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Spider wasps (Hymenoptera, Pompilidae) from the Southeastern Iran, Kerman

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ABSTRACT. The spider wasps (Hymenoptera: Pompilidae) of Kerman province were faunistically investigated. A total of 17 species of 12 genera belonging to three subfamilies, Ceropalinae, pepsinae and pompilinae were collected during 2017–2018 and identified. Among the collected material, three species of Ceropalinae, *Ceropales juncoi* Giner, 1945, *Ceropales kriechbaumeri* Magretti, 1884, *Ceropales maroccana* de Beaumont, 1947 and a single species of Pompilinae, *Agenioideus gentilis* (Klug, 1834) are recorded for the first time for the fauna of Iran. Geographical distribution of each species in Kerman province, Iran and outside Iran are presented.

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Introduction

The family Pompilidae known as 'spider wasps' are the largest family among aculeate wasps that contains about 5,000 species belonging to 130 genera, worldwide (Aguiar et al., 2013). Members of this family are found in a wide range of habitats, especially in tropical regions (Wasbauer, 1995). The pompilids are long-legged solitary wasps that can be distinguished from all other wasps by the presence of oblique mesopleural suture (Pitts et al., 2006). Adult wasps feed on flower nectar, but they hunt spiders to feed their larvae, that is why they are called spider wasps (Grimaldi & Engel, 2004). Based on Waichert et al. (2015), the Pompilidae comprises five subfamilies, Ceropalinae, Ctenocerinae, Notocyphinae, Pepsinae and Pompilinae, of which the last two subfamilies have highest species abundance. Some recent faunistic and taxonomic studies have been carried out on Iranian Pompilidae (Wahis, 2000; Wahis & Schmid-Egger, 2002; Ebrahimi, 2006; Ebrahimi et al., 2008; Amiresmaili et al., 2010a, 2010b, 2011; Amiresmaili & Barari, 2012; Falahatpishe et al., 2016; Schmid-Egger et al., 2018) but still little is known on their taxonomy and distribution. The last updated list of Iranian Pompilidae (Enayatnia et al., 2018) included 162 species belonging to 41 genera and three subfamilies. The aim of this paper is to study the pompilid fauna of Kerman province and complete with new information on the distributional data.

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Material and methods

This research was carried out during 2017 and 2018. Specimens were collected from different habitates of Kerman province (Southeastern Iran) (Fig. 1) using sweep net and Malaise traps. The collected specimens were preserved in ethanol 75%, later prepared using the AXA method (van Achterberg, 2009), mounted or pinned and examined under Nikon® SMZ800 stereomicroscope. Many genera of the Palaearctic Pompilidae are not revised or available keys and revisions are incomplete for Iranian fauna. For this reason, species were mainly identified with unpublished keys of Christian Schmid-Egger or by comparisons with identified species deposited in his private collection. Primary revisions of the new recorded species for Iran are presented in Wolf (1985, 1986, 1990) and Móczár (1968, 1986, 1989). For full references of Iranian Pompilidae see references section in Enayatnia et al. (2018), from which the distributional records of the species are also extracted. Specimens are deposited in the Insect Collection of the Zoological Museum of Shahid Bahonar University of Kerman, Kerman, Iran (ZMSBUK).

Figure 1. Geographic map of Kerman province.

Results

A total of 17 species belonging to 12 genera and three subfamilies, Ceropalinae, pepsinae and pompilinae were collected and identified in the present study. The subfamilies, genera and species are listed in alphabetic order. The identified material are given bellow. New records for Iran and for Kerman province are marked with single (*) and double (**) asterisks, respectively.

Family POMPILIDAE

Subfamily Ceropalinae Ashmead, 1900

Ceropales cribrata* Costa, 1881*

Material examined: Iran, Kerman province: 1♀, Kerman County, Chatrood-Booj, 30°22′43.09″ N, 56°41′55.09″ E, 2365 m, 01.vi.2018-28.vi.2018, Malaise trap, (Sh. Mohebban leg.); 1♀, Koohpayeh, 30°28′50.65″ N, 57°19′17.98″ E, 1803 m, 28.vi.2018-19.vii.2018, Malaise trap, (Sh. Mohebban leg.).

Distribution in Iran: Fars, West Azarbaijan, Kerman (present study).

Distribution outside Iran: Europe and East Palaearctic (Wahis, 2015), Turkey (Özbek et al., 1999; Yildirim & Wahis, 2011a, 2011b).

Ceropales juncoi* Giner, 1945 (Fig. 2A)

Material examined: Iran, Kerman province: 1♂, Baft County, Khabr village, 28°49′46.25″ N, 56°15′40.80″ E, 1448 m, 09.vii.2018–10.viii.2018, Malaise trap, (Sh. Mohebban leg.); 1♂, Khabr village, 28°49′46.25″ N, 56°15′40.80″ E, 1448 m, 10.viii.2018-07.ix.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Kerman province (**new record from Iran**).

Distribution outside Iran: Chad, Egypt, Israel, Pakistan, Somalia, Sudan, Western Sahara (van Noort, 2019)**.**

Ceropales kriechbaumeri* Magretti, 1884 (Fig. 2B)

Material examined: Iran, Kerman province: 1♂, Kerman County, Chatrood, Booj, 30°22′43.09″ N, 56°41′55.09″ E, 2365 m, 28.vi.2018–03.viii.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Kerman province (**new record from Iran**).

Distribution outside Iran: Burkina Faso, Nigeria, South Africa, Zimbabwe, Uganda (Gess & Roosenchoon, 2016).

Ceropales maculata* (Fabricius, 1775)*

Material examined: Iran, Kerman province: 1♂, Kerman County, Koohpayeh, 30°28′50.65″ N, 57°19′17.98″ E, 1803 m, 19.vii.2018–24.viii.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Fars, Mazandaran, Tehran, Kerman (present study).

Distribution outside Iran: Europe, East Palaearctic, Near East, North Africa (Wahis, 2015), China, Korea, Mongolia (Yasumatsu, 1946), Japan (Yasumatsu & Ishikawa, 1955), Turkmenistan (Wolf, 1995), Kazakhstan (Wolf, 2004), Kyrgyzstan (Wahis, 1996; Wolf, 2004), Tadzhikistan (Wolf, 2004), Mongolia (Wolf, 2005a), Turkey (Özbek et al., 1999; Yildirim & Wahis, 2011a, 2011b).

Ceropales maroccana* de Beaumont, 1947 (Fig. 2C)

Material examined: Iran, Kerman province: 1♂, Bardsir County, Dashtkar, 29°52′04.96″ N, 56°38′53.36″ E, 2088 m, 20.vii.2018–17.viii.2018, Malaise trap (Sh. Mohebban leg.); 1♂, Kerman County, Chatrood-Booj, 30°22′43.09″ N, 56°41′55.09″ E, 2365 m, 01.vi.2018–28.vi.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Kerman province (**new record from Iran**).

Distribution outside Iran: Southeastern Anatolia (Yildirim & Wahis, 2010).

Subfamily Pepsinae Lepeletier, 1845

Auplopus carbonarius* (Scopoli, 1763)*

Material examined: Iran, Kerman province: 1♀, Bam County, Bam, 29°06′01.7″ N, 58°19′44.0″ E, 1111 m, 13.v.2017–31.v.2017, Malaise trap (M. Purrezaali leg.).

Distribution in Iran: Alborz, East Azerbaijan, Fars, Golestan, Mazandaran, Kerman (present study).

Distribution outside Iran: Europe (Wahis, 2015), Kazakhstan, Kyrgyzstan (Wolf, 1998a), Jordan (Wolf, 1998b), Syria (Wolf, 2005b); Algeria, Britain, Israel, Japan, Lebanon, Mongolia, Morocco, Sweden (Wolf, 1971), Croatia (Wahis, 1963), France (Wahis, 1979), Greece (Priesner, 1965), Turkey (Özbek et al., 1999; Yildirim & Wahis, 2011a, 2011b); Kazakhstan (Wolf, 2003, 2005a); Tadzhikistan (Wolf, 2004), Russia, Western Europe, Ukraine, Kazakhstan, Near East, Korea, Japan, North Africa (Lelej & Loktionov, 2012; Baghirov, 2014).

Auplopus nigroaurantiacus* Magretii, 1884*

Material examined: Iran, Kerman province: 1♀, Anbar Abad County, Bardeh, 28°28′04.1″ N, 58°12′39.3″ E, 1510 m, 23.v.2017–04.vi.2017, Malaise trap (S.M. Madjdzadeh leg.); 1♀, Orzuoieye, 28°24′37.00″ N, 56°27′14.27″ E, 1063 m, 10.viii.2018, Swept on *Medicago sativa* (Sh. Mohebban leg.).

Distribution in Iran: Fars, Kerman (present study).

Distribution outside Iran: Natal, Zimbabwe, Senegal, Gambia, Saudi Arabia (Gadallah & El-Barty, 2011).

Subfamily Pompilinae Ashmead, 1900

Agenioideus gentilis* (Klug, 1834) (Fig. 2D)

Material examined: Iran, Kerman province: 1♂, Kerman County, Mahan, 30°03′22.83″ N, 57°17′50.88″ E, 1890 m, 04.v.2018–06.vi.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Kerman province (**new record from Iran**).

Distribution outside Iran: South Europe, Egypt, Israel, newly recorded from Saudi Arabia (Gadallah & El-Barty, 2011).

Agenioideus nubecula* (Costa, 1874)*

Material examined: Iran, Kerman province: 1♂, Jiroft County, Dalfard-Bondar, 29°00′36″ N, 57°36′39.1″ E, 2232 m, 17.vii.2017–30.viii.2017, Malaise trap, (S.M. Madjdzadeh leg.); 1♂, Chatrood, 30°36′24.52″ N, 56°55′12.46″ E, 1893 m, 06.ix.2018–12.x.2018, Malaise trap (Sh. Mohebban leg.).

Distribution in Iran: Mazandaran, Sistan-o Baluchestan, South Khorasan, Kerman (present study).
Distribution outside Iran: Eastern Anatolia, Southeastern Anatolia, Central Anatolia, Mediterranean, Aegean, Marmara (Yildirim & Wahis, 2010).

Agenioideus waltlii **(Spinola, 1838)****
Material examined: Iran, Kerman province: 1♂, Manujan County, Chermil, 27°33′13.6″ N, 57°35′52″ E, 445 m, 5.v.2017–22.v.2017, Malaise trap (M. Purrezaali leg.).
Distribution in Iran: Fars, Kerman (present study).
Distribution outside Iran: Egypt, Israel, North Africa, Saudi Arabia (Gadallah & El-Barty, 2011).

Agenioideus zarudnyi **(Gussakovskij, 1932)****
Material examined: Iran, Kerman province: 1♀, Jiroft County, Jiroft, 28°36′13.7″N, 57°49′42.0″ E, 652 m, 04.vi.2017–09.vi.2017, Malaise trap (S.M. Madjdzadeh leg.).
Distribution in Iran: Sistan-o Baluchestan, South Khorasan, Kerman (present study).
Distribution outside Iran: Algeria (Wolf, 1988, 1990). This species is recorded for the first time from Asia.

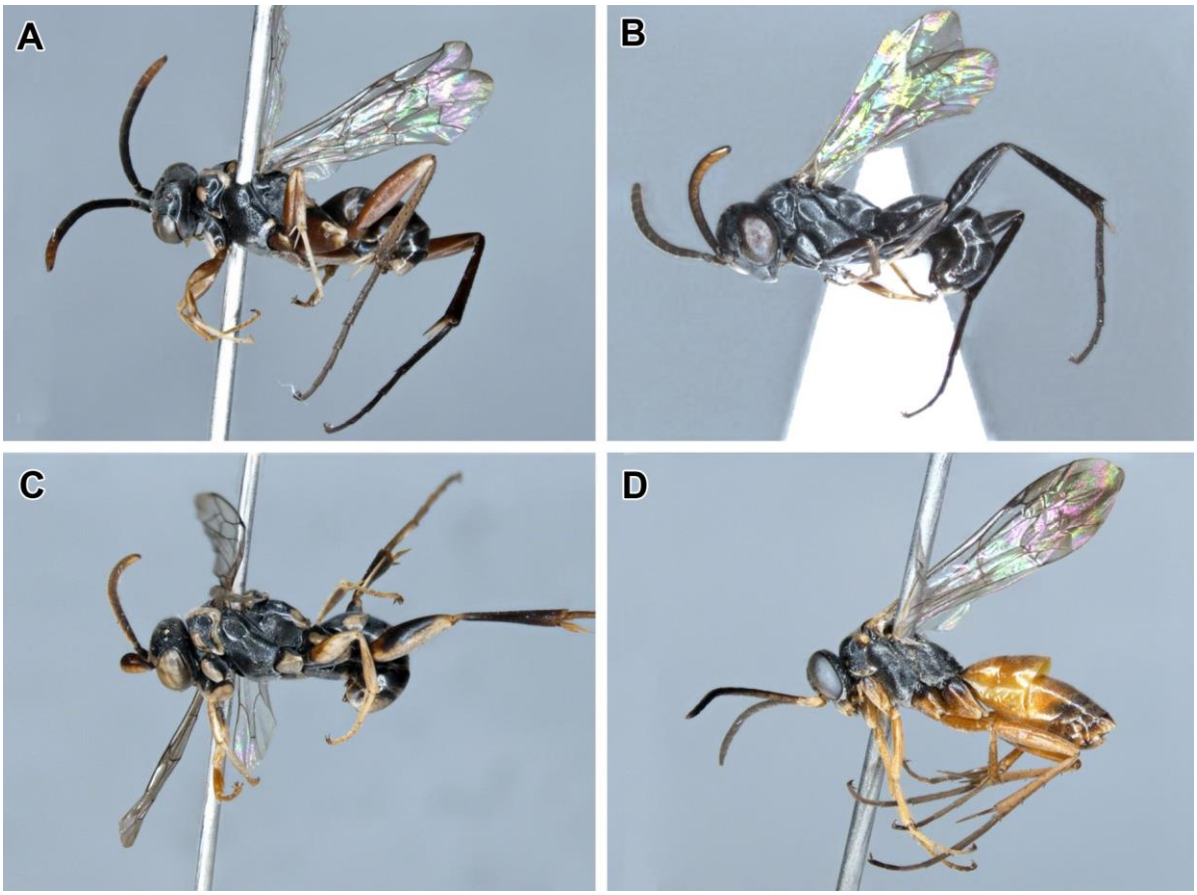

Figure 2. The newly recorded pompilid species, habitus, lateral view: **A.** *Ceropales juncoi* Giner, 1945, male, **B.** *Ceropales kriechbaumeri* Magretti, 1884, male, **C.** *Ceropales maroccana* de Beaumont, 1947, male, **D.** *Agenioideus gentilis* (Klug, 1834), male.

Arachnotheutes aegyptorum **(Priesner, 1955)****

Material examined: Iran, Kerman province: 1♂, Kerman County, Chatrood, 30°36′24.52″ N, 56°55′12.46″ E, 1893 m, 03.viii.2018–06.xi.2018, Malaise trap (Sh. Mohebban leg.); 1♂, Anbar Abad, Bardeh, 28°28′04.1″ N, 58°12′39.3″ E, 1510 m, 13.iv.2017–05.v.2017, Malaise trap, (S.M. Madjdzadeh leg.).

Distribution in Iran: Fars, Kerman (present study).

Distribution outside Iran: Egypt, Israel, Libya, Somalia, UAE (Schmid-Egger, 2017).

Ferreola barrei **(Radoszkowski, 1893)****

Material examined: Iran, Kerman province: 1♂, Anbar Abad County, Roodfarq, 28°29′4″ N, 58°9′ 56.2″ E, 1429 m, 21.iv.2017–05.v.2017, Malaise trap (M. Purrezaali leg.).

Distribution in Iran: Fars, Alborz, Kerman (present study).

Distribution outside Iran: Turkmenistan, Afghanistan (Schmid-Egger et al., 2018).

Icazus arcanus **(Priesner, 1955)****

Material examined: Iran, Kerman province: 1♀, Kahnooj County, Tomgoran, 28°01′48.2″ N, 57°44′22.2″ E, 528 m, 15.v.2017–28.v.2017, Malaise trap (S.M. Madjdzadeh leg.).

Distribution in Iran: Fars, Kerman (present study).

Distribution outside Iran: Egypt, Saudi Arabia (Gadallah & El-Barty, 2011).

Parabatozonus fuliginosus **(Klug, 1834)****

Material examined: Iran, Kerman province: 1♂, Kahnooj County, Deh Kahan, 27°41′52.8″ N, 57°32′10.7″ E, 785 m, 23.v.2017–04.vii.2017, Malaise trap (S.M. Madjdzadeh leg.); 1♂, Mijan, Sarasiyab, 27°41′52.8″ N, 57°32′10.7″ E, 785 m, 05.v.2017–23.v.2017, Malaise trap, (S.M. Madjdzadeh leg.).

Distribution in Iran: Sistan-o Baluchestan, Kerman (present study).

Distribution outside Iran: Egypt, Central to South Africa, Saudi Arabia, Yemen (Wahis, 2000; Gadallah & El-Barty, 2011).

Paracyphononyx ruficrus **(Klug, 1834)****

Material examined: Iran, Kerman province: 1♀, Kerman County, Rayen, 29°21′21.98″ N, 57°21′15.88″ E, 2678 m, 05.vii.2018, Swept on *Medicago sativa* L. (Sh. Mohebban leg.), 1♂, Kahnooj-Ghuch abad, 28°03′37.2″ N, 57°48′32.1″ E, 492 m, 21.iv.2017–08.v.2017, Malaise trap, (M. Purrezaali leg.).

Distribution in Iran: Fars, Sistan-o Baluchestan, Kerman (present study).

Distribution outside Iran: Asia Minor, Africa, Saudi Arabia, Yemen (Wahis, 2002), Egypt, South Africa, Zimbabwe (Arnold, 1936), Israel (Haupt, 1962).

Pseudopompilus humboldti **(Dahlbom, 1845)****

Material examined: Iran, Kerman province: 1♀, Jiroft County, Jiroft, 28°36′13.7″ N, 57°49′42.0″ E, 652 m, 23.v.2017–04.vi.2017, Malaise trap, (M. Purrezaali leg.).

Distribution in Iran: Isfahan, Kerman (present study).

Distribution outside Iran: Eastern Anatolia (Yildirim & Wahis, 2010).

Discussion

Prior to this study, only six pompilid species belonging to four genera and two subfamilies, Pompilinae and pepsinae, had been reported from Kerman province (Gussakovskij, 1932; Ebrahimi, 2006; Ebrahimi et al., 2008; Wolf et al., 2009). In the present study seventeen species were collected from Kerman province (South-Eastern Iran). Of them, four species, *Ceropales juncoi*, *Ceropales kriechbaumeri*, *Ceropales maroccana* (Ceropalinae) and *Agenioideus gentilis* (Pompilinae) were recorded for the first time for Iran, increasing the number of known Pompilidae speices from 162 to 166 species. In the present research, all pompilid species are recorded for the first time from Kerman province increasing the number of pompilid species in Kerman from six to 23. Previous papers showed that many regions of the country have not been investigated well and the major part of pompilid species had been recorded in North (Mazandaran, Golestan), South-central (Fars) and Southeastern (Sistan-o Baluchestan) Iran (Enayatnia et al., 2018), so we assume that a large number of species remain to be discovered. It is necessary to emphasis that the current study could be considered as only a small part of investigations aiming at completing knowledge on faunal diversity of this diverse group of parasitoids in Iran. Further taxonomic investigations together with biological and behavioral data are necessary to increase the knowledge of diversity and applicability of this group of insects in Kerman province as well as other parts of Iran.

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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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زنبورهای عنکبوت‌خوار (Hymenoptera: Pompilidae) در جنوب شرقی ایران، کرمان

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چکیـــده: فون زنبورهای عنکبوت‌خوار (Hymenoptera: Pompilidae) استان کرمان (جنوب شرقی ایران) بررسی شد. درمجموع ۱۷ گونه متعلق به ۱۲ جنس از سه زیرخانواده Ceropalinae, Pepsinae و Pompilinae در طی سال‌های ۱۳۹۶ تا ۱۳۹۸ جمع‌آوری و شناسایی شدند. از بین گونه‌های جمع‌آوری شده، سه گونه از زیرخانواده Ceropalinae شامل *Ceropales juncoi* Giner, 1945، *Ceropales kriechbaumeri* Magretti, 1884 و *Ceropales maroccana* de Beaumont, 1947 یک گونه از زیرخانوادهٔ Pompilinae به نام *Agenioideus gentilis* (Klug, 1834) برای اولین بار از ایران گزارش می‌شوند. پراکنش جغرافیایی گونه‌ها ارایه شده است.

واژگـــان کلیدی: بال‌غشاییان، زنبورهای عنکبوت‌خوار، فون، گزارش‌های جدید، ایران