



New finding in Opiinae (Hymenoptera: Braconidae) from north of Iran

Sana Dolati¹, Ali Asghar Talebi^{1,*}, Samira Farahani², Mohammad Khayrandish³

¹ Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box: 14115-336, Tehran, Iran.

² Research Institute of Forests and Rangelands, Agricultural Research Education and Extension Organization (AREEO), Tehran, Iran.

³ Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University, Kerman, Iran.

ABSTRACT. The fauna of the subfamily Opiinae was studied in northern parts of Iran. A total of eight species including *Biosteres rusticus* (Haliday, 1837), *Phaeditoma depeculator* Foerster, 1862, *Phaeditoma exigua* (Wesmael, 1835), *Phaeditoma pulchriiventris* (Fischer, 1958), *Phaeditoma variegatus* (Szepligeti, 1896), *Xynobius curtifemur* (Fischer, 1961), *Xynobius caelatus* (Haliday, 1837), and *Utetes rotundiventris* (Thomson, 1895) were identified of which the four last species are reported for the first time from Iran. A key for identification of the collected species as well as the general distribution of each species either in the world or within Iran has been provided.

Key words: fauna, Braconidae, Opiinae, Iran, malaise trap

Received:
01 October, 2018

Accepted:
06 November, 2018

Published:
18 December, 2018

Subject Editor:
Majid Fallahzadeh

Citation: Dolati, S., Talebi, A.A., Farahani, S. & Khayrandish, M. (2018) New finding in Opiinae (Hymenoptera: Braconidae) from north of Iran. *Journal of Insect Biodiversity and Systematics*, 4 (3), 163–182.

Introduction

The family Braconidae is one of the largest groups of parasitic wasps with more than 20,000 described species, in more than 1000 genera and 46 subfamilies, worldwide (Yu et al., 2016). The subfamily Opiinae is a diverse group of Braconidae with more than 2063 valid species in 39 genera (Li et al., 2013; Yu et al., 2016), most of which are solitary koinobiont endoparasitoids of larvae of cyclorrhaphous Diptera (Wharton, 1997). Particularly, they attack some important groups of leaf mining and fruit-infesting flies in the families Agromyzidae, Anthomyiidae, Tephritidae and Drosophilidae (Shaw & Huddleston, 1991;

Beyarslan & Fischer, 2011). Several species of Opiinae are known as important biological agents of leafminer flies and fruit flies around the world (Greathead, 1975; Schuster & Wharton, 1993; Khajeh et al., 2014). With more than 1000 named species, the cosmopolitan genus *Opius* Wesmael, 1835 accounts for more than half of the described species in Opiinae (Yu et al., 2016). These species are currently classified in 34 subgenera (Yu et al., 2016), all of which are known to be parasitic on Agromyzidae, and less importantly Anthomyiidae and Tephritidae (Shaw & Huddleston, 1991).

Corresponding author: Ali Asghar Talebi, E-mail: talebia@modares.ac.ir

Copyright © 2018, Dolati et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY NC 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Until recently, the fauna of Braconidae in Iran had been very poorly studied. By 2010, a total of 202 species in 19 subfamilies had been reported from Iran (Fallahzadeh & Saghaei, 2010). Recent taxonomic and faunistic studies on different groups and in various geographical regions have resulted in introduction of many new species and records for the country (Farrar et al., 2009; Lashkari Bod et al., 2011; Ghahari & Fischer, 2012; Ghahari et al., 2012; Ameri et al., 2014; Khajeh et al., 2014; Peris-Felipo et al., 2014). A recently published checklist of Iranian Braconidae, presenting 780 species in 141 genera, highlights a four-fold increase in species number of the country only within six years (Farahani et al., 2016). A more rapid improvement has been achieved in case of Opiinae, where the country records of Iran has raised from only seven species in 2010 (Fallahzadeh & Saghaei, 2010) to 101 species six years later (Gadallah et al., 2016). Nonetheless, this species number seems unlikely to reflect the real fauna of Opiinae in Iran as many areas have been very poorly or never studied so far. Therefore, continued faunistic studies are expected to result in the discovery of new records and species for this country (e.g. Ameri et al., 2014; Ranjbar et al., 2016). The current study aims to contribute to the fauna of Opiinae in northern regions of Iran.

Material and methods

Sampling was conducted from different habitat types (orchards, rangelands, field crops, and forests) with different altitudes located at five Northern provinces of Iran including Tehran, Alborz, Mazandaran, Guilan, and Qazvin. The wasps were collected using Malaise traps (Fig. 1) during March–November 2010–2011. The specimens were extracted from the traps once a week, treated with 70% ethanol and placed over a filter paper to dry. Dried specimens were then card-mounted and labeled. Images from different parts of specimens were taken under a microscope

(Olympus™ AX70) or stereomicroscope (Olympus™ SZX9) equipped with digital camera (Sony, Japan). A set of 4–5 images taken with different focuses were merged to provide a single in-focus image using Combine ZP 1.0 software. Morphological terminology and wing venation characters were adopted according to Tobias & Jakimavicius (1986). Species identification was performed according to the keys of van Achterberg (1997), Fischer (1972, 1974, 1991, 1995, 1996, 1998, 1999), Fisher & Beyarslan (2005a, 2005b), Papp (1978, 1979, 1982), and Tobias & Jakimavicius (1986). All specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran.

Results

Biosteres rusticus (Haliday, 1837)

Materials examined: Iran, Guilan province: Eshman Komachal [37° 22' 06.11"N, 49° 57' 54.06"E] -1 m, 21.XI.2010, 1♀, Leg.: M. Khayrandish.

Distribution: West Palaearctic, Nearctic (Yu et al., 2016).

Distribution in Iran: Guilan province (Farahani et al., 2016, current study).

Short description: body 2.5 mm; face with distinct lusterous keel in middle; clypeus with sparse hair (Fig. 2A); temples as long as eye or very slightly longer (Fig. 2C); antennae roughly 1.5 times as long as body, 35-segmented; mandibles contiguous with clypeus (no depression between them and anterior margin of clypeus), basally gradually broadened (Fig. 2A); maxillary palps longer than height of face; thorax 1.5 times as long as high (Fig. 2D); prescutellar pit slightly elongate (Fig. 2E); notaulices on mesonotal disk not developed (Fig. 2E); scutellum posteriorly rugose (Fig. 2E); sternauli crenulate (Fig. 2D); propodeum rugose (Fig. 2F); stigma narrow (Fig. 2I); third section of radial vein slightly more than 2 times as long as 2nd section, first

radiomedial vein roughly as long as 2nd section of radial vein, radial cell reaching or almost reaching wing apex (Fig. 2I); hind femur 4.2 times as long as wide (Fig. 2H); abdomen black (Fig. 2G); ovipositor barely exerted (Fig. 10A).

***Phaedrotoma depeculator* Foerster, 1862**

Materials examined: Iran, Guilan province: Ziaz [36° 52' 27.18"N, 50° 13' 24.78"E] 537 m, 10.V.2010, 1♀; Mazandaran province: Jourband [36° 26' 18"N 52° 07' 12"E] 275 m, 05.XI.2011, 1♀; 26.IX.2011, 1♀; Tangehvaz [36° 21' 54"N, 52° 06' 12"E] 687 m, 03.IX.2011, 1♀, 16.VIII.2011, 1♀; 03.IX.2011, 1♀; Nour [36° 34' 54"N, 52° 02' 48"E] 14 m, 26.IX.2011, 1♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Guilan and Mazandaran provinces (current study), Kermanshah and Ardabil provinces (Farahani et al., 2016).

Short description: Body 1.5-2.2 mm, smooth (Fig. 10B); oral cavity developed, wide (Fig. 3A); temples slightly roundly narrowed, sharply bordered, somewhat shorter than eye (Fig. 3C); pronotum in middle of collar with transverse-oval depression (Fig. 3E); mesonotum anteriorly with depression, between it and depression notaulices tuberculately raised (Fig. 3E); sternauli deep, but smooth (Fig. 3D); propodeum on sides weakly sculptured (Fig. 3F); prescutellar pit on mesonotum (anterior to prescutellar furrow) not developed (Fig. 3E); second radiomedial cell somewhat strongly narrowed toward apex, second section of radial vein 1.5-2 times as long as 1st radiomedial vein (Fig. 3I); 3rd abdominal tergite in basal half granulosely sculptured (Fig. 3G); hind femur 3.5 times as long as wide (Fig. 3H).

***Phaedrotoma exigua* (Wesmael, 1835)**

Materials examined: Iran, Alborz province: Arangeh [35° 55' 07.20"N, 51° 05' 09.24"E]

1891 m, 25.V.2010, 1♀; 01.VI.2010, 1♀; 14.VII.2010, 1♀; 16.VIII.2010, 1♀; Karaj [35° 46' 20.16"N, 50° 56' 44.94"E] 1278 m, 08.VI.2010, 3♀; 18.V.2010, 2♀; 14.VII.2010, 1♀; Karaj [35° 46' 08.88"N, 50° 56' 55.20"E] 1277 m, 18.V.2010, 1♀; 14.VI.2010, 1♀; 08.VI.2010, 5♀; 10.VIII.2010, 1♀; 22.VI.2011, 1♀; Shahrestanak [35° 55' 34.98"N, 51° 22' 20.34"E] 2305 m, 21.VI.2010, 1♀; 29.VI.2010, 4♀; 06.VII.2010, 1♀; 28.VII.2010, 3♀; 03.VIII.2010, 3♀; 10.VIII.2010, 1♀; 16.VIII.2010, 3♀; 31.VIII.2010, 1♀; 24.VIII.2010, 1♀; 26.IV.2010, 1♀; 05.IX.2010, 5♀; Shahrestanak [35° 58' 16.26"N, 51° 21' 25.80"E] 2225 m, 29.VI.2010, 1♀; Guilan province: Orkom [36° 45' 44.34"N, 50° 18' 11.88"E] 1201 m, 24.IV.2010, 1♀; 18.IX.2010, 1♀; 14.VI.2010, 1♀; Qazichak [36° 45' 57.54"N, 50° 19' 35.22"E] 1803 m, 28.VI.2010, 1♀; 14.VI.2010, 4♀; 01.VI.2010, 1♀; 22.VI.2010, 1♀; 15.IX.2010, 1♀; Qazichak [36° 45' 52.62"N, 50° 20' 01.08"E] 1787 m, 14.VI.2010, 2♀; Ziaz [36° 52' 27.18"N, 50° 13' 24.78"E] 490 m, 10.IV.2010, 1♀; 17.IX.2010, 2♀; Mazandaran province: Jourband [36° 26' 18"N 52° 07' 12"E] 275 m, 05.XI.2011, 4♀; Tangehvaz [36° 21' 54"N, 52° 06' 12"E] 687 m, 28.V.2011, 1♀; Qazvin province: Barajin, Tarom-Manjil road [36° 40' 12"N 49° 25' 36.71"E] 290 m, 10.IV.2011, 3 ♀; 10.V.2011, 1 ♀; 25.V.2011, 1♀; 22.VI.2010, 2♀; Qazvin-Zereshk road [36° 21' 42.05"N 50° 03' 54.44"E] 1540 m, 22.VI.2010, 3♀; Tehran province: Peykanshahr [35°44'24"N 51°09'36"E] 1350 m, 25.IV.2010, 2♀; Shahriar [35° 40' 08.10"N, 50° 56' 56.64"E] 1168 m, 01.VI.2010, 1♀; 05.VI.2010, 2♀; 21.VI.2010, 1♀; 26.IV.2010, 1♀; 29.VI.2010, 4♀; 06.VII.2010, 1♀; 28.VII.2010, 3♀; 03.VIII.2010, 3♀; 10.VIII.2010, 1♀; 16.VIII.2010, 3♀; 31.VIII.2010, 1♀; 24.VIII.2010, 2♀; 05.IX.2010, 5♀; 05.X.2010, 3♀; 13.X.2010, 1 ♀; Shahriar [35° 40' 03.06"N, 50° 56' 52.14"E] 1168 m, 25.V.2010, 1♀; 01.VI.2010, 10♀; 08.VI.2010, 2♀; 22.VI.2010, 2♀; 12.IX.2010, 1♀; 14.IX.2010, 1♀; 19.IX.2010, 1♀; 05.X.2010, 1♀; 13.X.2010, 2♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Tehran province (Fischer, 1990), Lorestan province (Ghahari & Fischer, 2012 as *Opius exiguus*), Sistan and Baluchestan province (Khajeh et al., 2014), Alborz, Guilan, Mazandaran, Qazvin, and Tehran provinces (current study).

Short description: Body 1.2–2 mm; oral cavity developed (Fig. 4A); head behind eyes roundly narrowed, more transverse, black (Fig. 4C); metasoma and head entirely black (Fig. 10C); head behind eye roundly narrowed (Fig. 4C); temples much shorter than eyes (Fig. 4C); antennae 17–28 segmented; thorax less than 1.5 times as

long as high (Fig. 4D); sternauli smooth (Fig. 4D); mesonotum lacking depression in middle of anterior part (Fig. 4E); prescutellar pit on mesonotum (anterior to prescutellar furrow) not developed (Fig. 4E); propodeum smooth (Fig. 4F); second section of radial vein 1.5–1.7 times as long as 1st radiomedial vein (Fig. 4I); radial cell on fore wing reaching or almost reaching wing apex (Fig. 4I); abdomen entirely black (Fig. 4G); first abdominal tergite 1.3–1.5 times as long as its width at apex (Fig. 4G); second and third abdominal tergites basally rugose or with granulate sculpture (Fig. 4G); ovipositor short, slightly exerted (Fig. 10C).



Figure 1. Geographical location of five provinces in northern region of Iran: 1. Alborz; 2. Guilan; 3. Mazandaran; 4. Qazvin; 5. Tehran.

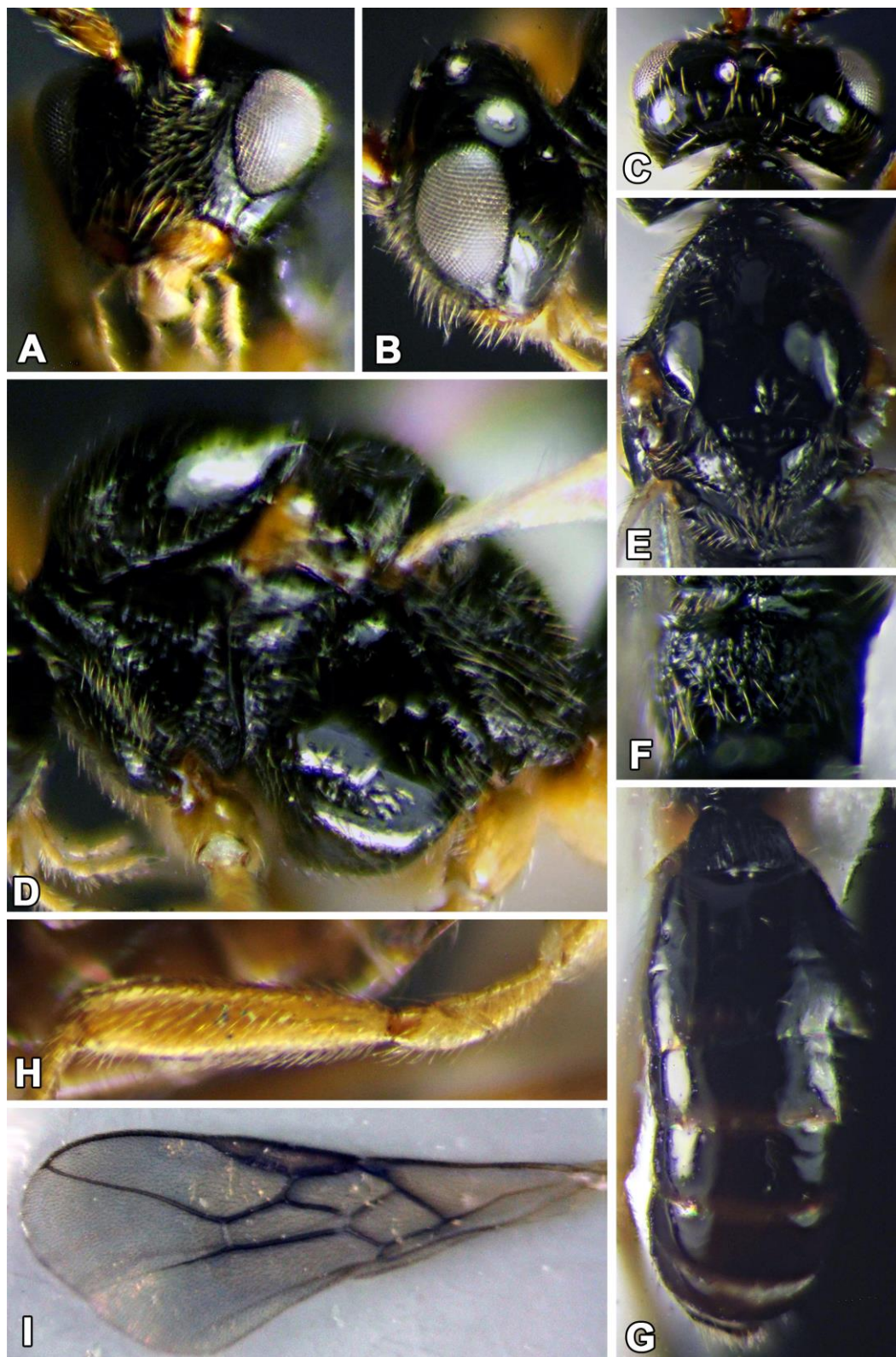


Figure 2. *Biosteres rusticus* (Haliday, 1837); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

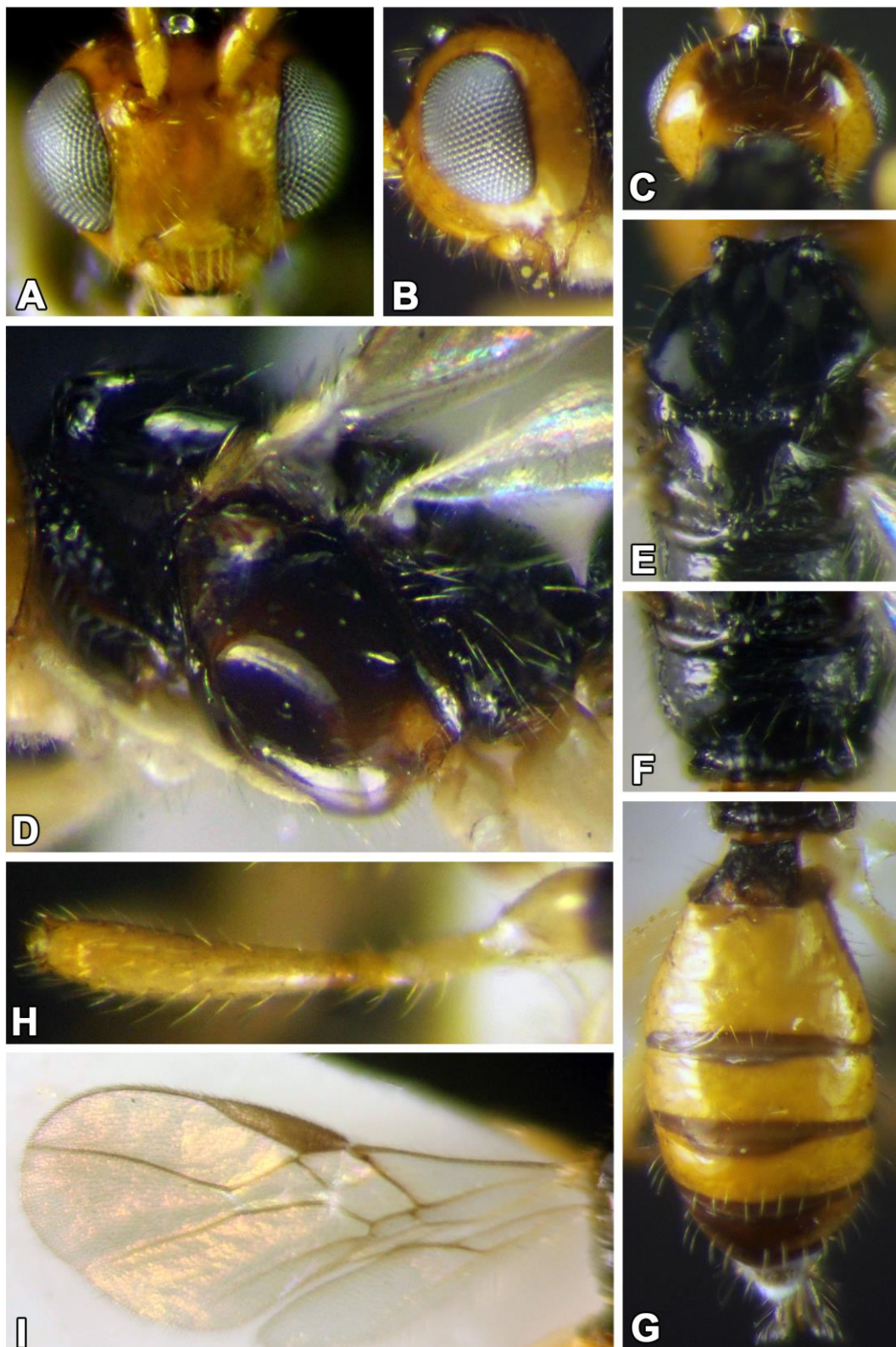


Figure 3. *Phaedrotoma depeculator* Foerster, 1862; **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** Propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

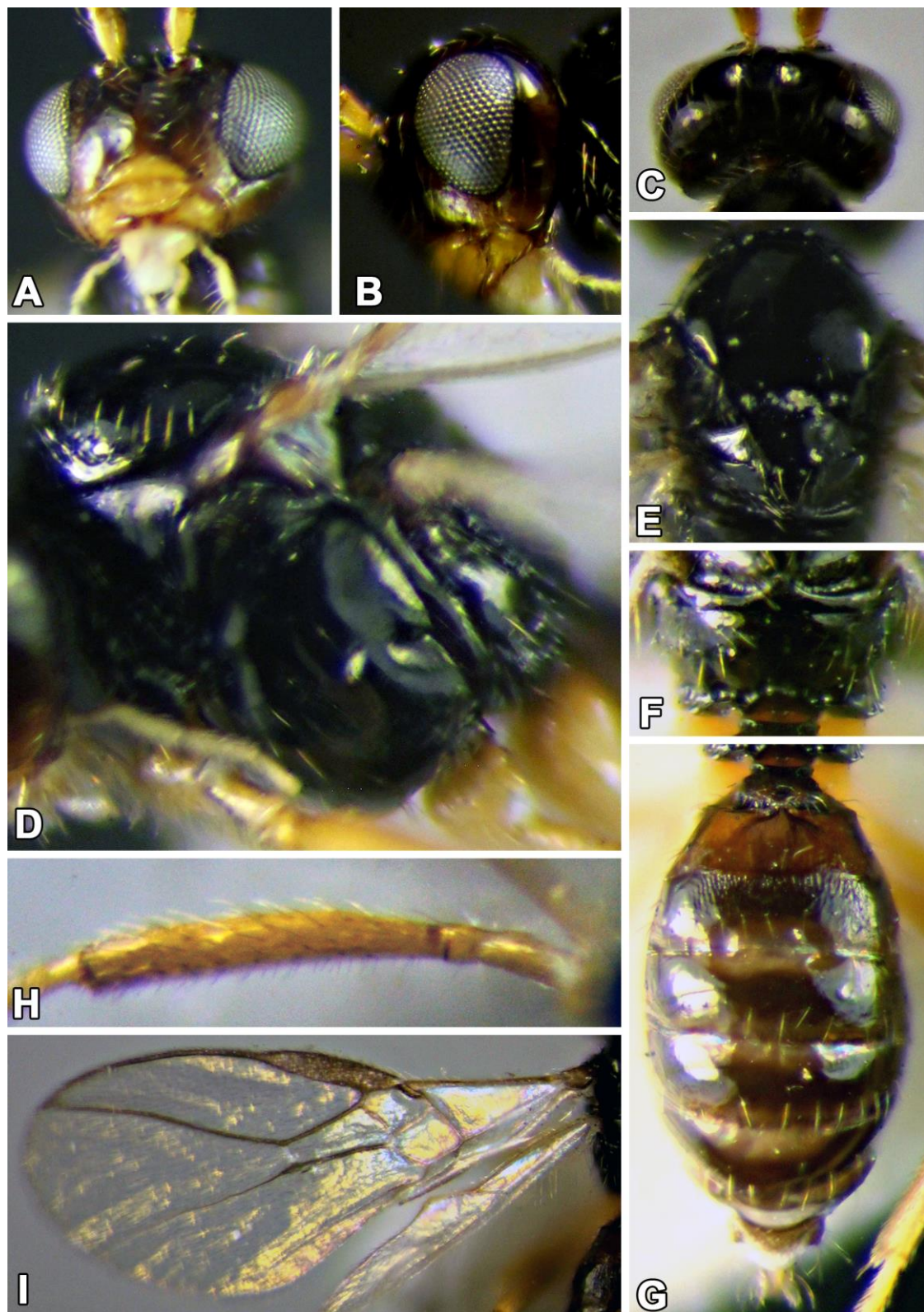


Figure 4. *Phaedrotoma exigua* (Wesmael, 1835); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** Propodeum, **G.** Dorsal view of metasoma, **H.** Hind leg, **I.** Fore wing.

***Phaeditoma pulchriiventris* (Fischer, 1958)**

Materials examined: Iran, Tehran Province: National Botanical Garden [35°44'13"N, 51°17'55"E] 1340 m, 04.V.2010, 1♀; 18.V.2010, 1♀; 08.VI.2010, 1♀; Peykanshahr [35° 44' 24"N, 51° 09' 36"E] 1350 m, 25.V.2010, 2♀; Shahriar [35° 40' 08.10"N, 50° 56' 56.64"E] 1168 m, 01.VI.2010, 3♀; 08.VI.2010, 2♀; 14.VII.2010, 1♀; 20.VII.2010, 1♀; 03.VIII.2010, 1♀; 31.VIII.2010, 1♀; 05.IX.2010, 5♀; 12.IX.2010, 5♀; 19.IX.2010, 1♀; 26.IX.2010, 1♀; 05.X.2010, 3♀; 13.X.2010, 2♀, Alborz province: Karaj [35° 46' 20.16"N, 50° 56' 44.94"E] 1278 m, 05.IX.2010, 2♀; 01.VI.2010, 1♀; 18.V.2010, 2♀; 28.IX.2010, 1♀; Qazvin province: Barajin, Tarom-Manjil road [36° 40' 12"N, 49° 25' 36.71"E] 290 m, 25.V.2011, 1 ♀; Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Alborz and Tehran provinces (current study), Guilan province (Ghahari et al., 2012, as *Opius* (*Phaeditoma*) *pulchriiventris* (Fischer, 1958)), East Azarbaijan province (Rastegar et al., 2012, as *Opius pulchriceps* Szépligeti, 1898).

Short description: Body 1.3-1.5 mm; oral cavity developed (Fig. 5A); mandibles basally with slight broadening (Fig. 5A); head and abdomen with abundant reddish pattern (Fig. 5C, 5G); temples slightly shorter than eye (Fig. 5C); antennae 1.3 times as long as body (Fig. 10D), 21-24 segmented; thorax black, 1.3 times as long as high (Fig. 5D); sternauli smooth (Fig. 5D); mesonotum lacking depression in middle of anterior part (Fig. 5E); propodeum smooth (Fig. 5F); second radiomedial cell distinctly narrowed outward (Fig. 5I); 2nd section of radial vein less than 2 times as long as 1st radiomedial vein (Fig. 5I); radial cell on fore wing reaching or almost reaching wing apex (Fig. 5I); first metasomal tergite dark brownish yellow, with weak sculpture (Fig. 5G); second and third abdominal

tergites basally rugose or with granulose sculpture (Fig. 5G); ovipositor short (Fig. 10D).

***Phaeditoma variegatus* (Szepligeti, 1896)**

Materials examined: Iran, Tehran province: Shahriar [35° 40' 08.10"N, 50° 56' 56.64"E] 1168 m, 18.V.2010, 1♀; Shahriar [35° 40' 08.10"N, 50° 56' 56.64"E] 1168 m, 08.VI.2010, 2♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Tehran province (current study), new record in Iran.

Short description: Body 2.0–2.5 mm, oral cavity developed (Fig. 6A); mandibles basally uniformly broadened (Fig. 6A); head and metasoma with dark pattern (Figs 6C, 6G); temples long, 0.6 as long as eye (Fig. 6C); antennae 1.5–2.0 times as long as body (Fig. 10E), 29 segmented; mesosoma black, 1.3 times as long as high (Fig. 6D); sternauli smooth or not developed (Fig. 6D); prescutellar pit on mesonotum not developed (Fig. 6E); propodeum smooth (Fig. 6F); radial cell on forewing reaching or almost reaching wing apex (Fig. 6I); second radiomedial cell distinctly narrowed outward (Fig. 6I); second section of radial vein less than two times longer than first radiomedial vein (Fig. 6I); first metasomal tergite black, coarsely sculptured (Fig. 6G); ovipositor short (Fig. 10E).

***Utetes rotundiventris* (Thomson, 1895)**

Materials examined: Iran, Guilan province: Eshman Komachal [37° 22' 06.11"N 49° 57' 54.06"E]-1 m, 10.V.2010, 1♀; 17.V.2010, 1♀; 23.V.2010, 1♀; 13.IX.2010, 1♀; Qazichak [36° 45' 57.54"N, 50° 19' 35.22"E] 1803 m, 24.V.2010, 1♀; Ziaz [36° 52' 27.18"N, 50° 13' 24.78"E] 537 m, 22.VI.2010, 1♀, 01.VI.2010, 1♀; Orkam [36° 45' 44.34"N, 50° 18' 11.88"E] 1201 m, 01.VI.2010, 1♀, 24.V.2010, 1♀; Mazandaran province: Nour [36° 34' 54.11"N 52° 02' 48.50"E] -14 m, 27.IV.2011,

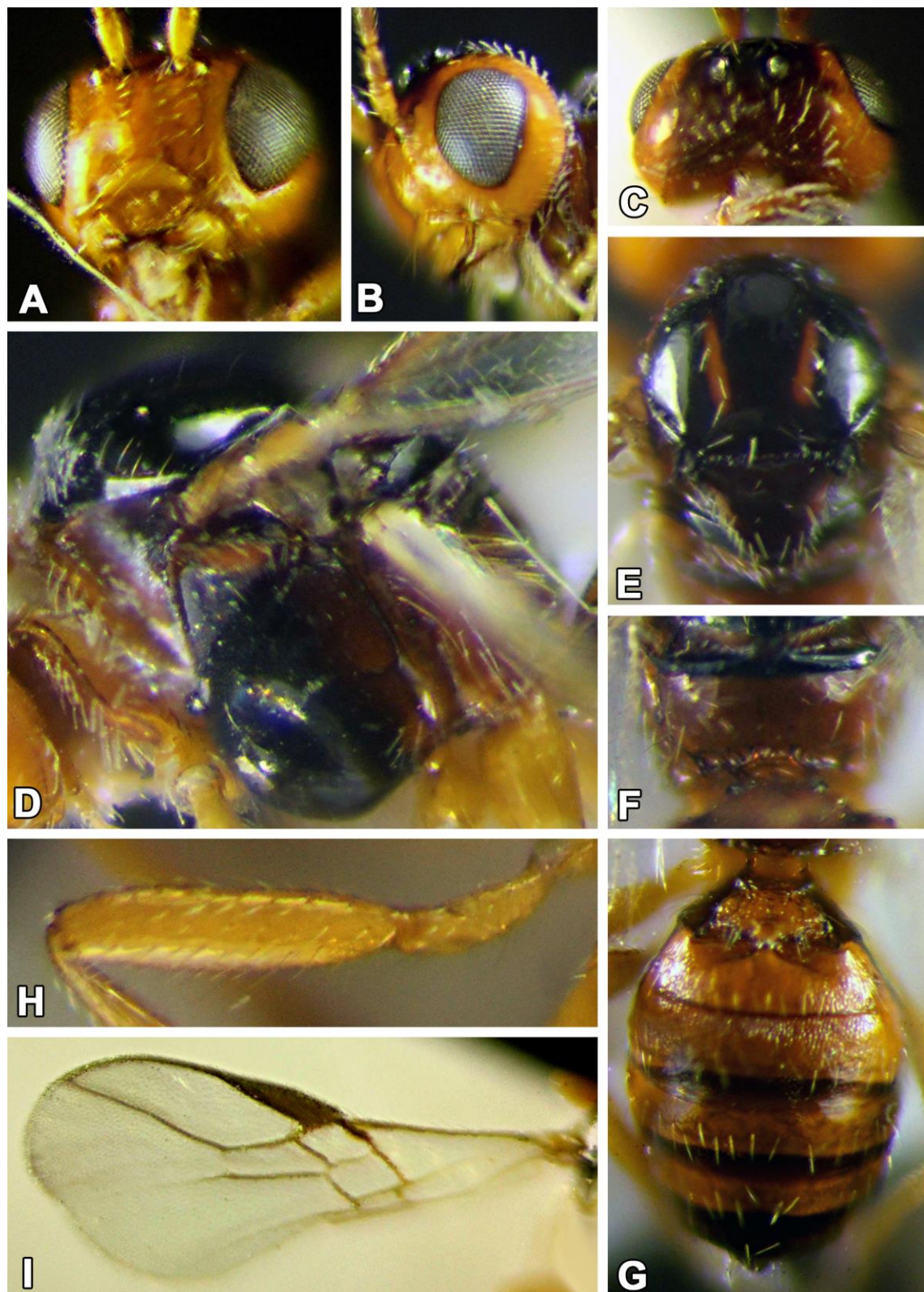


Figure 5. *Phaedrotoma pulchriventris* (Fischer, 1958); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

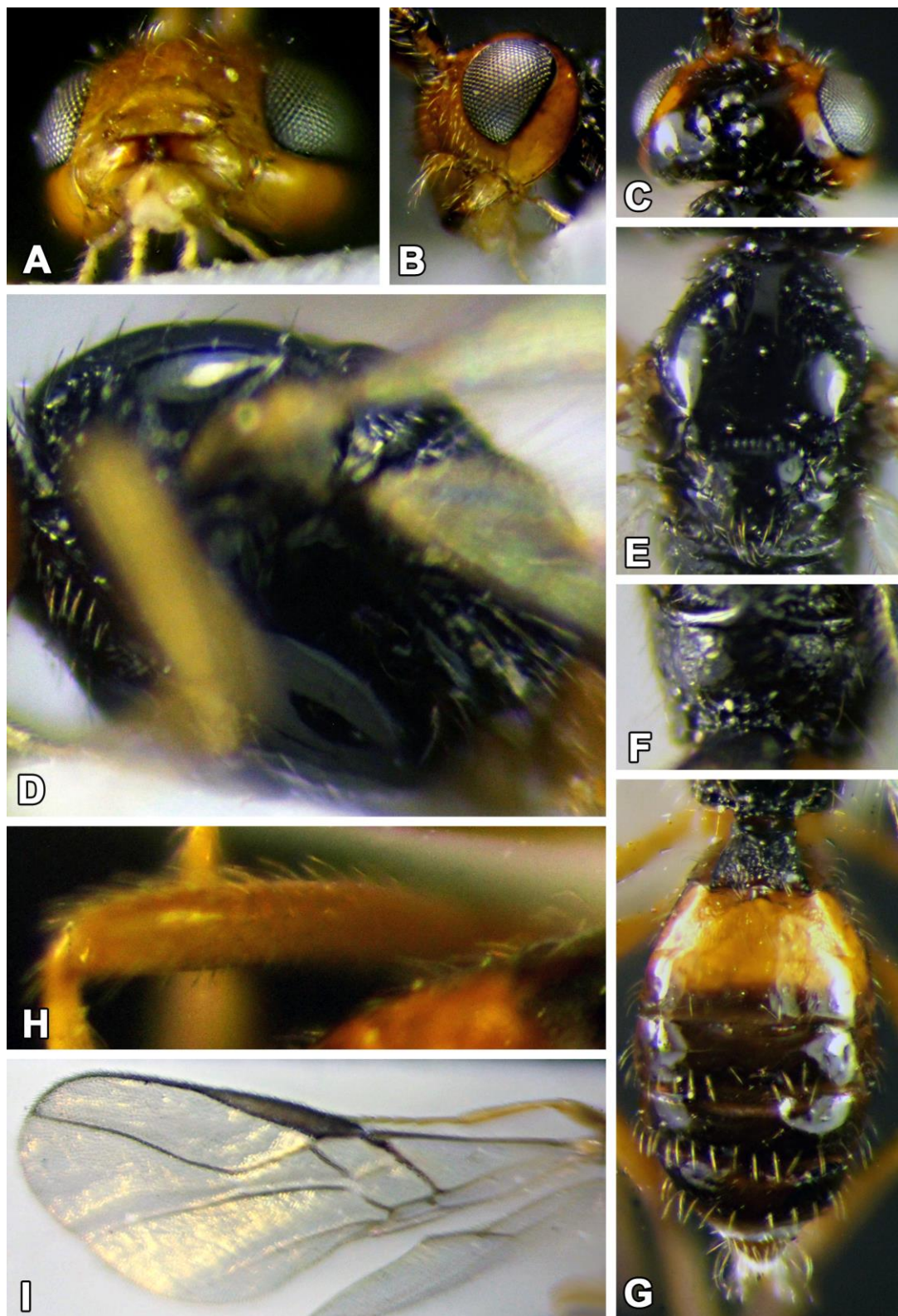


Figure 6. *Phaedrotoma variegatus* (Szepligeti, 1896); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

1♀; 26.IV.2011, 1♀; Jourband [36° 26' 18"N 52° 07' 12"E] 275 m, 10.X.2011, 1♀; 24.IX.2011, 1♀; Tangehvaz [36° 21' 54"N, 52° 06' 12"E] 687 m, 07.VI.2011, 1♀; 26.VII.2011, 1♀; 26.IX.2011, 2♀; 26.IX.2011, 3♀; 05.IX.2011, 1♀; 28.VI.2011, 2♀; Gaznasara [36° 16' 54"N, 52° 10' 54"E] 2031 m, 28.VI.2011, 1♀; 28.VI.2011, 1♀; Gaznasara [36° 16' 58.08"N, 52° 10' 55.62"E] 2013 m, 27.IV.2010, 1♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Guilan and Mazandaran provinces (current study), new record in Iran.

Short description: Body 2.0–2.3 mm, face reddish yellow (Fig. 7A); mandibles not contiguous with clypeus, basally uniformly broadened (Fig. 7A); oral cavity developed between mandibles and clypeus (Fig. 7A); eye almost two times as long as temples (Fig. 7C); antennae 1.5 times as long as body (Fig. 10F), 28–33 segmented; sternauli crenulate or somewhat non-uniformly rugose (Fig. 7D); mesonotum anterior to scutellum (anterior to prescutellar furrow) with rounded pit or elongated into longitudinal furrow (Fig. 7E); scutellum absolutely smooth (Fig. 7E); furrow on posterior margin of sides of mesothorax smooth (Fig. 7D); notaulices smooth or entirely absent (Fig. 7E); propodeum somewhat rugose or almost smooth, lacking transverse ridge (Fig. 7F); second section of radial vein more than 1.5 times as long as first radiomedial vein (Fig. 7I); recurrent vein postfurcal (Fig. 7I); stigma on forewing broad, triangular (Fig. 7I); hind femur 5.0 times as long as wide (Fig. 7H); 2nd metasomal tergite with somewhat developed light colored pattern (Fig. 7G); ovipositor valves roughly as long as 1st metasomal tergite (Fig. 10F).

Xynobius caelatus (Haliday, 1837)

Materials examined: Iran, Mazandaran province: Tangehvaz [36° 21' 54"N, 52° 06'

12"E] 687 m, 07.VI.2011, 1♀, 26.V.2011, 4♀; Gaznasara [36° 16' 54"N, 52° 10' 54"E] 2031 m, 07.VI.2011, 3 ♀; 10.V.2011, 1♀; Qazvin province: Barajin, Tarom-Manjil road [36° 40' 12"N 49° 25' 36.71"E] 290 m, 10.V.2011, 1♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016).

Distribution in Iran: Mazandaran and Qazvin provinces (current study), new record for Iran.

Short description: Body 3.7–5.0 mm; mandibles not contiguous with clypeus lacking dental projection (Fig. 8A); oral cavity developed between mandibles and clypeus (Fig. 8A); temples 1.5 times as long as eye (Fig. 8C); antennae 1.5 times as long as body (Fig. 10G), 41–50 segmented; sternauli crenulate or somewhat non-uniformly rugose (Fig. 8D); mesonotum anterior to scutellum (anterior to prescutellar furrow) with rounded pit or elongated into longitudinal furrow, entirely or mostly smooth (Fig. 8E); scutellum sculptured (Fig. 8E); notaulices deep (Fig. 8E); recurrent vein antefurcal or interstitial, stigma narrow, long (Fig. 8I); hind femur 4.0 times as long as wide (Fig. 8H).

Xynobius curtifemur (Fischer, 1961)

Materials examined: Iran, Guilan province: Orkom [36° 45' 44.34"N, 50° 18' 11.88"E] 1201 m, 26.IV.2010, 1♀; Qazichak [36° 45' 57.54"N, 50° 19' 35.22"E] 1803 m, 04.V.2010, 1♀; 10.V.2010, 1♀, Leg.: M. Khayrandish.

Distribution: Palaearctic (Yu et al., 2016), new record for Iran.

Distribution in Iran: Guilan province (current study), new record for Iran.

Short description: Body 1.8–2.2 mm, black (Fig. 10H); face with usual pubescence (Fig. 9A); oral cavity not developed (Fig. 9A); clypeus, mandibles and legs yellow to yellowish dark brown (Fig. 10H); antennae slightly longer than

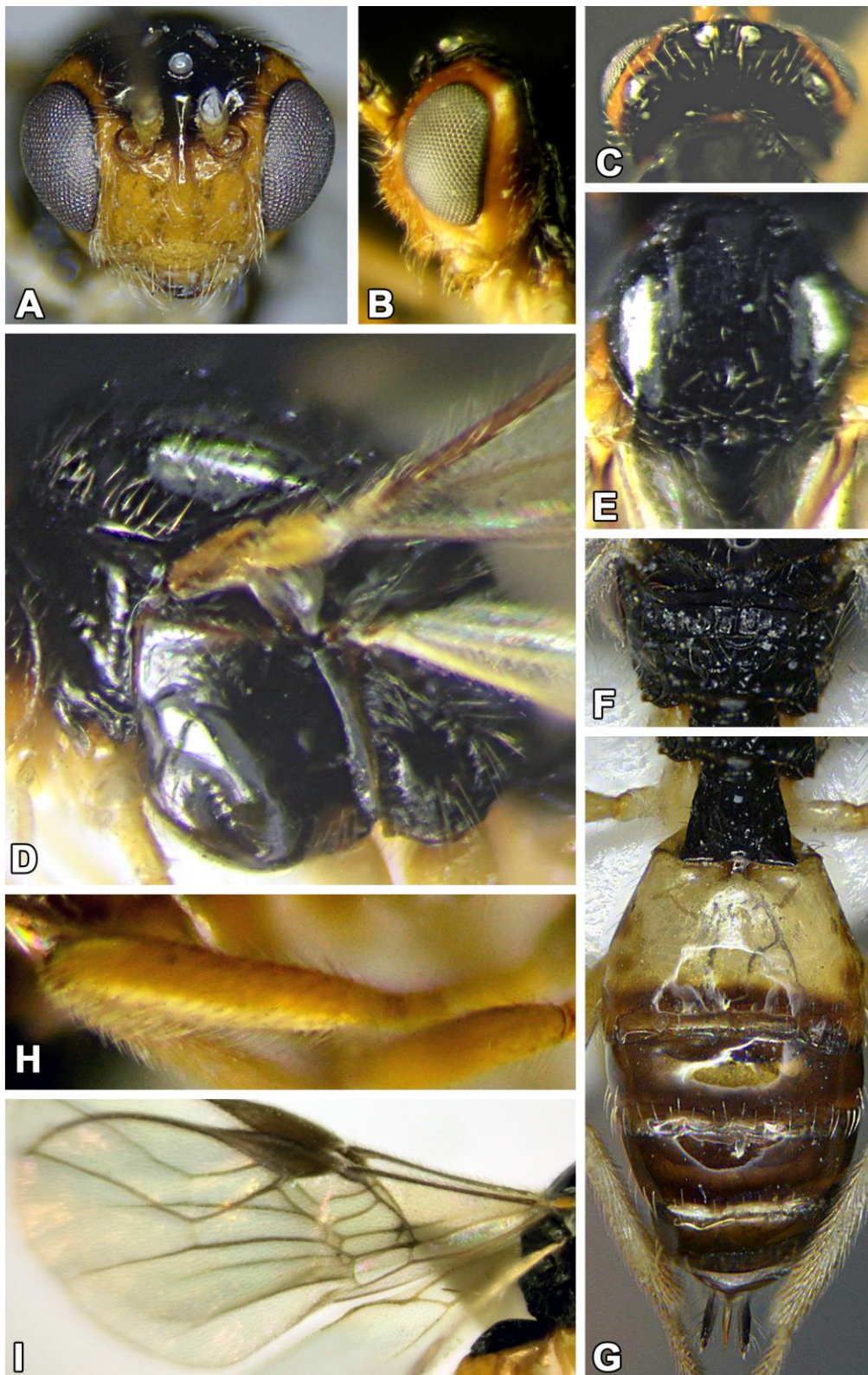


Figure 7. *Utetes rotundiventris* (Thomson, 1895); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

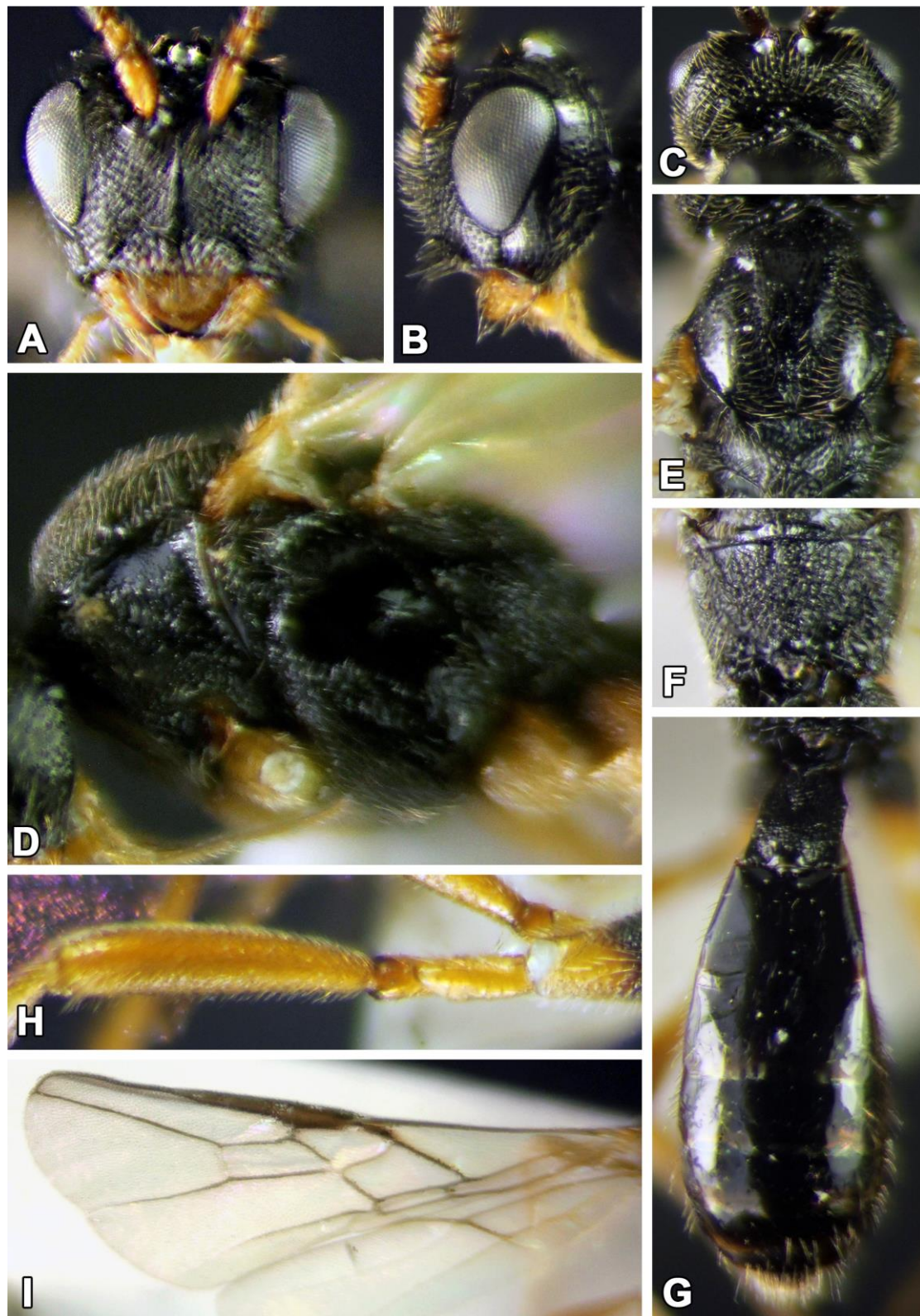


Figure 8. *Xynobius caelatus* (Haliday, 1837); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** Dorsal view of metasoma, **H.** hind leg, **I.** Fore wing.

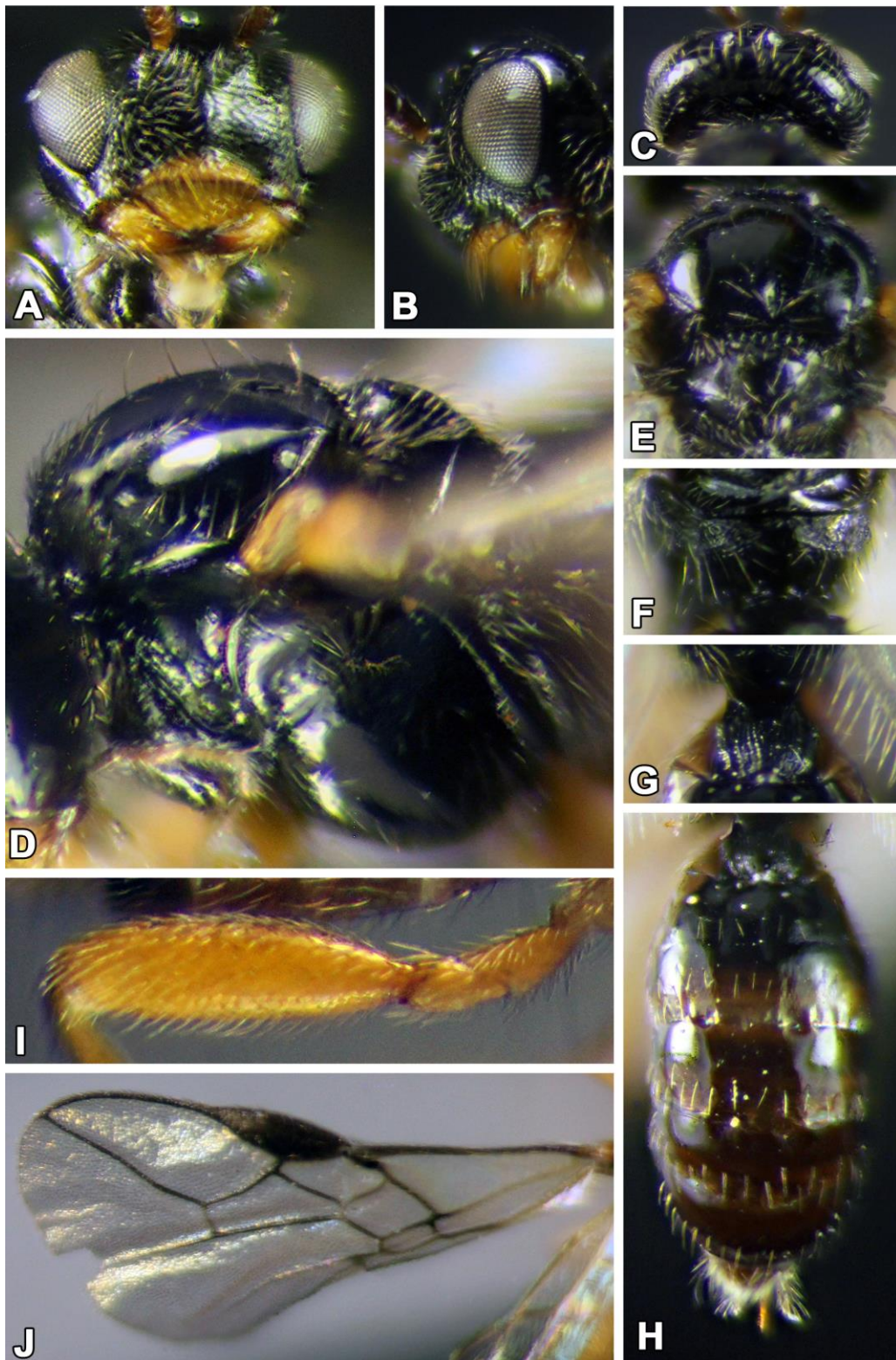


Figure 9. *Xynobius curtifemur* (Fischer, 1961); **A.** Frontal view of head, **B.** Lateral view of head and compound eye, **C.** Dorsal view of head, **D.** Lateral view of mesosoma, **E.** Dorsal view of mesosoma, **F.** propodeum, **G.** first metasomal tergite, **H.** Dorsal view of metasoma, **I.** hind leg, **J.** Fore wing.

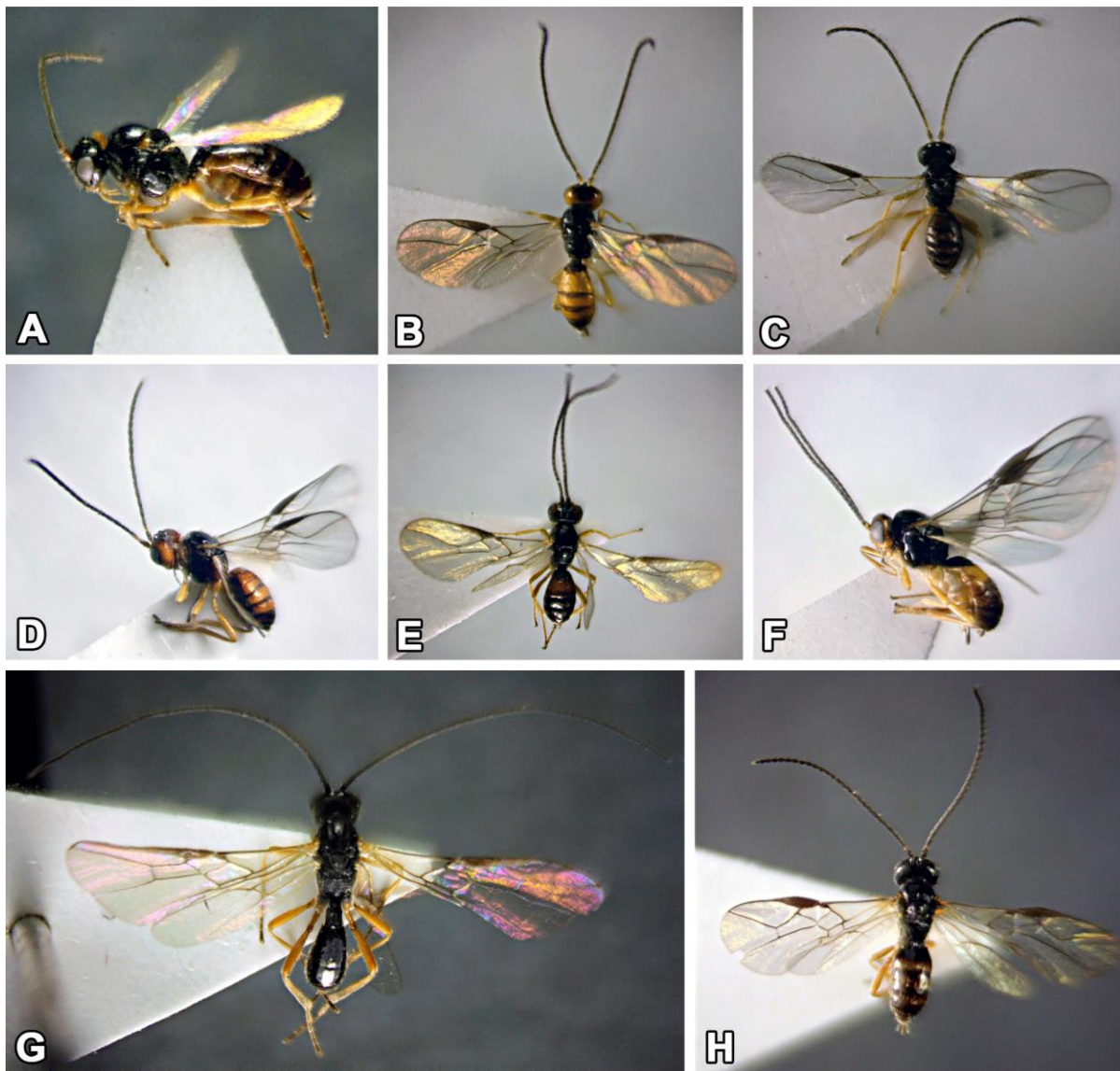


Figure 10. Dorsal or lateral habitus of female, **A.** *Biosteres rusticus* (Haliday, 1837), **B.** *Phaeditoma depeculator* Foerster, 1862, **C.** *Phaeditoma exigua* (Wesmael, 1835), **D.** *Phaeditoma pulchriventris* (Fischer, 1958), **E.** *Phaeditoma variegatus* (Szepligeti, 1896), **F.** *Utetes rotundiventris* (Thomson, 1895), **G.** *Xynobius caelatus* (Haliday, 1837), **H.** *Xynobius curtifemur* (Fischer, 1961).

body (Fig. 10H), 26–31-segmented; sternauli absolutely smooth or not developed (Fig. 9D); mesonotum anterior to scutellum (anterior to prescutellar furrow) with rounded pit or elongated into longitudinal furrow (Fig. 9E); hairs mostly on anterior slopping part of mesonotum or mesonotum absolutely glabrous (Fig. 9E); prescutellar pit at usual distance from scutellum, at posterior margin of mesonotal

disk (Fig. 9E); recurrent vein postfurcal (Fig. 9J); second section of radial vein 1.5–1.7 times as long as first radiomedial vein (Fig. 9J); legs thickened, hind femur 3.0 times as long as wide (Fig. 9I); metasoma black or only second metasomal tergite light colored (Fig. 9H); first metasomal tergite basally uniformly narrowed, as long as or slightly longer than its width at apex (Fig. 9G).

Key to the identified species of Opiinae from northern Iran

1. Second section of radial vein as long as 1st radiomedial vein (Fig. 2I); mesonotum with pit anterior to prescutellar furrow (Fig. 2E); radial cell reaching or almost reaching wing apex (Fig. 2I); scutellum posteriorly rugose (Fig. 2E); ovipositor barely exerted; stigma narrow; antennae 35–40-segmented. *Biosteres rusticus*
 - Second section of radial vein longer than 1st radiomedial vein (Figs 3I, 4I, 5I, 6I, 7I, 8I, 9J). 2
2. Scutellum sculptured (Fig. 8E); mesonotum entirely or mostly smooth (Fig. 8E); notaulices deep (Fig. 8E); stigma narrow, long (Fig. 8I); temple longer than eye (Fig. 8C); antennae 1.5 times as long as body, 41–50-segmented; hind femur 4 times as long as wide (Fig. 8H). *Xynobius caelatus*
 - Scutellum absolutely smooth (Figs 3E, 4E, 5E, 6E, 7E, 9E). 3
3. Second section of radial vein more than 1.5 times as long as first radiomedial vein (Fig. 7I); face reddish yellow (Fig. 7A), 2nd metasomal tergite with somewhat developed light colored pattern (Fig. 7G); eyes as least two times as long as temples (Fig. 7C), antennae 1.5 times as long as body, 28–33-segmented; hind femur 5 times as long as wide (Fig. 7H). *Utetes rotundiventris*
 - Second section of radial vein distinctly more than 1.5 times as long as first radiomedial vein (Figs 3I, 4I, 5I, 6I, 9J); head black (Figs 4C, 6C, 9C), if light colored, then densely punctate. 4
4. Metasoma black or only 2nd metasomal tergite light colored (Fig. 9H); oral cavity large (Fig. 9A); legs thickened, hind femur 3 times as long as wide (Fig. 9I); antennae slightly longer than body, 26–31-segmented; body black, mandibles and legs yellow or yellowish dark brown (Figs 9A & 10H). *Xynobius curtifemur*
 - Abdomen red or yellowish dark brown, at least distinctly light colored on first tergite (Figs 3G, 4G, 5G, 6G). 5
5. Mesonotum anteriorly with depression, between it and depression notaulices tuberculately raised (Fig. 3E); pronotum in middle of collar with transverse-oval depression (Fig. 3E); temples slightly roundly narrowed (Fig. 3C); oral cavity wide (Fig. 3A), sternauli deep, but smooth (Fig. 3D). *Phaedrotoma depeculator*
 - Mesonotum of usual structure, lacking depression in middle of anterior part (Figs 4E, 5E, 6E). 6
6. Metasoma and head entirely black (Figs 4C & 4G); head behind eye roundly narrowed (Fig. 4C); temples much shorter than eyes (Fig. 4C); first metasomal tergite 1.3 to 1.5 times as long as its width at apex (Fig. 4G); antennae 17–28-segmented. *Phaedrotoma exigua*
 - Metasoma as also head with reddish pattern (Figs 10D & 10E); second radiomedial cell distinctly narrowed outward (Figs 5I, 6I); second section of radial vein less than 2 times as long as first radiomedial vein (Figs 5I, 6I). 7
7. First metasomal tergite dark brownish yellow, with weak sculpture (Fig. 5G); temples slightly shorter than eye (Fig. 5C); antennae 1.3 times as long as body, 21–24-segmented; mandibles basally with slight broadening (Fig. 5A). *Phaedrotoma pulchriventris*
 - First metasomal tergite black, coarsely sculptured (Fig. 6G); temples 0.6 as long as eye (Fig. 6C); antennae 1.5–2.0 times as long as body, 24–34-segmented; mandibles basally uniformly broadened (Fig. 6A). *Phaedrotoma variegatus*

Discussion

A total of eight species, belonging to four genera were identified, of which the four species *Phaerotoma variegatus*, *Xynobius curtifemur*, *Xynobius caelatus*, and *Utetes rotundiventris* are reported for the first time from Iran. These species have been reported only from Palearctic region. *Phaerotoma variegatus* is a common parasitoid associated with many species of leaf miner flies within the genera *Agromyza*, *Cerodontha* and *Amauromyza* (Tobias & Jakimavicius, 1986). *Utetes rotundiventris* has been known in association with *A. albitarsis*, *A. rufipes*; *Phytomyza diversicornis*, and *P. sedicola*. *Xynobius caelatus* and *X. curtifemur* have been only reported as parasites of *Pegomyia seitenettensis* and *Agromyza nana*, respectively (Tobias & Jakimavicius, 1986). Leaf miner flies of the family Agromyzidae represent an important group of agricultural pests worldwide, especially on ornamental and vegetable crops (Kaspi & Parrella, 2006). Parasitic wasps are the most important natural enemies of leaf miner flies and play an important role in biological control of these pests. A comprehensive knowledge on species diversity of natural enemies and their host range and food plant resources is favored for control of leaf miner flies in the shade of integrated pest management programs. Therefore, future studies may assess the feasibility of using these parasitic wasps for applied biological control of leaf miner flies in agricultural systems.

Acknowledgments

The authors would like to appreciate Drs. M. Khayrandiah and A. Nadimi for his great helps in sampling of the specimens referred to in this study.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- Ameri, A., Talebi, A.A., Rakhshani, E., Beyarslan, A. & Kamali, K. (2014) Study of the genus *Opius* Wesmael (Hymenoptera: Braconidae: Opiinae) in Southern Iran, with eleven new records. *Zootaxa*, 3884, 1–26.
<https://doi.org/10.11646/zootaxa.3884.1.1>
- Beyarslan, A. & Fischer, M. (2011) Contributions to the Opiinae fauna of Turkey (Hymenoptera: Braconidae). *Turkish Journal of Zoology*, 35, 293–305.
<https://doi.org/10.3906/zoo-1204-9>
- Beyarslan, A. & Fischer, M. (2013) Checklist of Turkish Opiinae (Hymenoptera, Braconidae), *Zootaxa*, 3721, 401–454.
<https://doi.org/10.11646/zootaxa.3721.5.1>
- Fallahzadeh, M. & Saghaei, N. (2010) Checklist of Braconidae (Insecta: Hymenoptera) from Iran. *Munis Entomology and Zoology*, 5, 170–186.
- Farahani, S., Talebi, A.A. & Rakhshani, E. (2016) Iranian Braconidae (Insecta: Hymenoptera: Ichneumonoidea): diversity, distribution and host association. *Journal of Insect Biodiversity and Systematics*, 2, 1–92.
- Farrar, N., Golestaneh, R., Askari, H & Assareh, M.H. (2009) Studies on parasitism of *Fopius carpomyiae* (Silvestri) (Hymenoptera: Braconidae), an egg-pupal parasitoid of Ber (Konar) fruit fly, *Carpomya vesuviana* Costa (Diptera: Tephritidae), in Bushehr Iran. *Acta Horticulturae*, 840, 431–438.
<https://doi.org/10.17660/ActaHortic.2009.840.61>
- Fischer, M. & Beyarslan, A. (2005a) New maggot wasps from the Turkish fauna (Hymenoptera, Braconidae, Opiinae). *Polskie Pismo Entomologiczne*, 74, 379–421.
- Fischer, M. & Beyarslan, A. (2005b) A survey of Opiinae (Hymenoptera, Braconidae) of Turkey. *Fragmenta Faunistica*, 48, 27–62.
<https://doi.org/10.3161/00159301FF2005.48.1.027>
- Fischer, M. (1972) Hymenoptera, Braconidae (Opiinae I). *Das Tierreich*, 91, 1–620.
- Fischer, M. (1974) Opiinae aus dem Ötztal (Österreich) (Hymenoptera: Braconidae). *Beiträge zur Entomologie*, 24, 73–86.
- Fischer, M. (1990) Palaarktische Opiinae (Hymenoptera, Braconidae): Neue Arten

- und neue Funde aus dem Ungarischen Naturwissenschaftlichen Museum in Budapest. *Annales Historico-Naturales Musei Nationalis Hungarici*, 81, 205–238.
- Fischer, M. (1991) Wiederbeschreibungen und Neubeschreibungen von Opiinae aus der Alten Welt (Hymenoptera: Braconidae). *Annalen des Naturhistorischen Museums Wien*, 92, 139–203.
- Fischer, M. (1995) Korrekturen und Ergänzungen zur Taxonomie altweltlicher Opiinae und Neufassung eines Bestimmungsschlüssels für die paläarktischen Arten des Subgenus *Opiothorax* Fischer, M. (1972) des Genus *Opius* Wesm., 1835 (Hymenoptera, Braconidae). *Entomofauna*, 16, 217–244.
- Fischer, M. (1996) Beschreibungen und Wiederbeschreibungen von einigen europäischen und kanarischen Opiinae (Hymenoptera: Braconidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen*, 48, 49–62.
- Fischer, M. (1998) Neue taxonomische Untersuchungen über Madenwespen der Alten Welt mit besonderer Berücksichtigung der Gattungen *Eurytenes* Förster, *Aulonotus* Ashmead, *Biosteres* Förster und der Untergattung *Gastrosema* Fischer (Hymenoptera, Braconidae: Opiinae). *Linzer Biologische Beiträge*, 30, 21–51.
- Fischer, M. (1999) Zur Evolution und zum System der Opiusverwandten Gattungen der Unterfamilie Opiinae mit einer erweiterten Aufteilung dieses Gattungs-Komplexes (Hymenoptera, Braconidae, Opiinae). *Linzer Biologische Beiträge*, 31, 277–336.
- Gadallah, N.S., Ghahari, H., Peris-Felipo, F.J. & Fischer, M. (2016) Updated checklist of Iranian Opiinae (Hymenoptera: Braconidae). *Zootaxa*, 4066, 1–40.
<https://doi.org/10.11646/zootaxa.4066.1.1>
- Ghahari, H. & Fischer, M. (2012) A faunistic survey on the braconid wasps (Hymenoptera: Braconidae) from Kermanshah province, Iran. *Entomofauna*, 20, 305–312.
- Ghahari, H., Fischer, M., & Tobias, V.I. (2012) A study on the Braconidae (Hymenoptera: Ichneumonidae) from Gilan Province, Iran. *Entomofauna*, 22, 317–324.
- Greathead, D.J. (1975) Biological control of the beanfly, *Ophiomyia phaseoli* (Dipt. Agromyzidae), by *Opius* spp. (Hym. Braconidae) in the Hawaiian Islands. *Entomophaga*, 20, 313–316.
<https://doi.org/10.1007/BF02371957>
- Kaspi, R. & Parrella, M.P. (2006) Improving the biological control of leafminers (Diptera: Agromyzidae) using the sterile insect technique. *Journal of Economic Entomology*, 99, 1168–1175.
<https://doi.org/10.1603/0022-0493-99.4.1168>
- Khajeh, N., Rakhshani, E., Peris-Felipo, F.J. & Zikić, V. (2014) Contributions to the Opiinae (Hymenoptera: Braconidae) of Eastern Iran with updated checklist of Iranian species. *Zootaxa*, 3784, 131–147.
<https://doi.org/10.11646/zootaxa.3784.2.3>
- Lashkari Bod, A., Rakhshani, E., Talebi, A.A., Lozan, A. & Zikić, V. (2011) Contribution to the knowledge of Braconidae (Hym., Ichneumonidae) of Iran. *Biharean Biologist*, 5, 147–150.
- Li, X.Y., van Achterberg, C. & Tan, J.C. (2013) Revision of the subfamily Opiinae (Hymenoptera, Braconidae) from Hunan (China), including thirty-six new species and two new genera. *ZooKeys*, 268, 1–168.
<https://doi.org/10.3897/zookeys.268.4071>
- Papp, J. (1978) Braconidae (Hymenoptera) from Korea. 3. *Folia Entomologica Hungarica*, 24, 133–148.
- Papp, J. (1979) Braconidae (Hymenoptera) from Tunisia. I. *Folia Entomologica Hungarica*, 32, 175–187.
- Papp, J. (1982) Braconidae (Hymenoptera) from Greece. 1. *Annales musei gouldensis*, 5, 183–193.
- Peris-Felipo, F.J., Rahmani, Z., Belokobylskij, S.A. & Rakhshani, E. (2014) Genus *Indiopus* Fischer, 1966 (Hymenoptera, Braconidae, Opiinae) in Iran with a key to the world species. *ZooKeys*, 368, 37–44.
<https://doi.org/10.3897/zookeys.368.6658>
- Ranjbar, M., Majdzadeh, S.M., Peris-Felipo, F.J., Askari, M. & Rakhshani, E. (2016) A Contribution to the Fauna of Opiinae (Hym.: Braconidae) of Kerman Province South-Eastern Iran. *Journal of Entomological Research Society*, 18, 19–26.

- Rastegar, J., Sakenin, H., Khodaparast, S., Havaskary, M. (2012) On a collection of Braconidae (Hymenoptera) from East Azarbaijan and vicinity, Iran. *Calodema*, 226, 1-4.
- Schuster, D.J. & Wharton, R.A. (1993) Hymenopterous parasitoids of leafmining *Liriomyza* spp. (Diptera: Agromyzidae) on tomato in Florida. *Environmental Entomology*, 22, 1188-1191.
<https://doi.org/10.1093/ee/22.5.1188>
- Shaw, M.R. & Huddleston, T. (1991) Classification and biology of braconid wasps (Hymenoptera: Braconidae). *Handbook for the Identification of British Insects*, 7, 1-126.
- Tobias, V.I. & Jakimavicius, A. (1986) Alysiinae & Opiinae. In: Medvedev G.S. (Ed.), *Keys to the Insects of the European Part of the USSR*, III. Part V. Nauca Publisher, Leningrad., pp. 7-231.
- Tobias, V.I. (1995) Keys to the fauna of the USSR III, Hymenoptera V, Science Publishers 10 Water St # 310, Lebanon, NH 0376, (USA) (In Russian).
- van Achterberg, C. (1988) Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae). *Zoologische Verhandelingen Leiden*, 249, 1324.
- van Achterberg, C. (1993) Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen Leiden*, 283, 1-189.
- van Achterberg, C. (1997) Revision of the Haliday collection of Braconidae (Hymenoptera). *Zoologische Verhandelingen Leiden*, 314, 1-115.
- Wharton, R.A. (1997) Subfamily Opiinae. In: Wharton, R.A., Marsh, P.M., Sharkey, M.J. (Eds.). *Manual of the New World Genera of the Family Braconidae (Hymenoptera)*. International Society of Hymenopterists Special Publication No. 1., Washington, DC, U.S.A., pp. 378-395.
- Yu, D.S., van Achterberg, C. & Horstmann, K. (2016) Taxapad 2016, Ichneumonoidea 2015. Database on flash-drive. www.taxapad.com, Nepean, Ontario, Canada.

یافته‌های جدید از زیرخانواده Opiinae (Hymenoptera: Braconidae) در شمال ایران

ثنا دولتی^۱، علی اصغر طالبی^{۱*}، سمیرا فراهانی^۲ و محمد خیراندیش^۳

۱ گروه حشره‌شناسی، دانشکده کشاورزی، دانشگاه تربیت مدرس، صندوق پستی ۳۳۶-۱۴۱۱۵، تهران، ایران

۲ موسسه تحقیقات جنگل‌ها و مراتع، مرکز تحقیقات آموزش و ترویج کشاورزی، تهران، ایران

۳ گروه گیاهپزشکی، دانشکده کشاورزی، دانشگاه شهید باهنر کرمان، کرمان، ایران

* پست الکترونیکی نویسنده مسئول مکاتبه: talebiala@modares.ac.ir

تاریخ دریافت: ۰۹ مهر ۱۳۹۷، تاریخ پذیرش: ۱۵ آبان ۱۳۹۷، تاریخ انتشار: ۲۷ آذر ۱۳۹۷

چکیده: فون زنبورهای زیرخانواده Opiinae در نواحی شمالی ایران مورد مطالعه قرار

گرفت. در مجموع، هشت گونه شامل (*Biosteres rusticus* (Haliday, 1837)

Phaerotoma exigua (Wesmael, 1862)، *Phaerotoma depeculator* Foerster, 1862

Phaerotoma variegatus (Fischer, 1958)، *Phaerotoma pulchriventris* (Fischer, 1958)، 1835)

Xynobius caelatus (Szepligeti, 1896)، *Xynobius curtifemur* (Fischer, 1961)

(Haliday, 1837) و *Utetes rotundiventris* (Thomson, 1895) جمع‌آوری و شناسایی

گردید که در این میان، چهار گونه اخیر برای اولین بار از ایران گزارش می‌شوند. کلید

شناسایی گونه‌های جمع‌آوری شده به همراه پراکنش آنها در جهان و ایران ارائه شده است.

واژگان کلیدی: فون، Opiinae، Braconidae، ایران، تله مالیز