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A taxonomic study of Orgilinae and Microtypinae from Iran

(Hymenoptera, Braconidae)

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A survey was conducted to study the species of Orgilinae and Microtypinae (Hymenoptera: Braconidae) in the northern provinces of Iran. The specimens were collected using Malaise traps in different habitats in the northern provinces during 2010–2011. Six species of the genus *Orgilus* Haliday, 1833 and two species of the genus *Microtypus* Ratzeburg, 1848 were collected and identified, among them four species, viz. *Orgilus ischnus* Marshall, 1898, *O. nitidor* Taeger, 1989, *O. punctiventris* Tobias, 1976 and *O. temporalis* Tobias, 1976, were recorded for the first time from Iran. A key is presented for identification of the Iranian species.

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Introduction

The Orgilinae Ashmead, 1900 is a small subfamily with approximately 250 described species worldwide (Yu et al. 2013). This subfamily has been divided into three tribes: Antestrigini van Achterberg, 1987, Mimagathidini Enderlein, 1905 and Orgilini Ashmead, 1900, of which the two last tribes are represented in the Palaearctic region (Yu et al. 2013). The genera *Stantonia* Ashmead, 1904 and *Orgilus* Haliday, 1833 are common in the Palaearctic region. *Orgilus* is a cosmopolitan genus with 238 described species worldwide (Yu et al. 2013). The taxonomy of the genus *Orgilus* has been studied in Japan (Watanabe 1968), China-Taiwan (Chou 1995), Nearctic (Muesebeck 1970), Palaearctic (Taeger 1989), Turkey (Beyarslan

& Çetin Erodoğan 2011), Russian Far East and USSR (Tobias 1986, Belokobylskij & Taeger 1998).

The subfamily Microtypinae Szepliget, 1908 includes three genera, viz. *Microtypus* Ratzeburg, 1848, *Neomicrotypus* van Achterberg, 1992 and *Plesioctypus* van Achterberg, 1992, of which only the first genus is represented in the Palaearctic region. The world species of the Microtypinae were revised and keyed by van Achterberg (1992). Also, Čapek & van Achterberg (1992) revised the genus *Microtypus*. The genus *Similearinus* Glowacki & Karpinski, 1967 has been synonymized with *Microtypus* by Čapek & van Achterberg (1992). The genus *Microtypus* was taxonomically studied in the Holarctic (Čapek & van Achterberg 1992), USSR (Tobias 1986), Russia (Tobias 1986), China (Chen et al. 2002), Hungary (Papp 1999)



Fig. 1. Northern Iran: Alborz, Tehran, Qazvin, Guilan and Mazandaran provinces, where the specimens have been collected.

and Turkey (Beyarslan & Çetin Erdoğan 2011).

The fauna of Iranian Orgilinae and Microtypinae were poorly studied. Up to now, two genera *Orgilus* and *Microtypus* are represented in Iran with 6 and 2 species, respectively (Taeger 1989, Ghahari et al. 2009, Fallahzadeh & Saghaei 2010, Lashkari-Bod et al. 2011, Ghahari & Fischer 2011a,b). The objective of this study as a part of our ongoing research on the braconid fauna of Iran, is to contribute to the knowledge on the subfamilies Orgilinae and Microtypinae in northern Iran. The results may be useful for future biological and ecological studies in this region.

Material and methods

Material for the present study was collected using Malaise traps with alcohol as a killing and preservation agent. Sampling was carried out from March to November during 2010 and 2011 at five locations (Alborz, Tehran, Guilan, Mazandaran and Qazvin provinces) (Fig. 1). The specimens were collected using 32 Malaise traps. The specimens were extracted from Malaise traps and sorted weekly in 2010 and at biweekly intervals in 2011. They were then preserved in 70 % ethanol, pinned or card-mounted and labelled. Images for this study were taken with an Olympus TM AX70 microscope and an Olympus TM SZX9 stereomicroscope equipped with a Sony CCD digital camera. The collected specimens were identified using keys provided by Tobias (1986), Taeger (1989) and Capek & van Achterberg (1992). All specimens are deposited in the insect collection of the Department of Entomology, Tarbait Modares University, Tehran, Iran.

The abbreviations used in the identification key and diagnostic characters of species are as follows: OOL = distance between posterior ocellus and eye margin, OD = diameter of posterior ocelli, POL = distance between posterior ocelli.

Results

Six species of the genus *Orgilus* and two species of the genus *Microtypus* were identified, of which four species are new records for the Iranian insect fauna, marked by an asterisk in the text.

Subfamily Orgilinae Ashmead, 1900

**Orgilus ischnus* Marshall, 1898

Fig. 2A

Material examined. Alborz province: Arangeh (35°55' 07.20"N, 51°05'09.24"E, 1891 m a.s.l.), 21.vi.2010, 1♂; 28.vi.2010, 1♂; 13.vii.2010, 4♂; 19.vii.2010, 1♀, 11♂; 27.vii.2010, 1♀, 2♂; 02.viii.2010, 1♀, 4♂; 09.viii.2010, 1♀, 8♂; 15.viii.2010, 4♀, 2♂; 23.viii.2010, 5♀, 6♂; 30.viii.2010, 3♀, 1♂; 06.ix.2010, 1♀; 18.x.2010, 1♂; Karadj (35°46'20.16"N, 50°56'44.94"E, 1278 m a.s.l.), 03.v.2010, 1♂; 07.vi.2010, 1♂; 14.vi.2010, 1♂; 28.vi.2010, 1♂; Shahrestanak (35°58' 16.26"N, 51°21'25.80"E, 2225 m a.s.l.), 27.vii.2010, 1♀, 4♂; 02.viii.2010, 1♂; 23.viii.2010, 1♀; Sarziarat (35°55' 10.38"N, 51°06'51.24"E, 1980 m a.s.l.), 28.vi.2010, 1♂; 13.vii.2010, 2♂; Tehran province: Peykanshahr, National Botanical Garden (35°44'19.91"N, 51°10'52.49"E, 1265 m a.s.l.), 17.v.2010, 1♂; leg. A. Nadimi.

Distribution. Palaearctic and Oriental (Yu et al. 2013). New record for the fauna of Iran.

Host. *Orgilus ischnus* is a parasitoid on the larvae of *Coleophora frischella*, *C. paripennella*, *C. peisoniella* (Lep.: Coleophoridae) and *Spilonota ocellana* (Lep.: Tortricidae) (Yu et al. 2013).

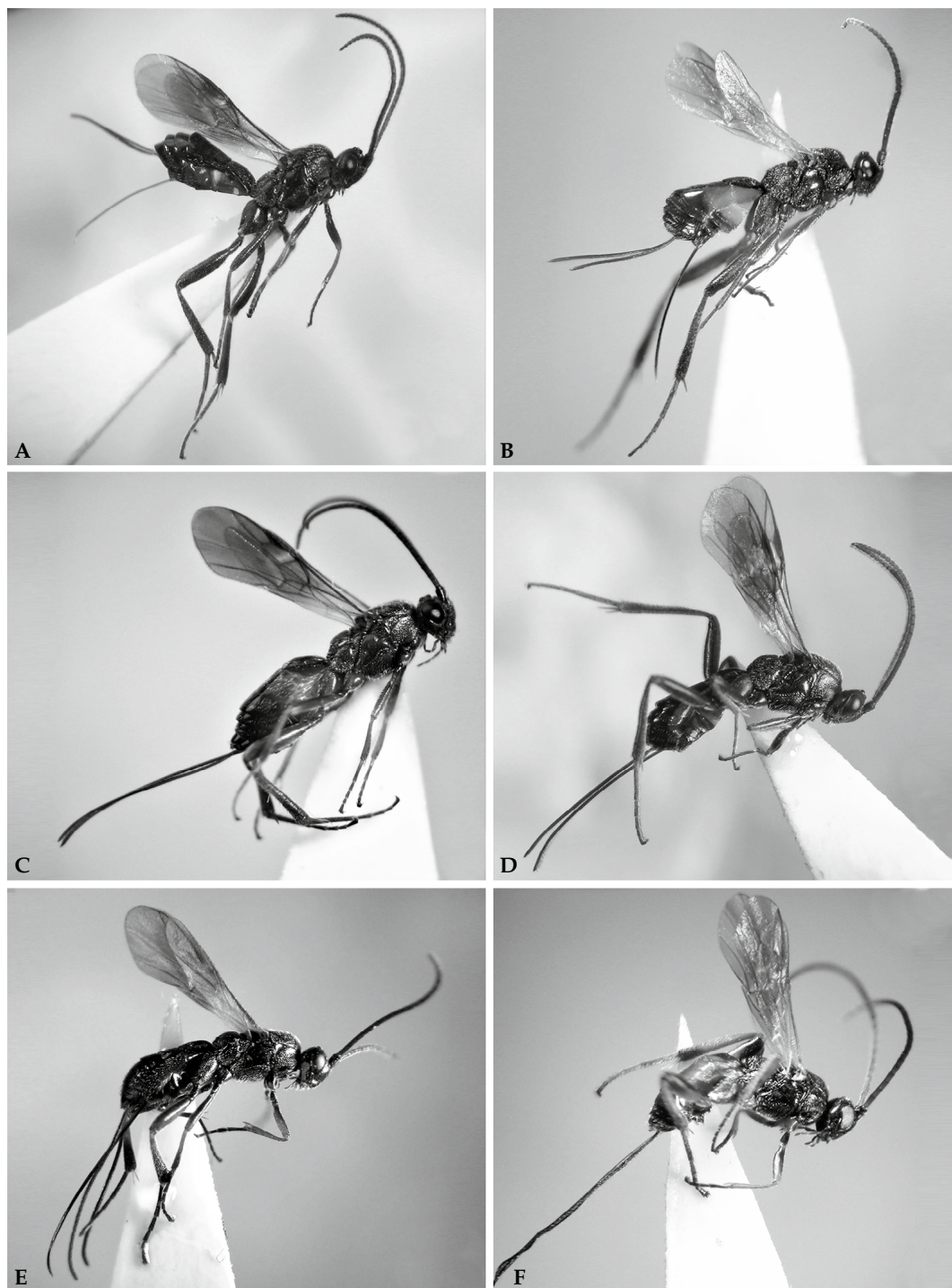


Fig. 2. Lateral habitus of female in *Orgilus* species. **A.** *O. ischnus*; **B.** *O. meyeri*; **C.** *O. nitidor*; **D.** *O. pimpinellae*; **E.** *O. punctiventris*; **F.** *O. temporalis*.

***Orgilus meyeri* Telenga, 1933**
Fig. 2B

Material examined. Alborz province: Arangeh (35°55' 07.20"N, 51°05'09.24"E, 1891 m a.s.l.), 13.vii.2010, 1♀; Guilan province: Roodsar, Orkom (36°45'44.34"N, 50°18' 11.88"E, 1201 m a.s.l.), 17.x.2010, 1♀; Astaneh Ashrafiyeh, Eshman kamachal (37°21'10.50"N, 49°57'56.16"E, 2 m a.s.l.), 31.v.2010, 1♀; 22.vi.2010, 1♀; 01.viii.2010, 1♀; 08.viii.2010, 1♀; 15.viii.2010, 2♀; 28.viii.2010, 1♀; 27.ix.2010, 1♀; 03.x.2010, 2♀; 10.x.2010, 10♀; 17.x.2010, 8♀; 24.x.2010, 2♀; 14.xi.2010, 1♀; 20.xi.2010, 1♀; Ziaz (36°52'27.18"N, 50°13'24.78"E, 490 m a.s.l.), 24.vii.2010, 1♀; Mazandaran province: Noor, Tangehvaz (36°21' 55.02"N, 52°06'10.74"E, 692 m a.s.l.), 27.vi.2011, 1♀; 12.vii.2011, 2♀; 25.vii.2011, 4♀; 15.viii.2011, 35♀; 04. ix. 2011, 2♀; 25.ix.2011, 3♀; Joorbard (36°26'15.54"N, 52°07'13.50"E, 275 m a.s.l.), 13.vii.2011, 1♀; 25.vii.2011, 1♀; 25.ix.2011, 2♀; 14.xi.2011, 1♀; leg. A. Mohammadi.

Distribution. Palaearctic (Yu et al. 2013), Iran (Teager 1989).

Host. Unknown.

****Orgilus nitidor* Taeger, 1989**
Fig. 2C

Material examined. Alborz province: Karadj (35°46' 20.16"N, 50°56'44.94"E, 1278 m a.s.l.), 05.vii.2010, 1♀; 09.viii.2010, 1♀; Guilan province: Roodsar, Orkom (36° 45'44.34"N, 50°18'11.88"E, 1201 m a.s.l.), 12.ix.2010, 1♀; Qazvin province, Zereskh Road (36°25'23.88"N, 50°06' 37.68"E, 1926 m a.s.l.), 27.vi.2011, 1♀; Tehran province: Shahriar (35°40'08.10"N, 50°56'56.64"E, 1168 m a.s.l.), 07.vi.2010, 1♀; 14.vi.2010, 1♀; 13.vii.2010, 2♀; 23.viii. 2010, 1♀; 30.viii.2010, 1♂; 06.ix.2010, 1♀; 13.ix.2010, 2♀, 1♂; 20.ix.2010, 1♀; 27.ix.2010, 1♀; 04.x.2010, 3♂; 12.x.2010, 1♂; 18.x.2010, 1♂; leg. M. Khayrandish.

Distribution. Palaearctic (Yu et al. 2013). New record from Iran.

Host. Unknown.

***Orgilus pimpinellae* Niezabitowski, 1910**
Fig. 2D

Material examined. Qazvin province: Zereskh Road (36°25'39.36"N, 50°06'36.90"E, 1997 m a.s.l.), 24.v. 2011, 1♀; 22.vi.2011, 1♀; 25.vii.2011, 1♂; Zereskh Road (36°25'23.88"N, 50°06'37.68"E, 1926 m a.s.l.), 24.v. 2011, 3♀; 08.vi.2011, 1♀; 05.vii.2011, 2♂; 26.vii.2011, 1♀; 26.ix.2011, 1♂; Zereskh Road (36°21'39.72"N, 50°03' 55.56"E, 1541 m a.s.l.), 08.vi.2011, 1♀; 22.vi.2011, 2♀, 1♂; Guilan province: Roodsar, Rahim abad, Orkom (36°45'44.34"N, 50°18'11.88"E, 1201 m a.s.l.), 09.v.2010, 1♂; 06.vi.2010, 1♂; 22.vi.2010, 1♀; 05.vii.2010, 2♀, 2♂; 18.vii.2010, 1♂; 24.vii.2010, 3♀; 08.viii.2010, 1♀;

15.viii.2010, 3♀; 22.viii.2010, 1♀, 1♂; 04.ix.2010, 1♂; 19.ix.2010, 1♂; 25.ix.2010, 1♀; 24.x.2010, 1♀; Qazichak (36°45'52.62"N, 50°20'01.08"E, 1787 m a.s.l.), 27.vi.2010, 1♀, 2♂; 04.vii.2010, 3♀, 2♂; 10.vii.2010, 6♀; 18.vii.2010, 1♀; 24.vii.2010, 1♂; 08.viii.2010, 1♂; 15.viii.2010, 1♀; 04.ix.2010, 1♂; 19.ix.2010, 3♂; 25.ix.2010, 24♂; 03.x. 2010, 2♀, 28♂; 10.x.2010, 2♀, 3♂; 17.x.2010, 1♀; Ziaz (36°52'27.18"N, 50°13'24.78"E, 490 m a.s.l.), 28.viii.2010, 1♀; 12.ix.2010, 1♀; leg. M. Khayrandish.

Distribution. Palaearctic (Yu et al. 2013), Iran (Ghahari et al. 2010).

Host. Most species host records involve species of Gelechiidae (Yu et al. 2013).

****Orgilus punctiventris* Tobias, 1976**
Fig. 2E

Material examined. Guilan province: Roodsar, Qazichak (36°45'52.62"N, 50°20'01.08"E, 1787 m a.s.l.), 06. vi.2010, 1♀; leg. A. Nadimi.

Distribution. Palaearctic (Yu et al. 2013). New record for the fauna of Iran.

Host. Unknown.

****Orgilus temporalis* Tobias, 1976**
Fig. 2F

Material examined. Mazandaran province: Noor, Tangehvaz (36°21'55.02"N, 52°06'10.74"E, 692 m a.s.l.), 15.viii.2011, 1♀; leg. A. Mohammadi.

Distribution. Palaearctic (Yu et al. 2013). New record for the fauna of Iran.

Host. Unknown.

Key to Iranian species of *Orgilus* Haliday, 1833

1. Fourth-sixth metasomal tergites completely sculptured (Fig. 4E). 2
- Fourth-sixth metasomal tergites smooth (Figs 4A–D,F). 3
2. Length of ovipositor sheath 3.2 times hind femur, 0.9 times forewing; OD 1.7 times as long as OOL; head 1.6 times as wide as height; antennae 28-segmented in female; inner spur of hind tibia 0.5 times basitarsus. *O. punctiventris* Tobias
- Length of ovipositor sheath 1.6–2.0 times hind femur, 0.5–0.6 times forewing; OD 1.7–2.0 times as long as OOL; head 1.7–1.8 times as wide as height; antennae 31–32-segmented in female;

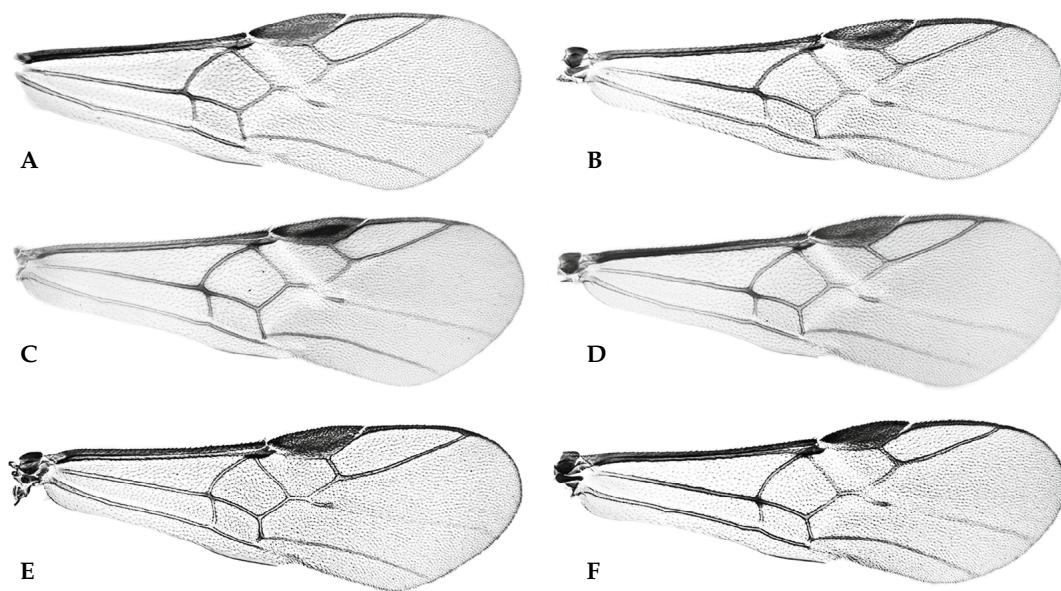


Fig. 3. Forewing of female in *Orgilus* species. **A.** *O. ischnus*; **B.** *O. meyeri*; **C.** *O. nitidor*; **D.** *O. pimpinellae*; **E.** *O. punctiventris*; **F.** *O. temporalis*.

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| <p>inner spur of hind tibia 0.6 times basitarsus.
..... <i>O. puncticus</i> Tobias</p> <p>3. Antennae 54–59-segmented in female; vein 2+3–M of forewing 0.3–0.5 times as long as vein 2–SR+M; head and thorax always with brownish yellow pattern; length of body 6.0–7.5 mm.
..... <i>O. hungaricus</i> Szépligeti</p> <p>– Antennae less than 40-segmented in female; vein 2+3–M of forewing at least as long as vein 2–SR+M (Figs 3A–3F); head and thorax without brownish yellow pattern and usually uniformly black or dark brown; length of body less than 5.0 mm. 4</p> <p>4. Temple straight, widened behind compound eye in dorsal view (Fig. 5A). 5</p> <p>– Temple rounded, narrowed behind compound eye in dorsal view (Fig. 5B). 6</p> <p>5. Antennae 23-segmented in female; ovipositor sheath 2.7 times as long as hind femur; 0.8 times as long as forewing second metasomal tergite 0.7 times as long as its basal width; OD 1.6 times as long as OOL. <i>O. obscurator</i> (Nees)</p> <p>– Antennae 32-segmented in female; ovipositor sheath 3.7 times as long as hind femur, 1.4 times as long as forewing; second metasomal tergite 0.9 times as long as its basal width (Fig. 4F); OD 2.2 times as long as OOL.
..... <i>O. temporalis</i> Tobias</p> | <p>6. Length of ovipositor sheath less than 0.7 times forewing; second metasomal tergite completely sculptured (Fig. 4A). 7</p> <p>– Length of ovipositor sheath more than 0.8 times forewing; second metasomal tergite only basally sculptured (Figs 4B–D) or smooth. 8</p> <p>7. Temple twice as long as eye in dorsal view; hind wing at least 4.8–5.5 times as long as its width; second metasomal tergite as long as basal width; antennae of female 32-segmented; hind femur 3.6 times as long as its width.
..... <i>O. ischnus</i> Marshall</p> <p>– Temple 1.6 times length of eye in dorsal view; hind wing at most 4.5 times as long as its width; second metasomal tergite 0.8 times as long as basal width; antennae of female 28–30-segmented; hind femur 3.8–4.0 times as long as its width. <i>O. abbreviator</i> (Ratzeburg)</p> <p>8. Coxae completely black; third metasomal tergite usually smooth or slightly sculptured in base. 9</p> <p>– Coxae brownish red, sometimes black basally (rarely black in some specimens of <i>O. priesteri</i>); third metasomal tergite always smooth. 10</p> <p>9. Ovipositor sheath 1.5–2.4 times as long as hind femur; head 1.4–1.5 as wide as high.
..... <i>O. pimpinellae</i> Niezabitowski</p> |
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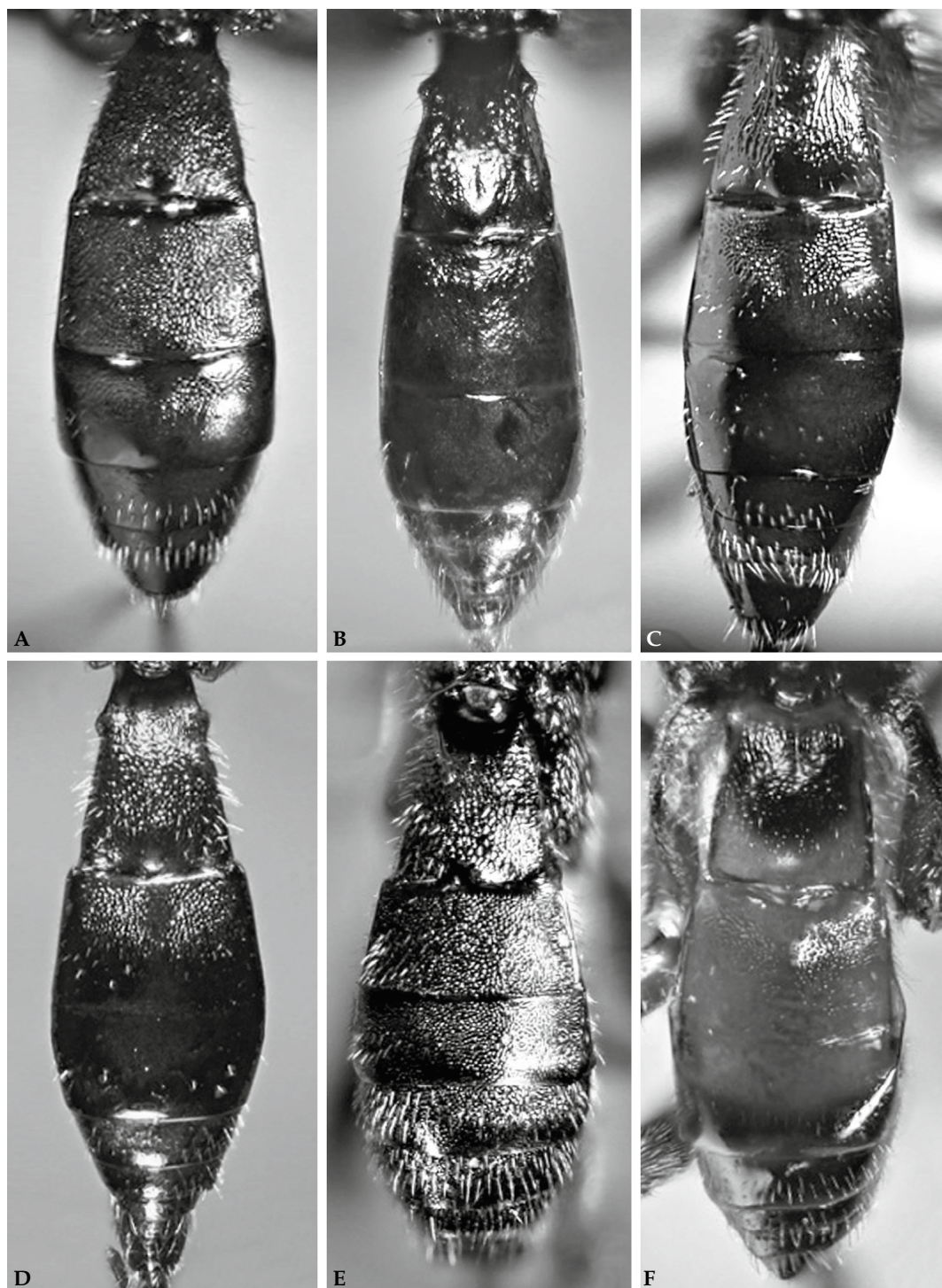


Fig. 4. Metasomal tergites of female in *Orgilus* species. **A.** *O. ischnus*; **B.** *O. meyeri*; **C.** *O. nitidor*; **D.** *O. pimpinellae*; **E.** *O. punctiventris*; **F.** *O. temporalis*.

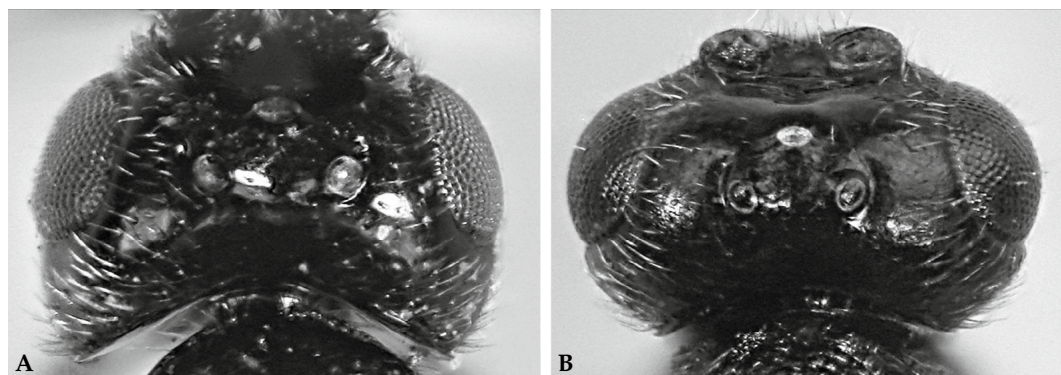


Fig. 5. Head in dorsal view. A. *Orgilus temporalis*; B. *Orgilus meyeri*.

- Ovipositor sheath 2.4–3.0 times as long as hind femur; head 1.7–1.8 as wide as high.
..... *O. tobiasi* Teager
- 10. Antennae of female 25–26-segmented; face yellowish brown; mesosoma brownish red.
..... *O. priesneri* Fischer
- Antenna of female with 29–32 segments; face and mesosoma black (Figs 2B,C). 11
- 11. Distance between apex of marginal cell and tip of forewing 0.7–0.8 times as long as vein 1–R1 (Fig. 3B); fore and middle femur completely brownish red; antenna of female with 30–32 segments. *O. meyeri* Telenga
- Distance between apex of marginal cell and tip of forewing 0.9–1.0 times as long as vein 1–R1 (Fig. 3C); fore and middle femur with strip black in dorsal view; antenna of female with 29–30 segments. *O. nitidor* Taeger

Subfamily Microtypinae Szépligeti, 1908

Microtypus desertorum Shestakov, 1932

Fig. 6A

Material examined. Alborz province: Shahrestanak (35°58'16.26"N, 51°21'25.80"E, 2225 m a.s.l.), 13.vii.2010, 1♀; leg. A. Nadimi.

Distribution. Palaearctic (Yu et al. 2013), Iran (Hedwig 1957).

Host. Unknown.

**Microtypus wesmaelii* Ratzeburg, 1848

Fig. 6B

Material examined. Guilan province: Roodsar, Qazachak (36°45'52.62"N, 50°20'01.08"E, 1787 m a.s.l.), 17.x.2010, 1♀; leg. M. Khayrandish.

Distribution. Palaearctic and Nearctic (Yu et al. 2013), Iran (Ghahari & Fischer 2011b).

Host. It is a solitary endoparasitoid on larvae of *Acrobasis betulella* Hulst, *A. comptoniella* Hulst, *A. sylviella* Ely, *Conobathra tumidana* (Denis & Schiffermüller), *Pococera asperatella* Clemens, *Dioryctria auranticella* Grote (Lep.: Pyralidae), *Loxostege sticticalis* L. (Lep.: Crambidae), *Coleotechnites atrupictella* Dietz (Lep.: Gelechiidae), *Grapholita molesta* Busck (Lep.: Tortricidae), *Zelleria haimbachii* Busck (Lep.: Yponomeutidae) and *Biorhiza pallida* (Olivier) (Hym.: Cynipidae) (Yu et al. 2013).

Key to Iranian species of *Microtypus* Ratzeburg, 1848

1. Pterostigma and frons yellowish (Figs 7A,B); ovipositor sheath 0.5 times as long as fore wing; POL longer than OOL (Fig. 7A); length of malar space 0.3 times basal width of mandible; first metasomal tergite hardly constricted behind spiracles (Fig. 7C).
..... *M. desertorum* Shestakov
- Pterostigma dark brown (Fig. 7E); middle part of frons black (Fig. 7D); ovipositor sheath 0.7–0.8 times as long as fore wing; POL shorter than OOL (Fig. 7D); length of malar space 0.5 times basal width of mandible; first metasomal tergite distinctly constricted behind spiracles (Fig. 7F). *M. wesmaelii* Ratzeburg



Fig. 6. Lateral habitus of female in *Microtypus* species. **A.** *M. desertorum*; **B.** *M. wesmaelii*.

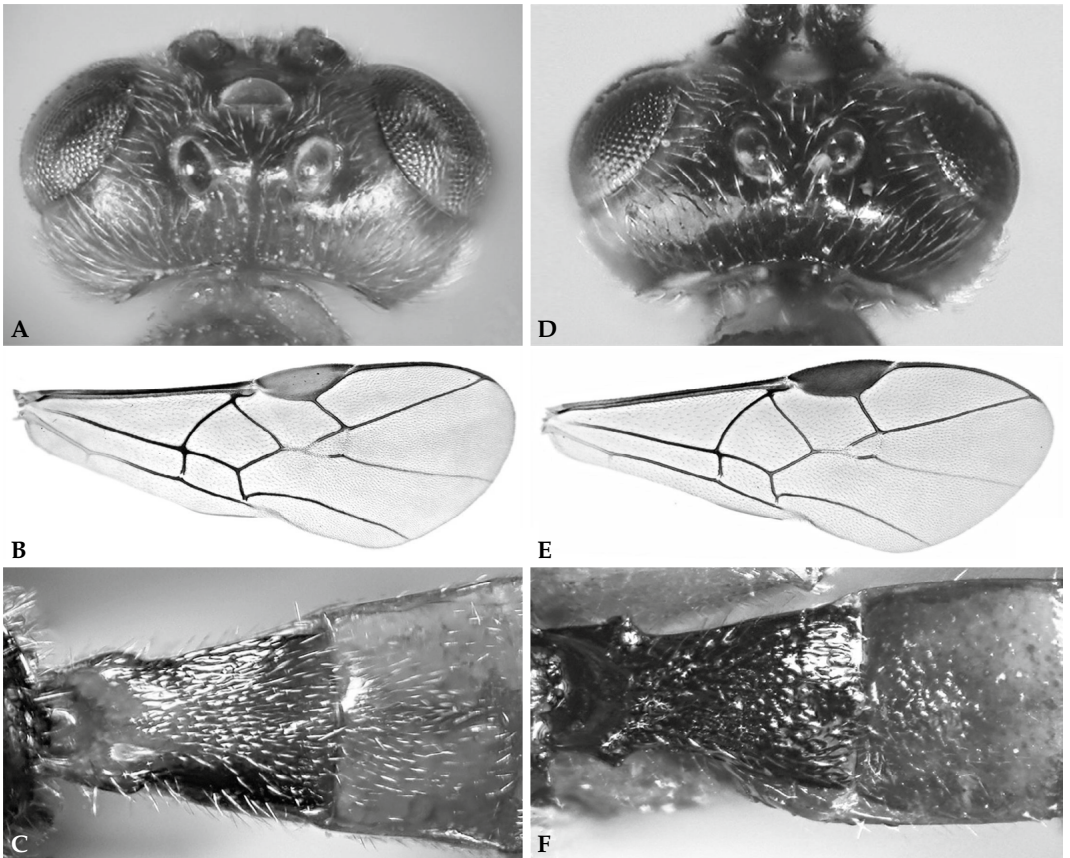


Fig. 7. **A-C.** *Microtypus desertorum*. **A.** dorsal view of head; **B.** forewing; **C.** first metasomal tergite. **D-F.** *Microtypus wesmaelii*. **D.** dorsal view of head; **E.** forewing; **F.** first metasomal tergite.

Discussion

Eight species of *Orgilus* have previously been reported from Iran (Taeger 1989, Ghahari et al. 2009, 2010, Lashkari-Bod et al. 2011, Ghahari & Fischer 2011a). Fallahzadeh & Saghaei (2010) had erroneously recorded *Orgilus jenniae* Marsh, 1979. However, this species has been reported from Costa Rica and introduced into India and California (Yu et al. 2013). *Orgilus priesneri* has already been recorded by Lashkari-Bod et al. (2011) from Fars province, but as *O. kasakhstanicus* Tobias, 1986, which was considered as junior synonym. Six species of Orgilinae found in this study are from the northern provinces of Iran, of these, four species are newly recorded and increase the number of known Orgilinae in Iran from 8 to 12.

Only two species of the genus *Microtypus*, *M. desertorum* and *M. wesmaelii*, had already been recorded from Iran (Hedwig 1957, Ghahari & Fischer 2011b) and we found both species during this study.

Among the neighbouring countries, Beyarslan & Çetin Erdoğan (2011) listed 19 species of the Microtypinae and Orgilinae (2 *Microtypus*, 16 *Orgilus* and 1 *Kerorgilus*) from Turkey. From the eastern and southern neighbouring countries, *Orgilus pimpinellae* and *O. turkmenus* Telenga, 1933 were reported from Afghanistan (Tobias et al. 1998) and *O. priesneri* was reported from Saudi Arabia (Taeger 1989). Tobias (1986) reported 26 and 7 species of both subgenera *Orgilus* and *Ischiolus* from USSR, respectively. Twenty-seven species of *Orgilus* have been reported from Russia (Tobias 1986, Belokobylskij & Taeger 1998).

Members of the genus *Orgilus* are considered as important biological control agents. For example, in Chile a large augmentative project has been implemented for the control of pine shoot moth, *Rhyacionia buoliana* Schiffermüller, 1775 (Lepidoptera: Tortricidae), using *O. obscurator* (Bueno et al. 2002). *Orgilus lepidus* Muesebeck has been successfully used for biological control of *Phthorimaea operculella* Zeller (Lepidoptera: Gelechiidae) (Izhevskiy 1985). This species is distributed in the Australasian and Nearctic region and was introduced to Cyprus, India, New Zealand, California and Zambia (Yu et al. 2013).

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