

Research Article

## Additions to the fauna of Iranian Elampini (Hymenoptera: Chrysididae, Chrysidinae), with key to species and taxonomic notes

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**Abstract:** We provide keys and new distributional data for the Iranian cuckoo wasps of four Elampini genera: *Chrysellampus* Semenov, 1932, *Omalus* Panzer, 1801, *Philoctetes* Abeille de Perrin, 1879 and *Pseudomalus* Ashmead, 1902. Two species are newly recorded for Iran: *Chrysellampus pici* (du Buysson, 1900) and *Philoctetes kuznetzovi* (Semenov, 1932). One new synonymy is proposed: *Pseudomalus masalskii* (Semenov, 1932) syn. nov. of *Pseudomalus turkestanicus* (Mocsáry, 1889). The lectotype of *Ellampus hypocrita* du Buysson, 1893 is designated.

**Keywords:** Chrysididae; Elampini; new record; Iran

### Introduction

Elampini are the second largest tribe of Chrysidinae in the World, including more than 700 valid species. The majority of these cuckoo wasps inhabit arid areas of the Holarctic region (Kimsey and Bohart, 1991). Different systematic classifications of the genera *Omalus* Panzer, 1801, *Elampus* Spinola, 1806, *Philoctetes* Abeille de Perrin, 1879, *Holophris* Mocsáry, 1890, *Pseudomalus* Ashmead, 1902 and *Chrysellampus* Semenov, 1932 have been proposed by Linsenmaier (1959, 1997, 1999) and Kimsey and Bohart (1991). In this study we follow the classification by Kimsey and Bohart (1991) partly modified by Rosa *et al.* (2015a; 2015b; 2015c); however molecular investigations are needed to clarify the relations within these

genera. Rosa *et al.* (2013) provided a list of the Iranian species mainly based on historical data, but the real number of expected species for the country is higher and was recently updated by Rosa and Lotfalizadeh (2013), Torabipour *et al.* (2013a, 2013b); Samin *et al.* (2014), Strumia and Fallazahdeh (2015), Tavassoli and Fallahzadeh (2015), Farhad *et al.* (2015, 2016, 2017), Strumia and Fallazahdeh (2016), Strumia *et al.* (2016a, b), Iranmanesh *et al.* (2017) and Rosa *et al.* (2017).

During field researches carried out between 2010 and 2013, a total of 128 specimens belonging to *Omalus*, *Philoctetes*, *Pseudomalus* and *Chrysellampus* have been collected by net and Malaise traps in Northern provinces (Guilan, Mazandaran, Alborz and Qazvin) and southern provinces (Hormozgan and Fars) of Iran. Overall eighteen species of these genera were already known for the Iranian fauna, yet newly collected specimens as well as new systematic and distributional data found in the museums of Linz (Biologiezentrum, Austria), Luzern (Natur

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Museum, Switzerland) and St. Petersburg (Zoological Institute, Russia) provided important changes to the previous species list that we expose in the present paper.

### Materials and Methods

The following data are included: valid taxa names, synonymies, brief description of the newly recorded species and distribution. Studied specimens were examined and described using Olympus SZH10 stereomicroscope and images were taken by Sony CCD digital camera attached to an Olympus AX70 stereomicroscope. Photos were processed by Zerene Stacker 1.04 software. Newly recorded specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University and in the private collection of Paolo Rosa. New records for Iran are indicated by an asterisk (\*). Abbreviations used in the text follow that of Kimsey and Bohart (1991): F1, F2, F3, etc. = flagellum 1, flagellum 2, flagellum 3, etc.; MOD = mid ocellar diameter; MS = malar space; PD = puncture diameter; T1, T2, T3 = first abdominal tergum, second abdominal tergum, third abdominal tergum; l/w = length versus width.

### Results

#### Genus *Chrysellampus* Semenov, 1932

*Chrysellampus* Semenov-Tian-Shanskij 1932: 5. Type species: *Ellampus heros* Semenov, 1892. Original designation.

**Diagnosis:** The genus *Chrysellampus* Semenov, 1932 is distinguished from other genera by the combination of the following characteristics: habitus sub-cylindrical and elongated; F2-F11 flattened; MS bisected or nearly so by curved genal carina; pronotum with large and dense punctures; mesoscutum with large punctures clumped along notauli (*C. sculpticollis* (Abeille de Perrin, 1878)) or covering entire surface; if punctures on mesoscutum are clumped along notauli, then

punctuation on pronotum is dense with large punctures; medial vein weakly curved; the distance between posterior margin of anterior declivity of T1 and posterior margin of T1 as long as or longer than mesoscutellum; apex of T3 with median notch, with a single tooth at each side; head and mesosoma characterized by colliculate sculpture (Harris, 1979), a reticulate microsculpture continuously set with granulations on the intervals among punctures; tarsal claw with five teeth.

**Remarks:** The genus *Chrysellampus* was reinstated by Rosa *et al.* (2015b). *Chrysellampus medanae* (Du Buysson), *C. pici* (du Buysson) and *C. tatianae* Semenov had been previously included in the genus *Philoctetes* Abeille de Perrin by Kimsey and Bohart (1991) and Rosa *et al.* (2013).

#### Key to Iranian *Chrysellampus* Semenov

- 1- Body colour entirely green to bluish green, with or without a blue or blackish spot on T2 ... *C. pici* (du Buysson).
- Body distinctly bicoloured: head and mesosoma green and metasoma golden-red to red ... 2.
- 2- Punctures on mesoscutum mostly clumped along notauli; mesoscutum and mesoscutellum with distinct colliculate sculpture ... *C. medanae* (du Buysson).
- Punctures on mesoscutum irregularly and sparsely distributed on the entire surface; mesoscutum and mesoscutellum smooth to indistinctly sculptured with weak colliculate sculpture ... *C. tatianae* Semenov.

#### *Chrysellampus medanae* (du Buysson, 1890)

*Ellampus medanae* du Buysson in Magretti 1890: 531. Lectotype ♀, designated by Rosa 2009: 244; Lebanon: Alei (Genoa) (examined).

**Material examined:** Alborz Province: 2♂♂, Chalous Road, Shahrestanak (35°57'34" N, 51°22'20" E, 2305 m), 09.VIII.2010; 1♂, 1♀, idem, 18.VIII.2010; Qazvin Province: 4♀♀, Zereshk (36°25'42" N, 50°06'36" E, 2035 m), 11.VIII.2011, all specimens collected by M.

Khayrandish.

**Distribution:** Iran (Alborz, Markazi, Qazvin) (Rosa *et al.*, 2013), Lebanon, Syria (Linsenmaier, 1959; Rosa, 2009), Turkey (Strumia and Yildirim, 2007).

**\**Chrysellampus pici* (du Buysson, 1900)**

*Ellampus pici* du Buysson, 1900: 126. Holotype ♂; Turkey: Smyrne [currently İzmir] (Paris) (examined material).

*Omalus (Chrysellampus) nigromaculatus* Linsenmaier, 1997a: 249. Holotype ♂; Turkey: Ankara (Luzern) (examined material).

*Chrysellampus shestakovi* Semenov, 1967: 119. Holotype ♂; Turkmenistan: Firyuza (St. Petersburg) (examined material).

Material examined: 1♀, Iran, Fars, steppe mountain 5 Km N of Persepolis, 6.VII.1965, leg. Giordani Soika-Mavromoustakis (Luzern); 1♀, Teheran, Keredj (Luzern).

**Description:** Body length 6.5-7.0 mm. Elongated, head with large and dense punctures on frons and lateral sides of scapal basin. Scapal basin deep and polished, irregularly wrinkled towards the clypeus, post-ocellar area polished, without post-ocellar line. Pronotum and mesonotum with large and deep punctures covering entire surface; punctures on lateral lobes of mesoscutum somehow spaced; notauli pits deep and short (1 PD), notauli complete; mesoscutellum with sparse punctures, denser laterally; metanotum elongated (as long as mesoscutum) and gibbous, with large areolate punctures; propodeal angles large and wide, slightly divergent, with acute tip pointing posteriorly; mesopleuron with enlarged omaulus and scrobal sulcus. Metasoma with fine punctures subequally spread on terga, with small dots at intervals; apex of T3 with large and round median notch, basally bidentate.

**Colouration:** Body completely blue-green, usually with a large blue to dull black area on T1 and T2, and terga entirely emerald green in the Iranian specimens and in another specimen from Turkey (Halfeti).

**Distribution:** Greece (Peloponnese and Rhodes) (Arens, 2014), Turkey (du Buysson, 1900), new record for Iranian fauna.

***Chrysellampus tatianae* Semenov, 1967**

*Chrysellampus tatianae* Semenov-Tian-Shanskij 1967: 120. Holotype ♂; Iran: Tabriz (St. Petersburg) (examined).

Material examined: Alborz Province: 1♂, Chalous Road, Shahrestanak (35°57'34" N, 51°22'20" E, 2305 m), 23.VIII.2010, leg. Khayrandish.

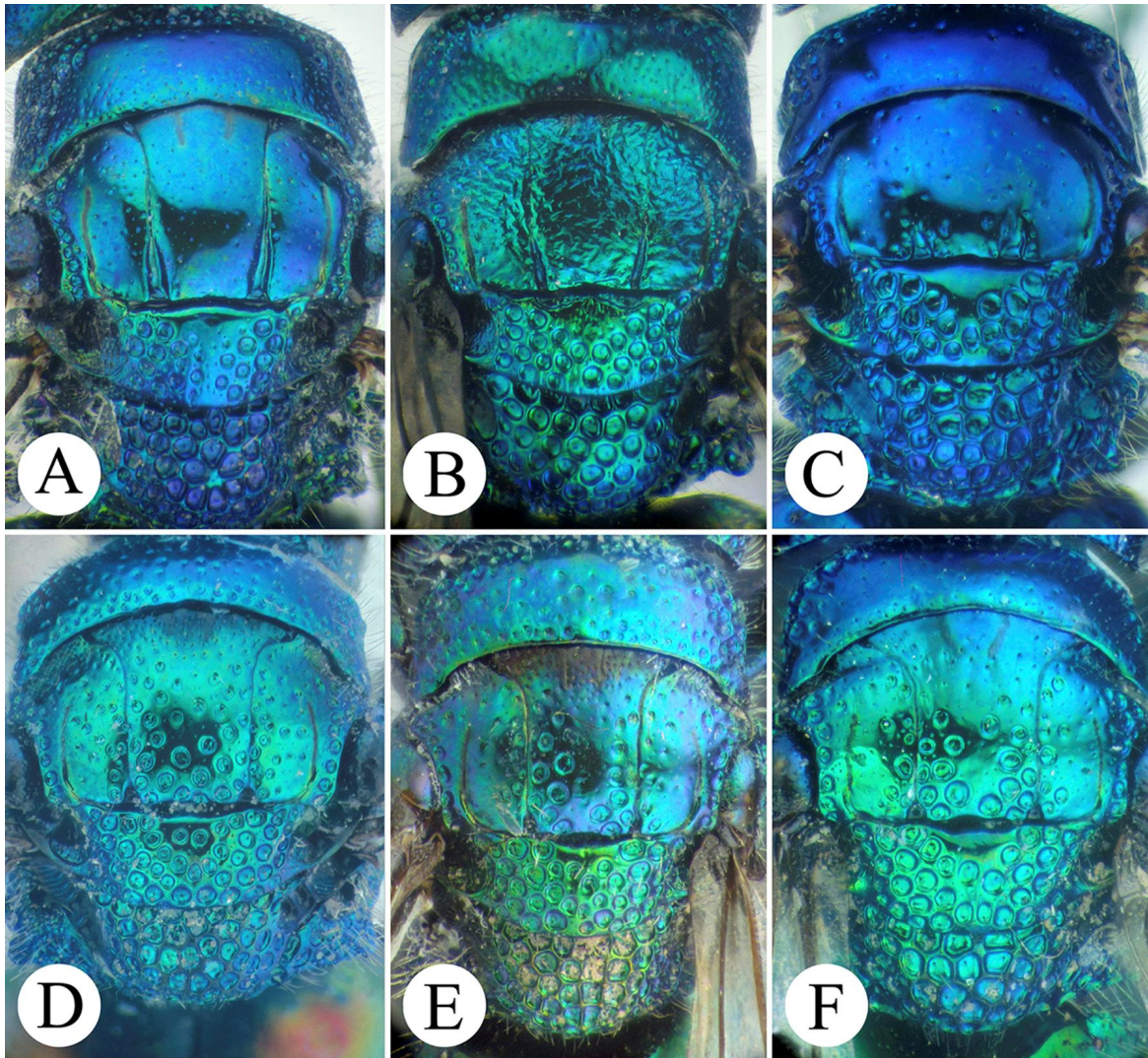
**Distribution:** Iran (Alborz, East-Azerbaijan) (Semenov-Tian-Shanskij, 1967), former USSR (Kimsey and Bohart, 1991).

**Remarks:** In the original comparative diagnosis of *Chrysellampus tatianae* it has been noted that this species has tarsal claw without teeth. Nevertheless, in the original description, existence of four subsidiary teeth is emphasized and the examined type has truly four subsidiary teeth.

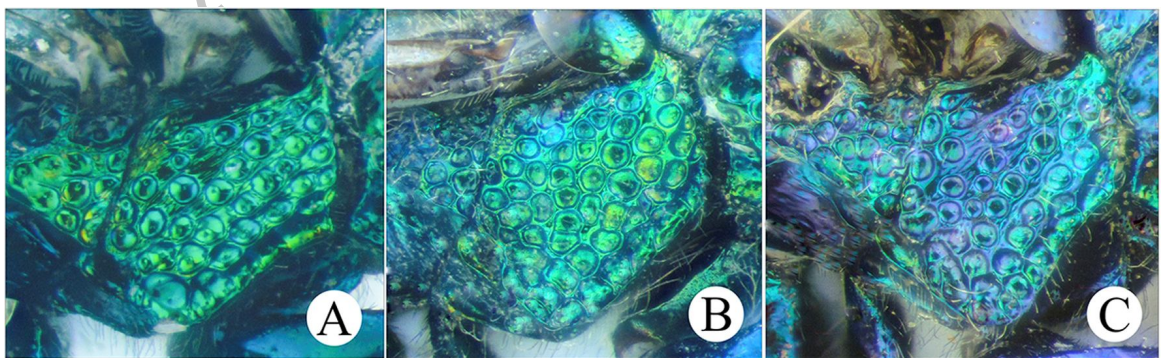
**Genus *Omalus* Panzer, 1801**

*Omalus* Panzer, 1801: 13. Type species: *Chrysis aenea* Fabricius 1787. Monobasic.

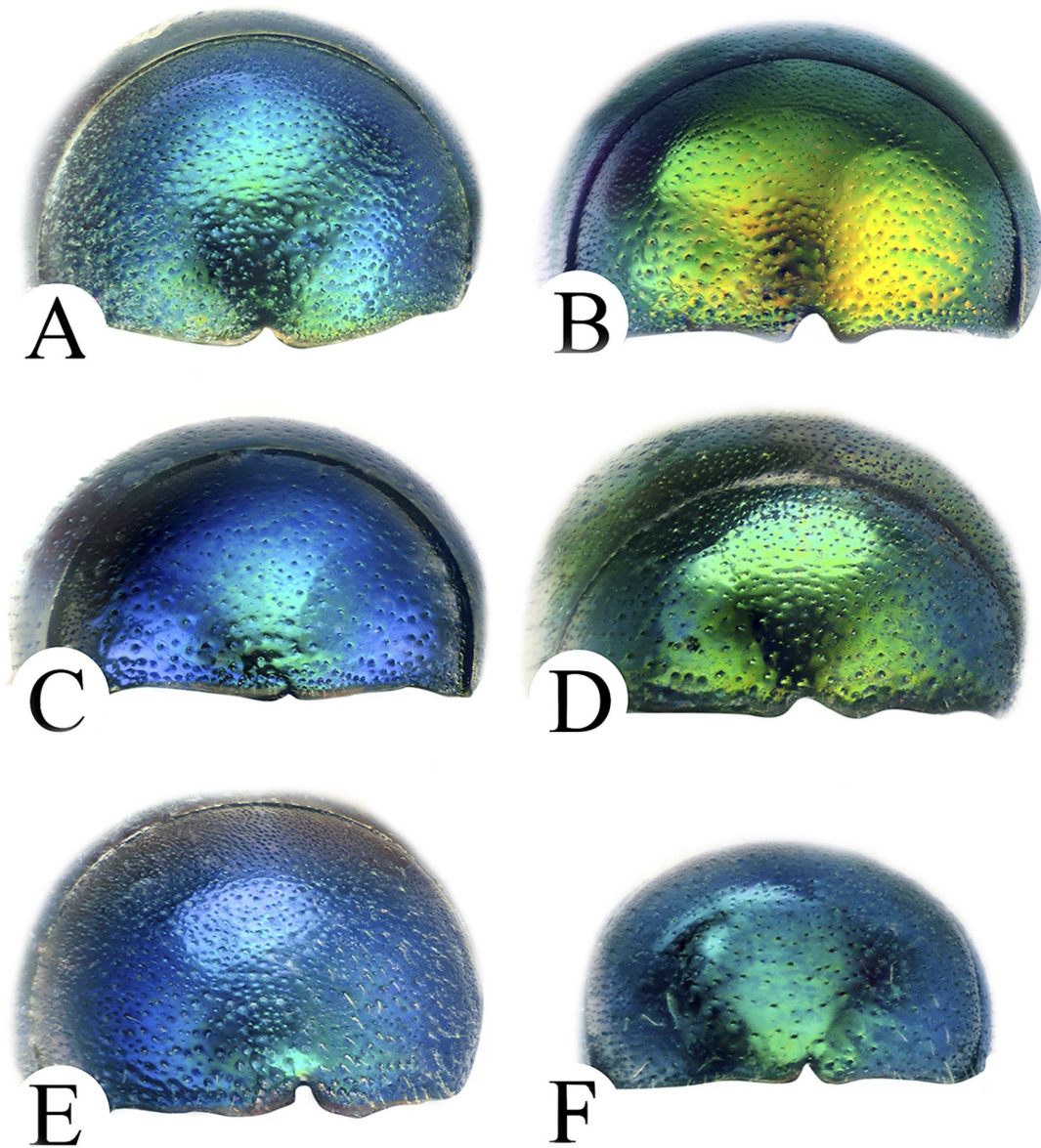
**Diagnosis:** *Omalus* Panzer, 1801 can be distinguished from other genera by combination of the following characteristics: scapal basin deep, smooth and glabrous, rarely with weak striae; MS usually equal to or longer than 1 MOD, horizontally bisected by curved genal carina; pronotum impunctate medially; mesoscutum impunctate, at most with very sparse and tiny punctures evenly distributed, or weakly transversally wrinkled (Fig. 1A-C); mesopleuron with single carina (Fig. 2A) or ventrally with aligned large punctures disclosing a weak double carinae (Rosa *et al.*, 2015a); mesoscutellum with or without anterior foveae; tarsal claw with three to four teeth; T3 with or without semitransparent rim; apex of T3 with large and triangular median notch or with shallow median notch, sometimes barely visible (Fig. 3A-C).



**Figure 1** Mesoscutum, dorsal view, A. *Omalus aeneus* (Fabricius), B. *Omalus biaccinctus* (du Buysson), C. *Omalus margianus* (Semenov), D. *Philoctetes bogdanovii* (Radoszkowski), E. *Philoctetes tarnanii* (Semenov), F. *Pseudomalus turkestanicus* (Mocsáry).



**Figure 2** Mesopleuron, lateral view, A. *Omalus aeneus* (Fabricius), B. *Philoctetes tarnanii* (Semenov), C. *Pseudomalus turkestanicus* (Mocsáry).



**Figure 3** Third abdominal tergum, posterior view, A. *Omalus aeneus* (Fabricius), B. *Omalus biaccinctus* (du Buysson), C. *Omalus margianus* (Semenov), D. *Philoctetes bogdanovii* (Radoszkowski), E. *Philoctetes tarnanii* (Semenov), F. *Pseudomalus turkestanicus* (Mocsáry).

#### Key to Iranian *Omalus* Panzer

1. Mesoscutum wrinkled without punctures (Fig. 1B) ... *O. biaccinctus* (du Buysson).
  - Mesoscutum smooth and shining, without punctures or with evenly distributed tiny punctures (Fig. 1A, 1C) ... 2.
2. Notaular pit elongated (up to 6 MOD) (Fig. 1A); notaular line deep and complete;

- mesoscutum impunctate, or with sparse tiny punctures; tarsal claw with four teeth ... *O. aeneus* (Fabricius).
- Notaular pit short (about 1 MOD); notaular line vanishing or narrow and short (up to  $\frac{3}{4}$  of mesoscutum length); tarsal claw with three distinct teeth ... 3.
- 3. Body bicoloured with metallic blue to violet

head and mesosoma and contrasting metallic flame red to reddish metasoma; wings brownish; apex of T3 with deep and triangular apical notch ... *O. politus* (du Buysson).

- Body metallic green to greenish-blue; wings semitransparent hyaline; apex of T3 with small and shallow apical notch... 4.

4. Notauli indistinct and basally impressed as fine lines; mesoscutum with sparse, tiny punctures and/or lacunose punctures (large and shallow punctures); anterior margin of mesoscutellum with large and usually fused foveae; *Rs* as long as pterostigma ... *O. margianus* (Semenov).

- Notauli impressed as fine lines; mesoscutum polished without punctures or with sparse and tiny punctures without large punctures; anterior margin of mesoscutellum with two enlarged flattened foveae; *Rs* distinctly longer than pterostigma ... *O. imbecillus* (Mocsáry).

#### ***Omalus aeneus* (Fabricius, 1787)**

*Chrysis aenea* Fabricius, 1787: 284. Holotype f#; Germany: Halae Saxonum [currently Halle] (Copenhagen) (examined).

*Ellampus zarudnyi* Semenov, 1932: 44. Holotype ♀, Turkmenistan: Tashkent (St. Petersburg) (examined).

**Material examined:** Golestan Province: 1f#, Gorgan, Schaskola-Wald, 300 m, 2.VI.1977, leg. Hozschuh and Ressler (Linz); Alborz Province: 1♀, Chalous Road, Shahrestanak (35°57'34" N, 51°22'20" E, 2305 m), 22.VI.2010; 1♀, idem, 24.VIII.2010; Mazandaran Province: 1♂, Noor, Chamestan, Tangehvaz (36°21'54" N, 52°06'12" E, 687 m), 23.VII.2010; 1♀, idem, Joorband (36°26'18" N, 52°07'12" E, 275 m), 11.VIII.2011, all specimens collected by M. Khayrandish.

**Distribution:** Widespread in the Palaearctic and Oriental Regions, accidentally introduced in North America (Kimsey and Bohart, 1991; Wei *et al.*, 2014), Iran (Alborz, Mazandaran, Fars) (Farhad *et al.*, 2016; Strumia *et al.*, 2016a; Tavassoli *et al.*, 2016).

#### ***Omalus biaccinctus* (du Buysson, 1892)**

*Ellampus biaccinctus* du Buysson in André

1892: 152. Syntypes ♂, ♀; France (Paris) (examined).

**Material examined:** Alborz Province: 1♂, Chalous Road, Shahrestanak (35°57'34" N, 51°22'20" E, 2305 m), 22.VI.2010; 1♀, idem, 24.VIII.2010; 1♀, idem, 07.IX.2010; Qazvin Province: 1♀, Zereshk (36°25'42" N, 50°06'36" E, 2035 m), 27.VII.2011; 1♂, idem, 11.VIII.2011; 1♂, idem, 06.IX.2011, all specimens collected by M. Khayrandish.

**Distribution:** Europe, west Asia (Linsenmaier, 1959), Turkey, Uzbekistan (Strumia and Yildirim, 2011), Iran (Alborz, East-Azerbaijan, Qazvin) (Rosa *et al.*, 2013).

#### ***Omalus imbecillus* (Mocsáry, 1889)**

*Ellampus (Ellampus) imbecillus* Mocsáry, 1889: 98. Lectotype ♀, designated by French in Bohart and French 1986: 341; Turkmenistan: Pendgikent (Budapest) (examined).

**Distribution:** Iran (Khorasan, Sistan and Baluchestan) (Bischoff, 1913; Torabipour *et al.*, 2013a). Oman, Saudi Arabia, Turkey, Tajikistan, United Arab Emirates (Mocsáry, 1889; Linsenmaier, 1968, 1994), China (Wei *et al.*, 2014).

#### ***Omalus margianus* (Semenov, 1932)**

*Ellampus margianus* Semenov-Tian-Shanskij 1932: 15. Lectotype ♀, designated by Kimsey 1986: 107; Turkmenistan: Imam-Baba, (St. Petersburg) (examined).

*Ellampus integellus* Semenov-Tian-Shanskij 1932: 17. Holotype ♂; Uzbekistan: Amur-Darya, Termez, (St. Petersburg) (examined).

*Ellampus specularis* Semenov-Tian-Shanskij 1932: 18. Syntypes ♂♂, ♀; Turkmenistan (Bairam-Ali, Mary) and Iran (Makran in Sistan and Baluchestan), Bagu, Bal (St. Petersburg) (examined).

**Material examined:** Fars Province: 3♀♀, Jahrom (site III) (28° 34' 37" N, 53° 40' 47" E, 1107 m), 29.III.2013, leg. A. Amiri; Hormozgan Province: 1♀, Bandar Abbas, Zakin (site II), (27°53'7" N, 56°19'58" E, 1020 m), 23.V.2011; 1♀, idem, 25.V.2012; 1♀, idem, 22.III.2013; 1♀, Genou (27°24'16" N, 56°08'51" E, 1274 m), 04.IV.2011; 1♀, idem, 20.IV.2011; 1♀, Minab,

Chelo, (27°10'30"N, 57°01'09"E, 16 m), 05.IV.2013; 1♀, Minab, Goleshvar (27°58'30" N, 56°59'53" E, 14 m), 03.IV.2011; 1♀, Minab, Agricultural and Natural Resources Research center of Minab, (27°8'39" N, 57°04'31" E, 28 m), 03.IV.2012; 1♀, idem, 6.V.2013; 1♀, Qale Qazi (27°26'53" N, 56°32'53" E, 48 m), 17.IV.2011; 1♀, idem, 24.III.2011; 1♂, idem, 16.IV.2013; 1♂, Sirik (27°10'30" N, 57°01'09" E, 16 m), 13.IV.2013; 1♀, Qeshm Island, Ramkan, (26°52'25" N, 56°01'07" E, 34 m), 24.IV.2013; 1♀, idem, 25.V.2012; 2♀♀, idem, 23.VI.2013, all specimens collected by A. Ameri.

**Distribution:** Iran (Fars, Hormozgan, Sistan and Baluchestan), Turkmenistan, Uzbekistan (Semenov-Tian-Shanskij, 1932).

#### ***Omalus politus* du Buysson, 1887**

*Omalus politus* du Buysson 1887: 168. Lectotype ♀, designated by Kimsey [in Kimsey and Bohart 1991]: 249; Lebanon: Beirut (Paris) (examined).

**Distribution:** Iran (Fars, Lorestan) (Rosa et al. 2013). South-eastern Europe, western Asia, North Africa (Linsenmaier, 1959, 1999), Middle East, Turkey (Kimsey and Bohart, 1991).

#### **Genus *Philoctetes* Abeille de Perrin, 1879**

*Philoctetes* Abeille de Perrin, 1879: 27. Type species: *Elampus micans* Klug, 1835. Designated by Ashmead 1902.

**Diagnosis:** *Philoctetes* Abeille de Perrin is distinguished from other genera by combination of the following characteristics: MS usually short (< 1 MOD) and not bisected by curved genal carina; genal carina usually faint or not sharply elevated; mesoscutum with punctures clumped along notauli, or more evenly distributed, but anyway gathering together toward notauli (Fig. 1D, E); mesopleuron extending at an oblique angle toward venter, ecarinate and not strongly projecting on juncture between omaulus and scrobal carina (Fig. 2B); metanotum usually conical, metascutellum projected backward in few species, or distinctly mucronate, spine-like;

posterior margin of T3 usually deeply notched medially (Fig. 3D, E), sometimes bordered by thickened brown rim; tarsal claw with 1-3 subsidiary teeth.

#### **Key to Iranian *Philoctetes* Abeille de Perrin**

1. Body metallic bronze to red ... *P. horvathi* (Mocsáry)

- Body differently coloured, metallic green or bicoloured, with head and mesosoma metallic green to blue and metasoma golden to metallic red at least on T1 and T2; or golden to metallic red on mesosoma and metasoma, with contrasting green head and ventral surface ... 2.

2. Head, mesosoma and T3 metallic green to blue and metasoma golden to metallic red on T1 and T2 ... *P. bogdanovii* (Radoszkowski).

- Metasoma uniformly coloured ... 3.

3. Apical margin of T3 saddled, with a brownish rim running beneath the apical margin ... *P. deflexus* (Abeille de Perrin).

- Apical margin simple, not saddled ... 4.

4. Body metallic green ... 5.

- Body bicoloured with head and mesosoma greenish to blue and metasoma golden to metallic red, well visible in lateral view ... 6.

5. Mesoscutum with unusual large punctures along notauli; male with elongate flagellomeres ( $l/w = 1.5$ ) ... *P. tarnanii* (Semenov).

- Mesoscutum with small and tiny punctures along notauli; male with short flagellomeres ( $F3-F12 l/w \sim 1$ ) ... *P. sareptanus* (Mocsáry).

6. Punctures on mesoscutum larger, especially between notauli; apex of T3 transversally bulged, lateral margin of T3 continuous ... *P. punctulatus* (Dahlbom).

- Punctures on mesoscutum smaller and distributed close to notauli; apex of T3 not transversally bulged; lateral margin of T3 concave to shallowly concave anterior to apical notch ... 7.

7. Lateral margin of T3 shallowly concave anterior to apical notch...*P. kuznetzovi* (Semenov).

- Lateral margin of T3 deeply concave anterior to apical notch, in females margins of apical notch similar to large teeth ... *P. bidentulus* (Lepeletier).

***Philoctetes bidentulus* (Lepeletier, 1806)**

*Hedychrum bidentulus* Lepeletier, 1806: 121. Neotype ♂, designated by Rosa and Xu (2015: 81); France: Machecoul (Luzern) (examined).

**Distribution:** Iran (Lorestan) (Strumia and Fallahzadeh, 2015). Central to Southern Europe, northern Africa, West Asia (Linsenmaier, 1959, 1999).

***Philoctetes bogdanovii* (Radoszkowski, 1877)**

*Holopyga Bogdanovii* Radoszkowski 1877: 5. Holotype ♂; Uzbekistan: Sarafshan Valley (Moscow) (examined).

Material examined: Alborz Province: 1♀, Karadj (35°46'08" N, 50°56'55" E, 1277 m), 15.VI.2010; 1♂, idem, 26.VI.2010; 4♀♀, 1♂, Shahrjar (35°40'08" N, 50°56'56" E, 1168 m), 08.IV.2010; 1♀, idem, 30.VIII.2010; 1♂, idem, 01.IX.2010; 2♀♀, idem, 22.IX.2010; 3♀♀, idem, 28.IX.2010; Qazvin Province: 1♀, Zereshk (36°25'42" N, 50°06'36" E, 2035 m), 16.VIII.2011, all specimens collected by M. Khayrandish.

**Distribution:** Iran (Alborz, Lorestan, Qazvin) (Rosa *et al.*, 2013). South-eastern Europe, western Asia (Linsenmaier, 1959), Russia (southern European part), Greece (Kimsey and Bohart, 1991), Turkey (Strumia and Yildirim, 2011).

***Philoctetes deflexus* (Abeille de Perrin, 1878)**

*Holopyga deflexa* Abeille de Perrin 1878: 2.

Lectotype ♀, designated by Kimsey 1986; Egypt (Paris) (examined).

**Material examined:** Fars Province: 1♂, Jahrom (site I) (28°39'31" N, 53°32'17" E, 1018m), 03.VI.2012; 2♂♂, idem, 30.III.2013, all specimens collected by A. Amiri.

**Distribution:** Iran (Fars) (Tavassoli and Fallahzadeh, 2015; Strumia *et al.*, 2016a). Northern Africa, Palestine, Syria, Saudi Arabia (Linsenmaier, 1959, 1994).

**Remarks:** Body colour of Iranian species is variable. At the Zoological Institute of St. Petersburg, Russia) there are twenty-one specimens collected in Persia by Zarudnij in 1903-1904 entirely emerald green (Fig. 4A) and eleven more or less golden to metallic red (Fig. 4B). Specimens from Egypt are often greenish-blue to blue.

***Philoctetes horvathi* (Mocsáry, 1889)**

*Ellampus wesmaeli* Mocsáry 1882: 27, nom. praecoc., nec. Chevrier, 1862. Syntypes ♂, ♀; Austria (Budapest).

*Ellampus horvathi* Mocsáry 1889: 82. Replacement name for *Ellampus wesmaeli* Mocsáry, 1882.

**Distribution:** Iran (Golestan) (Mocsáry, 1890). Trans-Palaearctic: central and eastern Europe; Middle East; Far East to Mongolia, China and Korea; northern Africa (Morocco) (Linsenmaier, 1959; Kimsey and Bohart, 1991; Rosa *et al.*, 2015c).

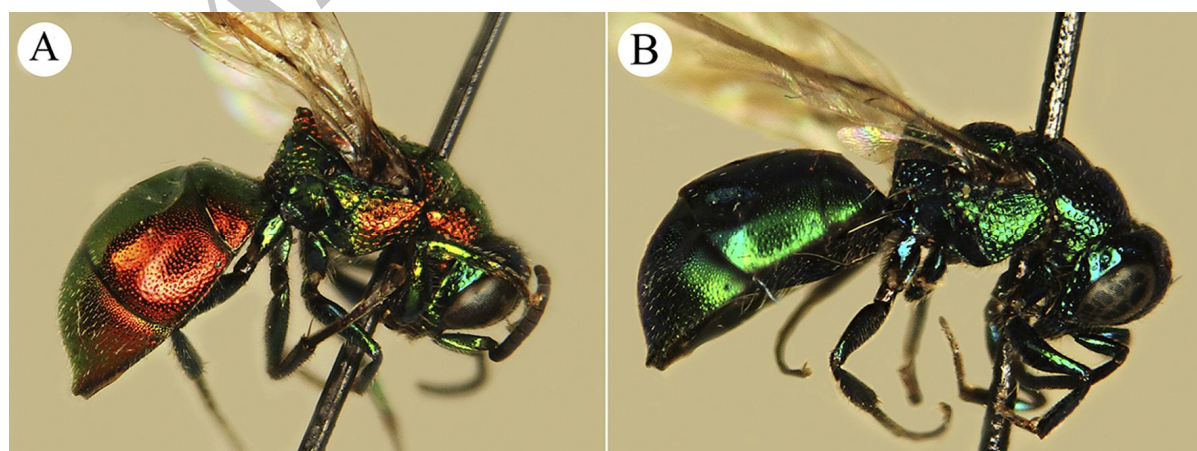


Figure 4 A-B. Body colour variation in *Philoctetes deflexus*.



***Philoctetes hypocrita* (du Buysson, 1893)**

*Ellampus hypocrita* du Buysson, 1893: 246. Lectotype (hereby designated) ♂: China: Kansu Jelisyyn Kuse (Krakow).

**Distribution:** Azerbaijan, Mongolia (du Buysson, 1893; Rosa et al., 2014); Persia (du Buysson, 1893); southern former USSR, China (Kimsey and Bohart, 1991; Rosa et al., 2014).

**Remarks:** *Ellampus hypocrita* du Buysson, 1893 was described on two specimens collected in China and Azerbaijan, on the Caspian Sea: “Mongolie: Kansu-Jelisyyn-Kuse (*Radoszkowsky*); Perse: mer Caspienne occidentale”, These two syntypes are deposited in Paris and Kraków (Rosa et al., 2015d). Kimsey and Bohart (1991: 248) erroneously considered the syntype housed in Paris as the holotype, but this specimen is considered neither as the holotype nor as the lectotype by inference of holotype according to the Code (ICZN 1999: Article 74.5). The correct spelling is *hypocrita*, which is a latin noun of the first declension.

The systematic position of this specimen is not yet clear. Kimsey and Bohart (1991) placed it in the genus *Omalus*. This placement was later followed by Rosa et al. (2013) in the check-list of the Iranian species. Nevertheless, the two syntypes have been later checked by the second author and they do not belong to the genus *Omalus* Panzer, sensu Kimsey and Bohart (1991), according to their punctures on mesoscutum and shape of mesopleuron (Rosa et al., 2015d) and therefore *E. hypocrita* was placed in the genus *Pseudomalus* Ashmead. The syntype in Paris is badly damaged, and only the mesosoma remains. Since the type in Paris is almost destroyed and the examination of important diagnostic characteristics for genus and species identification is not possible, we hereby designate the male specimen in Krakow [not female as reported in Rosa et al. (2015d)] as the lectotype of *E. hypocrita*. It bears the following labels: golden rounded label // *Ellampus hypocrites* n.sp. Buys. [hand written by du Buysson] // Kansu Jelisyyn Kuse 20/VII [handwritten]. Pictures of this specimen are published in Rosa et al., (2015d: plate 57). A

recent study on the Chinese specimens (Rosa et al., 2015c) pointed out a new sexual dimorphism in the genus *Philoctetes* Abeille de Perrin, based on different length of flagellomeres, more elongate in males, and found that also *Philoctetes* specimens may have large punctures on mesoscutum, similar to *Pseudomalus* species. In the light of this new diagnostic characteristics of the genus *Philoctetes*, a reevaluation of *E. hypocrita* allows changing the placement of this species into the genus *Philoctetes*. This change is confirmed by elongate flagellomeres ( $l/w \geq 2$ ), malar spaces apparently not bisected by genal carena and apical notch bordered with a narrow semitransparent and thickened rim, typical of Asian *Philoctetes*. A new and careful examination of the type specimen in Krakow is needed to include this species in a dichotomous key and it is not excluded that *P. tarnanii* (Semenov) could be synonym of this species.

*Philoctetes hypocrita* was included in the check-list of the Iranian because of the type locality “Perse: mer Caspienne occidentale”, which is currently Azerbaijan and no longer Iran, after 1945. For the moment, we exclude *P. hypocrita* from the Iranian fauna, because not any Iranian record is known to us.

**\**Philoctetes kuznetzovi* (Semenov, 1932)**

*Ellampus (Ellampus) kuznetzovi* Semenov-Tian-Shanskij 1932: 25. Lectotype ♂; Georgia: Kodzhory (St. Petersburg) (examined).

**Material examined:** Fars Province: 1♀, Shahremian (30°54'39" N, 52°28'16" E, 2120 m), 05.VII.2012; 1♂, 15.VIII.2012, all specimens collected by A. Amiri; Zanzan Province: 1♀, Tarom-Gilvan Rd. WSW of Sorkhe Dizaj (36°47'40" N, 48°52'01" E), 29.V.-3.VI.2011, leg. Baiocchi (PRC). Isfahan Province: 1♀, Kashan env., 3.V.1999, leg. K. Deneš (Linz).

**Description:** Body length 4.5-4.7 mm; head with large, shallow and dense punctures, scapal basin mostly polished in males, medially with fine and very short transverse wrinkles, vertex mostly polished with shallow and sparse punctures in females, finer and

sparser in males, postocellar line absent; pronotum with shallow punctures, on lateral margin with large and dense punctures; mesoscutum mostly polished with large and shallow punctures clumped along notauli, notauli shallow but complete; scutellum with close and deep punctures in females, with a triangular smooth area antero-medially in males; metanotum convex, with large, deep, and reticulate punctures; propodeal angles distinct and stout with round tip, pointing posteriorly; mesopleuron with large, deep and close punctures; metasoma with deep, tiny and sparse punctures; lateral margin of T3 weakly sinuate medially and before the median notch,

apex of T3 with narrow, brownish transparent rim, median notch deep and narrow. Head and thorax with long hairs (as long as F1).

**Colouration:** Head green; mesosoma green, partly with golden reflection; metasoma green golden to golden red, tegula non metallic; wing tanned on outer half (Fig. 5).

**Distribution:** Caucasus (Semenov, 1932). New record for Iranian fauna.

**Remark:** Specimens from the northern part of Iran have flame red colour of metasoma, similar to the type specimen, whereas specimens from southern part of Iran have a golden green colouration, as often shown in other chrysidid species.



**Figure 5** *Philoctetes kuznetzovi* (Semenov). Habitus, Lateral view.

***Philoctetes punctulatus* (Dahlbom, 1854)**

*Omalus punctulatus* Dahlbom 1854: 33. Syntypes (sex unknown); France: Landes, St. Severy and Italy: Sicily (Lund) (examined).

**Distribution:** Iran (Qazvin) (Rosa *et al.*, 2013), Southern Europe, south-western former USSR, North Africa, Caucasus, (Linsenmaier, 1959; Kimsey and Bohart, 1991), Turkey (Strumia

and Yildirim, 2007).

***Philoctetes sareptanus* (Mocsáry, 1889)**

*Ellampus sareptanus* Mocsáry 1882: 83.

Holotype ♂; Russia: Sarepta (Vienna).

*Ellampus schulthessi* Mocsáry 1890b: 50.

Holotype ♀; Russia: Sarepta (Zurich).

*Ellampus schulthessi* var. *subauratus* Mocsáry

1890b: 51. Holotype (sex unknown); Russia: "Raddefka" [Russian Far East, Jewish autonomous oblast, Radde] (Zurich).

*Ellampus sareptanus* var. *inflammatus* Mocsáry 1890b: 50. Gorgan [former Astrabad] (Zurich).

**Distribution:** Iran (Golestan) (Mocsáry, 1890; du Buysson, 1892), Russia (Linsenmaier, 1959).

***Philoctetes tarnanii* (Semenov, 1932)**

*Ellampus (Ellampus) tarnanii* Semenov-Tian-Shanskij 1932: 40. Lectotype m# designated by Kimsey 1986; Uzbekistan: Termez (St. Petersburg) (examined).

Material examined: Alborz Province: 1♀, Shahriar (35°40'08" N, 50°56'56" E, 1168 m), 1.VI.2010, leg. M. Khayrandish.

**Distribution:** Iran (Alborz), Uzbekistan (Semenov-Tian-Shanskij, 1932; Kimsey and Bohart, 1991).

**Genus *Pseudomalus* Ashmead, 1902**

*Pseudomalus* Ashmead, 1902: 229. Type species: *Omalus semicircularis* Aaron, 1885. Original designation.

**Diagnosis:** *Pseudomalus* Ashmead can be distinguished from other genera by the combination of the following characteristics: MS bisected by curved genal carina; structure and punctuation of mesosoma: mesoscutum with large punctures mostly clumped posteriorly between notauli (Fig. 1F), and latero-ventral margin of mesopleuron strongly projecting ventrally, forming a sharp angle in lateral view (Fig. 2C); posterior margin of T3 usually deeply notched medially (Fig. 3F).

**Key to Iranian *Pseudomalus* Ashmead**

1. Body bicoloured with metallic greenish to bluish head and mesosoma, and at least laterally metallic red metasoma ... *P. auratus* (Linnaeus).

- Body entirely green to greenish-golden, violet-blue or blackish-green ... 2.

2. Tarsal claws with five teeth; small to medium species, body length 3-6 mm ... *P. turkestanicus* (Mocsáry).

- Tarsal claws with six teeth; large species, body length over 6 mm ... 3.

3. Apical notch of T3 deep and triangular ... *P. bergi* (Semenov).

- Apical notch of T3 wide and shallow ... *P. violaceus* (Scopoli).

***Pseudomalus auratus* (Linnaeus, 1758)**

*Sphex aurata* Linnaeus 1758: 572. Holotype ♀; Europe (London).

**Distribution:** Iran (Lorestan) (Rosa et al., 2013), Widespread in the Palaearctic Region and accidentally introduced into the Nearctic Region (Kimsey and Bohart, 1991).

***Pseudomalus bergi* (Semenov, 1932)**

*Ellampus bergi* Semenov 1932: 43. Holotype ♀; South-East Kazakhstan, Dzhungar Alatau Mts., Kora River [near Tekeli] (St. Petersburg) (examined).

**Distribution:** Iran (East-Azarbaijan) (Pourrafeii et al., 2011; Rosa et al., 2013), South-East Kazakhstan (Semenov-Tian-Shanskij, 1932).

***Pseudomalus turkestanicus* (Mocsáry 1889)**

*Ellampus turkestanicus* Mocsáry 1889: 101. Holotype (sex unknown); Uzbekistan: Tashkent (Krakow) (examined).

*Ellampus (Ellampus) masalskii* Semenov-Tian-Shanskij 1932: 47. Holotype ♂; Uzbekistan: Samarkand (Moscow) (examined). **Syn. nov.**

Material examined: Alborz Province: 1♀, Lake Karaj, 1800m, 12.VII.1977, leg. J. Gusenleitner, *Omalus masalskii* Sem. det. Linsenmaier 1980 (Linz); Mazandaran Province: 1♀, 60 km S Chalus, 1600 m, 28.VII.1977, leg. A. W. Ebmer, *Omalus masalskii* Sem. det. Linsenmaier 1980 (Linz).

**Distribution:** Alborz province: 1♀, Chalous Road, Arangeh (35°55'06" N, 51°05'12" E, 1891 m), 15.X.2010; 1♀, idem, 18.X.2010; 1♀, idem, 14.IX.2010; 1♂, Chalous Road, Shahrestanak (35°57'34" N, 51°22'20" E, 2305 m), 22.VI.2010; 1♂, 1♀, Karadj (35°46'08" N, 50°56'55" E, 1277 m), 18.V.2010; 6♀♀, idem, 22.VI.2010; 3♀♀, idem, 23.VI.2010; 1♀, idem, 29.VI.2010; 1♀, idem, 6.VII.2010; 1♀, idem, 24.VIII.2010; 1♀, idem, 05.X.2010; 5♀♀, Shahriar (35°40'03" N, 50°56'52" E, 1168 m), 01.VI.2010; 2♀♀,

idem, 08.VI.2010; 2♀♀, idem, 22.VI.2010; 1♀, idem, 29.VI.2010; 1♂, idem, 23.VIII.2010; 2♀♀, idem, 01.IX.2010; 1♀, idem, 07.IX.2010; 1♀, idem, 14.IX.2010; 1♂, idem, 28.IX.2010; 1♀, idem, 15.X.2010; 1♀, idem, 28.X.2010; 1♀, idem, 7.XI.2010; 1♂, idem, 27.VII.2010; 1♀, Shahriar (site II) (35°40'08" N, 50°56'56" E, 1168 m), 07.IX.2010; 2♀♀, idem, 28.IX.2010, all specimens collected by M. Khayrandish; Fars province: 2♀♀, Jahrom (site I) (28° 39'31" N, 53°32'17" E, 1018 m), 30.III.2013; 2♂♂, 1♀, idem, 30.IV.2013; 4♀♀, Jahrom (site II) (28°39'35" N, 53°32'10" E, 1017 m), 03.VI.2012; 1♂, idem, 18.VIII.2012; 2♂♂, idem, 23.VIII.2012; 1♀, idem, 17.VI.2013; 2♀♀, Jahrom (site III) (28° 34'37" N, 53°40'47" E, 1107 m), 30.III.2013, all specimens collected by A. Amiri; Guilan province: 1♀, Astaneh Ashrafiyeh, Eshman kamachal (37°22'06" N, 49°57'54" E, -1 m), 27.IX.2010; Mazandaran province: 1♀, Noor, Chamestan, Joorband (36°26'18" N, 52°07'12"

E, 275 m), 04.X.2011; Qazvin province: 2♀♀, 1♂, Zereskh (36°25'42" N, 50°06'36" E, 2035 m), 06.VII.2011; 1♀, idem, 27.VII.2011; all specimens collected by M. Khayrandish; Hormozgan province: 1♀, Hajiabad, Tezerj (27°17'01" N, 55°45'14" E, 867 m), 29.III.2012; 2♀♀, idem, 14.IV.2013, all specimens collected by A. Ameri.

**Distribution:** Iran (Alborz, Fars, Guilan, Hormozgan, Mazandaran) (Strumia and Fallahzadeh, 2015). Turkey, Uzbekistan (Strumia and Yildirim, 2011).

**Remarks:** This species shows a great variation in size, punctuation and shape of third abdominal tergum. Also the colouration is variable from dark blue to golden green and is illustrated in Fig. 6. The type material of *Ellampus (Ellampus) masalskii* Semenov-Tian-Shanskij, 1932 was examined by the second author of this paper and we here propose the new synonym: *Pseudomalus masalskii* (Semenov-Tian-Shanskij, 1932) **n. syn.** = *Pseudomalus turkestanicus* (Mocsáry, 1889).

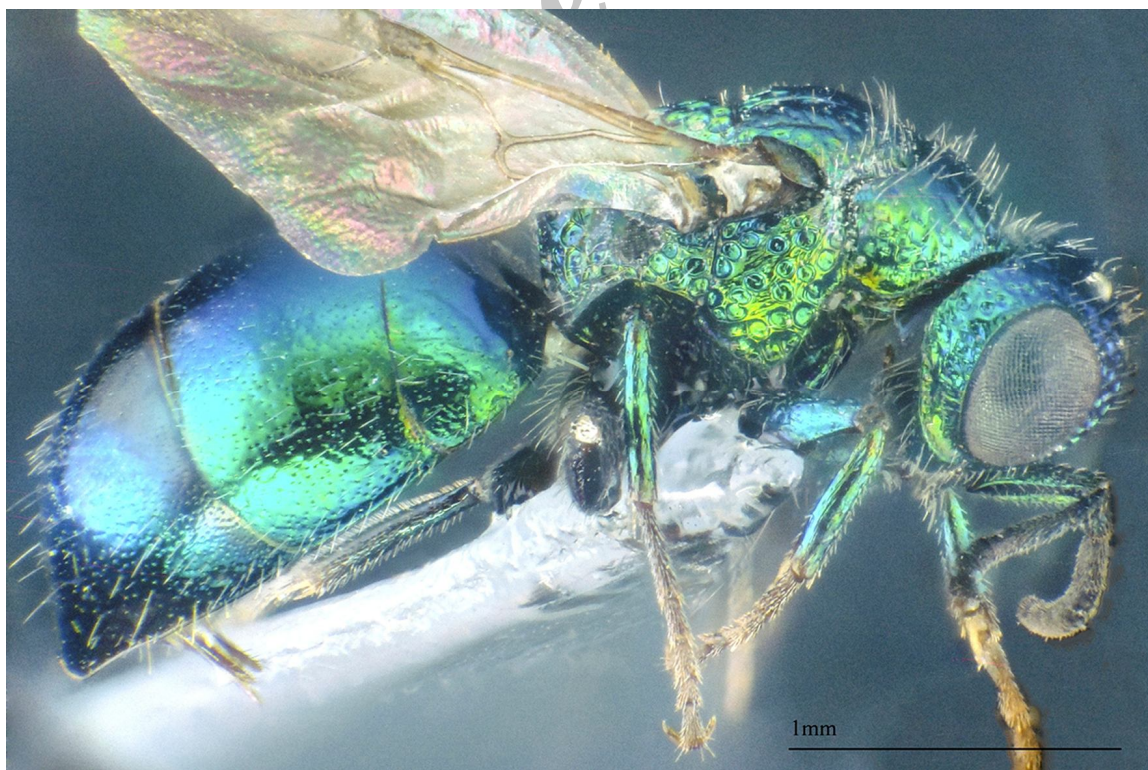


Figure 6 *Pseudomalus turkestanicus* (Mocsáry). Habitus, Lateral view.

***Pseudomalus violaceus* (Scopoli, 1763)**

*Sphex violacea* Scopoli 1763: 298. Type lost?; Europe.

Material examined: 1m#, Elburs, Shemschak, 27.V.1971, leg. Holzschuh, *Omalus violaceus* Scop. det. J. Schmidt, 1972 (Linz).

**Distribution:** Iran (Kordestan, Mazandaran) (Samin et al., 2014; Strumia and Fallazahdeh, 2015). Trans-Palaeartic, from Western Europe to China (Inner Mongolia) (Rosa et al., 2014), widely disturbed in the Palaeartic Region (Kimsey and Bohart, 1991).

**Discussion**

This study is part of an ongoing research on the chrysidid fauna of Iran. Overall a total of 277 Iranian chrysidid species have been known (Rosa et al., 2013; Rosa and Lotfalizadeh, 2013; Torabipour et al., 2013a, 2013b; Samin et al., 2014; Ebrahimi, 2015; Strumia and Fallahzadeh, 2015; Tavassoli and Fallahzadeh, 2015; Farhad et al., 2015, 2016; Strumia and Fallahzadeh, 2016; Strumia et al., 2016 a, b Farhad et al., 2017; Iranmanesh et al., 2017; Rosa et al., 2017) and the number of known taxa is now raised to 279. A higher number of Iranian chrysidid species is still expected, when compared with the fauna of the adjacent countries (in particular with that of Turkey) and according to the geographical position of Iran. According to our data, *P. turkestanicus* (Mocsáry 1889) is the most frequent and widespread species in Iran and it was captured from both northern and southern Provinces. *Omalus margianus* (Semenov, 1932) was also observed with great abundance in southern Iran.

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## اضافاتی بر فون زنبورهای قبیله (Hymenoptera: Chrysididae, Chrysidinae) Elampini در ایران، به همراه کلید گونه‌ها و نکات تاکسونومیک

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**چکیده:** کلید شناسایی و اطلاعات پراکنشی جدید برای چهار جنس: *Chrysellampus* Semenov, 1932، *Omalus* Panzer, 1801، *Philoctetes* Abeille de Perrin, 1879 و *Pseudomalus* Ashmead, 1902 متعلق به قبیله Elampini از زنبورهای فاخته ایران تهیه شد. دو گونه *Chrysellampus pici* (du Buysson, 1900) و *Philoctetes kuznetzovi* (Semenov, 1932) برای اولین بار از ایران گزارش می‌شوند. گونه *Pseudomalus turkestanicus* (Semenov, 1932) هم‌نام گونه *Pseudomalus masalskii* (Mocsáry, 1889) شناخته شد. لکتوتیپ گونه *Ellampus hypocrita* du Buysson, 1893 نیز تعیین شد.

**واژگان کلیدی:** *Chrysididae*, *Chrysidinae*, *Chrysellampus*, *Omalus*, *Philoctetes*, *Pseudomalus*, Elampini. گزارش جدید، ایران