



Study of the genus *Platylabus* Wesmael, 1845 (Hymenoptera: Ichneumonidae) in north of Iran, with a new record for the Middle East

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ABSTRACT. The present study is based on the material collected from Alborz and Guilan provinces of Iran during March to November 2010 and 2011. Three species of the genus *Platylabus* Wesmael were collected and identified, of which *Platylabus orbitalis* (Gravenhorst, 1829) (Hym.: Ichneumonidae: Ichneumoninae, Platylabini) is newly recorded from Iran and the Middle East region. This study increases the number of known Iranian species of the tribe Platylabini and genus *Platylabus* to 12 and 5 species, respectively. An identification key to Iranian *Platylabus*, as well as a brief description and diagnostic characters of the new record species is provided.

Key words: Ichneumonidae, Platylabini, *Platylabus*, new record, taxonomy

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Introduction

The family Ichneumonidae with 38–48 subfamilies and 25,292 described species is one of the largest families in the class Insecta (Quicke, 2015; Yu et al., 2016), but despite their abundance and important role in ecosystems as biological pest control, the taxonomy, ecology, and distribution of many groups of Ichneumonidae is still remained unknown (Riedel & Turrisi, 2013). The Ichneumoninae is the second largest subfamily of Ichneumonidae with 437 genera and about 4355 species (Yu et al., 2016). The members of this subfamily are koinobiont or idiobiont endoparasitoids

of Lepidoptera (Rasnitsyn & Siitan, 1981). Tribe Platylabini includes 38 genera worldwide with 86 species from the Western Palearctic region (Tereshkin, 2009; Yu et al., 2016). The faunistics and taxonomy of this tribe poorly studied, so far only 6 genera and 11 species of Platylabini have been recorded from Iran (Kolarov & Ghahari, 2008; Ghahari & Jussila, 2010; Ghahari & Schwarz, 2012; Ghahari, 2014; Mohebban et al., 2016; Shirzadegan et al., 2017). The *Platylabus* Wesmael, 1845 is the most species-rich genus of the tribe Platylabini and its members are almost exclusively parasitoids of Geometridae (Lepidoptera), only two

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European species are reported from different hosts (Tereshkin, 2009). The aim of this study as a part of our ongoing research project is to improve our understanding on the subfamily Ichneumoninae in Iran.

Material and methods

In this study, the specimens were collected using several Malaise traps that were installed at different places including Arangeh, Sarziarat, Shahrestanak, Karaj (Alborz province), Ghazichak, Eshman Kamachal, Orkom and Ziaz (Guilan province) during March to November 2010–2011 (Fig. 1). The captured specimens were extracted from the collecting jars and treated with mixture of ethanol (60%) / Xylene (40%) for two days, followed by Amyl acetate for two days (AXA) and finally placed on the filter paper for drying (van Achterberg, 2009), then card mounted and labeled. Terminology of morphological characters follows Riedel (2008) and Tereshkin (2009). Relevant keys (Perkins, 1959; Riedel, 2008; Tereshkin, 2009) were used to identification of the specimens.

Illustrations were taken using an Olympus TM SZX9 stereomicroscope equipped with a Sony TM digital camera. A series of 10–15 captured images were merged into a single in-focus image using the image-stacking software Zerene Stacker version 1.04. The specimens are deposited in the Collection of Department of Entomology, Tarbiat Modares University (TMUC), Tehran, Iran.

Results

As a result of this study and review of the previously information, five species of *Platylabus* are known to occur in Iran. *Platylabus orbitalis* (Gravenhorst, 1829) is newly recorded for the Iranian fauna and the Middle East.

Platylabus heteromallus (Berthoumieu, 1910)

Distribution in Iran: East Azarbaijan (Ghahari & Jussila 2010).

General distribution: Palaearctic region (Yu et al., 2016).

Host records: *Camptogramma bilineatum* Linnaeus, 1758; *Eupithecia innotata* Hufnagel, 1767; *Perizoma didymata* Linnaeus, 1758 (Lepidoptera: Geometridae) (Riedel, 2008).

Platylabus iridipennis (Gravenhorst, 1829)

Material examined: Alborz province, Karaj (35°46'18" N, 50°56'42" E, 1278 m a.s.l.), 04.V.2010, 1♀; leg.: M. Khayrandish.

Distribution in Iran: Qazvin (Ghahari & Schwarz, 2012), Kerman (Mohebban et al., 2016) and Tehran provinces (Shirzadegan et al., 2017).

General distribution: Palaearctic region (Yu et al., 2016).

Host records: *Anticlea derivata* Denis & Schiffermuller, 1775; *Eupithecia innotata* Hufnagel, 1767; *Eupithecia massiliata* Milliere, 1865; *Eupithecia millefoliata* Rossler, 1866; *Eupithecia nanata* Hubner, 1813; *Eupithecia pimpinellata* Hubner, 1813; *Eupithecia trisignaria* Herrich-Schaffer, 1848; *Plagodis pulveraria* Linnaeus, 1758 (Lepidoptera: Geometridae); *Anarta myrtilli* Linnaeus, 1761 (Lepidoptera: Noctuidae) (Riedel, 2008); *Cabera exanthemata* Scopoli, 1763 (Sedivy, 1986); *Erannis defoliaria* Clerck, 1759; *Eupithecia exiguata* Hubner, 1813 (Brischke, 1862); *Eupithecia linariata* Denis & Schiffermuller, 1775 (Fulmek, 1968); *Eupithecia minutana* Treitschke; *Jodis lactearia* Linnaeus, 1758 (Hedwig, 1958); *Eupithecia oxycedrata* Rambur, 1833 (Seyrig, 1957); *Eupithecia satyrata* Hubner, 1813 (Uffeln, 1940); *Eupithecia tripunctaria* Herrich-Schaffer, 1852 (Pfankuch, 1934); *Scotopteryx chenopodiata* Linnaeus, 1758 (Lepidoptera: Geometridae) (Rondani, 1876).



Figure 1. Geographic map of sampling locations in Guilan and Alborz provinces of Iran. 1. Eshman Kamachal; 2. Ghazichak; 3. Ziaz; 4. Orkom; 5. Shahrestanak; 6. Sarziarat; 7. Arangeh; 8. Karaj.

***Platylabus orbitalis* (Gravenhorst, 1829)**

(Figs. 2, 3A-H)

Material examined: Iran, Guilan province, Orkom (36°45'42" N, 50° 18' 12" E, 1235 m a.s.l.), 03.V.2010, 1♂, leg.: M. Khayrandish.

Description (Male): Body length 9.0 mm (Fig. 2); vertex straightly slanting down behind the ocelli to occipital carina in lateral view (Fig. 3C); temples 0.7X as wide as transverse diameter of the eye in lateral view, roundly narrowed behind the eyes, in dorsal view (Fig. 3A), its surface densely but superficially punctured (Fig. 3C); occipital carina not extending to posterior ocelli in dorsal view; face convex at the middle, its surface densely punctured (Fig. 3B); clypeus convex, 1.9X as wide as its length, anterior margin straight with distinct rounded corners, separated from face by weak impression; clypeus densely punctured (Fig. 3B); malar space as long as

basal width of mandible; hypostomal carina raised in lateral view, connected to occipital carina almost at mandibular base (Fig. 3D); mandible gradually narrowed from base to apex, upper tooth longer than lower one, with sharp margins (Fig. 3D); antennal cavities deeply impressed, with weak tubercle between antennal fossae (Fig. 3B); antenna 0.88 X length of body; flagellum 37 segmented, annulus white on segments 9-16, first flagellar segment 2.8X as long as its apical width (Fig. 3G); mesonotum convex, its length almost as long as its width; notauli distinct only at base of mesonotum; mesopleuron densely punctured its posterior half wrinkly-punctured (Fig. 3F); speculum densely punctured (Fig. 3F); sternaulus distinctly impressed in anterior part; scutellum moderately convex, carinated in its lateral parts (Fig. 3E); carinae of propodeum

slightly sharpened, costulae absent; area superomedia approximately square, 1.5X as wide as its length; propodeal spiracle elongate, 2X as long as its width; horizontal part of propodeum 1.28X as wide as area posteromedia length (Fig. 3E); second metasomal tergite 1.08X as wide as its length at apex; middle field of postpetiole slightly convex at the middle, its surface shining (Fig. 3H); gastrocoeli distinct; thyridia equal to interval between them (Fig. 3H); lunulae distinct.

Coloration: Head and mesosoma black; facial orbits ivory; face ivory laterally; mandible base, tegula, subalarum and coxae of front leg marked with ivory; scutellum ivory; hind femur red with black apex; front femur, front and middle tibiae marked with testaceous; tergites 1-5 red; tarsal segments of the legs, base petiolus and tergite 6 darkened; tergite 7 black.

Distribution in Iran: New for Iran and the Middle East.



Figure 2. Lateral habitus of male in *Platylabus orbitalis* Gravenhorst, 1829.

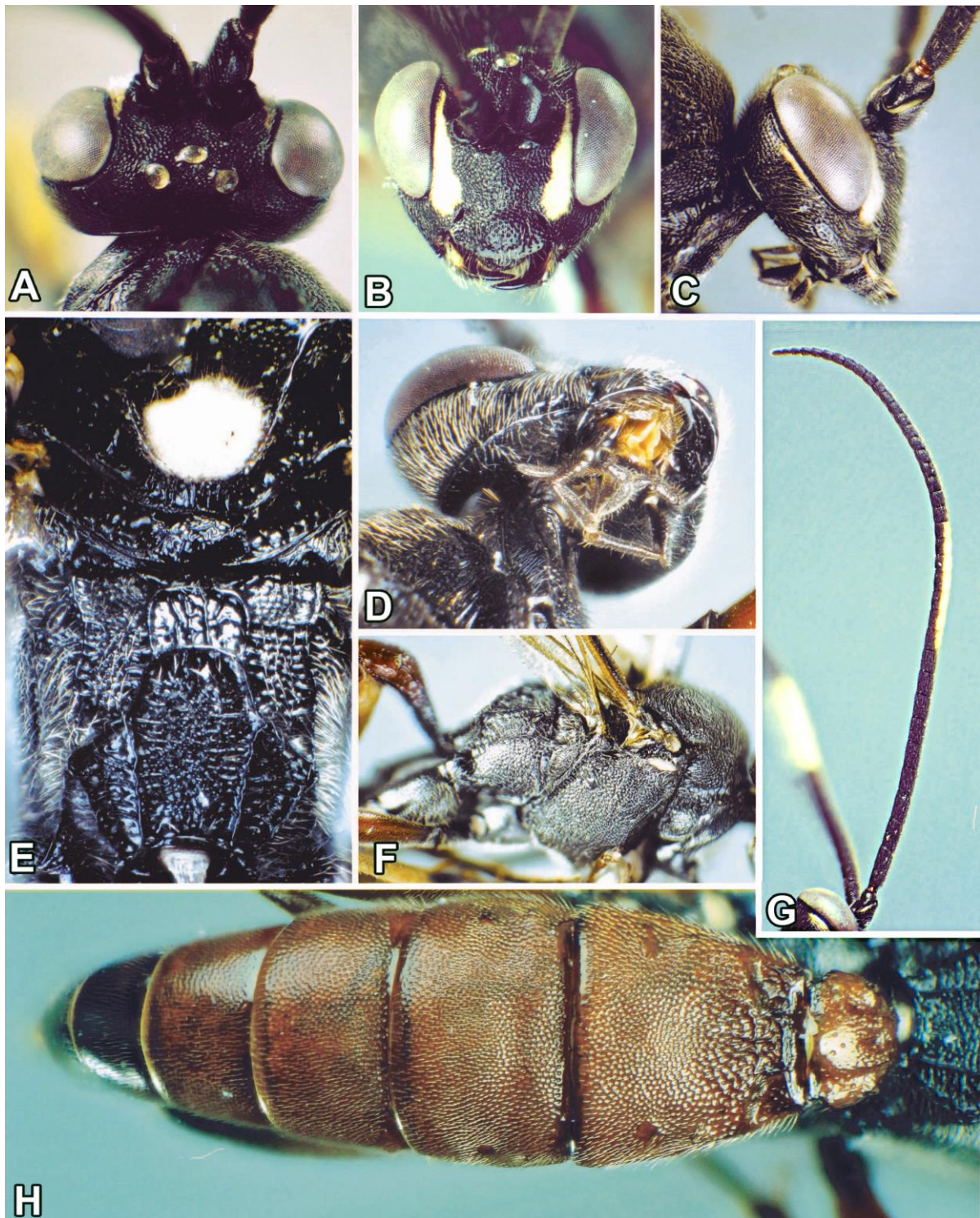


Figure 3. *Platylabus orbitalis* Gravenhorst, 1829, male: **A.** Head, dorsal view, **B.** Head, frontal view, **C.** Head, lateral view, **D.** Head, ventral view, **E.** Mesonotum and scutellum, dorsal view, **F.** Mesosoma, lateral view, **G.** Antenna, lateral view, **H.** Metasoma, dorsal view.

General distribution: Algeria, Austria, Belgium, Bulgaria, former Czechoslovakia, Estonia, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Ukraine, United Kingdom (Yu et al., 2016).

Host records: *Bupalus piniarius* Linnaeus, 1758 (Dalla Torre, 1902); *Cabera pusaria* Linnaeus, 1758; *Eulithis testata* Linnaeus, 1761; *Eupithecia millefoliata* Rossler, 1866; *Xanthorhoe fluctuata* Linnaeus, 1758 (Riedel, 2008); *Eupithecia absinthiata* Clerck, 1759 (Habermehl, 1929); *Horisme tersata* Denis & Schiffermuller, 1775 (Fitch, 1883); *Thera juniperata* Linnaeus, 1758 (Lepidoptera: Geometridae) (Brischke, 1862); *Pterapherapteryx sexalata* Retzius, 1783 (Rudow, 1919); *Megalophanes stetinensis* Hering, 1846 (Zykoff, 1911); *Megalophanes viciella* Denis & Schiffermuller, 1775 (Lepidoptera: Psychidae) (Dalla Torre, 1901, 1902); *Zygaena filipendulae* Linnaeus, 1758 (Lepidoptera: Zygaenidae) (Uffeln, 1940).

***Platylabus tricingulatus* (Gravenhorst, 1820)**

Material examined: Iran, Guilan province, Orkom (36°45'42" N, 50° 18' 12" E, 1235 m a.s.l.), 19.VII.2010, 1♀; Leg.: M. Khayrandish.

Distribution in Iran: Golestan (Kolarov & Ghahari, 2008), Tehran (Ghahari, 2014) and Guilan provinces (current study).

General distribution: Western Palaearctic region (Yu et al., 2016).

Host records: *Cyclophora punctaria* Linnaeus, 1758; *Eupithecia innotata* Hufnagel, 1767 (Riedel, 2008); *Eupithecia pulchellata* Stephens, 1831 (Lepidoptera: Geometridae) (Bignell, 1898).

***Platylabus rufus* Wesmael, 1845**

Distribution in Iran: Mazandaran province (Kolarov & Ghahari, 2008).

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

Host records: *Cabera pusaria* Linnaeus, 1758 (Dalla Torre, 1902); *Hydriomena furcata* Thunberg, 1784; *Hydriomena impluviata* Denis and Schiffermuller, 1775 (Riedel, 2008); *Operophtera brumata* Linnaeus, 1758 (Lepidoptera: Geometridae) (Rudow, 1919); *Depressaria emeritella* Stainton, 1849 (Lepidoptera: Depressariidae) (Riedel, 2008).

Key to the species of Iranian *Platylabus*
(The following identification key basically follows Riedel (2008), with modification based on the Iranian species)

1. Head, mesosoma, metasoma and legs in most parts, red; **Female:** body length 7.5–11.0 mm; thyridia broad; vertex with ivory spots; flagellum with 34–37 segments; **Male:** body length 9–12 mm; flagellum with 34–36 segments, without tyloids; basal tergites shining centrally; thyridia broad; metanotum sometimes with yellow spot central parts.
.....*P. rufus* Wesmael, 1845
- Head and mesosoma never marked with red.2
2. Metasoma black (Fig. 4D); frons almost entirely smooth or with scattered punctures.3
- Metasoma at least with the postpetiole and 2nd and 3rd tergites red (Fig. 4F); frons punctate, rugose or aciculate; hind femur entirely or its greater part red.4
3. Upper lateral margin of pronotum with ivory line (Fig. 4A), rarely only hind angles ivory; lateral mesoscutum smooth and shining between punctures; body length 5.0–7.5 mm; **Female:** Hypostomal carina slightly raised (Fig. 4A); front orbits and genal orbits usually with ivory marks (Fig. 4A, 4B); flagellum strongly widened in the apical half, widest segments square or transverse; hind femur red; pterostigma brownish-yellow; thyridia distinct; gastrocoeli usually impressed (Fig. 4A); body length 5.5–7.0 mm (Fig. 4H); **Male:** Hypostomal carina variable; tyloids

sometimes present; hind femur red, usually not or slightly darkened apically; area petiolaris usually aciculate and slightly shining or dull.

.....*P. iridipennis* (Gravenhorst, 1829)

- Upper lateral margin of pronotum usually black, if hind angles or (very rarely) upper lateral margin ivory, than lateral mesoscutum with microsculpture; **female:** flagellum with 32-37 segments; pterostigma brownish-yellow centrally; lateral mesoscutum smooth in the center, shining; hind tibia darkened in the apical; thyridia less oblique; body length 6.5-10 mm; **Male:** Flagellum with 32-38 segments; pterostigma usually yellowish-brown (rarely darker brown) in center; lateral mesoscutum smooth, shining in central parts; thyridia less oblique.

.....*P. heteromallus* (Berthoumieu, 1910)

4. Temples parallel or moderately narrowed behind the eyes (Fig. 3A); gena often swollen; postpetiolus moderately widened; thyridia moderately wide (Fig. 3H); flagellum with 30-38 segments; **Female:** vertex usually without ivory spots; upper lateral margin of pronotum black, at most hind angle with ivory spot; flagellum with 30-38 segments; a very variable species; **Male:** vertex usually without ivory spots (Fig. 3A); upper lateral margin of pronotum black, at most hind angle with ivory spots (Fig. 3F); prepectus often raised behind front coxae (Fig. 3F); flagellum usually with ivory stripe (Fig. 3G), with 37 (32-38) segments; body length 6.5-10.5 mm. A very variable species.*P. orbitalis* (Gravenhorst, 1829)

- Temples strongly, sometimes almost linearly narrowed (Fig. 4E); genae not swollen; postpetiole very strongly widened, the dorsal carinae strong (Fig. 4F); thyridia distinct, connect to base of second tergite (Fig. 4F); flagellum with 32 (30-33) segments; **Female:** middle field of face and clypeus distinctly convex (Fig. 4C); flagellum with 30-33 segments (Fig.

4G); hind angle of pronotum sometimes with ivory spot; smaller, body length 6.0-8.0 mm (Fig. 4I); **Male:** vertex usually with ivory spots; face largely ivory, only a black longitudinal line in the middle of the face; flagellum with 30-33 segments; smaller, body length 6.0-8.0 mm.

.....*P. tricingulatus* (Gravenhorst, 1820)

Discussion

The species of Platylabini are mainly parasitoids of the Lepidopteran families, Geometridae and Drepanidae (Perkins, 1960; Tereshkin, 2009). In this survey, *Platylabus orbitalis* (Gravenhorst, 1829) was identified and recorded for the first time for Iranian fauna and Middle East. Number of *Platylabus* species in Iran increase to five with report of *P. orbitalis* Gravenhorst (1829). Recently *Platylabops cornicula* (Wesmael, 1855) has erroneously listed under the genus *Platylabus*, however this species belonging to tribe Ichneumonini (Shirzadegan et al., 2017). *Platylabus orbitalis* Gravenhorst (1829) is mainly parasitoid of the Lepidopteran families Geometridae, Psychidae and Zygaenidae on the plants of the families Apiaceae and Rosaceae (Yu et al., 2016). Many species of Geometridae and other families of Lepidoptera had been reported from northern Iran (Barou, 1967) and the members of the tribe Platylabini may play an important role in their natural control. In the present study, *P. orbitalis* (Gravenhorst, 1829) was collected in Orkom located in Guilan province. This province is characterized by great variation in plant community composition due to significant differences in topography and climatic changes (Firouz, 2005). Most probably, some other species of *Platylabus* may be distributed in this province, which needs further studies. Sampling data from Alborz and Guilan provinces showed that this genus is rare in northern Iran.

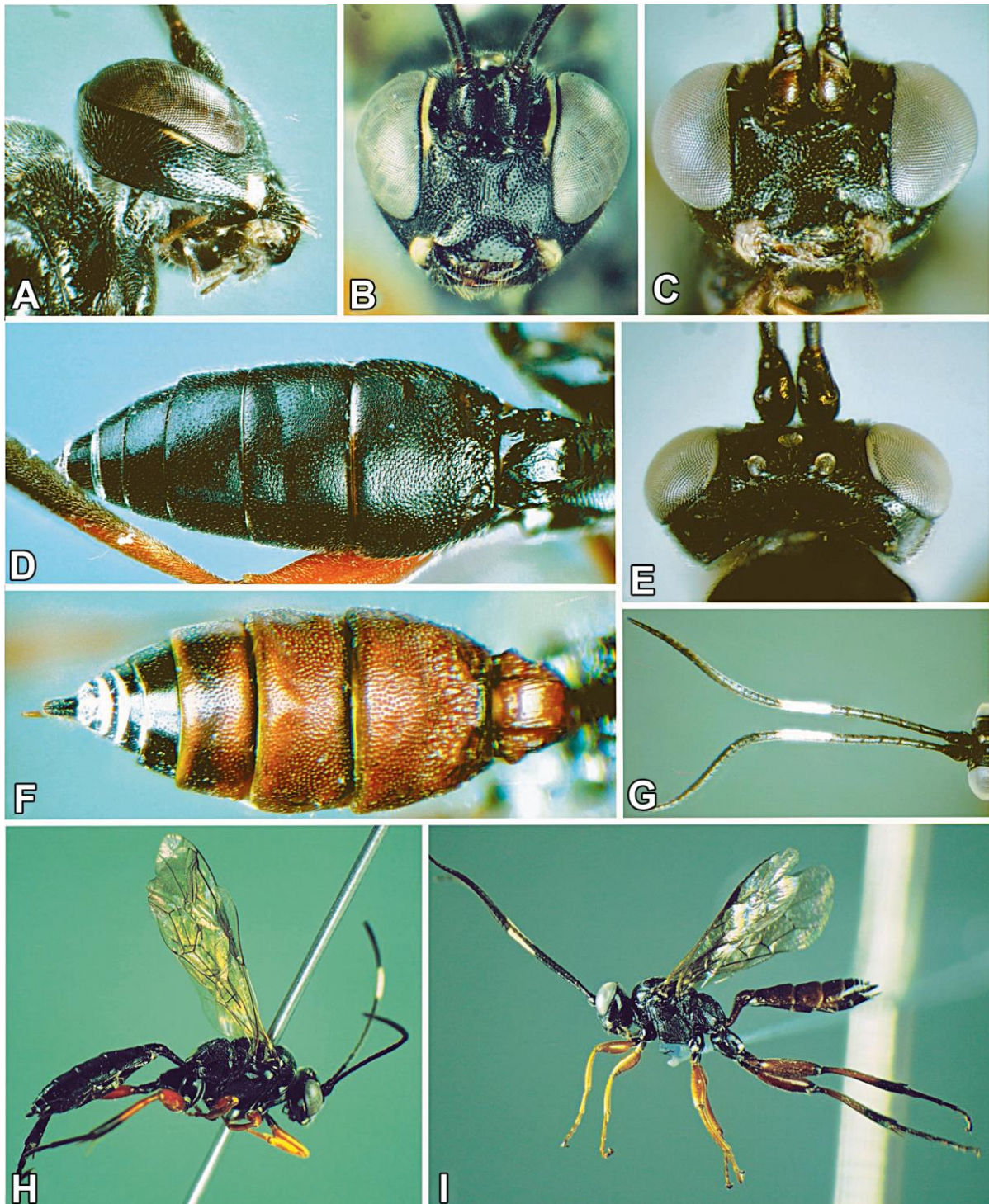


Figure 4. *Platylabus iridipennis* Gravenhorst, 1829, female (A, B, D, H); *Platylabus tricingulatus* Gravenhorst, 1820, female (C, E, F, G, I): **A.** Head, ventrolateral view; **B.** Head, frontal view; **C.** Head, frontal view; **D.** Metasoma, dorsal view; **E.** Head, dorsal view; **F.** Metasoma, dorsal view; **G.** Antenna, dorsal view; **H.** Adult specimen, lateral view; **I.** Adult specimen, lateral view.

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Conflict of Interests

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

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مطالعه جنس *Platylabus* Wesmael, 1845 (Hymenoptera: Ichneumonidae) در شمال ایران
به همراه یک گزارش جدید از منطقه خاورمیانه

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چکیده: تحقیق حاضر بر اساس نمونه‌های جمع‌آوری شده از استان‌های البرز و گیلان طی ماه‌های فروردین تا آبان ۱۳۸۹ و ۱۳۹۰ انجام شد. سه گونه از جنس *Platylabus* Wesmael جمع‌آوری و شناسایی شد که از بین آنها گونه *Platylabus orbitalis* (Gravenhorst, 1829) (Ichneumoninae, Platylabini) برای اولین بار از ایران و منطقه خاورمیانه گزارش شد. این تحقیق تعداد گونه‌های شناسایی شده قبلیه *Platylabini* و جنس *Platylabus* در ایران را به ترتیب به ۱۲ و ۵ گونه افزایش داد. کلید شناسایی برای گونه‌های جنس *Platylabus* در ایران به همراه توصیف مختصر و خصوصیات افتراقی گزارش جدید ارائه شد.

واژگان کلیدی: *Platylabus*, *Platylabini*, Ichneumonidae، گزارش جدید،

رده‌بندی