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First record of two genera and three species of Pteromalidae (Hymenoptera: Chalcidoidea) from Iran

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ABSTRACT

During our studies on the family Pteromalidae in northern and southern areas of Iran, two genera and three species were recorded for the first time from Iran: *Hemitrichus oxygaster* Bouček, 1965 (Guilan province), *Platygerrhus affinis* (Walker, 1836) (Guilan province) and *Rohatina monstrosa* Bouček, 1954 (Guilan province). Diagnostic characteristics are provided for the newly recorded species, as well as the recently reported species, *Psilocera crassispina* (Thomson, 1878) (Fars, Qazvin and Guilan). In addition, a key to the *Hemitrichus* species in the Middle East and geographical distribution for all reported species in Iran are presented.

KEYWORDS: New record, Key, Iran, Fauna, Parasitoid.

INTRODUCTION

Pteromalidae Dalman, 1820 is one of the largest families in Chalcidoidea that is important in biological control programs worldwide (Noyes, 2019), comprises nine tribes and eight subfamilies (Burks et al., 2022). All species of Pteromalidae have diverse life histories, most of which are parasitoids of Diptera, Coleoptera, Hemiptera, and even spiders (Gibson, 1997). In addition, some species are hyperparasitoids of other parasitic Hymenoptera (Desjardins et al., 2007). So far, 221 species belonging to 84 genera of Pteromalidae have been reported from Iran (Abd-Rabou, 2022; Rahmani et al. 2022; Taher et al. 2022; Karami et al. 2023; Shojaey et al. 2023; Ghahari et al. 2024). The fauna of Pteromalidae in Iran is very diverse, but many species are not already known. The objective of this investigation is to increase the knowledge of the pteromalids that have been recently collected as a part of our ongoing project on the taxonomy and species diversity of Iranian Pteromalidae.

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MATERIALS AND METHODS

The sampling was conducted in Guilan (Roodsar) and Qazvin (Zereshk Road) provinces in northern Iran and Fars (Dejkord) province in southern Iran from April 2010 to June 2013. The specimens were collected by Malaise traps and were preserved in 75% Ethanol. For mounting, the specimens were treated with Acetone and Acetic acid (Noyes, 1982). The morphological terminology and classification follow Bouček (1988) and Gibson (1997) and are identified by using Bouček and Rasplus (1991) and Graham (1969). External morphology was illustrated using an Olympus SZX9 stereomicroscope with a BMZ-04-DZ digital imaging system. Confirmation of the identifications was done by the third author (HL). The images were processed using Combine ZM (Hadley, 2023) and Adobe® Photoshop ® CS6 programs. The voucher specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University, Tehran (TMUC) and the Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman (DPPBUK).

The following abbreviations are used for other morphological terms, *sensu* Bouček (1988): OOL= ocular ocellar line: the shortest distance between the posterior ocellus and the eye; POL= posterior ocellar line: the shortest distance between the posterior ocelli.

RESULTS

Four genera and four species were collected and identified from Iran which among them two genera and three species are new records for Iran. The genera and species are listed alphabetically. Newly recorded genera are marked with an asterisk (*). Short morphological characteristics are presented for the newly recorded species.

Family Pteromalidae Dalman, 1820

Subfamily *Incertae sedis* (Burks et al., 2022)

Genus *Hemitrichus* Thomson, 1878

***Hemitrichus oxygaster* Bouček, 1965**

Material examined

Iran, Guilan province, Roodsar, Rahim abad, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 20-27.VII.2010, 1♀, 30. VIII-06.IX.2010, 1♀, Malaise trap, Leg.: M. Khayrandish.

Morphological characters

Body length 4.36 mm (Fig. 2A); POL 2.2 times as long as OOL (Fig. 2C), occiput without occipital carina, clypeus with median tooth (Fig. 2B), antenna filiform and inserted fairly below center of face, antennal formula 11263, clava rounded at apex (Fig. 2D); pronotal collar rounded, notauli incomplete (Fig. 2E), marginal vein not thickened proximally, about as long as postmarginal vein and 1.7 times as long as stigma vein (Fig. 2G); metasoma convex and 3.2 times as long as broad (Fig. 2F), nearly 1.3 times as long as head plus mesosoma, last tergite nearly twice as long as its basal breadth.

Distribution

Palaearctic region: Kazakhstan, Moldova, Slovakia, Spain (Noyes, 2019), Iran **(new record - Guilan province).**

Note: The genus *Hemitrichus* was first reported from Iran by Sakenin et al. (2019)**.** However, this genus was subsequently provisionally excluded from the authoritative Iranian Pteromalidae checklist **(**Rahmani et al., 2022**)** due to unverifiable taxonomic evidence. Notably, the first report by Sakenin et al. (2019) was published in a non-archived publication, limiting accessibility and preventing independent confirmation. A later report by Abd-Rabou (2022) referenced a single male specimen, but absent morphological documentation and lack of voucher specimen details raise questions about the validation of this record.

Key to species of genus *Hemitrichus* in the Middle East

1. Marginal vein of fore wing about 1.8 times as long as the stigma vein and postmarginal vein 1.7 times as long as stigma vein (Fig. 2G); POL about 2 times as long as OOL (Fig. 2C)…… *Hemitrichus oxygaster* Bouček, 1965

1′. Marginal vein of fore wing 2.4 times as long as the stigma vein and postmarginal vein 2.3 times as long as stigma vein; POL 2.4 times as long as OOL……. *Hemitrichus longigaster* Narendran, 2006

Subfamily Trigonoderinae Boucek, 1964

Genus *Platygerrhus* Thomson, 1878*

***Platygerrhus affinis* (Walker, 1836)**

Material examined

Iran, Guilan province, Roodsar, Rahim abad, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 01-08.XI.2010, 1♀, Malaise trap, Leg.: M. Khayrandish.

Morphological characters

Body length 2.4 mm (Fig. 3A); length of eye 3 times as long as the malar space, face with deep tentorial pits, lower margin of clypeus straight (Fig. 3C), occiput without occipital carina, antennal formula 11263, all funiculars longer than broad (Fig. 3B); pronotum sloping right from hind margin, notauli complete and deep, propodeum with distinct median carina (Fig. 3E), marginal vein 0.9 times as long as postmarginal vein and 3.times as long as stigma vein (Fig. 3G); metasoma lanceolate and 2.3 times as long as broad (Fig. 3F), hypopygium situated at half the length of the metasoma.

Distribution

Palaearctic region: Austria, Belgium, Croatia, Czech Republic, England, France, Germany, Hungary Italy, Netherlands, Poland, Romania, Sweden, Switzerland (Noyes, 2019), Iran (**new record** - Guilan province).

Subfamily Pteromalinae Dalman, 1820

Genus *Psilocera* Walker, 1833

***Psilocera crassispina* (Thomson, 1878)**

Material examined

Iran, Guilan province, Roodsar, Rahim abad, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 23-29.VIII.2010, 1♀, Ziaz (36°52'27.18" N, 50°13'24.78" E, 490 m a.s.l.), 06-12. IX.2010, 1♀, Ghazichak (36°45'57.54" N, 50°19'35.22" E, 1803 m a.s.l.), 23.VII-09.VIII.2010, 1♀, 16-23.VIII.2010, 1♀ Malaise trap, Leg.: M. Khayrandish; Qazvin province, Zereshk Road (36°25'23.88" N, 50°06'37.68" E, 1926 m a.s.l.), 05.V-09.VI.2011, 1♀, 06-26.VII.2011, 3♀♀, 17.VIII-04.IX.2011, 2♀♀, Malaise trap, Leg.: A. Nadimi; Fars province, Dejkord (30°43'59"N, 51°57'03"E, 2168 m), 10.VI.2013, 1♀, Malaise trap, Leg.: A. Amiri.

Morphological characters

Body length 2.9 mm (Fig. 4A); head about 1.3 times as broad as mesoscutum, antenna inserted below central face, clypeus with two symmetric teeth (Fig. 4B), antennal formula 11263 and

clavate, clava with large micropilosity area, first funicular slightly longer than pedicel (Fig. 4E); notauli incomplete, propodeum with distinct castula crossing median carina (Fig. 4C), marginal vein slender and longer than stigma vein, postmarginal vein 0.8 times as long as marginal vein and 2.25 times as long as stigma vein (Fig. 4F); metasoma as long as head plus mesosoma, basal tergites excised in the middle (Fig. 4D).

Distribution

Palaearctic region: Belgium, Bulgaria, Croatia, Czech Republic, England, France, Hungary, Italy, Kazakhstan, Netherlands, Romania, Serbia, Slovenia, Slovakia, Spain, Sweden, Ukraine (Noyes, 2019), Iran (Qazvin - Shojaey et al., 2023; Fars and Guilan provinces – current study).

Note

Psilocera crassispina has recently been reported from Iran by the authors of this paper, and a brief abstract was published in the proceedings of the 4th Iranian International Congress of Entomology (Shojaey et al., 2023). Here, for the first time in Iran, its diagnostic morphological characteristics are presented along with the relevant images.

Genus *Rohatina* Bouček, 1954*

***Rohatina monstrosa* Bouček, 1954**

Material examined

Iran, Guilan province, Roodsar, Rahim abad, Ghazichak (36°45'57.54" N, 50°19'35.22" E, 1803 m a.s.l.), 12-19.IV.2010, 1♀, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 16-23.VIII.2010, 1♀, Malaise trap, Leg.: M. Khayrandish.

Morphological characters

Body length 2 mm (Fig. 5A); paraclypeal margin on either side with a strong tooth (Figs 5D, 5G), antennal formula 11263, clava rounded at apex (Fig. 5B); pronotum about as broad as mesoscutum, collar carina distinct, notauli incomplete, propodeum with sinuate plicae, hind coxa dorsally bare (Fig. 5E), postmarginal vein as long as marginal vein and 1.8 times as long as stigma vein, basal vein without setae (Fig. 5H), hind tibia with one spur; metasoma sessile, petiole transverse (Fig. 5F).

Distribution

Palaearctic region: Croatia, Czech Republic, Romania, Slovakia, Spain, Sweden (Noyes, 2019), Iran **(new record -** Guilan province**)**.

DISCUSSION

During this survey of Pteromalidae in Northern and Southern Iran, two species of Pteromalinae belonging to two genera (*Psilocera crassispina* and *Rohatina monstrosa*), one species of Trigonoderinae (*Platygerrhus affinis*) and one species that unplaced to the subfamily of Pteromalidae (*Hemitrichus oxygaster*) were identified which three species are new records for Iran. These species are distributed in the west Palaearctic region and were mainly reported from Europe (Fig. 6). Here, we reported *Platygerrhus* and *Rohatina* are reported from the Middle East for the first time. *Platygerrhus affinis* has been recorded in 13 and *R. monstrosa* in six European countries (Noyes 2019). Still, a single species of *Hemitrichus* (*H. longigaster* Narendran, 2006) was previously recorded from Yemen (Narendran et al., 2006) and *H. oxygaster* has been only recorded from the four European countries (Noyes, 2019). Also, these genera seem to be only distributed in the Palaearctic region. The species *Psilocera crassispina* is recorded for the first time in the Middle East (Shojaey et al., 2023) and has only been recorded in 17 European countries (Noyes, 2019). The biology of all these species is unknown, except *Platygerrhus affinis* which is known as the primary parasitoid of some species of Coleoptera: *Anobium punctatum* De Geer, 1774 and *Xylocleptes bispinus* (Duftschmid, 1825) (Ptinidae); *Leiopus punctulatus* (Paykull, 1800) and *Stenostola ferrea* (Schrank, 1776) (Cerambycidae); *Ernoporus tiliae* (Panzer, 1793) (Curculionidae) and one species of Diptera: *Agromyza* sp. (Agromyzidae) (Noyes, 2019). According to Ghahari et al. (2024), the Pteromalidae fauna of Iran was documented to comprise 300 species within 124 genera. However, Rahmani et al. (2022) highlighted taxonomic uncertainties for 40 genera and 79 species due to missing or undocumented voucher specimens and deposits, prompting their provisional exclusion from the confirmed checklist. Consequently, based on the most recent credible checklist and corroborating studies the currently validated Iranian Pteromalidae fauna stands at 221 species in 84 genera (Abd-Rabou et al., 2022; Rahmani et al., 2022; Taher et al., 2022; Karimi et al., 2023; Shojaey et al., 2023; Ghahari et al., 2024). .As reported in this study, three new species records and two new genera records of this family were identified from Iran. So, regarding to other published contributions after Rahmani et al. (2022), the total number of the pteromalid species reported from Iran increased to 224 species in 86 genera. This work compares the

number of recorded genera and species between Iran and neighbouring countries (Table 1). According to the Table 1, Türkiye with 236 species has the most recorded among neighbouring countries of Iran. The issue has related to more studies on this family in other adjacent countries (Rahmani et al., 2022).

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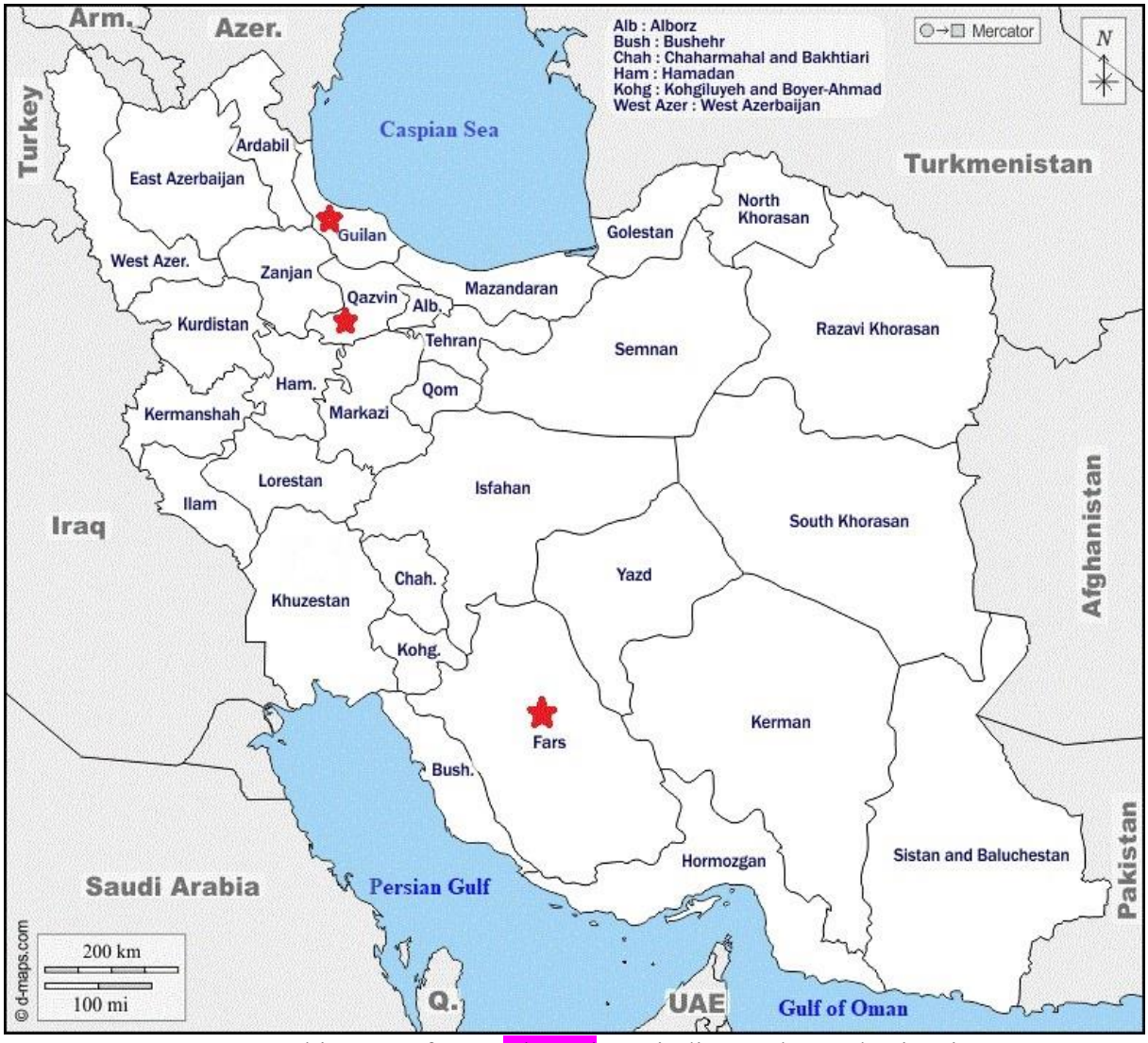

Figure 1. Geographic map of Iran. The red star indicates the study sites in Iran.

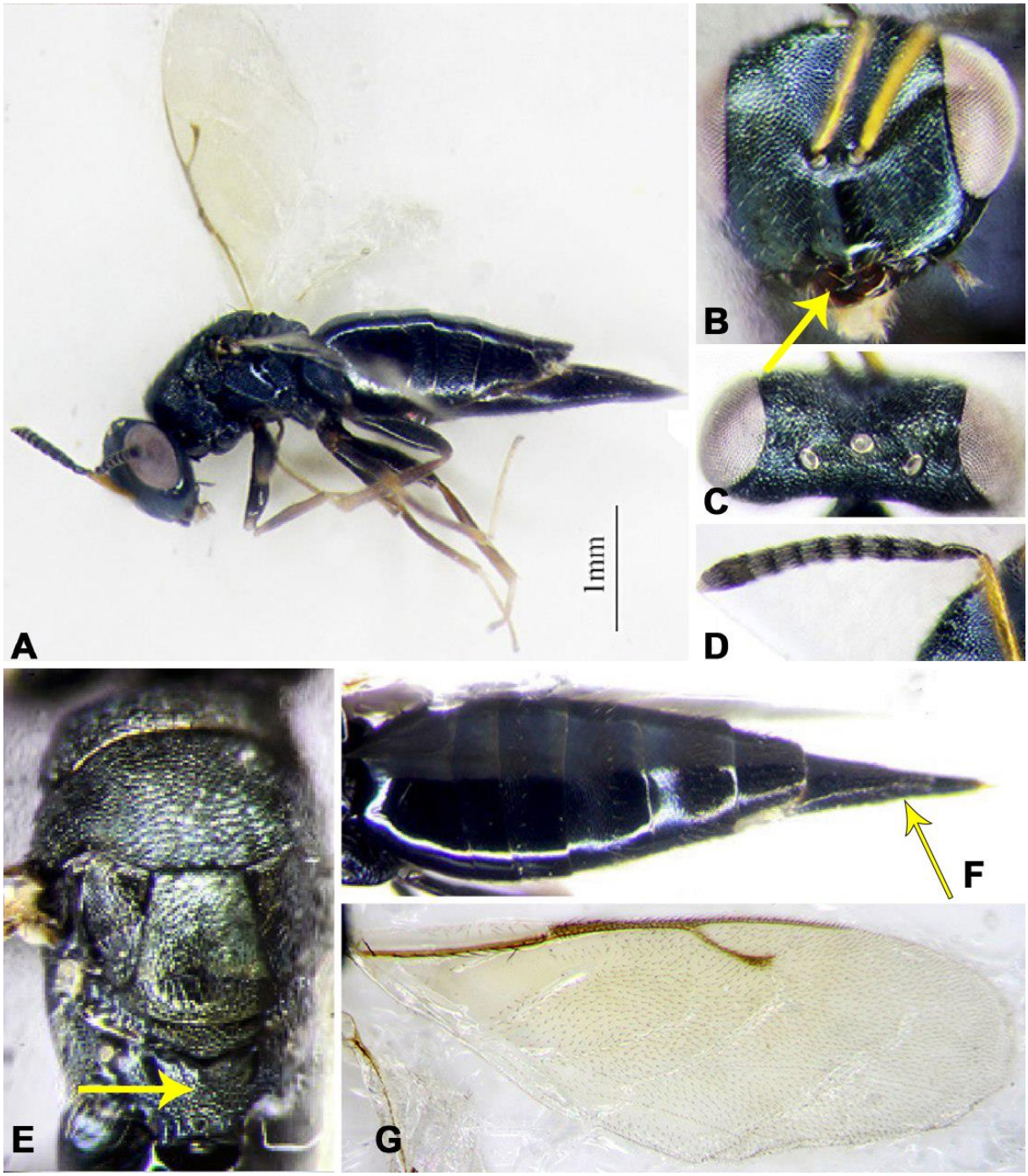

Figure 2. *Hemitrichus oxygaster* Bouček, 1965. Female, A, general habitus, lateral view; B, head, frontal view; C, head, dorsal view; D, antenna; E, mesosoma, dorsal view; F, metasoma, dorsal view; G, fore wing.

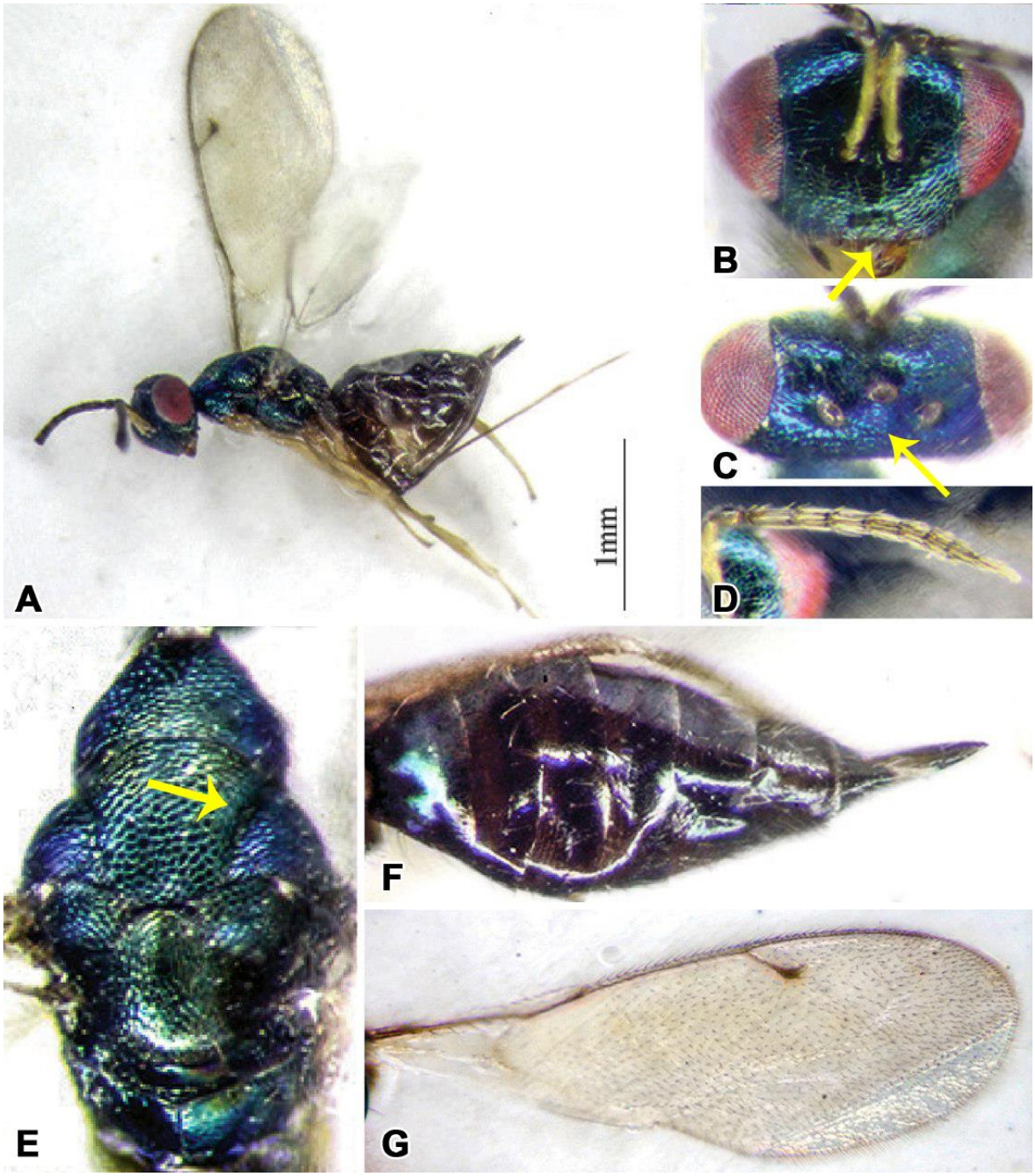

Figure 3. *Platygerrhus affinis* (Walker, 1836). female: A, general habitus, lateral view; B, antenna; C, head, frontal view; D, head, dorsal view; E, mesosoma, dorsal view; F, metasoma, dorsal view; G, fore wing.

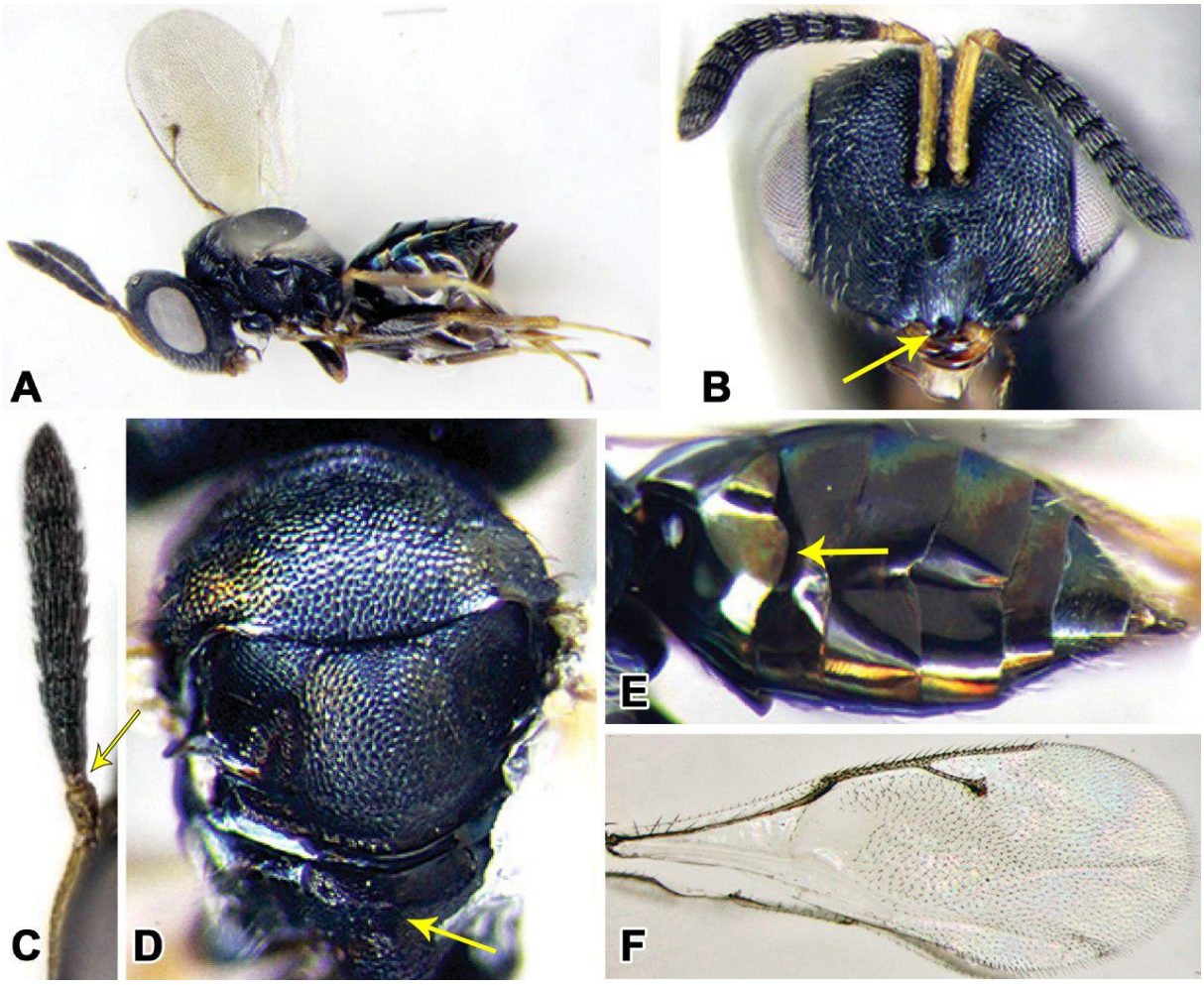

Figure 4. *Psilocera crassispina* (Thomson, 1878). Female: A, general habitus, lateral view; B, head, frontal view; C, mesosoma, dorsal view; D, metasoma, dorsal view; E, antenna; F, fore wing.

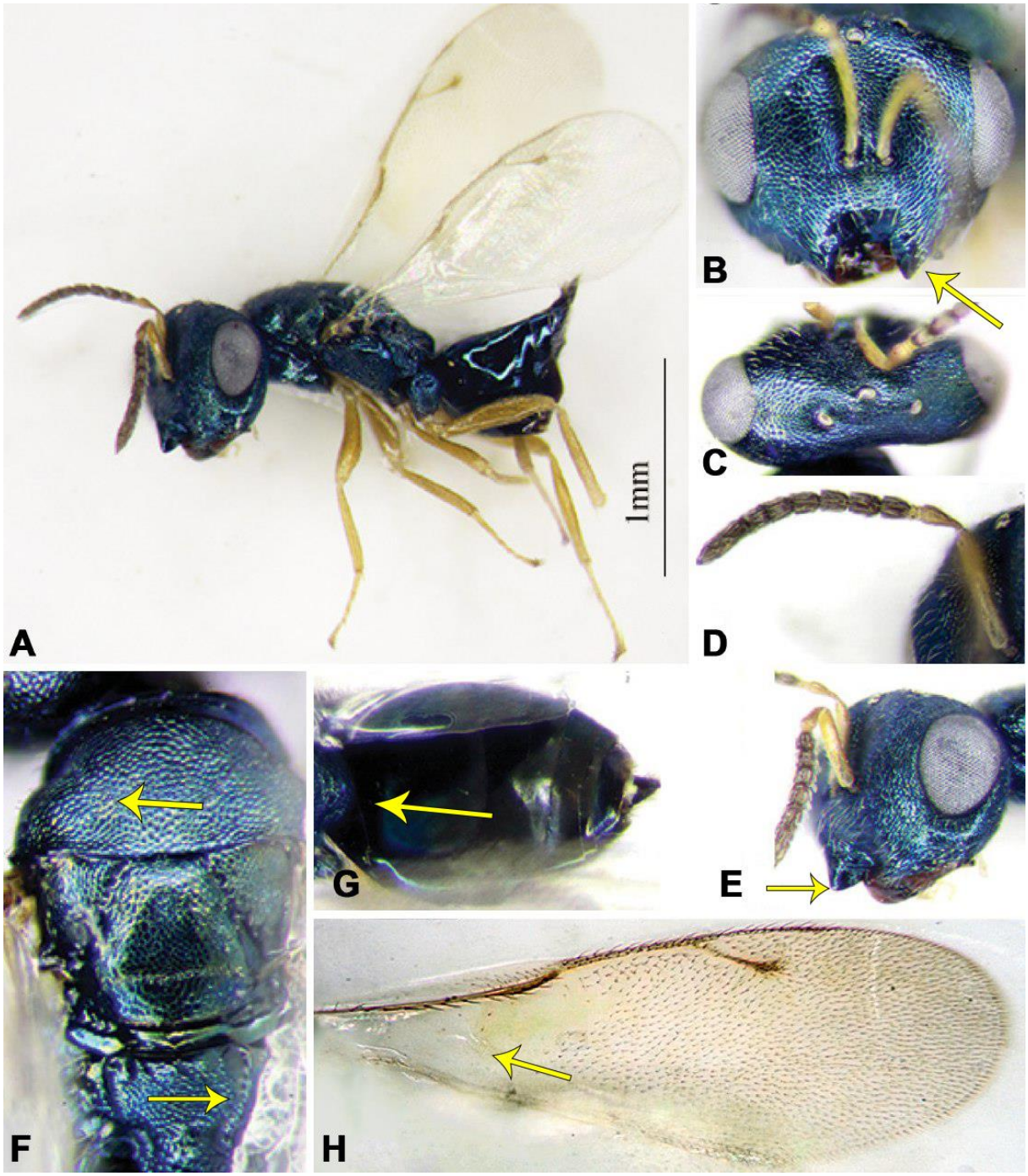

Figure 5. *Rohatina monstrosa* Bouček, 1954. Female: A, general habitus, lateral view; B, antenna; C, head, dorsal view; D, head, frontal view; E, mesosoma, dorsal view; F, metasoma, dorsal view; G, head, lateral view; H, fore wing.

Figure 6. Distribution map of *Hemitrichus oxygaster* Bouček, 1965, *Platygerrhus affinis* (Walker, 1836), *Psilocera crassispina* (Thomson, 1878) and *Rohatina monstrosa* Bouček, 1954 in west Palaearctic region.

Table 1. Number of genera and species of Pteromalidae in the neighbour countries of Iran (Noyes, 2019; Rahmani et al., 2022).

Countries	Number of genera	Number of species
Afghanistan	6	7
Armenia	17	19
Azerbaijan	22	30
Iran	86	224
Iraq	8	10
Pakistan	20	29
Türkiye	75	236
Turkmenistan	24	29