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New data on the subfamily Opiinae (Hymenoptera: Braconidae) from Iran

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Abstract

Specimens of the Opiinae subfamily (Hymenoptera: Braconidae) were collected using Malaise traps during 2010–2011 in Northern Iran (Alborz, Guilan, Mazandaran, Qazvin and Tehran provinces). A total of 32 species belonging to 12 genera were identified, of which 11 species are new records for the fauna of Iran: *Apodesmia posticatae* (Fischer, 1957), *Apodesmia striatula* (Fischer, 1957), *Biosteres* (*Chilotrichia*) *advectus* Papp, 1979, *Bitomus* (*Bitomus*) *multipilis* Fischer, 1990, *Desmiostoma parvulum* (Wesmael, 1835), *Opius* (*Misophthora*) *rufimixtus* Fischer, 1958, *Opius* (*Opiothorax*) *phytobiae* Fischer, 1959, *Opius* (*Misophthora*) *mischa* Fischer, 1968, *Opius* (*Opiothorax*) *attributus* Fischer, 1962, *Phaedrotoma pseudonitida* (Fahringer, 1943) and *Utetes curtipectus* (Fischer, 1958). In addition, 21 species are new provincial records. Local and global distributions of all 32 species as well as diagnostic characters of each of the newly recorded species are provided.

Key words: parasitoid wasps, fauna, diagnosis, Malaise traps, Northern Iran

Introduction

Braconidae (Hymenoptera) is one of the most fascinating, diverse and beneficial groups of insects (Quicke 2015). Most species from Iran have been recorded within the last decade, resulting an increase in the species number from 202 (Fallahzadeh & Saghaei 2010) to about 900 species (Farahani *et al*. 2016; Gadallah *et al*. 2016; Ranjbar *et al*. 2016; Samin *et al*. 2018; Safahani *et al*. 2018; Dolati *et al*. 2018, 2019; Abdoli *et al.* 2019a, b; Zargar *et al*. 2019a, b, c, 2020).

Within the Braconidae, the Opiinae is one of the largest subfamilies containing about 2063 described species worldwide (Yu *et al*. 2016). Opiinae are important for biological control of Diptera, mostly belonging to the families Agromyzidae, Anthomyiidae, Drosophylidae, Ephydridae and Tephritidae (Shaw & Huddleston 1991). *Opius* Wesmael, 1835 is the largest genus of Opiinae with 38 subgenera and more than 1000 described species worldwide (Yu *et al*. 2016). Some species are recognized as important biocontrol factors of leaf-miner flies (Agromyzidae) and fruit flies (Tephritidae) (Belokobylskij *et al*. 2003, Yu *et al*. 2016).

First species of Opiinae from Iran were reported by Fischer (1960, 1963, 1990, 2001). Since then, seven species from four genera (*Eurytenes*, *Fopius*, *Opius* and *Phaedrotoma*) have been recorded by Fallahzadeh & Sadeghi (2010). Ameri *et al*. (2014) reported 15 species of the genus *Opius*, of which 11 were new records for Iran. Gadallah *et al*. (2016) published a checklist of Iranian Opiinae, including 101 species belonging to 11 genera. Later, Ranjbar *et al*. (2016) reported 11 species from Kerman province (South-Eastern Iran), of which three species: *Biophthora bajula* (Haliday, 1837), *Opius* (*Opius*) *circinus* Papp, 1979, and *Opius* (*Odontopoea*) *paranivens* Fischer, 1990 were

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recorded for the first time from Iran. Recently, several studies have been carried out on Iranian Opiinae resulted a significant increasing the number of species (Safahani *et al*. 2018; Peris-Felipo *et al.* 2018; Dolati *et al.* 2018, 2019).

Although several studies have been carried out on the fauna of Iranian Braconidae in the last decade, our knowledge on the species diversity of Iranian Opiinae remains incomplete. Therefore, the aim of the present work is to increase our knowledge about this large group of parasitoid wasps in Iran.

Material and methods

This study was carried out in Northern Iran (Alborz, Guilan, Mazandaran, Qazvin and Tehran provinces) from April to November 2010 and 2011. Specimens were collected by Malaise traps installed in different ecosystems. Specimens were preserved in 75% ethanol until preparation. The dried specimens were card-mounted and treated according to the method of van Achterberg (2009) and labeled. Specimens were photographed with an Olympus™ SZX9 stereomicroscope equipped with a Canon (EOS 550D) digital camera. A series of 4–5 captured images were stacked into a single in-focus image using Combine ZP 1.0 software. Morphological terminology follows Karlsson & Ronquist (2012) and Wharton (2006). The specimens were identified at species level using the keys provided by Fischer (1972a, b, 1974, 1991, 1995, 1996, 1998, and 1999), Tobias & Jakimavicius (1986), Papp (1978, 1979, 1982), van Achterberg (1997), and Fischer & Beyarslan (2005a, b). All specimens are deposited in the Insect Collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran (TMUC).

Results

In the present study, 32 species within 12 genera of Opiinae were collected and identified from Northern Iran, of which 11 species: *Apodesmia posticatae* (Fischer, 1957), *Apodesmia striatula* (Fischer, 1957), *Biosteres (Chilotrichia) advectus* Papp, 1979, *Bitomus (Bitomus) multipilis* Fischer, 1990, *Desmiostoma parvulum* (Wesmael, 1835), *Opius (Misophthora) rufimixtus* Fischer, 1958, *Opius (Opiothorax) phytobiae* Fischer, 1959, *Opius (Misophthora) mischa* Fischer, 1968, *Opius (Opiothorax) attributus* Fischer, 1962, *Phaedrotoma pseudonitida* (Fahringer, 1943) and *Utetes curtipectus* (Fischer, 1958) are reported for Iranian fauna for the first time.

Genus *Apodesmia* Forster, 1863

Apodesmia posticatae (Fischer, 1957)

Material collected: Iran, Guilan province: Ziaz (36°52′27″N, 50°13′24″E, 490 m a.s.l.), 11.X.2011, 1♀, leg.: M. Khayrandish**.**

Diagnosis (Female): Body length 3.1 mm (Fig. 1A); antenna 1.5× as long as body, with 30 antennomeres; head transverse, temple roundly narrowed behind eye, somewhat shorter than longitudinal diameter of eye (Fig. 1B); face slightly wider than high (Fig. 1C); width of clypeus 2.0× its maximum height (Fig. 1C); mandibles uniformly broadened basally; oral cavity well developed (Fig. 1C); notauli entirely absent (Fig. 1D); medio-posterior mesoscutal depression elongate (Fig. 1D); scutellum entirely smooth (Fig. 1D); mesosoma 1.25× longer than its maximum height (Fig. 1E); mesopleuron smooth, mesepimeral sulcus on posterior margin of mesopleuron smooth (Fig. 1E), precoxal sulcus crenulate (Fig. 1E); pterostigma cuneate, m-cu vein postfurcal, 3RSa vein longer than 2RS vein (Fig. 1F); length of hind femur 5.0× its maximum width (Fig. 1G); propodeum somewhat rugose, without transverse ridge (Fig. 1H); first metasomal tergite 1.5× its maximum width at apex (Fig. 1I); second metasomal tergite entirely smooth (Fig. 1J); first metasomal tergite black, remaining metasomal tergites dark brownish yellow (Fig. 1J); ovipositor sheaths extended beyond apex of metasoma (Fig. 1J).

Distribution in Iran: Guilan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

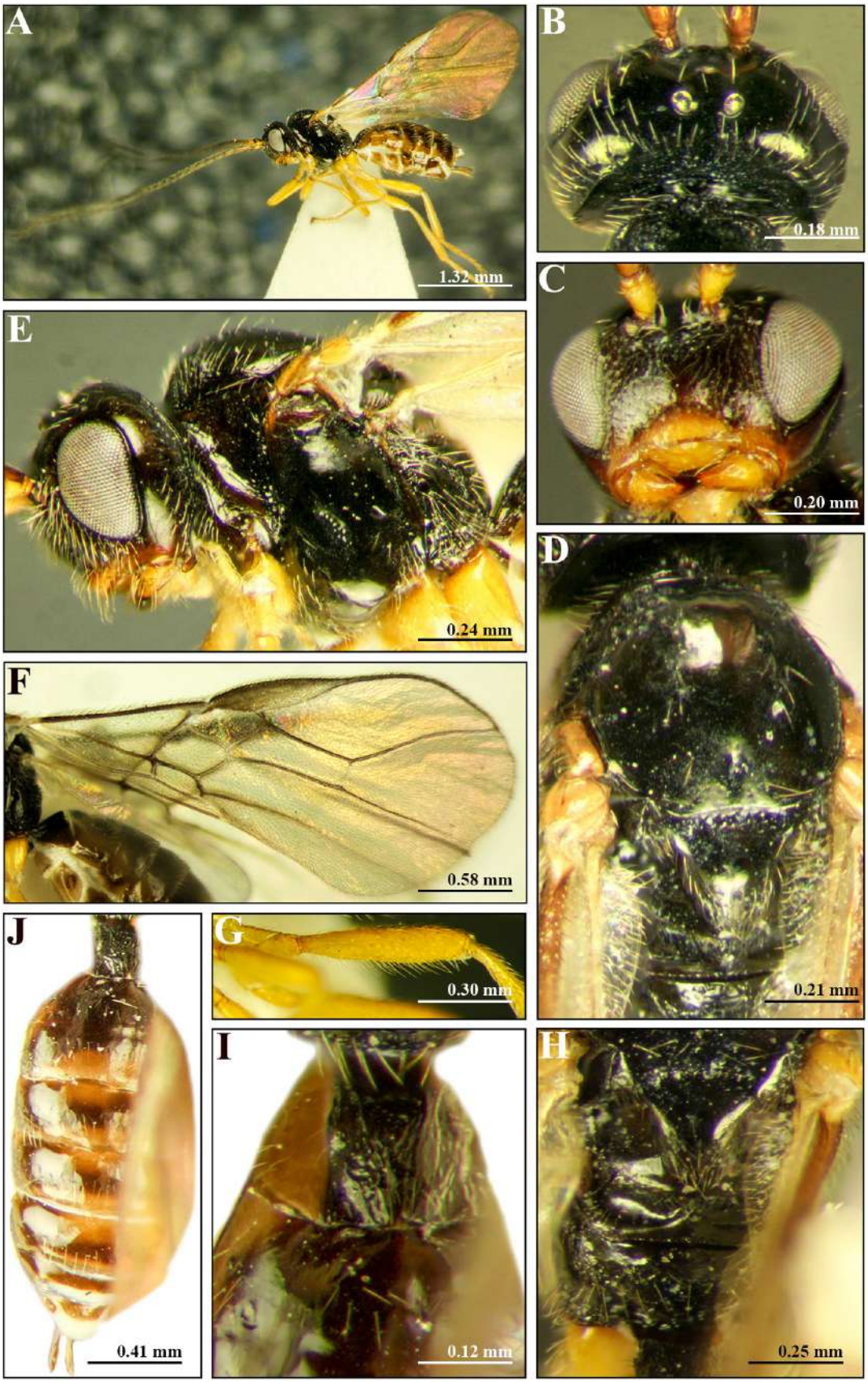

FIGURE 1. *Apodesmia posticatae* (Fischer, 1957): A. Habitus, lateral view; B. Head, dorsal view; C. Head, frontal view; D. Mesosoma, dorsal view; E. Mesosoma, lateral view; F. Fore wing; G. Hind leg, H. Propodeum, dorsal view; I. First metasomal tergite, dorsal view; J. Metasoma, dorsal view**.**

Apodesmia similis **(Szepligeti, 1898)**

Material collected: Iran, Guilan province: Orkom (36°45′44″N, 50°18′11″E, 1201 m a.s.l.), 17.V.2010, 1♀; Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 702 m a.s.l.), 26.VII.2011, 1♀; Mazandaran province: Joorband (36°26′17″N, 52°07′16″E, 272 m a.s.l.), 26.IX.2011, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Golestan (Sakenin *et al*. 2012), Lorestan (Farahani *et al*. 2016), Kerman (Safahani *et al*. 2018), and Guilan and Mazandaran (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Apodesmia striatula **(Fischer, 1957)**

Material collected: Iran, Guilan province: Ziaz (36°52′27″N, 50°13′24″E, 490 m a.s.l.), 11.X.2011, 1♀, leg.: M. Khayrandish.

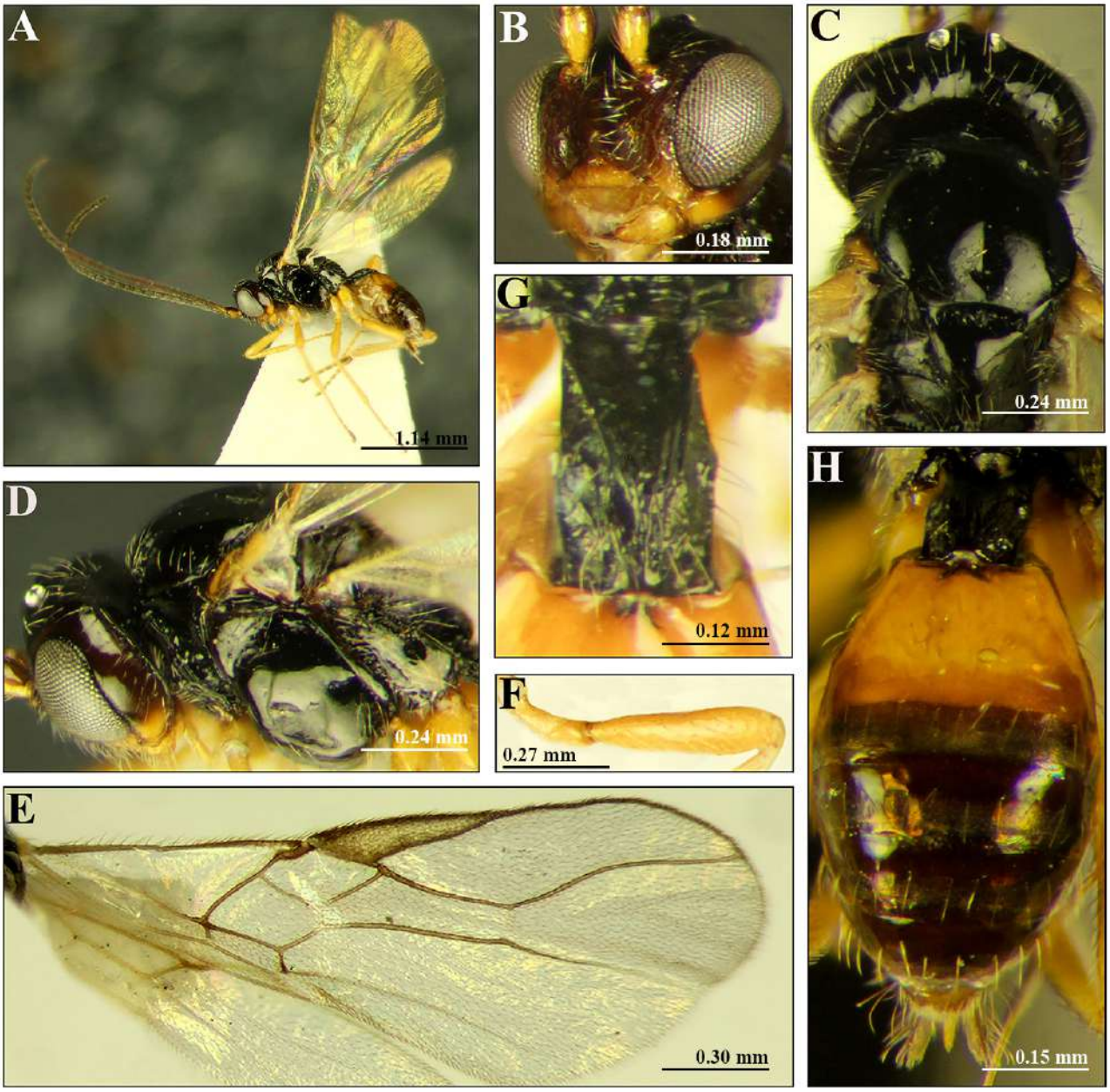

FIGURE 2. *Apodesmia striatula* (Fischer, 1957): A. Habitus, lateral view, B. Head, frontal view; C. Mesosoma, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Hind leg, lateral view; G. First metasomal tergite, dorsal view; H. Metasoma, dorsal view.

Diagnosis (Female): Body length 2 mm (Fig. 2A); face with usual pubescence (Fig. 2B); oral cavity developed (Fig. 2B); mandibles gradually broadened basally (Fig. 2B); medio-posterior mesoscutal depression elongate (Fig. 2C); mesosoma 1.5× its maximum height (Fig. 2D); precoxal sulcus smooth (Fig. 2D); pterostigma long-cuneate, 3RSa vein 1.7–1.8× as long as 2RS vein, m-cu vein postfurcal, lower side of discoidal cell 1.5× as long as m-cu vein (Fig. 2E); length of hind femur 5.0× its maximum width (Fig. 2F); propodeum rugose or with granulose sculpture; first metasomal tergite 1.5× longer than its width at apex (Fig. 2G); metasoma black except second tergite yellow (Fig. 2H); ovipositor sheaths barely extended beyond apex of metasoma (Fig. 2H).

Distribution in Iran: Guilan province (current study).

General distribution: Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

Apodesmia uttoisimilis (Fischer, 1999)

Material collected: Iran, Qazvin province: Loshan (36°40′14″N, 49°25′38″E, 295 m a.s.l.), 4.III.2011, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Isfahan province (Farahani *et al*. 2016) and Qazvin province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Biosteres* Forster, 1863

Biosteres (*Chilotrichia*) *advectus* Papp, 1979

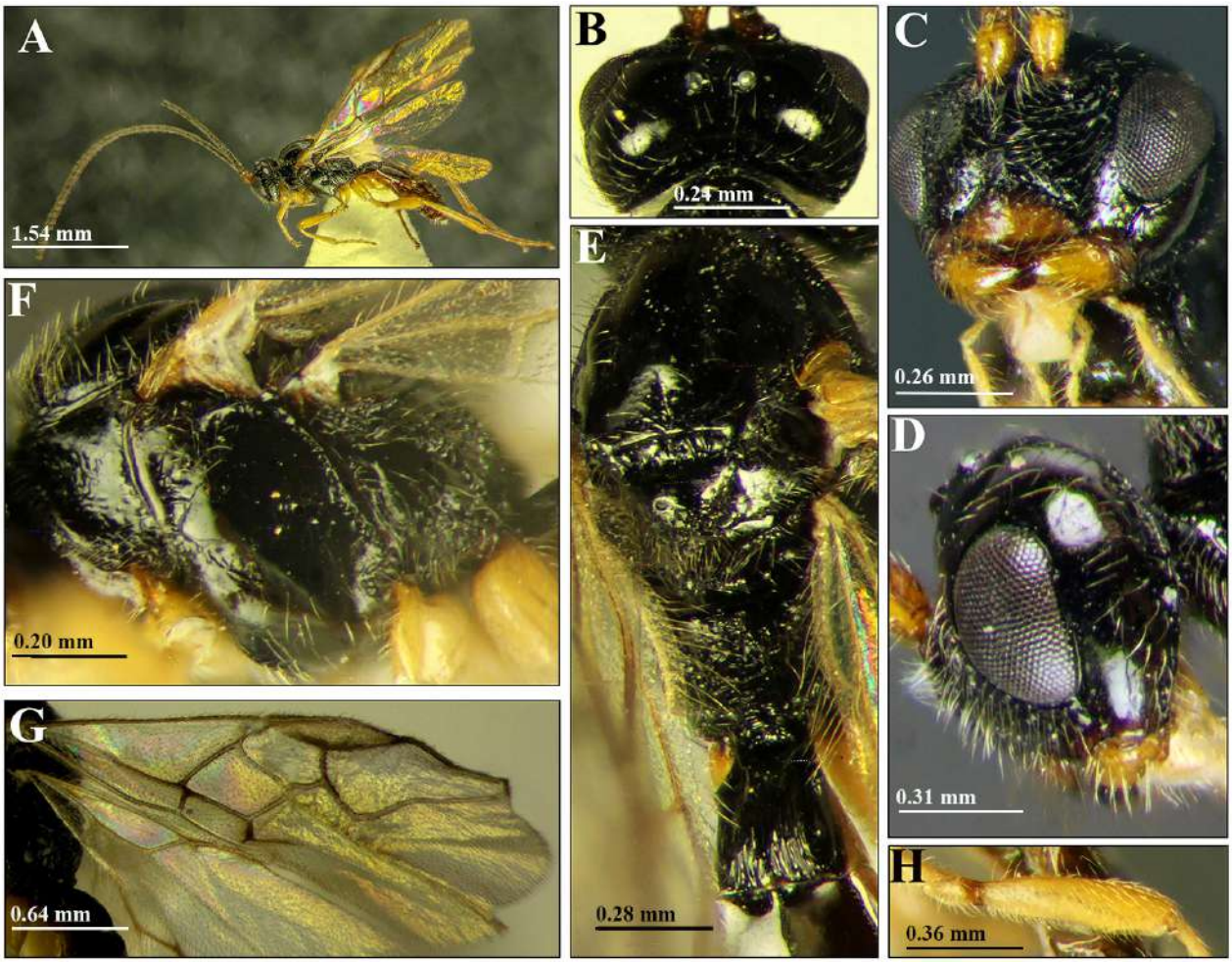

FIGURE 3. *Biosteres* (*Chilotrichia*) *advectus* Papp, 1979: A. Habitus, lateral view; B. Head, dorsal view; C. Head, frontal view; D. Head, lateral view; E. Mesosoma, dorsal view; F. Mesosoma, lateral view; G. Fore wing; H. Hind leg, lateral view.

Material collected: Iran, Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 692 m a.s.l.), 5.IX.2011, 1 ♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 2.7 mm (Fig. 3A); antenna with 37 antennomeres, longer than body; head behind eyes not narrowed (Fig. 3B); width of clypeus 2.0× its maximum height, with long hair (Fig. 3C); mandibles gradually widened basally (Fig. 3C); oral cavity not developed (Fig. 3C); length of eye in dorsal view as long as temple (Fig. 3D); mesonotum with medio-posterior mesoscutal depression (Fig. 3E); notauli smooth (Fig. 3E); precoxal sulcus crenulate or rugose (Fig. 3F); pterostigma narrow, elongate, 3RSa vein as long as 2RS vein, m-cu vein interstitial, vein r originating almost middle of pterostigma, marginal cell almost reaching apex of wing (Fig. 3G); first metasomal tergite 1.3× as long as its width at apex, gradually narrowing toward base; metasomal tergites black, metasomal sternites light brown; legs brownish yellow (Fig. 3H); ovipositor sheaths short and not extended beyond apex of metasoma .

Distribution in Iran: Mazandaran Province (current study).

General distribution: Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

Biosteres (*Chilotrichia*) *blandus* (Haliday, 1837)

Material collected: Iran, Mazandaran province: Joorband (36°26′17″ N, 52°07′16″ E, 272 m a.s.l.), 9.VI.2011, 1 ♀, leg.: M. Khayrandish.

Distribution in Iran: Kermanshah Province (Farahani *et al*. 2016) and Mazandaran Province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Bitomus* Szepligeti, 1910

Bitomus (*Bitomus*) *multipilis* Fischer, 1990

Material collected: Iran, Alborz province: Karaj (35°46′20″N, 50°56′44″E, 1278 m a.s.l.), 8.VI.2010, 1 ♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 1.1 mm (Fig. 4A); antenna a little longer than the body; width of head (dorsal view) 2.1× as long as its length; width of clypeus 2.6× its maximum height (Fig. 4B); oral cavity developed (Fig. 4B); longitudinal diameter of eye 1.8×longer than temple (Fig. 4C); mesosoma 1.3× times its maximum height (Fig. 4D); precoxal sulcus narrow, crenulate (Fig. 4D); scutellar sulcus deep (Fig. 4E); pterostigma cuneate, vein r 0.3× as long as pterostigma wide, forming a straight line with 3RSa vein, 3RSa vein 1.5× as long as 2RS vein, 3RSb vein straight, 2.3× as long as 3RSa vein (Fig. 4F); length of hind femur 3.8× its maximum width (Fig. 4G); propodeum finely rugose; metasomal tergits entirely smooth; first metasomal tergite black, remaining metasomal tergites reddish yellow; legs yellow; ovipositor sheaths as long as first metasomal tergite.

Distribution in Iran: Alborz Province (current study).

General distribution: Hungary (Yu *et al*. 2016) and Iran (new record).

Genus *Desmiostoma* Forster, 1863

Desmiostoma parvulum (Wesmael, 1835)

Material collected: Iran, Qazvin province: Zereshk Road (36°21′39″N, 50°03′55″E, 1541 m a.s.l.), 20.V.2011, 2 ♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 1.7 mm, black, and smooth (Fig. 5A); antenna with 22 antennomeres; temples as long as length of eye in dorsal view (Fig. 5B), roundly narrowed (Fig. 5C); head half as long as its width in dorsal view (Fig. 5C) notauli only in anteriorly distinct (Fig. 5D); mesosoma 1.3× its maximum height (Fig. 5E); precoxal sulcus weakly sculptured (Fig. 5E); pterostigma cuneate (Fig. 5F); length of hind femur 5.0× its maximum width; first metasomal tergite 1.3× as long as its width at apex (Fig. 5G); metasoma black; legs yellow; ovipositor sheaths short and not extended beyond apex of metasoma.

Distribution in Iran: Qazvin province (current study).

General distribution*:* Afrotropical, Nearctic, Oceanic, Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

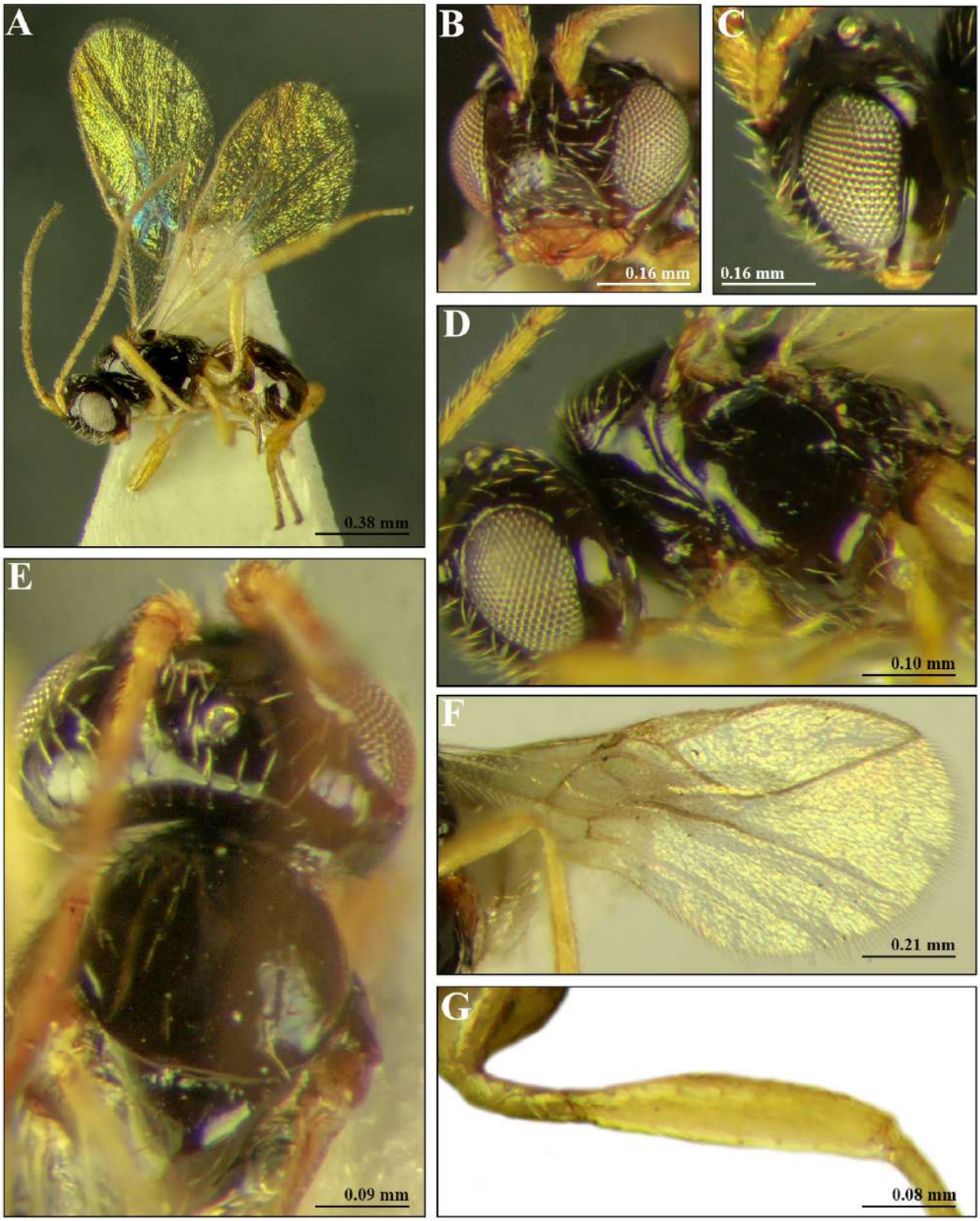

FIGURE 4. *Bitomus* (*Bitomus*) *multipilis* Fischer, 1990: A. Habitus, lateral view; B. Head, frontal view; C. Head, lateral view; D. Mesosoma, lateral view; E. Mesosoma, dorsal view; F. Fore wing; G. Hind leg, lateral view.

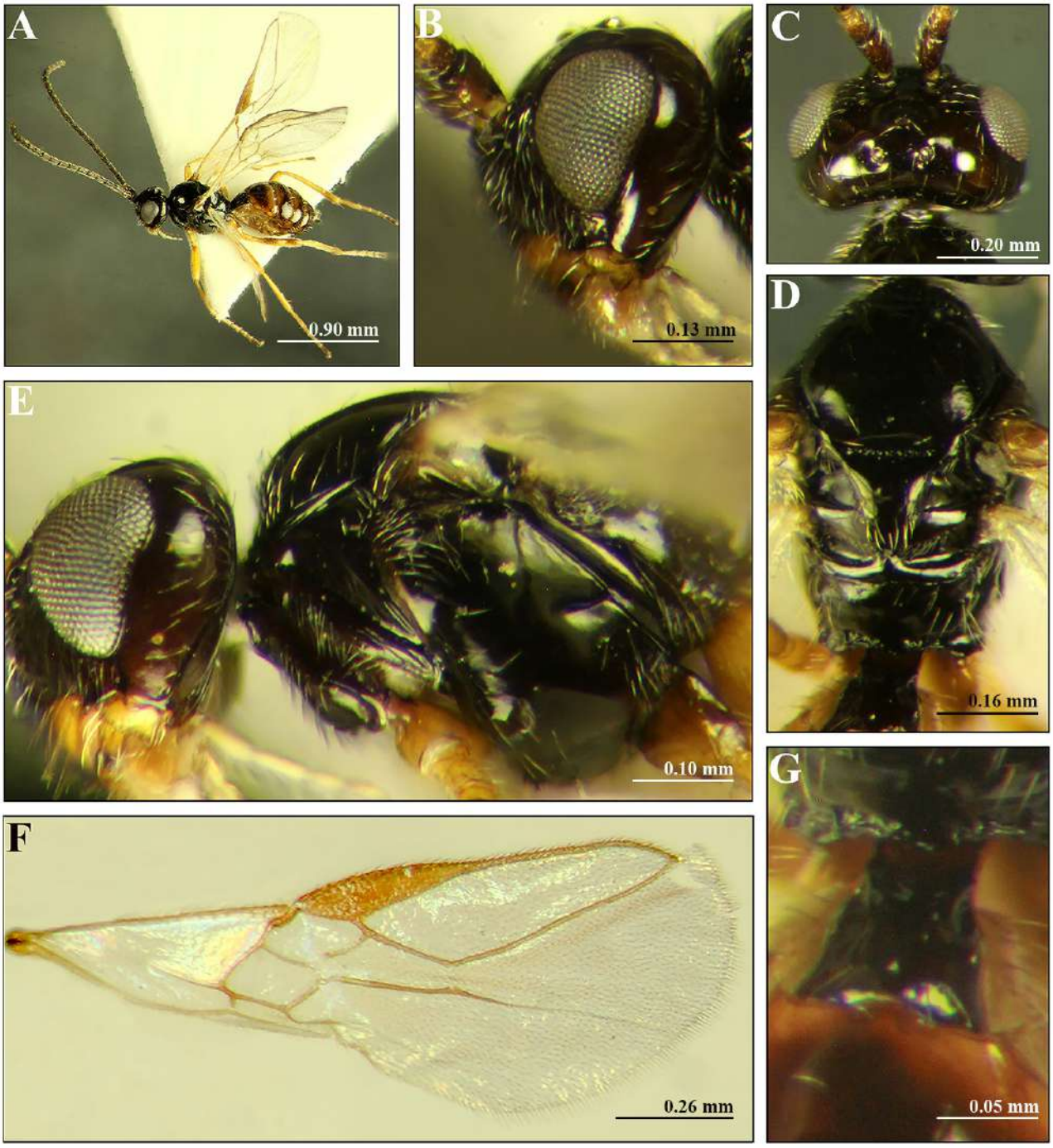

FIGURE 5. *Desmiostoma parvulum* (Wesmael, 1835): A. Habitus, dorsal view; B. Head, lateral view; C. Head, dorsal view; D. Mesosoma, dorsal view; E. Mesosoma, lateral view; F. Fore wing; G. First metasomal tergite, dorsal view.

Genus *Eurytenes* Forster, 1863

Eurytenes (*Eurytenes*) *abnormis* (Wesmael, 1835)

Material collected: Iran, Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 692 m a.s.l.), 19.VI.2011, 2 ♀, leg.: M. Khayrandish.

Distribution in Iran: West Azarbaijan province (Gadallah *et al*. 2016) and Mazandaran province (current study).

General distribution: Eastern and Western Palaearctic and Nearctic (Yu *et al*. 2016).

Genus *Opiostomus* Fischer, 1972

***Opiostomus* (*Snoflakopius*) *snoflaki* (Fischer, 1959)**

Material collected: Iran, Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 702 m a.s.l.), 27.VII.2011, 1 ♀, leg.: M. Khayrandish.

Distribution in Iran: Kermanshah province (Farahani *et al*. 2016) and Mazandaran province (current study).

General distribution: Eastern and Western Palaearctic and Oriental (Yu *et al*. 2016).

Genus *Opius* Wesmael, 1835

***Opius* (*Cryptonastes*) *pygmaeus* Fischer, 1962**

Material collected: Iran, Tehran province: Botanical Garden (35°44′19″N, 51°10′52″E, 1265 m a.s.l.), 4.V.2010, 1♀; Alborz province: karaj (35°46′20″N, 50°56′44″E 1278 m a.s.l.), 28.IV.2010, 1♀; Guilan province: Qazichak (36°45′57″N, 50°19′35″E 1803 m a.s.l.), 7.VI.2010, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Fars province (Lashkari Bod *et al*. 2011), Lorestan province (Farahani *et al*. 2016), Kerman province (Ranjbar *et al*. 2016; Safahani *et al*. 2018), Alborz, Guilan and Tehran provinces (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

***Opius* (*Hypocynodus*) *flavipes* Szepligeti, 1898**

Material collected: Iran, Guilan province: Qazichak (36°45′57″N, 50°19′35″E, 1803 m a.s.l.), 17.V.2010, 1 ♀, leg.: M. Khayrandish.

Distribution in Iran: Hormozgan province (Ameri *et al*. 2014), Kerman province (Safahani *et al*., 2018) and Guilan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

***Opius* (*Hypocynodus*) *robustus* Telenga, 1950**

Material collected: Iran, Alborz province: Sarziarat (35°55′10″N, 51°06′51″E, 1980 m a.s.l.), 28.VI.2010, 1 ♀, leg.: M. Khayrandish.

Distribution in Iran: Fars province (Lashkari Bod *et al*. 2011) and Alborz province (current study).

Distribution outside Iran: Eastern and Western Palaearctic (Yu *et al*. 2016).

***Opius* (*Misophthora*) *mischa* Fischer, 1968**

Material collected: Iran, Guilan province: Orkom (36°45′44″N, 50°18′11″E, 1201 m a.s.l.), 10.V.2010, 1 ♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 2.7 mm, black (Fig. 6A); antenna 1.3× as long as body, with 24 antennomeres; width of clypeus 3.0× its maximum height (Fig. 6B); oral cavity developed (Fig. 6B); mandibles abruptly broadened basally (Fig. 6B); width of head 2.0× its maximum height (dorsal view) (Fig. 6C); notauli distinct only in middle, mesonotum smooth (Fig. 6D); medio-posterior mesoscutal depression distinctly elongate, deep (Fig. 6D); mesosoma 1.3× its maximum height, without red coloration (Fig. 6E); precoxal sulcus entirely smooth (Fig. 6E); vein r originating from the basal fourth of pterostigma, 3RSa vein almost 2.0× as long as 2RS vein , 3RSb almost 2.0× as long as 3RSa , 3RSb vein terminating far before wing apex, pterostigma cuneate (Fig. 6F); length of hind femur 4.5× its maximum width, legs somewhat light yellow (Fig. 6G); propodeum at least in anterior part smooth (Fig. 6H); first metasomal tergite 1.3× as long as its width at apex, coarsely sculptured (Fig. 6H); ovipositor sheaths short and barely extended beyond apex of metasoma (Fig. 6I).

Distribution in Iran: Guilan province (current study).
General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

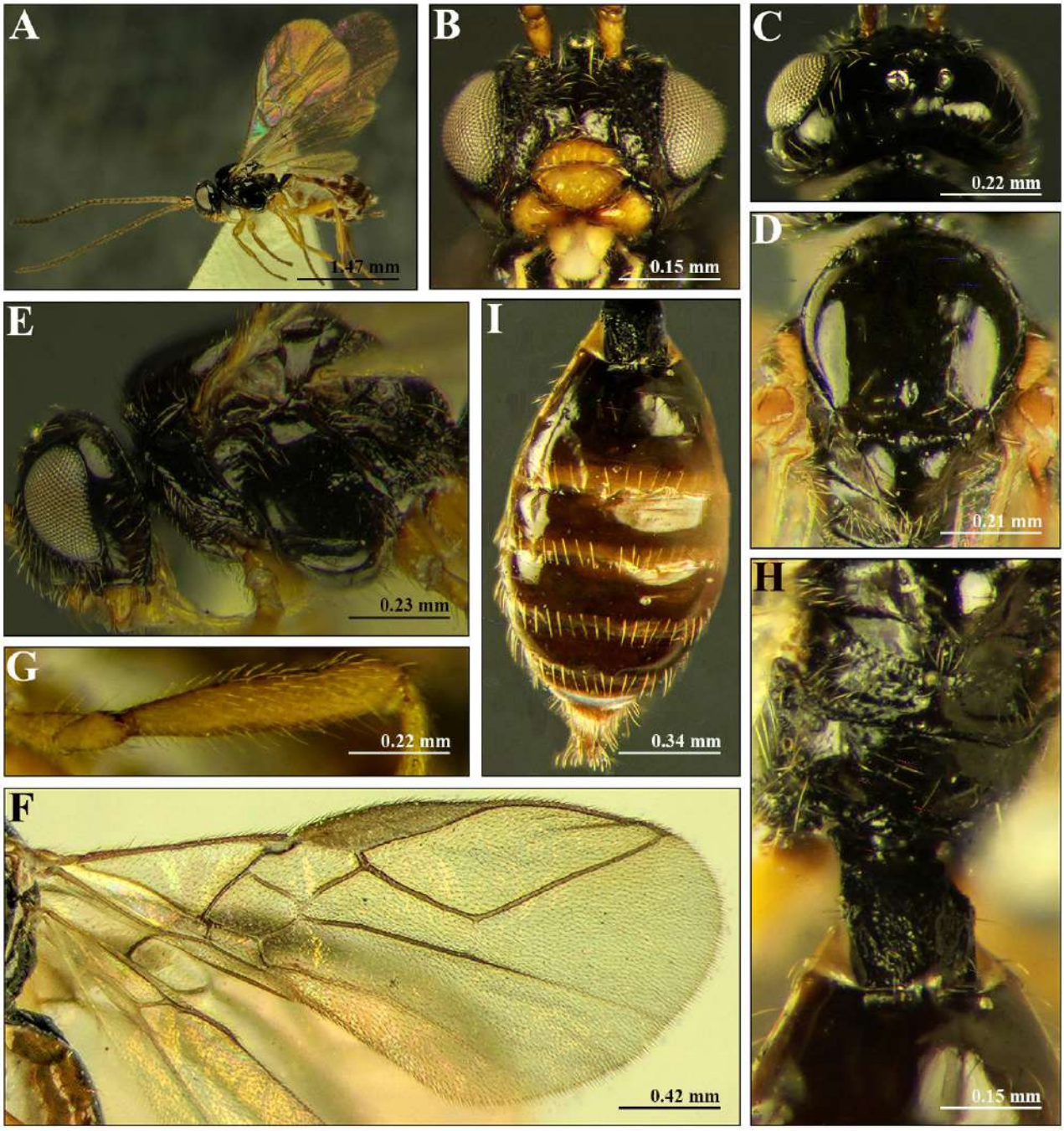

FIGURE 6. *Opius* (*Misophthora*) *mischa* Fischer, 1968: A. Habitus, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, dorsal view; E. Mesosoma, lateral view; F. Fore wing; G. Hind leg, lateral view; H. Propodeum, dorsal view; I. Metasoma, dorsal view.

Opius (*Misophthora*) *rufimixtus* Fischer, 1958

Material collected: Iran, Mazandaran province: Joorband (36°26′17″N, 52°07′16″E, 272 m a.s.l.), 5.XI.2011, 1♀; Qazvin province: Zereshk Road (36°22′14″N, 49°40′02″E, 1926 m a.s.l), 5.IX.2011, 1♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 1.8 mm, dark brownish red (Fig. 7A); antenna with 24 antennomeres, somewhat longer than body; oral cavity developed (Fig. 7B); mandibles gradually widened basally (Fig. 7B); temples half as long as length of eye in dorsal view (Fig. 7B); medio-posterior mesoscutal depression punctiform (Fig. 7C);

mesosoma with reddish dark brown pattern, its length 1.3× longer than its maximum height (Fig. 7D); precoxal sulcus entirely smooth (Fig. 7D); propodeum at least in anterior part smooth (Fig. 7E); pterostigma cuneate, 3RSa vein longer than 2RS vein (Fig. 7F); length of hind femur 3.3× its maximum width (Fig. 7G); ovipositor longer than half length of metasoma and clearly extended beyond apex of metasoma (Fig. 7H); apical half of metasomal tergites black (Fig. 7H).

Distribution in Iran: Mazandaran and Qazvin provinces (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

Opius (*Nosopoea*) *circulator* (Nees, 1834)

Material collected: Iran, Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 692 m a.s.l.), 5.IX.2011, 2♀, leg.: A. Nadimi**.**

Distribution in Iran: Guilan province (Farahani *et al*. 2016) and Mazandaran province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016)

Opius (*Opiothorax*) *attributus* Fischer, 1962

Material collected: Iran, Mazandaran province: Joorband (36°26′17″N, 52°07′16″E, 272 m a.s.l.), 10.X.2011, 1♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 1.8 mm (Fig. 8A); antenna 1.5× as long as body, with 32 antennomeres; clypeus narrow falcate, oral cavity developed (Fig. 8B); mandibles abruptly widened basally (Fig. 8B); mesonotum with usual structure, without medio-posterior mesoscutal depression (Fig. 8C); mesosoma 1.4× its maximum height (Fig. 8D); precoxal sulcus smooth (Fig. 8D); propodeum with distinct longitudinal ridge (Fig. 8E); pterostigma cuneate, 2nd submarginal cell and 3RSa vein longer, 3RSa vein less than 2.0× as long as 2RS vein (Fig. 8F); length of hind femur 4.0-5.0× its maximum width (Fig. 8G); first metasomal tergite 1.5× as long as its width at apex (Fig. 8H); first and second metasomal tergites yellow, remaining metasomal tergites dark brown, metasomal tergites smooth except first tergite rugose (Fig. 8H); ovispositor sheaths short and not extended beyond apex of metasoma.

Distribution in Iran: Mazandaran province (current study).

General distribution: Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

Opius (*Opiothorax*) *levis* Wesmael, 1835

Material collected: Iran, Mazandaran province: Noor (36°34′52″N, 52°02′45″E, -14 m b.s.l.), 11.X.2011, 1♀, leg.: A. Mohammadi.

Distribution in Iran: Fars province (Lashkari Bod *et al*. 2011), Sistan & Baluchestan province (Khajeh *et al*. 2014), Isfahan province (Farahani *et al*. 2016), Kermanshah province (Gadallah *et al*. 2016) and Mazandaran province (current study).

General distribution: Afrotropical, Eastern and Western Palaearctic (Yu et al., 2016).

Opius (*Opiothorax*) *minusculae* Fischer, 1967

Material collected: Iran, Guilan province: Orkom (36°45′44″N, 50°18′11″E, 1201 m a.s.l.), 25.X.2010, 1♀; Orkom (36°45′44″N, 50°18′11″E, 1225 m a.s.l.), 31.V.2010, 1♀, leg.: A. Mohammadi.

Distribution in Iran: Hormozgan province (Ameri *et al*. 2014) and Guilan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

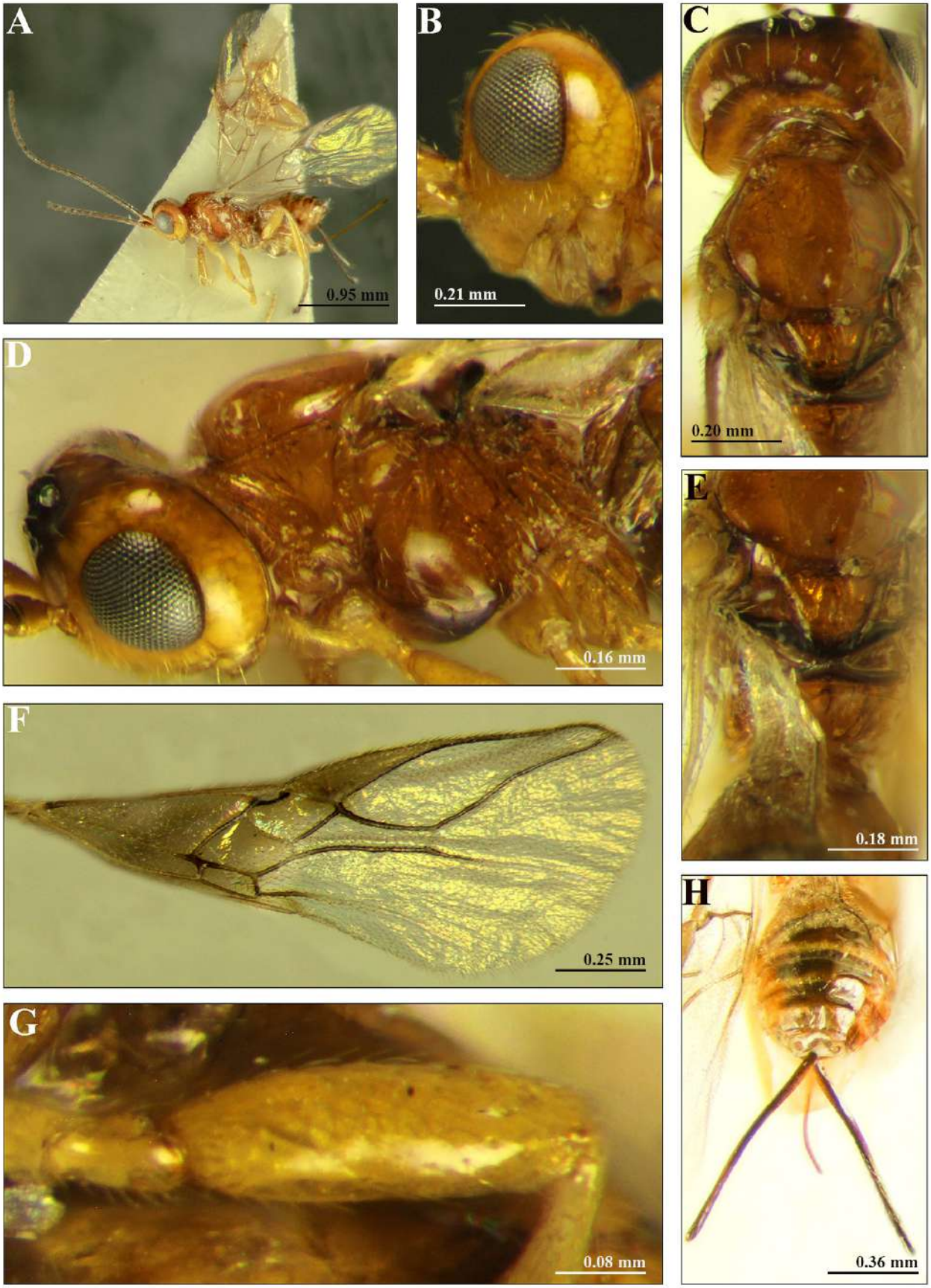

FIGURE 7. *Opius* (*Misophthora*) *rufimixtus* Fischer, 1958: A. Habitus, lateral view; B. Head, lateral view; C. Mesosoma, dorsal view; D. Mesosoma, lateral view; E. Propodeum, dorsal view; F. Fore wing; G. Hind leg, lateral view; H. Metasoma, dorsal view.

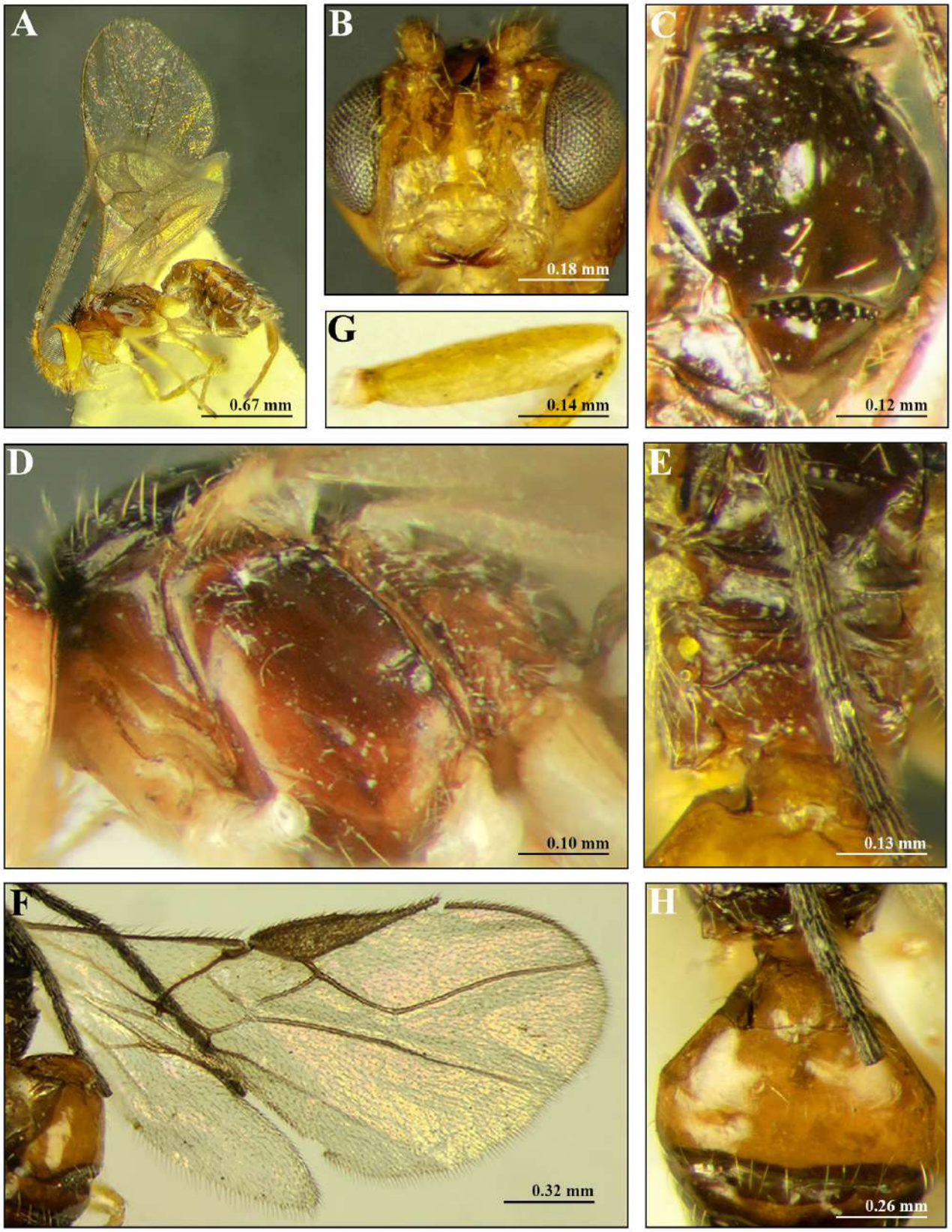

FIGURE 8. *Opius* (*Opiothorax*) *attributus* Fischer, 1962: A. Habitus, ateral view, B. Head, frontal view; C. Mesosoma, dorsal view; D. Mesosoma, lateral view; E. Propodeum, dorsal view; F. Fore wing; G. Hind leg, lateral view; H. Metasoma, dorsal view.

***Opius* (*Opiothorax*) *phytobiae* Fischer, 1959**

Material collected: Iran, Guilan province: Orkom (36°45′44″N, 50°18′11″E, 1201 m a.s.l.), 3.V.2010, 1♀, leg.: M. Khayrandish.

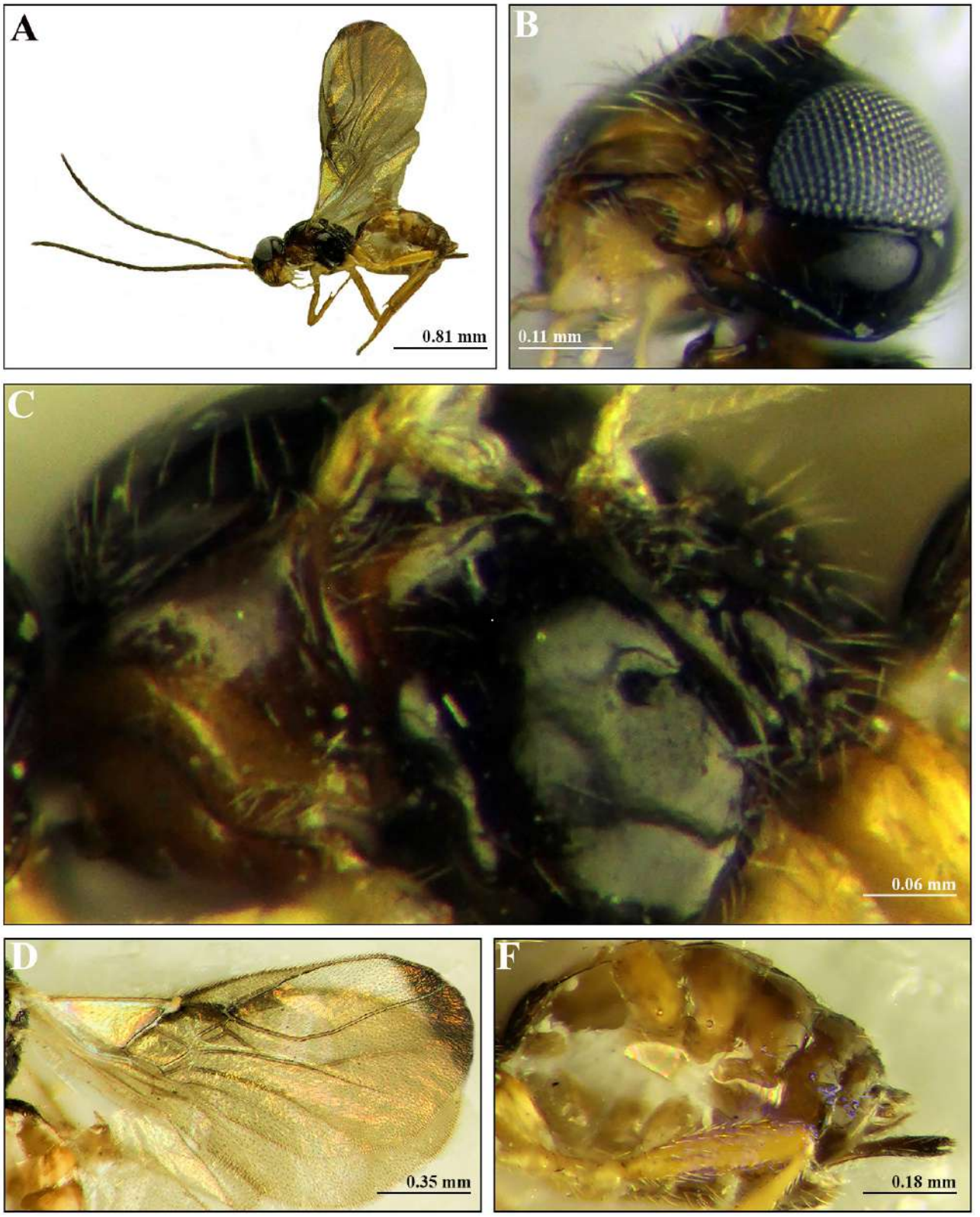

FIGURE 9. *Opius* (*Opiothorax*) *phytobiae* Fischer, 1959: A. Habitus, lateral view; B. Head, lateral view; C. Mesosoma, lateral view; F. Metasoma, lateral view; D. Fore wing.

Diagnosis (Female): Body length 1.9 mm (Fig. 9A); antenna 1.5× as long as body, with 22 antennomeres; head behind eyes not broadened; face black or very dark brown (Fig. 9B); clypeus narrow falcate (Fig. 9B); oral cavity developed (Fig. 9B); mandibles abruptly widened basally (Fig. 9B); mesosoma 1.3× its maximum height (Fig. 9C); precoxal sulcus not developed (Fig. 9C); mesonotum with usual structure, without medio-posterior mesoscutal depression; pterostigma cuneate; 3RSb vein 3.0× as long as 3RSa, marginal cell terminating near to apex of wing, m-cu vein almost interstitial, 2nd submarginal cell and 3RSa vein longer, 3RSa vein less than 2.0× as long as 2RS vein (Fig. 9D); length of hind femur 4.0× its maximum width (Fig. 9F); propodeum smooth; first metasomal tergite barely sculptured, remaining metasomal tergites smooth; metasoma yellow except first tergite black (Fig. 9F); ovipositor sheaths slightly extended beyond apex of metasoma (Fig. 9F).

Distribution in Iran: Guilan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

Opius (*Opius*) *lugens* Haliday, 1837

Material collected: Iran, Guilan province: Qazichak (36°45′57″N, 50°19′35″E, 1803 m a.s.l.), 13.IX.2010, 1♀, leg.: M. Khayrandish**.**

Distribution in Iran: Kermanshah province (Gadallah *et al*. 2016), Kerman province (Safahani *et al*. 2018) and Guilan province (current study).

General distribution: Afrotropical, Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Phaedrotoma* Forster, 1863

Phaedrotoma aethiops (Haliday, 1837)

Material collected: Iran, Guilan province: Qazichak (36°45′57″N, 50°19′35″E, 1803 m a.s.l.), 24.V.2010, 1♀, leg.: A. Mohammadi**.**

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

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Phaedrotoma pseudonitidus (Fahringer, 1943)

Material collected: Iran, Tehran province: shahriar (35°40′08″N, 50°56′56″E, 1168 m a.s.l.), 28.IX.2010, 1♀, leg.: M. Khayrandish.

Diagnosis (Female): Body length 1.6 mm (Fig. 10A); greater part of body dark brownish yellow (Fig. 10A); antannae longer than body, with 23 antennomeres; oral cavity developed (Fig. 10C); mandibles gradually broadened basally (Fig. 10C); mesonotum with usual structure, without medio-posterior mesoscutal depression (Fig. 10D); mesosoma 1.5× its maximum height (Fig. 10E); precoxal sulcus smooth (Fig. 10E); 3RSa vein longer than 2RS vein, marginal cell on forewing definitely not reaching apex of wing (Fig. 10F); propodeum smooth (Fig. 10G); metasoma posterior to 1st tergite sculptured (Fig. 10H); ovipositor sheaths slightly extended beyond apex of metasoma (Fig. 10J).

Distribution in Iran: Tehran province (current study).

General distribution: Bulgaria, Kazakhstan (Yu *et al*. 2016) and Iran (new record).

Phaedrotoma rex (Fischer, 1958)

Material collected: Iran, Guilan province: Qazichak (36°45′57″N, 50°19′35″E, 1803 m a.s.l.), 17.V.2010, 1♀, leg.: M. Khayrandish**.**

Distribution in Iran: Ardabil province (Farahani *et al*., 2016), Mazandaran province (Farahani *et al*., 2016), Kerman province (Safahani *et al*., 2018) and Guilan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*., 2016).

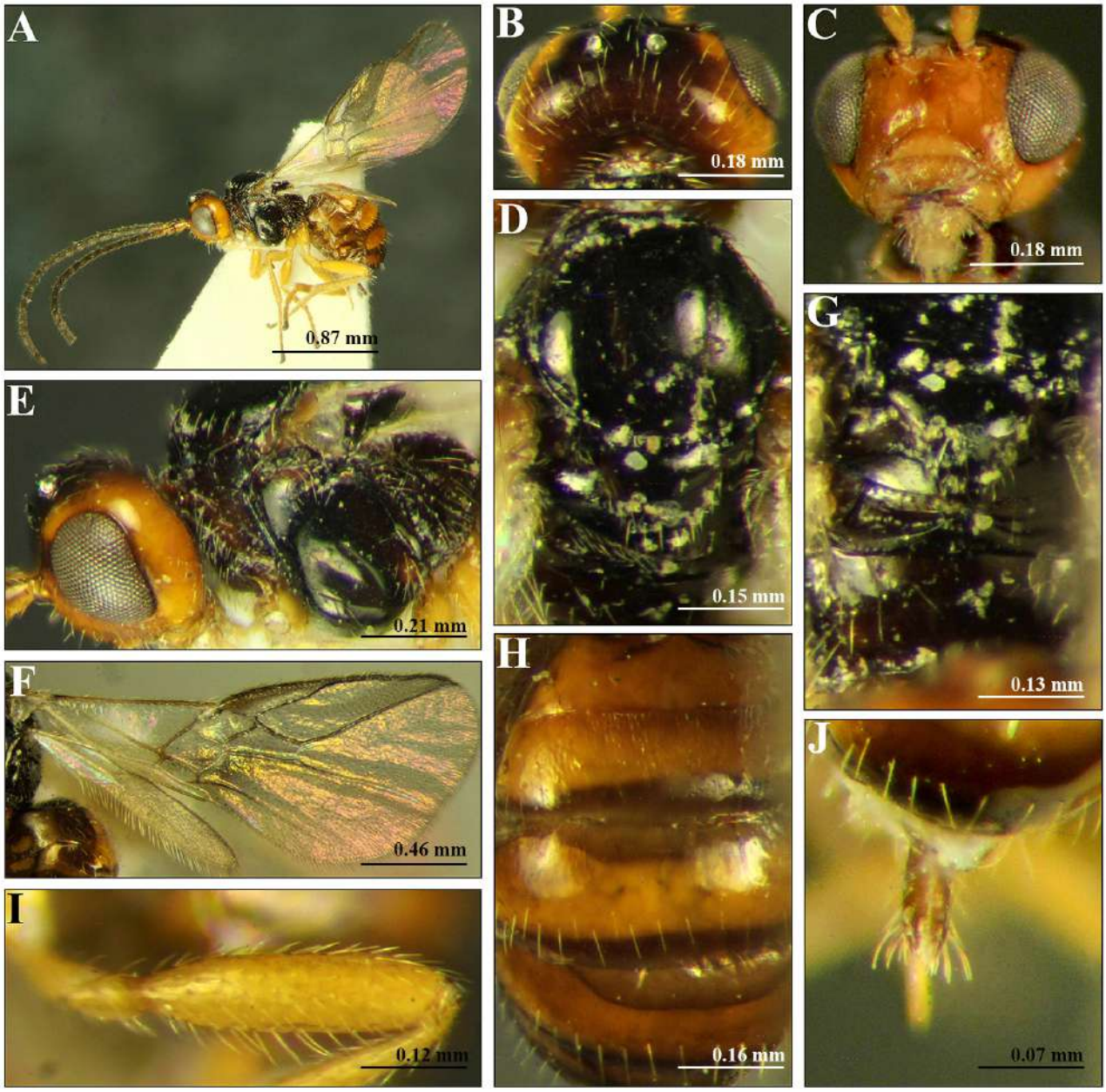

FIGURE 10. *Phaedrotoma pseudonitidus* (Fahringer, 1943): A. Habitus, lateral view; B. Head, dorsal view; C. Head, frontal view; D. Mesosoma, dorsal view; E. Mesosoma, lateral view; F. Fore wing; G. Propodeum, dorsal view; H. Metasoma, dorsal view; I. Hind leg, lateral view; J. Ovipositor sheath.

Phaedrotoma rudis (Wesmael, 1835)

Material collected: Iran, Guilan province: Ziaz (36°52′27″N, 50°13′24″E, 490 m a.s.l.), 27.IX.V.2010, 1♀; Ziaz (36°52′34″N, 50°13′17″E, 537 m a.s.l.), 10.V.2010, 1♀, leg.: M. Khayrandish

Distribution in Iran: Sistan & Baluchestan province (Khajeh *et al*. 2014), Kermanshah province (Gadallah *et al*. 2016, reported as *Opius (Xynobius) rudis*), and Guilan province (current study).

General distribution: Eastern and Western Palaearctic and Nearctic (Yu *et al*. 2016).

***Phaedrotoma staryi* (Fischer, 1958)**

Material collected: Iran, Guilan province: Orkom (36°45′44″N, 50°18′11″E, 1201 m a.s.l.), 26.IV.2010, 1♀; Mazandaran province: Gaznasara (36°16′56″N, 52°10′58″E, 2032 m a.s.l.), 26.IX.2011, 1♀; Guilan province: Ziaz (36°52′27″N, 50°13′24″E, 490 m a.s.l.), 8.XI.2010, 1♀, leg.: M. Khayrandish.

Dsitribution in Iran: Hormozgan province (Ameri *et al*. 2014), Guilan and Mazandaran provinces (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Pokomandya* Fischer, 1959

***Pokomandya curticornis* Fischer, 1959**

Material collected: Iran, Alborz province: Karaj (35°46′20″N, 50°56′44″E, 1278 m a.s.l.), 15.VI.2010, 1♀, leg.: M. Khayrandish.

Distribution in Iran: East Azarbaijan (Farahani *et al*. 2016) and Alborz province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Psyttalia* Walker, 1860

***Psyttalia* (*Psyttalia*) *concolor* (Szépligeti, 1910)**

Material collected: Iran, Mazandaran province: Joorband (36°34′52″N, 52°02′45″E, 275 m a.s.l.), 11.X.2011, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Lorestan province (Farahani *et al*. 2016) and Mazandaran province (current study).

General distribution: Afrotropical, Eastern and Western Palaearctic, Oceanic (Yu *et al*. 2016).

Genus *Utetes* Forster, 1863

***Utetes curtipectus* (Fischer, 1958)**

Material collected: Iran, Mazandaran province: Joorband (36°26′17″N, 52°07′16″E, 272 m a.s.l.), 30.III.2011, 1♀; Guilan province: Eshman kamachal (37°21′10″N, 49°57′56″E), 2 m a.s.l.), 6.IV.2010, 1♀, leg.: A. Nadimi.

Diagnosis (Female): Body length 2.8 mm (Fig. 11A); antenna somewhat longer than body; Clypeus semicircular (Fig. 11B); mandibles uniformly broadened basally, oral cavity developed (Fig. 11B); width of head 2.0× its maximum height (dorsal view) (Fig. 11C); notauli smooth (Fig. 11D); medio-posterior mesoscutal depression rounded (Fig. 11D); scutellum almost smooth (Fig. 11D); mesosoma 1.3× its maximum height (Fig. 11E); mesepimeral sulcus on posterior margin of mesopleuron smooth (Fig. 11E); precoxal sulcus somewhat rugose (Fig. 11E); pterostigma cuneate, 2nd submarginal cell somewhat narrowed toward apex, m-cu vein interstitial, 3RSa vein longer than 2RS vein (Fig. 11F); length of hind femur 5.0× its maximum width ; propodeum uniformly rugose (Fig. 11G); second metasomal tergite smooth, 1st tergite roughly as long as its width at apex; ovipositor sheaths slightly extended beyond apex of metasoma (Fig. 11H).

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

General distribution: Western Palaearctic (Yu *et al*. 2016) and Iran (new record).

***Utetes testaceus* (Wesmeal, 1838)**

Material collected: Iran, Alborz province: Shahrestanak (35°55′34″N, 51°22′20″E, 2305 m a.s.l.), 31.VIII.2010, 1♀, leg.: A. Nadimi**.**

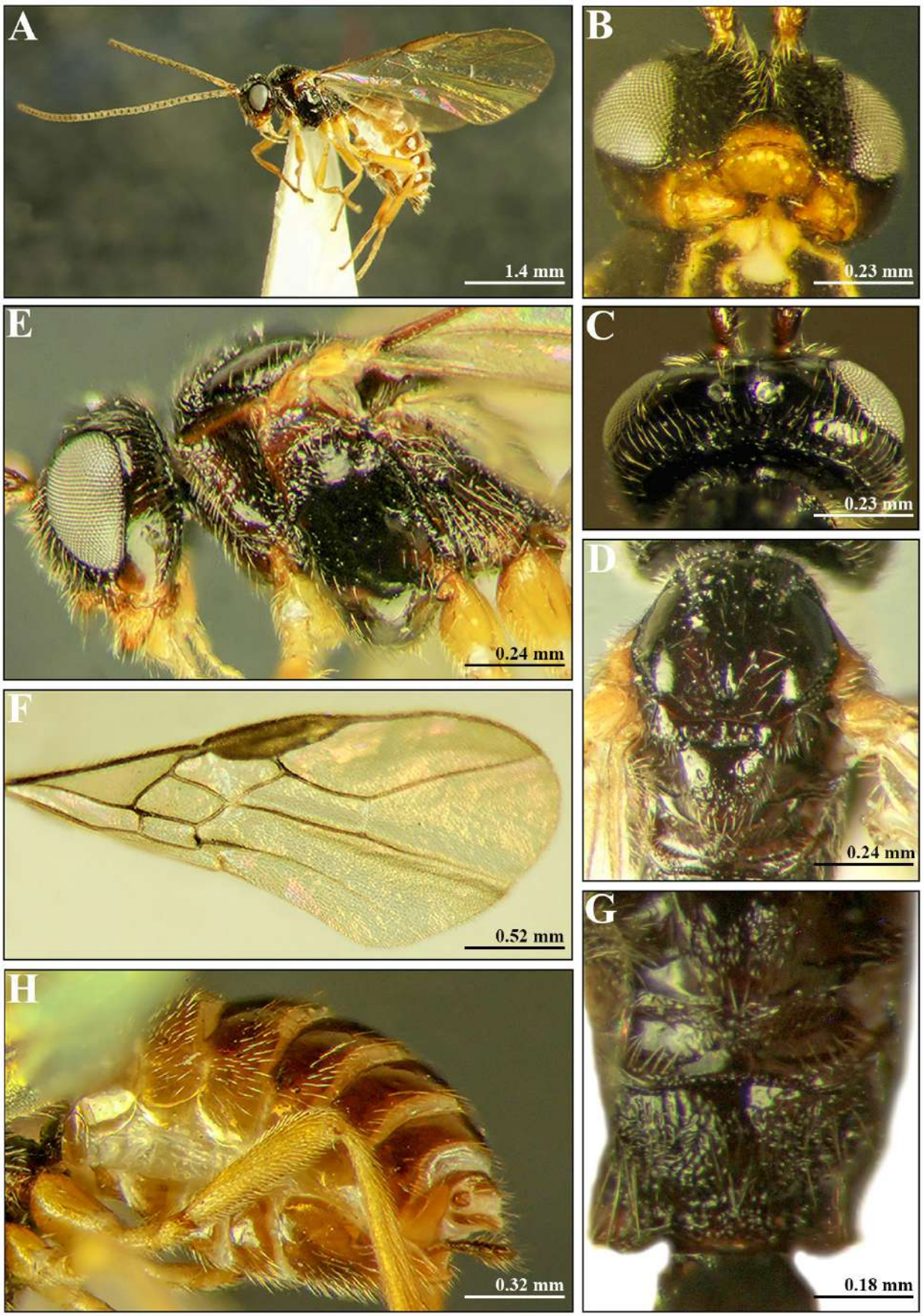

FIGURE 11. *Utetes curtipectus* (Fischer, 1958): A. Habitus, lateral view; B. Head, frontal view; C. Head, dorsal view; D. mesosoma, dorsal view; E. Mesosoma, lateral view; F. Fore wing; G. Propodeum, dorsal view; H. Ovipositor sheath.

Distribution in Iran: Guilan province (Farahani *et al*. 2016) and Alborz province (current study).
General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Genus *Xynobius* Forster, 1863

Xynobius (*Xynobius*) *aciculatus* (Thomson, 1895)

Material collected: Iran, Mazandaran province: Tangehvaz (36°21′55″N, 52°06′10″E, 692 m a.s.l.), 27.V.2011, 1♀; Guilan province: Qazichak (36°45′57″N, 50°19′35″E, 1803 m a.s.l.), 12.IV.2010, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Kermanshah province (Gadallah *et al*. 2016, reported as *Opius (Xynobius) aciculatus*), Mazandaran and Guilan provinces (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Xynobius (*Xynobiotenes*) *scutellatus* (Fischer, 1962)

Material collected: Iran, Giulan province: Ziaz (36°52′34″N, 50°13′17″E, 537 m a.s.l.), 17.V.2010, 1♀, leg.: M. Khayrandish.

Distribution in Iran: Fars province (Lashkari Bod *et al*. 2011), Tehran province (Fischer 1990; Khajeh *et al*. 2014) and Giulan province (current study).

General distribution: Eastern and Western Palaearctic (Yu *et al*. 2016).

Discussion

In this research, two species of *Apodesmia*, four species of *Opius*, and one species of *Biosteres*, *Bitomus, Desmiostoma, Phaedrotoma* and *Utetes* were recorded for the first time from Iran. Moreover, 21 species are new for the Northern provinces of the country (Alborz, four species; Guilan, ten species; Mazandaran, nine species; Qazvin and Tehran, one species, respectively).

According to previous studies, the majority of Braconid wasps including Opiinae have been recorded from northern Iran (Fischer 1990; Farahani *et al*. 2012a, b, c; Sakenin *et al*. 2012; Khajeh *et al*. 2014; Zargar *et al*. 2014, 2015; Gadallah *et al*. 2016; Farahani *et al*. 2016; Samin *et al*. 2018; Dolati *et al*. 2018, 2019; Abdoli *et al*. 2019a, b).

Since the parasitic wasps of the subfamily Opiinae play a fundamental important role in biological control of the leaf miner flies (Diptera: Agromyzidae, Anthomyiidae) and fruit flies (Diptera: Tephritidae), increasing knowledge of the diversity and phenology about this large and important group is essential. However, the number of species of Opiinae subfamily is still low in Iran in comparison with adjacent countries, for example, 201 in Turkey and 306 in Russia (Yu *et al*. 2016). With result of this study, the number of known Opiinae species from Iran has increased from 118 to 129.

Totally, *Opius* is the most species-rich genus in Guilan province (5 species) followed by Mazandaran (4 species), Alborz (2 species), Qazvin and Tehran provinces (each with one species). Climatically, the Northern provinces of Iran have winters mild with heavy rainfall, spring and fall are relatively moderate weather while summer heat is accompanied by high humidity. The Hyrcanian forests of Northern Iran are composed by *Acer* Linnaeus, *Fagus* Linnaeus, *Juniperus* Linnaeus, *Populus* Linnaeus, *Quercus* Linnaeus, *Taxus* Linnaeus and *Ulmus* Linnaeus (Kiani *et al*. 2017; Heshmati 2007; FAO 2012). Moreover, this region presents a huge area of crops such as olives, citrus fruits are wildly cultivated for the special climate conditions. For these reasons the Dipteran fauna is also very diverse in northern Iran. Subsequently, it is expected that the fauna of Opiinae should also be more diverse in this area than in other parts of Iran (Peris-Felipo *et al*. 2014, 2018; Ranjbar *et al*. 2016; Safahani *et al*. 2016, 2018).

Further field studies in Iran (especially in Northern Iran) should be carried out in order to increase our knowledge on the taxonomy, biology and economic importance of Opiinae.

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