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Research Article

Adding to the fauna of digger wasps (Hymenoptera: Apoidea: Sphecidae) from Kerman province, Iran

Zahra Ghaderipour[1], Mohammad Khayrandish[1*], Seyed Massoud Madjdzadeh[2], Ebrahim Ebrahimi[3] and Christian Schmid-Egger[4]

1. Department of Plant Protection, Faculty of Agriculture, Shahid Bahonar University of Kerman, Kerman, Iran.
2. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran.
3. Iranian Research Institute of Plant Protection, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran.
4. Fischerstr. 1, 10317 Berlin, Germany.

Abstract: New data on the distribution of eight Sphecid wasps species (Hymenoptera: Apoidea: Sphecidae) collected from different localities in southern areas of Kerman province (southeast Iran) are presented. The specimens were collected at 21 localities using Malaise traps from April to September 2017. The identified species belong to three subfamilies, Ammophilinae André, 1886 (three species, two genera), Sceliphrinae Ashmead, 1899 (a single species), and Sphecinae Latreille, 1802 (four species, two genera, two tribes). *Palmodes parvulus* (Roth, 1967) is newly recorded for the Iranian fauna, and its diagnostic characters are presented.

Keywords: Hymenoptera, digger wasps, Sphecidae, new record, Iran

Introduction

The family Sphecidae Latreille, 1802, commonly referred to as sphecid wasps, is a large group belonging to aculeate wasps with a cosmopolitan distribution, mainly occupying arid and semiarid areas. Adult specimens feed primarily on nectars from flowers. Most species live on the ground and make their nests by digging in the sand or the soil. The females are predators and hunt mostly Orthoptera (grasshoppers), Arachnida (spiders), and caterpillars, mainly of Noctuidae (moths) for larval nutrition (Bohart and Menke, 1976). Totally 789 species belonging to 19 genera and 5 subfamilies are described worldwide (Pulawski, 2020). In Iran, several studies treat Sphecidae.

The first complementary checklist of Iranian Spheciformes was published by Jahantigh *et al*. (2017), who presented 88 species of Sphecidae belonging to 13 genera from four subfamilies in Iran. To date, 15 species belonging to six genera are exclusively recorded from Kerman province. The present paper aims to study the Sphecidae fauna of southern parts of Kerman province.

Materials and Methods

The specimens were collected using Malaise traps at 21 locations from April to September 2017 in the southern areas of Kerman province, Iran. Specimens were extracted from the traps mostly every two weeks and stored in 75% ethanol. The specimens were examined with an Olympus SZ60 Stereomicroscope. The last author determined the identity of

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* Corresponding author: m.khayrandish@uk.ac.ir
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specimens. External morphology was illustrated by a Nikon™ SMZ800 stereomicroscope equipped with a Canon™ A750 digital camera. Morphological terminology follows Bohart and Menk (1976) and other resources (Dollfuss, 2010, 2013a; Menke and Pulawski, 2000). General distributional data for each species were adopted from Pulawski (2020). Abbreviations for the name of collectors are as follow:

S. M. Madjdzadeh: S. M. M.

M. Purrezaali: M. P

The specimens were deposited in the Zoological Museum of Shahid Bahonar University of Kerman (ZMSBUK) and Department of Plant Protection, Shahid Bahonar University of Kerman (DPPUK).

Results

Family: Sphecidae Latreille, 1802
Subfamily: Ammophilinae André, 1886
Genus: *Ammophila* W. Kirby, 1798
***Ammophila rubripes* Spinola, 1839**

Material examined: Iran: Kerman Province: (1♀, 7♂♂); Jiroft County (Mijan–Sar Asiab), 28° 41'06.6"N, 57°55'17.7"E, 1288 m, 13–23.v.2017, 2♂♂, leg, S. M. M; Jiroft County (Dalfard), 29°01'31.4"N, 57°36'56.1"E, 2390 m, 17.vii–27.viii.2017, 1♂, leg, S. M. M; Jiroft County (Baqer Abad), 28°36'13.7"N, 57°49'42.0"E, 652 m, 20.iv–13.v.2017, 1♂, leg, S. M. M; Anbar Abad County (Roodfarq), 28°29'41.0"N, 58°09'56.2"E, 1429 m, 21.iv–05.v.2017, 1♂, S. M. M; Bam County (Bam), 29°06'01.7"N, 58°19'44.0"E, 1111 m, 04.vii–26.viii.2017, 2♂♂, M. P; Bam County (Hemat Abad), 29°08'19.6"N, 57°58'05.1"E, 1673 m, 26.viii–21.ix.2017, 1♀, leg, M. P.

Distribution in Iran: Khuzestan (Jahantigh *et al*., 2017) and Kerman provinces (Current study).

General distribution: Large parts of Africa, Israel, Jordan, Arabian Peninsula, Spain.

Genus: *Podalonia* Fernald, 1927
***Podalonia hirsuta* (Scopoli, 1763)**

Material examined: Iran: Kerman Province: (7♂♂); Anbar Abad County, (Bardeh), 28°28'04.1"N, 58°12'39.3"E, 1510m, 21.iv–5.v.2017, 2♂♂; 05–23.v.2017, 2♂♂; 23.v–4.vi.2017, 2♂♂; Bam County (Dehbakri–Marghak Bidkhun), 29°07'22.6"N, 57°52'56.8"E, 2220m, 22.v–4.vi.2017, 1♂.

Distribution in Iran: Alborz, Ardabil (de Beaumont, 1957; Ebrahimi 1993, 2014); Charmahal–o Bakhtiari, Khorasan–e Razavi, Lorestan, Sistan–o Baluchestan, Tehran, West Azerbaijan, Zanjan (Ebrahimi, 2014); East Azerbaijan (Ghazi–Soltani *et al*., 2010a, b; Dollfuss, 2013b; Ebrahimi, 2014); Isfahan (Jahantigh *et al*., 2017); Kohgiluyeh–va Boyerahmad (Dollfuss 2013b, 2015); Markazi (Hadi *et al*., 2014); Mazandaran (de Beaumont, 1957); Qazvin (Jahantigh *et al*., 2017); and Kerman provinces (Current study).

General distribution: Widespread in southern and temperate parts of the Palaearctic region.

***Podalonia tydei* (Le Guillou, 1841)**

Material examined: Iran: Kerman Province: (13♂♂, 9♀♀); Jiroft County (Bager Abad), 28°36'13.7"N, 57°49'42.0"E, 652 m, 20.iv–13.v.2017, 1♂, 13–23.v.2017, 1♂, 1♀; 05.vii–26.vii.2017, 1♀, leg, S. M. M; Jiroft County (Mijan–Sar Asiab), 28°41'06.6"N, 57°55'17.7"E, 1288 m, 05–23.v.2017, 1♂, 1♀, leg, S. M. M; Jiroft County (Mijan–Koldan), 28°41'27.8"N, 57°55'14.8"E, 1349 m, 05.vii–26.vii.2017, 1♂, S. M. M; Jiroft County (Dalfard), 29°01'31.4"N, 57°36'56.1"E, 2390m, 17.vii–27.viii.2017, 1♂, leg, S. M. M; Anbar Abad County (Bardeh), 28°28'04.1"N, 58°12'39.3"E, 1510m, 21.iv–05.v.2017, 3♂♂, 1♀; 05–23.v.2017, 2♂♂, 1♀, leg, S. M. M; Anbar Abad County (Roodfarq), 28°29'41.0"N, 58°09'56.2"E, 1429 m, 05–23.v.2017, 2♂♂, S. M. M; Bam County (Dehbakri), 29°03'10.0"N, 57°54'53.2"E, 2044 m, 22.v–4.vii.2017, 2♀♀, leg, M. P; Bam County (Hemat Abad), 29°08'19.6"N, 57°58'05.1"E, 1673 m, 22.v–04.vii.2017, 1♂, 2♀♀, leg, M. P.

Distribution in Iran: Alborz, Qom, Tehran (Ebrahimi 1993, 2014); Isfahan (Dollfuss,

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2010); Khorasan (Ebrahimi, 1993); Markazi (Hadi *et al*., 2014); Mazandaran (Jahantigh *et al*., 2017; Ebrahimi, 2014); Sistan–o Baluchestan (Gussakovskij, 1933); West Azerbaijan (Jahantigh *et al*., 2017) and Kerman provinces (Current study).
General distribution: Widespread in southern parts of Palaearctic region and Africa.

Subfamily: Sceliphrinae Ashmead, 1899
Genus*: Chalybion* Dahlbom, 1843
***Chalybion flebile* (Lepeletier de Saint Fargeau, 1845)**
Material examined: Iran: Kerman Province: (1♂); Jiroft County (Dalfard), 29°01'31.4 "N, 57°36'56.1"E, 2390 m, 07–17.vii.2017, 1♂, leg, S. M. M.
Distribution in Iran: Guilan (Ghahari *et al*., 2008); Isfahan (Shayestefar *et al*., 2014); Sistan–o Baluchestan (de Beaumont, 1970) and Kerman provinces (Current study).
General distribution: Mediterranean Area, Arabian Peninsula.

Subfamily: Sphecinae Latreille, 1802
Genus: *Palmodes* Kohl, 1890
***Palmodes melanarius* (Mocsáry, 1883)**
Material examined: Iran: Kerman Province: (4♀♀); Jiroft County (Baqer Abad), 28°36'13.7"N, 57°49'42.0"E, 652 m, 23.v–9.vi.2017, 1♀, S. M. M; Jiroft County (Mijan–Sar Asiab), 28°41'06.6"N, 57°55'17.7"E, 1288 m, 05–23.v.2017, 2♀♀, leg, S. M. M; Jiroft County (Mijan–Koldan), 28°41'27.8"N, 57°55'14.8"E, 1349 m, 05–23.v.2017, 1♀, leg, S. M. M.
Distribution in Iran: no specific locality (Ebrahimi, 2014) and Kerman provinces (Current study).
General distribution: Mediterranean area to Central Asia.

***Palmodes parvulus* (Roth, 1967)**
Material examined: Iran: Kerman Province: (5♀♀, 5♂♂); Jiroft County (Mijan–Sar Asiab), 28°41'06.6"N, 57°55'17.7"E, 1288 m, 23.v–05.vii.2017, 1♂, 1♀, leg, S. M. M; Bam County (Dehbakri–Marghak Bidkhun), 29°07'22.6"N, 57°52'56.8"E, 2220 m, 12–22.v.2017, 4♂♂, 4♀♀, M. P.
Distribution in Iran: Kerman (new record).
General distribution: Turkey (Yildirim, 2014b).
Short description: Female: Body length 22 mm, color black except claws reddish, wings yellowish orange (Fig. 1A). Clypeus concave, middle clypeal lobe broader than lateral (Fig. 1B); Pronotum and scutum shiny, finely and sparse punctate (Fig. 1C); Legs black and claws reddish, propodeum enclosure shiny and transversely rugose (Fig. 1D).

Male: Body length 19 mm, color black except claws reddish, wings yellowish orange (Fig. 1A); Vertex with scattered punctures and sparse (Fig. 2A); Frons and clypeus covered by silvery pubescence, middle clypeal lobe distinctly elongate (Fig. 2B); Scutum shiny with sparse punctation (Fig. 2C); Legs black, claws reddish, propodeum enclosure shiny with transversely rugose (Fig. 2D); Ventral side of penis head valve with teeth (Fig. 2E).

Tribe: Sphecini Latreille, 1802
Genus: *Sphex* Linnaeus, 1758
***Sphex flavipennis* Fabricius, 1793**
Material examined: Iran: Kerman Province: (35♀♀, 79♂♂); Bam County (Dehbakri–Marghak Bidkhun), 29°07'22.6"N, 57°52'56.8"E, 2220m, 04–17.vii.2017, 4♂♂, 4♀♀, leg, M. P; Bam County (Dehbakri), 29°03'10.0"N, 57°54'53.2"E, 2044 m, 22.v–4.vii.2017, 14♂♂, 1♀, leg, M. P; Bam County (Hemat Abad), 29°08'19.6"N, 57°58'05.1"E, 1673 m, 22.v–4.vii.2017, 11♂♂, 5♀♀, leg, M. P; Kahnooj County (Dehkahan), 27°41'52.8"N, 57°32'10.7"E, 783 m, 11–22.iv.2017, 2♂, 1♀, leg, S. M. M; Anbar Abad County (Bardeh), 28°28'04.1"N, 58°12'39.3"E, 1510 m, 21.iv–5.v.2017, 9♂♂, 6♀♀, leg, S. M. M; Anbar Abad County (Roodfarq), 28°29'41.0"N, 58°09'56.2"E, 1429 m, 05–23.v.2017, 16♂♂, 2♀♀, leg, S. M M; Anbar Abad County (Jebal Barez), 28°54'39.5"N, 57°54'30.2"E, 2145 m, 06–17.vii.2017, 8♂♂, 3♀♀, S. M. M; Manujan County (Chah Nasri), 27°31'14.6"N, 57°33'51.5"E, 384 m, 10.iv–5.v.2017, 1♂,

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1♀, S. M. M; Manujan County (Chermil), 27°33'13.6"N, 57°35'52.0"E, 445 m, 10.iv–05.v.2017, 1♀, leg, S. M. M; Jiroft County (Esmailieh-Bahram Abad), 28°19'00.5"N, 58°37'08.5"E, 679 m, 09–29.iv 2017, 1♂, leg, S. M. M; Jiroft County (Mijan–Koldan), 28°41'27.8"N, 57°55'14.8"E, 1349 m, 05–23.v.2017, 3♂♂, 2♀♀, leg, S. M. M; Jiroft County (Mijan–Sar Asiab), 28°41'06.6"N, 57°55'17.7"E, 1288 m, 23.v–05.vii.2017, 3♂♂, 2♀♀, leg, S. M. M; Jiroft County (Dalfard), 29°01'31.4"N, 57°36'56.1"E, 2390m, 17.vii–27.viii.2017 4♀♀, 2♂♂, S. M. M; Jiroft County (Dalfard–Bondar), 29°00'36.0"N, 57°36'39.1 "E, 2232 m, 17.vii–27.viii.2017, 3♀♀, 2♂♂, leg, S. M. M; Jiroft County (Sardooieh–Abbas Abad), 29°13'04.0"N, 57°15'46.7"E, 2921 m, 28.vii–27.viii.2017, 3♂♂, leg, S. M. M.

Distribution in Iran: Alborz, Fars, Guilan, Hamadan, Isfahan, Kermanshah, Lorestan, Sistan–o Baluchestan, West Azerbaijan (Ebrahimi, 2014); Ardabil (de Beaumont, 1957; Ebrahimi, 2014; Jahantigh *et al*., 2017); East Azerbaijan (Ghazi–Soltani *et al*., 2010a); Golestan, Khorasan–e Razavi, Mazandaran (de Beaumont, 1957; Ebrahimi, 2014); Hormozgan (Dollfuss, 2008); Kohgiluyeh–va Boyerahmad (Ebrahimi, 1993); Markazi (Ebrahimi, 2014); Qazvin (de Beaumont, 1957); Tehran (Ebrahimi, 2014; Hadi *et al*., 2014) and Kerman provinces (Current study).

General distribution: Mediterranean area to Central Asia.

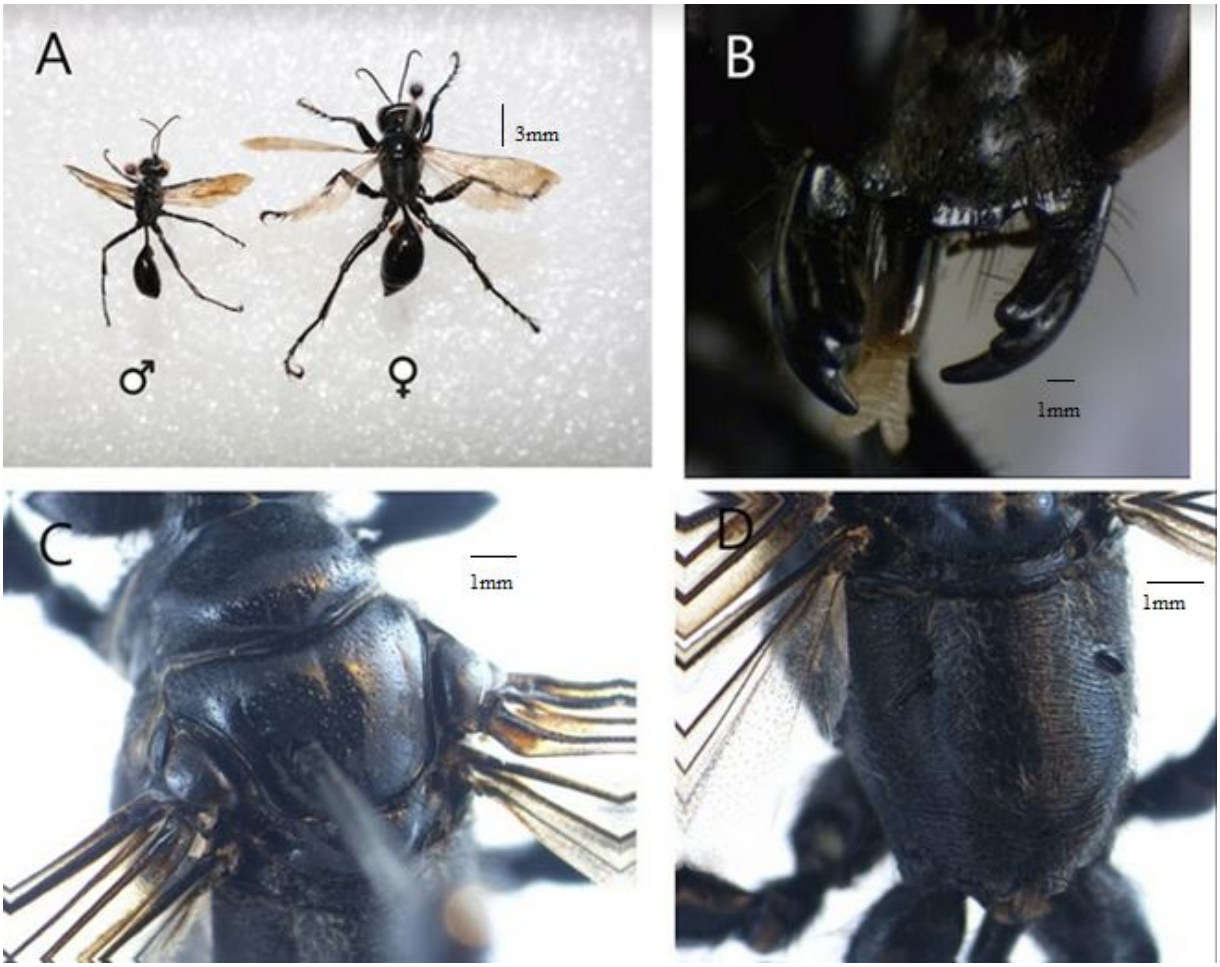

Figure 1 *Palmodes parvulus* (Roth, 1967): A. Female and male, B–D, Female: B. Clypeus. C. Scutum. D. Propodeum.

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***Sphex funerarius* Gussakovskij, 1934**

Material examined: Iran: Kerman Province: (4♀♀, 15♂♂); Manujan County (Chah Nasri), 27°31'14.6"N, 57°33'51.5"E, 384 m, 05–22.v.2017, 2♀♀, 2♂♂, leg, S. M. M; Manujan County (Chermil), 27°33'13.6"N, 57°35'52.0"E, 445 m, 05–22.v.2017, 3♂♂, 1♀, S. M. M; Qal–e Gang County (Shahid Beheshti farm), 27°14'27.3"N, 58°17'58.6"E, 395 m, 07.iv–04.v.2017, 3♂♂, leg, S. M. M; Qal–e Gang County (Keshit), 27°26'50.1"N, 57°48"13.9"E, 559 m, 07.iv–4.v.2017, 5♂♂, 1♀, leg, S. M. M; Kahnooj County (Dehkahan), 27°41'52.8"N, 57°32'10.7"E, 783 m, 04–23.v.2017, 2♂♂, leg, M. P.

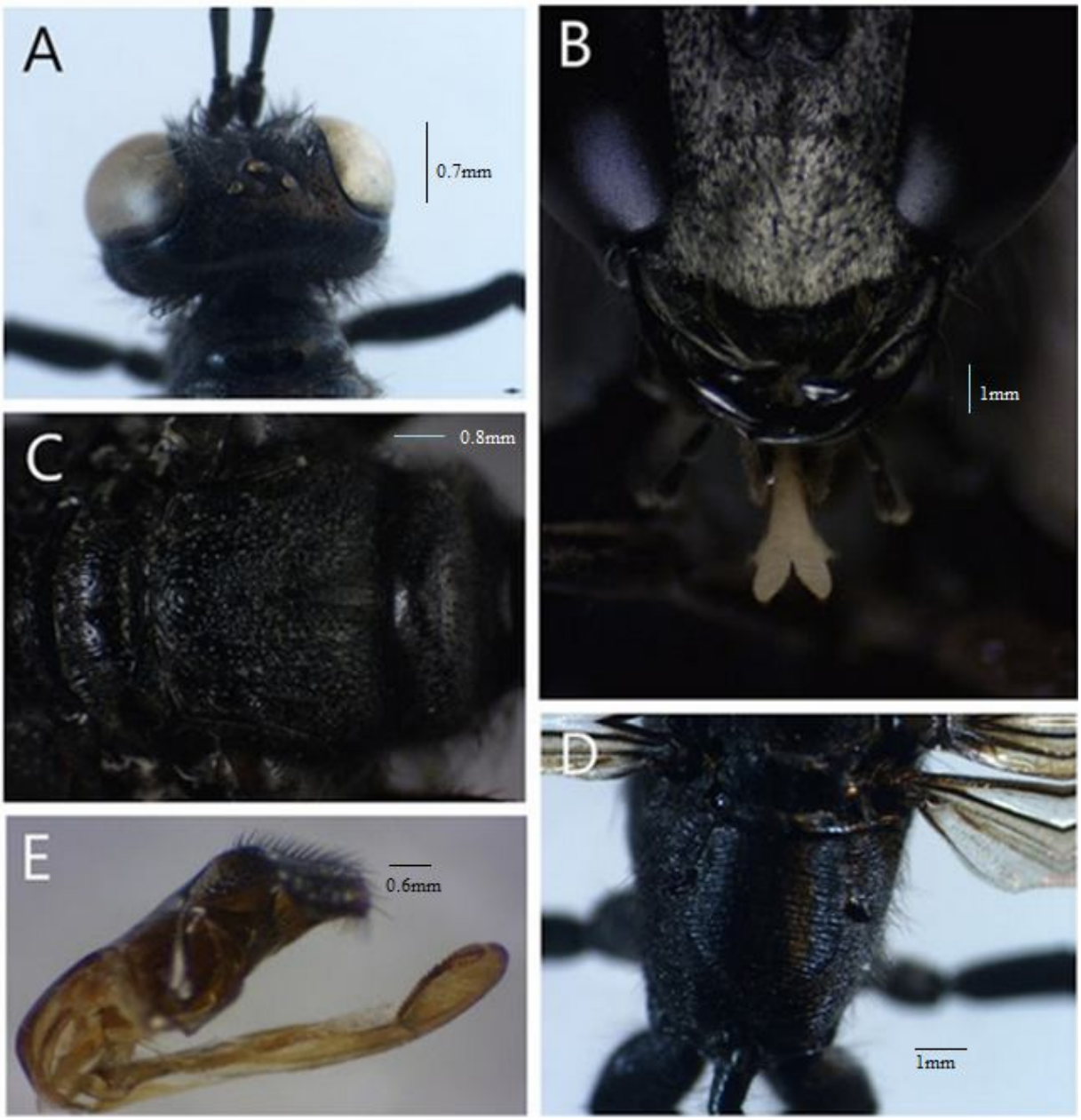

Figure 2 *Palmodes parvulus* (Roth, 1967) Male: A. head in dorsal view. B. Clypeus and mouthparts. C. Pronotum and Scutum in dorsal view. D. Propodeum in dorsal view. E. Penis valve.

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Distribution in Iran: Alborz, Hamadan, Kordestan (Ebrahimi 1993, 2014); Ardabil, East Azerbaijan, Golestan, Tehran (Ebrahimi, 2014); Fars (Fallahzadeh *et al*., 2009); Guilan (de Beaumont, 1970); South Khorasan (Gussakovskij, 1933) and Kerman provinces (Current study).
General distribution: Mediterranean area to Central Asia.

Discussion

Before this study, 15 species in six genera of Sphecidae were recorded from Kerman province (Gussakovskij, 1933; Ebrahimi, 1993, 2014; de Beaumont, 1970; Dollfuss, 2013b, 2015). In the present study, eight species were found to be new to the fauna of Kerman, which increases the number of species to 23. *Palmodes parvulus* is new to the fauna of Iran. This species has only been reported from Turkey so far (Yildirim, 2014). Recently Jahantigh et al. (2017) listed 88 species from Iran, 39 species of which are recorded from Sistan-o Baluchestan province, 22 species from Golestan, 18 species from Markazi, and 15 species from Fars provinces that have the highest species richness amongst Iran's other provinces respectively. The similarity of Kerman's fauna with Sistan-o Baluchestan and Fars provinces (Eastern and western neighbors of Kerman provinces) are 12 and 6 species in common, respectively. According to the present study, the number of Sphecidae from Iran increased from 88 to 89 species.

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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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اطلاعات جدید از زنبورهای حفار (Hymenoptera: Apoidea, Sphecidae) در استان کرمان، ایران

زهرا قادری‌پور[1] محمد خیراندیش[1*] سیدمسعود مجدزاده[2] ابراهیم ابراهیمی[3] و کریستین اشمید-ایگر[4]

۱- گروه حشره‌شناسی، دانشکده کشاورزی، دانشگاه شهید باهنر کرمان، کرمان، ایران.
۲- گروه زیست‌شناسی، دانشکده علوم، دانشگاه شهید باهنر کرمان، کرمان، ایران.
۳- مؤسسه تحقیقات گیاه‌پزشکی کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران.
۴- خیابان فیشر ۱، ۱۰۳۱۷ برلین، آلمان.
پست الکترونیکی نویسنده مسئول مکاتبه: m.khayrandish@uk.ac.ir
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چکیده: اطلاعات جدیدی درباره پراکنش هشت گونه از زنبورهای حفار (Hymenoptera: Apoidea: Sphecidae) که از مناطق مختلف جنوب استان کرمان (جنوب شرقی ایران) جمع‌آوری شده‌اند، ارائه شده است. نمونه‌ها از ۲۱ منطقه از فروردین تا شهریور ۱۳۹۶ با استفاده از تله مالیز جمع‌آوری شدند. گونه‌های جمع‌آوری شده متعلق به سه زیرخانواده، Ammophilinae André, 1886 (سه گونه، دو جنس)، Sceliphrinae Ashmead, 1899 (یک‌گونه) و Sphecinae Latreille, 1802 (چهار گونه، دو جنس، دو قبیله) بودند. گونه *Palmodes parvulus* (Roth, 1967) یک گزارش جدید برای فون ایران می‌باشد که خصوصیات مورفولوژیک این گونه ذکر شده است.

واژگان کلیدی: بال‌غشائیان، زنبورهای حفار، Sphecidae، رکورد جدید، ایران

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