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Aphids living on Asteraceae plants in North Khorasan, Iran: report of three aphid species new to fauna of Iran

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ABSTRACT. During 2015–2017, 28 aphid species belonging to 12 genera were collected and identified on Asteraceae plants in North Khorasan province, Iran. Among these, three aphid species including *Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974, *Macrosiphoniella szalaymarzsoi* Szelegiewicz, 1978 and *Protaphis iliensis* Kadyrbekov, 2001 (Hemiptera: Aphididae) are new for aphid fauna of Iran. Brief redescrptions of Iranian populations of these three species are given and compared to the original descriptions.

Key words: Aphididae, Compositae, Hemiptera, Iran, new record

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Introduction

The family Asteraceae or Compositae (Known as the aster, daisy or sunflower family) is one of the largest plant families in the world (Funk et al., 2009). The family is distributed widely from the Polar regions to the tropics, colonizing all available habitats but most common in the arid and semiarid regions of subtropical and lower temperate (Judd et al., 1999). Most members of Asteraceae are herbaceous, subshrubs or shrubs and rarely trees (Funk et al., 2005; Roque & Bautista, 2008). This family is economically important since the members are used for food, medicinal purposes, grazing for stock or ornamentals, while some are troublesome weeds or poisonous to animals (Herman, 2000). The Asteraceae family includes more than 1,600 genera and over 25,000 species (Petacci et al., 2012) belonging to 17 tribes and three subfamilies (Sobrinho et al., 2017). The family Asteraceae in Iran comprises 480 plant species belonging to 143 genera (Asadi, 2015). Most plant species in this family were found to be attacked by aphids (Hemiptera: Aphididae) in Iran (Hodjat, 2005; Mehrparvar, 2017).

Considering aphid fauna of the Middle East, it is revealed that about 500 species are recorded from Turkey (Şenol et al., 2014), more than 540 species from Iran (Mehrparvar & Rezwani, 2007; Barjadze et al., 2010; Goodarzifar et al., 2016; Mehrparvar, 2016, 2017;

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Kanturski & Barjadze, 2018; Sedighi et al., 2018; Momeni Shahraki et al., 2019; Sedighi et al., 2020), 300 from Pakistan (Naumann-Etienne & Remaudière, 1995), 167 from Lebanon and Syria (Remaudière & Talhouk, 1999). Despite the fact that the aphid fauna has been investigated in the above-mentioned regions, there is a strong probability of finding additional new records and even new species, because of the high level of endemism of vascular plants in the Middle East and the Caucasus (Özdemir & Barjadze, 2015).

North Khorasan province is located in the northeast of Iran. Natural ecosystems in Northern Khorasan cover around 2,033,036 ha which include 434,540 ha of forest and woodlands, 1,414,850 ha of rangelands, and 183,636 ha of desert and bare lands (Natural Resources and Watershed Administration of Northern Khorasan province, 2019). In North Khorasan province, unique ecological and climatic conditions and very diverse and valuable vegetation reserves make it a remarkable habitat for the faunistic studies. As far as we know there is little information on aphid fauna of North Khorasan province (Heidarnia & Derakhshan Shadmehri, 2018). So, the aim of this study was to investigate the aphid fauna living on Asteraceae plants in North Khorasan province, Iran.

Material and methods

The sampling regions were Asadli, Pelmis, Bojnourd, Mane and Samalghan, Raz and Jargalan and Esfarayen located in North-Khorasan province, Iran. North Khorasan province, with the area of about 2843400 ha, is located in the northeast of Iran, between 55°53' to 58°20' Eastern longitude and 36°37' to 38°17' North latitude. The province is a mountainous-plain area, and its elevation ranges from 400 to 3041 m a.s.l. (Jafari et al., 2015). According to the De Martonne Aridity Index, only arid and semiarid climates can be recognized in this province (Meteorological Administration of Northern Khorasan Province, 2019). Annual mean temperature is 13.3°C considering the maximum and minimum temperatures as 24.7°C and 1.5°C, respectively. The annual mean precipitation varies from 124.4 mm in lowlands to 468.5 mm in high altitude (Jafari et al., 2015).

During May until June in 2015–2017, aphid specimens and their attending ant species (if any) were collected by a paintbrush on their host plants and transferred into tubes containing 70% ethanol. Sampling data such as host plant name, feeding location on the host plant, colour of alive 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. To prepare microscopic slides of aphids for identification, adult aphid specimens were cleared and mounted using Canada balsam on microscopic slides by techniques described by late F. A. Ilharco (Personal communication of third author- unpublished) and identified using related resources (Blackman & Eastop, 2019). 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.

Abbreviations used in the text are as follows: BL: Body length, ANT: antenna length; ANTI, ANTII, ANTI, ANTV, and ANTVIb: antennal segments I, II, III, IV, V, and the base of antennal segment VI, respectively; B.D. ANTI: basal diameter of antennal segment III; PT: processus terminalis; URS: ultimate rostral segment; ABDIII: abdominal tergite III; HFemur: hind femur; HTibia: hind tibia; 2HT: second segment of hind tarsus; SIPH: siphunculus; M.D. SIPH: median diameter of siphunculus; B.D. SIPH: basal diameter of siphunculus; B.D. cauda: basal diameter of cauda; Rhin.: rhinaria.

Results

During this study, 28 aphid species belonging to 12 genera on 34 plant species were collected and identified in different regions of North Khorasan, Iran (Table 1). Among these aphids, three species, i.e. *Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974 (collected on *Artemisia sieberi* and *A. herba-alba*), *M. szalaymarzsoi* Szelegiewicz, 1978 (on *A. difusa* and *Artemisia* sp.) and *Protaphis iliensis* Kadyrbekov, 2001 (on *Acroptilon repens*), are reported here as new records for aphid fauna of Iran.

Table 1. Aphid species living on Asteraceae plants in North Khorasan, Iran. New records for fauna of Iran are marked by “*”.

Aphid species	Host Plant	Location
<i>Acyrtosiphon pisum</i>	<i>Cousinia</i> sp.	Raz and Jargalan
<i>Acyrtosiphon</i> sp.	<i>Acroptilon repens</i>	Bojnord
	<i>Cousinia</i> sp.	Asadli
		Raz and Jargalan
	<i>Tragopogon graminifolius</i>	Asadli
	<i>Achillea wilhelmsii</i>	Esfarayen
	<i>Artemisia herba-alba</i>	Raz and Jargalan
<i>Aphis craccivora</i>	<i>Artemisia kopetdaghensis</i>	Esfarayen
	<i>Centaurea iberica</i>	Sisab
	<i>Chondrilla juncea</i>	Maneh and Samalghan
	<i>Gundelia</i> sp.	Esfarayen
	<i>Lactuca</i> sp.	Esfarayen
	<i>Artemisia</i> sp.	Raz and Jargalan
<i>Aphis fabae</i>	<i>Centaurea iberica</i>	Asadli
	<i>Cirsium</i> sp.	Bojnord
<i>Aphis solanella</i>	<i>Carduus onopordioides</i>	Raz and Jargalan
		Sisab
	<i>Carduus</i> sp.	Raz and Jargalan
		Sisab
	<i>Carthamus lanatus</i>	Asadli
	<i>Centaurea iberica</i>	Maneh and Samalghan
	<i>Centaurea</i> sp.	Bojnord
		Maneh and Samalghan
<i>Brachycaudus cardui</i>		Asadli
	<i>Cirsium arvense</i>	Bojnord
	<i>Gundelia tourenfortii</i>	Sisab
	<i>Onopordum acanthium</i>	Raz and Jargalan
	<i>Onopordum leptolepis</i>	Asadli
		Bojnord
		Sisab
	Maneh and Samalghan	

Table 1. Continued.

Aphid species	Host Plant	Location
<i>Brachycaudus tragopogonis</i>	<i>Tragopogon graminifolius</i>	Asadli
		Bojnord
	<i>Tragopogon</i> sp.	Asadli
<i>Cavariella</i> sp.	<i>Artemisia</i> sp.	Asadli
<i>Coloradoa</i> sp.	<i>Artemisia herba-alba</i>	Raz and Jargalan
<i>Dysaphis cousiniae</i>	<i>Cousinia</i> sp.	Asadli
<i>Hyperomyzus lactucae</i>	<i>Sonchus oleraceus</i>	Bojnord
		Esfarayan
	<i>Artemisia herba-alba</i>	Asadli
<i>Macrosiphoniella frigidivora</i> *		Raz and Jargalan
	<i>Artemisia sieberi</i>	Bojnord
		Raz and Jargalan
	<i>Artemisia turcomanica</i>	Sisab
<i>Macrosiphoniella seriphidii</i>	<i>Artemisia</i> sp.	Raz and Jargalan
	<i>Artemisia kopetdaghensis</i>	Sisab
	<i>Artemisia absinthium</i>	Bojnord
	<i>Artemisia deserti</i>	Bojnord
	<i>Artemisia herba-alba</i>	Raz and Jargalan
	<i>Artemisia kopetdaghensis</i>	Sisab
<i>Macrosiphoniella</i> sp.	<i>Artemisia sieberi</i>	Raz and Jargalan
	<i>Artemisia</i> sp.	Esfarayan
		Sisab
	<i>Artemisia turcomanica</i>	Sisab
	<i>Artemisia vulgaris</i>	Esfarayan
		Sisab
	<i>Carthamus lanatus</i>	Asadli
<i>Macrosiphoniella staegeri</i>		Esfarayan
	<i>Centaurea depressa</i>	Raz and Jargalan
	<i>Centaurea</i> sp.	Raz and Jargalan
<i>Macrosiphoniella szalaymarzsoi</i> *	<i>Centaurea virgata</i>	Asadli
	<i>Artemisia difusa</i>	Maneh and Samalghan
	<i>Artemisia</i> sp.	Esfarayan
		Raz and Jargalan
<i>Macrosiphoniella tuberculata</i>	<i>Cousinia</i> sp.	Esfarayan
	<i>Artemisia kopetdaghensis</i>	Sisab
<i>Obtusicauda iranica</i>	<i>Artemisia sieberi</i>	Asadli
	<i>Artemisia scoparia</i>	Sisab
<i>Protaphis iliensis</i> *	<i>Acroptilon repens</i>	Esfarayan

Table 1. Continued.

Aphid species	Host Plant	Location
<i>Protaphis</i> sp.	<i>Artemisia sieberi</i>	Bojnord
	<i>Gundelia</i> sp.	Asadli
	<i>Gundelia tourenfortii</i>	Maneh and Samalghan Esfarayen
<i>Protaphis terricola</i>	<i>Onopordum leptolepis</i>	Sisab
<i>Uroleucon acroptilidis</i>	<i>Acroptilon repens</i>	Esfarayen Raz and Jargalan Sisab
	<i>Carthamus lanatus</i>	Asadli Sisab
		Maneh and Samalghan
<i>Uroleucon chondrillae</i>	<i>Chondrilla juncea</i>	Esfarayen
<i>Uroleucon jaceae</i>	<i>Centaurea iberica</i>	Maneh and Samalghan
<i>Uroleucon sonchi</i>	<i>Sonchus oleraceus</i>	Bojnord Esfarayen Asadli
	<i>Centaurea depressa</i>	Sisab
	<i>Carthamus lanatus</i>	Sisab
<i>Uroleucon</i> sp.	<i>Cnicus benedictus</i>	Maneh and Samalghan
	<i>Echinops orientalis</i>	Bojnord
	<i>Lactuca scoriola</i>	Asadli
	<i>Lactuca</i> sp.	Esfarayen
	<i>Sonchus oleraceus</i>	Asadli
	<i>Xerobion</i> sp.	<i>Artemisia difusa</i>
<i>Artemisia kopetdaghensis</i>		Asadli Esfarayen Sisab
<i>Artemisia</i> sp.		Sisab Sisab

***Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974**

(Aphididae: Aphidinae: Macrosiphini)

Materials examined: ARG00216, Iran, North-Khorasan province, Raz and Jargalan, 38°1'28.705" N, 57°0'44.914" E, 1481 m. a.s.l., *Artemisia sieberi* (Asteraceae), 02.X.2015; leg.: N. Sedighi. ARG00217, Iran, North-Khorasan province, Raz and Jargalan, 38°1'31.625" N, 57°0'53.569" E, 1345 m. a.s.l., *Artemisia herba-alba* (Asteraceae), 21.X.2016; leg.: N. Sedighi.

Apterous viviparous females (n=16) (Figs. 1 & 2) (Table 2)

Body color in living specimens green, dusted with fine gray wax powder with blackish antenna, legs, SIPH and cauda (Fig. 1). In cleared specimens body almost colorless, head brown, ANT III-VI monotonically brown and ANTI and ANTII darker than other segments. SIPH dark brown, cauda paler. Legs dark brown except for narrow zones at the bases of the femora which nearly colorless and middle of tibia paler (Fig. 2).

Body spindle-shaped. Dorsum mostly membranous, dorsal hairs stout and blunt, head smooth, antennal tubercles developed moderately. URS stiletto-shaped. SIPH cylindrical, moderately tapering, without distinct basal constriction. Cauda elongate and acuminate at apex. First tarsal segments with 3:3:3 hairs. Biometric data are given in Table 2 and compared to the original description by Holman & Szelegiewicz (1974).

Biology: Collected on terminal parts of the shoots of *A. turcomanica*, *A. herba-alba* and *A. siberi*. Colonies are not visited by ants. Life cycle probably is holocyclic and monoecious like other species of this genus (Holman & Szelegiewicz, 1974). Sexual morphs are unknown.

Distribution: Mongolia (Holman & Szelegiewicz, 1974).

Table 2. Biometric data of apterous viviparous females of *Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974. The data of specimens collected in Iran are compared to the original description by Holman & Szelegiewicz (1974).

Characters	Apterous viviparous females (Iranian population) <i>n</i> =16	Apterous viviparous females (Original Description) <i>n</i> =75
BL	1.80–2.80	1.60–2.20
ANTIII	0.45–0.79	0.38–0.55
ANTIV	0.37–0.67	0.28–0.50
ANTV	0.35–0.56	0.26–0.43
ANTVIb	0.17–0.26	0.13–0.19
PT	0.38–0.61	0.42–0.55
URS	0.14–0.20	0.14–0.18
2HT	0.14–0.19	0.13–0.17
SIPH	0.29–0.49	0.24–0.37
Cauda	0.25–0.50	0.28–0.41
Hind Femur	0.62–1.03	–
Hind tibia	1.12–1.87	–
URS Hair	6	5–6
Cauda Hair	14–22	12–18
Rhin. on ANTIII	1–5	4–15
SIPH reticulation area %	26–40	45–60
ANTIII/ANTIV	1.03–1.43	0.60–0.98
PT/ANTVIb	2.10–2.90	2.50–4.00
URS/2HT	0.96–1.17	1.00–1.15
PT/URS	2.50–3.42	2.50–4.00
PT/ANTIII	0.74–0.89	0.71–1.11
SIPH/ANTIII	0.52–0.70	0.55–0.80
URS/ANTVIb	0.70–0.92	–
SIPH/Cauda	0.83–1.19	0.80–1.05
SIPH/BL	0.13–0.18	0.13–0.19
Hind femur/BL	0.28–0.39	0.27–0.40
Hind tibia/BL	0.57–0.70	0.50–0.72



Figure 1. *Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974 colonies on terminal parts of the shoots of their host plants, *Artemisia* spp.



Figure 2. Habitus of apterous viviparous female of *Macrosiphoniella frigidivora* Holman & Szelegiewicz, 1974.

Macrosiphoniella szalaymarzsoi Szelegiewicz, 1978

(Aphididae: Aphidinae: Macrosiphini)

Materials examined: ARG00218, Iran, North-Khorasan province, Maneh and Samalghan, 37°37'46.797" N, 56°59'27.361" E, 706 m. a.s.l., *Artemisia difusa* (Asteraceae) 06.XI.2015; leg.: N. Sedighi. ARG00219, Iran, North-Khorasan province, Raz and Jargalan, 37°54'23.452" N, 56°55'47.165" E, 1216 m. a.s.l., *Artemisia* sp. (Asteraceae), 21.IV.2016; leg.: N. Sedighi. ARG00198, Iran, North-Khorasan province, Raz and Jargalan, 37°52'13.422" N, 56°55'48.145" E, 1216 m. a.s.l., *Artemisia* sp. (Asteraceae), 21.IV.2016; leg.: N. Sedighi. ARG00220, Iran, North-Khorasan province, Esfarayen, 36°48'26.081" N, 57°34'30.43" E, 1097 m. a.s.l., *Artemisia* sp. (Asteraceae), 22.IV.2016; leg.: N. Sedighi.

Apterous viviparous females (n=15) (Fig. 3) (Table 3)

Colour when alive, green powdered with fine gray wax, ANT, legs and SIPH dark. When cleared, body almost colourless, head, including clypeus pale brown and darker than body. Antenna brown, basal section of ANT III paler. SIPH and cauda brown. Tibia and coxa pale brown (Fig. 3). Body spindle shaped, URS stiletto-shaped, SIPH tapering, without distinct basal constriction. Cauda elongate, constricted at basal third. First tarsal segment with 3: 3 hairs. Biometric data are given in Table 3 and compared to the original description by Szelegiewicz (1978).

Biology: Collected on terminal shoots of *Artemisia* sp. Not attended by ants. Life cycle presumably is holocyclic and monoecious as the other species of the genus (Szelegiewicz, 1978). Sexual morphs are unknown.

Distribution: Hungary (Szelegiewicz, 1978) and Kazakhstan (Kadyrbekov, 2004).



Figure 3. Habitus of apterous viviparous female of *Macrosiphoniella szalaymarzsoi* Szelegiewicz, 1978.

Table 3. Biometric data of apterous viviparous females of *Macrosiphoniella szalaymarzsoi* Szelegiewicz, 1978 (Hemiptera: Aphididae). The data of specimens collected in Iran are compared to the original description by Szelegiewicz (1978).

Characters	Apterous viviparous females (Iranian population) <i>n</i> =15	Apterous viviparous females (Original Description) <i>n</i> =8
BL	1.98–2.66	2.3– 2.5
ANT	0.85	–
ANTIII	0.44–0.69	–
ANTIV	0.36–0.53	–
ANTV	0.36–0.51	–
ANTVIb	0.14–0.24	–
PT	0.38–0.63	–
URS	0.13–0.20	0.172–0.192
2HT	0.13–0.16	0.172–0.180
SIPH	0.31–0.45	–
SIPH Width	0.07–0.10	–
M. D. SIPH	0.04–0.07	–
Cauda	0.33–0.47	–
Hind Femur	0.64–0.88	–
Hind tibia	1.12–1.55	–
Cauda hair	10–22	12–15
Rhin. on ANTIII	1–8	8–16
SIPH reticulation area %	19–56	50–85
ANTIII/ANTIV	1.05–1.35	–
PT/ANTVIb	1.95–3.56	2.6–3.1
URS/2HT	0.93–1.28	1.1–1.3
URS Hair	6	6
SIPH/ANTIII	0.60– 0.80	0.68– 0.92
SIPH/Cauda	0.92–1.18	1.18–1.4
SIPH/BL	0.14–0.21	0.14–0.19

Protaphis iliensis Kadyrbekov, 2001

(Aphididae: Aphidinae: Aphidini)

Materials examined: ARG00197, Iran, North-Khorasan province, Esfarayen, 36°53'19.396" N, 57°32'44.919" E, 1172 m. a.s.l., *Acroptilon repens* (Asteraceae), 30.IV.2017; leg.: N. Sedighi.

Apterous viviparous females (n=4) (Figs. 4 & 5) (Table 4)

Body color in living specimens dark green with grey wax (Fig. 4). In slide-mounted specimens, body nearly colourless with dark dorsal sclerotisation, head, SIPH, URS, cauda

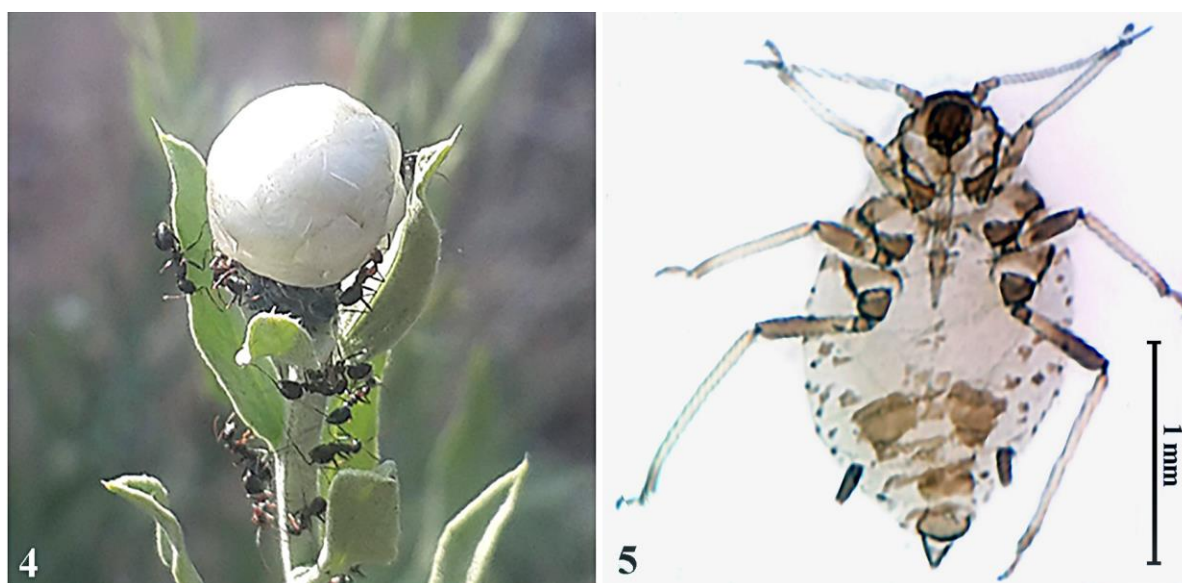
and coxa brown. Femora also brown except the bases. Cauda seems to be paler than SIPH, tibiae mainly colourless but distal parts brown. Antennae monotonically colourless however, ANT I, II, V and VI are darker. Two dark sclerites present on ABD tergites V and VI (Fig. 5). Body broad oval. ANT shorter than body. Clypeus normal, SIPH short. Cauda helmet-shaped. Biometric data are given in Table 4 and compared to the original description by Kadyrbekov (2001).

Biology: In general, *P. iliensis* lives on stems and flowers of *Acroptilon repens* (Asteraceae), attended by ants, *Acantholepis* sp. (Formicidae) (Fig. 4). Life cycle and sexual morphs unknown.

Distribution: Kazakhstan (Kadyrbekov, 2001).

Table 4. Biometric data of apterous viviparous females of *Protaphis iliensis* Kadyrbekov, 2001 (Hemiptera: Aphididae). The data of specimens collected in Iran are compared to the original description by Kadyrbekov (2001).

Characters	apterous viviparous females (Iranian population) <i>n</i> =4	apterous viviparous females (Original Description) <i>n</i> =8
BL	2.19–2.35	1.65–1.85
ANTIII	0.26–0.27	–
ANTVIb	0.12–0.13	–
PT	0.08–0.09	–
URS	0.15–0.16	–
2HT	0.11–0.12	–
SIPH	0.15–0.16	–
Cauda	0.13–0.15	–
Rhin. on ANTIII	0–4	0–2
URS Hair	2–3	2
Cauda Hair	18–23	20–22
ANTIII/ANTVI	1.18–1.35	1.2–1.35
ANTIII/PT	2.89–3.38	2.7–3.3 (3.8)
PT/ANTVIb	0.67–0.75	0.55–0.75
URS/2HT	1.25–1.42	1.3–1.4
SIPH/URS	0.94–1.03	0.6–0.7
SIPH/Cauda	1.07–1.15	(0.7) 0.8–1.0
SIPH/BL	0.06–0.07	0.05–0.055
Cauda/URS	0.82–0.97	0.64–0.84



Figures 4 & 5. *Protaphis iliensis* Kadyrbekov, 2001, **4.** colonies on the terminal part of shoot of *Acroptilon repens* (Asteraceae), attended by ants, *Acantholepis* sp. (Formicidae). **5.** Habitus of apterous viviparous female.

Discussion

Despite numerous studies on aphid fauna of Iran (e.g. Mehrparvar & Rezwani, 2007; Goodarzifar et al., 2016; Mehrparvar, 2016, 2017; Kanturski & Barjadze, 2018; Sedighi et al., 2018; Momeni Shahraki et al., 2019), many regions of the country still remained unexplored and the aphid fauna of Iran has not yet been studied extensively and there is no complete information on different aphid species in most parts of Iran. While Iran covers a very large area in West Asia with the great diversity of environment, only about 540 aphid species have been recorded (Rezwani, 2001; Hodjat, 2005; Rezwani, 2010; Goodarzifar et al., 2016; Mehrparvar, 2017; Momeni Shahraki et al., 2019).

About 120 aphid species belonging to the genus *Macrosiphoniella* have been identified in the world and so far 30 species have been reported from Iran (Mehrparvar, 2017; Kanturski & Barjadze, 2018). In this study, five different species of *Macrosiphoniella* were collected and identified from which two species *M. frigidivora* and *M. szalaymarzsoi* are reported here for the first time from Iran. *Macrosiphoniella frigidivora* was so far known only from Mongolia collected on terminal parts of shoots of *Artemisia frigida* (Asteraceae) while Iranian samples were collected on *Artemisia sieberi* and *A. herba-alba*. Apterous viviparous female of Mongolian population have 4–15 secondary rhinaria on ANTIII (Holman & Szelegiewicz, 1974); whereas, we observed 1–5 rhinaria on ANTIII respectively in the Iranian population. Such differences are also true for reticulated area on distal part of SIPH and the ratio between ANTIII and ANTIV (see Table 2). Biometric data of Iranian population indicating that they are bigger in body and appendages size in comparison to those originally described.

Apterous viviparous females of Hungarian population of *M. szalaymarzsoi* have 8–16 secondary rhinaria on ANTIII (Szelegiewicz, 1978), while Iranian samples have 1–8 rhinaria.

The ratio between SIPH and cauda in Iranian population is shorter than Hungarian population (original description) (Table 3).

In *P. iliensis*, we found small biometric differences in apterous viviparous females from Iran when compared to original description by Kadyrbekov (2001). For example, the ratios of SIPH/URS and SIPH/Cauda differ. So far, *P. iliensis* has been reported only in Kazakhstan, and considering the fact that it is also reported in Iran, it can be inferred that it is spreading southward. We consider these and other biometric differences representing intraspecific variation resulting from differences in environmental conditions, geographical distribution and different host plants which cause local adaptation (Madjdzadeh & Mehrparvar, 2009).

The present study adds three new records to the aphid fauna of Iran. Despite the rich flora, various climatic conditions, indigenous geographic characteristics and the remarkable number of agricultural plants in Iran, studies on the Iranian aphid fauna are necessary to get better and deep resolution on species present in this part of the world. It is expected that with more extensive investigations the number of species will increase in the future.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- Asadi, M. (2015) *Flora of Iran*. Agricultural Research, Education & Extension Organization. 92 pp. (In Persian).
- Barjadze, S., Japoshvili, G. & Bakhtadze, N. (2010) New records for the Georgian aphid fauna (Hemiptera: Aphididae). *Zoology in the Middle East*, 50, 140–141.
<https://doi.org/10.1080/09397140.2010.10638427>
- Blackman, R.L. & Eastop, V.F. (2019) Aphids on the World's Plants: An online identification and information guide. Available from: <http://www.aphidsonworldsplants.info/> (Accessed 22 September 2019).
- Funk, V.A., Bayer, R.J., Chan, R., Watson, L., Gemeinholzer, B., Schilling, E., Panero, J.L., Badwin, B.G., Garcia-Jacas, N. & Susanna, A. (2005) Everywhere but Antarctica: using a supertree to understand the diversity and distribution of the compositae dimensions. In: Friis, I. & Balslev, H. (eds.) *Proceedings of an International Symposium Held at the Royal Danish Academy of Sciences and Letters in Copenhagen*, Denmark, 2003, 25–28 May. Kgl. Danske Videnskabernes Selskab. pp. 343.
- Funk, V.A., Susanna, A., Steussy, T.F. & Robinson, H.E. (2009) Classification of Compositae. In: Funk, V.A., Susanna, A., Steussy, T. F. & Bayer, R.J. (eds.) *Systematics, Evolution, and Biogeography of Compositae*. University of Vienna, pp. 171–189.
- Goodarzifar, Z., Madjdzadeh, S.M. & Mehrparvar, M. (2016) Aphids living on *Echinops* in Iran: *Turanoleucon jashenkoi* (Hemiptera, Aphididae) as a new record. *Journal of Insect Biodiversity and Systematics*, 2, 301–308.

- Heidarnia, M. & Derakhshan Shadmehri, A. (2018) Faunistic study of Esfarayen aphids and the report of new species, *Aphis illinoisensis* Shimer, 1866 for Iran fauna. In: Pourrahim, R. & Farzadfar, Sh. (eds.) *Proceedings of the 23rd Iranian Plant Protection Congress. 2018, 27 August - 30 August, Gorgan, Iran*. Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, P. 944
- Herman, P. (2000) Die familie Asteraceae:’n Algemene oorsig. *Die Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie*, 19, 66–67. <https://doi.org/10.4102/satnt.v19i2.746>
- Hodjat, H. (2005) *A List of Aphids and their Host Plants in Iran*. Shahid-Chamran University Printing & Publication Center, Ahwaz, Iran. 148 pp.
- Holman, J. & Szelegiewicz, H. (1974) Aphids of the genus *Macrosiphoniella* (Homoptera, Aphididae) from Mongolia. *Acta Entomologica Bohemoslovaca*, 71, 161–177.
- Jafari, T., Moghim, G.M. & Azimian, M. (2015) *Identification of Northern Khorasan province*. Educational Books Publication, Tehran. 159 pp. [in Persian]
- Judd, W., Campbell, C.S., Kellogg, E. & Stevens, P. (1999) *Plant Systematics. A Phylogenetic Approach*. Sinauer Associates, Sunderland, Mass., USA, 464 pp.
- Kadyrbekov, R.K. (2001) Contribution to the systematic of the xerobiont supraspecific taxa from subtribe Aphidina (Homoptera, Aphididae). *Tethys Entomological Research*, 3, 89–98.
- Kadyrbekov, R.K. (2004) Addition to the aphid fauna (Homoptera, Aphidinea) of the Kazakhstan part of the Altai mountain system. *Bulletin of the Al-Farabi Kazakh National University. Series Biological*, 2, 138–144.
- Kanturski, M. & Barjadze, S. (2018) Hitherto unknown and poorly known morphs of *Macrosiphoniella davazhamci* and *M. nikolajevi* (Hemiptera: Aphididae) – aphid species new to Iran. *Zootaxa*, 4524, 536–552. <https://doi.org/10.11646/zootaxa.4524.5.2>
- Madjzadeh, S.M. & Mehrparvar, M. (2009) Morphological discrimination of geographical populations of *Macrosiphoniella sanborni* (Gillette, 1908)(Hem.: Aphididae) in Iran. *North-Western Journal of Zoology*, 5, 338–348.
- Mehrparvar, M. (2016) Aphids living on *Berberis* in Iran: New record of *Liosomaphis atra* Hille Ris Lambers, 1966 (Hem.: Aphididae). *North-Western Journal of Zoology*, 12, 382–385.
- Mehrparvar, M. (2017) Aphids living on *Artemisia* and *Scorzonera* plants (Asteraceae) in Iran: *Macrosiphoniella vallesiaca* Jörg & Lample, 1988 and *Uroleucon pilosellae* (Börner, 1933)(Hemiptera: Aphididae) as new records. *Journal of Insect Biodiversity and Systematics*, 3, 21–32.
- Mehrparvar, M. & Rezwani, A. (2007) A new species of *Macrosiphoniella* and redescription of *Coloradoa heinzei* (Hemiptera: Sternorrhyncha: Aphididae) as a new record in Iran. *Zootaxa*, 1634, 61–68. <https://doi.org/10.11646/zootaxa.1634.1.2>
- Momeni Shahraki, F., Minaei, K. & Barjadze, S. (2019) Checklist of Iranian aphids (Hemiptera: Sternorrhyncha: Aphidomorpha). *Journal of Insect Biodiversity and Systematics*, 5 (4), 269–300.
- Naumann-Etienne, K. & Remaudière, G. (1995) A commented preliminary checklist of the aphids (Homoptera: Aphididae) of Pakistan and their host plants. *Parasitica*, 51, 1–61.
- Özdemir, I. & Barjadze, S. (2015) Some new records of aphid species (Hemiptera: Aphididae) from the Middle East and the Caucasus. *Turkish Journal of Zoology*, 39, 712–714. <https://doi.org/10.3906/zoo-1406-31>
- Petacci, F., Tavares, W., Freitas, S., Teles, A., Serrão, J. & Zanuncio, J. (2012) Phytochemistry and quantification of polyphenols in extracts of the Asteraceae weeds from Diamantina, Minas Gerais State, Brazil. *Planta Daninha*, 30, 9–15. <https://doi.org/10.1590/S0100-83582012000100002>
- Remaudière, G. & Talhouk, A. (1999) Aphids of Lebanon and Syria with description of a new species of the genus *Brachyunguis* Das (Hemiptera, Aphididae). *Parasitica*, 55 (4), 149–183.
- Rezwani, A. (2001) *Key to the Aphids in Iran*. Agricultural Research, Education and Extension Organization, Tehran. 304 pp.

- Rezwani, A. (2010) *Aphids (Hemiptera: Aphidoidea) of Herbaceous Plants in Iran*. Tehran, Iran: Publication of Entomological Society of Iran. 557 pp.
- Roque, N. & Bautista, H.P. (2008) *Asteraceae: Caracterização e Morfologia Floral*. Universidade Federal da Bahia, Salvador. 79 pp.
- 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, 241–251.
- Sedighi, N., Hosseini, M. and Mehrparvar, M. (2020) A new species of *Obtusicauda* (Hemiptera: Aphididae) from Iran living on *Artemisia*. *Zoology in the Middle East*, 66 (1), 58–67.
<https://doi.org/10.1080/09397140.2019.1682778>
- Şenol, Ö., Akyıldırım, H., Görür, G. and Demirtaş, E. (2014) New records for the aphid fauna (Hemiptera: Aphidoidea) of Turkey. *Acta Zoologica Bulgarica*, 66 (1), 133–136.
- Sobrinho, A.C.N., de Moraes, S.M., de Souza, E.B. & dos Santos Fontenelle, R.O. (2017) The genus *Eupatorium* L. (Asteraceae): A review of their antimicrobial activity. *Journal of Medicinal Plants Research*, 11, 43–57. <https://doi.org/10.5897/JMPR2016.6313>
- Szelegiewicz, H. (1978) Three new aphid species (Hom., Aphidoidea) from *Artemisia* in Hungary. *Acta Zoologica Academie Science Hungary*, 24 (1–2), 211–218.

شته‌های گیاهان تیره کاسنیان در استان خراسان شمالی، ایران: گزارش سه گونه جدید برای فون ایران

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چکیده: در سال‌های ۱۳۹۴ تا ۱۳۹۶، ۲۸ گونه شته متعلق به ۱۲ جنس از روی گیاهان تیره کاسنیان در استان خراسان شمالی، ایران جمع‌آوری و شناسایی شدند. در این مطالعه سه گونه شته (Hemiptera: Aphididae) با نام‌های *Macrosiphoniella szalaymarzsoi frigidivora* Holman & Szelegiewicz, 1974 و *Protaphis iliensis* Kadyrbekov, 2001 برای فون ایران جدید هستند. توصیف‌های مجدد مربوط به جمعیت‌های ایرانی این سه گونه به‌طور خلاصه ارائه و با توصیف اصلی مقایسه شدند.

واژگان کلیدی: شته، Compositae، ناجوربالان، ایران، گزارش جدید