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New Records of Sceliotrachelinae (Hymenoptera: Platygasteridae) in Iran

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ABSTRACT. The hymenopteran family Platygasteridae is a large group of parasitic wasps. A survey was carried out on the subfamily Sceliotrachelinae (Hym.: Platygasteridae) in East Azerbaijan and Fars provinces of Iran. The genus *Fidobia* Ashmead and three species, *Allotropia conventus* Maneval, *Fidobia hofferi* Kozlov and *Isolia mongolica* (Kozlov) are newly recorded from Iran. Illustrations of the morphological characteristics and their geographical distribution are presented.

Key words: *Allotropia*, *Fidobia*, *Isolia*, fauna, Iran, parasitoid

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Introduction

The family Platygasteridae is divided into two subfamilies, the Platygasterinae and the Sceliotrachelinae (Buhl et al., 2016). The members of subfamily Sceliotrachelinae are much smaller, including 29 genera worldwide (Johnson, 2020), typically have the rudiments of a vein in the forewings. They are generally idiobionts parasitoids of Coleoptera (Curculionidae and Cerambycidae), Sternorrhyncha (Flatidae) and nymphal stages of Sternorrhyncha viz. Pseudococcidae and Aleyrodidae (Masner, 1993; Koponen et al., 2016). This subfamily is represented by only four genera and eight species in Iran (*Isolia*, *Amitus*, *Allotropia* and *Afrisolia*) (Fallahzadeh et al., 2007; Ghahari & Buhl, 2011; Lotfalizadeh, 2018). Here, we present additional records of the subfamily from Iran, including a genus and three species.

Material and methods

The specimens were collected in different localities (East-Azerbaijan and Fars Provinces) using Malaise traps and Berlese Funnels. The collected material was transferred to the entomology laboratory of the Department of Plant Protection, East-Azerbaijan Agricultural and Natural Resources Research and Education Center, Tabriz and sorted specimens were

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placed in ethanol 75%. Then these specimens were mounted on point-card tips. An Olympus™ SZH stereomicroscope and Leica CLS 150X fiber optic light source were used for card-mounted specimen observation. The examination of morphological terminology and abbreviations follow that of Masner & Huggert (1989). Specimens were identified using keys provided by Buhl (1999), Popovici & Buhl (2010) and Veenakumari et al. (2019).

Photos were taken using by a BK Lab System by Visionary Digital and also Zerene Stacker 1.04 (Zerene Systems LLC, Richland, Washington, USA) for focus stacking and then optimized in Photoshop CS4. Assemblage and edition of illustrations in the plates were done in Adobe Photoshop CS4® software. Diagnostic characters, collecting data, including locality (name of the province, city, GIS coordinates, etc.), date of collection, collector name and number of the studied specimens are provided.

The following abbreviations are used: A1-A10 = antennal segments 1-10, OOL = distance between lateral ocellus and eye, LOL = distance between lateral and anterior ocelli, and T1-T6 = tergites 1-6.

Results

Genus *Allotropia* Foerster

Distribution: worldwide (Johnson, 2020).

The genus *Allotropia* is known by only a single species, *A. mecrida* (Walker, 1835) in Iran (Fars province) (Fallahzadeh et al., 2007).

Biology: The genus *Allotropia* parasitizing mealybugs and some species have been used in biological control programs of these pests (Clancy, 1944; Masner & Huggert, 1989; Vlug, 1995).

Allotropia conventus Maneval, 1936 (Fig. 1)

Material examined: Iran, East Azerbaijan province, Khosroshah (37°58'28"N, 46°02'55"E, 1346m) via Malaise trap, X.2007; VIII.VI.2008; 23-29.V.2009; 22-25.IX.2009; 11.VI.2016; Lotfalizadeh, H. and Asadi-Farfar, M. leg., 1♀ 6♂♂. Iran, East Azerbaijan province, Marand (38°25'28"N, 45°46'59"E, 1360m) via Malaise trap, 1.IX.2007; Lotfalizadeh, H. leg., 1♂. Iran, East Azerbaijan province, Marand, Yam (38°48'84"N, 45°77'57.24"E, 1748m) via Malaise trap, 7.VII.2009; Lotfalizadeh, H. leg., 2♂♂.

Morphological characters: Head and mesosoma dark brown, metasoma and tegula brown (Fig. 1B); eyes gray (Fig. 1E); transverse head (Fig. 1B); antennae yellow, antenna 9-segmented; male antenna nonclavate, A3-A4 of male equal; flagellar segments with whorls of long, erect bristles (Fig. 1D); thorax wide; notauli absent (Fig. 1B); legs completely yellow; metapleuron and sides of propodeum hairy (Fig. 1B); submarginal vein of fore wing with slightly upcurved apically, rounded knob distinctly surpassing 1/3 wing length, hyaline wings, the anterior exceeding the abdomen (Fig. 1D); metasoma with seven tergites, longer than the thorax; T1 longitudinally costate, hairy at sides; T2 with 2 hairy pits anterolaterally (Fig. 1B).

Distribution: Palaearctic: Moldavia, France, Finland, Iceland, Norway, (Kozlov, 1978; Vlug, 1995; Buhl, 1999; Buhl & Koponen, 2003; Johnson, 2010); Canary Islands and Madeira (Buhl & Koponen, 2003); Iran (**new record**).

Host: Hemiptera, Pseudococcidae (Popovici, 2005).

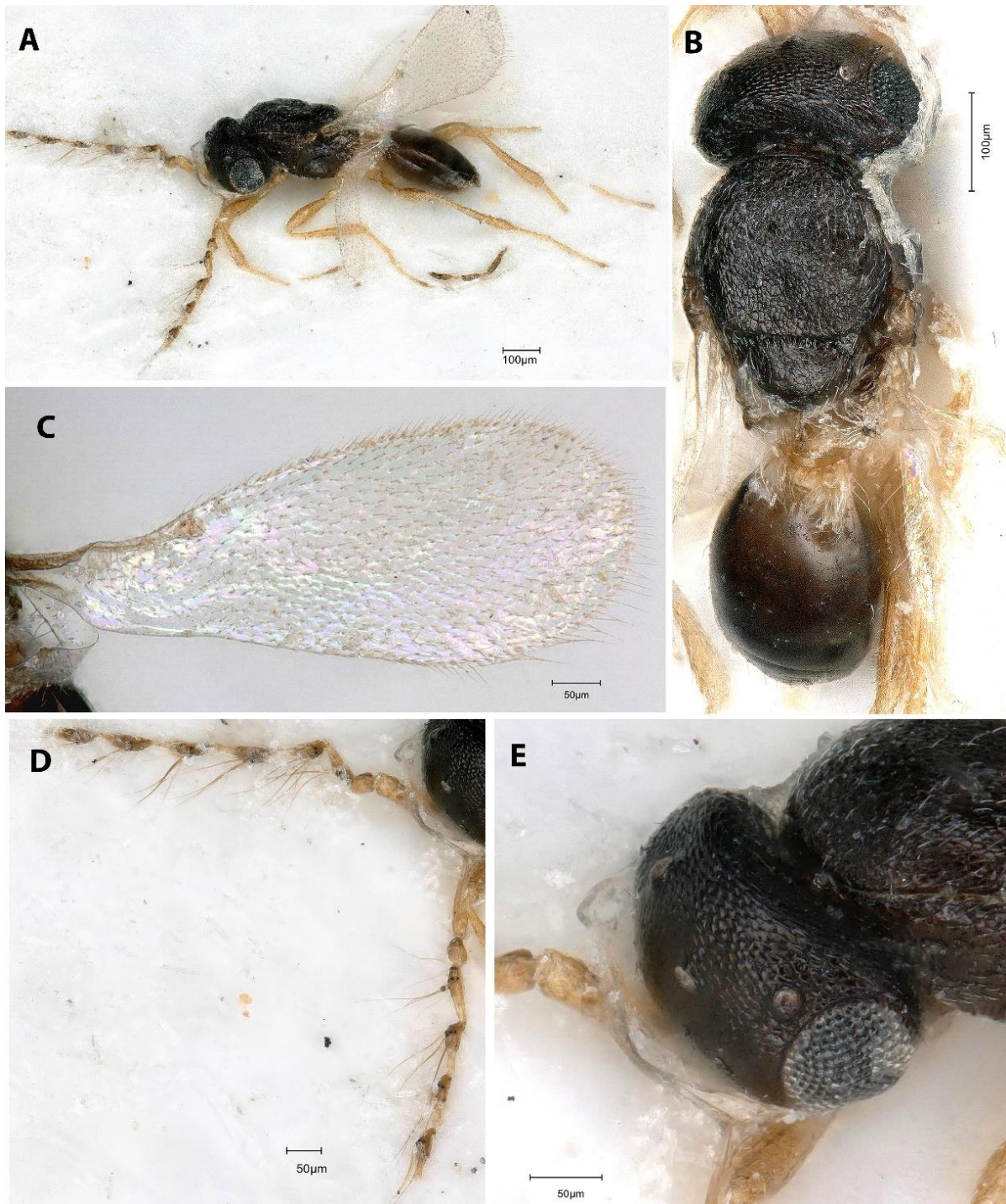


Figure 1. Male *Allotropa conventus* Maneval: **A.** General habitus in lateral view; **B.** General habitus in dorsal view; **C.** Fore wing; **D.** Antennae; **E.** Head in dorsal view.

Genus *Isolia* Foerster

Distribution: Palearctic, Oriental and Afrotropical regions (Veenakumari et al., 2018).

The genus *Isolia* is known by only a single species *Isolia foersteri* Szabó 1959 recorded from Iran (Semnan province) (Ghahari & Buhl, 2011).

Biology: Host and habitat are unknown.

Isolia mongolica (Kozlov, 1972) (Fig. 2)

Material examined: Iran, East Azerbaijan province, Dasht-e Arzhan (29°39'40"N, 51°59'0"E, 2020 m) via Berlese Funnels, 5.VIII.2015; Lotfalizadeh, H. leg., 1♂. Iran, East Azerbaijan province, Khosroshar (37°58'28"N, 46°02'55"E, 1346m) via Malaise trap, 13.VII.2016; 25.IX.2009; Lotfalizadeh, H. leg., 1♀ 1♂.

Morphological characters: Head and mesosoma dark brown, metasoma and tegula honey brown (Fig. 2B, C); eyes gray glabrous (Fig. 2A); all antennal segments honey yellow in female, in male, radicle and A1 honey yellow and A3-A10 brown in male; antenna formula 10-10 in both sexes, female with an abrupt 3-segmented clava; male antenna filiform, unique in interantennal process enlarged as a circular plate (Fig. 2A); all legs yellowish brown (Fig. 2A); OOL as long as LOL in male (Fig. 2A, B), LOL longer than OOL in female, POL at most 2× as long as OOL; sharp hyperoccipital carina present posterior to anterior ocellus (Fig. 2A); pronotal shoulders distinct, extending beyond tegula, nonangular; pronotum with sparse long bristles (Fig. 2B); notauli absent (Fig. 2B); metapleuron anteroventrally smooth, remainder with white dense setae followed by foamy structures yellowish-white, present on posterior margin of propodeum (Fig. 2B); hind wing fully formed; fore wing with short nebulous stem of submarginal vein without knob, fore wing either hyaline; marginal cilia absent on fore wing and present on hind wing (Fig. 2D); metasoma in female with 6, in male with 8 visible tergites; T1 with dense long white setae, remainder smooth with sparse setae; T2 predominantly smooth except for laterally weakly striate (Fig. 2C); S1 with foamy structures; apex of metasoma broadly triangular in female, obtuse in male.

Distribution: Mongolia (Veenakumari et al., 2018); Iran (new record)

Host: Unknown.

Genus *Fidiobia* Ashmead

Distribution: Worldwide (Johnson, 2020); Iran (new record).

Biology: Endoparasitoids of Coleoptera (Austin et al., 2005).

Fidiobia hofferi Kozlov, 1978 (Fig. 3)

Material examined: Iran, Fars province, Dasht-e Arzhan (29°39'40"N, 51°59'0"E, 2020 m) via Berlese Funnels, 9.VIII.2015; Lotfalizadeh, H. leg., 1♀.

Morphological characters: Head and mesonotum dark brown (Fig. 3C), antenna yellow, 9-segmented (Fig. 3E), legs including coxae yellow (Fig. 3A); pronotum hardly visible in dorsal view; mesoscutum with incomplete notauli, abbreviated anteriorly, gradually dilated posteriorly, between notauli smooth, shining (Fig. 3B, C); metapleuron with scattered, short silvery setae in the posterior part; T1 convex, with distinct medial prominence and anterolaterally with two large depressions, without costae and T2 smooth, shining, glabrous, without visible sculpture with two large depression anterolaterally (Fig. 3D).

Distribution: Palaearctic: Czech Republic (Kozlov, 1978), Finland, Sweden (Koponen & Huggert, 1982); Iran (new record).

Host: This species has been reared from an ichneumonid parasitoid of *Exoteleia dodecella* (L.) (Lep.: Gelechiidae) in Czechoslovakia (Lemarie, 1958).

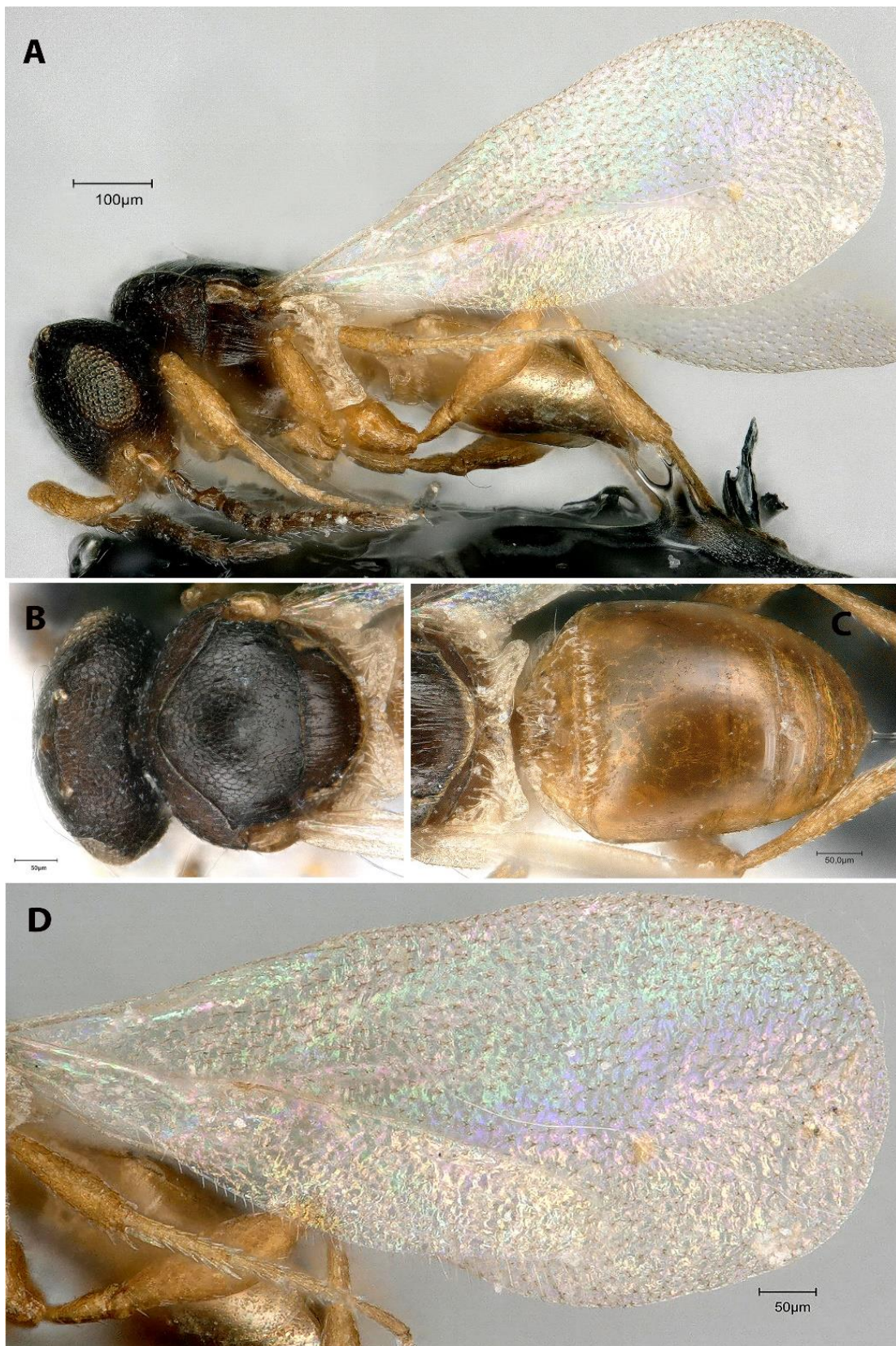


Figure 2. Female *Isolia mongolica* (Kozlov, 1972): **A.** General habitus in lateral view; **B.** head and mesosoma in dorsal view; **C.** metanotum and metasoma in dorsal view; **D.** fore wing.



Figure 3. Female *Fidiobia hofferi* Kozlov, 1978: **A.** General habitus in lateral view; **B.** General habitus in dorsal view; **C.** Head and mesosoma in dorsal view; **D.** metasoma in dorso-lateral view; **E.** Antenna.

Discussion

Platygastridae as a common group in a broad range of habitat can be found on different hosts of the orders Lepidoptera, Coleoptera or large Hymenoptera (Buhl & Jałoszyński, 2016). Shweta & Rajmohana (2016) conclude that to get a diverse collection of Platygastrids, the use of Malaise trap is recommended as the most efficient sampling gadget over the sweeping net and yellow pan trap. The species of *Isolia* and *Fidiobia* are minute species and most rarely collected. In this study some specimens of *Isolia* and *Fidiobia* collected by Berlese funnel. Hitherto four genera and eight species viz *Allotropa mecrida* (*Allotropa*-cluster); *Amitus fuscipennis* MCGOWN & NEBEKER 1978, *Am. hesperidum* Silvestri 1927, *Am. longicornis* 1878 (Foerster), *Am. minervae* Silvestri 1911, *Am. spiniferus* Brèthes 1914 (*Amitus*-cluster); *Isolia foersteri* and *Afrisolia* sp. (*Isolia*- cluster) of subfamily Sceliotrachelinae were reported from Iran (Fallahzadeh et al., 2007; Ghahari & Buhl, 2011; Lotfalizadeh, 2018).

Thirty-three species of *Allotropa* have been described worldwide (Johnson, 2020) of which only one species, *A. mecrida* (Fallahzadeh et al., 2007) are reported from Iran, now we added *A. conventus* to the fauna of Iran. The genus *Fidiobia* contains 48 described species worldwide, of which seven are known from the Palaearctic and 22 from Oriental regions (Veenakumari et al., 2018), now we include *F. hofferi* for the first time to Iranian fauna. Of the ten described species of *Isolia* worldwide, seven are reported from the Palaearctic region (Veenakumari et al., 2019). The genus *Isolia* recorded by Sakenin et al. (2008) from Iran (Semnan province) by *I. foersteri*, now *I. mongolica* is second species added to the fauna. With three new records belonging to three clusters of subfamily Sceliotrachelinae, this paper raises the number of Sceliotrachelinae known species from Iran to eleven.

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Conflict of Interests

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

References

- Austin, A.D., Johnson, N.F. & Dowton, M. (2005) Systematics, evolution, and biology of scelionid and platygastrid wasps. *Annual Review of Entomology*, (50), 553–582. <https://doi.org/10.1146/annurev.ento.50.071803.130500>
- Buhl, P.N. (1999) A synopsis of the Platygastridae of Fennoscandia and Denmark (Hymenoptera, Platygastroidea). *Entomofauna*, 20 (3), 17–52.
- Buhl, P.N. & Koponen, M. (2003) New records of Platygastridae (Hymenoptera: Platygastroidea) from Finland. *Entomologica Fennica*, 14(2), 98–104. <https://doi.org/10.33338/ef.84175>
- Buhl, P.N., Broad, G.R. & Notton, D.G. (2016) Checklist of British and Irish Hymenoptera-Platygastroidea. *Biodiversity Data Journal*, 4, e7991. <https://doi.org/10.3897/BDJ.4.e7991>
- Buhl, P.N. & Jałoszyński, P. (2016) New records of Platygastrinae (Hymenoptera: Platygastridae) in Poland, including sixteen species new in the Polish fauna. *Wiadomości Entomologiczne*, 35 (2), 109–116.

- Clancy, D.W. (1944) Biology of *Allotropa burrelli*, a gregarious parasite of *Pseudococcus comstocki*. *Journal of Agricultural Research*, 69 (4), 159–167.
- Ghahari, H. & Buhl, P.N. (2011) Check-list of Iranian Platygasteridae (Hymenoptera, Platygastroidea). *Entomofauna*, 32 (8), 329–336.
- Fallahzadeh, M., Shojaei, M., Ostovan, H. & Kamali, K. (2007) Study of the parasitoids and hyperparasitoids of *Maconellicoccus hirsutus* (Hem. Pseudococcidae) in Fars province. *Journal of Agricultural Sciences, Islamic Azad University*, 13 (3), 593–609.
- Johnson, N.F. (2010) Fauna Europaea: Scelionidae. In: Noyes J. (ed.) *Fauna Europaea: Hymenoptera*. Fauna Europaea version 2.2. Available from: <http://www.faunaeur.org> (Accessed 12th October 2010)
- Johnson, N.F. (2020) *Hymenoptera On-Line*. Available from: <https://hol.osu.edu/index.html?id=7855> (Accessed 15th February 2020).
- Koponen, M. & Huggert, L. (1982) Platygasteridae (Hymenoptera, Proctotrupoidea) from Finland. *Notulae Entomologicae*, 62, 51–59.
- Koponen, M., Buhl, P.N. & Vikberg, V. (2016) Check list of Platygasteridae of Finland (Hymenoptera, Platygastroidea). *Sahlbergia*, 22 (2), 32–47.
- Kozlov, M.A. (1978) Superfamily Proctotrupoidea. In: Medvedev, G.S. (ed.), *Identification Guide to the insects of the European part of the USSR*. (In Russian). Nauka Publishing House, Leningrad, 3 (2), 538–664.
- Lemarie, J. (1958) Beitrag zur Kenntnis der Parasiten der Kiefernknospentriebmotte *Exoteleia* (Heringia) *dodecella* L. Teil 1. Chalcidoidea, Proctotrupoidea, Bethyloidea. *Folia Zoologica*, 7 (3), 221–230.
- Lotfalizadeh, H. (2018) Four subfamilies of Platygastroidea (Hymenoptera) in the northwest of Iran with new report of Sceliotrachelinae. *North-Western Journal of Zoology*, 14 (2), 237–242.
- Masner, L. & Huggert, L. (1989) World review and keys to genera of the subfamily Inostemmatinae with reassignment of the taxa to the Platygasterinae and Sceliotrachelinae (Hymenoptera: Platygasteridae). *Memoirs of the Entomological Society of Canada*, 121, 1–214. <https://doi.org/10.4039/entm121147fv>.
- Masner, L. (1993) Superfamily Platygastroidea. In: Goulet H. & Huber J. T. (eds.), *Hymenoptera of the world: An identification guide to families*. Canada Communication Group-Publishing, Ottawa, Canada, pp. 558–563.
- Popovici, O. (2005) New species of Platygasteridae (Hymenoptera, Platygastroidea, Platygasteridae) for Romanian fauna (II). *Analele Stiintifice ale Universitatii Alexandru Ioan Cuza, Iasi, Sectiunea I Biologie Animala*, 51, 11–13.
- Popovici, O.A. & Buhl, P.N. (2010) The West Palaearctic species of *Fidiobia* Ashmead (Hymenoptera: Platygastroidea). *Journal of Natural History*, 44 (19–20), 1131–1164. <https://doi.org/10.1080/00222931003632740>.
- Sakenin, C.H., Imani, S., Shirdel, F., Samin, N. & Havaskary, M. (2008) Identification of Pentatomidae (Heteroptera) and their host plants in central and eastern Mazandaran province and introducing of many dominant natural enemies. *Journal of Plant and Ecosystem*, 15, 37–51.
- Shweta, M. & Rajmohana, K. (2016) A comparison of efficiencies of sweep net, yellow pan trap and Malaise trap in sampling Platygasteridae (Hymenoptera: Insecta). *The Journal of Experimental Zoology*, 19, 393–396.
- Veenakumari, K., Buhl, P.N. & Mohanraj, P. (2019) Review of the genus *Isolia* Förster (Platygastroidea: Platygasteridae: Sceliotrachelinae) with description of two new species from India. *Zootaxa*, 4565 (4), 451–474. <http://dx.doi.org/10.11646/zootaxa.4565.4.1>
- Veenakumari, K., Popovici, O.A., Buhl, P.N. & Mohanraj, P. (2018) Revision of Indian Species of *Fidiobia* Ashmead (Platygasteridae: Sceliotrachelinae). *Annales Zoologici*, 8 (3), 553–600. <https://doi.org/10.3161/00034541ANZ2018.68.3.013>
- Vlug, H.J. (1995) Catalogue of the Platygasteridae (Platygastroidea) of the world (Insecta: Hymenoptera). *Hymenopterorum Catalogus*, 19, 1–168. <https://doi.org/10.5281/zenodo.24358>

گزارش‌های جدید از زیرخانواده Sceliotrachelinae (Hymenoptera: Platygasteridae) در ایران

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چکیده: زنبورهای خانواده Platygasteridae گروه بزرگی از پارازیتوئیدها را شامل می‌شوند. در این تحقیق زیرخانواده Sceliotrachelinae (Hym.: Platygasteridae) در استان‌های آذربایجان شرقی و فارس بررسی شد. جنس *Fidobia* Ashmead و سه گونه *Isolia* و *Fidiobia hofferi* Kozlov، *Allotropa conventus* Maneval و *mongolica* (Kozlov) برای اولین بار از ایران گزارش می‌شوند. ویژگی‌های ریخت‌شناسی و پراکنش جغرافیایی آنها ارایه شد.

واژگان کلیدی: *Isolia*، *Fidiobia*، *Allotropa*، فون، ایران، پارازیتوئید