearctic, Neotropic.

Host: Lepidoptera, Arctiidae: *Atolmis rubicollis* (Linnaeus, 1758), Crambidae: *Anania crocealis* (Hubner, 1796), Erebidae: *Leucoma salicis* (Linnaeus, 1758), Gelechiidae: *Caryocolum amaurella* (M. Hering 1924), Geometridae: *Abraxas grossulariata* (Linnaeus 1758), *Bupalus piniarius* (Linnaeus, 1758), *Cyclophora ruficiliaria* (Herrich-Schäffer, 1855), *Epirrhoe galiata* (Denis & Schiffermuller, 1775), *Epirrita autumnata* (Borkhausen, 1794), *Eupithecia alliarda* (Staudinger, 1870), *E. linariata* (Denis & Schiffermuller 1775), *E. subfuscata* (Haworth, 1809), *Gymnoscelis rufifasciata* (Haworth, 1809), *Hylaea fasciaria* (Linnaeus, 1758), *Lycia isabellae* (Harrison, 1914), *Thera variata* (Denis & Schiffermuller 1775), Noctuidae: *Apamea crenata* (Hufnagel, 1766), *Autographa gamma* (Linnaeus, 1758), *Diarsia rubi* (Vieweg, 1790), *Helicoverpa armigera* (Hubner, 1808), *Hoplodrina octogenaria* (Goeze, 1781), *Lithomoia solidaginis* (Hubner, 1803), *Mamestra brassicae* (Linnaeus, 1758), *Noctua fimbriata* (Schreber, 1759), *N. pronuba* (Linnaeus, 1758), *Notodonta dromedarius* Linnaeus, 1767, *Orthosia gracilis* (Denis & Schiffermuller, 1775), *O. incerta* (Hufnagel, 1766), *O. stabilis* (Denis & Schiffermuller, 1775), *Pammene amygdalana* (Duponchel, 1842), *Penicillaria jocosatrix* Guenee, 1852, *Pseudaletia unipuncta* (Haworth, 1809), *Spodoptera exigua* (Hubner, 1808), *Xestia agathina* (Duponchel, 1827), *X. baja* (Denis & Schiffermuller, 1775), *X. xanthographa* (Denis & Schiffermuller, 1775), Pterophoridae: *Pterophorus pentadactyla* (Linnaeus, 1758), Pyralidae: *Dioryctria abietella* (Denis & Schiffermuller, 1775), Tortricidae: *Archips rosana* (Linnaeus, 1758), *Croesia bergmaniana* (Linnaeus, 1758), *C. holmiana* (Linnaeus, 1758), *Cydia conicolana* (Heylaerts,

1874), *C. strobilella* (Linnaeus, 1758), *Pammene gallicolana* (Lienig ve Zeller, 1846), *Tortrix viridana* (Linnaeus, 1758), *Zeiraphera griseana* (Hubner, 1799).

****Aleiodes (Aleiodes) arnoldii*** (Tobias, 1976)

Rogas arnoldii Tobias, 1976

Aleiodes (Aleiodes) arnoldii: Huflejt 1997.

Material examined: Bitlis Rahva, Üçyol, (38°29'18.11"N, 42°11'07.00"E), 1795 m, 12.8.2019, 1♂.

Distribution: Palaearctic.

Host: Unknown.

This species is the first record for fauna of Turkey.

Aleiodes (Aleiodes) bicolor (Spinola, 1808)

Bracon bicolor Spinola, 1808

Aleiodes (Aleiodes) bicolor: Wesmael 1838.

Synonym: *Aleiodes essenii*; *Aleiodes tristis*; *Bracon assimilis*; *Bracon praerogator*; *Rhogas coxator*; *Rhogas docavoi*.

Material examined: Ankara Gölbaşı (*Heliothis peltigera* üzerinden), (39°49'57"N, 32°54'07"E), 1236 m, 16.6.2018, 1♂; Bingöl Adaklı, Hasbağlar, (39°05'42.87"N, 40°24'05.91"E), 1591 m, 25.9.2012, 2d, 1♂; Salköy, (38°53'7.6704"N, 40°29'47.8464"E) 1757 m, 29.7.2016, 1♀, 1♂; Bitlis-Eren üniversitesi tesisteleri, (38°29'18.11"N, 42°11'07.00"E), 1795 m, 17.9.2015, 1♂; Ahlat, Erik Kapı Köyü, (38°46'49.8504"N, 42°6'34.4520"E), 1943 m, 28.7.2016, 1♀, 1♂; Tatvan, Küçükusu, (38°25'21.73"N, 42°19'27.11"E), 2219 m, 5.8.2014, 2♀. 9.8.202014, 8♀, 13.6.2014, 4♀; Tatvan, Reşadiye, (38°29'20.67"N, 42°32'14.40"E), 1688 m, 27.7.2016, 1♀; Tatvan Kuşlu mezra (38°45'27"K, 42°18'40"E), 1654 m, 13.9.2014, 2♀; Muş-Mercimek Kale, (38°56'11"N, 41°30'27"E), 1263 m, 20.6.2013, 1♀; Varto, (39°09'55"N 41°27'52"E), 1525 m, 20.6.2013, 1♀; Sivas Gürün, İncesu Köyü, (38°52'49.86"N, 37°28'30.79"E), 1536 m, 15.9.207, 1♀; Gürün, Suti mahlesi Köyü, (38°43'09.43"N, 37°20'22.89"E), 1289 m, 15.9.207, 1♀; Gürün, Yazyurdu Köyü, (38°52'49.86"N, 37°28'30.79"E), 1536 m, 15.9.207, 1♀; Van-Erciş, (39°01'43.39"N, 43°21'32.51"E), 1693 m, 28.7.2016, 1♀.

Distribution: Palaearctic.

Host: Lepidoptera, Crambidae: *Loxostege sticticalis* (Linnaeus, 1761), *Pyrausta purpuralis* (Linnaeus, 1758), *P. sanguinalis* (Linnaeus, 1767), Erebidae: *Dasychira albedentata* Bremer, 1864, *Leucoma salicis* (Linnaeus, 1758), Geometridae: *Apocheima cinerarius* (Erschoff, 1874), *Archiearis parthenias* (Linnaeus, 1761), *Eupithecia linariata* (Denis & Schiffermuller, 1775), Lycaenidae: *Aricia agestis* (Denis & Schiffermuller, 1775), *A. artaxerxes* (Fabricus, 1793), *Cupido alceas* (Hoffmannsegg, 1804), *C. minimus* (Fuessly 1775), *Lysandra coridon* (Poda, 1761), *Plebejus idas* (Linnaeus, 1761), *Polyommatus albicans* (Gerhard, 1851), *P. damon* (Denis & Schiffermuller, 1775), *P. eros* (Ochsenheimer, 1808), *P. icarus* (Rottemburg, 1775), Noctuidae: *Apamea sordens* (Hufnagel, 1766), Nymphalidae: *Maniola jurtina* (Linnaeus, 1758), *Aglais urticae* (Linnaeus, 1758), Pterophoridae: *Emmelina monodactyla* (Linnaeus, 1758), *Hellinsia tephradactyla* (Hubner, 1813), Zygaenidae: *Jordanita chloros* (Hubner, 1813), *J. graeca* (Jordan, 1907), *Rhagades pruni* (Denis & Schiffermuller, 1775), *Zygaena filipendulae* (Linnaeus, 1758), *Z. loniceriae* (Scheven, 1777), *Z. purpuralis* (Brunnich, 1763), *Z. viciae* (Denis & Schiffermuller, 1775).

Aleiodes (Aleiodes) circumscriptus* (Nees, 1834)Rogas circumscriptus* Nees, 1834*Aleiodes (Aleiodes) circumscriptus*: Beyarslan et al. 2002.

Synonym: *Aleiodes bistrigatus*, *Aleiodes nigriceps*, *Aleiodes nigricornis*, *Bassus minutus*, *Ichneumon testaceus*, *Rogas pictus*.

Material examined: Muş-Mercimek Kale, (38°56'11"N, 41°30'27"E), 1263 m, 20.6.2013, 1♀; Yaygın Solhan arası, (38°56'1.48"N, 40°45'23.99"E) 1560 m, 29.7.2016, 3♀, 1♂; Sivas-Gürün, İncesu Köyü, (38°52'49.86"N, 37°28'30.79"E), 1536 m, 15.9.207, 1♀; Gürün, Yazyurdu Köyü, (38°48'11.27"N, 36°55'40.89"E), 1798 m, 15.9.207, 1♀; Van-Gevaş, Değirtaş, (38° 17' 52.05"N, 43° 06' 20.12"E), 1687 m, 30.9.2017, 2♂.

Distribution: Palaearctic.

Host: Lepidoptera, Arctiidae: *Atolmis rubricollis* (Linnaeus, 1758), Erebidae: *Leucoma salicis* (Linnaeus, 1758), Gelechiidae: *Caryocolum amaurella* (Hering, 1924), Geometridae: *Thera variata* (Denis & Schiffermuller, 1775), *Abraxas grossulariata* Linnaeus, 1758, *Bupalus piniarius* Linnaeus, 1758, *Cyclophora ruficiliaria* (Herrich-Schaffer, 1855), *Epirrhoe galiata* (Denis & Schiffermuller 1775), *Epirrita autumnata* (Borkhausen, 1794), *Eupithecia alliaria* (Staudinger, 1870), *E. linariata* (Denis & Schiffermuller, 1775), *E. subfuscata* (Haworth, 1809), *Gymnoscelis rufifasciata* (Haworth, 1809), *Hylaea fasciaria* (Linnaeus, 1758), *Lycia isabellae* (Harrison, 1914), Noctuidae: *Apamea crenata* (Hufnagel, 1766), *Autographa gamma* (Linnaeus, 1758), *Diarsia rubi* (Vieweg, 1790), *Helicoverpa armigera* (Hubner, 1808), *Hoplodrina octogenaria* (Goeze, 1781), *Lithomoia solidaginis* (Hubner 1803), *Mamestra brassicae* (Linnaeus, 1758), *Noctua fimbriata* (Schreber, 1759), *N. pronuba* (Linnaeus, 1758), *Orthosia gracilis* (Denis & Schiffermuller, 1775), *O. incerta* (Hufnagel, 1766), *O. stabilis* (Denis & Schiffermuller, 1775), *Penicillaria jocosatrix* Guenee, 1852, *Pseudaletia unipuncta* (Haworth, 1809), *Spodoptera exigua* (Hubner, 1808), *Xestia agathina* (Duponchel, 1827), *X. baja* (Denis & Schiffermuller, 1775), *X. xanthographa* (Denis & Schiffermuller, 1775), *Pterophorus pentadactyla* (Linnaeus, 1758), Pyralidae: *Dioryctria abietella* (Denis & Schiffermuller, 1775), *Ebulea crocealis* (Denis & Schiffermuller, 1775), Tortricidae: *Archips rosana* (Linnaeus, 1758), *Croesia bergmanniana* Linnaeus, 1758, *C. holmiana* Linnaeus, 1758, *Cydia conicolana* (Heylaerts, 1874), *C. strobilella* (Linnaeus, 1758), *Pammene amygdalana* (Duponchel, 1842), *P. gallicolana* (Lienig & Zeller, 1846), *Tortrix viridana* (Linnaeus, 1758), *Zeiraphera griseana* (Hubner, 1799).

Aleiodes (Aleiodes) esenbeckii* (Hartig, 1838)Rogas esenbeckii* Hartig, 1838*Aleiodes (Aleiodes) esenbeckii*: You ve Wei 2006.

Synonym: *Phanomeris dendrolimi*, *Phanomeris spectabilis*, *Rhogas corsicus*, *Rhogas metanastriae*, *Rogas gastropachae*.

Material examined: Kars-Sarıkamış (40°21'59"N, 42°32'10"E), 2472 m, 8.9.2017, 1♀; Sarıkamış, Büyükkumru, (40°25'05"N, 42°28'13"E), 2400 m, 16.9.2012, 1♂; 20.6.2018, 1♀.

Distribution: Palaearctic, Oriental.

Host: Lepidoptera, Endromidae: *Endromis versicolora* (Linnaeus, 1758), Lasiocampidae: *Dendrolimus albolineatus* Matsumura, 1921, *D. pini* (Linnaeus, 1758), *D. punctatus* Walker, 1855, *D. sibiricus* (Tschetverikov, 1908), *D. spectabilis* (Butler, 1877), *D. superans* (Butler 1877), *D. tabulaeformis* Tsai & Liu, 1962, *Selenephra luni-gera* (Esper, 1911), Zygaenidae: *Zygaena lonicerae* (Scheven, 1777).

Aleiodes (Aleiodes) gastritor (Thunberg, 1822)*Ichneumon gastritor* Thunberg, 1822*Aleiodes (Aleiodes) gastritor*: Papp 2012.

Synonym: *Aleiodes armatus*, *Aleiodes caudalis*, *Aleiodes ochraceus*; *Rhogas fuscomaculatus*, *Rhogas japonicus*, *Rhogas rossicus*, *Rogas similis*, *Rogas spathuliformis*.

Material examined: Ardahan-Posof, (41°30'30"N, 42°44'03"E), 1445 m, 23.6.2012, 4♀; Bitlis-Tatlı kaynak köyü, (38°21'59.28"N, 42°04'10.66"E), 1502 m, 14.10.2018, 1♂; Adilcevaz (38°48'16.93"N, 42°44'16.20"E), 1678 m, 28.7.2016, 1♀; Edirne-Güllapoğlu yerleşkesi (41°40'41"N, 26°37'43"E), 116 m, 3.5.2002, 1♀; Kars-Sarıkamış, Büyükkumru, (40°25'05"K, 42°28'13"D), 2400 m, 16.9.2012, 1♂; 20.6.2013, 1♀; Muş-Bulanık, Güllüova Köyü, (39°03'34"N, 42°20'01"E), 1554 m, 23.9.2017, 1♀.

Distribution: Holarctic, Oceanic, Oriental.

Host: Lepidoptera, Crambidae: *Ostrinia nubilalis* (Hubner, 1796), *Phlyctaenia coronata* (Hufnagel, 1767), Drepanidae: *Cilix glaucata* (Scopoli, 1763), Elachistidae: *Depressaria absynthiella* (Herrich-Schaffer, 1865), Geometridae: *Alsophila pomataria* (Harris, 1841), *Apocheima cinerarius* (Erschoff, 1874), *A. hispidaria* (Denis & Schiffermuller, 1775), *Chiasmia clathrata* (Linnaeus, 1758), *Chloroclystis v-ata* (Haworth, 1809), *Digrammia gnophosaria* (Guenee, 1857), *Epirrita autumnata* (Borhausen, 1794), *Erannis defoliaria* (Clerck, 1759), *Eupithecia alliaris* (Staudinger, 1870), *E. miserulata* (Grote, 1863), *E. pusillata* (Denis & Schiffermuller, 1775), *Glena cribrataria* (Guenee, 1858), *Hylaea fasciaria* (Linnaeus, 1758), *Hypagyrtis unipuncta* (Haworth, 1809), *Isturgia limbaria* (Fabricius, 1775), *Lycia hirtaria* (Clerck, 1760), *Lycia pomonaria* (Hubner, 1790), *Operophtera brumata* (Linnaeus, 1758), *Phthonandria atrilineata* (Butler 1881), *Tephрина arenacearia* (Denis & Schiffermuller, 1775), Lasiocampidae: *Malacosoma neustria* (Linnaeus, 1758), Erebidae: *Euproctis chrysorrhoea* (Linnaeus, 1758), *E. similis* (Fuessly, 1775), *Hypena scabra* (Fabricius, 1798), *Leucoma salicis* (Linnaeus, 1758), Noctuidae: *Agrapha agnata* (Staudinger, 1892), *Autographa gamma* (Linnaeus, 1758), *Harpyia hermelina* (Stephens, 1829), *Helicoverpa armigera* (Hubner, 1808), *Pseudaletia unipuncta* (Haworth, 1809), *Spodoptera exigua* (Hubner, 1808), *Trichoplusia ni* (Hubner, 1803), Notodontidae: *Cerura vinula* (Linnaeus, 1758), *Thaumetopoea processionea* (Linnaeus, 1758), Yponomeutidae: *Prays oleae* (Bernard, 1788), Tortricidae: *Archips rosana* (Linnaeus, 1758), *Lobesia botrana* (Denis & Schiffermuller, 1775).

****Aleiodes (Aleiodes) modestus*** (Reinhard, 1863)*Rogas modestus* Reinhard, 1863*Aleiodes (Aleiodes) modestus*: Belokobylskij 2000.Synonym: *Rhogas piceus*.

Material examined: Ardahan-Posof, (41°30'30"N, 42°44'03"E), 1445 m, 21.8.2013, 1♀.

Distribution: Palearctic.

Host: Lepidoptera, Geometridae: *Eupithecia absinthiata* (Clerck, 1759) [*Artemisia absinthium*], *E. exigua* (Hübner, 1813), *E. lariciata* (Freyer, 1842), *E. nanata* (Hübner, 1813), *E. pimpinellata* (Hübner, 1813), *E. satyrata* (Hübner, 1813), *Idaea aureolaria* (Denis & Schiffermüller, 1775), *Macaria liturata* (Clerck, 1759), *Macrothylacia rubi* (Linnaeus, 1758).

This species is the first record for the fauna Turkey.

Aleiodes (Aleiodes) moldavicus Tobias, 1986 var

Material examined: Bitlis-Tatvan, Dibekli Köyü, (38°28'10.44"N, 42°25'06.39"E), 1826 m, 21.6.2017, 1♀; Hizan, Alabalık tesisleri, (38°10'34.62"N, 42°23'29.88"D, 1268 m, 13.6.2015, 1♂.

Distribution: Western Palaearctic.

Host: Unknown.

Aleiodes (Aleiodes) nocturnus (Telenga, 1941)

Rhogas nocturnus Telenga, 1941

Aleiodes (Aleiodes) nocturnus: Papp 1987.

Material examined: Kars-Kağızman, Kuloğlu, (40°05'49"N, 42°57'49"E), 1287 m, 23.6.2013, 1♀.

Distribution: Palaearctic.

Host: Lepidoptera, Erebidae: *Euproctis karghalica* (Moore, 1878), Noctuidae: *Helicoverpa armigera* (Hubner, 1808), *H. zea* (Boddie, 1850), Notodontidae: *Cerura menciana* (Moore, 1877), *C. vinula* (Linnaeus, 1758), *Harpyia hermelina* (Goeze, 1781).

Aleiodes (Aleiodes) pallidator (Thunberg, 1822)

Ichneumon pallidator Thunberg, 1822

Aleiodes (Aleiodes) pallidator: Papp 2012.

Synonym: *Aleiodes unicolor*; *Rhogas apiculatus*, *Rhogas pellucens*, *Rogas apicalis*, *Rogas ochraceus*.

Material examined: Muş-Konukbekler, (39°3'39.68"N, 42°19'0.34"E), 1573 m, 29.7.2016, 1♂.

Distribution: Holarctic, Neotropical, Oriental.

Host: Lepidoptera, Erebidae: *Euproctis karghalica* (Moore, 1878), *Orgyia definita* (Packard, 1865), *O. leucostigma* (Smith, 1797), Gelechiidae: *Anarsia lineatella* (Zeller, 1839), *Caryocolum amaurella* (Hering, 1924), Geometridae: *Bupalus piniarius* (Linnaeus, 1758), *Cyclophora pendularia* (Hufnagel, 1767), *C. punctaria* (Linnaeus 1758), *C. quercimontaria* (Bastelberger 1897), *Dyscia conspersaria* (Denis & Schiffermuller, 1775), *Eupithecia pimpinellata* (Hubner, 1813), *Hylaea fasciaria* (Linnaeus 1758), Lasiocampidae: *Selenophera lobulina* (Schiffermuller, 1775), Noctuidae: *Agrotis segetum* (Denis & Schiffermuller, 1775), *Heliothis virescens* (Hufnagel, 1766), *Helicoverpa armigera* (Hubner, 1808), *H. zea* (Boddie, 1850), *Spodoptera exigua* (Hubner, 1808), Notodontidae: *Cerura menciana* (Moore, 1877), *C. vinula* (Linnaeus, 1758), *Harpyia hermelina* (Goeze, 1781), Psychidae: *Megalophanes viciella* (Denis & Schiffermuller, 1775), Tortricidae: *Apotomis sororculana* (Zetterstedt, 1839).

Aleiodes (Aleiodes) seriatus (Herrich-Schäffer, 1838)

Rogas seriatus Herrich-Schäffer, 1838

Aleiodes (Aleiodes) seriatus: Farahani et al. 2015.

Synonym: *Aleiodes vittige*. *Rogas kuslitkyi*.

Material examined: Bitlis-Rahva, Üçyol, (38°29'18.11"N, 42°11'07.00"E), 1795 m, 12.8.2019, 1♀, 1♂; Eren üniversitesi tesisleri, (38°29'18.11"N, 42°11'07.00"E), 1795 m, 17.9.2015, 1♂; Tatlı kaynak köyü, (38°21'59.28"N, 42°04'10.66"E), 1502

m,14.10.2018, 1♀; Vani-Gevaş, Değirtaş, (38°17'52.05"N, 43°06'20.12"E), 1687 m, 30.9.2017, 1♂.

Distribution: Oriental, Palaearctic.

Host: Lepidoptera, Noctuidae: *Atolmis rubricollis* Linnaeus, 1758, *Orthosia gracilis* (Denis & Schiffermuller, 1775).

Aleiodes (Aleiodes) signatus (Nees, 1811)

Braccon signatus (Nees, 1811)

Aleiodes (Aleiodes) signatus: Papp 2012.

Synonym: *Aleiodes essenii*, *Rhogas cassinielloi*, *Rhogas dubius*, *Rogas alternator*, *Rogas annulipes*, *Rogas balteatus*, *Rogas geniculator*.

Material examined: Bitlis-Tatvan, Küçüksu, mezarlık, (38°25'21.73"N, 42°19'27.11"E), 2219 m, 9.8..202014, 4♀; Tatvan, Nemrut kalderası, Büyük göl, (38°38'38.58"N, 42°4'15.48"E), 2259 m, 13.9.2014, 4♀; Tatvan Kuşlu mezra (38°45'27"N, 42°18'40"E), 1654 m, 13.9.2014, 4♀.

Distribution: Palaearctic.

Host: Lepidoptera, Arctiidae: *Arctia caja* (Linnaeus, 1758), *Coscinia cribraria* (Linnaeus, 1758), *Epicallia villica* (Linnaeus, 1758), *Ocnogyna baetica* (Rambur, 1837), Erebidae: *Euproctis chrysorrhoea* (Linnaeus, 1758), *E.similis* (Fuessly, 1775), *Gynaephora selenitica* (Esper, 1789), *Orgyia antiqua* (Linnaeus, 1758), *O. aurolimbata* (Guenee, 1835), Lasiocampidae: *Euthrix potatoria* (Linnaeus, 1758), Noctuidae: *Acronicta psi* (Linnaeus, 1758), *A. rumicis* (Linnaeus, 1758), *Autographa gamma* (Linnaeus, 1758), *Noctua fimbriata* (Schreber, 1759), *N. pronuba* (Linnaeus, 1758), Notodontidae: *Taumatopoea pityocampa* (Denis & Schiffermuller, 1775), *T. processio-nea* (Linnaeus, 1758), Tortricidae: *Spilonota ocellana* (Denis & Schiffermuller, 1775).

Aleiodes (Aleiodes) varius (Herrich-Schäffer, 1838)

Rogas varius Herrich-Schäffer, 1838

Aleiodes (Aleiodes) varius: Belokobylskij ve Taeger 2003.

Synonym: *Aleiodes procerus*.

Material examined: Ardahan-Bilbilan Yaylası, (41°4'19"N, 42°21'13"E), 2965 m, 15.9.2012, 1♀.

Distribution: Palaearctic.

Host: Unknown.

Subgenus: ***Chelonorhogas*** Enderlein, 1912

Aleiodes (Chelonorhogas) dimidiatus (Spinola, 1808)

Bracon dimidiatus Spinola, 1808

Aleiodes (Chelonorhogas) dimidiatus: Papp 2008.

Synonym: *Aleiodes brevicornis*, *Aleiodes nigripalpis*, *Rogas alpinus*, *Rogas ruficornis*.

Material examined: Bingöl-Salköy, (38°53'7.6704"N, 40°29'47.8464" E) 1757 m, 29.7.2016, 1♀, 1♂; Muş-Mercimek Kale, (38°56'11"N, 41°30'27"E), 1263 m, 13.7.2013, 1♂.

Distribution: Western Palaearctic, Oriental.

Host: Lepidoptera, Chloropidae: *Lipara lucens* Meigen, 1830, Erebidae: *Diacrisia russula* (Linnaeus, 1758), *D. sannio* (Linnaeus, 1758), *Orgyia dubia* (Tauscher, 1806),

Palaearctia gratiosa (Grum-Grshimailo, 1890), *Palaearctia gratiosa rupicola* (Grum-Grshimailo, 1890), *Orgyia antiqua* (Linnaeus, 1758), Lasiocampidae: *Euthrix potatoria* (Linnaeus, 1758), *Lasiocampa quercus* (Linnaeus, 1758), *Macrothylacia rubi* (Linnaeus, 1758), Noctuidae: *Agrotis (Agrotis) ipsilon* (Hufnagel, 1766), *A. clavis* (Hufnagel, 1766), *A. exclamationis* (Linnaeus, 1758), *A. segetum* (Denis & Schiffermüller, 1775), *A. vestigialis* (Hufnagel, 1766), *Apamea anceps* (Denis & Schiffermüller, 1775), *Arctia caja* (Linnaeus, 1758), *Caradrina (Caradrina) morpheus* (Hufnagel, 1766), *Cerapteryx graminis* (Linnaeus, 1758), *Cladius pectinicornis* (Geoffroy, 1785), *Cosmia subtilis* Staudinger 1888, *Euxoa sibirica* (Boisduval, 1837), *E. temera* (Hubner, 1808), *E. tritici* (Linnaeus, 1761), *Helicoverpa armigera* (Hübner, [1808]), *Helicoverpa zea* (Boddie, 1850) [*Gossypium hirsutum*], *Hoplodrina blanda* (Denis & Schiffermüller, 1775), *H. octogenaria* (Goeze, 1781), *Mythimna separata* (Walker, 1865), Thaumetopoeidae: *Thaumetopoea processionea* (Linnaeus, 1758).

Aleiodes (Chelonorhogas) ductor (Thunberg, 1822)

Ichneumon ductor Thunberg, 1822

Aleiodes (Chelonorhogas) ductor: Belokobylskij 2000.

Synonym: *Rhogas similis*, *Rogas bicolor*, *Rogas nobilis*, *Rogas reticulatus*.

Material examined: Bingöl-Karlıova, Kalencik, (39°26'25"N, 41°03'27"E), 2.144 m, 26.9.2012, 1♂.

Distribution: Palaearctic.

Host: Lepidoptera, Lasiocampidae: *Anarta (Calocestra) trifolii* (Hufnagel, 1766), *Autographa gamma* (Linnaeus, 1758), *Euthrix potatoria* (Linnaeus, 1758), *Mamestra brassicae* (Linnaeus, 1758), Nymphalidae: *Brenthis ino* (Rottentburg, 1775), Sesiidae: *Synanthedon scoliaeformis* (Borkhausen, 1789).

Aleiodes (Chelonorhogas) miniatus (Herrich-Schäffer, 1838)

Rogas miniatus Herrich-Schäffer, 1838

Aleiodes (Chelonorhogas) miniatus: Belokobylskij 2000.

Synonym: *Aleiodes formosus*, *Rogas bicoloratus*.

Material examined: Kars-Sarıkamış, (40°15'03"N, 42°39'11"E), 2016 m, 23.6.2019, 1♀.

Distribution: Palaearctic.

Host: Unknown.

Subgenus: ***Neorhogas*** Szépligeti, 1906

Aleiodes (Neorhogas) caucasicus (Tobias, 1976)

Rogas (Rogas) caucasicus Tobias, 1976

Aleiodes (Neorhogas) caucasicus: Papp 1985.

Material examined: Afyon-Dinar, Kazanpınar, (38°4'0.83" N, 30°10'7.68"E), 1.101 m, 28.6.1998, 1 ♀

Distribution: Western Palaearctic.

Host: Unknown.

Aleiodes (Neorhogas) dissector (Nees, 1834)

Rogas dissector (Nees, 1834)

Aleiodes (Neorhogas) dissector: Papp 1985.

Synonym: *Bracon rugulosus*, *Phylax aestivalis*, *Rhogas diversus*.

Material examined: Bingöl-Karlıova, Kalencik, (39°26'25"N, 41°03'27"E), 26.9.2012, 1♂; Bitlis-Tatvan Kuşlu mezra (38°45'27"N, 42°18'40"E), 1654 m, 13.6.2015, 1♂.

Distribution: Palaearctic.

Host: Lepidoptera, Noctuidae: *Acronicta rumicis* (Linnaeus, 1758), *A. tridens* (Denis & Schiffermuller, 1775), *Orthosia incerta* (Hufnagel, 1766).

**Aleiodes (Neorhogas) fortipes* (Reinhard, 1863)

Rogas fortipes Reinhard, 1863

Aleiodes (Neorhogas) fortipes: Papp 1987.

Synonym: *Rhogas freyi*.

Material examined: Sivas-Gürün, Göbek .Ö. (38°43'09.43"N, 37°20'22.89"E), 1289 m, 14.5.2018, 3♂.

Distribution: Western Palaearctic.

Host: Unknown.

This species is the first record for the fauna of Turkey.

Subgenus: *Tetrasphaeropyx* Ashmead, 1889

Aleiodes (Tetrasphaeropyx) arcticus (Thomson, 1892)

Rogas arcticus Thomson, 1892

Aleiodes (Tetrasphaeropyx) arcticus: Fortier 2009.

Synonym: *Rhogas reticulatus*.

Material examined: Bingöl-İlçalar, (38°58'50.96"N, 40°40'42.98"E), 1250 m, 26.9.2012, 1♂; Sancak, (39°5'38.35"N, 40°23'7.25"E), 1590 m, 5.7.2012, 1♀, 1♂; Bingöl-Solhan, Çavuşlar, (38°56'1.48"N, 40°45'23.99"E). 1560 m, 26.9.2012, 5♀; Bitkis-Ağaçlı Köy, (38°10'34.49"N, 42°23'29.92"E), 1267 m, 14.10.2018, 1♀; Tatlı kaynak köyü, (38°21'59.28"N, 42°04'10.66"E), 1502 m, 14.10.2018, 2♂; Tatvan, Güntepe, (38°21'58.80"N, 42°37'40.69"E), 1710 m, 30.9.2017, 9♀; Tatvan, Küçükusu, mezarlık, (38°25'21.73"N, 42°19'27.11"E), 2219 m, 13.6.2015, 6♀, 31♂; Tatvan, Mezra, (38°45'27"N, 42°18'40"E), 1654 m, 13.6.2015, 3♀; Tatvan, Nemrut kalderası, Küçük göl, (38°38'38.58"N, 42°14'15.48"E), 2259 m, 13.6.2015, 1♀; Ahlat, Ovakişla, Gören Köyü, (8°49'19"N, 42°19'36"E). 1831 m, 23.9.2017, 1♀; Muş- Bulanık, Güllüova Köyü, (39°03'34"N, 42°20'01"E), 1554 m, 23.9.2017, 2♀; Van-Gevaş, Değirtaş, (38°17'52.05"N, 43°06'20.12"E), 1687 m, 30.9.2017, 5♀.

Distribution: Palaearctic.

Host: Lepidoptera, Arctiidae: *Arctia caja* (Linnaeus, 1758), Geometridae: *Itame wauaria* (Linnaeus, 1758), *Macaria brunneata* (Thunberg, 1784), *M. fusca* (Thunberg, 1792).

Discussion

The collected adult specimens were identified. In total, 20 species belonging 1 genus and 4 subgenera were determined. The distribution of the species by subgenera are as follows. *Aleiodes* s. str.: 13, *Chelonorhogas*: 3 *Neorhogas*: 3; *Tetrasphaeropyx*: 1. All species identified are new records for the fauna of the researched area. *Aleiodes (Aleiodes) arnoldii*, *A.(A.) modestus* and *Aleiodes (Neorhogas) fortipes* are the first records for the fauna of Turkey (Table 1 and Fig. 2).

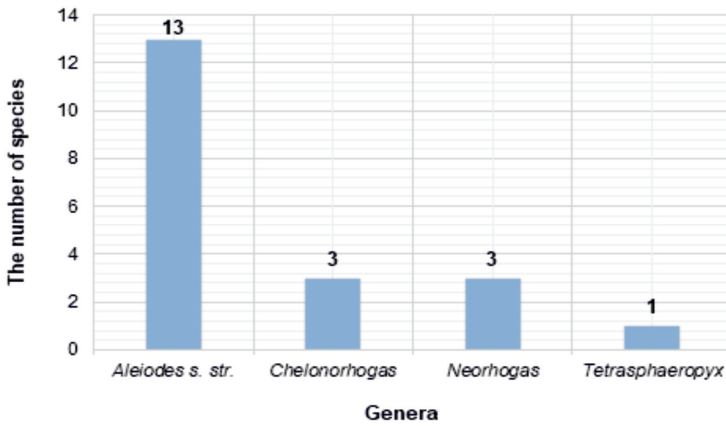


Fig. 2. Genera and their species numbers

A. (A.) bicolor and *A. (A.) circumscriptus* are the most common species in the area researched and each were recorded from the 16 localities. *A. (A.) circumscriptus* was recorded from 42 localities and attack 42 pest species of Arctiidae, Erebiidae, Gelechiidae, Noctuidae, Pterophoridae, Pyralidae and Tortricidae families of Lepidoptera. *A. (A.) bicolor* was recorded from 34 localities. It attacks 28 pest species of families Crambidae, Erebiidae, Geometridae, Lycaenidae, Noctuidae, Nymphalidae, Pterophoridae and Zygaenidae of Lepidoptera (YÜ et al. 2016).

A. (A.) pallidator is common in Neotropic, Nearctic and Palaearctic regions, covering 66 countries. It was imported and placed in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Washington of USA for biocontrol of agricultural pests (BARTLETT et al. 1978). This species can be used in the biocontrol of *Thaumetopoea pityocampa*. Adequate basic research has not been done on species of Rogadinae. The hosts of 6 of the identified species are still unknown (Table 1).

The distribution of the identified species according to zoogeographical regions are as follows: Palaearctic: 12; Holarctic and Neotropic: 3; Oriental and Palaearctic: 3. (Table 1).

A. (A.) signatus is distributed in Palaearctic region. It uses 18 plant pest species of the subfamilies Arctiidae, Erebiidae, Lasiocampidae, Noctuidae, Notodontidae and Tortricidae of the order Lepidoptera as hosts. *Thaumetopoea pityocampa*, one of these species, causes significant damage in our pine forests, especially in the Mediterranean, Aegean and Marmara regions (IPEKDAL & ÇAĞLAR 2019). *A.(A.) signatus*, the parasitoid of the pine moth, can be used in the biocontrol of this pest. Plant pests can be used against harmful biological control applied in the same in Turkey. The hosts of *A. (A.) arnoldii*, *A. (A.) moldavicus*, *A. (A.) varius*, *A. (C.) miniatus*, *A.(N.) caucasicus* and *A. (N.) fortipes* are unknown. The biology of these species should also be studied.

Table 1. Localities and number of host species, host families and zoogeographic distribution of the species

Recorded species	Number of localities where the species was collected	Number of the host	Host families	Distribution zoogeography of species
<i>Aleiodes (Aleiodes) albitibia</i>	1	42	Arctiidae, Erebidae, Gelechiidae, Geometridae, Noctuidae, Pterophoridae, Pyralidae, Tortricidae	Holarctic, Neotropic
<i>A. (A.) arnoldii</i>	1	—	—	Palaeartic
<i>A. (A.) bicolor</i>	16	28	Crambidae, Erebidae, Geometridae, Lycaenidae, Noctuidae, Nymphalidae, Pterophoridae, Zygaenidae	Palaeartic
<i>A. (A.) circumscriptus</i>	16	42	Arctiidae, Erebidae, Gelechiidae, Geometridae, Noctuidae, Pyralidae, Tortricidae	Palaeartic
<i>A. (A.) esenbeckii</i>	2	10	Endromidae, Lasiocampidae, Zygaenidae	Oriental, Palaeartic
<i>A. (A.) gastritor</i>	2	40	Crambidae, Drepanidae, Elachistidae, Geometridae, Lasiocampidae, Notodontidae, Yponomeutidae	Holarctic, Neotropic
<i>A. (A.) modestus</i>	1	9	Geometridae	Palaeartic
<i>A. (A.) moldavicus</i>	2	—	—	Western Palaeartic
<i>A. (A.) nocturnus</i>	1	6	Erebidae	Palaeartic
<i>A. (A.) pallidator</i>	1	23	Arctiidae, Erebidae, Gelechiidae, Noctuidae, Pterophoridae, Pyralidae, Tortricidae	Holarctic, Neotropic
<i>A. (A.) seriatus</i>	3	1	Noctuidae	Oriental, Palaeartic
<i>A. (A.) signatus</i>	3	18	Arctiidae, Erebidae, Lasiocampidae Noctuidae	Palaeartic
<i>A. (A.) varius</i>	1	—	—	Palaeartic
<i>Aleiodes (Chelonorhogas) dimidiatus</i>	2	31	Chloropidae, Erebidae, Lasiocampidae, Noctuidae, Thaumetopoeidae	Western Palaeartic, Oriental
<i>A. (C.) ductor</i>	2	6	Lasiocampidae	Palaeartic
<i>A. (C.) miniatus</i>	1	—	—	Palaeartic
<i>Aleiodes (Neorhogas) caucasicus</i>	1	—	—	Western Palaeartic
<i>A. (N.) dissector</i>	2	1	Noctuidae	Palaeartic
<i>A. (N.) fortipes</i>	1	—	—	Western Palaeartic
<i>Aleiodes (Tetrasphaeropyx) arcticus</i>	11	4	Arctiidae, Geometridae	Palaeartic

References

- AYDOĞDU, M. & BEYARSLAN, A. 2005: The first records of *Aleiodes Wesmael* 1838 (Hymenoptera: Braconidae: Rogadinae). The fauna of Thrace region of Turkey. - *Linzer biologische Beiträge* 37: 185-193.
- AYDOĞDU, M. & BEYARSLAN, A. 2006: First records of *Aleiodes Wesmael*, 1838 species in East Marmara Region of Turkey (Hymenoptera: Braconidae: Rogadinae). - *Acta Entomologica Slovenica* 14: 81-88.
- BARTLETT, B.R., CLAUSEN, C.P., DEBACH, P., GOEDEN, R.D., LEGNER, E.F., MCMURTRY, J.A. & OATMAN, E.R. 1978: Introduced parasites and predators of arthropod pests and weeds: A world review. - Agricultural Research Service. United States Department of Agriculture. Agriculture Handbook No.480. 545 pp.
- BELOKOBYSKIY, S.A. 1996: Contribution to the knowledge of Braconid fauna of the subfamily Rogadinae (Hymenoptera: Braconidae) of Russian far east and eastern Siberia. Part 2. - *Far Eastern Entomologist* 28: 13-36.
- BELOKOBYSKIY, S.A. 2000: Key to insects of the Russian Far East Neuropteroidea, Mecoptera, Hymenoptera. Vol. 4. - P.A.L. Vladivostok: Dal'nauka; 2000. Fam Braconidae. Subfam. Rogadinae, pt. 4; pp. 15-109.
- BEYARSLAN, A. 2015: Taxonomic survey on the Rogadinae Förster, 1862 (Hymenoptera, Braconidae) in the northeastern Anatolian region, Turkey. - *Turkish Journal of Zoology* 39: 811-819.
- BEYARSLAN, A., INANC, F., CETIN, O. & AYDOĞDU, M. 2002: Braconidae species of the Turkish Aegean region. In: MELIKA G, THURCZY C, editors. Parasitic Wasps: Evolution, Systematics, Biodiversity and Biological Control. International Symposium: Parasitic Hymenoptera: Taxonomy and Biological Control; 14-17 May 2001; Kőszeg, Hungary. Budapest: Agroinform, pp. 285-290.
- BUTCHER, B.A., SMITH, M.A., SHARKEY, M.J. & QUICKE, D.L. 2012: A turbotaxonomic study of Thai *Aleiodes* (*Aleiodes*) and *Aleiodes* (*Arcaleiodes*) (Hymenoptera: Braconidae: Rogadinae) Based largely on COI barcoded specimens, with rapid descriptions of 179 new species. - *Zootaxa* 3457: 1-232.
- ÇIPLAK, B. 2003: Distribution of Tettigoniinae (Orthoptera, Tettigoniidae) bush-crickets in Turkey: the importance of the Anatolian Taurus Mountains in biodiversity and implications for conservation. - *Biodiversity and Conservation* 12: 47-64.
- JASSO-MARTINEZ, J.M., QUICKE, D.L.J., BELOKOBYSKIY, S.A., MEZA-LÁZAROR, N. & ZALDIVAR-RIVERÓ, A. 2020: Phylogenomics of the lepidopteran endoparasitoid wasp subfamily Rogadinae (Hymenoptera: Braconidae) and related subfamilies. - *Systematic Entomology*, (2021) 46. 83-95. <https://doi.org/10.1111/syen.12449>
- İPEKDAL K. & ÇAĞLAR S.S. 2019: Thaumetopoea pityocampa ve T. wilkinsoni'nin Türkiye'deki Yayılışının ve melezleşmesinin Moleküler Yöntemlerle Araştırılması. Türkiye I. - Orman Entomolojisi ve Patolojisi Sempozyumu 23-25 Kasım 2011/Antalya
- MARSH, P.M. & SHAW S.R. 2003: Revision of North American *Aleiodes Wesmael* (Part 7): the compressor *Herrich-Schaeffer*, *ufei* (Walley), *gressetti* (Muesebeck), and *procerus* (*Wesmael*) species-groups (Hymenoptera: Braconidae: Rogadinae). - *Proceedings of the Entomological Society of Washington* 105: 698-707.
- QUICKE, D.L.J., MORI, M., ZALDIVAR-RIVERON, A., LAURENNE, N.M. & SHAW, M.R. 2006: Suspended mummies in *Aleiodes* species (Hymenoptera: Braconidae: Rogadinae) with descriptions of six new species from western Uganda based largely on DNA sequence data. - *Journal of Natural History* 40: 2663-2680. <https://doi.org/10.1080/00222930601121288>
- PAPP J. 1985: Braconidae (Hymenoptera) from Greece. 2. - *Annales Historico-Naturales Musei Nationalis Hungarici*. 77:217-226.
- SHAW, M.R. 1983: On[e] evolution of endoparasitism: the biology of some genera of Rogadinae (Braconidae). - *Contributions of the American Entomological Institute* 20: 307-328.
- SHAW, M.R. 2002: Host ranges of *Aleiodes* species (Hymenoptera: Braconidae), and an evolutionary hypothesis. In: MELIKA G, THURCZY C, editors. Parasitic Wasps: Evolution, Systematics, Biodiversity and Biological Control. - International Symposium: Parasitic Hymenoptera: Taxonomy and Biological Control; 14-17 May 2001; Kőszeg, Hungary. Budapest: Agroinform, pp. 321-327.
- SHAW, M.R. 2006: *Aleiodes* wasps of eastern forests: a guide to parasitoids and associated mummified caterpillars. - Forest Health Technology Enterprise Team, Technology Transfer Series. Washington, DC, USA: USDA, 2006.
- SHAW, M.R. & HUDDLESTON, T. 1991: Classification and Biology of Braconid Wasps (Hymenoptera: Braconidae). - *Handbooks for the Identification of British Insects*, Vol. 7, Part 11. London, UK: Royal Entomology Society of London.

- SHAW, M.R., MARSH, P.M. & FORTIER, J.C. 1997: Revision of North American *Aleiodes* Wesmael (Part 1): the pulchripes Wesmael species-group in the New World (Hymenoptera: Braconidae: Rogadinae). - *Journal of Hymenoptera Research* 6: 10-35. DOI:10.5962/BHL.PART.28126
- SHAW, M.R., MARSH, P.M. & FORTIER, J.C. 2006: Revision of North American *Aleiodes* Wesmael (Part 8): the coxalis Spinola species-group (Hymenoptera: Braconidae: Rogadinae). - *Zootaxa* 1314: 1-30.
- SHIMBORI, E.M. & SHAW, S.R. 2014: Twenty-four new species of *Aleiodes* Wesmael from the eastern Andes of Ecuador with associated biological information (Hymenoptera, Braconidae, Rogadinae). - *Zookeys*, 405: 1-81. doi: <http://dx.doi.org/10.3897/zookeys.405.7402>.
- SHIMBORI, E.M., PENTEADO-DIAS, A. & SHAW, S.R. 2015: A revision of the New World species of the *Aleiodes* compressor species-group (Hymenoptera: Braconidae: Rogadinae). - *The Canadian Entomologist*, 147:665-673. doi: <http://dx.doi.org/10.4039/tce.2015.9>.
- SHIMBORI, E.M., SHAW, S.R., ALMEIDA, L.F.V. & PENTEADO-DIAS, A.M. 2016: Eleven new species of *Athacryvac* Braet & van Achterberg from the Neotropical Region (Hymenoptera, Braconidae, Rogadinae). - *Zootaxa* 4138(1): 83-117. doi: <http://dx.doi.org/10.11646/zootaxa.4138.1.3>
- STEINER, P. 1936: Beiträge zur Kenntnis der Schädlingfauna Kleinasiens. III. *Laphygma exigua* Hb., ein Großschädling der Zuckerrübe in Anatolien. - *Zeitschrift für Angewandte Entomologie*. 23:177-222.
- SULCA, L., SHIMBORI E.M. & SHAW, S.R. 2017: Four new species of the *Aleiodes* compressor Herrich-Schäffer species-group (Hymenoptera: Braconidae: Rogadinae) from South America. - *Revista peruana de biología* 23(3): 227-236. DOI: 10.15381/rpb.v23i3.12857
- TOBIAS, V.I. 1986: Subfamily Braconinae. In: MEDVEDEV G.S, editor. Keys to the Insects of the European Part of the USSR. Vol. 3. Hymenoptera. Part 4. Leningrad, USSR: Nauka, pp. 156-254.
- TOWNSEND, A.C. & SHAW, S.R. 2009: Nine new species of *Aleiodes* Wesmael reared at Yanayacu Biological Station (Hymenoptera: Braconidae: Rogadinae) in eastern Ecuador. - *Journal of Insect Science*, 9: 1-37. doi: <http://dx.doi.org/10.1673/031.009.3701>
- VAN ACHTERBERG, C. 1985: The *Aleiodes* dispar-group of the Palaearctic region (Hymenoptera: Braconidae: Rogadinae). - *Zoologische Verhandelingen Leiden* 59: 178-187.
- VAN ACHTERBERG, C. 1991: Revision of the genera of the Afrotropical and W. Palaearctic Rogadinae Foerster (Hymenoptera: Braconidae). - *Zoologische Verhandelingen Leiden* 273: 1-102.
- VAN ACHTERBERG, C. 1993: Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). - *Zoologische Verhandelingen Leiden* 283: 1-189.
- VAN ACHTERBERG, C. & POLASZEK, A. 1996: The parasites of cereal stem borers (Lepidoptera: Cossidae, Crambidae, Noctuidae, Pyralidae) in Africa, belonging to the family Braconidae (Hymenoptera: Ichneumonoidea). - *Zoologische Verhandelingen Leiden* 304: 123.
- YU, D.S., VAN ACHTERBERG, C. & HORSTMANN, K. 2016: World Ichneumonoidea 2004. Taxonomy, Biology, Morphology and Distribution (Braconidae). - *Taxapad 2005* (Scientific Names for Information Management) Interactive Catalogue on DVD/CDROM. Vancouver, Canada.
- ZALDIVAR-RÍVERON, A., SHAW, M.R., SAEZ, A.G. MORI, M., BELOKOBYLSKIJ, S.A. & SHAW, S.R. 2008: Evolution of the parasitic wasp subfamily Rogadinae (Braconidae): phylogeny and evolution of lepidopteran host ranges and mummy characteristics. - *BMC Evolutionary Biology*, 8: 1-20. doi: <http://dx.doi.org/10.1186/1471-2148-8-329>.