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Research article

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Taxonomic study of the genus *Microplitis* Förster, 1862 (Hymenoptera, Braconidae, Microgastrinae) from Iran

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Abstract. The genus *Microplitis* Förster, 1862 (Hymenoptera, Braconidae, Microgastrinae) was studied from northern Iran. Specimens were collected using Malaise traps during 2010–2011. A total of 13 species were collected and identified, of which six species are recorded for the first time from Iran: *M. cebes* Nixon, 1970, *M. docilis* Nixon, 1970, *M. eremitus* Reinhard, 1880, *M. kaszabi* Papp, 1980, *M. pallidipennis* Tobias, 1964 and *M. varipes* (Ruthe, 1860). Two species *M. kaszabi* and *M. pallidipennis* are new records for the west Palaearctic region. A new species, *Microplitis alborziensis* Abdoli & Talebi sp. nov., is described and illustrated. The number of species of *Microplitis* in Iran is now raised from 17 to 24. A faunistic list, an identification key to all known Iranian species and brief diagnoses and illustrations for all species that have been collected in this study are provided. The validity of the new species is supported by DNA barcoding.

Keywords. Taxonomy, new records, new taxa, identification key, Microgastrinae, Palaearctic.

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Introduction

Microgastrinae Förster, 1862 is a large and diverse subfamily in the Braconidae with about 3000 described species worldwide (Fernandez-Triana *et al.* 2020). This subfamily is one of the most important groups of parasitoids in terms of both species richness and economic importance (Rodriguez *et al.* 2013). Until 1862, all described species in Microgastrinae were assigned to the genus *Microgaster* Latreille, 1804. Förster (1862) erected two additional genera for Microgastrinae: *Microplitis* and *Apanteles* (Whitfield *et al.* 2002).

The genus *Microplitis* Förster, 1862 comprises 192 described species worldwide including 108 species in the Palaearctic region (Fernandez-Triana *et al.* 2020). Species of *Microplitis* are beneficial parasitoid wasps, predominantly attacking exposed Macrolepidoptera and many of their hosts live fully exposed on vegetation throughout their larval stages. Larvae of species of *Microplitis* are essentially hemolymph and fat-body feeders, and in many cases their hosts remain alive for several days after the parasitoid larvae exit the host body, which usually takes place from the central or posterior abdominal segments of the caterpillar (Shaw & Huddleston 1991).

The genus *Microplitis* has been revised and keyed in the Palaearctic by several authors (Fahringer 1937; Nixon 1968, 1970; Papp 1986, 1987, 1990; Tobias 1986; Xu & He 2003; Chen & Song 2004; Kotenko 2007; Zhang *et al.* 2019), and also in other regions of the world such as the Australian (Austin & Dangerfield 1993), Afrotropical (De Saeger 1944), Oriental (Ranjith *et al.* 2015) and Costa Rican (Fernandez-Triana *et al.* 2015).

The fauna of some subfamilies of Iranian Braconidae was already catalogued (Rakhshani *et al.* 2007; Farahani *et al.* 2012, 2014a, 2014b, 2014d, 2015, 2016; Ameri *et al.* 2014, 2015; Ghahari & Beyarslan 2017) but Microgastrinae has been poorly studied (Farahani *et al.* 2014c; Karimi-Malati *et al.* 2014; Gadallah *et al.* 2015; Ghafouri Moghaddam *et al.* 2018; Samin *et al.* 2018; Abdoli *et al.* 2019a, 2019b; Zargar *et al.* 2019a, 2019b, 2019c). Prior to this study, only 17 species of *Microplitis* had been recorded from Iran (Farahani *et al.* 2014c; Karimi-Malati *et al.* 2014; Gadallah *et al.* 2015; Samin *et al.* 2018, 2019; Belokobylskij *et al.* 2019; Fernandez-Triana *et al.* 2020). The objective of this study is to improve our knowledge about the genus *Microplitis* from Iran.

Material and methods

Specimens for the present study were collected using Malaise traps from March to November of 2010 and 2011 in northern Iran (i.e., Alborz, Guilan, Mazandaran, Qazvin and Tehran Provinces) (Fig. 1). Malaise traps were placed in a range of different habitats such as forests, rangelands and orchards. The specimens were identified using the keys of Telenga (1955), Papp (1984), Tobias (1986) and Kotenko (2007). Morphological terminology follows Karlsson & Ronquist (2012) for various body parts and Wharton *et al.* (1997) for wing venation. The specimens were photographed with a Keyence VHX-1000 Digital microscope, using a lens with a range of 13–130×. Multiple images through the focal plane were taken of a structure, and latter, these were combined to produce a single in-focus image. The software associated with the Keyence system produced the focused images taken with that camera. The measurements were done using an Olympus™ SZX9 stereo microscope equipped with a graticule. The specimens are deposited at the TMUC.

DNA barcoding of new species focused on the sequencing of a short, standardized portion of the mitochondrial cytochrome c oxidase I gene (COI). The sample in this study (a paratype) had some legs removed for DNA. DNA extraction method follows Brewster & Paoli (2013). The COI gene was amplified using primers (LCO1490–HC02198) following standard protocols (Folmer *et al.* 1994). The barcode data is stored in the National Center for Biotechnology Information. A map with the Iranian

provinces where the species of *Microplitis* were collected in this study was generated using Simple Mapper (Shorthouse 2010).

Abbreviations

- F2, F8, F15 = flagellomeres 2, 8 and 15
OD = ocellus diameter (maximum diameter of anterior ocellus)
OOL = ocello-ocular line (minimum distance between posterior ocelli and eyes)
POL = posterior ocellar line (minimum distance between posterior ocelli)
T1, T2, T3 = tergites 1, 2 and 3
T2+ = T2 to end of terga

Repositories

- CNC = Canadian National Collection of Insects, Agriculture and Agri-food Canada
TMUC = Insect Collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran

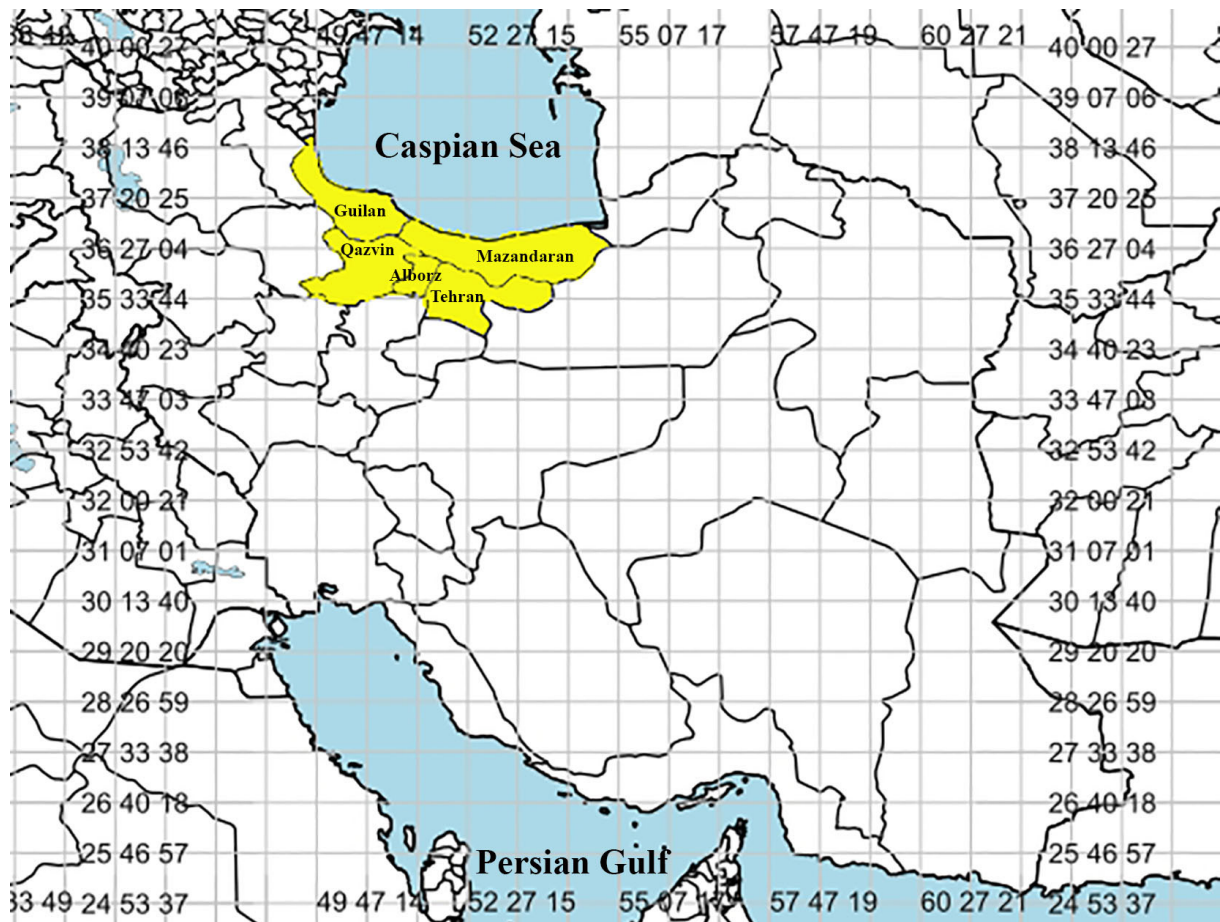


Fig. 1. Map of Iran: Alborz, Qazvin, Tehran, Guilan and Mazandaran Provinces, where specimens have been collected in this study.

Results

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Ichneumonoidea Latreille, 1802
Family Braconidae Nees, 1811
Subfamily Microgastrinae Förster, 1862
Tribe Microplitini Mason, 1981

Genus *Microplitis* Förster, 1862

Microplitis Förster, 1862: 245 (type species: *Microgaster sordipes* Nees, 1834: 167 (by original designation, holotype ♀, Klugiano Museum)).

Diagnosis

Members of this genus are distinguished by having anteromesoscutum densely sculptured, seldom shining, often with notauli which sometimes are strongly defined; propodeum evenly curved in profile, completely rugose and often with a median longitudinal carina but never with any indication of areola; fore wing always with a closed areolet; vannal lobe of the hind wing convex and setose; metacoxa small, not reaching past the posterior margin of T1; metatibial spurs shorter than one-half of metabasitarsus; mesotibial spurs shorter than mesobasitarsus; T1 of variable shape, from widening to narrowing posteriorly and usually sculptured; T2+ smooth, rarely weakly sculptured and often with a weakly delimited trapezoidal median area; T3 always longer than T2, the transverse groove separating them frequently not, or only poorly, defined; hypopygium usually rather small but sometimes elongated medially, rarely conspicuously so, occasionally truncate or medially emarginated; ovipositor and its sheath usually short (Mason 1981).

Identification key to the Iranian species of *Microplitis* Förster, 1862

The following identification key is mostly based on Papp (1984), Tobias (1986) and Kotenko (2007) but modified for Iranian species and including one species newly described in this paper.

1. T1 distinctly broadening posteriorly, T1 length almost equal to its posterior width (Figs 8F, 9F); T2 distinctly rugoluse 2
– T1 parallel- to sub-parallel-sided or weakly broadening posteriorly (Figs 2F, 3F, 4F, 5F, 6F, 7F, 10F, 11F, 12F, 13F, 14F), T1 much longer than posterior width; T2 with variable sculptures 4
2. Body mostly reddish yellow, except for black head (Fig. 8A–F); vein R1 more than $0.5 \times$ pterostigma length; pterostigma length $2.00 \times$ its width (Fig. 8D) *M. ochraceus* Szepligeti, 1896
– Body black; other characters variable 3
3. Antenna shorter than body; F15 length $1.50 \times$ its width; hypopygium in lateral view strongly developed, with characteristically pointed apex; tegula black *M. xanthopus* Ruthe, 1860
– Antenna as long as body; F15 length $2.00 \times$ its width; hypopygium normal; tegula yellow or reddish yellow *M. pallidipennis* Tobias, 1964
4. T1 length more than $1.70 \times$ (1.70–3.00) its maximum width, T1 usually parallel-sided or narrowing posteriorly (Figs 2F, 3F, 7F, 10F, 13F) 5
– T1 length $1.60 \times$ or less (1.40–1.60) its maximum width, T1 more or less broadening posteriorly (Figs 4F, 5F, 6F, 11F, 12F, 14F) 14

5. Antenna clearly shorter than body 6
 – Antenna as long as or longer than body 7
6. In dorsal view, head width (between temples) slightly broader than head width (between eyes); tegula yellow to brown; vein R1 $0.5 \times$ pterostigma length; vein 1CUb $2.50 \times$ as long as vein 1CUa; vein 1CUb and vein r–m slightly curved; vein r shorter than vein 2RS; T1 weakly broadening posteriorly *M. aduncus* (Ruthe, 1860)
 – In dorsal view, head width (between temples) similar to head width (between eyes) (Fig. 2B); tegula black; vein R1 more than $0.5 \times$ pterostigma length; vein 1CUb $2.00 \times$ as long as vein 1CUa; vein 1CUb and vein r–m straight; vein r slightly longer than vein 2RS (Fig. 2D); T1 parallel-sided or weakly barrel-shaped (Fig. 2F) *M. alborziensis* Abdoli & Talebi sp. nov.
7. Tegula and metafemur dark brown to black 8
 – Tegula and metafemur yellow to reddish yellow 9
8. Pterostigma with large anterior pale spot; T1 medially smooth to uneven, shiny, laterally rugose *M. sofron* Nixon, 1970
 – Pterostigma without or with a small anterior yellow spot; T1 rugose to coriaceous, matte
 *M. cebes* Nixon, 1970
9. Metasoma yellow or reddish yellow, at least last 2–3 segments more or less darkening
 *M. rufiventris* Kokujev, 1914
 – Metasoma black or dark brown, at least first 2–3 segments lightening 10
10. T1 length more than $2.20 \times (2.50–3.50)$ its maximum width; antenna dark, brown to black; tergites black, sometimes T2 and T3 yellow to brown; metacoxa yellow to reddish yellow; in fore wing, vein 1CUb $2.00 \times$ as long as vein 1CUa (Fig. 13D); in hind wing, vein 2r–m about $1.75–1.90 \times$ as long as vein 1r–m (Fig. 13E) *M. tuberculifer* (Wesmael, 1837)
 – T1 length $2.00 \times$ (or less) its maximum width, other characters variable 11
11. 6th sternite distinctly developed, produced beyond apex of metasoma; T1 reddish yellow (sometimes with blackish suffusion) and narrowed toward apex and base *M. fulvicornis* (Wesmael, 1837)
 – 6th sternite not produced beyond apex of metasoma; T1 black or dark brown and narrowed toward apex or base 12
12. Antenna usually light coloured (yellow to brownish yellow), distally darkening; tergites and metacoxa black; in fore wing, vein 1CUb $3.00 \times$ as long as vein 1CUa (Fig. 7D); in hind wing, vein 2r–m about $1.40–1.60 \times$ as long as vein 1r–m (Fig. 7D) *M. mandibularis* Thomson, 1895
 – Antenna always dark brown or black (scape reddish yellow or black); other characters variable
 13
13. T1 in posterior third sculptured, matte, in basal half smooth; pterostigma entirely dark brown, without anterior pale spot; basal one third of wing with light-coloured veins, the rest with darkened veins; scape reddish yellow, in contrasts with a dark-coloured flagellum; T2 and T3 black
 *M. marshallii* Kokujev, 1898
 – T1 almost entirely sculptured; pterostigma with anterior pale spot; wing all smoky, with darkened veins; scape dark-coloured, does not contrast in colour with the flagellum; T2 and T3 often light coloured *M. mediator* Haliday, 1834

14. Antenna shorter than body; F15 $1.40\text{--}1.50 \times$ as long as wide (Fig. 11A); pterostigma length $2.30\text{--}2.40 \times$ its width, with light yellow spot anteriorly (Fig. 11D); all coxae black to infusate; metafemur reddish brown, brown to black; tegula dark brown to black *M. spectabilis* (Haliday, 1834)
– Antenna longer than body; other characters variable 15
15. T2 rugulose or sub-rugulose (Fig. 12E); frons polished (Fig. 12D) *M. spinolae* (Nees, 1834)
– T2 smooth, frons not polished (if T2 uneven to shrivelled then frons sculptured) 16
16. Tegula and metafemur yellow or reddish yellow 17
– Tegula black and metafemur variable coloured 19
17. Mesoscutellar disc weakly and dispersedly punctate to smooth, with medio-longitudinal keel anteriorly which is rather short and low; pterostigma without anterior pale spot; T2 rather smooth to polished, though frequently uneven to shrivelled, less frequently rugulose
..... *M. deprimator* (Fabricius, 1798)
– Mesoscutellar disc coriaceous to rugulose, without keel anteriorly, pterostigma with or without anterior yellow spot 18
18. T2 and T3 yellow or reddish yellow (Fig. 6F); pterostigma with anterior yellow spot (Fig. 6D)
..... *M. kaszabi* Papp, 1980
– T2 and T3 black or brown, sometimes with small yellow areas; pterostigma without anterior pale spot (Fig. 5D) *M. eremitus* Reinhard, 1880
19. Metafemur yellow; tergites black, sometimes T2 and T3 ferruginous to red
..... *M. scrophulariae* Szépligeti, 1898
– Metafemur black or dark brown (sometimes with yellowish patterns); tergites black 20
20. Mesoscutellar disc strongly rugose (Fig. 4C); scape yellow to reddish yellow, contrasting with dark brown flagellum; pterostigma without anterior pale spot (Fig. 4D) *M. docilis* Nixon, 1970
– Mesoscutellar disc with usual sculpture, finely to densely punctate, matte or shiny; scape black or brown, similar colour to flagellum; pterostigma with or without anterior pale spot 21
21. Fore wing areolet relatively very large and almost pentagonal; lateral and median lobes of anteromesonotum densely shagreened, dull; pterostigma black, with a small pale spot anteriorly ...
..... *M. decipiens* Prell, 1925
– Fore wing areolet relatively smaller and triangular; lateral and median lobes of anteromesonotum rugulose to rugose; pterostigma with or without pale spot anteriorly 22
22. Pterostigma with distinct pale spot anteriorly (Fig. 14D); F15 length $2.00 \times$ its width; body relatively smaller, its length at most 3.50 mm, usually 2.80–3.50 mm *M. varipes* (Ruthe, 1860)
– Pterostigma evenly brown or with diffusely pale spot anteriorly; F15 length $1.50 \times$ its width; body relatively bigger, usually 4.00–4.20 mm *M. viduus* (Ruthe, 1860)

Microplitis aduncus (Ruthe, 1860)

Microgaster aduncus Ruthe, 1860: 129.

Microgaster brachycera Thomson, 1895: 2252, pl. 13.

Distribution in Iran

Iran (no locality cited) (Papp 1984).

Microplitis albipennis Abdinbekova, 1969

Microplitis albipennis Abdinbekova, 1969: 74.

Distribution in Iran

Khuzestan Province (Samin *et al.* 2018).

Microplitis alborziensis Abdoli & Talebi sp. nov.

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Fig. 2

Diagnosis

Antenna shorter than body; head in dorsal view more transverse (i.e., its width/length ratio 1.90) and rounded behind eyes; scutoscutellar sulcus distinctly widened, with eight distinct costulae; length of vein R1 shorter than length of pterostigma; vein 1CUb 2.0 × as long as vein 1CUa; vein r as long as to slightly longer than vein 2RS; T1 length/width ratio 2.0, parallel-sided (or weakly barrel-shaped), rugose to rugulose; tegula, scape and metasomal tergites black; metafemur yellow.

Etymology

The new species is named after the type locality. The species name ‘*alborziensis*’ is an adjective derived from the Alborz Province in Iran.

Material examined

Holotype

IRAN – **Alborz Province** • ♀; Chalous Road, Sarzariat; 35°55'10.38" N, 51°06'51.24" E; 1980 m a.s.l.; 22 Jul. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0001.

Paratypes

IRAN • 2 ♀♀, 2 ♂♂; same collection data as for holotype; TMUC-HBMMP0002 to TMUC-HBMMP0005.

Description

Female (holotype)

MEASUREMENTS. Body length 3.7 mm; antenna length 3.2 mm; fore wing length 3.4 mm.

HEAD (Fig. 2B). Antenna shorter than body, its segments normally setose; F2, F8, F15 length/width ratio 2.5, 2.0 and 1.5, respectively; head rounded behind eyes; mouthparts not elongated; gena, vertex, upper and lower face (i.e., frons and face, respectively) punctate; clypeus and labrum softly punctate and shiny; basal width of mandible 2.00 × malar length; length of OOL, DO, POL: 0.2, 0.1 and 0.2 mm, respectively.

MESOSOMA (Fig. 2C). Anteromesoscutum punctate; notauli weakly defined; scutoscutellar sulcus widened, with eight distinct costulae; mesoscutellar disc coarsely punctate; side of mesoscutellar disc with widened crenulated depression; metanotum coarsely wrinkled; propodeum rugose with a complete median longitudinal carina; pronotum and propleuron coarsely punctate; epicnemial carina absent; anterolateral, dorsolateral and ventrolateral parts of mesopleuron punctate, medially smooth; metapleuron punctate.

WINGS (Fig. 2D–E). Pterostigma length/width ratio 2.4, pterostigma 1.4 × as long as vein R1; vein R1 as long as or slightly shorter than distance of vein R1 to vein 3RSb; vein r slightly longer than vein 2RS; vein 1M/m-cu ratio 1.9; areolet closed; vein 1CUb 2.0 × as long as vein 1CUa. Hind wing: vein M+CU/1-M ratio 0.9; vein cu-a slightly curved; vannal lobe fringed anteriorly, with slight setae posteriorly and posterior margin somewhat straight

LEGS (Fig. 2D). Metacoxa finely punctate; length of metafemur, metatibia, metabasitarsus and combined of other metatibial tarsus: 0.9, 1.1, 0.5 and 0.7 mm, respectively; metafemur length/width ratio 4.0; metatibial spurs equal or outer spur slightly shorter than inner spur; metatibial inner spur as long as half of metabasitarsus.

METASOMA (Fig. 2F). T1 length 2.0 × its maximum width, parallel-sided or weakly barrel-shaped, rugose to rugulose; ovipositor sheath short; hypopygium sclerotized; abdomen almost as long as combined length of head and thorax.

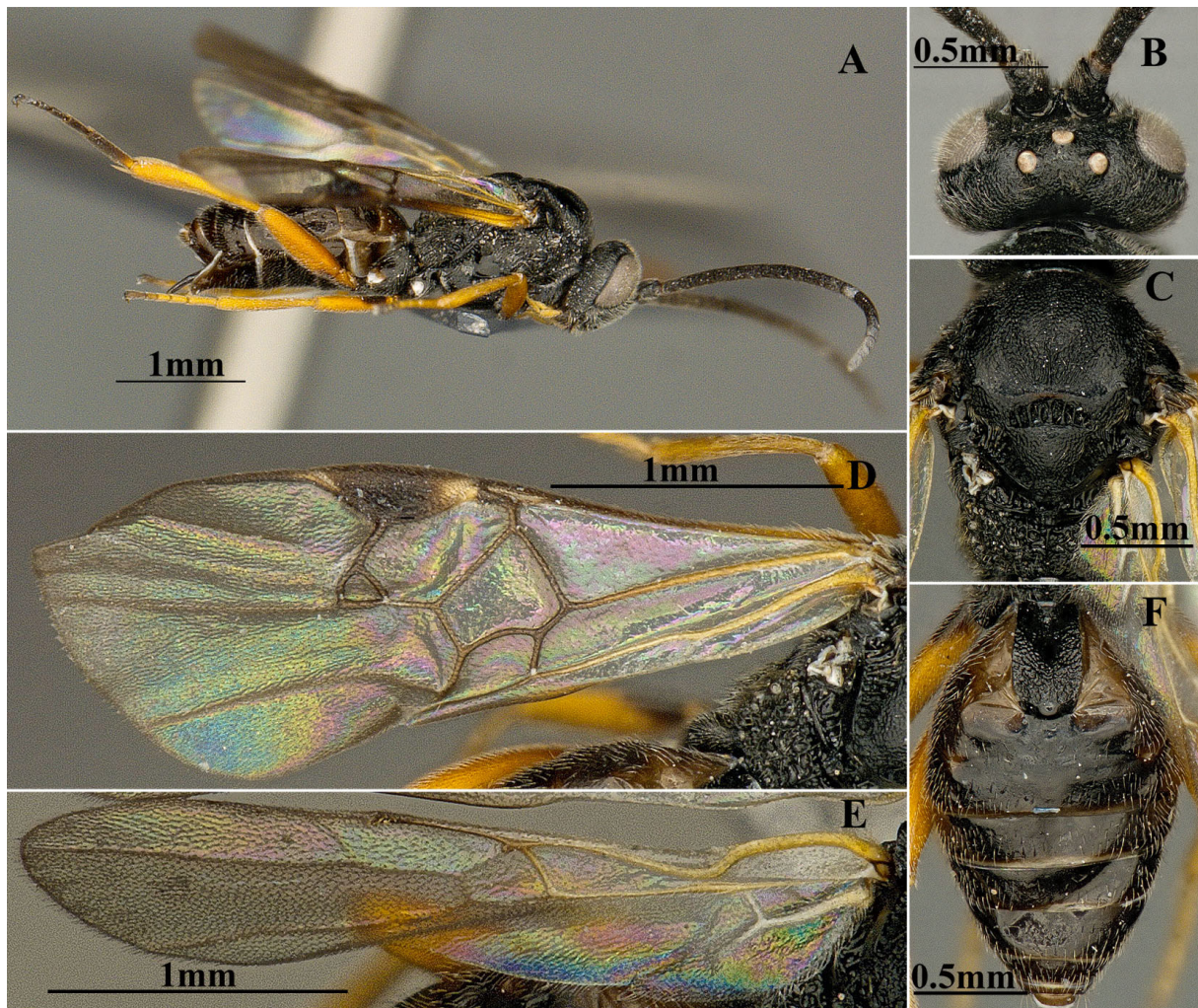


Fig. 2. *Microplitis alborziensis* Abdoli & Talebi sp. nov., holotype, ♀, TMUC-HBMMP0001. **A.** Habitus, lateral view. **B.** Head, dorsal view. **C.** Mesosoma, dorsal view. **D.** Fore wing. **E.** Hind wing. **F.** Metasoma, dorsal view.

COLOUR. Body black; palpi and legs yellow or reddish yellow (except for black coxae and metatarsus); wings with brownish yellow setae; wing venation brown, pterostigma dark brown, with a small basal yellow spot (Fig. 2D).

DNA barcode

The DNA barcode sequences of *Microplitis alborziensis* sp. nov. specimen is available at the NCBI database (National Center for Biotechnology Information: <https://www.ncbi.nlm.nih.gov/>; accession number: MN820452.1).

The available data in NCBI shows that two specimens, *Microplitis* jft111 (European, Sweden, with accession numbers of NCBI: HM396982.1) and *Microplitis* jft112 (North American, Alaska, with accession numbers of NCBI: HM397413.1), for which there are DNA barcodes available (all based from specimens in the CNC) differ by 1.7% base pairs (11 base pairs of difference) and 1.6% base pairs (10 base pairs of difference), respectively, suggesting that they are different species (see Smith *et al.* 2013 for further details).

Remarks

Microplitis alborziensis sp. nov. runs to *M. tuberculifer* (Wesmael, 1937) in the key provided by Telenga (1955) and runs to *M. trochanterata* (Thomson, 1895) in the key of Tobias (1986) (Tobias' species was later synonymized with *M. tuberculifer* (Broad *et al.* 2016)). It can, however, be separated from *M. tuberculifer* by the following characters: (1) T1 length/width ratio is 2.0 vs 2.5–3.0 in *M. tuberculifer*, (2) antenna shorter than body vs slightly longer than body in *M. tuberculifer*, (3) tegula black vs reddish yellow to brown in *M. tuberculifer*.

The new species runs to *M. mediator* (Haliday, 1834) in the key of Kotenko (2007) from which it can be separated by: (1) head in dorsal view more transverse (i.e., its width/length ratio 1.90) vs head in dorsal view less transverse (i.e., its width/length ratio 1.60–1.70) in *M. mediator*, (2) hind legs yellow, metasomal tergites and scape black vs hind legs dark brown, metasomal tergites and scape reddish yellow to red in *M. mediator*.

This species runs to *M. aduncus* (Ruthe, 1860) in Papp (1984), however, *M. aduncus* differs from *M. alborziensis* sp. nov. as follows: in *M. alborziensis* sp. nov. meso- and metafemora are yellow, vein cu-a in hind wing is slightly curved, and T1 is rugose to rugulose, whereas in *M. aduncus* meso- and metafemora are dark brown to black, vein cu-a in hind wing is distinctly curved, and T1 is smooth.

Host

Unknown.

Distribution in Iran

Alborz Province (present study).

Microplitis cebes Nixon, 1970

Fig. 3

Microplitis cebes Nixon, 1970: 18, pl. 26.

Diagnosis (female)

Body length 3.0–3.8 mm; antenna as long as or slightly longer than body, F15 length $2.0 \times$ its width; anteromesoscutum rugose to rugulose; mesoscutellar disc coriaceous (Fig. 3C); vein R1 shorter than pterostigma (i.e., vein R1 longer than pterostigma half), 1st discal cell length $1.0\text{--}1.2 \times$ its width, vein 1CUb $2.3\text{--}2.5 \times$ as long as vein 1CUa (Fig. 3D); T1 length $2.0 \times$ its maximum width, T1 sub-parallel- to

parallel-sided (Fig. 3E). Colour: body black; pterostigma dark brown; legs except for metafemur and basal half of mesofemur yellow.

Material examined

IRAN – **Alborz Province** • 1 ♀; Chalous Road, Shahrestanak; 35°57'34.98" N, 51°22'20.34" E; 2305 m a.s.l.; 1 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0006. – **Tehran Province** • 1 ♀; Shahriar; 35°40'08.10" N, 50°56'56.64" E; 1168 m a.s.l.; 27 May 2010; TMUC-HBMMP0007 • 2 ♂♂; same collection data as for preceding; 15 Jun. 2010; TMUC-HBMMP0008, TMUC-HBMMP0009 • 1 ♀, 2 ♂♂; same collection data as for preceding; 20 Jun. 2010; TMUC-HBMMP0010 to TMUC-HBMMP0012.

Distribution in Iran

Alborz and Tehran Provinces (present study). New record from Iran.

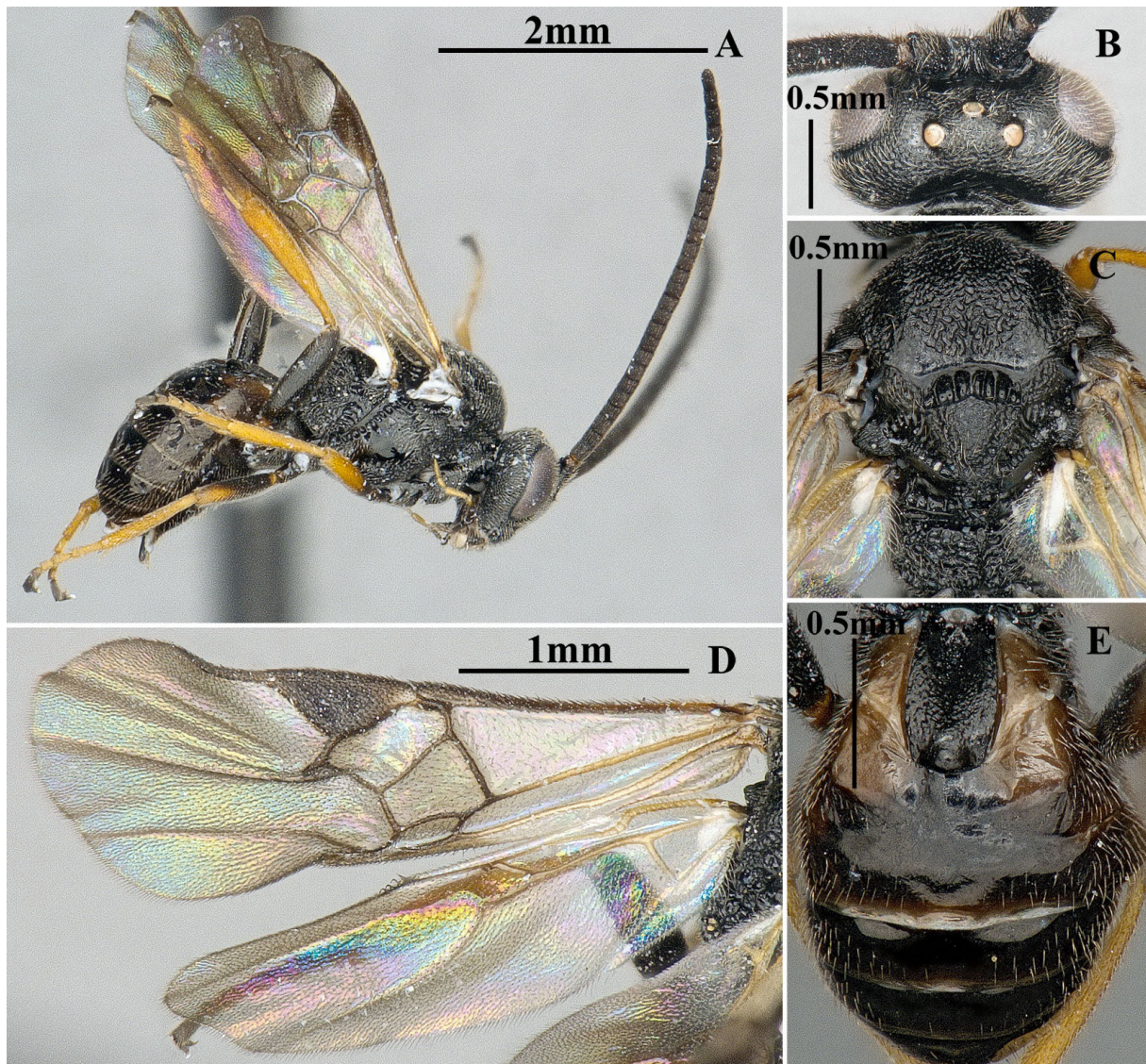


Fig. 3. *Microplitis cebes* Nixon, 1970, ♀, TMUC-HBMMP0007. **A.** Habitus, lateral view. **B.** Head, dorsal view. **C.** Mesosoma, dorsal view. **D.** Wings. **E.** Metasoma, dorsal view.

Microplitis decipiens Prell, 1925

Microplitis decipiens Prell, 1925: 140.

Distribution in Iran

East Azerbaijan Province (Gadallah *et al.* 2015).

Microplitis deprimator (Fabricius, 1798)

Ichneomon deprimator Fabricius, 1798: 227, pl. 10.

Microgaster ingratus Haliday, 1834: 236, pl. 20.

Microgaster deprimatrix Schulz, 1906: 343.

Distribution in Iran

Iran (no locality cited) (Nixon 1968).

Microplitis docilis Nixon, 1970

Fig. 4

Microplitis docilis Nixon, 1970: 28, pl. 23.

Diagnosis (female)

Body length 3.00–3.30 mm; antenna as long as or slightly longer than body, F15 length $2.0 \times$ its width (Fig. 4A); anteromesoscutum and mesoscutellar disc rugose; notauli slightly defined with coarse rugosity (Fig. 4C); vein R1 shorter than pterostigma (i.e., vein R1 longer than pterostigma half); 1st discal cell length $1.1\text{--}1.2 \times$ its width, vein 1CUb $2.0\text{--}2.6 \times$ as long as vein 1CUa (Fig. 4D); T1 length $1.5\text{--}1.6 \times$ its maximum width, more or less broadening posteriorly, T1 coarsely rugose (Fig. 4F). Colour: body black; antennal flagellum brown; scape yellow; pterostigma black or dark brown; legs yellow or reddish yellow (except for black coxae and brown or reddish brown metafemur) (Fig. 4A).

Material examined

IRAN – Qazvin Province • 3 ♀♀; Loshan; $36^{\circ}40'09.12''$ N, $49^{\circ}25'37.74''$ E; 291 m a.s.l.; 6 Jul. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0013 to TMUC-HBMMP0015.

Distribution in Iran

Qazvin Province (present study). New record from Iran.

Microplitis eremitus Reinhard, 1880

Fig. 5

Microplitis eremita Reinhard, 1880: 360.

Diagnosis (female)

Body length 3.0–4.0 mm; antenna as long as body, F15 length $2.0 \times$ its width (Fig. 5A); anteromesoscutum rugose and rugulose; notauli well defined by rugosity; mesoscutellar disc coriaceous to rugulose (Fig. 5C); pterostigma length $2.5 \times$ its width; vein R1 shorter than pterostigma (i.e., vein R1 longer than pterostigma half); 1st discal cell length $1.0\text{--}1.1 \times$ its width; vein 1CUb $2.0 \times$ as long as vein 1CUa (Fig. 5D); T1 length $1.5\text{--}1.6 \times$ its maximum width, T1 more or less broadening posteriorly (Fig. 5F).

Colour: body black; antenna, tegula and legs reddish yellow or yellow exception of dark brown metacoxa, metatibia and a dark spot at apical metafemur; pterostigma dark brown.

Material examined

IRAN – **Guilan Province** • 1 ♀; Roodsar, Rahim abad, Ghazichak; 36°45'52.62" N, 50°20'01.08" E; 1787 m a.s.l.; 17 May 2010; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0016 • 1 ♀; same collection data as for preceding; 14 Jun. 2010; TMUC-HBMMP0017 • 1 ♀; Roodsar, Rahim abad, Orkom; 36°45'44.34" N, 50°18'11.88" E; 1201 m a.s.l.; 17 May 2010; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0018 • 1 ♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0019 • 1 ♀; same collection data as for preceding; 25 Jul. 2010; TMUC-HBMMP0020. – **Mazandaran Province** • 1 ♀; Noor, Chamestan, Joorband; 36°26'17.28" N, 52°07'16.62" E; 272 m a.s.l.; 13 Jul. 2011; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0021 • 4 ♀♀, 1 ♂; same collection data as for preceding; 10 Oct. 2011; TMUC-HBMMP0022 to TMUC-HBMMP0026 • 11 ♀♀, 3 ♂♂; Noor,

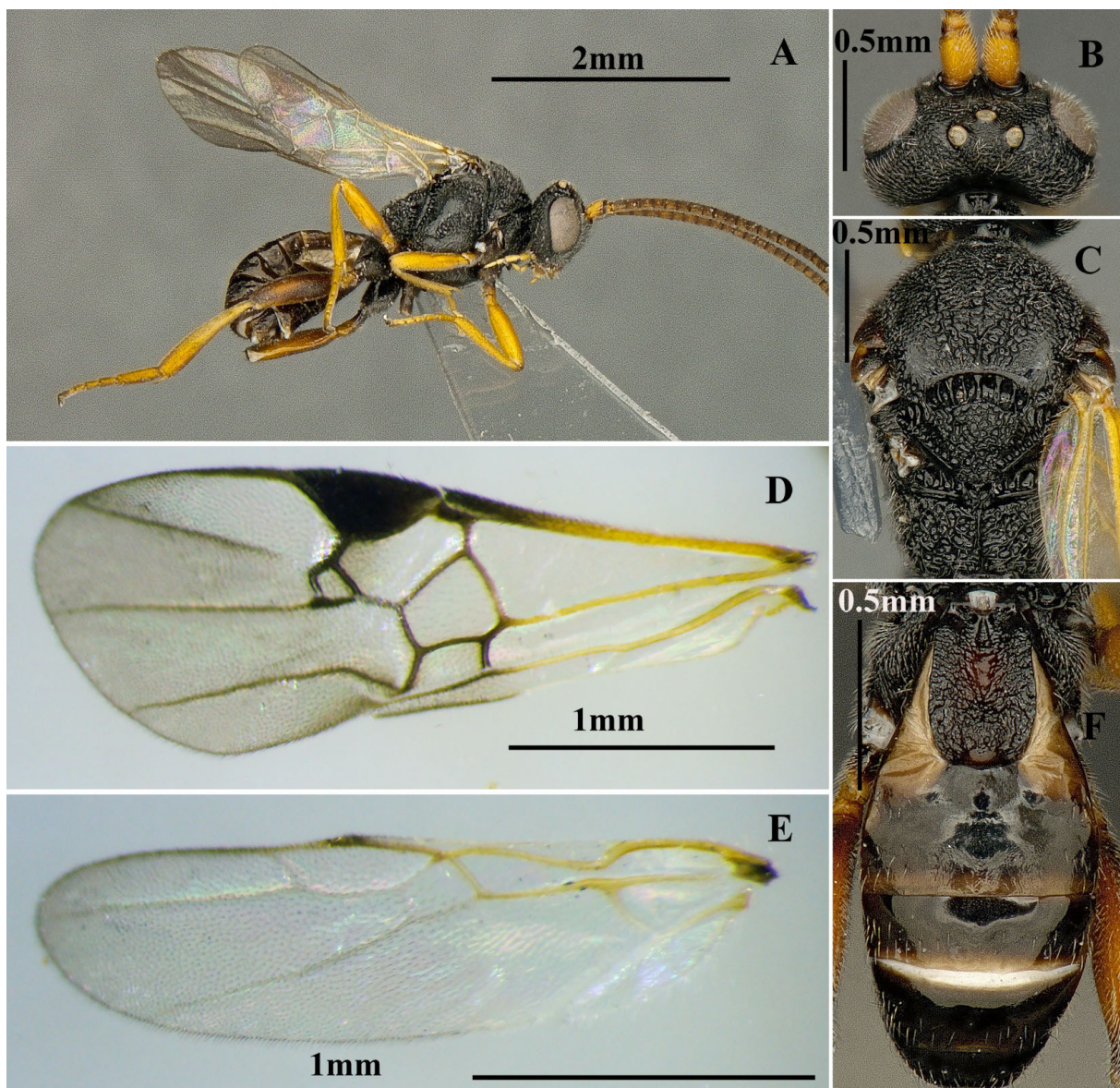


Fig. 4. *Microplitis docilis* Nixon, 1970, ♀, TMUC-HBMMP0013. **A.** Habitus, lateral view **B.** Head, dorsal view. **C.** Mesosoma, dorsal view. **D.** Fore wing. **E.** Hind wing. **F.** Metasoma, dorsal view.

Chamestan, Tangehvaz; 36°21'55.02" N, 52°06'10.74" E; 692 m a.s.l.; 26 Jul. 2011; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0027 to TMUC-HBMMP0040 • 2 ♀♀; same collection data as for preceding; 10 Oct. 2011; TMUC-HBMMP0041, TMUC-HBMMP0042 • 2 ♀♀; same collection data as for preceding; 16 Aug. 2011; TMUC-HBMMP0043, TMUC-HBMMP0044. – **Qazvin Province** • 1 ♀; Loshan; 36°40'09.12" N, 49°25'37.74" E; 291 m a.s.l.; 22 Jun. 2011; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0045.

Distribution in Iran

Guilan, Mazandaran and Qazvin Provinces (present study). New record from Iran.

Microplitis fulvicornis (Wesmael, 1837)

Microgaster fulvicornis Wesmael, 1837: 44.

Microgaster pallidicornis Marshall, 1898: 182, pl. 27.

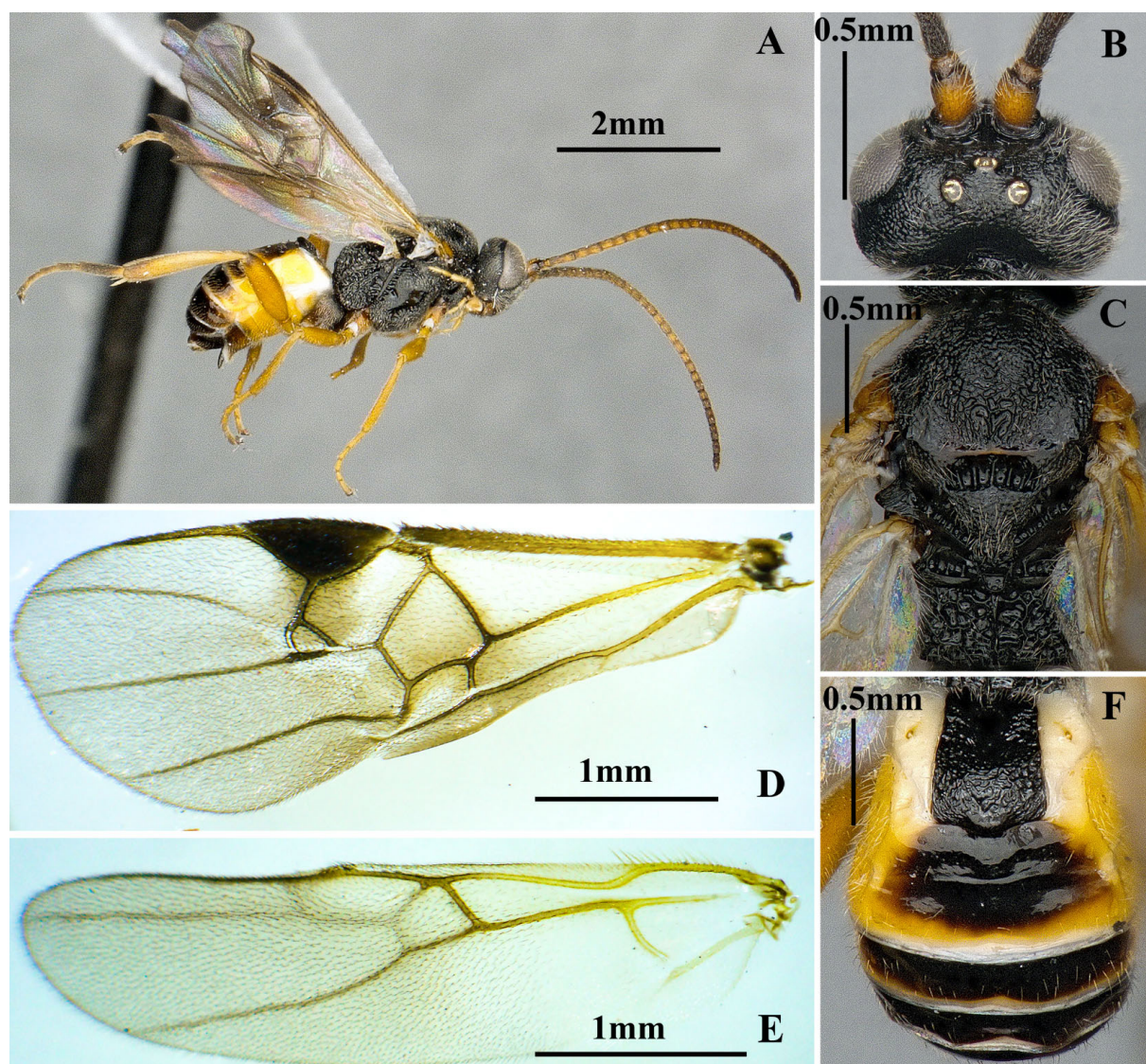


Fig. 5. *Microplitis eremitus* Reinhard, 1880, ♀, TMUC-HBMMP0017. **A.** Habitus, lateral view. **B.** Head, dorsal view. **C.** Mesosoma, dorsal view. **D.** Fore wing. **E.** Hind wing. **F.** Metasoma, dorsal view.

Distribution in Iran

Razavi Khorasan Province (Karimi-Malati *et al.* 2014).

Microplitis kaszabi Papp, 1980

Fig. 6

Microplitis kaszabi Papp, 1980: 406, pl. 36.

Diagnosis (female)

Body length 3.3–3.8 mm; antenna longer than body, F15 $2.0 \times$ its width (Fig. 6A); anteromesoscutum rugulose, notauli well defined by rugosity, mesoscutellar disc coriaceous (Fig. 6C); pterostigma length $2.5 \times$ its width; vein R1 shorter than pterostigma (i.e., vein R1 distinctly longer than pterostigma half);

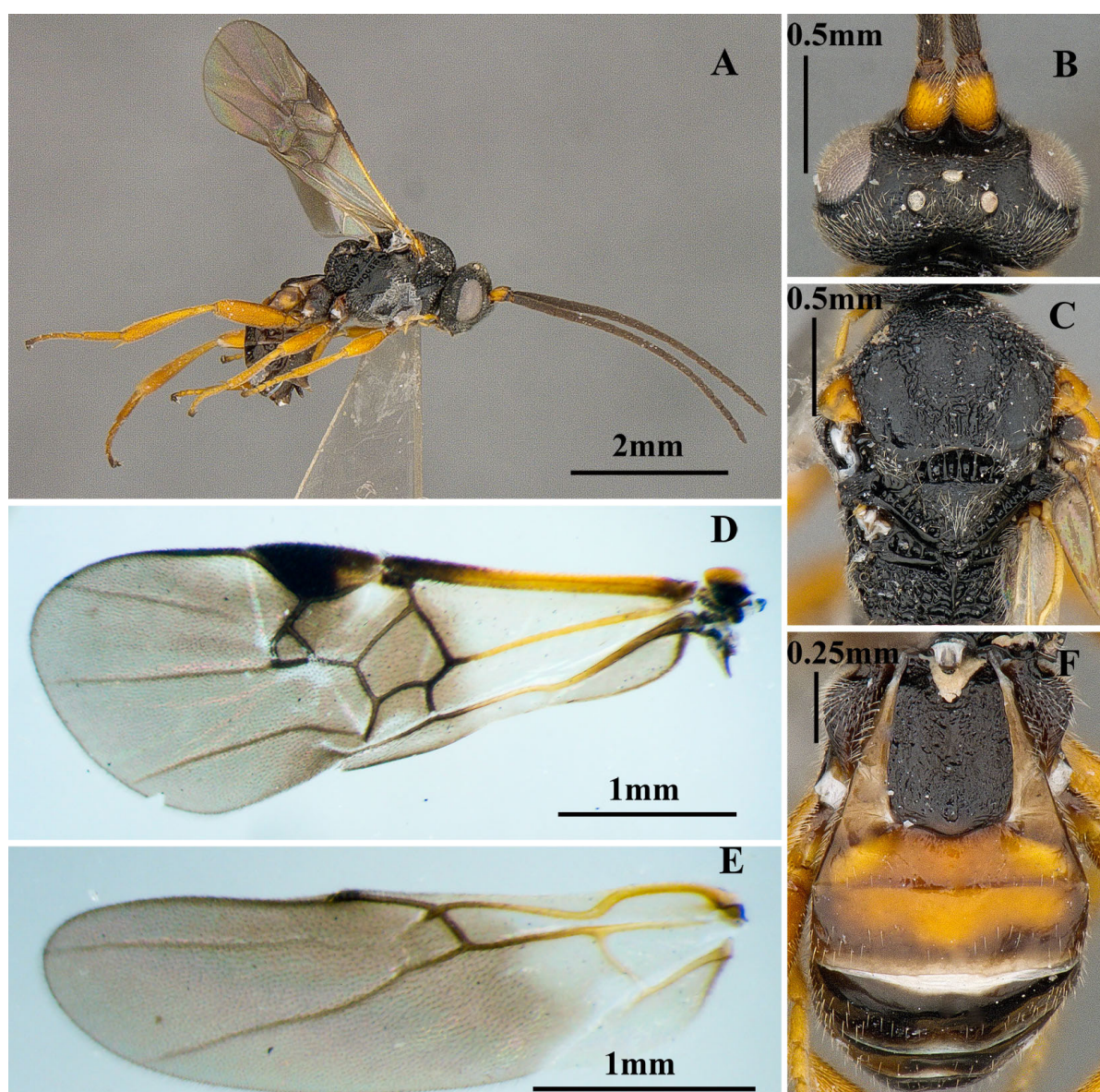


Fig. 6. *Microplitis kaszabi* Papp, 1980, ♀, TMUC-HBMMP0047. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Fore wing. E. Hind wing. F. Metasoma, dorsal view.

in 1st discal cell length 1.2–1.3 × its width; vein 1CUB 1.7–1.8 × as long as vein 1CUa (Fig. 6D); T1 rugulose, more or less broadening posteriorly and T1 length 1.5–1.6 × its maximum width (Fig. 6A). Colour: body black; antenna brown; tegula, scape, T2, T3 and legs (except for black metacoxa) yellow; pterostigma dark brown to black with a small basal yellow spot.

Material examined

IRAN – Alborz Province • 1 ♂; Karadj; 35°46'08.88" N, 50°56'55.20" E; 1277 m a.s.l.; 22 Jun. 2010; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0046. – Tehran Province • 1 ♀; Shahriar; 35°40'08.10" N, 50°56'56.64" E; 1168 m a.s.l.; 15 Jun. 2010; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0047. – Qazvin Province • 1 ♀, 1 ♂; Zereshk Road; 36°21'39.72" N, 50°03'55.56" E; 1541 m a.s.l.; 5 Jun. 2011; A. Mohammadi leg.; Malaise trap; TMUC-HBMMP0048, TMUC-HBMMP0049.

Distribution in Iran

Alborz, Tehran and Qazvin Provinces (present study). New record from Iran.

Microplitis mandibularis Thomson, 1895

Fig. 7

Microgaster (Microplitis) mandibularis Thomson, 1895: 2251, pl. 4.

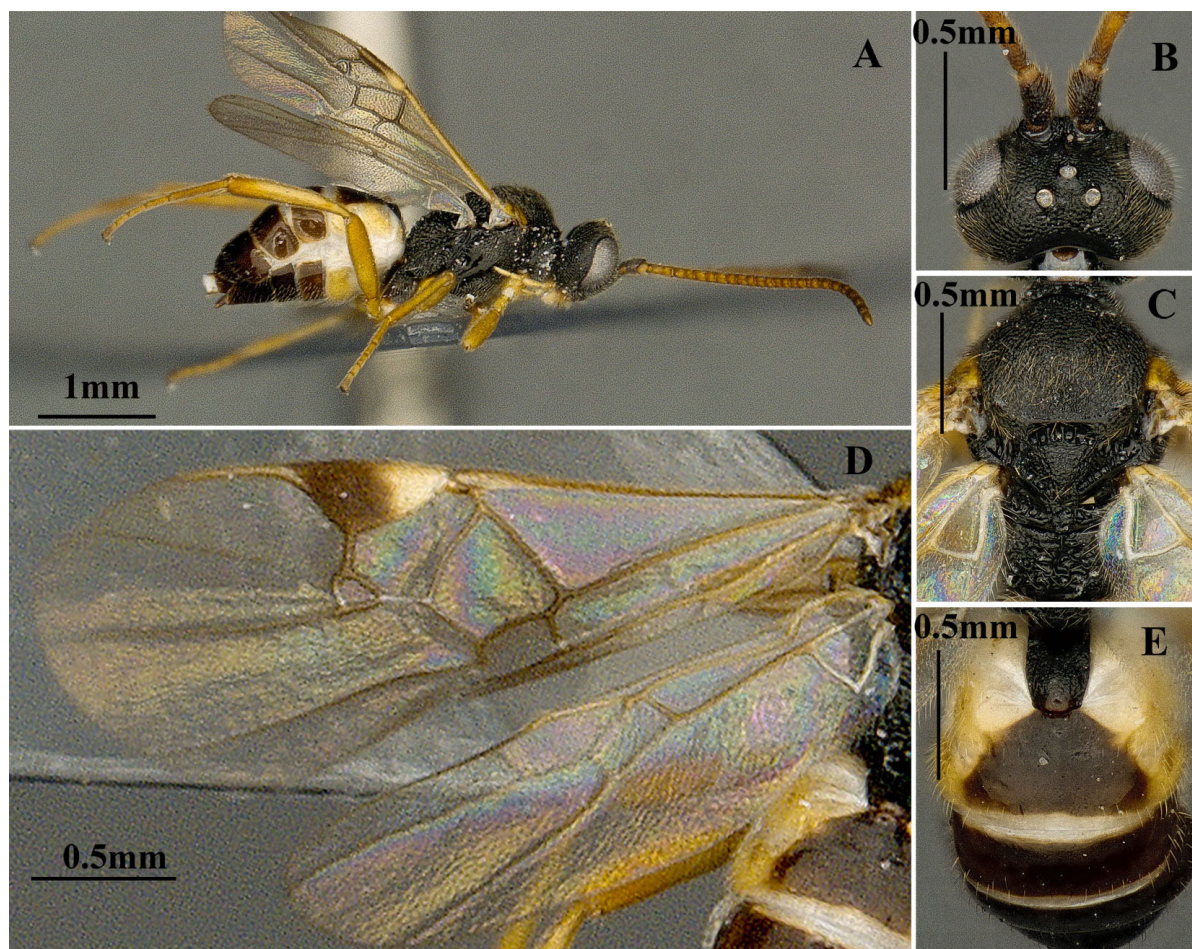


Fig. 7. *Microplitis mandibularis* Thomson, 1895, ♀, TMUC-HBMMP0051. A. Habitus, dorsal view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Wings. E. Metasoma, dorsal view.

Diagnosis (female)

Body length 3.0–3.5 mm; antenna as long as body, F15 length $2.0 \times$ its width (Fig. 7A); in dorsal view, head width less than $2.0 \times$ its length (Fig. 7B); anteromesoscutum and mesoscutellar disc coriaceous (Fig. 7C); pterostigma length $2.5 \times$ its width; vein R1 longer than pterostigma half; 1st discal cell length $1.2\text{--}1.3 \times$ its width; vein 1CUb $3.0 \times$ as long as vein 1CUa (Fig. 7D); T1 length $2.5 \times$ its maximum width, T1 rugulose and parallel-sided (Fig. 7E). Colour: body black; antenna and tegula reddish yellow; basal one third of pterostigma and legs yellow (except for black metacoxa).

Material examined

IRAN – Alborz Province • 2 ♀♀; Chalous Road, Sarzariat; $35^{\circ}55'10.38''$ N, $51^{\circ}06'51.24''$ E; 1980 m a.s.l.; 20 Jul. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0050, TMUC-HBMMP0051 • 2 ♀♀, 1 ♂; Karadj; $35^{\circ}46'08.88''$ N, $50^{\circ}56'55.20''$ E; 1277 m a.s.l.; 29 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0052 to TMUC-HBMMP0054.

Distribution in Iran

Fars Province (Samin *et al.* 2018), Alborz Province (present study).

Microplitis marshallii Kokujev, 1898

Microplitis marshallii Kokujev, 1898 (in Marshall 1900): 183, pl. 9.

Distribution in Iran

Ardabil Province (Gadallah *et al.* 2015).

Microplitis mediator (Haliday, 1834)

Microgaster mediator Haliday, 1834: 235.

Microgaster medianus Ruthe, 1860: 127.

Microplitis halidayi Fahringer, 1937: 285.

Microplitis pseudomedianus Fahringer, 1937: 267.

Distribution in Iran

No locality cited (Belokobylskij *et al.* 2019).

Microplitis ochraceus Szepligeti, 1896

Fig. 8

Microplitis ochraceus Szepligeti, 1896: 307.

Microplitis flaviventris Ivanov, 1898 (in Ivanov 1899): 342.

Diagnosis (female)

Body length 3.5–4.0 mm; antenna as long as body, F15 length $2.0 \times$ its width (Fig. 8A); anteromesoscutum and mesoscutellar disc weakly rugulose or coriaceous (Fig. 8C); pterostigma length $2.1 \times$ its width; vein R1 longer than pterostigma half; 1st discal cell length $1.3\text{--}1.4 \times$ its width; vein 1CUb $2.0 \times$ as long as vein 1CUa (Fig. 8D); T1 rugose, distinctly broadening posteriorly and T1 length slightly longer than its maximum width; T2 rugulose (Fig. 8D). Colour: body yellow or reddish yellow except for black head, brown mesoscutellar disc and metanotum; basal one third of pterostigma yellow.

Material examined

IRAN – **Tehran Province** • 1 ♀; Shahriar; 35°40'08.10" N, 50°56'56.64" E; 1168 m a.s.l.; 15 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0055.

Distribution in Iran

Ardabil Province (Telenga 1955), Iran (locality not exactly defined) (Papp 1984; Tobias 1986), Golestan Province (Ghahari *et al.* 2011d), Alborz and Tehran Provinces (Farahani *et al.* 2014c; present study).

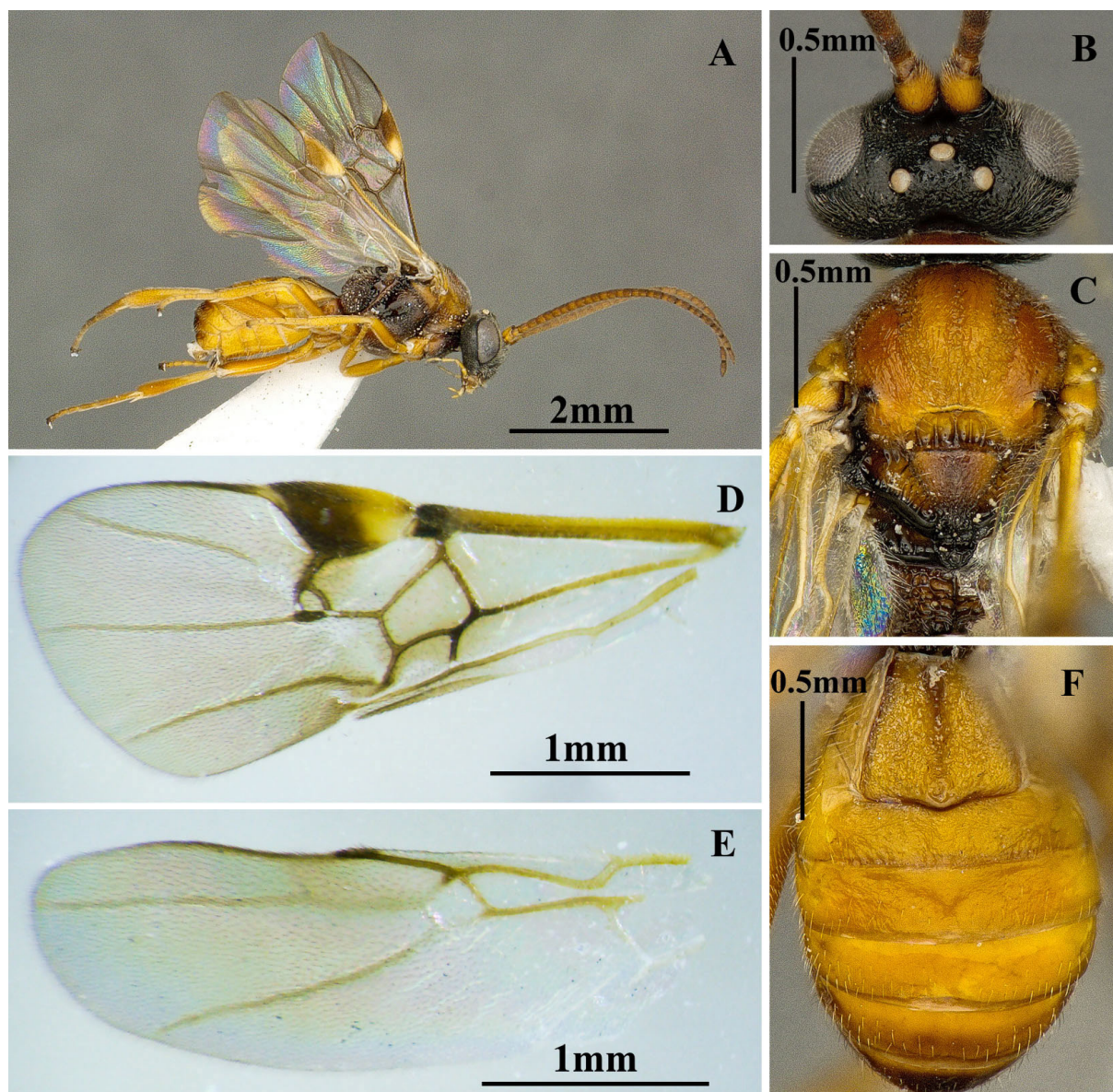


Fig. 8. *Microplitis ochraceus* Szepligeti, 1896, ♀, TMUC-HBMMP0055. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Fore wing. E. Hind wing. F. Metasoma, dorsal view.

Microplitis pallidipennis Tobias, 1964

Fig. 9

Microplitis pallidipennis Tobias, 1964: 213, pl. 50.

Diagnosis (female)

Body length 4.2 mm; antenna as long as body, F15 length $2.0 \times$ as long as its width; vertex punctate; notauli well defined with crowded rugosity; lateral and median lobe of anteromesoscutum weakly punctate and shiny; mesoscutellar disc anteriorly or antero-medially weakly punctate, shiny and its

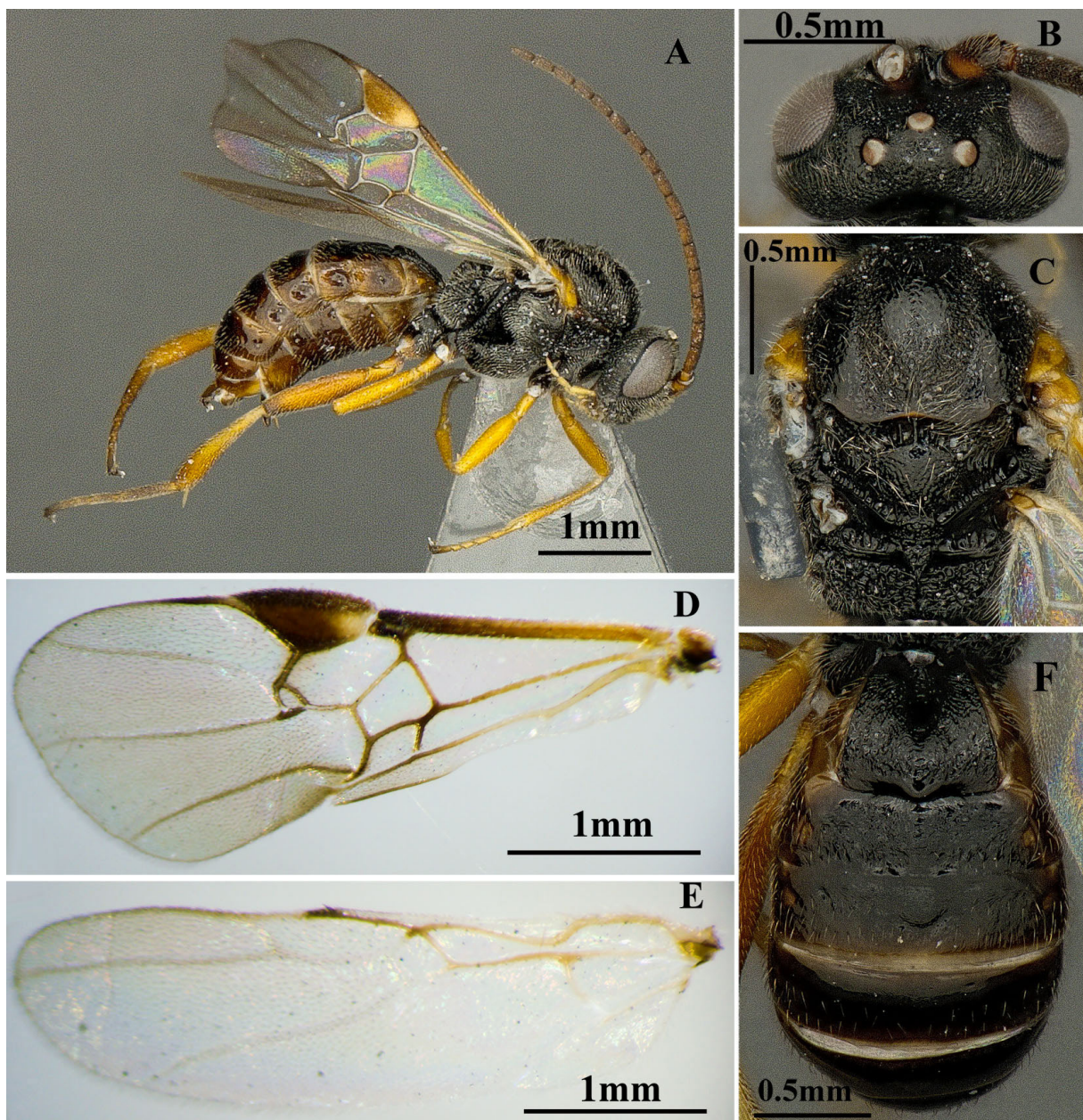


Fig. 9. *Microplitis pallidipennis* Tobias, 1964, ♀, TMUC-HBMMP0056. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Fore wing. E. Hind wing. F. Metasoma, dorsal view.

posterior area coriaceous (Fig. 9C); pterostigma length $2.1\text{--}2.2 \times$ its width; vein R1 as long as pterostigma half; 1st discal cell length $1.3 \times$ its width; vein 1Cub $2.0 \times$ as long as vein 1CUa (Fig. 9D); T1 rugulose, distinctly broadening posteriorly, its length equal or slightly longer than its maximum width; T2 weakly wrinkled; T3 and the following tergites smooth (Fig. 9F). Colour: body black; antenna brown; tegula and legs reddish yellow (except for black coxae); basal one quarter of pterostigma with a yellow spot.

Material examined

IRAN – Alborz Province • 1 ♀; Chalous Road, Sarzariat; $35^{\circ}55'10.38''$ N, $51^{\circ}06'51.24''$ E; 1980 m a.s.l.; 15 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0056.

Distribution in Iran

Alborz Province (present study). New record from Iran.

Microplitis rufiventris Kokujev, 1914

Fig. 10

Microplitis rufiventris Kokujev, 1914: 513.

Diagnosis (female)

Body length 2.8–3.5 mm; antenna as long as body, F15 length $2.0 \times$ its width (Fig. 10A); in dorsal view, head width $1.8 \times$ its length (Fig. 10B); anteromesoscutum rugulose; mesoscutellar disc weakly rugulose (Fig. 10C); vein R1 as long as pterostigma half; 1st discal cell length $1.2\text{--}1.3 \times$ its width; vein 1Cub $2.0 \times$ as long as vein 1CUa (Fig. 10D); T1 length $2.0 \times$ its maximum width, T1 smooth, shiny and parallel- to sub-parallel-sided (Fig. 10F). Colour: body black; antenna and metatarsus brown; tegula, tergites and legs reddish yellow to yellow; basal one third of pterostigma with a yellow spot (Fig. 10).

Material examined

IRAN – Alborz Province • 2 ♀♀; Karadj; $35^{\circ}46'08.88''$ N, $50^{\circ}56'55.20''$ E; 1277 m a.s.l.; 29 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0057, TMUC-HBMMP0058.

Distribution in Iran

Alborz Province (Farahani *et al.* 2014c; present study), Tehran Province (Farahani *et al.* 2014c), Qazvin Province (Farahani *et al.* 2016).

Microplitis scrophulariae Szepliget, 1898

Microplitis scrophulariae Szepliget, 1898: 385.

Distribution in Iran

Kashan Province (Ghahari *et al.* 2011c); Iran (no locality cited) (Tobias 1976).

Microplitis sofron Nixon, 1970

Microplitis sofron Nixon, 1970: 8, pl. 10.

Distribution in Iran

Qazvin Province (Samin *et al.* 2019).

Microplitis spectabilis (Haliday, 1834)

Fig. 11

Microgaster spectabilis Haliday, 1834: 236, pl. 4.

Microgaster fossulatus Bouche, 1834: 161.

Microgaster parvulus Ruthe, 1860: 139.

Microgaster seuratii Marshall, 1998: 370.

Dapsilotoma testaceipes Cameron, 1906: 101.

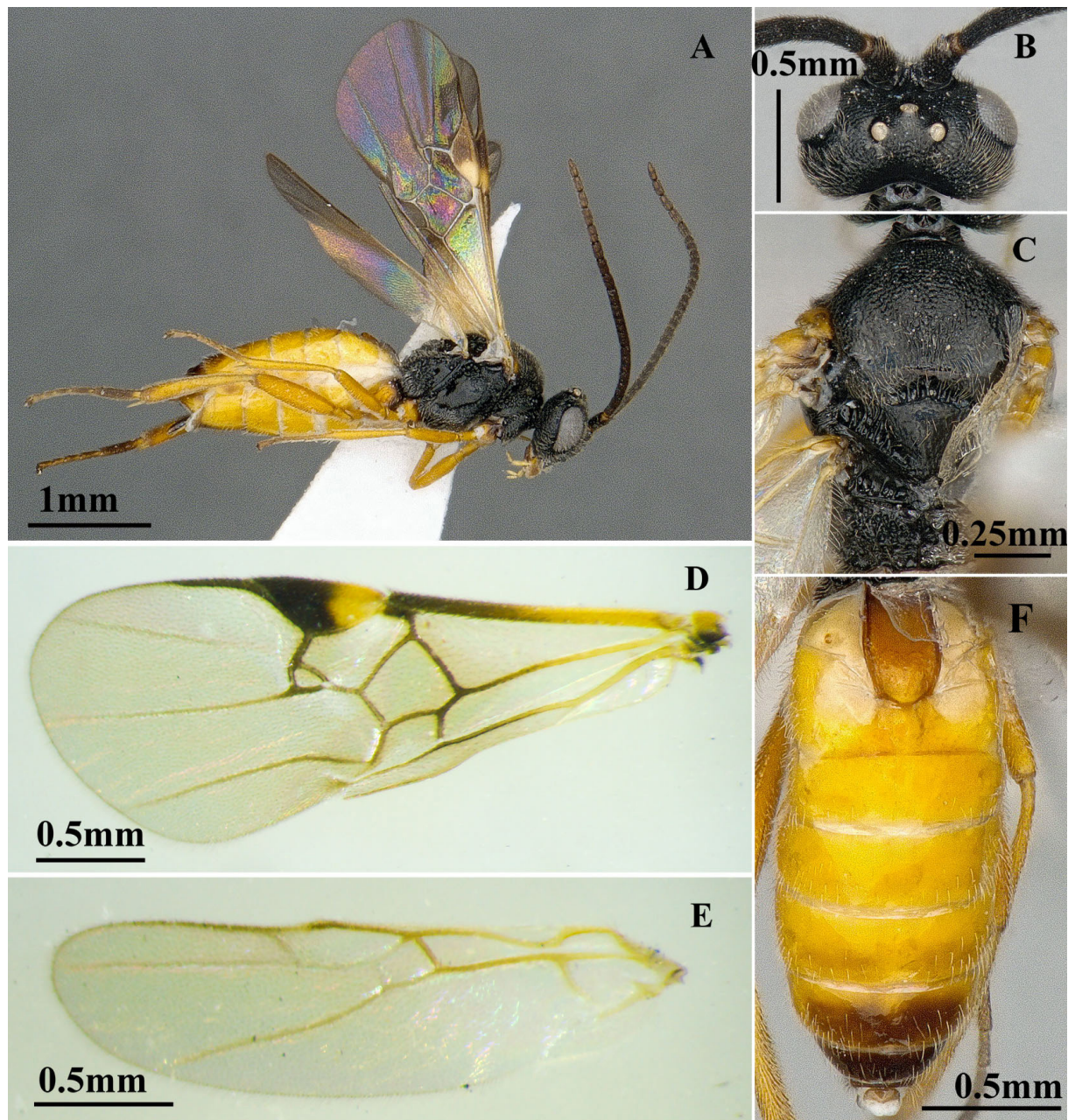


Fig. 10. *Microplitis rufiventris* Kokujev, 1914, ♀, TMUC-HBMMP0057. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Fore wing. E. Hind wing. F. Metasoma, dorsal view.

Diagnosis (female)

Body length 2.4–3.0 mm; antenna shorter than body, F15 length $2.0 \times$ its width (Fig. 11A); head in dorsal view less transverse and head width $1.7 \times$ its length (Fig. 11B); anteromesoscutum rugulose; notauli slightly defined by rugosity; mesoscutellar disc coriaceous (Fig. 11C); pterostigma length $2.5 \times$ its width; 1st discal cell length $1.20\text{--}1.4 \times$ its width; vein 1Cub $1.7\text{--}1.9 \times$ as long as vein 1CUa; vein R1 slightly longer than pterostigma half (Fig. 11D); vein cu-a in hind wing slightly curved (Fig. 11E); T1 length $1.5 \times$ its maximum width, T1 more or less broadening posteriorly, rugose to rugulose. Colour: body black; antenna brown; basal one third of pterostigma with a yellow spot; legs yellow, except for black metacoxa, metafemur with a variable coloured pattern (reddish brown, brown to black).

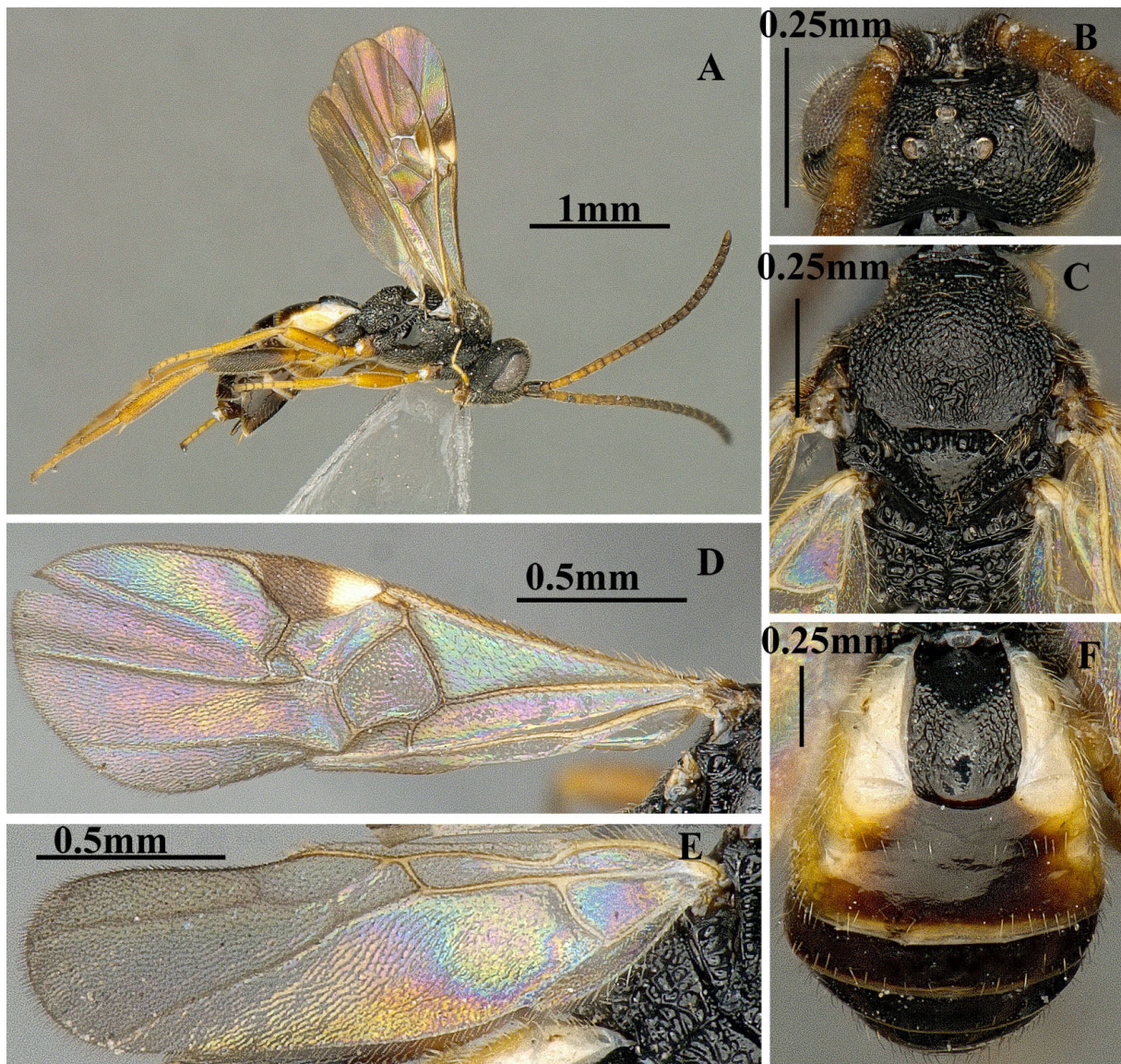


Fig. 11. *Microplitis spectabilis* (Haliday, 1834), ♀, TMUC-HBMMP0061. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Fore wing. E. Hind wing. F. Metasoma, dorsal view.

Material examined

IRAN – **Alborz Province** • 2 ♀♀; Chalous Road, Arangeh; 35°55'07.20" N, 51°05'09.24" E; 1891 m a.s.l.; 29 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0059, TMUC-HBMMP0060 • 1 ♀; same collection data as for preceding; 14 Jul. 2010; TMUC-HBMMP0061 • 1 ♀, 1 ♂; same collection data as for preceding; 16 Aug. 2010; TMUC-HBMMP0062, TMUC-HBMMP0063 • 11 ♀♀; same collection data as for preceding; 14 Sep. 2010; TMUC-HBMMP0064 to TMUC-HBMMP0074 • 4 ♂♂; same collection data as for preceding; 5 Oct. 2010; TMUC-HBMMP0075 to TMUC-HBMMP0078 • 1 ♀, 3 ♂♂; Sarziarat; 35°55'10.38" N, 51°06'51.24" E; 1980 m a.s.l.; 15 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0079 to TMUC-HBMMP0082 • 2 ♀♀, 14 ♂♂; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0083 to TMUC-HBMMP0098 • 3 ♀♀, 5 ♂♂; same collection data as for preceding; 14 Jul. 2010; TMUC-HBMMP099 to TMUC-HBMMP0106 • 1 ♀, 1 ♂; same collection data as for preceding; 21 Sep. 2010; TMUC-HBMMP0107, TMUC-HBMMP0108. – **Guilan Province** • 1 ♀, 1 ♂; Roodsar, Rahim abad, Ghazichak; 36°45'52.62" N, 50°20'01.08" E; 1787 m a.s.l.; 7 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0109, TMUC-HBMMP0110 • 1 ♀; same collection data as for preceding; 11 Jul. 2010; TMUC-HBMMP0111 • 1 ♀, 7 ♂♂; same collection data as for preceding; 20 Sep. 2010; TMUC-HBMMP0112 to TMUC-HBMMP0119 • 1 ♀, 3 ♂♂; same collection data as for preceding; 22 Jun. 2010; TMUC-HBMMP0120 to TMUC-HBMMP0123 • 10 ♀♀, 19 ♂♂; same collection data as for preceding; 28 Jun. 2010; TMUC-HBMMP0124 to TMUC-HBMMP0152 • 5 ♀♀, 18 ♂♂; same collection data as for preceding; 5 Sep. 2010; TMUC-HBMMP0153 to TMUC-HBMMP0175 • 8 ♀♀, 1 ♂; same collection data as for preceding; 13 Sep. 2010; TMUC-HBMMP0176 to TMUC-HBMMP0184 • 1 ♀, 3 ♂♂; same collection data as for preceding; 26 Sep. 2010; TMUC-HBMMP0185 to TMUC-HBMMP0188 • 1 ♂; Roodsar, Rahim abad, Orkom; 36°45'44.34" N, 50°18'11.88" E; 1201 m a.s.l.; 17 May 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0189 • 3 ♀♀, 5 ♂♂; same collection data as for preceding; 14 Jun. 2010; TMUC-HBMMP0190 to TMUC-HBMMP0197 • 13 ♀♀, 10 ♂♂; same collection data as for preceding; 22 Jun. 2010; TMUC-HBMMP0198 to TMUC-HBMMP0220 • 15 ♂♂, 5 ♀♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0221 to TMUC-HBMMP0240 • 2 ♀♀, 1 ♂; same collection data as for preceding; 23 Aug. 2010; TMUC-HBMMP0241 to TMUC-HBMMP0243 • 2 ♀♀; same collection data as for preceding; 5 Sep. 2010; TMUC-HBMMP0244, TMUC-HBMMP0245 • 1 ♂; same collection data as for preceding; 19 Sep. 2010; TMUC-HBMMP0246 • 4 ♀♀; same collection data as for preceding; 20 Sep. 2010; TMUC-HBMMP0247 to TMUC-HBMMP0250 • 4 ♀♀, 16 ♂♂; same collection data as for preceding; 26 Sep. 2010; TMUC-HBMMP0251 to TMUC-HBMMP0270 • 11 ♀♀, 4 ♂♂; same collection data as for preceding; 4 Oct. 2010; TMUC-HBMMP0271 to TMUC-HBMMP0285 • 2 ♀♀, 2 ♂♂; same collection data as for preceding; 11 Oct. 2010; TMUC-HBMMP0286 to TMUC-HBMMP0289 • 1 ♀, 1 ♂; same collection data as for preceding; 18 Oct. 2010; TMUC-HBMMP0290, TMUC-HBMMP0291 • 1 ♀; same collection data as for preceding; 19 Oct. 2010; TMUC-HBMMP0292 • 1 ♀; same collection data as for preceding; 1 Nov. 2010; TMUC-HBMMP0293 • 1 ♀, 1 ♂; Roodsar, Rahim abad, Ziaz; 36°52'27.18" N, 50°13'24.78" E; 490 m a.s.l.; 14 Oct. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0294, TMUC-HBMMP0295 • 2 ♀♀, 2 ♂♂; same collection data as for preceding; 17 Jun. 2010; TMUC-HBMMP0296 to TMUC-HBMMP0299 • 1 ♀; same collection data as for preceding; 18 Oct. 2010; TMUC-HBMMP0300. – **Mazandaran Province** • 10 ♂♂; Noor, Chamestan, Tangehvaz; 36°21'55.68" N, 52°06'10.32" E; 702 m a.s.l.; 5 Sep. 2011, M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0301 to TMUC-HBMMP0310 • 3 ♀♀, 3 ♂♂; same collection data as for preceding; 26 Sep. 2011; TMUC-HBMMP0311 to TMUC-HBMMP0316. – **Qazvin Province** • 1 ♀, 1 ♂; Zereshk Road; 36°21'43.02" N, 50°03'53.22" E; 1553 m a.s.l.; 9 Jun. 2011; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0317, TMUC-HBMMP0318.

Distribution in Iran

Isfahan (Ghahari *et al.* 2011c), East Azarbaijan (Rastegar *et al.* 2012), Alborz, Mazandaran, Guilan and Qazvin Provinces (present study).

Microplitis spinolae (Nees, 1834)

Fig. 12

Microgaster spinolae Nees, 1834: 166, pl. 4.

Microplitis sapporoensis Ashmead, 1906: 194.

Microplitis radiorimata Telenga, 1955: 142, pl. 34.

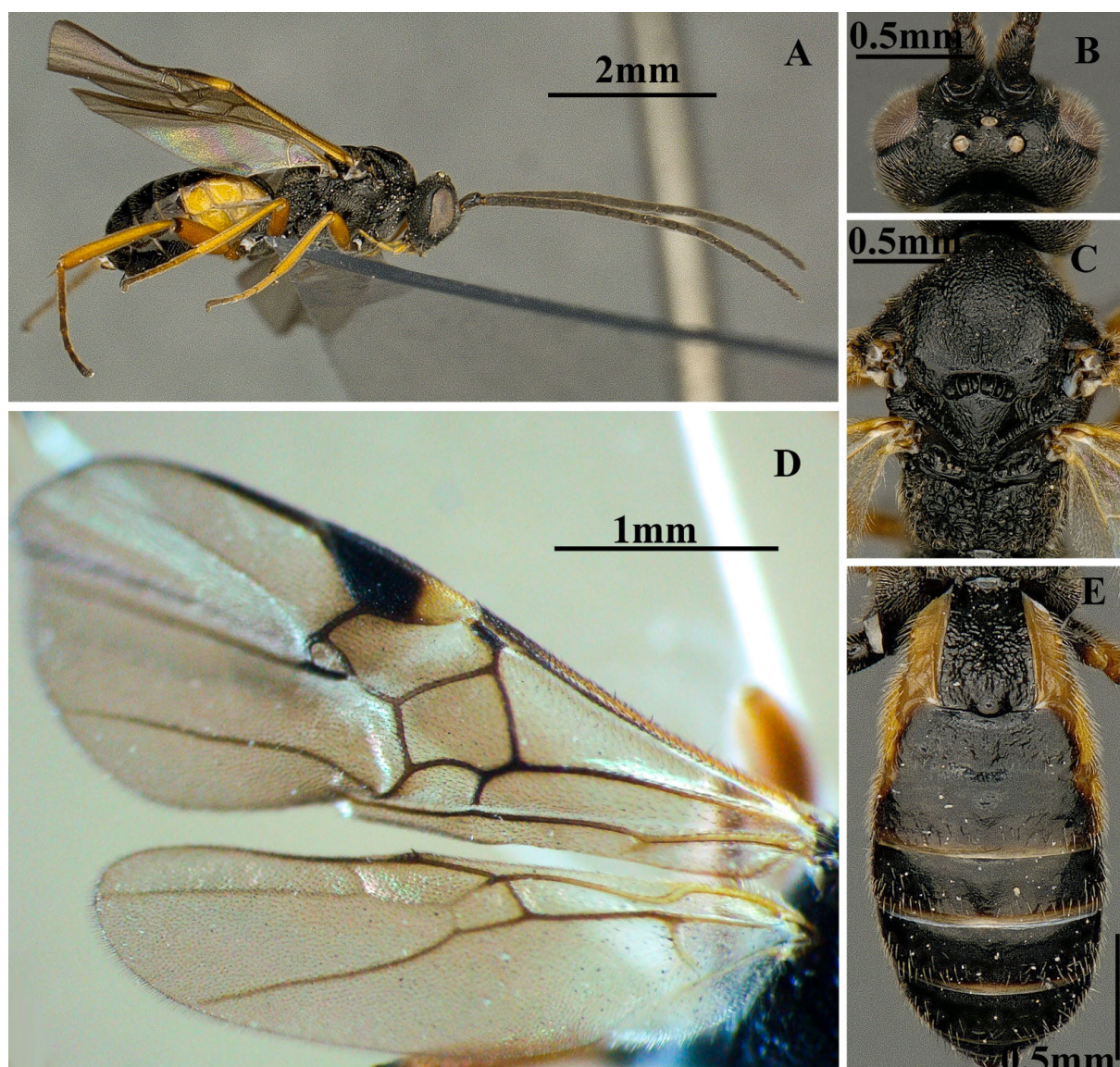


Fig. 12. *Microplitis spinolae* (Nees, 1834), ♀, TMUC-HBMMP0321. A. Habitus, lateral view. B. Head, dorsal view. C. Mesosoma, dorsal view. D. Wings. E. metasoma, dorsal view.

Diagnosis (female)

Body length 3.5–4.5 mm; antenna as long as body, F15 length $2.0 \times$ its width (Fig. 12A), above of antennal socket (on upper face) polished, while in other species is completely sculptured (Fig. 12B); anteromesoscutum and mesoscutellar disc rugulose; notauli slightly defined by rugosity (Fig. 12C); pterostigma length $2.2\text{--}2.4 \times$ its width; 1st discal cell length $1.2\text{--}1.4 \times$ its width; vein 1CUB $1.9\text{--}2.0 \times$ as long as vein 1CUa; vein R1 longer than pterostigma half (Fig. 12D); T1 length $1.4\text{--}1.6 \times$ its maximum width; T1 rugulose, more or less broadening posteriorly; T2 weakly wrinkled (Fig. 12E). Colour: body black; basal one third of pterostigma with a yellow spot; legs reddish yellow, except for black coxae, metafemur with a black spot apically.

Material examined

IRAN – **Alborz Province** • 2 ♂♂; Karadj; $35^{\circ}46'08.88''$ N, $50^{\circ}56'55.20''$ E; 1277 m a.s.l.; 29 Jun. 2010; A. Nadimi leg.; Malaise trap; TMUC-HBMMP0319, TMUC-HBMMP0320. – **Guilan Province** • 2 ♀♀; Roodsar, Rahim abad, Ghazichak; $36^{\circ}45'52.62''$ N, $50^{\circ}20'01.08''$ E; 1787 m a.s.l.; 17 May 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0321, TMUC-HBMMP0322 • 1 ♀; Orkom; $36^{\circ}45'44.34''$ N, $50^{\circ}18'11.88''$ E; 1201 m a.s.l.; 6 Jul. 2010; A. Nadimi leg.; Malaise trap; TMUC-HBMMP0323 • 2 ♀♀; Ziaz; $36^{\circ}52'27.18''$ N, $50^{\circ}13'24.78''$ E; 490 m a.s.l.; 24 May 2010; A. Nadimi leg.; Malaise trap; TMUC-HBMMP0324, TMUC-HBMMP0325 • 1 ♀; same collection data as for preceding; 7 Jun. 2010; TMUC-HBMMP0326 • 1 ♀; same collection data as for preceding; 6 Jun. 2010; TMUC-HBMMP0327. – **Mazandaran Province** • 3 ♂♂; Noor, Chamestan, Joorband; $36^{\circ}26'17.28''$ N, $52^{\circ}07'16.62''$ E; 272 m a.s.l.; 5 Sep. 2011; A. Nadimi leg.; Malaise trap; TMUC-HBMMP0328, TMUC-HBMMP0330. – **Tehran Province** • 1 ♀; Shahriar; $35^{\circ}40'08.10''$ N, $50^{\circ}56'56.64''$ E; 1168 m a.s.l.; 28 Sep. 2010; A. Nadimi leg.; Malaise trap; TMUC-HBMMP0331.

Distribution in Iran

Iran (locality not exactly defined) (Nixon 1970); Alborz, Guilan, Mazandaran and Qazvin Provinces (present study).

Microplitis tuberculifer (Wesmael, 1837)

Fig. 13

Microgaster tuberculifer Wesmael, 1837: 43.

Microgaster calcaratus Thomson, 1895: 2249, pl. 11.

Microgaster trochanterata Thomson, 1895: 2249, pl. 25.

Microplitis manevali Gautier & Bonnamour, 1939: 190, pl. 4.

Diagnosis (female)

Body length 3.0–3.8 mm; antenna as long as body, F15 length $2.0\text{--}3.0 \times$ its width (Fig. 13A); in dorsal view, head width $1.8 \times$ its length; vertex punctate; anteromesoscutum and mesoscutellar disc coriaceous (Fig. 13C); pterostigma length $2.3\text{--}2.5 \times$ its width; 1st discal cell length $1.2\text{--}1.3 \times$ its width; vein 1CUB $2.0 \times$ as long as vein 1CUa; vein R1 longer than pterostigma half (Fig. 13D); T1 length $2.5 \times$ its maximum width, T1 rugose or rugulose and parallel-sided (Fig. 13F). Colour: body black; antenna brown or black; tegula brownish yellow; pterostigma dark brown with a basal yellow spot; legs yellow, except for brownish yellow metatarsus; T2 and T3 variably coloured, yellow, brown or black.

Material examined

IRAN – **Alborz Province** • 3 ♀♀; Chalous Road, Arangeh; $35^{\circ}55'07.20''$ N, $51^{\circ}05'09.24''$ E; 1891 m a.s.l.; 22 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0332 to TMUC-

HBMMMP0334 • 3 ♀♀; same collection data as for preceding; 14 Jul. 2010; TMUC-HBMMP0335 to TMUC-HBMMP0337 • 2 ♀♀; Chalous Road, Sarziarat; 35°55'10.38" N, 51°06'51.24" E; 1980 m a.s.l.; 8 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0338, TMUC-HBMMP0339 • 1 ♀; Shahrestanak; 35°57'34.98" N, 51°22'20.34" E; 2305 m a.s.l.; 18 May 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0340 • 1 ♀; same collection data as for preceding; 5 Jul. 2010; TMUC-HBMMP0341 • 15 ♀♀, 1 ♂; same collection data as for preceding; 13 Jul. 2010; TMUC-HBMMP0342 to TMUC-HBMMP0357 • 1 ♀; Karadj; 35°46'08.88" N, 50°56'55.20" E; 1277 m a.s.l.; 15 Jun. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0358. – **Guilan Province** • 2 ♀♀;

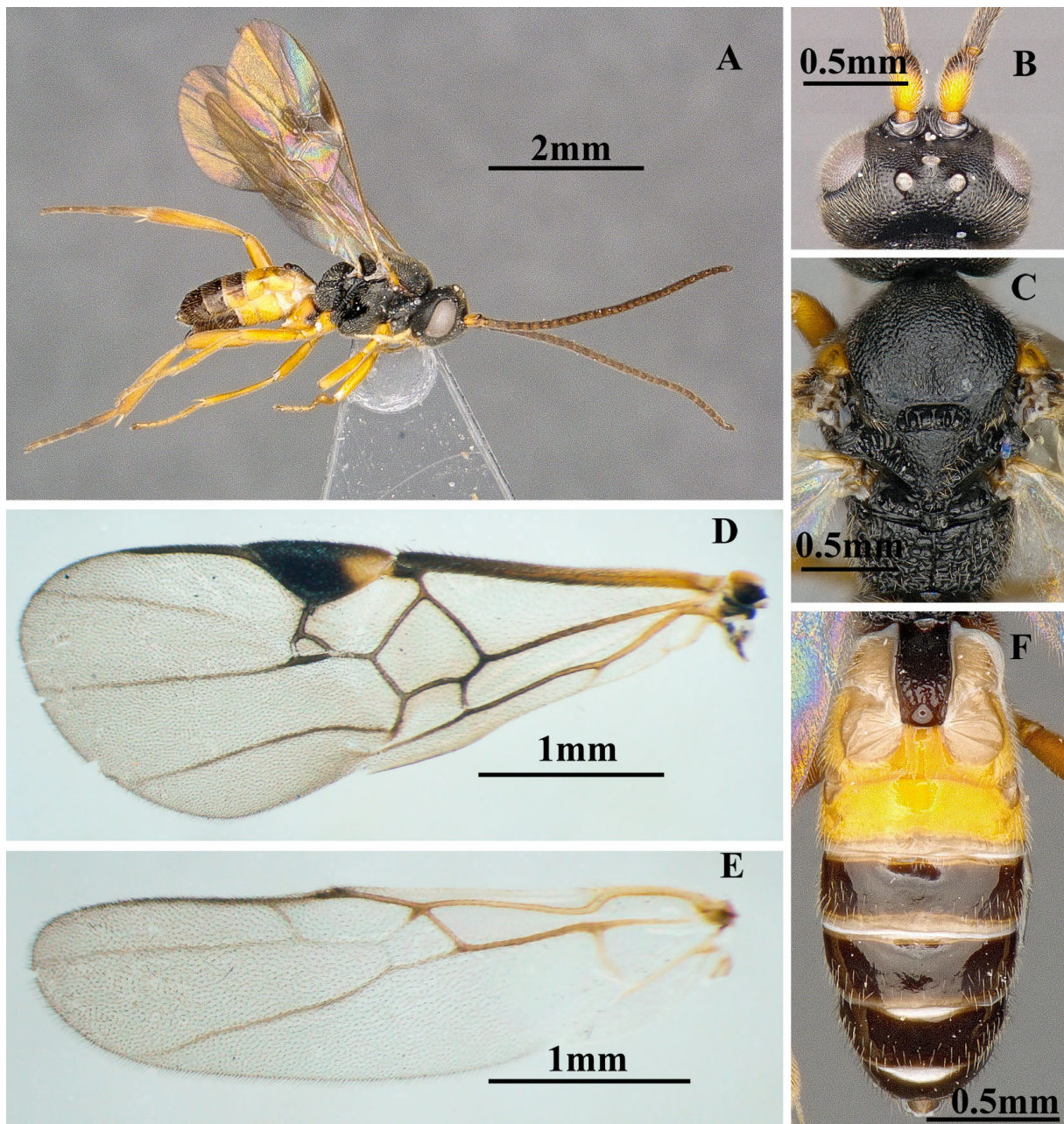


Fig. 13. *Microplitis tuberculifer* (Wesmael, 1837), ♀, TMUC-HBMMP0335. **A.** Habitus, lateral view. **B.** Fore wing. **C.** Hind wing. **D.** Head, dorsal view. **E.** Mesosoma, dorsal view. **F.** Metasoma, dorsal view.

Astaneh Ashrafiyeh, Eshman kamachal; 37°22'03.66" N, 49°57'57.84" E; 1 m b.s.l.; 10 May 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0359, TMUC-HBMMP0360 • 1 ♀; Roodsar, Ziaz; 36°52'34.44" N, 50°13'17.40" E; 537 m a.s.l.; 12 Apr. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0361 • 1 ♀; same collection data as for preceding; 25 Apr. 2010; TMUC-HBMMP0362 • 5 ♀♀; same collection data as for preceding; 10 May 2010; TMUC-HBMMP0363 to TMUC-HBMMP0367 • 7 ♀♀; same collection data as for preceding; 17 May 2010; TMUC-HBMMP0368 to TMUC-HBMMP0374 • 2 ♀♀, 3 ♂♂; same collection data as for preceding; 20 May 2010; TMUC-HBMMP0375 to TMUC-HBMMP0379 • 2 ♀♀; same collection data as for preceding; 24 May 2010; TMUC-HBMMP0380, TMUC-HBMMP0381 • 2 ♂♂; same collection data as for preceding; 14 Jun. 2010; TMUC-HBMMP0382, TMUC-HBMMP0383 • 2 ♀♀; same collection data as for preceding; 21 Jun. 2010; TMUC-HBMMP0384, TMUC-HBMMP0385 • 1 ♀, 2 ♂♂; same collection data as for preceding; 22 Jun. 2010; TMUC-HBMMP0386 to TMUC-HBMMP0388 • 1 ♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0389 • 1 ♂; same collection data as for preceding; 15 Jul. 2010; TMUC-HBMMP0390 • 2 ♀♀; Roodsar, Ghazichak; 36°45'52.62" N, 50°20'01.08" E; 1787 m a.s.l.; 3 May 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0391, TMUC-HBMMP0392 • 2 ♀♀; same collection data as for preceding; 10 May 2010; TMUC-HBMMP0393, TMUC-HBMMP0394 • 3 ♀♀, 1 ♂; same collection data as for preceding; 17 May 2010; TMUC-HBMMP0395 to TMUC-HBMMP0398 • 1 ♀; same collection data as for preceding; 31 May 2010; TMUC-HBMMP0399 • 1 ♀, 4 ♂♂; same collection data as for preceding; 14 Jun. 2010; TMUC-HBMMP0400-0404 • 2 ♀♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0405, TMUC-HBMMP0406 • 2 ♀♀, 8 ♂♂; same collection data as for preceding; 11 Jul. 2010; TMUC-HBMMP0407 to TMUC-HBMMP0416 • 2 ♀♀, 19 ♂♂; same collection data as for preceding; 12 Jul. 2010; TMUC-HBMMP0417 to TMUC-HBMMP0437 • 2 ♀♀; Roodsar, Orkom; 36°45'44.34" N, 50°18'11.88" E; 1201 m a.s.l.; 6 Apr. 2010; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0438, TMUC-HBMMP0439 • 1 ♂; same collection data as for preceding; 12 Apr. 2010; TMUC-HBMMP0440 • 1 ♀; same collection data as for preceding; 26 Apr. 2010; TMUC-HBMMP0441 • 1 ♀; same collection data as for preceding; 10 May 2010; TMUC-HBMMP0442 • 4 ♀♀; same collection data as for preceding; 17 May 2010; TMUC-HBMMP0443 to TMUC-HBMMP0446 • 3 ♀♀; same collection data as for preceding; 27 May 2010; TMUC-HBMMP0447 to TMUC-HBMMP0449 • 2 ♂♂; same collection data as for preceding; 7 Jun. 2010; TMUC-HBMMP0450, TMUC-HBMMP0451 • 1 ♀; same collection data as for preceding; 14 Jun. 2010; TMUC-HBMMP0452 • 1 ♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0453 • 1 ♀; same collection data as for preceding; 19 Jul. 2010; TMUC-HBMMP0454 • 1 ♂; same collection data as for preceding; 21 Jul. 2010; TMUC-HBMMP0455 • 1 ♀; same collection data as for preceding; 23 Aug. 2010; TMUC-HBMMP0456 • 2 ♂♂; same collection data as for preceding; 6 Sep. 2010; TMUC-HBMMP0457, TMUC-HBMMP0458 • 1 ♀; same collection data as for preceding; 20 Sep. 2010; TMUC-HBMMP0459 • 11 ♂♂; same collection data as for preceding; 20 Jul. 2010; TMUC-HBMMP0460 to TMUC-HBMMP0470. – **Mazandaran Province** • 2 ♀♀; Noor, Chamestan, Gaznasara; 36°16'56.82" N, 52°10'58.50" E; 2032 m a.s.l.; 28 Jun. 2011; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0471, TMUC-HBMMP0472 • 1 ♀; same collection data as for preceding; 13 Jul. 2011; TMUC-HBMMP0473 • 1 ♀; Noor, Chamestan, Tangehvaz; 36°21'55.68" N, 52°06'10.32" E; 702 m a.s.l.; 26 May 2011; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0474 • 1 ♀; same collection data as for preceding; 30 Jul. 2011; TMUC-HBMMP0475 • 1 ♀; same collection data as for preceding; 5 Aug. 2011; TMUC-HBMMP0476 • 1 ♀, 1 ♂; same collection data as for preceding; 16 Aug. 2011; TMUC-HBMMP0477, TMUC-HBMMP0478 • 2 ♀♀; same collection data as for preceding; 20 Sep. 2011; TMUC-HBMMP0479, TMUC-HBMMP0480 • 2 ♀♀, 1 ♂; same collection data as for preceding; 6 Oct. 2011; TMUC-HBMMP0481 to TMUC-HBMMP0483 • 1 ♀; same collection data as for preceding; 10 Oct. 2011; TMUC-HBMMP0484 • 1 ♀; same collection data as for preceding; 28 Oct. 2011; TMUC-HBMMP0485 • 2 ♀♀; Noor, Faculty of Natural Resources and Marine Sciences; 36°34'52.98" N, 52°02'45.78" E; 14 m b.s.l.; 25 May 2011; M. Khayrandish leg.; Malaise trap; TMUC-HBMMP0486, TMUC-HBMMP0487 • 1 ♀; same collection data as for preceding; 7 Jun. 2011; TMUC-HBMMP0488

• 2 ♀♀, 1 ♂; same collection data as for preceding; 30 Jun. 2011; TMUC-HBMMP0489 to TMUC-HBMMP0491 • 1 ♀; same collection data as for preceding; 28 Jul. 2011; TMUC-HBMMP0492 • 1 ♀; same collection data as for preceding; 10 Aug. 2011; TMUC-HBMMP0493 • 2 ♀♀; Noor, Chamestan, Joorband; 36°26'15.54" N, 52°07'13.50" E; 275 m a.s.l.; 8 Oct. 2011; Khayrandish leg.; Malaise trap; TMUC-HBMMP0494, TMUC-HBMMP0495. – **Tehran Province** • 1 ♀; Shahriar; 35°40'08.10" N, 50°56'56.64" E; 1168 m a.s.l.; 8 Jun. 2010; Khayrandish leg.; Malaise trap; TMUC-HBMMP0496 • 1 ♀; same collection data as for preceding; 30 Jun. 2010; TMUC-HBMMP0497 • 1 ♂; same collection data as for preceding; 29 Sep. 2010; TMUC-HBMMP0498.

Distribution in Iran

Ilam Province (Ghahari *et al.* 2011a), Alborz, Guilan, Mazandaran and Tehran Provinces (present study).

Microplitis varipes (Ruthe, 1860)

Fig. 14

Microgaster varipes Ruthe, 1860: 136.

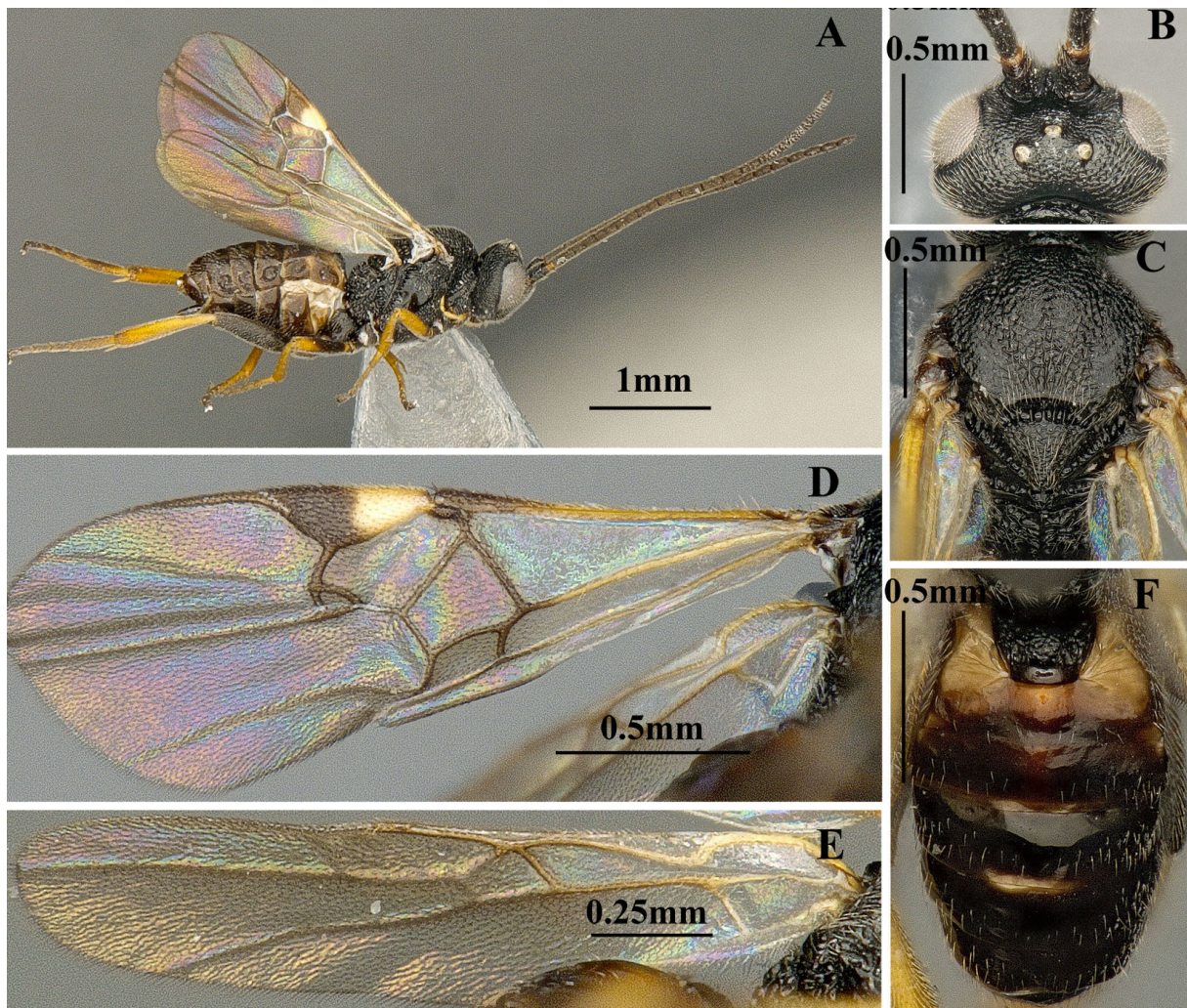


Fig. 14. *Microplitis varipes* (Ruthe, 1860), ♀, TMUC-HBMMP0512. **A.** Habitus, lateral view. **B.** Fore wing. **C.** Hind wing. **D.** Head, dorsal view. **E.** Mesosoma, dorsal view. **F.** Metasoma, dorsal view.

Diagnosis (female)

Body length 2.8–3.5 mm; antenna longer than body, F15 length $2.0 \times$ its width (Fig. 14A); anteromesoscutum and mesoscutellar disc densely rugulose (Fig. 14C) and notauli slightly defined by rugosity; 1st discal cell length $1.3\text{--}1.4 \times$ its width; vein 1CUb $2.0\text{--}2.2 \times$ as long as vein 1CUa; vein R1 longer than pterostigma half (Fig. 14D); T1 length $1.6 \times$ its maximum width, T1 rugulose, sub-parallel-sided and rounded apically (Fig. 14F). Colour: body black; basal one third of pterostigma with a yellow spot; legs reddish or brownish yellow, except for black metafemur and a black spot at basal half of mesofemur.

Material examined

IRAN – **Alborz Province** • 1 ♀, 3 ♂♂; Chalous Road, Shahrestanak; $35^{\circ}57'34.98''$ N, $51^{\circ}22'20.34''$ E; 2305 m a.s.l.; 6 Jul. 2010; Khayrandish leg.; Malaise trap; TMUC-HBMMP0499 to TMUC-HBMMP0502 • 1 ♀, 2 ♂♂; same collection data as for preceding; 14 Jul. 2010; TMUC-HBMMP0503 to TMUC-HBMMP0505. – **Guilan Province** • 2 ♀♀, 3 ♂♂; Roodsar, Rahim abad, Orkom; $36^{\circ}45'44.34''$ N, $50^{\circ}18'11.88''$ E; 120 m a.s.l.; 19 Jul. 2010; Khayrandish leg.; Malaise trap; TMUC-HBMMP0506 to TMUC-HBMMP0510 • 1 ♀; same collection data as for preceding; 6 Jul. 2010; TMUC-HBMMP0511 • 10 ♀♀; Ghazichak; $36^{\circ}45'52.62''$ N, $50^{\circ}20'01.08''$ E; 1787 m a.s.l.; 11 Jul. 2010; Khayrandish leg.; Malaise trap; TMUC-HBMMP0512 to TMUC-HBMMP0521. – **Qazvin Province** • 3 ♀♀; Zereskh Road; $36^{\circ}25'23.88''$ N, $50^{\circ}06'37.68''$ E; 1926 m a.s.l.; 6 Jul. 2011; TMUC-HBMMP0522 to TMUC-HBMMP0524 • 2 ♀♀; same collection data as for preceding; 17 Aug. 2011; TMUC-HBMMP0525, TMUC-HBMMP0526 • 1 ♀; same collection data as for preceding; 27 Sep. 2011; TMUC-HBMMP0527 • 2 ♀♀; Zereskh Road; $36^{\circ}21'39.72''$ N, $50^{\circ}03'55.56''$ E; 1541 m a.s.l.; 25 May 2011; Khayrandish leg.; Malaise trap; TMUC-HBMMP0528, TMUC-HBMMP0529. – **Tehran Province** • 1 ♀; Peykanshahr, Iran National Botanical Garden; $35^{\circ}44'19.91''$ N, $51^{\circ}10'52.49''$ E; 1265 m a.s.l.; 14 May 2010; TMUC-HBMMP0530.

Distribution in Iran

Alborz, Guilan, Tehran and Qazvin Provinces (present study). New record from Iran.

Microplitis viduus (Ruthe, 1860)

Microgaster viduus Ruthe, 1860: 134.

Distribution in Iran

Qazvin Province (Ghahari *et al.* 2011b).

Microplitis xanthopus (Ruthe, 1860)

Microgaster xanthopus Ruthe, 1860: 147.

Microgaster tenuipes Thomson, 1895: 2246.

Distribution in Iran

No locality cited (Belokobylskij *et al.* 2019).

Discussion

The present study is the first faunistic overview of the genus *Microplitis* of Iran, in which we present a key for the identification of all known Iranian species. Our samples were collected from five provinces of northern Iran including Alborz, Qazvin, Guilan, Tehran and Mazandaran. The sampled regions in

Table 1. Updated list of the species of *Microplitis* Förster, 1862 (Hymenoptera: Braconidae, Microgasterinae) recorded from Iran.

Parasitoid species	References
<i>Microplitis aduncus</i> (Ruthe, 1860)	Papp (1984)
<i>Microplitis albipennis</i> Abdinbekova, 1969	Samin <i>et al.</i> (2018)
<i>Microplitis alborziensis</i> Abdoli & Talebi sp. nov.	present study
<i>Microplitis cebes</i> Nixon, 1970	present study
<i>Microplitis decipiens</i> Prell, 1925	Gadallah <i>et al.</i> (2015)
<i>Microplitis deprimator</i> (Fabricius, 1798)	Nixon (1968)
<i>Microplitis docilis</i> Nixon, 1970	present study
<i>Microplitis eremitus</i> Reinhard, 1880	present study
<i>Microplitis fulvicornis</i> (Wesmael, 1837)	Karimi-Malati <i>et al.</i> (2014)
<i>Microplitis kaszabi</i> Papp, 1980	present study
<i>Microplitis mandibularis</i> Thomson, 1895	Samin <i>et al.</i> (2018), present study
<i>Microplitis marshallii</i> Kokujev, 1898	Gadallah <i>et al.</i> (2015)
<i>Microplitis mediator</i> (Haliday, 1834)	Belokobylskij <i>et al.</i> (2019)
<i>Microplitis ochraceus</i> Szepligeti, 1896	Farahani <i>et al.</i> (2014c), present study
<i>Microplitis pallidipennis</i> Tobias, 1964	present study
<i>Microplitis rufiventris</i> Kokujev, 1914	Farahani <i>et al.</i> (2014c), present study
<i>Microplitis scrophulariae</i> Szepligeti, 1898	Ghahari <i>et al.</i> (2011c)
<i>Microplitis sofron</i> Nixon, 1970	Samin <i>et al.</i> (2019)
<i>Microplitis spectabilis</i> (Haliday, 1834)	Ghahari <i>et al.</i> (2011b), present study
<i>Microplitis spinolae</i> (Nees, 1834)	Nixon (1970), present study
<i>Microplitis tuberculifer</i> (Wesmael, 1837)	Ghahari <i>et al.</i> (2011a), present study
<i>Microplitis varipes</i> (Ruthe, 1860)	present study
<i>Microplitis viduus</i> (Ruthe, 1860)	Ghahari <i>et al.</i> (2011b)
<i>Microplitis xanthopus</i> (Ruthe, 1860)	Belokobylskij <i>et al.</i> (2019)

this study belong to the Irano-Anatolian and Caucasus hotspots, which are expected to have the highest biodiversity in Iran (Kiani *et al.* 2017). According to previous studies, 17 species of *Microplitis* had been reported from Iran (Farahani *et al.* 2016; Samin *et al.* 2018; Fernandez-Triana *et al.* 2020). In the present study, thirteen species were collected and identified, including six new records for the Iranian fauna and one new species. Two species, *M. kaszabi* and *M. pallidipennis*, are new records for the west Palaearctic region. The updated checklist of *Microplitis* from Iran now consists of 24 species (Table 1).

In the present study, Malaise traps were set up in protected areas in five provinces and collection was made during the same period uniformly (from March to November of 2010 and 2011). During the collection period, two Malaise traps in Ziaz (Gilan Province) and Tangevaz (Mazandaran Province) were damaged by wild animals, and replaced by new ones. The Alborz Mountains separate the tropical Caspian Sea area (Gilan and Mazandaran Provinces) from Alborz, Tehran and Qazvin Provinces. Gilan and Mazandaran Provinces are located on the northern slopes of the Alborz Mountains with humid subtropical climate, annual rainfall of about 1500 mm, moderate temperature and high relative humidity leading to diverse vegetation. Alborz, Tehran and Qazvin Provinces are located on the southern slopes of Alborz Mountains with semi-arid steppe climate and annual rainfall of about 300 mm. A total of 290 specimens of the genus *Microplitis* were collected in northern Iran, representing 13 species. The

Table 2. Distribution of collected *Microplitis* Förster, 1862 (Hymenoptera: Braconidae, Microgasterinae) species in northern Iran (present study).

Species	provinces														Number of specimens	Frequency of species (%)								
	Alborz	Guilan	Mazandaran	Qazvin	Tehran	Arangeh	Sarziarat	Shahrestanak	Karadj	Eshman Kamachal	Ghazichak	Orkom	Ziaz	Faculty of natural resources			Gaznasara	Joorband	Tangevaz	Loshan	Zeresh Roud	Peyskanshahr	Shahrjar	
<i>M. alborziensis</i> sp. nov.	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1.03
<i>M. cebes</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3	1.03
<i>M. docilis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3	1.03
<i>M. eremitus</i>	-	-	-	-	-	2	3	-	-	-	-	-	-	-	-	5	15	1	1	-	-	-	27	9.31
<i>M. kaszabi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2	0.69
<i>M. mandibularis</i>	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1.38
<i>M. ochraceus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	0.34
<i>M. pallidipennis</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.34
<i>M. rufiventris</i>	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.69
<i>M. spectabilis</i>	15	7	-	-	-	28	49	4	-	-	49	4	-	-	-	3	-	-	1	-	-	107	36.94	
<i>M. spinolae</i>	-	-	-	-	-	2	1	4	-	-	1	4	-	-	-	-	-	-	-	-	1	-	8	2.76
<i>M. tuberculifer</i>	6	2	17	1	2	15	16	22	7	3	16	22	7	3	2	10	-	-	-	2	2	105	36.26	
<i>M. varipes</i>	-	-	2	-	-	10	3	-	-	-	3	-	-	-	-	-	-	-	8	1	-	24	8.28	
Total	21	15	20	5	2	57	72	30	7	3	72	30	7	3	7	28	4	11	1	1	7	290	100	
No. and % of specimens per province	61	61	61	61	61	61	61	61	61	61	61	61	61	45	45	45	45	15	15	8	8	290		
	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(21.03)	(15.52)	(15.52)	(15.52)	(15.52)	(5.17)	(5.17)	(2.76)	(2.76)	290		

collection data set was showing a huge variation in the number of specimens per site (ranging from one to 72 specimens). Two hundred six specimens (71.03%) were collected from the northern slopes of the Alborz Mountains. The largest number of specimens was found in Orkom (72 specimens, 24.82%) followed by Ghazichak (57 specimens, 19.66%) in Gilan Province. Eight species were only found on the southern slopes of the Alborz Mountains with low populations (Table 2). Our findings showed that *M. tuberculifer* with 36.3% and *M. spectabilis* with 36.9% of all collected specimens were the most commonly collected species. *Microplitis tuberculifer* was widely distributed in most locations and seems to be a common species in northern Iran. Of the five provinces sampled in this research, Guilan yielded more than 50% of the total number of collected specimens (Table 2). The 24 species of *Microplitis* recorded from Iran represent 22.2% of all recorded species in the Palearctic region (108 species). The number of species of *Microplitis* in countries adjacent to Iran is recorded as: 58 species in Russia, 30 species in Turkey, 17 species in Turkmenistan, three species in Afghanistan and four species in Tajikistan (Fernandez-Triana *et al.* 2020).

The genus *Microplitis* is a difficult group for taxonomic studies because its species are similar and in most of the available keys related to this genus in the Palearctic region, the species are usually separated by colouration of the body (e.g., Papp 1984; Tobias 1986). Adding DNA barcoding data will improve the accuracy of identifications in the future.

Since Iran is a large country with various geographical regions, additional new records and species are expected to be found from the region in future studies, and thus this checklist will need to be periodically updated. Finally, more research on *Microplitis* is required to identify biological attributes for their potential use in pest control, or to protect and conserve them.

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