

APHIDS (HEMIPTERA: APHIDOIDEA) OF GÖLCÜK NATURAL PARK (ISPARTA PROVINCE, TURKEY)

Shalva Barjadze*, **George Japoshvili***,
İsmail Karaca** and **İşıl Özdemir*****

* Agricultural University of Georgia, Entomology and Biocontrol Research Centre, 13th km of David Aghmashenebeli Alley, 0131 Tbilisi, GEORGIA. E-mail: shalva.barjadze@yahoo.com

** Süleyman Demirel University, Faculty of Agriculture, Department of Plant Protection, 32260 Isparta, TURKEY.

*** Plant Protection Central Research Institute Gayret Mahallesi, Fatih Sultan Mehmet Bulvarı, No.: 66, P.K.49 06172 Yenimahalle/Ankara TURKEY.

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ABSTRACT: Winged morphs of aphids were investigated in 2008-2009 in Gölcük Natural Park (Isparta Province, Turkey). Nineteen species of aphids were caught in 3 Malaise traps in 3 localities of the above mentioned territory. Most of the aphid species (12 species) were members of the subfamily Aphidinae, subfamilies Calaphidinae and Eriosomatinae were each represented by two species, with one species in each of the subfamilies Anoeciinae, Lachninae and Thelaxinae. Eight species and one subspecies are new records for the aphid fauna of Isparta Province, Turkey.

KEY WORDS: Aphid, new record, Gölcük Natural Park, Isparta, Turkey.

Gölcük Natural Park as a protected area was established in 1991. Plants of this natural park was studied in by Fakir (1998) and Fakir & Dutkuner (1999). Twenty two species of the plants (9.7% of total) are endemics to the Irano-Anatolian biodiversity hotspot, and 17 (7.5%) are endemic to the Mediterranean basin hotspot. Twenty five species (11%) are endemic to Turkey (Fakir, 1998).

Previous studies on the different taxa of insects such as Hymenoptera, Coleoptera and Hemiptera of Gölcük Natural Park have been done during 2008-2009 (Japoshvili et al., 2009, 2010; Japoshvili & Celik, 2010; Japoshvili & Karaca, 2010; Japoshvili & Anlas, 2011; Japoshvili & Ljubomirov, 2011; Japoshvili & Toyganozu, 2011; Japoshvili et al., 2011). Only one aphid species - *Myzus cerasi* (Fabricius, 1775) - was recorded in this park before our investigation (Aslan & Karaca, 2005).

MATERIAL AND METHODS

Alate aphids collected by Malaise traps in Gölcük Natural Park in 2008 and 2009 were mounted and identified. Sampling sites are shown on the map (Fig. 1). The aphids were cleared and individually mounted in Canada balsam on microscope slides using J. Martin's technique (Martin, 1983). The specimens were studied using a Hirox microscope and each morphological character was measured by binocular micrometer. For alate aphid identification the following works were used: Jacky & Bouchery (1984); Taylor et al. (1981); Remaudière & SecoFernández (1990); Heie (1992, 1994, 1995); Quednau (2003). Aphids slides are deposited in the Entomology and Biocontrol Research Centre of the Agricultural University of Georgia.

RESULTS

Nineteen species of aphids were recorded in Gölcük Natural Park during our investigation in 2008-2009. Information about the collected species, which belong to 18 genera in 6 subfamilies, are given in the annotated list. The following species: *Acyrtosiphon pisum* (Harris, 1776), *Anoecia corni* (Fabricius, 1775), *Hyadaphis foeniculi* (Passerini, 1860), *Liosomaphis berberidis* (Kaltenbach, 1843), *Sitobion fragariae* (Walker, 1848), *Therioaphis arnaultae* Remaudière, 1989, *Therioaphis trifolii* (Monell, 1882), *Uroleucon inulicola* (Hille Ris Lambers, 1939), were recorded for the first time from Isparta Province. The subspecies *Therioaphis trifolii ventromaculata* F.P. Müller, 1968 was also a new record for the aphid fauna of Isparta Province.

Annotated list of the aphid species collected in Gölcük Natural Park collected by Malaise traps in 2008-2009 (Newly recorded species for Isparta Province are indicated by an asterisk.)

Aphididae

Anoeciinae

1. *Anoecia corni* (Fabricius, 1775) *

Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.09, leg. G. Japoshvili.

Biology: Host alternating between *Cornus sanguinea* and roots of plants of the family Poaceae, or anholocyclic on roots of Poaceae (Blackman & Eastop, 2013).

Distribution: Europe, central and eastern Asia, Africa, Argentina and North America (Blackman & Eastop, 2013).

Comment: This species was recorded on *Triticum aestivum* (as *Triticum sativa*) in İncecik (Tekirdag) for the first time from Turkey by Tuatay & Remaudière (1964).

Aphidinae

Macrosiphini

2. *Acyrtosiphon pisum* (Harris, 1776) *

Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.

Biology: It is a monoecious holocyclic on plants of the family Leguminosae (Blackman & Eastop, 2013).

Distribution: Almost cosmopolitan (Blackman & Eastop, 2013).

Comment: This species was recorded on *Medicago sativa* in Ankara from Turkey by Düzgünes & Tuatay (1956).

3. *Brachycaudus (Prunaphis) cardui* (Linnaeus 1758)

Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 21-28.05.2009, leg. G. Japoshvili; 1 alate viviparous female, stony place, Gölcük National Park, 06.06.2009, leg. G. Japoshvili; 1 alate viviparous female, stony place, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species. It migrates from *Prunus* spp. to plants of the families Boraginaceae and Compositae (Blackman & Eastop, 2013).

Distribution: Europe, Asia, north Africa and North America (Blackman & Eastop, 2013)

Comment: This species was recorded on *Carduus* sp. in Ankara for the first time from Turkey by Düzgünes & Tuatay (1956); It was recorded on *Prunus amygdalus* (as *Amygdalus communis*) in Eğirdir (Mahmutlar) in Isparta province by Aslan & Karaca (2005).

4. *Chaetosiphon (Pentatrachopus) tetrarhodum* (Walker 1849)

Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on wild and cultivated *Rosa* spp. (Blackman & Eastop, 2013).

Distribution: World-wide except east Asia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Rosa* sp. in Ankara and Atabey (Isparta) for the first time in Turkey by Tuatay & Remaudière (1964).

5. *Diuraphis noxia* (Kurdjumov, 1913)

Material examined: 3 alate viviparous females, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on grasses and cereals in cold temperate climates, probably anholocyclic elsewhere (Blackman & Eastop, 2013).

Distribution: Europe, central Asia, Middle East, Central Asia, north Africa, Kenya, South Africa, Chile, Argentina, North America (Blackman & Eastop, 2013).

Comment: This species was recorded on undetermined grasses no locality and no date for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Triticum* sp. in Eğirdir (Isparta) and Yalvaç (Isparta) (Tuatay and Remaudière 1964).

6. *Dysaphis (Pomaphis) plantaginea* (Passerini 1860)

Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species, migrating from *Malus* spp. and sometimes *Pyrus* spp. to *Plantago* spp. (Blackman & Eastop, 2013).

Distribution: Europe, south-west and central Asia, India, Pakistan, Nepal, North and South America (Blackman & Eastop, 2013).

Comment: This species was recorded on *Pyrus communis* in Ankara, on *Malus pumila* (as *Pyrus malus*) in Gaziantep - for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Malus pumila* (as *Malus communis*) in in Eğirdir, Gönen, Keçiborlu, Aksu, Merkez (Çünür) in Isparta Province by Aslan & Karaca (2005).

7. *Hyadaphis foeniculi* (Passerini, 1860)

Material examined: 4 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.09; 1 alate viviparous female, the same locality, Gölcük Natural Park, 14-21.10.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species, migrating from *Lonicera* spp. to various plants of the family Apiaceae (Blackman & Eastop, 2013).

Distribution: Widespread in Europe, eastward to Turkey and Iraq, North America (Blackman & Eastop, 2013).

Comment: This species was recorded on *Lonicera* sp. in Ankara for the first time from Turkey by Bodenheimer & Swirski (1957).

8. *Liosomaphis berberidis* (Kaltenbach, 1843)

Material examined: 1 alate male, Pilavtepe, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.

Biology: It lives holocyclically on *Berberis* spp. and *Mahonia japonica* (Blackman & Eastop, 2013).

Distribution: Europe, eastward to India, North America, Australia and New Zealand (Blackman & Eastop, 2013).

Comment: This species was recorded on *Berberis vulgaris* in Ahlat (Bitlis), Beysşehir (Konya) and Ankara for the first time from Turkey by Tuatay & Remaudière (1964).

9. *Macrosiphum rosae* (Linnaeus, 1758)

Material examined: 1 alate viviparous female, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.

Biology: Heteroecious holocyclic or monoecious anholocyclic on *Rosa* spp. It has a facultative migration from *Rosa* to plants of the families Dipsacaceae and Valerianaceae, and sometimes to certain Aquifoliaceae and Onagraceae (Blackman & Eastop, 2013).

Distribution: World-wide, except for east and south-east Asia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Rosa* sp. in Ankara for the first time from Turkey by Düzgünes & Tuatay (1956). It was recorded on *Rosa* sp. in Isparta by Toros (1991-1992).

10. *Myzus cerasi* (Fabricius, 1775)

Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.09, leg. G. Japoshvili.

Biology: It is a heterecious holocyclic species, migrating from *Prunus* spp. to plants of the families Rubiaceae, Orobanchaceae, Plantaginaceae and Brassicaceae (Blackman & Eastop, 2013).

Distribution: Europe, across Asia to Pakistan and India, introduced to Australia, New Zealand and North America (Blackman & Eastop, 2013).

Comment: This species was recorded on *Prunus cerasus* in İznik (Kocaeli) for the first time from Turkey by Bodenheimer & Swirski (1957). It was recorded on *Prunus avium* in in Eğirdir, Keçiborlu, Merkez (Gölcük), Merkez (Milas), Merkez (Kirazlidele) in Isparta Province by Aslan & Karaca (2005).

11. *Sitobion fragariae* (Walker, 1848) *

Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species, migrating from *Rubus* spp. and other Rosaceae to species of Poaceae (Blackman & Eastop, 2013).

Distribution: Europe, Asia, introduced to South Africa and North and South America (Blackman & Eastop, 2013).

Comment: This species was recorded on wheat in Konya for the first time from Turkey by Uysal et al. (2004).

12. *Uroleucon inulicola* (Hille Ris Lambers, 1939)*

Material examined: 1 alate viviparous female, stony place, Gölcük Natural Park, 06.06.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on *Inula* spp. (Blackman & Eastop, 2013).

Distribution: Europe, west Siberia and Central Asia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Inula hirta* in Artvin for the first time from Turkey by Tuatay (1991).

13. *Wahlgreniella nervata* (Gillette, 1908)

Material examined: 2 alate viviparous females, Pilavtepe, Gölcük Natural Park, 21.05.2009, leg. G. Japoshvili.

Biology: It is a heterecious holocyclic species in North America, where it migrates from *Rosa* spp. to Ericaceae, but it probably lives without host alternation on *Rosa* spp. outside of North America (Blackman & Eastop, 2013).

Distribution: North America, introduced to Central and South America, Africa and Pakistan (Blackman & Eastop, 2013).

Comment: This species was recorded on *Berberis thunbergii* (not a true host) for the first time from Turkey by Çiraklı et al. (2008), while from Isparta province it was recorded as a pest of damask rose (*Rosa damascena*) in Isparta city by Barjadze et al. (2011).

Calaphidinae

Panaphidini

14. *Therioaphis arnaultae* Remaudière, 1989*

Material examined: 4 alate viviparous females, Pilavtepe, Gölcük Natural Park, 24.09.09, leg. G. Japoshvili; 1 alate viviparous female, the same locality, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.

Biology: It is a monoecious holocyclic species on *Astragalus* spp. (Blackman & Eastop, 2013).

Distribution: Iran, Turkey and Lebanon (Blackman & Eastop, 2013).

Comment: This species was recorded on *Astragalus* sp. in Ivriz (Eregli) and Erciyesdag (Kayseri) for the first time from Turkey by Remaudière (1989).

15. *Therioaphis trifolii* (Monell, 1882) *

Material examined: 2 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.09.2009, leg. G. Japoshvili; 2 alate viviparous females, the same locality, Gölcük Natural Park, 14-21.10.08, leg. G. Japoshvili;

Biology: It is monoecious holocyclic on Leguminosae, or anholocyclic in warmer regions (Blackman & Eastop, 2013).

Distribution: Europe, North Africa, Middle East, India, Pakistan, Japan, China, introduced to North and South America, South Africa and Australia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Medicago sativa* in Konya, Kırşehir, Ankara, Niğde for the first time from Turkey by Bodenheimer & Swirski (1957).

15a. *Therioaphis trifolii ventromaculata* F.P. Müller, 1968) *

Material examined: 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.09.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on *Astragalus* spp. (Blackman & Eastop, 2013).

Distribution: Europe (Holman, 2009).

Comment: This subspecies was recorded on *Astragalus* sp. in Elma dağ, Ankara for the first time from Turkey by Remaudière (1989).

Eriosomatinae**Fordini****16. *Forda formicaria* von Heyden, 1837) ***

Material examined: 3 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 03.07.2009, leg. G. Japoshvili; 2 alate viviparous females, Pilavtepe, Gölcük Natural Park, 12.07.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species, migrating from *Pistacia* spp. to Poaceae and Cyperaceae species or it lives anholocyclically on the roots of grasses (Blackman & Eastop, 2013).

Distribution: Northern Europe, Mediterranean region, south-west Asia, Central Asia, Siberia, North America.

Comment: This species was recorded on *Pistacia terebinthus* in Alemdağ (Kocaeli) for the first time from Turkey by Trotter (1903).

17. *Geocia setulosa* (Passerini, 1860)

Material examined: 3 alate viviparous females, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 24.08.2009, leg. G. Japoshvili.

Biology: It is a heteroecious holocyclic species, migrating from *Pistacia khinjuk* to Poaceae plants or living anholocyclically on the roots of grasses (Blackman & Eastop, 2013).

Distribution: Italy, Turkey, Georgia, Iran, Israel, introduced to USA (Blackman & Eastop, 2013).

Comment: This species was recorded on *Pistacia* sp. in Eğirdir (Isparta) for the first time from Turkey by Tuatay & Remaudière (1964).

Lachninae**Cinarini****18. *Eulachnus rileyi* (Williams, 1911) ***

Material examined: 1 alate viviparous female, Pilavtepe, Gölcük National Park, 21.07.2009, leg. G. Japoshvili; 1 alate viviparous female, the same locality, Gölcük National Park, 24.09.09, leg. G. Japoshvili; 1 alate viviparous female, under *Robinia pseudoacacia* trees, Gölcük Natural Park, 15.10.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on *Pinus* spp., but apparently anholocyclic in warmer regions (Blackman & Eastop, 2013).

Distribution: North, South and Central America, Europe, Mediterranean area, south-west Asia, introduced into Africa south of Equator (Blackman & Eastop, 2013).

Comment: This species was recorded on *Pinus nigra* in Ankara for the first time from Turkey by Tuatay & Remaudière (1964).

Thelaxinae

19. *Thelaxes suberi* (del Guercio, 1911)

Material examined: 2 alate viviparous females, stony place, Gölcük National Park, 06.06.2009, leg. G. Japoshvili.

Biology: It is monoecious holocyclic on *Quercus* spp., and is also recorded from *Castanea sativa* (Blackman & Eastop, 2013).

Distribution: England, Southern Europe, Mediterranean region, southwest Asia (Blackman & Eastop, 2013).

Comment: This species was recorded on *Quercus fraimetto* (as *Quercus conferta*) in Alemdağ (Kocaeli) for the first time from Turkey by Schimitschek (1944).

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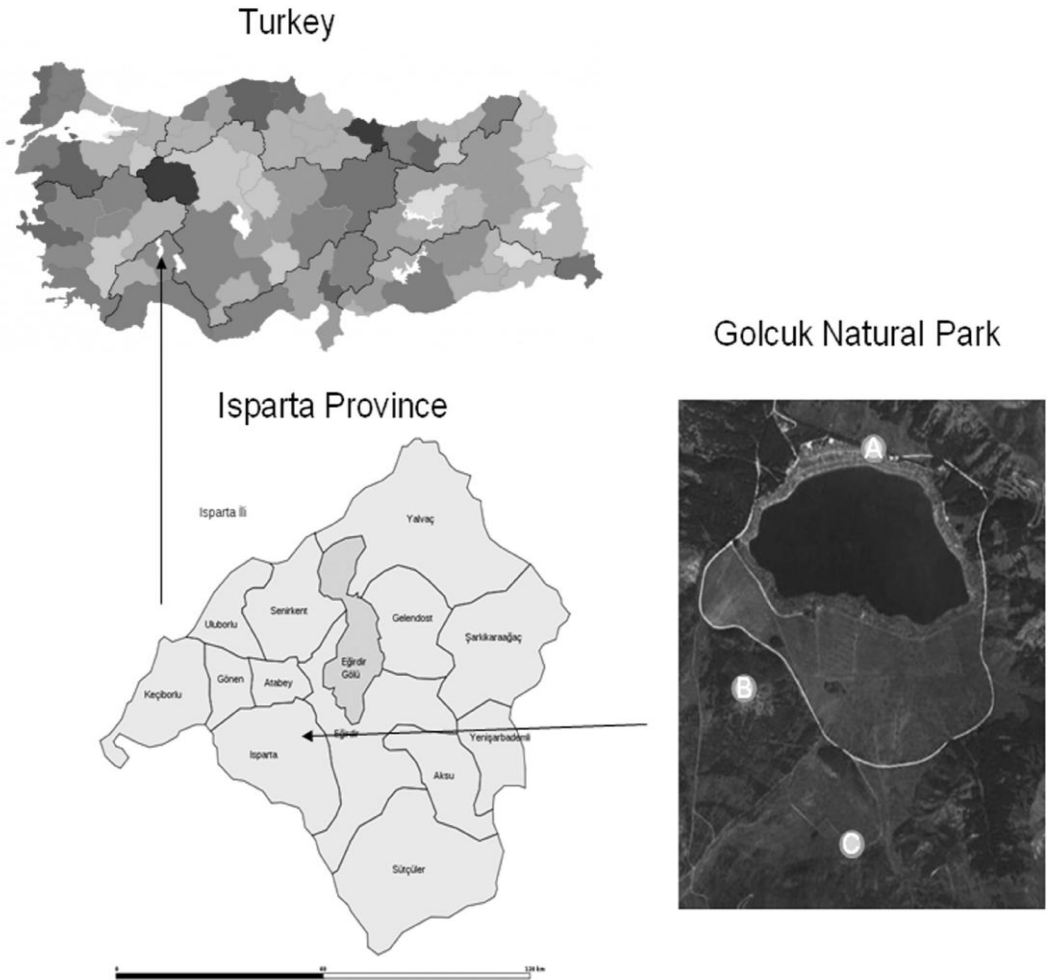


Figure 1. Sampling sites of aphids in Gölcük Natural Park. A: place with *Robinia pseudoacacia* trees; B: Pilavtepe; C: stony place.