



Aphids associated with Lamiaceae in Iran with redescription of *Ovatus mentharius* (van der Goot, 1913) (Hemiptera: Aphididae)

Mohsen Mehrparvar¹, Seyed Mozaffar Mansouri¹ & Leila Malekpourzadeh²

- 1- Department of Biodiversity, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran
✉ mehrparvar@aphidology.com <https://orcid.org/0000-0002-6051-5845>
✉ m.mansouri.89@gmail.com <https://orcid.org/0000-0002-9109-2566>
- 2- Department of Ecology, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran
✉ malekpour.leila@yahoo.com <https://orcid.org/0000-0002-2374-9255>

Abstract. There are 33 aphid species reported so far on Lamiaceae plants in Iran. In this research, a total of 19 aphid species belonging to 12 genera were collected on 20 host plant species. Furthermore, 33 associations between aphid species and host plants were recognized, of which six are new for Iran. Among the examined specimens, an *Ovatus* species collected on *Mentha longifolia* showed a complete range of intermediate biometric data of *O. mentharius* (van der Goot, 1913) and *O. archangelskajae* Kadyrbekov, 2008. In view of the biometric data from samples of Iran, we conclude that *O. archangelskajae* is a geographical variant of *O. mentharius*, therefore we consider it as a synonym for *O. mentharius* and redescribe *O. mentharius* as its morphological entities are extended. In this paper, the distribution of the aphid species in different parts of Iran is also presented and six new occurrences are reported for Fars and Kerman provinces. An identification key to the apterous viviparous female aphids living on Lamiaceae in Iran is provided.

Keywords: Fauna, taxonomy, synonym, distribution, identification

Article History

Received:
21 January 2024
Accepted:
11 March 2024
Subject Editor:
Mehdi Esfandiari

Citation: Mehrparvar, M., Mansouri, S. M. & Malekpourzadeh, L. (2024) Aphids associated with Lamiaceae in Iran with redescription of *Ovatus mentharius* (van der Goot, 1913) (Hemiptera: Aphididae). *J. Entomol. Soc. Iran*, 44 (2), 217-238.

Introduction

The plant family Lamiaceae, formerly called Labiatae, is a family of flowering plants of which some species are woody shrubs or subshrubs. Most members of the family are perennial or annual herbs with square stems (Harley *et al.*, 2004). Lamiaceae are distributed nearly worldwide and are commonly known as mint, deadnettle or sage family with 236 genera and more than 7,000 species (Harley *et al.*, 2004). The family is particularly important to humans as herb plants useful for flavor, fragrance, or medicinal properties. There are 46 genera and more than 400 species of this family in Iran of which 165 species are endemic (Jamzad, 2013).

To date, about 33 aphid species have been recorded on Lamiaceae plants in Iran (Hodjat, 1993; Holman, 2009; Rezwani *et al.*, 1994; Sedighi *et al.*, 2018).

Iran has diverse climates and ecosystems. Considering this variety and geographical conditions along with the presence of a large number of plant species, it is expected that the biodiversity of aphids in the country is high. The aphid fauna of Iran has not yet been studied extensively and there is a high possibility to discover more species as new to aphid fauna of Iran and also new to science (Mosapour *et al.*, 2019). Aphids are able to cause considerable economic damage and transmit virus diseases in agricultural, horticultural and forest plants (van Emden & Harrington, 2007), so they are considered as an important group of pests. Hence, developing an effective control or a reliable management strategy for aphid pests requires a precise knowledge of their taxonomy and biology (Farahpour-Haghani *et al.*, 2015).

Corresponding author: Mohsen Mehrparvar (E-mail: mehrparvar@aphidology.com ; mehrparvar@kgut.ac.ir)



© 2024 by Author(s), Published by the Entomological Society of Iran

This Work is Licensed under Creative Commons Attribution-Non Commercial 4.0 International Public License.

In the course of studies of aphid fauna of Iran by the first author, since 2006, many aphid samples belonging to the family Lamiaceae were collected and identified. In this paper, the aphid species associated with Lamiaceae in Iran are presented and an identification key to the apterous viviparous females is provided.

Materials and methods

Plants foliage and roots were examined carefully in purpose to find aphid colonies. After finding aphid colonies on the host plant, the infested plant parts were cut and gently placed into plastic containers. Sometimes it was not easy to locate aphids directly on plants, so it was needed to use some indicators such as existence of aphid's honeydew on plant surface, ants' attendance and predators' presence. When there was no trace of aphids on plants, beating onto a white tray placed underneath the plant was useful. Then, the aphids were collected by a paint brush carefully and specimens were preserved in ethanol 75%. Sampling data such as host plant name, feeding location on the host plant, color of live aphid specimens, locality, date, biological information, geographical coordinates and elevation were recorded at the time of collection. It was also noted whether there are ants in attendance, if so, they were collected along with the aphids. Later, in the laboratory, the specimens were mounted on microscopic slides using the method described by Mehrparvar *et al.* (2021) or Mehrparvar (2023). The specimens are deposited in the Aphid Collection of Aphidology Research Group, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology (KGUT), Kerman, Iran. The specimens, were identified using related resources (e.g. Blackman, 2010; Blackman & Eastop, 2006, 2023; Heie, 1986, 1992, 1994, 1995). The collected ants and host plants are deposited in the insect collection and herbarium of KGUT, respectively.

Abbreviations used in the text are as follows: BL, body length; ANT, antennae length; ANTI, ANTI, ANTI, ANTI, ANTI, ANTI, ANTI, ANTI, antennal segments I, II, III, IV, V, and the base of antennal segment VI, respectively; PT, processus terminalis; Rhin., rhinaria; URS, ultimate rostral segment; 2HT, second segment of hind tarsus; SIPH, siphunculus; BDANTI, basal diameter of the third antennal segment; LHANTI, longest hair on third antennal segment; LHF, longest hair on femur; TFS, trochanter-femoral suture; LHT, longest hair on trochanter; BWURS, basal width of ultimate rostral segment; BWSIPH, basal width of siphunculus; MDSIPH, median diameter of siphunculus; BWCauda, basal width of cauda; ABDT, abdominal tergite; ARG, Aphidology Research Group.

Results

In this study, a total of 19 aphid species belonging to 12 genera were collected on 20 host plant species. Based on this and previously published resources a total of 33 aphid species belonging to 13 genera on 55 host plant species are recorded on Lamiaceae in Iran. In this study, six new occurrences are reported for the first time for Fars and Kerman provinces. Furthermore, 33 associations between aphid species and host plants were recognized, of which six are new for Iran. The host plants and distribution of aphid species associated with Lamiaceae plants in Iran are presented in Table 1, in which the aforementioned reports are marked by an asterisk “*”.

In the following, the aphid species associated with Lamiaceae in Iran are presented which are comprises of the specimens that were collected in the present study and/or those that were previously mentioned in the published resources.

1- *Aphis affinis* Del Guercio, 1911 (Aphididae: Aphidinae: Aphidini)

Apterae are pale yellow to dark green-gray in color. Nymphs' body dusted with wax powder. The body length is 0.6–2.1 mm. Siphunculi and cauda are both dark with the same color. The number of secondary rhinaria distributed on ANTI and ANTI in alatae is 3–9 and 0 respectively (Blackman & Eastop, 2023); however, in one of alatae collected in this study there was one rhinaria on ANTI. There are morphological variations between the Iranian populations (based on specimens in the Aphidology Research Group collection) and those given in the literature; so, the biometric data of Iranian specimens are given in Table 2. Some dwarf apterae (small body) were collected on *Mentha piperita* in Jiroft (the weather is sweltering in summer – it is one of the hottest places in Iran – but temperatures are moderate in winter), Kerman province which identification of them was problematic (Ilharco, 1987), but using morphometric methods it revealed that they belong to *A. affinis* (unpublished data).

Table 1: Aphid species living on Lamiaceae in Iran based on specimens in the ARG collection and/or already published resources. New host plant and new distribution are marked by an asterisk “*”.

Aphid species	Host plant	Distribution	Reference
<i>Aphis affinis</i> Del Guercio, 1911	<i>Ballota</i> sp.	Alborz	(Alikhani <i>et al.</i> , 2010;
	<i>Coleus amoinicus</i>	Fars	Hodjat, 1993;
	<i>Coleus blumei</i>	Gilan	Mehrpavar <i>et al.</i> , 2007;
	<i>Lamium</i> sp.	Isfahan	Mehrpavar <i>et al.</i> , 2021,
	<i>Marrubium alternidens</i>	Kerman	2022; Mehrpavar <i>et al.</i> ,
	<i>Mentha aquatica</i>	Khuzestan	2008; Mokhtari <i>et al.</i> ,
	<i>Mentha latifolia</i>	Markazi	2012; Momeni Shahraki
	<i>Mentha longifolia</i>	Mazandaran	<i>et al.</i> , 2019; Mousapour,
	<i>Mentha piperita</i> *	Qazvin	2016; Rezwani, 1987,
	<i>Mentha</i> sp.	Sistan & Baluchestan	2010; Rezwani &
<i>Mentha viridis</i>	Tehran	Parvizi, 1990; Rezwani	
	West Azerbaijan	<i>et al.</i> , 1994; Samii, 1992)	
	Zanjan		
<i>Aphis ballotae</i> Passerini, 1860 Syn. <i>Aphis ballotica</i> Szelegiewicz, 1968	<i>Ballota</i> sp.	Fars*	(Hodjat, 1993; Momeni
	<i>Lamium</i> sp.	Gilan	Shahraki <i>et al.</i> , 2019;
	<i>Marrubium anisodon</i>	Golestan	Rezwani, 1987, 2010;
	<i>Marrubium</i> sp.	Isfahan	Rezwani <i>et al.</i> , 1994;
	<i>Marrubium vulgare</i>	Kerman*	Samii, 1992; Sedighi,
	<i>Nepeta</i> sp.*	Mazandaran	2019)
	Tehran		
	North Khorasan		
<i>Aphis craccivora</i> Koch, 1854	<i>Calamintha</i> sp.		(Ghahramani Nezhad <i>et</i>
	<i>Lamium</i> sp.		<i>al.</i> , 2012; Hodjat, 1993;
	<i>Marrubium alternidens</i>		Mehrpavar <i>et al.</i> , 2007;
	<i>Mentha longifolia</i>		Mokhtari <i>et al.</i> , 2012;
	<i>Mentha</i> sp.	Widely distributed in Iran	Rezwani, 2010;
	<i>Phlomis cancellata</i> *		Rezwani <i>et al.</i> , 1994;
	<i>Salvia nemorosa</i>		Samii, 1992)
	<i>Salvia microsiphon</i> *		
	<i>Teucrium orientale</i>		
<i>Aphis fabae</i> Scopoli, 1763	<i>Lavandula officinalis</i>		(Ghahramani Nezhad <i>et</i>
	<i>Mentha</i> sp.	Widely distributed in Iran	<i>al.</i> , 2012)
	<i>Salvia</i> spp.		
<i>Aphis frangulae</i> Kaltenbach, 1845	<i>Lamium</i> sp.		(Rezwani, 1987;
	<i>Mentha</i> sp.	Widely distributed in Iran	Rezwani <i>et al.</i> , 1994)
<i>Aphis gossypii</i> Glover, 1887	<i>Lamium amplexicaule</i>		(Hodjat, 1993;
	<i>Lamium</i> sp.		Rezwani, 2010)
	<i>Mentha longifolia</i>	Widely distributed in Iran	
	<i>Mentha</i> sp.		
	<i>Salvia nemorosa</i>		
	<i>Salvia</i> sp.		
<i>Aphis nepetae</i> Kaltenbach, 1843	<i>Marrubium anisodon</i>		(Mehrpavar <i>et al.</i> ,
	<i>Marrubium vulgare</i>		2007; Momeni Shahraki
	<i>Melissa officinalis</i>	Kerman	<i>et al.</i> , 2019; Rezwani,
	<i>Nepeta cataria</i>	Mazandaran	2010; Rezwani <i>et al.</i> ,
	<i>Nepeta crassifolia</i>		1994)
<i>Aphis polii</i> Barjadze, Blackman & Özdemir, 2015	<i>Teucrium polium</i>	Fars	(Barjadze <i>et al.</i> , 2015;
	<i>Teucrium</i> sp.	Mazandaran Tehran	Mehrpavar <i>et al.</i> , 2021, 2022)
<i>Aphis salviae</i> Walker, 1852	<i>Salvia nemorosa</i>	Alborz	(Alikhani <i>et al.</i> , 2010;
	<i>Salvia pratensis</i>	Fars	Hodjat, 1993;
	<i>Salvia pseudosylvestris</i>	Hamedan	Mehrpavar <i>et al.</i> , 2021,
	<i>Salvia sclarea</i>	Isfahan	2022; Momeni Shahraki
	<i>Salvia</i> sp.	Markazi	<i>et al.</i> , 2019; Remaudière
	<i>Salvia vingata</i>	Mazandaran	& Remaudière, 1997;
		Tehran	Rezwani, 1987, 2010;
	West Azerbaijan	Rezwani <i>et al.</i> , 1994;	
		Samii, 1992)	
<i>Aphis spiraeicola</i> Patch, 1914		Alborz	(Hodjat, 1993; Hodjat
		Fars	& Eastop, 1982;
		Gilan	Rezwani, 2010)
		Golestan	
		Kerman	
		Mazandaran	
		Razavi Khorasan	
		Sistan & Baluchestan	
	Tehran		
	<i>Rosmarinus officinalis</i>		

Aphid species	Host plant	Distribution	Reference
<i>Aphis stachydis</i> Mordvilko, 1929	<i>Stachys pubescens</i>	Mazandaran West Azerbaijan	(Momeni Shahraki <i>et al.</i> , 2019; Rezwani, 2010; Rezwani <i>et al.</i> , 1994)
<i>Aphis teucrii</i> (Börner, 1942)	<i>Teucrium orientale</i> <i>Teucrium polium</i>	West Azerbaijan	(Rezwani, 2010; Rezwani <i>et al.</i> , 1994)
<i>Appendiseta robiniae</i> (Gillette, 1907) [The presence of this species on <i>Vitex</i> needs confirmation]	<i>Vitex agnus-castus</i>	Razavi Khorasan	(Entezari <i>et al.</i> , 2016; Momeni Shahraki <i>et al.</i> , 2019)
<i>Aulacorthum solani</i> (Kaltenbach, 1843)	<i>Melissa officinalis</i> <i>Mentha</i> sp.	Alborz Fars Gilan Golestan Mazandaran Qazvin Tehran	(Hodjat, 1993; Mehrparvar <i>et al.</i> , 2021, 2022; Rezwani, 2010)
<i>Brachycaudus cerasicola</i> (Mordvilko, 1929)	<i>Hymenocrater elegans</i> <i>Marrubium anisodon</i> <i>Perovskia abrotanoides</i> <i>Phlomis cancellata</i> <i>Salvia aethiopsis</i> <i>Salvia macrosiphon</i> <i>Stachys turcomanica</i>	North Khorasan	(Momeni Shahraki <i>et al.</i> , 2019; Sedighi, 2019; Sedighi <i>et al.</i> , 2018)
<i>Brachycaudus helichrysi</i> (Kaltenbach, 1843)	<i>Salvia splendens</i> <i>Marrubium</i> sp.	Widely distributed in Iran	(Hodjat, 1993; Mehrparvar <i>et al.</i> , 2007; Rezwani, 2010)
<i>Brachycaudus persicae</i> (Passerini, 1860)	<i>Salvia aethiopsis</i>	Alborz Gilan Hamedan Markazi Qazvin Razavi Khorasan	(Momeni Shahraki <i>et al.</i> , 2019; Rezwani, 1987, 2004)
<i>Cavariella aegopodii</i> (Scopoli, 1763)	<i>Teucrium polium</i>	Alborz Fars Kerman Markazi Mazandaran Tehran West Azerbaijan	(Rezwani <i>et al.</i> , 1994)
<i>Cavariella theobaldi</i> (Gillette & Bragg, 1918)	<i>Marrubium</i> sp. <i>Teucrium orientale</i>	Alborz Fars Gilan Golestan Mazandaran Tehran	(Rezwani <i>et al.</i> , 1994)
<i>Cryptomyzus ballotae</i> Hille Ris Lambers, 1953	<i>Ballota</i> sp. <i>Lamium</i> sp. <i>Marrubium anisodon</i> <i>Marrubium</i> sp. <i>Marrubium vulgare</i>	Fars* Tehran	(Hodjat, 1993; Momeni Shahraki <i>et al.</i> , 2019; Rezwani, 2010)
<i>Cryptomyzus behboudii</i> Remaudière & Davatchi, 1961	<i>Phlomis oliveri</i>	Fars	(Hodjat, 1993; Momeni Shahraki <i>et al.</i> , 2019; Remaudière & Davatchi, 1961; Rezwani, 2010; Rezwani <i>et al.</i> , 1994)
<i>Cryptomyzus korschelti</i> Börner, 1938	<i>Marrubium anisodon</i> <i>Marrubium vulgare</i> <i>Stachys</i> sp.	Gilan	(Momeni Shahraki <i>et al.</i> , 2019; Rezwani, 2010; Rezwani <i>et al.</i> , 1994)
<i>Dysaphis microsiphon</i> (Nevsky, 1929)	<i>Mentha longifolia</i> <i>Mentha</i> sp. <i>Mentha sylvestris</i>	Alborz Kerman Markazi Mazandaran Razavi Khorasan	(Hodjat, 1993; Mehrparvar <i>et al.</i> , 2008; Mokhtari <i>et al.</i> , 2012; Rezwani, 1990, 2010; Rezwani <i>et al.</i> , 1994)

Aphid species	Host plant	Distribution	Reference
<i>Eucarazzia elegans</i> (Ferrari, 1872)	<i>Calamintha</i> sp.		
	<i>Coleus amoinicus</i>	Alborz	
	<i>Coleus blumei</i>	Fars*	(Hodjat, 1993;
	<i>Lavandula angustifolia</i>	Gilan	Mehrparvar <i>et al.</i> , 2007;
	<i>Melissa</i> sp.	Golestan	Mehrparvar <i>et al.</i> , 2008;
	<i>Mentha</i> sp.	Isfahan	Mokhtari <i>et al.</i> , 2012;
	<i>Nepeta cataria</i> *	Kerman	Momeni Shahraki <i>et al.</i> ,
	<i>Nepeta fissa</i>	Khuzestan	2019; Rezwani, 1987,
	<i>Nepeta</i> sp.	Mazandaran	2010; Rezwani <i>et al.</i> ,
	<i>Salvia officinalis</i>	Tehran	1994; Wiczeorek &
<i>Salvia</i> sp.	Zanjan	Chlond, 2019)	
<i>Kaltenbachella pallida</i> (Haliday, 1838)	<i>Mentha longifolia</i>	Gilan	
	<i>Mentha</i> sp.	Golestan	
		Kerman*	(Hodjat, 1993; Momeni
		Markazi	Shahraki <i>et al.</i> , 2019;
		Mazandaran	Rezwani, 2004, 2010)
	Razavi Khorasan		
	Tehran		
<i>Klimaszewskia salviae</i> (Nevsky, 1929)	<i>Salvia rhytidea</i>	Kerman	(Remaudière & Remaudière, 1997)
<i>Macrosiphum euphorbiae</i> (Thomas, 1878)	<i>Lamium amplexicaule</i>		(Hodjat, 1993;
	<i>Salvia</i> sp.	Widely distributed in Iran	Mehrparvar <i>et al.</i> , 2007;
			Rezwani, 2010)
<i>Myzus ornatus</i> Laing, 1932	<i>Teucrium chamaedrys</i>	Alborz	(Hodjat, 1993; Hodjat
	<i>Teucrium</i> sp.	Mazandaran	& Rezwani, 1987;
		Tehran	Rezwani, 2010)
<i>Myzus padellus</i> Hille Ris Lambers & Rogerson, 1946		Tehran	(Momeni Shahraki <i>et al.</i> ,
			2019; Rezwani, 2010)
<i>Myzus persicae</i> (Sulzer, 1776)	<i>Clerodendrum</i> sp.		
	<i>Hymenocrater</i> sp.		
	<i>Lamium amplexicaule</i>		
	<i>Marrubium</i> sp.		
	<i>Mentha longifolia</i>		(Hodjat, 1993;
	<i>Mentha</i> sp.	Widely distributed in Iran	Mehrparvar <i>et al.</i> , 2007;
	<i>Nepeta glomerulosa</i>		Rezwani, 2010;
	<i>Nepeta saccharata</i>		Rezwani <i>et al.</i> , 1994)
	<i>Ocimum basilicum</i>		
	<i>Stachys pubescens</i>		
<i>Ovatus crataegarius</i> (Walker, 1850)	<i>Mentha longifolia</i>	Alborz	
	<i>Mentha</i> sp.	Gilan	(Abaii, 1984; Hodjat,
		Isfahan	1993; Mokhtari <i>et al.</i> ,
		Markazi	2012; Momeni Shahraki
		Mazandaran	<i>et al.</i> , 2019; Rezwani,
	Tehran	2004, 2010)	
<i>Ovatus insitus</i> (Walker, 1849)	<i>Mentha longifolia</i>	Gilan	(Abaii, 1984; Momeni
			Shahraki <i>et al.</i> , 2019;
			Rezwani, 2010)
<i>Ovatus mentharius</i> (van der Goot, 1913)	<i>Mentha longifolia</i>		(Mehrparvar <i>et al.</i> ,
	<i>Mentha</i> sp.	Fars*	2007; Mehrparvar <i>et al.</i> ,
		Kerman	2021, 2022; Mehrparvar
			<i>et al.</i> , 2008; Momeni
			Shahraki <i>et al.</i> , 2019;
			Rezwani, 2010)

Biology: They live on plants of the genus *Mentha* and are often located at the ends of shoots, however, there are some reports of the existence of this species on plants of other genera, i.e. *Ballota* (Hodjat, 1993; Rezwani, 2010), *Coleus* (Hodjat, 1993; Rezwani, 2010), *Lamium* (Rezwani, 2010) and *Marrubium* (Mokhtari *et al.*, 2012) in Iran. This is for the first time that this aphid species is reported on *M. piperita* in Iran. This species is monoecious holocyclic with wingless males and they are attended by ants (Blackman & Eastop, 2023).

Distribution: In Europe, southern Russia, the Middle East, Central Asia, India and Pakistan (Blackman & Eastop, 2023).

Material examined: IRAN, Kerman province, Kohpayeh, 2 May 2007, on *Mentha longifolia*, ARG00505. IRAN, Kerman province, Jorjafk, 9 April 2007, on *Mentha longifolia*, ARG00506. IRAN, Mazandaran province, Jannat Rodbar, 4 June 2022, 1540 m., on *Mentha* sp., ARG00532. IRAN, Kerman province, Pamazar, 21 April 2006, 2316 m., on *Mentha longifolia*, ARG00496. IRAN, Kerman province, Rayen, 5 May 2006, 2497 m., on *Mentha longifolia*, ARG00497. IRAN, Fars province, Bovan, 9 May 2008, 1628 m., on *Mentha* sp., ARG00389. IRAN, Fars province,

Balmini-Doshman Ziari, 16 May 2008, 1577 m., on *Mentha* sp., ARG00382. IRAN, Fars province, Sepidan, 16 May 2008, 2006 m., on *Mentha longifolia*, ARG00517. IRAN, Fars province, Komehr-Sepidan, 9 June 2008, 2337 m., on *Mentha* sp., ARG00494. IRAN, Kerman province, Kohpayeh, 19 May 2006, 2158 m., on *Mentha longifolia*, ARG00498. IRAN, Kerman province, Lalehzar, 21 May 2006, 3017 m., on *Mentha longifolia*, ARG00500. IRAN, Kerman province, Anjerk-Baft, 18 April 2007, 2251 m., on *Mentha longifolia*, ARG00461. IRAN, Kerman province, Lalehzar, 11 May 2007, 3002 m., on *Mentha longifolia*, ARG00503. IRAN, Kerman province, Pesoujan, 1 May 2015, 2228 m., on *Mentha longifolia*, ARG00504. IRAN, Kerman province, Jiroft, 5 May 2007, on *Mentha piperita*, ARG00553. IRAN, Kerman province, Pariz, 9 May 2023, 2683 m., on *Mentha longifolia*, ARG00555.

Table 2: Biometric data of apterous viviparous females of the Iranian populations of *Aphis affinis* (Hemiptera: Aphididae: Aphidinae: Aphidini) (based on 85 specimens in the ARG collection). Measurements are in mm.

Characteristic	Length/No./Ratio	Characteristic	Length/No./Ratio
BL	1.08–1.86	No. URS Hairs	2–3
ANTIII	0.120–0.338	Rhin. ANTIII	0–4
ANTIV	0.058–0.189	ANTIII/ANTIV	1.39–3.16
ANTV	0.069–0.153	ANTIII/ANTV	1.62–2.77
ANTVib	0.060–0.116	ANTIII/PT	0.92–2.11
PT	0.122–0.203	PT/ANTVib	1.40–2.28
URS	0.102–0.140	SIPH/Cauda	1.07–1.98
BWURS	0.036–0.054	ANTIII/SIPH	0.90–1.52
2HT	0.066–0.105	URS/2HT	1.20–1.69
SIPH	0.111–0.306	SIPH/BL	0.10–0.18
BWSIPH	0.048–0.108	SIPH/BWSIPH	1.89–3.93
MDSIPH	0.035–0.063	URS/BWURS	2.20–3.69
Cauda	0.095–0.180	URS/ANTVib	1.00–1.85
BWCauda	0.072–0.146	SIPH/MDSIPH	2.92–5.77
Hind Femur	0.225–0.443	Cauda/BWCauda	1.10–1.84
Hind Tibia	0.374–0.740	BL/Hind Femur	3.52–5.24
BDANTIII	0.013–0.025	BL/Hind Tibia	2.09–3.29
LHANTIII	0.008–0.020	LHANTIII/BDANTIII	0.43–1.06
TFS	0.035–0.063	LHT/TFS	0.50–1.17
LHF	0.023–0.052	LHF/TFS	0.49–1.04
LHT	0.023–0.063	PT/SIPH	0.57–1.22
No. Cauda Hairs	3–7	CAUDA/URS	0.83–1.45

2- *Aphis ballotae* Passerini, 1860 (Aphididae: Aphidinae: Aphidini)

Syn.: *Aphis balloticola* Szelegiewicz, 1968

This species is a member of the species group *Aphis frangulae* complex and its diagnosis is very difficult and can only be separated based on biology and host plant (Blackman & Eastop, 2023). Apteræ are dark grey-blue to mottled green. The body length is 1.0–2.0 mm. The third antennal segment of apteræ has no secondary rhinaria, but the third, fourth and fifth antennal segments of alatae have 3–12, 0–3 and 0 secondary rhinaria, respectively.

Biology: This species typically lives on stems and undersides of leaves of *Ballota* spp. causing slight downward leaf-curl in early summer; however, it is also recorded from *Dracocephalum*, *Leonurus* and *Marrubium* (Blackman & Eastop, 2023). Beside these, this aphid has been collected on *Lamium* in Iran (Hodjat, 1993; Rezwani, 2010). This is for the first time that this aphid species is reported on *Nepeta* (Table 1). It is monoecious holocyclic with alate males (Blackman & Eastop, 2023; Börner, 1950).

Distribution: This species is distributed in Europe and eastward to Crimea, Algeria, Turkey and Iran (Blackman & Eastop, 2023). It has been reported from several provinces in Iran but this is the first time that reported from Kerman and Fars provinces.

Material examined: IRAN, Kerman province, Simk, 31 March 2006, on *Marrubium* sp., ARG00431. IRAN, Kerman province, Yas Chaman, 24 August 2007, 2827 m., on *Marrubium* sp., ARG00465. IRAN, Kerman province, Hoshin, 16 May 2015, 2248 m., on *Marrubium* sp., ARG00491. IRAN, Fars province, Ab Bid-Mamasani, 12 May 2008, 2151 m., on *Marrubium* sp., ARG00511. IRAN, Fars province, Dashte Gol-Mamasani, 12 May 2008, 2164 m., on *Marrubium* sp., ARG00515. IRAN, Kerman province, Madon, 16 May 2018, 2748 m., on *Nepeta* sp., ARG00554.

3- *Aphis craccivora* Koch, 1854 (Aphididae: Aphidinae: Aphidini)

The body length in this species is 1.4–2.2 mm and the color is shining black in adults and slightly covered with wax in nymphs. Alatae have 2–10 secondary rhinaria on their third antennal segment. The dorsal of abdomen has a large dark patch covering almost the entire abdominal tergites. Mehrparvar *et al.* (2012) reported the presence of morphometric differences between populations on different host plants.

Biology: This species is polyphagous and infests numerous plants, but it is considered as a serious pest for the plants of the family Fabaceae. It is an anholocyclic species almost everywhere, however, sexual phase with alate males has been observed in Germany, India and Argentina (Blackman & Eastop, 2023). It is usually attended by ants. So far, this species has not been collected on *Salvia macrosiphon* and *Phlomis cancellata* in Iran so these two aphid-host plant associations are new.

Distribution: This species has worldwide distribution but it is more common in temperate and tropical regions (Blackman & Eastop, 2006), it has also wide distribution in Iran and have been reported from all provinces.

Material examined: IRAN, North Khorasan province, Asadli, 2 June 2016, 1622 m., on *Salvia macrosiphon*, ARG00520. IRAN, North Khorasan province, Sisab, 23 May 2017, 1135 m., on *Phlomis cancellata*, NS0686.

4- *Aphis fabae* Scopoli, 1763 (Aphididae: Aphidinae: Aphidini)

Apterae are dull black but sometimes with white wax markings. Body length is 1.5–3.1 mm. Alatae have 7–33, 0–14 and 0–3 secondary rhinaria distributed on antennal segments III, IV and V respectively. This species has numerous subspecies and complicated taxonomic situation.

Biology: This species is polyphagous and has a wide range of secondary hosts. It is usually attended by ants. Oviparae on primary hosts in autumn are small, with strongly swollen hind tibiae, and males are alate (Blackman & Eastop, 2023).

Distribution: It almost has a worldwide distribution so that it has been recorded in temperate regions of northern hemisphere, and also in South America and Africa (Blackman & Eastop, 2023). This aphid species has a wide distribution in Iran and have been reported from all provinces; but the presence of this species on Lamiaceae plants in Iran is only recorded by Ghahramani Nezhad *et al.* (2012) in Kermanshah.

5- *Aphis frangulae* group Kalténbach, 1845 (Aphididae: Aphidinae: Aphidini)

Apterae have a variety of colors from yellow, green, bluish green, brown or blackish green. The body length is 0.9 to 2.4 mm. Alatae have 3–16, 0–8 and 0–3 secondary rhinaria on the third, fourth, and fifth antennal segments, respectively.

Biology: This group includes a combination of species or subspecies that feed on a wide range of herbaceous plants. Summer populations on Lamiaceae plants are indistinguishable from those of other species or subspecies (*A. balloticola* Szelegiewicz, 1968, *A. capsellae* Koch, 1854, *A. lamiorum* (Börner, 1950), *A. nepetae* Kalténbach, 1843) (Blackman & Eastop, 2023).

Distribution: It has a worldwide distribution and in Iran it has also been reported from all provinces. The existence of this species on Lamiaceae plants (i.e. *Lamium* sp.) in Iran is only recorded by Rezwani (1987) and Rezwani *et al.* (1994).

Material examined: IRAN, Isfahan province, Isfahan, 17 April 2004, on *Mentha* sp., ARG00526.

6- *Aphis gossypii* Glover, 1887 (Aphididae: Aphidinae: Aphidini)

Apterae have a variety of colors from pale whitish yellow, green, bluish green, brown to dark blackish green. The body length is 0.9 to 1.8 mm. Alatae have 3–15, 0–2 and 0 secondary rhinaria on the third, fourth, and fifth antennal segments, respectively. In some specimens examined in this study (5 out of 11) the ratio of LHF/TFS is more than 0.7 (0.55–1.0) which is not in accordance with the related key in the Aphids on the World's Plants (Blackman & Eastop, 2023).

Biology: This is a polyphagous species and one of the most important pests of cotton and cucurbits, and present in glasshouses in cold temperate regions (Blackman & Eastop, 2023). It is anholocyclic in warm climates, but host alternation and a sexual phase occur more regularly in parts of east Asia (Blackman & Eastop, 2023).

Distribution: This is a cosmopolitan species and has also been reported from all provinces in Iran.

Material examined: IRAN, Isfahan province, Isfahan (Saedi Park), 5 October 2003, on *Salvia* sp., ARG00528. IRAN, Isfahan province, Isfahan (Bisheh Habib), 5 October 2003, on *Salvia* sp., ARG00529.

7- *Aphis nepetae* Kaltenbach, 1843 (Aphididae: Aphidinae: Aphidini)

Apterae have a yellowish body with black head, siphunculi and distal parts of antennae and legs. The body length is 1.3–1.7 mm. Alatae have 3–17, 0–6 and 0–3 secondary rhinaria on the third, fourth, and fifth antennal segments, respectively.

Biology: The host plants for this species are *Nepeta* spp., however, there are records of other host plants such as *Marrubium* and *Melissa* in Iran (Rezvani, 2010). It is monoecious holocyclic in Germany (Börner, 1952).

Distribution: In the most Europe countries, Iran, Kazakhstan and USA (Blackman & Eastop, 2023).

8- *Aphis polii* Barjadze, Blackman & Özdemir, 2015 (Aphididae: Aphidinae: Aphidini)

Apterae are yellowish to dark green with dark siphunculi and cauda. Body length is 0.7–1.4 mm. Apterae have no secondary rhinaria on their antennal segments. Some of specimens in ARG collection from Fars province have 5-segmented antennae.

Biology: They live on tip of shoots and sometimes on undersides of leaves of *Teucrium polium* in ant-attended colonies. It is a monoecious holocyclic species with apterous males (Barjadze *et al.*, 2015).

Distribution: This aphid species is recorded from France, Corsica, Italy, Czech Republic, Lebanon, Iran and Ukraine (Blackman & Eastop, 2023).

Material examined: IRAN, Fars province, Barm Siah, 6 May 2008, 1101 m., on *Teucrium polium*, ARG00381.

9- *Aphis salviae* Walker, 1852 (Aphididae: Aphidinae: Aphidini)

The body length is 1.5–2.1 mm and the color is shining brown. Alatae have 4–10 and 0–1 secondary rhinaria on their third and fourth antennal segments, respectively.

Biology: This species is living on *Salvia* spp. and also recorded from *Lavandula multifida* and *Teucrium polium* (Blackman & Eastop, 2023). It is a monoecious holocyclic species with apterous males.

Distribution: This species has distribution in Europe, Algeria, Israel, Turkey, Iran and Kazakhstan (Blackman & Eastop, 2023).

Material examined: IRAN, Fars province, Sepidan, 9 June 2008, 2335 m., on *Salvia virgata*, ARG00403.

10- *Aphis spiraeicola* Patch, 1914 (Aphididae: Aphidinae: Aphidini)

Syn.: *Aphis citricola* van der Goot, 1912

The body length in this species is 1.2–2.2 mm and the color is bright greenish yellow to apple green with brown head and black siphunculi and cauda. Alatae have 6–11 and 0–5 secondary rhinaria on their third and fourth antennal segments, respectively.

Biology: This species is polyphagous and infests more than 20 plant families as the secondary hosts. It is a serious pest for Citrus (Blackman & Eastop, 2000; Hodjat & Eastop, 1982). This aphid is anholocyclic through most of the world, but a holocyclic population on *Spiraea* spp., as primary hosts, is recorded from North America, Brazil and Japan (Blackman & Eastop, 2023).

Distribution: This species has almost worldwide distribution.

11- *Aphis stachydis* Mordvilko, 1929 (Aphididae: Aphidinae: Aphidini)

Apterae are yellowish green or dark green, with brown siphunculi and pale cauda. The body length is 1.3–1.8 mm. The third and fourth antennal segments of alatae have 4–9, 0–3 secondary rhinaria respectively.

Biology: This species lives in rolled leaves or on flower-stems and flowers of *Stachys* spp. and is monoecious holocyclic with apterous males (Blackman & Eastop, 2023).

Distribution: This species is distributed in central and eastern Europe, and eastward to west Siberia, Iran, Turkey, Transcaucasia and Kazakhstan (Blackman & Eastop, 2023).

12- *Aphis teucrii* (Börner, 1942) (Aphididae: Aphidinae: Aphidini)

Apterae are bright green to dark green or dark grey-blue. The body length is 1.0–1.9 mm. The third antennal segment of alatae has 4–6 secondary rhinaria.

Biology: This species lives on shoot apices and leaves of *Teucrium* spp. It is monoecious holocyclic (Blackman & Eastop, 2023).

Distribution: This species is reported from several countries in Europe (England, Channel Islands, France, Austria, Switzerland, Spain, Italy, Czech Republic, Slovakia, Slovenia, Poland, Hungary, Rumania, Ukraine), and also from Iran, Iraq and Lebanon (Blackman & Eastop, 2023). It has been reported only from Urmia (West Azerbaijan) in Iran (Rezwani, 2010; Rezwani *et al.*, 1994).

13- *Appendiseta robiniae* (Gillette, 1907) (Aphididae: Calaphidinae: Therioaphidini)

This aphid is the only species in the genus *Appendiseta* with the origin of North America. All viviparae are alate with pale yellow-green body color. The body length is 1.6–1.9 mm. Cauda is knobbed and anal plate bilobed. Secondary rhinaria on third antennal segment transversely elongate. PT/ANTVIb is about 0.5. SIPH is short as truncated cones with a single short hair attached at the ventral side near its base. There are two pairs of anterior prothoracic marginal hairs (Richards, 1965).

Biology: This aphid has been reported to live on undersides of leaves of *Robinia pseudacacia* and *R. neomexicana*, and also now recorded from *Sophora japonica*, all in the plant family Fabaceae (Blackman & Eastop, 2023), however, this species is recorded from Iran on *Vitex agnus-castus* (Lamiaceae) by Entezari *et al.* (2016) which needs to be confirmed.

Distribution: This aphid species is widespread in North America, and introduced into Chile and Argentina, Europe and the Middle East (Blackman & Eastop, 2023).

14- *Aulacorthum solani* (Kaltenbach, 1843) (Aphididae: Aphidinae: Macrosiphini)

Apterae are shining pale whitish or yellowish green with darker green, orange or rust-colored spots at bases of siphunculi, to dull green or greenish brown. The body length is 1.8–3.0 mm. In apterae dorsum is without dark markings. SIPH is more than 10 times of mid-length width, with a large flange. URS 1.1–1.4 times of 2HT, and usually with 6 accessory hairs. Inner faces of antennal tubercles approximately parallel. The third antennal segment of alatae has 8–18 secondary rhinaria (Blackman & Eastop, 2023).

Biology: This species is polyphagous. It is monoecious holocyclic with apterous and alate males, however, it is commonly anholocyclic in mild climates and glasshouses (Blackman & Eastop, 2023).

Distribution: This species has a worldwide distribution.

Material examined: IRAN, Fars province, Ghaemiyeh, 27 April 2008, 928 m., on *Mentha* sp., ARG00397.

15- *Brachycaudus (Acaudus) cerasicola* (Mordvilko, 1929) (Aphididae: Aphidinae: Macrosiphini)

Syn.: *Anuraphis phlomicola* Nevsky, 1929

Apterae are dark brown to black with extensive dorsal sclerotic shield. Body length is 1.36–1.90 mm. SIPH shorter than URS, lightly imbricated, without spicules, also dorsal cuticle of body is not spiculose. Alatae have 24–62 secondary rhinaria on the third antennal segment which are distributed along whole of the segment. The number of rhinaria on ANTIV and ANTV are 3–23 and 0–3, respectively (Sedighi *et al.*, 2018).

Biology: They live, in general, inside the flowers of the host plants, however, depending on the host plant species, the infested parts are a bit different (see Sedighi *et al.*, 2018 for more details). The primary host plants are *Prunus* spp. and there is apparently a facultative host alternation to Lamiaceae (Blackman & Eastop, 2023). This aphid species is attended by ants.

Distribution: This aphid species is recorded from Central Asia and Iran (Blackman & Eastop, 2023; Sedighi *et al.*, 2018).

Material examined: IRAN, North Khorasan province, Asadli, 2 June 2016, 1622 m., on *Peroveskia abrotanoides*, ARG000104. IRAN, North Khorasan province, Raz and Jargalan, 15 May 2016, 1216 m., on *Peroveskia abrotanoides*,

ARG000105. IRAN, North Khorasan province, Asadli, 2 June 2016, 1622 m., on *Phlomis cancellata*, ARG000106. IRAN, North Khorasan province, Raz and Jargalan, 15 May 2016, 1250 m., on *Phlomis cancellata*, ARG000107. IRAN, North Khorasan province, Asadli, 26 May 2016, 1848 m., on *Phlomis cancellata*, ARG000108. IRAN, North Khorasan province, Asadli, 2 June 2016, 1622 m., on *Stachys turcomanica*, ARG000109. IRAN, North Khorasan province, Asadli, 26 May 2016, 1848 m., on *Stachys turcomanica*, ARG000110. IRAN, North Khorasan province, Raz and Jargalan, 15 May 2016, 1250 m., on *Stachys turcomanica*, ARG000111. IRAN, North Khorasan province, Raz and Jargalan, 15 May 2016, 1273 m., on *Hymenocrater elegans*, ARG000112. IRAN, North Khorasan province, Asadli, 10 May 2017, 1910 m., on *Peroveskia abrotanoides*, ARG000132. IRAN, North Khorasan province, Sisab, 9 June 2017, 1504 m., on *Phlomis cancellata*, ARG000133. IRAN, North Khorasan province, Raz and Jargalan, 27 May 2017, 1246 m., on *Stachys turcomanica*, ARG000134. IRAN, North Khorasan province, Asadli, 2 June 2016, 1622 m., on *Salvia macrosiphon*, ARG000521. IRAN, North Khorasan province, Sisab, 26 May 2017, 1101 m., on *Peroveskia abrotanoides*, ARG000522. IRAN, North Khorasan province, Sisab, 9 June 2017, 1657 m., on *Peroveskia abrotanoides*, ARG000523. IRAN, North Khorasan province, Sisab, 21 May 2017, 1080 m., on *Phlomis cancellata*, ARG000524. IRAN, North Khorasan province, Asadli, 12 May 2017, 1920 m., on *Phlomis cancellata*, ARG000525.

16- *Brachycaudus helichrysi* (Kaltenbach, 1843) (Aphididae: Aphidinae: Macrosiphini)

Apterae are pale green, pale yellow, whitish or pinkish. The body length is 0.9–2.0 mm. This species has helmet-shaped cauda; short conical and smooth siphunculi. Dorsum is without any dark markings and abdominal segments I and VII are without marginal tubercles. Spiracular apertures large and rounded. Alatae have 13–46 and 0–18 secondary rhinaria distributed on third and fourth antennal segments, respectively (Blackman & Eastop, 2023).

Biology: This species is polyphagous and infest numerous plants especially in the Families of Asteraceae and Boraginaceae. It is heteroecious holocyclic with sexual phase on *Prunus* spp. however, anholocyclic populations occur in warmer regions and in glasshouses (Blackman & Eastop, 2023).

Distribution: This species has a worldwide distribution.

Material examined: IRAN, Fars province, Mamasani, 12 May 2008, 2151 m., on *Marrubium* sp., ARG00512.

17- *Brachycaudus (Scrophulaphis) persicae* (Passerini, 1860) (Aphididae: Aphidinae: Macrosiphini)

Actually, this is a species group which live on several host plants and the host relationships and life cycles need further clarification. Apterae are shiny dark brown or black with black siphunculi. The body length is 1.5–2.2 mm. Alatae have 23–51, 9–21 and 1–6 secondary rhinaria on antennal segments III, IV and V, respectively (Blackman & Eastop, 2023).

Biology: The host plants of this species are mainly *Prunus* spp. and plants of Orobanchaceae (Blackman & Eastop, 2023). In Iran it is collected on *Salvia aethiopsis* in Gilan province (Rezwani, 2004).

Distribution: This species is recorded from Europe, the Middle East, Central Asia, southern Africa, Australia, New Zealand, North and South America (Blackman & Eastop, 2023).

18- *Cavariella aegopodii* (Scopoli, 1763) (Aphididae: Aphidinae: Macrosiphini)

Apterae are green or yellowish green. The body length is 1.0–2.6 mm (Blackman & Eastop, 2023). In this species ABDT VIII has a posteriorly projecting process above cauda; siphunculi are clavate, moderately imbricated, with narrower basal stem extending over 0.3–0.5 of length.

Biology: This aphid lives on leaves and umbels of numerous genera and species of Apiaceae. This species is heteroecious holocyclic, with *Salix* spp. as its primary host, but might be anholocyclic on Apiaceae in warmer climates (Blackman & Eastop, 2023).

Distribution: This species has a worldwide distribution.

Material examined: IRAN, Fars province, Barm Siah, 6 May 2008, 1101 m., on *Teucrium polium*, ARG00569.

19- *Cavariella theobaldi* (Gillette & Bragg, 1918) (Aphididae: Aphidinae: Macrosiphini)

Apterae are yellowish-green to green. The body length is 1.6–2.8 mm. In this species ABDT VIII has a posteriorly projecting process above cauda which is at least as long as second antennal segment; siphunculi are tapering or cylindrical. Alatae have dark dorsal abdominal cross-bands, which might be variably-developed, often forming a central trapezoid patch (Blackman & Eastop, 2023).

Biology: This species is heteroecious holocyclic (Blackman & Eastop, 2023).

Distribution: This species is distributed in Europe, North Africa, Turkey, Iran, east and west Siberia, Kazakhstan and north-eastern North America (Blackman & Eastop, 2023).

Material examined: IRAN, Fars province, Mamasani, 12 May 2008, 2164 m., on *Marrubium* sp., ARG00514.

20- *Cryptomyzus ballotae* Hille Ris Lambers, 1953 (Aphididae: Aphidinae: Macrosiphini)

Apterae are pale green. The body length is 1.7–2.1 mm. Most dorsal hairs are long, thick and capitate. PT/SIPH is 1.4–1.8; PT/ANTVib is 5.9–8.8; Cauda/URS is 0.6–0.8; URS/2HT is 1.4–1.7; SIPH/Cauda is 3.7–4.3. URS has 9–14 accessory hairs (Blackman & Eastop, 2023).

Biology: This species is living on *Ballota*, *Lamium*, *Leonurus*, *Marrubium* and *Melittis*. It is probably anholocyclic in Europe, although oviparae and alate males have been obtained in the laboratory (Blackman & Eastop, 2023).

Distribution: This species is found in western, central and southern Europe, Iran, possibly Pakistan and South America. This is the first report of this species from Fars province.

Material examined: IRAN, Fars province, Mamasani, 12 May 2008, 2164 m., on *Marrubium* sp., ARG00516.

21- *Cryptomyzus behboudii* Remaudière & Davatchi, 1961 (Aphididae: Aphidinae: Macrosiphini)

Apterae are wite. The body length is 1.3–1.6 mm. Dorsal hairs long with thick bases and knobbed apices, URS extremely long and narrow, as long as or longer than SIPH (Blackman & Eastop, 2023; Remaudière & Davatchi, 1961).

Biology: This aphid lives on undersides of the basal, densely hairy leaves of *Phlomis olivieri* (Remaudière & Davatchi, 1961). This species is monoecious holocyclic with oviparae and alate males (Blackman & Eastop, 2023).

Distribution: This species has been reported only from Iran and Turkey.

22- *Cryptomyzus korschelti* Börner, 1938 (Aphididae: Aphidinae: Macrosiphini)

Apterae are pale whitish green with some bright green mottling to red. The body length is 1.5–2.5 mm. ABDT I–IV each has at most 6–12 long capitate hairs. URS with 11–18 accessory hairs. Cauda not longer than its basal width (Blackman & Eastop, 2023).

Biology: The primary host plant of this species is *Ribes*. It is heteroecious holocyclic with apterous males (Blackman & Eastop, 2023).

Distribution: This species is widely distributed in Europe, and eastward at least to Central Asia, however, it has also been reported from Argentina (Ortego *et al.*, 2004).

23- *Dysaphis (Cotoneasteria) microsiphon* (Nevsky, 1929) (Aphididae: Aphidinae: Macrosiphini)

Apterae are greenish yellow, somewhat waxy. The body length is 2.1–2.3 mm. Cauda is pentagonal, as short as or shorter than its basal width. Dorsum pale, membranous (on primary host); SIPH very short, truncate cones, less than 2 times of their mid-length diameter. Cauda has 5 hairs. The extent of the dorsal sclerotic pattern in apterae on secondary hosts varies greatly between populations (Blackman & Eastop, 2023).

Biology: This species in spring slightly rolling leaves of *Cotoneaster* spp., then migrating to roots of herbaceous plants in several families including Lamiaceae, Rosaceae and Asteraceae. It is heteroecious holocyclic.

Distribution: This species has been recorded from Belgium, Greece, Morocco, Ukraine, Turkey, Iran, Georgia, Turkmenistan, Tajikistan, Uzbekistan, Kazakhstan, Pakistan, India and Bhutan.

Material examined: IRAN, Kerman province, Sirch, 24 March 2007, 1694 m., on *Mentha* sp., ARG00459.

24- *Eucarazzia elegans* (Ferrari, 1872) (Aphididae: Aphidinae: Macrosiphini)

Apterae are pale green. The body length is 1.4–2.1 mm. Siphunculi is strongly swollen, with maximum diameter of swollen part more than 2 times of the minimum diameter of stem, smooth except for a little subapical polygonal reticulation. SIPH/Cauda is 5.4–8.2. Alatae have extensive and distinctive black dorsal abdominal markings. Siphunculi is considerably clavate and the swollen part is dark and the cylindrical basal part is paler. Wings are with dark triangular spots at the ends of all the veins. URS has 20–22 accessory hairs (Blackman & Eastop, 2023; Kanturski & Stekolshchikov, 2018).

Biology: This species is living on undersides of leaves, shoots, and flowers of *Mentha* spp. and various other Lamiaceae. This species is monoecious holocyclic in Iran with apterous males (Naumann-Etienne & Remaudière, 1995). This is the first report of this aphid on *Thymus* and *Nepeta cataria* in Iran.

Distribution: This species is reported from the Mediterranean area, Madeira, the Middle East, Central Asia, Pakistan, northern India, Poland, Australia, Africa south of the Sahara, western USA and South America (Blackman & Eastop, 2023). This is the first report of this species from Fars province.

Material examined: IRAN, Kerman province, Lalehzar, 21 May 2006, 3018 m., on *Thymus* sp., ARG00460. IRAN, Fars province, Mamasani, 9 May 2008, 1618 m., on *Nepeta cataria*, ARG00508.

25- *Kaltenbachiella pallida* (Haliday, 1838) (Aphididae: Eriosomatinae: Eriosomatini)

Apterous exules are yellowish-white, secreting flocculent wax. The body length is 0.9–1.3 mm. Alatae have 1.8–2.1 mm body length. Antenna usually 4-segmented, 0.12–0.15 times of body length; PT/ANTVIb less than 0.5. Eyes are 3-faceted. SIPH is absent. Legs are very short, with fore- and mid-tarsi usually 1-segmented. Dorsal wax glands are present on head, thorax and ABDT I–VIII, comprising facets surrounding an elongate central area (Blackman & Eastop, 2023).

Biology: This species produces galls on *Ulmus* spp. mainly on the upper side of the leaf. They emerge from galls in June–July, and migrate on roots of Lamiaceae plants.

Distribution: This species has been recorded throughout Europe and in north Africa, the Middle East, south-west and central Asia, west Siberia, China, and Argentina. This is the first report of this species from Kerman province.

Material examined: IRAN, Kerman province, Sirch, 25 March 2007, 1651 m., on *Mentha longifolia*, ARG00462. IRAN, Kerman province, Sirch, 24 March 2007, 1694 m., on *Mentha* sp., ARG00463. IRAN, Kerman province, Sirch, 17 April 2008, 1684 m., on *Mentha* sp., ARG00464.

26- *Klimaszewskia salviae* (Nevsky, 1929) (Aphididae: Aphidinae: Macrosiphini)

This species has been reported for the first time in Iran (Kerman province, Lalehzar) as a subspecies of *K. salviae salviae* (Nevsky, 1929) by Remaudiere (Remaudière & Remaudière, 1997). Apteræ are pale green. The body length is 2.5–3.0 mm. URS is hairy which has 25–30 accessory hairs. Tibial apices and tarsi densely clothed with long hairs. First tarsal segments with 5 hairs. Alatae have 40–50 secondary rhinaria on their third antennal segment (Blackman & Eastop, 2023).

Biology: This species lives on *Salvia* spp.

Distribution: This species is reported from Uzbekistan, Iran, France and Tajikistan (Blackman & Eastop, 2023).

Material examined: IRAN, Kerman province, Bid-khon, 14 June 2015, 2674 m., on *Salvia rhytidea*, ARG00530.

27- *Macrosiphum euphorbiae* (Thomas, 1878) (Aphididae: Aphidinae: Macrosiphini)

Apteræ are usually green, sometimes yellowish, pink or magenta. The body length is 1.7–3.6 mm. Nymphs are dusted with greyish wax. The third antennal segment of alatae has 12–21 secondary rhinaria. PT/ANTVIb 5.3–6.2 (in examined specimens it was 6.47–6.67), longest hairs on ANTIII 0.6–1.0 times BDANTIII, SIPH 1.7–2.2 times cauda. URS 0.8–1.0 times 2HT. Hind tibiae and SIPH pale, or only dusky towards apices, femora entirely pale. Dorsal abdomen never with a dark patch (Blackman & Eastop, 2023).

Biology: This species is a polyphagous aphid. It is heteroecious holocyclic with a sexual phase on *Rosa* in north-eastern USA, but elsewhere probably mainly or entirely anholocyclic on secondary hosts in more than 20 different plant families (Blackman & Eastop, 2023).

Distribution: This species is of North American origin, now almost world-wide. The report of this species on Lamiaceae, so far, is only from Kerman province (Mehrpour et al., 2007).

Material examined: IRAN, Isfahan province, Isfahan, 12 October 2003, on *Salvia* sp., ARG00492. IRAN, Isfahan province, Isfahan, 27 September 2003, on *Salvia* sp., ARG00527.

28- *Myzus ornatus* Laing, 1932 (Aphididae: Aphidinae: Macrosiphini)

Apteræ are pale yellow or green, marked dorsally with a pattern of dark green or brownish dots and transverse flecks. The body length is 1.0–1.7 mm. Antennae are 0.5–0.6 times the body length; PT/ANTVIb 1.7–2.8; third antennal segments without rhinaria. Dorsal abdomen with a pattern of dark intersegmental spots. SIPH coarsely imbricated, and often with a shallow “S”-curve; URS 1.1–1.3 times 2HT, with 2 accessory hairs. SIPH 2.1–2.7 times cauda, which has 4–6 hairs (Blackman & Eastop, 2023).

Biology: This aphid is a very polyphagous species. Its life cycle is anholocyclic (Blackman & Eastop, 2023).

Distribution: This species has world-wide distribution.

29- *Myzus padellus* Hille Ris Lambers & Rogerson, 1946 (Aphididae: Aphidinae: Macrosiphini)

Apterae on *Prunus* are bright yellow with blackish brown head. The body length is 2.0–2.3 mm, however, apterae on secondary hosts are smaller (body length 1.3–1.9 mm), bright yellow to yellowish-green. SIPH thick and scaly; cylindrical or slightly swollen on basal half, tapering on distal half, and 2.0–2.5 times cauda. Dorsal cuticle strongly wrinkled. PT/ANTVIB is 1.5–2.0 (Blackman & Eastop, 2023).

Biology: This species is producing leaf-galls on *Prunus* in the spring. Apparently heteroecious holocyclic, migrating to Lamiaceae and Orobanchaceae. Sexual forms are unknown (Blackman & Eastop, 2023). This aphid species is reported on Lamiaceae in Iran by Rezwani (2010) without mentioning the host plant identity.

Distribution: This species is found in Europe, Russia, Turkey, Iran, Georgia, across Russia and Central Asia to east Siberia, and Korea.

30- *Myzus (Nectarosiphon) persicae* (Sulzer, 1776) (Aphididae: Aphidinae: Macrosiphini)

Apterae are whitish or pale yellowish green to mid-green, rose-pink or red. The body length is 1.2–2.1 mm. Alatae have a dark dorsal abdominal patch and 7–14 secondary rhinaria only on their third antennal segment. Antennal tubercles broadly rounded, without forwardly-directed processes. SIPH slightly to moderately and asymmetrically swollen over about distal 0.6. Dorsum without a reticulate pattern. PT/ANTVIB is 2.8–4.5, hairs on antennal tubercles are 0.2–0.6 times basal diameter of third antennal segment, URS is 0.9–1.0 (–1.2) times 2HT, which has 2–7 accessory hairs (Blackman & Eastop, 2023).

Biology: This species is the most polyphagous aphid. It is heteroecious holocyclic, migrating to secondary hosts in over 40 different plant families, and an important vector of numerous plant viruses (Blackman & Eastop, 2023; van Emden & Harrington, 2007).

Distribution: This species has a worldwide distribution.

Material examined: IRAN, Fars province, Mamasani, 12 May 2008, 2151 m., on *Marrubium* sp., ARG00513. IRAN, Kerman province, Bid-Khon, 13 May 2015, 2670 m., on *Nepeta saccharata*, ARG00531. IRAN, Kerman province, Pariz, 9 May 2023, 2610 m., on *Nepeta glomerulosa*, ARG00552.

31- *Ovatus crataegarius* (Walker, 1850) (Aphididae: Aphidinae: Macrosiphini)

Apterae are yellowish green to mid- or darkish green. The body length is 1.0–2.4 mm. URS 1.1–1.4 times ANTVIB, and 1.3–1.7 times 2HT. PT/ANTVIB is 4.0–6.0. Alatae have 11–52, 2–24 and 0–9 secondary rhinaria distributed on third, fourth and fifth antennal segments, respectively (Blackman & Eastop, 2023).

Biology: This species is living on the undersides of young leaves of Pyroidea (*Crataegus*, *Cydonia* or *Malus*) as primary hosts and then migrates to found colonies on the undersides of leaves of *Mentha* and some other Lamiaceae such as *Melissa* and *Nepeta* (Blackman & Eastop, 2023). It is heteroecious anholocyclic species.

Distribution: This species has worldwide distribution.

32- *Ovatus insitus* (Walker, 1849) (Aphididae: Aphidinae: Macrosiphini)

Apterae are green, greenish-yellow or greenish-white. The body length is 1.6–2.6 mm. Head is densely spiculate. Antennal tubercles well-developed, with inwardly directed scabrous processes bearing short hairs with blunt or slightly expanded apices. Antenna is 6-segmented, PT/ANTVIB is 4.4–6.1. Alatae have 25–83, 9–57 and 1–24 secondary rhinaria distributed on third, fourth and fifth antennal segments, respectively (Blackman & Eastop, 2023).

Biology: This species lives on undersides of young leaves of *Crataegus* spp. or *Mespilus germanica*, sometimes on other Pyroidea as primary hosts. They then migrate to *Lycopus* spp. (Lamiaceae) as secondary hosts (Blackman & Eastop, 2023). Rezwani (2010) reported this species on *Mentha longifolia* in Iran, however, there is no such a record on this plant in the world.

Distribution: This species is found in Europe, south-west and central Asia, and Siberia.

Table 3: Biometric data of apterous viviparous females of *Ovatus mentharius* (based on literature), the Iranian populations of *O. mentharius* (based on 39 specimens in the ARG collection) and *O. archangelskajae* described by Kadyrbekov (2008). Measurements are in mm.

	<i>Ovatus mentharius</i> (based on literature)	The Iranian populations of <i>O. mentharius</i>	<i>O. archangelskajae</i> described by Kadyrbekov (2008)
<i>n</i>		39	5
Body length	1.06–1.80	1.04–1.80	1.43–1.61

Frontal hairs length		0.018–0.027 (0.037)	0.017–0.022
LHANTIII		0.007–0.012	0.007–0.01
ANTIII	0.30–0.49	0.278–0.522	
ANTIV	0.21–0.39	0.189–0.439	
ANTV	0.18–0.35	0.200–0.376	
ANTVIb	0.085–0.115	0.080–0.129	
PT	0.425–0.590	0.606–0.814	
URS	0.100–0.135	0.108–0.140	
2HT	0.060–0.095	0.070–0.095	
SIPH	0.265–0.455	0.204–0.463	
Cauda	0.125–0.190	0.106–0.192	
HFemur	0.300–0.515	0.470–0.507	
HTibia	0.590–0.935	0.75–0.88	
ABDT VIII hair length		0.017–0.029	0.034
Frontal hairs length/BDANTIII		0.76–1.23	0.7–1.0
LHANTIII/BDANTIII	0.25–0.33	0.30–0.44(0.50)	0.3–0.4
ANT/BL	1 or more		1.25–1.40
ANTIII/ANTIV		1.12–1.62	1.3–1.6
ANTIII/ANTVI		0.46–0.63	0.50–0.55
ANTIV/ANTV		0.88–1.20	0.8–1.05
PT/ANTVIb	4.0–5.0	5.3–8.18	6.8–8.5
PT/ANTIII	1.2–1.4	1.37–1.91	1.6–1.8
PT/SIPH		1.59–2.21	1.8–2.0
URS/2HT	1.5–2.0	1.32–1.78	1.30–1.35
SIPH/BL	0.25	0.20–0.30	0.23–0.25
SIPH/Cauda	2.0–2.5	1.93–2.60	2.2–2.7
SIPH/ANTIII	1 or more	0.69–0.96	0.85–0.90
Cauda/URS		0.98–1.56	1.2–1.35
No. hairs on URS	2 (–4)	2–4	2–3
No. hairs on Cauda	5–7	5–6	5–6
No. hairs on ABDT VIII	4–6	4	4
No. Rhin. on ANTIII	0	0	0
No. Rhin. on ANTIV	0	0	0
No. Rhin. on ANTV	0	0	0

33- *Ovatus mentharius* (van der Goot, 1913) (Aphididae: Aphidinae: Macrosiphini)

Rezwani (2010) in his book reported this species as a new record for the aphid fauna of Iran collected in Kerman. He has identified and reported this species based on the specimens that he had borrowed from the first author of this article. Kadyrbekov in (2008) described a new *Ovatus* species as *O. archangelskajae* based on five apterous viviparous females collected on *Mentha longifolia* from Kazakhstan.

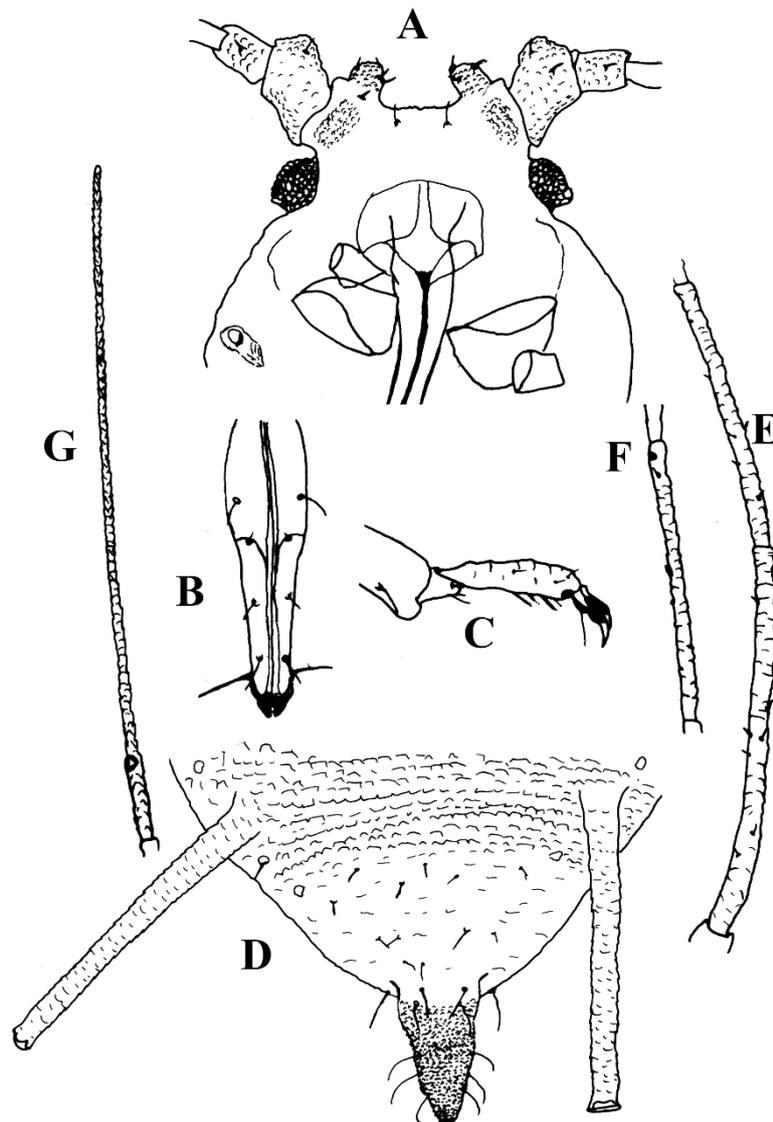


Fig. 1. *Ovatus mentharius*, apterous viviparous female; A) Head, B) URS, C) 2HT, D) Terminal segments of abdomen with SIPH and Cauda, E) ANTIII and ANTIV, F) ANTV, G) ANTVI including PT and ANTVIb.

This species is very close to *O. mentharius* and he differentiated the new species from *O. mentharius* using four morphological ratios (i. e. PT/ANTVIb, PT/ANTIII, URS/2HT and SIPH/ANTIII). In this study, four samples of an *Ovatus* species collected from four different locations in Iran on *M. longifolia*, comprising 39 apterous viviparous females and three alatae viviparous females, were examined. These specimens show a complete range of intermediate biometric data of *O. mentharius* and *O. archangelskajae* especially for the four distinguishing ratios used by Kadyrbekov (Table 3). Based on the biometric data from samples of Iran, we conclude that *O. archangelskajae* is actually not a distinct species but it is a geographical variant of *O. mentharius*. For the sake of cleaner nomenclature, we consider *O. archangelskajae* as a synonym for *O. mentharius* and here we redescribe *O. mentharius*, as its morphological entities are extended, based on previously published resources on *O. mentharius* (Heie, 1994; Hille Ris Lambers, 1947; Miller *et al.*, 2007), *O. archangelskajae* (Kadyrbekov, 2008) and the specimens examined in this study.

Apterous viviparous females: Color in living specimens: Body whitish pale green not covered with wax powder. Color in macerated specimens: Body mainly pale. The end of ANTV and ANTVI are darker than other antennal segments. SIPH dusky and darker than abdomen. Cauda pale.

Morphological characters: Body oval, 1.04–1.80 mm; head sclerotized and scabrous with minute spinules; antennal tubercles developed with bluntly conical processus on inner sides which converge markedly; median frontal tubercle not developed (Fig. 1A). Frontal hairs length 0.017–0.027(0.037) mm. LHANTIII 0.007–0.012 mm. Antenna as long as or longer than BL (1.0–1.4); antennal hairs blunt and shorter than BDANTIII. BDANTIII is 0.021–0.032 mm. LHANTIII/BDANTIII 0.25–0.44(0.50). ANTI with round projection forward on inner side. Antennal segments without secondary rhinaria (Fig. 1E). PT 4.0–8.5 times as long as ANTVIb (Fig. 1G) and 1.2–1.9 times as long as ANTIII. Other antennal ratios: ANTIII/ANTIV: 1.12–1.62, ANTIII/ANTVI: 0.46–0.63, ANTIV/ANTV: 0.8–1.2 (Figs. 1E & F), ANTIV/ANTIII: 0.62–0.89, PT/ANTIV: 1.7–2.6, PT/ANTV: 1.91–2.55. URS relatively long and blunt (Fig. 1B); first tarsal segment with 3–3–3 hairs. ANTVIb 0.68–1.03 times longer than URS. URS with 2–4 hairs (Fig. 1B) and 1.3–2.0 times longer than 2HT (Fig. 1C). Rostrum reaching hind coxa. Dorsum membranous, sclerotic with distinct irregular reticulations and small depressions; ABDT I and VII without marginal tubercles; dorsal hairs blunt and short; hairs on ABDT VIII 17–34 μ m long. SIPH cylindrical tapering slightly with a small flange, (Fig. 1D), 1.93–2.7 times longer than cauda and 0.20–0.30 times as long as BL. Cauda tongue-shaped (Fig. 1D). Other biometric data are as follows: SIPH/ANTIII: 0.69–1.0, PT/SIPH: 1.59–2.21, SIPH/URS: 1.9–3.6. Cauda with 5–7 hairs and 0.98–1.56 times URS. ABDT VIII with 4–6 hairs.

Alate viviparous females: based on Iranian population (3 individuals) and descriptions in Miller *et al.* (2007) and Heie (1994). Color in living specimens: Body green with brownish head, thorax, antennae and siphunculus, not covered with wax powder. Color in macerated specimens: ANTI–VI brown except for basal part of ANTIII which is paler. Head and thorax dark brown. Femur become darker toward apex. Wing vein brown-bordered. Abdomen membranous. SIPH and cauda dusky.

Morphological characters: Body oval, 1.18–1.76 mm; head sclerotized; antennal tubercles moderately developed. ANTI with round projection on inner side but not as pronounced as in apterae. Antenna as long as BL; antennal hairs blunt and shorter than BDANTIII. Antennal ratios: ANTIII/ANTIV: 1.06–1.23, ANTIII/ANTVI: 0.45–0.53, ANTIII/ANTV: 1.11–1.24, ANTIV/ANTIII: 0.82–0.94, PT/ANTIII: 1.66–1.95, PT/ANTVIb: 6.73–7.23, PT/ANTV: 1.87–2.39, PT/ANTV: 1.96–2.39. URS blunt, 1.34–1.53 times longer than 2HT. ANTVIb 0.77–0.88 times longer than URS. First tarsal segments with 3–3–3 hairs. Dorsum membranous; SIPH tubular, slightly wider at base. Ratios of SIPH to some particular body parts are as follows: SIPH/BL: 0.166–0.172, SIPH/Cauda: 1.93–2.08, SIPH/ANTIII: 0.71–0.73, PT/SIPH: 2.35–2.74, SIPH/URS: 2.16–2.39. Cauda tongue-shaped. There are 12–26, 4–15 and 0–5 secondary rhinaria distributed on third, fourth and fifth antennal segments, respectively.

Biology: This species is living on undersides of leaves of *Mentha* spp. It is monoecious holocyclic with alate males (Blackman & Eastop, 2023; Heie, 1994; Miller *et al.*, 2007).

Distribution: This species is found in Europe, the Middle East and North America. This is the first report of this species from Fars province.

Material examined: IRAN, Kerman province, Bardsir-Pamazar, 21 April 2006, 2316 m., on *Mentha longifolia*, ARG00495. IRAN, Kerman province, Bondar-e-Chatrood, 20 October 2006, 2299 m., on *Mentha longifolia*, ARG00501. IRAN, Kerman province, Anjerk, 18 April 2007, 2251 m., on *Mentha longifolia*, ARG00502. IRAN, Fars province, Mamasani, 6 June 2008, 1926 m., on *Mentha longifolia*, ARG00518.

Key to the apterous viviparous females of aphid species living on Lamiaceae in Iran

1. PT/ANTVIb is 0.5 or less 2
- PT/ANTVIb is more than 1 3
2. Antennae usually 4-segmented, 0.12–0.15 times body length; PT/ANTVIb less than 0.5. Eyes 3-faceted. SIPH absent. Legs very short, with fore- and mid-tarsi usually 1-segmented *Kaltenbachiella pallida*
- All viviparae are alate; PT/ANTVIb is about 0.5; Cauda knobbed; anal plate bilobed; secondary rhinaria on ANTIII transversely elongate; SIPH short, truncated cones with a single short hair attached at base *Appendiseta robiniae*
3. ABDT VIII with a backwardly-directed supracaudal process bearing a pair of hairs near apex 4
- ABDT VIII without a supracaudal process 5
4. SIPH cylindrical or tapering, not swollen *Cavariella theobaldi*
- SIPH clavate or at least slightly swollen *Cavariella aegopodii*
5. Dorsal body hairs long with thick bases and knobbed or expanded apices; longer than BDANTIII 6

- Dorsal hairs long or short without knobbed apices 8
6. URS extremely long and narrow, as long as or longer than SIPH *Cryptomyzus behboudii*
 - URS relatively short, shorter than SIPH 7
7. PT is 1.2–1.6 times ANTIII; Longest hair on ANTIII is 0.9–1.1 times BDANTIII; PT/ANTVIb is 5.9–8.8
 *Cryptomyzus ballotae*
 - PT is more than 1.6 times ANTIII; Longest hair on ANTIII is 0.5–0.8 times BDANTIII; PT/ANTVIb is 9.0–
 11.5 *Cryptomyzus korschelti*
8. SIPH strongly swollen, with maximum diameter of swollen part more than 2 times of minimum diameter of
 stem; SIPH 5.4–8.2 times cauda *Eucarazzia elegans*
 - SIPH not swollen or much less swollen, and less than 4 times cauda 9
9. ANT tubercles absent or weakly developed, not projecting beyond middle of head in dorsal view 10
 - ANT tubercles well developed 22
10. Cauda helmet-shaped, shorter than its basal width, with 4–6 hairs; Marginal tubercles either absent or present
 on ABDT I–V, but never on VII 11
 - Cauda tongue-shaped or bluntly triangular; ABDT I and VII with well-developed marginal tubercles ... 14
11. SIPH imbricated, very small, 0.03–0.08 mm; well-developed marginal tubercles present on ABDT I–V;
 spiracular apertures reniform; dark dorsal abdominal cross-bands often present *Dysaphis microsiphon*
 - SIPH smooth or sometimes lightly imbricated; marginal tubercles absent; spiracular apertures rounded .. 12
12. Dorsum without dark sclerotization; SIPH is less than 0.1 times of BL and about 2 times of Cauda or less;
 mesosternum without tubercles *Brachycaudus helichrysi*
 - Dorsum with a dark sclerotic shield 13
13. SIPH is less than 0.1 times (0.05–0.07) of BL and 1.0–1.5 times of cauda *Brachycaudus cerasicola*
 - SIPH is more than 0.1 times of BL and clearly more than 2 times of cauda *Brachycaudus persicae*
14. Dorsal abdomen with an extensive solid black sclerite centred on ABDT IV–V; cauda black like SIPH, tongue-
 shaped, rather pointed and usually bearing 4–7 hairs. (Also check: PT/ANTVIb usually 1.4–3.0, longest hair on
 ANTIII 0.3–0.8 times BDANTIII, URS usually 0.9–1.2 times 2HT) *Aphis craccivora*
 - Dorsal abdomen with or without dark markings, but without an extensive solid black sclerite. cauda pale or dark,
 but if black then usually with more than 7 hairs 15
15. Cauda paler than SIPH 16
 - Cauda dark like SIPH 17
16. On *Stachydis* (ANTIII 1.0–1.2 times PT; URS 1.2 times 2HT; The third, fourth and fifth antennal segments of
 alatae have 4–9, 0–3 and 0 secondary rhinaria, respectively) *Aphis stachydis*
 - On other plant species (The third, fourth and fifth antennal segments of alatae have 3–17, 0–8 and 0–3 secondary
 rhinaria, respectively) *Aphis frangulae* group (including *A. gossypii*, *A. nepetae*, *A. ballotae*)
17. Dorsum with pigmentation and/or dark cross-bands on ABDT VII or VIII 18
 - Dorsum without any pigmentation or bars 20
18. Dorsal abdomen with extensive dark sclerotisation on ABDT I–VI; URS 1.1–1.42 times 2HT
 *Aphis salviae*
 - Dorsal abdomen without extensive dark sclerotisation on ABDT I–VI; URS 0.85–1.69 times 2HT 19
19. Cauda black with 11–25 hairs; ABDT VII and VIII with dark cross-bands, and usually there are also dark
 dorsal markings anterior to SIPH; SIPH 0.8–1.6 times Cauda; URS 0.85–1.12 times 2HT; PT/ANTVIb (1.8–)2.1–
 3.4 (–3.8) *Aphis fabae*
 - Cauda dark with 3–7 hairs; ABDT VIII with narrow dark cross-bands, and no dark dorsal markings anterior to
 SIPH; SIPH 1.07–2.33 times Cauda; URS 1.2–1.69 times 2HT; PT/ANTVIb 1.4–2.3 *Aphis affinis*
20. Cauda usually with a midway constriction, and bearing 7–15 hairs; femur and URS are mostly dark (Also check:
 PT/ANTVIb 1.9–2.9, longest hairs on ANTIII 0.5–1.7 but usually 0.7–1.0 times BDANTIII, SIPH 0.9–1.7 times
 Cauda) *Aphis spiraeicola*
 - Cauda without a midway constriction, and bearing less than 7 hairs; femur and URS are pale 21
21. URS 1.49–2.25 times 2HT (97% of specimens more than 1.6), and 1.28–2.35 times ANTVIb
 *Aphis polii*

- URS 1.18–1.63 times 2HT (97% of specimens less than 1.6), and 1.14–1.79 times ANTVIb *Aphis teucrii*
- 22. Head spiculose, at least on ventral surface 23
- Head without spicules 29
- 23. SIPH slightly but distinctly swollen on distal half; SIPH 0.82–1.34 times ANTHIII *Myzus persicae*
- SIPH tapering or cylindrical, without any trace of swelling on distal half 24
- 24. ANTHIII usually with 1–2 small rhinaria near base; antennal tubercles are approximately parallel-sided in dorsal view, without forwardly-directed processes *Aulacorthum solani*
- ANTHIII without rhinaria; antennal tubercles are parallel-sided or slightly divergent but usually with convergent apices and/or bearing processes 25
- 25. Inner sides of antennal tubercles themselves divergent, but bearing rounded processes that project forward, shorter than their basal widths 26
- Inner sides of antennal tubercles without processes 28
- 26. Inner side of ANTI projecting forward as a round rugose protuberance *Ovatus mentharius*
- Inner side of ANTI not projecting forward as a round rugose protuberance 27
- 27. PT 1.1–2.1 times longer than ANTHIII (mostly more than 1.3), and 1.2–1.9 times longer than SIPH (mostly more than 1.4 times); URS usually with 2–3 secondary hairs; Tergum unpigmented and SIPH pale or only darker towards apices *Ovatus crataegarius*
- PT 1.0–1.5 times longer than ANTHIII (mostly less than 1.3), and 1.1–1.6 times longer than SIPH (mostly less than 1.4 times); URS usually with 3–5 secondary hairs; Tergum may be brown and SIPH dark *Ovatus insitus*
- 28. Dorsal abdomen with a conspicuous pattern of dark intersegmental markings; SIPH pale or dusky *Myzus ornatus*
- Dorsal abdomen membranous; SIPH dark *Myzus padellus*
- 29. SIPH with a subapical zone of polygonal reticulation; URS with 7–10 accessory hairs; First tarsal segments with 3 hairs *Macrosiphum euphorbiae*
- SIPH without a subapical zone of polygonal reticulation; URS with c.25–30 accessory hairs; First tarsal segments with 5 hairs *Klimaszewskia salviae*

Discussion

Aphid species associated with Lamiaceae plants in Iran all belong to the family Aphididae which is classified into three subfamilies: Aphidinae, Calaphidinae and Eriosomatinae; and into four tribes: Aphidini, Macrosiphini, Therioaphidini and Eriosomatini. The highest number of species belonged to the genus *Aphis* with 12 species and then the genera of *Brachycaudus*, *Cryptomyzus*, *Myzus* and *Ovatus* each with three species. Amongst the species, there are 10 species that are specific to plants of the family Lamiaceae including *A. affinis*, *A. ballotae*, *A. nepetae*, *A. polii*, *A. salviae*, *A. stachydis*, *A. teucrii*, *C. ballotae*, *K. salviae* and *O. mentharius* while seven species are considered as polyphagous which feed on several host plant families. According to the species identified in this research, it was found that three species are new to Fars province and two new to Kerman province (see Table 1).

The highest Lamiaceae host plants diversity belonged to the aphid species *E. elegans* with 13 host plant species. In this research by examining the specimens in the ARG collection, 33 host relationships were identified, of which six aphid-plant associations are new for Iran (see Table 1). In total, 116 aphid-plant associations were recognized for aphids of Lamiaceae plants in Iran.

Amongst the aphid species reported in this paper, 12 species have world-wide distribution however, two species of *B. cerasicola* (Central Asia and Iran) and *C. bebboudii* (Iran and Turkey) have restricted distribution in the region. Almost all the other species have distribution mainly in the Palearctic. *Appendiseta robiniae* is a species of North America origin but it has introduced to the other regions such as Europe and the Middle East as an invasive species.

The absence of a sufficient number of distinct diagnostic characters poses a significant challenge in the identification of species within the genus *Aphis*. Therefore, employing molecular markers, conducting morphometric analyses, and making ecological observations becomes imperative for accurately identifying species and resolving taxonomic ambiguities, particularly within species-groups exhibiting similar host range patterns.

According to the specific climatic conditions of Iran and its rich flora and indigenous geographic characteristics, it is expected that by increasing and repeating the sampling in the future researches, new species will be reported for the aphid fauna of Iran and the world. Considering the richness of aphid fauna and their importance as an important group of pests of crops and pasture plants, the present research can be a basis for future researches in the field of taxonomy, systematics, and ecology of this group of insects.

Acknowledgments

We would like to thank Miss Zahra Mehrparvar and Mr. Mahdi Iranmanesh for their valuable help in this study.

Funding

This research has been supported by the Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran under grant number of 01/682.

REFERENCES

- Abaii, M.** (1984) List of Pests of Forest Trees & Shrubs of Iran. Plant Pests and Diseases Research Institute, Ministry of Agriculture.
- Alikhani, M., Rezwani, A., Rakhshani, E. & Madani, S. M. J.** (2010) Survey of aphids (Hem., Aphidoidea) and their host plants in central parts of Iran. *Journal of Entomological Research*, 2, 7–16.
- Barjadze, S., Blackman, R. L. & Özdemir, I.** (2015) A new species of *Aphis* Linnaeus (Hemiptera, Aphididae) living on *Teucrium polium* L. (Lamiaceae). *Zootaxa*, 4057, 248–256.
- Blackman, R. L.** (2010) Aphids - Aphidinae (Macrosiphini). Field Studies Council. United Kingdom.
- Blackman, R. L. & Eastop, V. F.** (2000) Aphids on the world's crops (An identification and information guide), Second edition. John Wiley & Sons.
- Blackman, R. L. & Eastop, V. F.** (2006) Aphids on the world's herbaceous plants and shrubs. John Wiley & Sons.
- Blackman, R. L. & Eastop, V. F.** (2023) Aphids on the World's Plants: An online identification and information guide. Retrieved 2023.01.02 from <http://www.aphidsonworldsplants.info/>
- Börner, C.** (1950) Neue europäische Blattlausarten. Self-published, Naumberg (Saale).
- Börner, C.** (1952) Europae centralis Aphides. Die Blattläuse Mitteleuropas. Namen, Synonyme, Wirtspflanzen, Generationszyklen. Knabe.
- Entezari, E., Namaghi, H. S. & Moravvej, G.** (2016) First report of the aphid, *Appendiseta robiniae* (Gillette, 1907) (Hemiptera: Aphidoidea), from Iran. *Journal of Entomological Society of Iran*, 36, 233–234. [in Persian].
- Farahpour-Haghani, A., Jalaeian, M. & Mehrparvar, M.** (2015) First report of *Rhopalosiphum nymphaeae* (L.) (Hem.: Aphididae) on *Azolla filiculoides* from Iran and its male formation on secondary host plant. *Journal of Crop Protection*, 4(4), 557–561.
- Ghahramani Nezhad, S., Shayan Mehr, M. & Tohidi, M. T.** (2012) Faunestic study of Aphids (Hem., Sternorrhyncha; Aphidae) in Kermanshah region. *Journal of Entomological Research*, 4, 141–153. [in Persian with English abstract].
- Harley, R. M., Atkins, S., Budantsev, A. L., Cantino, P. D., Conn, B. J., Grayer, R., Harley, M. M., de Kok, R., Krestovskaja, T., Morales, R., Paton, A. J., Ryding, O. & Upson, T.** (2004) Labiatae. In **J. W. Kadereit** (Ed.), *Flowering Plants · Dicotyledons: Lamiales (except Acanthaceae including Avicenniaceae)* (pp. 167–275). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-18617-2_11
- Heie, O. E.** (1986) *The Aphidoidea (Hemiptera) of Fennoscandia and Denmark, Volume III. Family Aphididae: Subfamily Pterocommatinae and Tribe Aphidini of Subfamily Aphidinae.* E. J. Brill/Scandinavian Science Press.
- Heie, O. E.** (1992) *The Aphidoidea (Hemiptera) of Fennoscandia and Denmark, Volume IV. Family Aphididae: Part 1 of Tribe Macrosiphini of Subfamily Aphidinae.* E. J. Brill/Scandinavian Science Press.
- Heie, O. E.** (1994) *The Aphidoidea (Hemiptera) of Fennoscandia and Denmark, Volume V. Family Aphididae: Part 2 of Tribe Macrosiphini of Subfamily Aphidinae.* E. J. Brill/Scandinavian Science Press.
- Heie, O. E.** (1995) *The Aphidoidea (Hemiptera) of Fennoscandia and Denmark, Volume VI. Family Aphididae: Part 3 of Tribe Macrosiphini of Subfamily Aphidinae, and family Lachnidae.* E. J. Brill/Scandinavian Science Press.
- Hille Ris Lambers, D.** (1947) On some mainly western European aphids. *Zoologische Mededeelingen*, 28, 291–333.

- Hodjat, S. H. (1993). *A list of aphids and their host plants in Iran* (G. Lampel, Ed.). Shahid-Chamran University Printing & Publication Center.
- Hodjat, S. H. & Eastop, V. F. (1982) *Aphis citricola* van der Goot, a new aphid pest of citrus in Iran. *Entomologie et Phytopathologie Appliquées*, 50, 57–66. [in Persian].
- Hodjat, S. H., & Rezwani, A. (1987) The biology and keys to the species of *Myzus* in Iran. *The Scientific Journal of Agriculture*, 12, 54–61. [in Persian].
- Holman, J. (2009) *Host plant catalogue of aphids: Palaearctic region*. Springer.
- Ilharco, F. A. (1987) *Aphis affinis* and *Aphis pulegii*, two Del Guercio's species from *Mentha* (Homoptera, Aphidoidea). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri*, 44, 181–190.
- Jamzad, Z. (2013) A survey of Lamiaceae in the flora of Iran. *Rostaniba*, 14(1), 59–67. <https://doi.org/10.22092/botany.2013.101317>
- Kadyrbekov, R. K. (2008) A new species of *Ovatus* van der Goot, 1914 genus (Homoptera, Aphididae) from Kazakhstan. *Tethys Entomological Research*, 16, 13–14.
- Kanturski, M. & Stekolshchikov, A. V. (2018) *Rhinariaphis* – A remarkable new aphid genus from Afghanistan (Hemiptera: Aphididae: Aphidinae). *Zoologischer Anzeiger*, 277, 75–84.
- Mehrparvar, M. (2023) Preservation & Mounting Aphids. Retrieved 2023.12.05 from <http://aphidology.com/mounting-aphids/>
- Mehrparvar, M., Madjzadeh, S. M. & Mahdavi Arab, N. (2007) A survey of aphid fauna on plant family Lamiaceae in Northern half of Kerman province and a new record, *Ovatus mentharius* (Hom.: Aphididae) for Iran. The 2nd National Conference of Animal Science, Rasht, Iran.
- Mehrparvar, M., Madjzadeh, S. M., Mahdavi Arab, N., Esmailbeygi, M. & Ebrahimpour, E. (2012) Morphometric discrimination of Black Legume Aphid, *Aphis craccivora* Koch (Hemiptera: Aphididae), populations associated with different host plants. *North-Western Journal of Zoology*, 8(1), 172–180.
- Mehrparvar, M., Rakhshani, E. & Rokni, M. (2021) A Survey of Aphid (Hemiptera: Aphididae) Fauna in Southern Parts of Zagros Mountains and a New Record for Aphid Fauna of Iran. *Journal of Taxonomy and Biosystematics*, 13(2), 49–86 [in Persian with English Abstract].
- Mehrparvar, M., Rakhshani, E. & Rokni, M. (2022) A survey of aphid fauna and their parasitoids in southern parts of Zagros Mountains with emphasis on determination of potential competent parasitoids for biological control [Final Report of Joint Research Project].
- Mehrparvar, M., Rezwani, A. & Naseri, F. (2008) Investigation of biodiversity and geographical distribution of aphid species of rangelands and wild plants in the North of Kerman Province [Final Report of Research Project].
- Miller, G. L., Halbert, S. E. & Foottit, R. G. (2007) A taxonomic reevaluation of *Ovatus mentharius* (van der Goot) (Hemiptera: Aphididae). *Proceedings of the Entomological Society of Washington*, 109(3), 522–529.
- Mokhtari, A., Nozari, J., Rezwani, A., Rasolian, G., Petrović-Obradović, O. & Rakhshani, E. (2012) Aphids (Hemiptera: Aphididae) associated with grasslands of central Alborz, Iran. *Acta Entomologica Serbica*, 17, 1–22.
- Momeni Shahraki, F., Minaei, K. & Barjadze, S. (2019) Checklist of Iranian Aphids (Hemiptera: Stenorrhyncha: Aphidomorpha). *Journal of Insect Biodiversity and Systematics*, 5(4), 269–300.
- Mosapour, S., Madjzadeh, S. M. & Mehrparvar, M. (2019) Aphids living on *Stipa* (Poaceae) in Iran: *Chaetosiphella longirostris* Wieczorek, 2008 (Hemiptera: Aphididae: Chaitophorinae) as a new record. *Journal of Crop Protection*, 8(1), 123–129. <http://journals.modares.ac.ir/article-3-22673-en.html>
- Mousapour, S. (2016) Faunistic survey of aphids and their parasitoid wasps in Sirjan city and study of effects of different canola varieties on mustard aphid, *Lipaphis erysimi* (Hem.: Aphididae) and parasitoid wasp, *Diaeretiella rapae* (Hymenoptera: Aphidiinae) Shahid Bahonar University of Kerman. Kerman, Iran.
- Naumann-Etienne, K. & Remaudière, G. (1995) A commented preliminary checklist of the aphids (Homoptera: Aphididae) of Pakistan and their host plants. *Parasitica*, 51, 3–61.
- Ortego, J., Difabio, M. E. & Mier Durante, M. P. (2004) Nuevos registros y actualización de la lista faunística de los pulgones (Hemiptera: Aphididae) de la Argentina. *Revista de la Sociedad Entomológica Argentina*, 63(1-2), 19–30.
- Remaudière, G. & Davatchi, A. (1961) Un *Cryptomyzus* (Hom. Aphidoidea) nouveau de l'Iran. *Revue de Pathologie Végétale et d'Entomologie Agricole de France*, 40, 3–11.
- Remaudière, G. & Remaudière, M. (1997) Catalogue of the world's Aphididae, Homoptera, Aphidoidea. INRA.
- Rezwani, A. (1987) The Aphidoidea of Tehran Province. *Applied Entomology and Phytopathology*, 54, 73–87.

- Rezwani, A.** (1990) Key to the apterae viviparae females of the known *Dysaphis* species of Iran. *Applied Entomology and Phytopathology*, 57, 53–70. [in Persian].
- Rezwani, A.** (2004) Aphids on Trees & Shrubs in Iran. Plant Pests & Diseases Research Institute.
- Rezwani, A.** (2010) Aphids (Hemiptera: Aphidoidea) of herbaceous plants in Iran. Entomological Society of Iran [in Persian].
- Rezwani, A. & Parvizi, R.** (1990) The list of aphids of Western Azarbyegan (Homoptera: Aphididae). *Journal of the Entomological Society of Iran*, 10, 23–35.
- Rezwani, A., Termeh, F. & Moussavi, M.** (1994) Aphids of Iran and their host plants. Agricultural Research, Education and Extension Organization.
- Richards, W. R.** (1965) The Callaphidini of Canada (Homoptera: Aphididae). The Memoirs of the Entomological Society of Canada, 97(S44), 5-149. <https://doi.org/10.4039/entm9744fv>
- Samii, M. A.** (1992) Morphology and identification of Aphis spp. in cooler regions of Southern Isfahan. Shahid Chamran University. Ahwaz, Iran. [in Persian].
- Sedighi, N.** (2019) Species diversity of aphids, their parasitoids and mutualistic ants on crop and herbaceous plants in North Khorasan province. Ferdowsi University of Mashhad. Mashhad, Iran.
- Sedighi, N., Hosseini, M. & Mehrparvar, M.** (2018) Additional notes with detailed biometric data on *Brachycaudus cerasicola* (Mordvilko, 1929) (Hemiptera: Aphididae), a new record for Iran. *Journal of Insect Biodiversity and Systematics*, 4(4), 241-251.
- van Emden, H. F. & Harrington, R.** (Eds.). (2007) Aphids as Crop Pests. CABI.
- Wieczorek, K. & Chłond, D.** (2019) Description of the previously unknown sexual morphs of *Eucarazzia elegans* from Iran and Pakistan and the northernmost record of viviparous generation from Europe. *Bulletin of Insectology*, 72, 177–186.

شته‌های مرتبط با گیاهان تیره نعنائیان در ایران به همراه توصیف مجدد گونه *Ovatus mentharius* (van der Goot, 1913) (Hemiptera: Aphididae)

محسن مهرپرور^۱، سید مظفر منصوری^۱ و لیلا ملک‌پورزاده^۲

۱- دانشگاه تحصیلات تکمیلی صنعتی و فناوری پیشرفته، پژوهشگاه علوم و تکنولوژی پیشرفته و علوم محیطی، گروه تنوع زیستی، کرمان، ایران

✉ mehrparvar@aphidology.com

<https://orcid.org/0000-0002-6051-5845>

✉ m.mansouri.89@gmail.com

<https://orcid.org/0000-0002-9109-2566>

۲- دانشگاه تحصیلات تکمیلی صنعتی و فناوری پیشرفته، پژوهشگاه علوم و تکنولوژی پیشرفته و علوم محیطی، گروه اکولوژی، کرمان، ایران

✉ malekpour.leila@yahoo.com

<https://orcid.org/0000-0002-2374-9255>

تاریخچه مقاله

دریافت: ۱۴۰۲/۱۱/۰۱ | پذیرش: ۱۴۰۲/۱۲/۲۱ | دبیر تخصصی: مهدی اسفندیاری

چکیده

تاکنون ۳۳ گونه شته روی گیاهان تیره نعنائیان در ایران گزارش شده است. در این پژوهش تعداد ۱۹ گونه شته متعلق به ۱۲ جنس روی ۲۰ گونه گیاه میزبان جمع‌آوری شد. علاوه بر این، ۳۳ ارتباط بین گونه‌های شته و گیاهان میزبان شناسایی شد که ۶ مورد آن برای ایران جدید است. در میان نمونه‌های مورد بررسی، یک گونه از جنس *Ovatus* از روی گیاه *Mentha longifolia* جمع‌آوری شده که طیف کاملی از داده‌های بیومتریکی مابین دو گونه *O. mentharius* (van der Goot, 1913) و *O. archangelskajae* (Kadyrbekov, 2008) را نشان می‌داد. با توجه به داده‌های بیومتریکی نمونه‌های ایران، نتیجه گرفته شد که *O. archangelskajae* واریانت جغرافیایی *O. mentharius* است، بنابراین آن را نام مترادف *O. mentharius* در نظر گرفتیم و این گونه را توصیف مجدد نمودیم. در این مقاله پراکنش گونه‌های شته مرتبط با تیره نعنائیان در نقاط مختلف ایران ارائه شده و شش مورد جدید نیز برای استان‌های فارس و کرمان گزارش شده است. کلید شناسایی شته‌های ماده بکرزا بی بال مربوط به گیاهان تیره نعنائیان در ایران نیز ارائه شده است.

کلمات کلیدی: فون، رده بندی، نام مترادف، پراکنش، شناسایی

نویسنده مسئول: محسن مهرپرور (پست الکترونیک: mehrparvar@kgut.ac.ir ; mehrparvar@aphidology.com)

Citation: Mehrparvar, M., Mansouri, S. M. & Malekpourzadeh, L. (2024) Aphids associated with Lamiaceae in Iran with redescription of *Ovatus mentharius* (van der Goot, 1913) (Hemiptera: Aphididae). *J. Entomol. Soc. Iran*, 44 (2), 217-238. <https://doi.org/10.61186/jesi.44.2.10>