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On the distribution and taxonomy of vespine wasps of Iran (Hymenoptera: Vespidae: Vespinae)

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Dvořák L., Ghahari H., Carpenter J.M. & Abbasi R. 2012: On the distribution and taxonomy of vespine wasps of Iran (Hymenoptera: Vespidae: Vespinae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **97(2):** 69–86. – Nine species from three genera (*Dolichovespula* Rohwer, 1916, *Vespa* Linnaeus, 1758, and *Vespula* Thomson, 1869) of vespine wasps have hitherto been published from Iran. We summarize the published data on Iranian Vespinae, and also give new distributional records for the species. Only six species, for which specimens were checked by the senior author or by J. M. Carpenter, are considered as actually forming the fauna of Iran in this paper: *Vespa orientalis* Linnaeus, 1771, *Vespa crabro* Linnaeus, 1758, *Vespula germanica* (Fabricius, 1793), *Vespula vulgaris* (Linnaeus, 1758), *Dolichovespula sylvestris* (Scopoli, 1763), and *Dolichovespula omissa* (Bischoff, 1931). The occurrence of another three species, published by Iranian researchers, was not confirmed: *Vespula rufa* (Linnaeus, 1758), *Dolichovespula saxonica* (Fabricius, 1793), and *Dolichovespula media* (Retzius, 1783). In addition to the synonymies and distributional data, an identification key is given for all the recorded species. The presence of *Dolichovespula omissa* Bischoff, 1931, in Iran is verified.

Key words. Hymenoptera, Vespidae, Vespinae, taxonomy, distribution, Iran

Introduction

Scattered literature has presented data on the vespine wasps of Iran. The monograph of du Buysson (1905) is more than 100 years old, and contains the first description of a new taxon with Iran as type locality. Pérez (1910) then described another taxon from the Caspian region. Subsequent works focussing on the social wasp fauna of Iran are the studies of du Buysson (1912) and Morice (1921). Descriptions of hornets from Iran and some faunistic data were later published by Birula (1925ab, 1930). Bequaert (1931) commented on color forms in *Vespa crabro* Linnaeus, 1758. Blüthgen & Gusenleitner (1970) published a very complex study with the records of numerous species from many localities on the vespid fauna of Iran. New faunistic data were provided in the study of Guiglia (1977). Two papers by Archer (1981, 1992) were focussed on *Vespa crabro* and the *Dolichovespula sylvestris* (Scopoli, 1763) species group, and contained data pertinent

to Iran. The taxonomic paper of Dubatolov *et al.* (2003) pointed out some mistakes in citations of the papers of Birula. Various papers published by different Iranian researchers (e.g. Modarres Awal 1997, Abd-Rabou *et al.* 2005, Ghahari *et al.* 2007, Lehr *et al.* 2007, Sakenin *et al.* 2010) contain some new faunal data, but with some findings of unclear origin. The fauna of Zanjan province was the subject of a study by Abbasi *et al.* (2008). Ebrahimi & Carpenter (2008) summarized recent knowledge of the Vespidae as a whole in Iran. Bagriaçik & Samin (2011) produced checklist of Vespinae, but they only summarized all known data without new finding and without any critical view on the published records. Ebrahimi & Carpenter (2012) published new data on *Vespa* spp. in Iran and summarized their distribution.

The objective of this paper is to summarise the available published data on Iranian Vespinae, as well as present new data, and also discuss some aspects of the fauna. Additionally, an identification key is prepared for all the vespine species reported from Iran.

Material and methods

Museum and private collections housing material discussed in this contribution are abbreviated in the text as follows:

AMNH . . . . . American Museum of Natural History, New York, USA
BMNH . . . . . The Natural History Museum, London, United Kingdom
HGTI . . . . . H. Ghahari, Tehran, Iran
HNHM . . . . . Hungarian Natural History Museum, Budapest, Hungary
JGLA . . . . . J. Gusenleitner, Linz, Austria
LCTS . . . . . L. Castro, Terruel, Spain
LDTC . . . . . L. Dvořák, Tři Sekery, Czech Republic
MMBC . . . . . Moravian Museum, Brno, Czech Republic
MSI . . . . . Maryam Salehifard, Iran
MZL . . . . . Museum of Zoology, Lausanne, Switzerland
NMPC . . . . . The National Museum, Prague, Czech Republic
OLM . . . . . The Upper Austrian State Museum, Linz, Austria
RAI . . . . . R. Abbasi, Iran
SMNS . . . . . Natural Museum of Nature Sciences Stuttgart, Stuttgart, Germany
SMF . . . . . Senckenberg Museum, Frankfurt, Germany
ZMMU . . . . . Zoological Museum of Moscow State University, Russia

The material studied personally by the senior author was identified according to Archer (1989); the nomenclature and species distribution follow Carpenter & Kojima (1997) at the species level.

The acronymeW (= worker) is used throughout the text.

Results

Key to Vespinae reported from Iran

This key contains all the species reported from Iran so far, meaning all verified as well as dubious species. The key is modified from those by Archer (1989) and Dvořák & Roberts (2006). The metasomal terga are denoted as tergum I, etc.

1. Vertex long: distance from posterior ocellus to posterior margin of head 3–4 times as long as distance from ocellus to compound eye (Fig. 1). ***Vespa*** **Linnaeus, 1758.** ..... 2.
– Vertex short: distance from posterior ocellus to posterior margin of head only slightly longer than distance from ocellus to compound eye (Fig. 2). ..... 3.
2. Body brown and yellow; tergum V entirely brown. .... ***Vespa orientalis*** **Linnaeus, 1771**
– Body black, yellow, and reddish; tergum V almost entirely yellow. .... ***Vespa crabro*** **Linnaeus, 1758**
3. Oculo-malar space short: distance between mandible and lower margin of eye shorter than width of antennal scapus (Fig. 3). ***Vespula*** **Thomson, 1869.** ..... 4.
– Oculo-malar space long: distance between mandible and lower margin of eye the same or longer than width of antennal scapus (Fig. 4). ***Dolichovespula*** **Rohwer, 1916.** ..... 6.
4. Ocular sinus yellow only in the lower part; tergum I with black hairs. .... ***Vespula rufa*** **(Linnaeus, 1758)**
– Ocular sinus entirely yellow; tergum I with pale hairs. ..... 5.
5 Margin behind third mandibular tooth distinctly concave (Fig. 5). Males: aedeagus without small backwardly directed pointed barb on each side bellow apical spoon-shaped region; aedeagus emarginate apically (Fig. 7). ..... ***Vespula germanica*** **(Fabricius, 1793)**
– Margin behind third mandibular tooth straight (Fig. 6). Males: aedeagus with small backwardly directed pointed barb on each side bellow apical spoon-shaped region; aedeagus rounded apically (Fig. 8). .... ***Vespula vulgaris*** **(Linnaeus, 1758)**
6. Pronotum rugose on lower side (Fig. 4); ocular sinus almost entirely yellow. ..... ***Dolichovespula media*** **(Retzius, 1783)**
– Pronotum not rugose on lower side (Fig. 3); ocular sinus yellow only in lower part. ..... 7.
7. Lower third of clypeus with sparse and fine punctures, distances between punctures on the center of clypeus larger than puncture diameter (Fig. 9); clypeus usually with black longitudinal stripe, which is sometimes reduced to 1–3 black spots in middle; exceptionally completely yellow. ..... ***Dolichovespula saxonica*** **(Fabricius, 1793)**
– Lower third of clypeus with dense and coarse punctures, distances between punctures on the center of clypeus more or less equal to puncture diameter (Fig. 10); clypeus usually entirely yellow, rarely with 1–3 black spots in middle. ..... 8.
8. Anterior angles of clypeus sharply produced and pointed apically in queens (Fig. 10) and sharply rectangular in males; sting distinctly

curved. Parasitic species, without workers. Males: paramere narrow in dorsal view, inner (medial) side parallel for basal 3/4 of length, then slightly lobate and not produced apically (Fig. 11). .... ***Dolichovespula omissa*** **(Bischoff, 1931)**

– Anterior angles of clypeus bluntly produced in all castes (Fig. 9). Sting straight. Males: paramere wide in dorsal view, inner (medial) side emarginate basally, then parallel and produced apically (Fig. 12). .... ***Dolichovespula sylvestris*** **(Scopoli, 1763)**

Review of the species

A total of nine vespine species from three genera have been recorded from Iran by different researchers. Since the basis of the records for three species is unclear, only six species are considered as actually forming the Iranian fauna in this study, as discussed below. The list of species with synonymies and distibutional data and some comments are given below. A map indicating the provinces of Iran is provided in Fig. 13.

Genus *Vespa* Linnaeus, 1758

Vespa crabro Linnaeus, 1758

= *Vespa crabro germana* Christ, 1791
= *Vespa crabro* var. *caspica* Pérez, 1910

Material. Golestan: Golestan National Park, ix.2007, 1 ♀, N. Samin leg., N. Bagriacik det. (HGI). **Ilam:** Ilam, viii.1996, 1 W, A. Jozian leg., L. Dvořák det. (LDTC). **Mazandaran:** Pol Sefid, Shoormast, 36.1° N, 53.4833° E, 890 m, 26.vi.2001, 2 WW, T. Osten leg., J. Gusenleitner det. (SMNS); 5 km E Nowshar, 1.vi.1976, 1 ♀, C. Holzschuh and F. Ressl leg., J. Gusenleitner det. (JGLA); Bozak, 11.ix.1955, 1 W, F. Schmid leg., determiner unknown (MZL); Nooshahr (=Now Schahr), 4.viii.1961, 1 W, J. Klapperich leg., L. Dvořák det. (HNHM).

Distribution in Iran (Fig. 14). East Azarbayan (Sakenin *et al.* 2010), Golestan (Ebrahimi & Carpenter 2008, 2012, this paper), Guilan (Pérez 1910, Morice 1921, Ebrahimi & Carpenter 2008), Ilam (this paper), Khuzestan (Abd-Rabou *et al.* 2005), Mazandaran (Ebrahimi & Carpenter 2008, 2012, this paper).

General distribution. British Isles, Europe except extreme north and south; Asia east to Japan and south to Iran, and China; introduced into North America and Guatemala (Carpenter & Kojima 1997, Landolt *et al.* 2010).

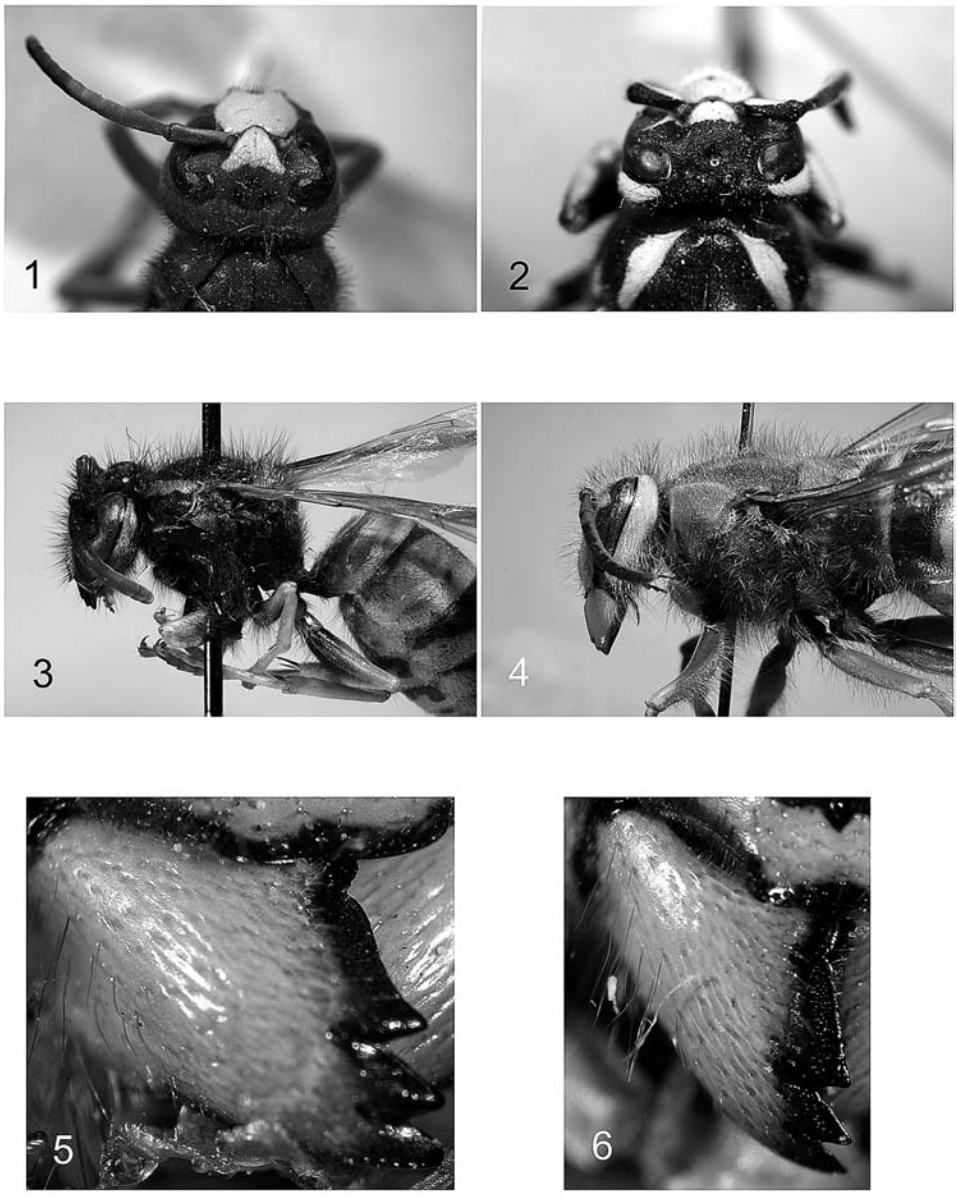
Remarks. Pérez (1910) described the form *Vespa crabro caspica* from the Caspian region. Fifteen years later, Birula (1925a,b) described *Vespa crabro meridionalis* from the same region. These descriptions agree with each other, hence it is evident that both authors described the same taxon. Bequaert (1931) commented on data from Pérez (1910), Birula (1925b), and Morice (1921). Dubatolov *et al.* (2003) published an essay about the *Vespa crabro* subspecies described by Birula (1925a,b). As Dubatolov *et al.* (2003) established, the earlier published paper is Birula (1925a), so the correct authorship of his *Vespa crabro meridionalis* is Birula, 1925a: 55. Archer (1992) mentioned that some specimens from Iran lack a yellow patch on tergum II, which is

typical for *V. crabro caspica* or *V. crabro meridionalis*, so he included Iranian populations in his west European form (*V. crabro germana* Christ, 1791). On the other hand, Archer (1992) noted that Iranian populations (with or without a yellow patch on tergum II) differ also by a darker tergum III. In fact, *Vespa crabro* is a species very variable in color. The presently prevailing taxonomic point of view does not accept any subspecies in this very plastic and widely distributed species. Also, Morice (1921) reported a record from Guilan province under the name *Vespa crabro crabroniformis* Smith, 1852, but this form is restricted to China (Archer 1992).

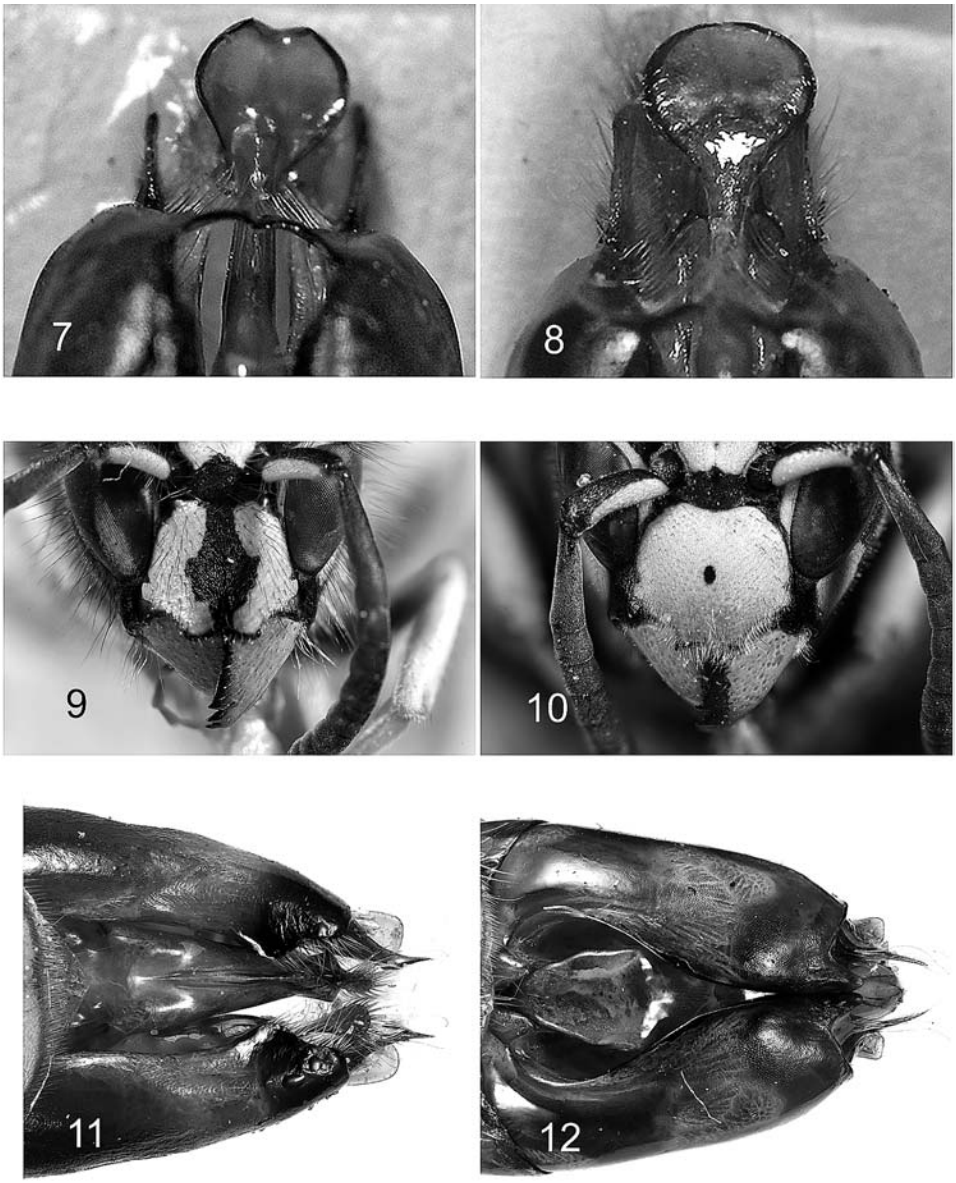
Vespa orientalis Linnaeus, 1771

= *Vespa orientalis aegyptiaca* André, 1884

Material. Ardabil: Ardabil, x.1995, 1 ♀, G. Nouri leg., L. Dvořák det. (destr); Ardabil, x.2001, 1 ♀, G. Nouri leg., L. Dvořák det. (LDTC); Meshkinshahr, vi.1990, 1 ♀, A. Sharifi leg., L. Dvořák det. (LDTC). **Bushehr:** Dalaki, 29.4167° N, 51.2833° E, 31.v.2001, 2 WW, T. Osten leg., J. Gusenleitner det. (SMNS); Teng-e Fariab, 29.4333° N, 51.55° E, 750 m, 1.vi.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Bushehr, date unknown, 1 ♀, collector unknown, L. Dvořák det. (NMPC); Jashak, 60 km SE Khormuj, 20.–21.iv.1977, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC). **East Azarbayjan:** Tabriz, 1427 m, vii.2003, 1 ♀, K. Ahmadi leg., L. Dvořák det. (LDTC); Arasbaran, 1131 m, viii.2005, 1 ♀, M. Havaskary leg., L. Dvořák det. (LDTC); Arasbara, vii.2007, 1 ♂, 1 ♀, N. Samin leg., N. Bagriacik det. (HGI). **Fars:** Zagros Mts., 2500 m, Dasht Arzhan, 8.–10.vi.1999, 2 ♀♀, V. Major leg., J. Gusenleitner det. (OLM); 7 km SW Dasht-e-Arzán, 2085m, 29°37′14″N 51°55′E, 28.vi.2003, 1 W, J. Procházka leg., J. Gusenleitner det. (OLM); Dasht-e-Arzhan (Shur), 5.vii.1970, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Fasa, 9.vii.1970, 5 WW, Exped. NMPC leg., L. Dvořák det. (NMPC); Mian Jangal, 1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Abadeh, 1965 m, viii.2004, 1 ♀, M. Khalili leg., L. Dvořák det. (LDTC); Kazeron, 842 m, vii.2002, 2 ♀, H. Ostovan leg., L. Dvořák det. (LDTC); Shiraz, 1573 m, iv.2003, 1 ♀, H. Ostovan leg., L. Dvořák det. (LDTC); Shiraz, 1573 m, vii.2003, 1 W, H. Ostovan leg., L. Dvořák det. (LDTC); Shiraz, 1342 m, viii.2004, 1 ♀, H. Ostovan leg., L. Dvořák det. (LDTC). **Golestan:** Shahkooh (=Schahkuh), 1800–2000 m, vii.19??, 1 W, collector unknown, L. Dvořák det. (NMPC); Shahkooh (=Schahkuh), 1 ♀, L. Dvořák det. (HNHM); Gorgan, vi.2000, 1 ♂, H. Bayat leg., L. Dvořák det. (destr); National Park, 153 m, vi.2002, 1 ♀, S. Akhondi leg., L. Dvořák det. (LDTC); National Park, 130 m, iv.2005, 1 W, S. Akhondi leg., L. Dvořák det. (LDTC); ditto, ix.2007, 2 ♂♂, N. Samin leg., N. Bagriacik det. (HGI); Gorgan, 73 m, ix.2004, 1 W, J. Karimi leg., L. Dvořák det. (LDTC); Gorgan, 110 m, viii.2005, 1 W, J. Karimi leg., L. Dvořák det. (LDTC); Kalaleh, 150 m, viii.1999, 1 ♂, H. Bayat leg., L. Dvořák det. (LDTC); Ali-Abad, 130 m, vi.2004, 1 W, R. Asghari leg., L. Dvořák det. (LDTC). **Guilan:** Rasht, 39 m, iv.2000, 1 W, M. Tabari leg., L. Dvořák det. (LDTC); Rasht, 39 m, iii. 2002, 1 ♀, M. Tabari leg., L. Dvořák det. (destr); Lahijan, 6 m, ix.2002, 1 W, H. Sakenin leg., L. Dvořák det. (LDTC); Lahijan, vi.2002, 3 f, H. Ghahari leg., L. Dvořák det. (LDTC); Rasht, vii.2004, 1 ♂ 1 ♀ 1 W, M. Tabari leg., L. Dvořák det. (LDTC). **Hamadan:** Hamadan, viii.1998, 1 ♀, collector unknown, L. Dvořák det. (LDTC); Malayer, xi.2000, 1 ♀, collector unknown, L. Dvořák det. (LDTC). **Hormozgan:** Minab 25 km NE, Robande, 27.3° N, 57.2333° E, 24.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Bandar Abbas 25 km NW, Kuhha-ye Genu, 27.3667° N, 56.1833° E, 1450 m, 21.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Minab 22 km W, Gurban, 27.1333° N, 56.9833° E, 23.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Minab, 27.1333° N, 57.0833° E, 80 m, 23.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); 11 km E Bandar Abbas, 27.iii.1972, 1 ♀, F. Kasy leg., J. Gusenleitner det. (JGLA); Ca. 100 km N Bandar Abbas, 5.iv.1970, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Bandar Abbas, 3.iv.1972, 1 ♀, F. Kasy leg., J. Gusenleitner det. (JGLA); 16 km N Jask, 22.–23.v.1973, 3 WW, Exped. NMPC leg., L. Dvořák det. (NMPC); 25 km NE Khamir, 26.–27.iv.1977, 4 WW, Exped. NMPC leg., L. Dvořák det. (NMPC); Derpehan, 12 km E Senderk, 11.–12.v.1977, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Minab, 19.–20.v.1973, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC). **Ilam:** Ilam, 1403 m, v.2005, 1 ♀, H. Razavi leg., L. Dvořák det. (LDTC); Ilam, ix.2005, 1 ♂, collector unknown, L. Dvořák det. (LDTC). **Isfahan:** Esfahan, 32°28′N, 51°07′E, 14.–16.vii.1998, 2 WW, L. Čížek et L.Černý leg., L. Dvořák det. (P. Průdek et LDTC); road zentre – Zafargand



Figs 1–6. 1 – *Vespa orientalis*, vertex. 2 – *Dolichovespula omissa*, vertex. 3 – *Vespula rufa*, thorax from lateral view. 4 – *Dolichovespula media*, thorax from lateral view. 5 – *Vespula germanica*, mandibles. 6 – *Vespula vulgaris*, mandibles. Photos: J. M. Carpenter.



Figs 7–12. 7 – *Vespula germanica*, male genitalia. 8 – *Vespula vulgaris*, male genitalia. 9 – *Dolichovespula saxonica*, clypeus. 10 – *Dolichovespula omissa*, clypeus. 11 – *Dolichovespula omissa*, male genitalia. 12 – *Dolichovespula sylvestris*, male genitalia. Photos: J. M. Carpenter.

3000m, 80 km NE Isfahan, 32°53′51″N52°22′ 45″E, 8.vii.2001, 1 W, M. Kalabza leg., J. Gusenleitner det. (OLM); Shahr-e-za, 1828 m, xi.1997, 1 W, H. Masjedian leg., L. Dvořák det. (LDTC); Najaf-Abad, viii.2003, 1 ♂, 1 ♀, 2 w, H. Rakhshani leg., L. Dvořák det. (LDTC); Najaf-Abad (Lavark), viii.2000, 1 ♀, H. Masjedian leg., L. Dvořák det. (LDTC). **Kerman:** Máhán, 1700 m, 23.–24.iii.1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Rafsanjan, 26.–28.iv.1973, 2 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Rask, valley of river Sarbáz, 3.–4.iv.1973, 2 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Jiroft, 1176 m, vii.2001, 1 ♀, M. Nozhati leg., L. Dvořák det. (LDTC); Jiroft, 580 m, spring and summer 2005–2006, 100 spec., G. Soleimani leg., R. Abbasi det. (RAI); Anbar abad, 530 m, spring and summer 2005–2006, 71 spec., G. Soleimani leg., R. Abbasi det. (RAI); Karim abad, 550 m, spring and summer 2005–2006, 74 spec., G. Soleimani leg., R. Abbasi det. (RAI); Mardhak, 700 m, spring and summer 2005–2006, 52 spec., G. Soleimani leg., R. Abbasi det. (RAI); Sardo, 2400 m, spring and summer 2005–2006, 21 spec., G. Soleimani leg., R. Abbasi det. (RAI); Mohammad abad, 1500 m, spring and summer 2005–2006, 46 spec., G. Soleimani leg., R. Abbasi det. (RAI); Dalfard 1900 m, spring and summer 2005–2006, 60 spec., G. Soleimani leg., R. Abbasi det. (RAI); Esfandagheh, 1700 m, spring and summer 2005–2006, 51 spec., G. Soleimani leg., R. Abbasi det. (RAI). **Kermanshah:** Kermanshah, vii.1997, 1 W, F. Mahmoudi leg., L. Dvořák det. (LDTC); Ravansar, iv.1995, 1 W, F. Mahmoudi leg., L. Dvořák det. (LDTC); Ravansar, 1359 m, iv.2003, 1 ♀, F. Mahmoodi leg., L. Dvořák det. (destr); Ravansar, 1359 m, iv.2005, 1 W, H. Rezaei leg., L. Dvořák det. (LDTC); Mashhad, vi.2002, 1 ♂, 1 ♀, 3 w, F. Razzaghi leg., L. Dvořák det. (LDTC). **Khorasan:** Kuh-e Binolud, S slope, 15 km NE Nishabur, 1600–2300 m, 13.–15.vi.1977, 4 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Mashad, 31.viii.–1.ix.1977, 2 WW, N. Mohr leg. et coll, J. Gusenleitner det.; Saqi, 1900 m a.s.l., 33°08′ N, 59°18′ E, 28.iv.2004, 2 ♀♀, A. Klimenko leg., L. Castro det. (LCTS); Deh Salm, 1000 m a.s.l., 31°13′ N, 59°18′ E, 1.v.2004, 1 ♀, A. Klimenko leg., L. Castro det. (LCTS); Mashad, i.1994, 1 ♀, M. Hosseini leg., L. Dvořák det. (LDTC); Kashmar, vii.2000, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC); Kashmar, 1060 m, ii.2002, 1 ♀, F. Sabzevari leg., L. Dvořák det. (LDTC); Kashmar, 1060 m, ix.2004, 1 W, collector unknown, L. Dvořák det. (LDTC); Birjand, 1434 m, ii.2003, 1 ♀, J. Hamed leg., L. Dvořák det. (LDTC); Birjand, 1434 m, i.2004, 1 ♀, J. Hamed leg., L. Dvořák det. (LDTC). **Khuzestan:** Ahwaz, vi.1994, 1 ♀, H. Sakenin leg., L. Dvořák det. (destr); Andimeshk, 169 m, viii.2001, 1 ♀, collector unknown, L. Dvořák det. (LDTC). **Kohguiluyeh and Boyerahmad:** Dinar Mts., 2600 m, Meynand, 16.–17.vi.1999, 2 ♀♀, V. Major leg., J. Gusenleitner det. (OLM). **Kordestan:** New records: Marivan, ii.1996, 1 ♀, S. Samvi leg., L. Dvořák det. (LDTC). **Lorestan:** Zagros Mts. Dorud 2500–3000 m, 19.vi.–21..vi.1999, 1 ♀, L.Bieber leg., J. Gusenleitner det. (OLM). **Markazi:** Arak, viii.2001, 1 ♀, R. Vafai leg., L. Dvořák det. (LDTC). **Mazandaran:** Mohammadabad, 3.–5.v.1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Sari, v.1991, 1 ♀, H. Barimani leg., L. Dvořák det. (destr); Savadkooh, 550 m, xi.2005, 1 ♀, H. Hedayati leg., L. Dvořák det. (LDTC); Ghaemshahr, 12 m, i.2001, 1 W, G. Omidi leg., L. Dvořák det. (LDTC); Sari, 15 m, iv.2005, 1 W, H. Barimani leg., L. Dvořák det. (LDTC); Chalus, 48 m, iii. 1998, 1 W, L. Ashkani leg., L. Dvořák det. (LDTC); Sari, viii.2003, 1 ♀, H. Sakenin leg., L. Dvořák det. (LDTC). **Semnan:** New records: Damghan, 1170 m, vii.1999, 1 ♀, H. Sakenin leg., L. Dvořák det. (LDTC); Shahmirzad, 1942 m, iii. 2004, 1 W, S. Sanai leg., L. Dvořák det. (LDTC). **Sistan and Baluchestan:** Bampur 3 km E, 27.2° N, 60.3833° E, 500 m, 18.v.2001, 1 ♀, 3 WW, T. Osten leg., J. Gusenleitner det. (SMNS); Espake-Pip, 26.4° N, 60.15° E, 450 m, 20.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Chabahar 25 km E, Guadar-Ramin, 26.1167° N, 61.3° E, 14.v.2001, 1 W, T. Osten leg., J. Gusenleitner det. (SMNS); Bampur 15 km E, Nuk-e Djube, 27.2167° N, 60.5° E, 550 m, 18.v.2001, 4 WW, T. Osten leg., J. Gusenleitner det. (SMNS); Bampur, 20.xii.1998, 4 WW, M. Kafka leg., J. Gusenleitner det. (OLM); Bazman, 10.xi.1995, 5 WW, M. Kafka leg., J. Gusenleitner det. (OLM); 13 km SSE Nikshahr (riv.), 8.–9.iv.1973, 2 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); 55–78 km NNW Tis, Pish mant kowr river, 8.iv.1973, 2 ♀♀, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Sands, 13–47 km N Espakeh, 11.iv.1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Zábolí, 31.iii.1973, 7 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); 40 km SW Zábolí, 31.iii.1973, 3 Q, Exped. NMPC leg., L. Dvořák det. (NMPC); Zabol, 1238 m, x. 2003, 2 W, H. Rakhshani leg., L. Dvořák det. (LDTC). **Tehran:** Teheran 95 km W, 36.1333° N, 50.65° E, 24.vi.2001, 1 ♀, T. Osten leg., J. Gusenleitner det. (SMNS); Abshar, Mt. Kühre Dinar, 3.v.1996, 4 ♀♀, M. Hrsćský leg., J. Gusenleitner det. (OLM); C. Elburz, Kuhha-ye Tu-Chal, 18.–19.vii.1970, 2 WW, Exped. NMPC leg., L. Dvořák det. (NMPC); Keredj, 2 ♀♀, Kargl leg., L. Dvořák det. (NMPC); Teheran, viii.1956, 1 W, Vl. Koudelka leg., L. Dvořák det. (MMBC); Teheran, area of Evin Institut, 30.viii.1973, 2 WW, D.S. Peters leg. et det., J. Gusenleitner revid. (SMF); Damavand, vii.2000, 1 W, H. Ghahari leg., L. Dvořák det. (destr); Shahreyar, ix.1994, 1 ♀, collector unknown, L. Dvořák det. (MZL); Karaj, 1261 m, ii.2000, 1 W, J. Karimi leg., L. Dvořák det. (LDTC); Shemiranat, 28.x.1933, 2 WW, N. Filippov leg., V.V. Gussakovskij det.

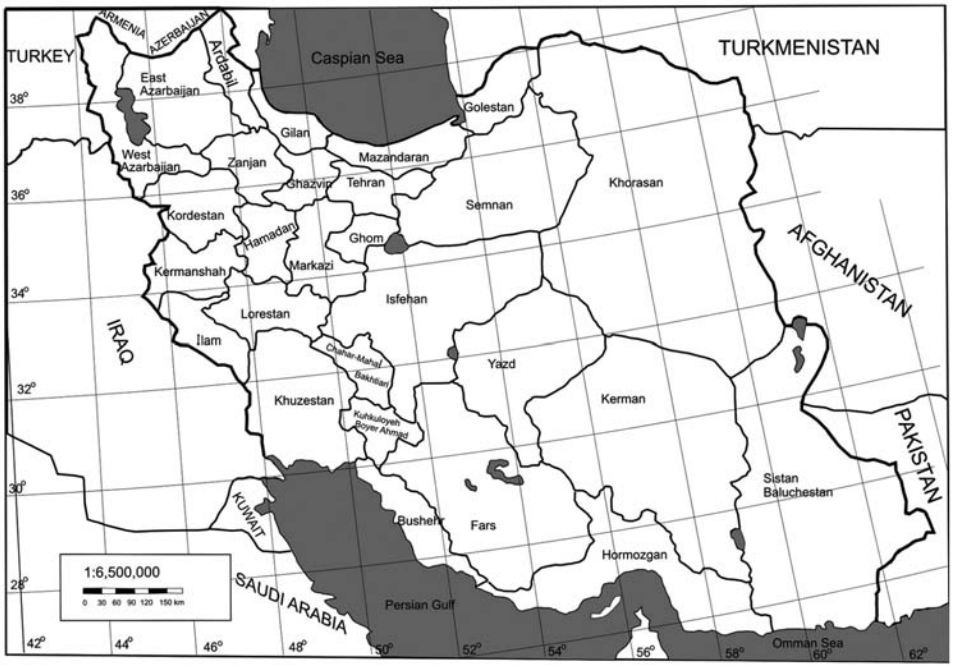
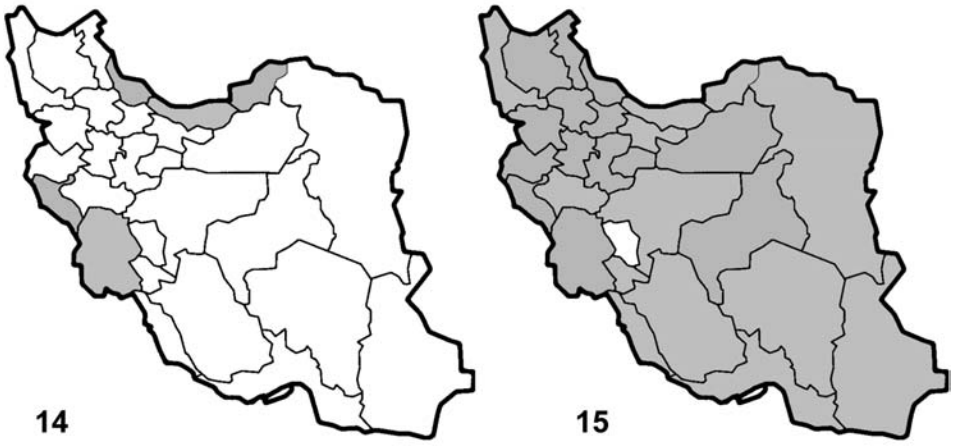


Fig. 13. Provinces of Iran.

(ZMMU); Shemiranat, 4.xi.1933, 2 WW, N. Filippov leg., V.V. Gussakovskij det. (ZMMU); Tehran, Gholhak (=Golhak), 7.viii.1960, 1 W, 1400 m, 6.v.1961, 2.x.1961, 1 ♀, 1 ♀, 1700 m, 16.vi.1961, 2 ♀♀, 1 W, 23.vi.1961, 1 ♀, 1 W, all J. Klapperich leg., L. Dvořák det. (HNHM). **West Azerbayjan:** New records: Serou 50 km NW Orumiye, 37°39′N44°45′E, 7.vi.2000, 1 ♀, E. and P. Haidai leg., J. Gusenleitner det. (OLM); Ourmieh, vi.1999, 1 ♀, S. Aramideh leg., L. Dvořák det. (LDTC); ditto, 1416 m, vii.2004, 1 W, N. Samin leg., L. Dvořák det. (LDTC); ditto, viii.2008, 1 ♂, N. Samin leg., N. Bagriacik det. (HGI). **Yazd:** New records: Meibod, v.2001, 1 ♀, A. Mohammadi leg., L. Dvořák det. (destr); Abarkooh, 1510 m, i.2001, 1 ♀, O. Mohammadi leg., L. Dvořák det. (LDTC). **Zanjan:** Zanjan, 1645 m, viii.2003, 1 ♀, F. Mansoori leg., L. Dvořák det. (LDTC).

Distribution in Iran (Fig. 15)**.** Ardabil (Ebrahimi & Carpenter 2008, 2012, this paper), Bushehr (Ebrahimi & Carpenter 2008, 2012, this paper), East Azarbayjan (Ebrahimi & Carpenter 2008, 2012, Sakenin *et al.* 2010, this paper). Fars (Guiglia 1977, Ebrahimi & Carpenter 2008, 2012, this paper), Ghazvin (Morice 1921, Ebrahimi & Carpenter 2008, 2012), Golestan (Ebrahimi & Carpenter 2008, 2012, this paper), Guilan (this paper), Hamadan (Ebrahimi & Carpenter 2008, 2012, this paper), Hormozgan (Ebrahimi & Carpenter 2008, 2012, this paper), Ilam (this paper), Isfahan (Blüthgen & Gusenleitner 1970, this paper), Kerman (Blüthgen & Gusenleitner 1970, Ebrahimi & Carpenter 2008, 2012, this paper), Kermanshah (Ebrahimi & Carpenter 2008, this paper), Khorasan (Blüthgen & Gusenleitner 1970, Guiglia 1977, Ebrahimi & Carpenter 2008, 2012, this paper). Khuzestan (du Buysson 1912, Ebrahimi &



Figs 14–15. Distribution in Iran: **14 –** *Vespa crabro*. **15 –** *Vespa orientalis*.

Carpenter 2008, 2012, this paper), Kohguiluyeh and Boyerahmad (Ebrahimi & Carpenter 2008, this paper), Kordestan (Ebrahimi & Carpenter 2008, this paper), Lorestan (du Buysson 1912, Ebrahimi & Carpenter 2008, 2012, this paper), Markazi (Ebrahimi & Carpenter 2008, 2012, this paper), Mazandaran (Guiglia 1977, this paper), Qom (Ebrahimi & Carpenter 2008), Semnan (this paper), Sistan and Baluchestan (Blüthgen & Gusenleitner 1970, Ebrahimi & Carpenter 2008, 2012, this paper), Tehran (du Buysson 1912, Blüthgen & Gusenleitner 1970, Ebrahimi & Carpenter 2008, 2012, this paper), West Azerbayan (this paper), Yazd (this paper), Zanjan (Abbasi *et al.* 2008, Ebrahimi & Carpenter 2012, this paper).

General distribution. Southern Italy; southeastern Europe; northern Africa; Arabian peninsula; Asia east to India, Nepal, and China: Xinjiang; introduced into Madagascar and Mexico (Carpenter & Kojima 1997, Dvořák 2006).

Remarks. Morice (1921) reported *V. orientalis aegyptiaca* from Ghazvin. Richards (1985: 427) noted regarding this form "The Egyptian populations seem to be rather variable but do not differ essentially from *V. o. orientalis* L.". Archer (1998a) agreed with this conclusion.

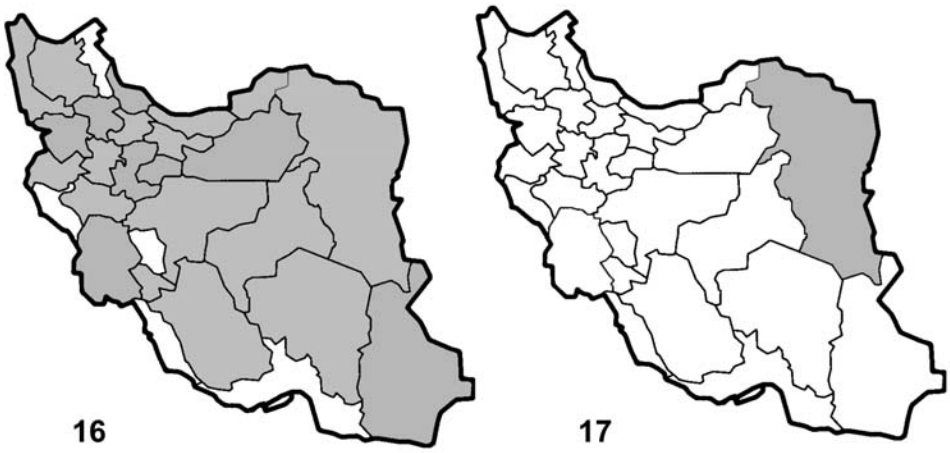
This species is widely distributed and plentiful in Iran (Fig. 15).

Genus *Vespula* Thomson, 1869

= *Pseudovespa* Schmiedeknecht, 1881
= *Paravespula* Blüthgen, 1938
= *Allovespula* Blüthgen, 1943
= *Rugovespula* Archer, 1982

Vespula germanica (Fabricius, 1793)

Material. East Azerbayjan: Sufian, 30 km W Tabriz, 20.–21.vi.1970, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Arasbara, vii.2007, 3 ♀♀, N. Samin leg., N. Bagriacik det. (HGI). **Fars:** 56 km W Shiraz, 16.iv.1970, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Shiraz, vii.1997, 1 ♀, A. Ahmadi leg., L. Dvořák det. (LDTC); Shiraz Deh Zid, 24.xi.1960, 5 WW, E.S. Brown leg., J.M. Carpenter det. (BMNH). **Ghazvin:** Ghazvin, 26.iv.1970, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Ghazvin, 1226 m, iii. 1999, 1 W, H. Hassani leg., L. Dvořák det. (LDTC); Alamoot, 1226 m, ix.1999, 1 ♂, collector unknown, L. Dvořák det. (LDTC). **Golestan:** 12 km SE Shah-pasand (Azadshahr), 26.iv.1972, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Gole-leve near Minou dasht, 22.iv.1974, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); National Park, 153 m, vii.2002, 1 ♂, S. Akhondi leg., L. Dvořák det. (LDTC); National Park, 153 m, iii. 1999, 1 ♀, H. Bayat leg., L. Dvořák det. (LDTC); National Park, 153 m, iii. 2002, 1 ♀, S. Akhondi leg., L. Dvořák det. (LDTC); Galogah, 147 m, v.2001, 1 W, Z. Karimian leg., L. Dvořák det. (destr). **Guilan:** Lahijan, 6 m, viii.2004, 1 ♀, M. Tabari leg., L. Dvořák det. (LDTC); Amlash, 88 m, xii.2001, 1 ♀, K. Emami leg., L. Dvořák det. (LDTC); Lahijan, vi.2002, 1 ♀, 1 W, H. Ghahari leg., L. Dvořák det. (LDTC); Rasht, vii.2004, 1 ♂, 1 ♀, M. Tabari leg., L. Dvořák det. (LDTC). **Hamadan:** Hamadan, 7.xi.1958, 2 WW, E.S. Brown leg., J.M. Carpenter det. (BMNH). **Isfahan:** Isfahan, i.1999, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC); Najaf-Abad, 1836 m, v.2002, 1 ♀, H. Rakhshani leg., L. Dvořák det. (destr); Najaf-Abad, viii.2003, 1 W, H. Rakhshani leg., L. Dvořák det. (LDTC); Isfahan, 3.ix.1960, 5 WW, E.S. Brown leg., J.M. Carpenter det. (BMNH). **Kerman:** Lalehzar, 24.–30.v.1977, 3 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Rafsanján, 22.iii.1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Bam, 17.xi.1960, 1 W, E.S. Brown leg., J.M. Carpenter det. (BMNH); Resht, 23.viii.1960, 1 W, E.S. Brown leg., J.M. Carpenter det. (BMNH); Sardo, 2400 m, spring and summer 2005–2006, 105 spec., G. Soleimani leg., R. Abbasi det. (RAI); Mohammad abad 1500 m, spring and summer 2005–2006, 50 spec., G. Soleimani leg., R. Abbasi det. (RAI); Dalfard 1900 m, spring and summer 2005–2006, 99 spec., G. Soleimani leg., R. Abbasi det. (RAI); Esfandagheh 1700 m, spring and summer 2005–2006, 35 spec., G. Soleimani leg., R. Abbasi det. (RAI). **Kermanshah:** Paveh, 80 km NW Kermanshah, 1500 m, 20.v.1975, 1 ♀, J. Ressl and C. Holzschuh leg., J. Gusenleitner det. (JGLA); Kermanshah, 5.vi.1939, 1 ♀, N. Filippov leg., A. Antropov det. (ZMMU); Kermanshah, 7.x.1958, 4 WW, E.S. Brown leg., J.M. Carpenter det. (BMNH). **Khorasan:** Zoshk bei Shandiz W Mashad, 1600–2000 m, 19.vii.1977, 2 WW, J. Gusenleitner leg. et det. (OLM); Mashhad, 9.–11.vi.1977, 3 ♀♀, Exped. NMPC leg., L. Dvořák det. (NMPC); Birjand, i.1998, 1 ♀, H. Mohebbi leg., L. Dvořák det. (LDTC). **Khuzestan:** Dezfool, 155 m, viii.2004, 1 ♀, collector unknown, L. Dvořák det. (LDTC). **Kohguiluyeh and Boyerahmad:** Si Sakht, SW Buyer-Ah, Mad-o-Kuhgiluye, 15.vii.2003, 2 WW, J. Jerus leg., J. Gusenleitner det. (OLM); 13 km SSW Yasuj, 1800 m, 12.–13.vi.1973, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Zagross Mts., Sisakht, 2400 m, 13.–15.vi.1973, 1 ♀, Exped. NMPC leg., L. Dvořák det. (NMPC). **Kordestan:** Marivan, 1340 m, ii.2003, 1 ♀, A. Hamidi leg., L. Dvořák det. (LDTC); Marivan, 1340 m, iv.2003, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC). **Lorestan:** 25 km NWW Dorud, 1874 m, 33°33′N, 48°53′E, 8.vii.2004, 1 W, S. Kadlec leg., L. Dvořák det. (LDTC); Brojerd, ix.1996, 1 ♀, R. Jafari leg., L. Dvořák det. (LDTC); Brojerd, 1588 m, ix.2002, 1 ♂, collector unknown, L. Dvořák det. (LDTC). **Markazi**: Arak, v.1997, 1 ♀, R. Vafai leg., L. Dvořák det. (LDTC); Arak, viii.2000, 1 W, R. Vafai leg., L. Dvořák det. (LDTC). **Mazandaran:** Polur, Damavand Gebiet, Elburs, 2000m, 23.vii.1977, 1 W, J. Gusenleitner leg., J. Gusenleitner det. (OLM); C. Elburz, Kazamak, Hazar Chay, 1400 m, 20.–21.vii.1970, 3 WW, Exped. NMPC leg., L. Dvořák det. (NMPC); Galogah, viii.1991, 1 ♀, H. Sakenin leg., L. Dvořák det. (destr); Savadkooh, vi.1997, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC); Chalus, 46 m, v.1999, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC); Ghaemshahr, 12 m, xii.2002, 1 ♀, H. Ghahari leg., L. Dvořák det. (LDTC); Nooshahr, 48 m, ii.2001, 1 ♀, S. Sanai leg., L. Dvořák det. (LDTC); Behshahr, 57 m, viii.2000, 1 W, M. Rezvani leg., L. Dvořák det. (LDTC); Sari, viii.2003, 1 ♀, H. Sakenin leg., L. Dvořák det. (LDTC); Sari, 8.v.1966, 1 ♀, S. Tirgari leg., J.M. Carpenter det. (AMNH). **Semnan:** Shahmirzad, iii.1998, 1 ♀, H. Sakenin leg., L. Dvořák det. (LDTC). **Tehran:** Karadj, 29.v.1976, 2 ♀♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Karaj 15 km N, 36.05° N, 51.05° E, 11.v.2001, 1 ♀, T. Osten leg., J. Gusenleitner det. (SMNS); Keredj, 1934, 1 ♀, collector unknown, L. Dvořák det. (NMPC); Keredj, date unknown, 1 ♀, collector unknown, L. Dvořák det. (NMPC); Teheran, area of Evin Institut, 28.viii.1973, 2 W2W, 30.viii.1973, 2 WW, all D.S. Peters leg. et det., J. Gusenleitner revid. (SMF); NW Teheran, brook valley, Darakeh ca. 1800 m, 31.viii.1973, 1 W, D.S. Peters leg. et det., J. Gusenleitner revid. (SMF); Varamin, 924 m, v.2001, 1 ♀, B. Abbasi leg., L. Dvořák det. (LDTC); Rayne, 6.ix.1955, 4 WW, F. Schmid leg., J. de Beaumont det. (MZL); Shemiran, 4.xi.1933, 4 WW, N. Filippov leg., A. Antropov det.



Figs 16–17. Distribution in Iran: **16 –** *Vespula germanica*. **17 –** *Vespula vulgaris* (only verified data were accepted).

(ZMMU); Gholhak (=Golhak), 1400 m, 19.v.1961, 1 ♀, 28.iv.1961, 4 ♀♀, all J. Klapperich leg., L. Dvořák det. (HNHM); Tehran, viii.1960, 2 WW, 28.viii.1960, 6 WW, E.S. Brown leg., J.M. Carpenter det. (BMNH). **West Azarbayjan:** 95 km SE Makou, 6.v.1970, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); 96 km SE Makou, 1.v.1970, 1 ♀, J. Ressl leg., J. Gusenleitner det. (JGLA); Takht-e Soleymán, 36°36′ N, 47°14′E, 3.x.1988, 1 W, P. Chvojka leg., L. Dvořák det. (NMPC); Ourmieh, viii.2008, 6 ♀♀, N. Samin leg., N. Bagriacik det. (HGI). **Yazd:** Yazd, 31.iii.1970, 1 ♀, 20.iv.1972, 1 ♀, all J. Ressl leg., J. Gusenleitner det. (JGLA); Yazd, hotel garden, 1.iv.1970, 1 ♀ J. Ressl leg., J. Gusenleitner det. (JGLA); Yazd, 31.iii.1970, 1 W, 12.iv.1970, 1 W, all essl leg., J. Gusenleitner det. (OLM). **Zanjan:** Darram, Gilvan, Zanjan, Nikpey, Chorok-e-sofla, Anguran, Mahneshan, Pari. New records: Zanjan, 1573 m, viii.2001, 1 ♀, F. Mansoori leg., L. Dvořák det. (LDTC).

Distribution in Iran (Fig. 16). East Azerbayan (Ebrahimi & Carpenter 2008, this paper), Fars (Ebrahimi & Carpenter 2008, this paper), Ghazvin (Morice 1921, this paper), Golestan (this paper), Guilan (Morice 1921, this paper), Hamadan (this paper), Isfahan (Lehr *et al.* 2007, Ebrahimi & Carpenter 2008, this paper), Kerman (Ebrahimi & Carpenter 2008, this paper), Kermanshah (du Buysson 1912, Morice 1921, this paper), Khorasan (Blüthgen & Gusenleitner 1970, Guiglia 1977, Ebrahimi & Carpenter 2008, this paper), Khuzestan (this paper), Kohguiluyeh and Boyerahmad (Ebrahimi & Carpenter 2008, this paper), Kordestan (Ebrahimi & Carpenter 2008, this paper), Lorestan (Ebrahimi & Carpenter 2008, this paper), Markazi (Ebrahimi & Carpenter 2008, this paper), Mazandaran (Ebrahimi & Carpenter 2008, this paper), Qom (Ebrahimi & Carpenter 2008), Semnan (this paper), Sistan and Baluchestan (Ebrahimi & Carpenter 2008), Tehran (Ebrahimi & Carpenter 2008, this paper), West Azarbayan (Ebrahimi & Carpenter 2008, this paper), Yazd (this paper), Zanjan (Abbasi *et al.* 2008, this paper).

General distribution. Europe; northern Africa; Asia east to Korea and south to northern India; introduced into many regions of the world: Iceland, New Zealand, Australia, Ascension Island, South Africa, Chile, Argentina, USA, Canada (Carpenter & Kojima 1997).

Remarks. This species is widely distributed and plentiful in Iran (Fig. 16).

Vespula rufa (Linnaeus, 1758)

Published data from Iran: East Azarbayan (Sakenin *et al.* 2010), Kordestan (Abd-Rabou *et al.* 2005).

General distribution: Europe except extreme south; Turkey; through Siberia to Nepal, Russian Far East, Korea, and Japan; Canada; northern USA (Carpenter & Kojima 1997).

Remarks. The senior author has as yet not had any possibility to study the reported material of this species. The occurrence of this species in mountain regions of north and northwestern Iran is possible, as it is widely distributed from Europe to East Asia (see the distribution map in Fig. 3 of Archer (1997)), but the accuracy of the cited records is unclear. We therefore do not consider this species as a part of the Iranian fauna, pending confirmation of the identification of specimens.

Vespula vulgaris (Linnaeus, 1758)

Material. Khorasan: Mashhad (Torogh), 900 m, 17.ix.2010, 2 WW, M. Salehifard leg., J. M. Carpenter det. (MSI et AMNH).

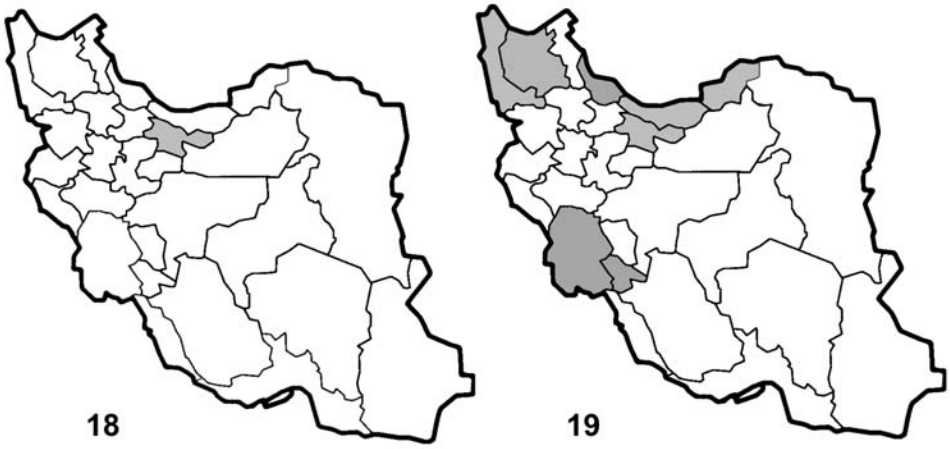
Distribution in Iran (Fig. 17): Kermanshah (Abd-Rabou *et al.* 2005), Khorasan (this paper).

General distribution. Europe except extreme south; Asia south to Kazakhstan, Mongolia, Kashmir, northern China, east to Korea and Japan; introduced into Iceland, New Zealand, and Australia (Carpenter & Kojima 1997). Note that this species was considered to be Holarctic, but Carpenter and Glare (2010) have recently shown that this was based on misidentification of North American specimens.

Remarks. Iran has been listed in its distribution by Archer (1989: 37) and also see maps in Fig. 5 of Archer (1998b), and Fig. 1 of Eck (1999). However, no precise locality has ever been published by Archer or Eck. The accuracy of the record of Abd-Rabou *et al.* (2005) is unclear, so the only exactly confirmed record of *V. vulgaris* from Iran is our one presented in the paper.

Genus *Dolichovespula* Rohwer, 1916

= *Pseudovespula* Bischoff, 1931
= *Boreovespula* Blüthgen, 1943
= *Metavespula* Blüthgen, 1943



Figs 18–19. Distribution in Iran: **18 –** *Dolichovespula omissa*. **19 –** *Dolichovespula sylvestris*.

Dolichovespula media (Retzius, 1783)

Published data from Iran: East Azarbayjan (Sakenin *et al.* 2010), Hamadan (Abd-Rabou *et al.* 2005).

General distribution: Europe except extreme south; nothern Africa; Asia south and east to southern Siberia, Mongolia, China, Korea, and Japan (Carpenter & Kojima 1997).

Remarks. The senior author has as yet not had any possibility to study the reported material of this species. The occurrence of this species in north and northwestern Iran is possible, but the accuracy of the cited records is unclear, and the distribution map in Fig. 3 of Archer (1999) has no points in Iran. Therefore, we do not consider this species as a part of the Iranian fauna, pending confirmation of the identification of specimens.

Dolichovespula omissa Bischoff, 1931

Material. Tehran: Tehran, 1200–1500 m, v.–vi.1960, 1 ♀, J. Klapperich leg., A. Cetkovic det., L. Dvořák revid. (HNHM).

Distribution in Iran (Fig. 18). Tehran (this paper).

General distribution. Europe except extreme south; Turkey; Russia and Kazakhstan east to 90° E (Carpenter & Kojima 1997).

Remarks. Archer (1989) listed this species from numerous countries including Iran. Archer (1999: Fig. 2) plotted two points on a map in southern Iran, but these records were not specified. This species was not listed in Ebrahimi & Carpenter (2008), therefore our record from Tehran is the first precise published locality of *D. omissa* from Iran.

Dolichovespula saxonica (Fabricius, 1793)

Published data from Iran: East Azarbayjan (Ghahari *et al.* 2007, Sakenin *et al.* 2010), West Azarbayjan (Abd-Rabou *et al.* 2005).

General distribution: Europe except extreme south; Asia south and east to southern Siberia, Mongolia, China, Korea, and Japan (Carpenter & Kojima 1997).

Remarks. The senior author has as yet not had any possibility to study the reported material of this species. The occurrence of this species in north and northwestern Iran is possible, but the accuracy of the cited records is unclear, and the distribution map in fig. 6 of Archer (1999) has no points in Iran. Therefore, we do not consider this species as a part of the Iranian fauna, pending confirmation of the identification of specimens.

Dolichovespula sylvestris (Scopoli, 1763)

= *Vespa silvestris* [!] *var. sumptuosa* du Buysson, 1905

Material. Golestan: Shahkooh (= Schahkuh), 1 ♀ 1 W, A. Giordani Soika det., L. Dvořák revid. (HNHM). **Mazandaran:** C. Elburz, Kandavan, pass, 11.viii.1970, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Barajan, 15.ix.1955, 4 ♂♂, F. Schmid leg., J. de Beaumont det. (MZL, LDTC). **Tehran:** E. Elbruz, Eyn Varzan, 2000 m, 2.–3.viii.1970, 1 W, Exped. NMPC leg., L. Dvořák det. (NMPC); Tehran, 1200–1500 m, v.–vi.1960, 1 W, J. Klapperich leg., L. Dvořák det. (HNHM).

Distribution in Iran (Fig. 19)**.** East Azarbayjan (Ebrahimi & Carpenter 2008), Golestan (this paper), Guilan (Archer 1981), Khuzestan (Archer 1981), Kohguiluyeh and Boyerahmad (Castro & Dvořák 2009), Mazandaran (Abd-Rabou *et al.* 2005, Ebrahimi & Carpenter 2008, this paper), Tehran (Archer 1981, Ebrahimi & Carpenter 2008, this paper), West Azarbayjan (Birula 1930, Archer 1981, Blüthgen & Gusenleitner 1970).

General distribution: Europe except extreme north; Morocco; through southern Siberia to Afghanistan, Pakistan, Kashmir, Mongolia, and China (Carpenter & Kojima 1997).

Remarks. Du Buysson (1905) described *Vespa silvestris* var. *sumptuosa* from "Perse centrale". This form or subspecies is about as common as the nominotypical form in Iran. The Iranian specimens mentioned by Birula (1930), Blüthgen & Gusenleitner (1970), Archer (1981), and Castro & Dvořák (2009), as well as all the material deposited in HNHM belongs to this taxon. Archer (1989) ranked *sumptuosa* as a valid subspecies of *Dolichovespula sylvestris*, but Archer (1999, 2006) did not. Castro & Dvořák (2009) summarised the distribution of form/subspecies *sumptuosa*.

Dolichovespula sylvestris is distributed in northern and southwestern parts of Iran, with very rare occurrence in southern provinces.

Conclusions

For four of the six species that we consider to comprise the fauna of Iran there are numerous locality records. However, all the regions of Iran have not been thoroughly sampled so far and surely other new distributional records are expected for the species.

The recent review on Iranian vespids by Ebrahimi & Carpenter (2008) documented several new distributional records mostly based on recent collections. Iran forms a large part of the Iranian plateau, and covers an area of 1,623,779 km¸ incorporating various geographical regions and climates (Fig. 13), the southern coast of Indian Ocean being known as zoogeographical bridge between Afrotropical and Oriental Regions. Therefore, with attention to the fauna of adjacent countries of Iran, we expect that some other vespine species (commented above as doubtful) remain to be discovered in Iran. To find new species and also new distributional records, more samplings and surveys should be conducted on this insect group in Iran. This highlights the general need for future collecting to gain a better knowledge of Iranian vespid biodiversity. The three species we consider as dubious have either had Iran included in their distributions without precise localities, or are based on questionable identifications. We hope that the further samplings in different regions of Iran will result in the collection of other vespine species, especially the doubtful species.

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