

New and rare mealybugs (Hemiptera: Coccoidea: Pseudococcidae, Putoidae) from Eastern Anatolia (Turkey)

Новые и редкие виды червецов (Hemiptera: Coccoidea: Pseudococcidae, Putoidae) из Восточной Анатолии (Турция)

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This study aimed to determine the species of mealybugs (Pseudococcidae and Putoidae) found in five provinces (Ağrı, Bitlis, Hakkari, Iğdır and Van) in Eastern Anatolia, (Turkey). Species of the families Pseudococcidae and Putoidae were collected from natural and cultivated plants between 2005 and 2008. New locality and host plant data are given for all species. In total, 60 species of Pseudococcidae in 16 genera and two species of the genus *Puto* Signoret, 1875 were found, including 25 new species records for the Turkish fauna, namely: *Atrococcus arakeliana* (Ter-Grigorian, 1964), *A. cracens* Williams, 1962, *Coccura circumscripta* (Kiritchenko, 1963), *Dysmicoccus brevipes* (Cockerell), *Fonscolombia europaea* (Newstead, 1897), *Heliococcus glacialis* (Newstead, 1900), *Metadenopus festucae* Šulc, 1931, *Mirococcopsis ammophila* Bazarov & Nurmamatov, 1975, *M. avetiana* Ter-Grigorian, 1964, *M. subalpina* (Danzig, 1985), *M. teberdae* (Danzig, 1985), *Phenacoccus angustatus* Borchsenius, 1949, *P. eurotiae* Danzig, 1975, *P. incertus* (Kiritschenko, 1940), *P. kokandicus* Nurmamatov, 1986, *P. persimplex* Borchsenius, 1949, *P. querculus* (Borchsenius, 1949), *P. prope schmelevi* Bazarov, 1980, *P. strigosus* Borchsenius, 1949, *Pseudococcus comstocki* (Kuwana, 1902), *Puto megriensis* (Borchsenius, 1948), *Ripersiella parva* (Danzig, 1985), *R. petiti* (Goux, 1941), *R. poltavae* (Laing, 1929) and *Spilococcus vashlovanicus* Danzig, 1998. A new mealybug species, *Phenacoccus chatakicus* sp. nov., is described and illustrated based on adult females.

Целью настоящей работы было определение червецов (Pseudococcidae and Putoidae) собранных в пяти провинциях (Агри, Битлис, Хаккари, Игдир и Ван) Восточной Анатолии, Турция. Виды семейств Pseudococcidae и Putoidae собирались с дикорастущих и культивируемых растений в 2005–2008 годах. Для всех обсуждаемых видов приведены новые местонахождения и новые кормовые растения. В целом, 60 видов Pseudococcidae из 16 родов и два вида из рода *Puto* Signoret, 1875 были найдены, включая 25 видов новых для фауны Турции: *Atrococcus arakeliana* (Ter-Grigorian, 1964), *A. cracens* Williams, 1962, *Coccura circumscripta* (Kiritchenko, 1963), *Dysmicoccus brevipes* (Cockerell), *Fonscolombia europaea* (Newstead, 1897), *Heliococcus glacialis* (Newstead, 1900), *Metadenopus festucae* Šulc, 1931, *Mirococcopsis ammophila* Bazarov et Nurmamatov, 1975, *M. avetiana* Ter-Grigorian, 1964, *M. subalpina* (Danzig, 1985), *M. teberdae* (Danzig, 1985), *Phenacoccus angustatus* Borchsenius, 1949, *P. eurotiae* Danzig, 1975, *P. incertus* (Kiritschenko, 1940), *P. kokandicus* Nurmamatov, 1986, *P. persimplex* Borchsenius, 1949, *P. querculus* (Borchsenius, 1949), *P. prope schmelevi* Bazarov, 1980, *P. strigosus* Borchsenius, 1949, *Pseudococcus comstocki* (Kuwana, 1902), *Puto megriensis* (Borchsenius, 1948), *Ripersiella parva* (Danzig, 1985), *R. petiti* (Goux, 1941), *R. poltavae* (Laing, 1929) и *Spilococcus vashlovanicus* Danzig, 1998. Новый для науки вид, *Phenacoccus chatakicus* sp. nov., описан и проиллюстрирован на основании изучения взрослых самок.

Key words: Pseudococcidae, Putoidae, fauna, mealybugs, host plants, distribution

Ключевые слова: Pseudococcidae, Putoidae, фауна, червецы, кормовые растения, распространение

INTRODUCTION

Mealybugs (Hemiptera: Coccoidea: Pseudococcidae) form the second largest family of scale insects (Ben-Dov, 1994; Ben-Dov et al., 2011), and the putoids (Hemiptera: Coccoidea: Putoidae) a small family containing a single genus *Puto* Signoret, 1875 (Ben-Dov, 1994; Ben-Dov et al., 2010). Both mealybugs and putoids have typically white, powdery or mealy wax secretions that cover their body.

The scale insect database, ScaleNet (last updated 9 January 2011) (Ben-Dov et al., 2011) reported 2274 mealybug and putoid species all over the world, with 717 species in 115 genera recorded for the Palearctic region. In a previous study, Kozár (1998) recorded 708 species in 115 genera of mealybug species in the Palearctic region. It is uncertain how many Putoidae species occur in the world and the Palearctic region because all *Puto* species have been treated as Pseudococcidae until now and some true mealybugs have been placed in *Puto*. More recently Williams et al. (2011) discussed the morphological features that are diagnostic for Putoidae and determined the family placement. As a result of their study they recognised 47 extant and two fossil species of *Puto*, and six species of *Ceroputo*.

The scale insect fauna of Turkey was studied first in detail by Bodenheimer (1953), who recorded ten species of Pseudococcidae. Later Çanakçıoğlu (1977) recorded three species in forest areas and Düzgüneş (1982) recorded 13 species from different areas and habitats. More recently, more than 50 mealybug species (including putoids) have been added to the Turkish fauna, as new records (Kaydan et al., 2001a, b, 2004, 2005). In the most recent list of scale insects of Turkey (Kaydan et al., 2007), among the 267 scale insect species recorded, 73 pseudococcid and putoid species in seventeen genera were included. Later, *Ph. solani* (Kaydan et al., 2008) and *Puto borealis* (Ben-Dov et al., 2010) were

added to the list. However, the latter, i.e., *P. borealis*, listed in ScaleNet (Ben-Dov et al., 2010) is likely an erroneous record, because this species was not recorded in the paper mentioned (Kaydan et al., 2004) in ScaleNet. As a result, there are currently 74 species of pseudococcids and putoids reliably recorded for Turkey. This paper deals with new mealybug records in Turkey, their hosts and geographical distribution.

MATERIALS AND METHODS

Pseudococcid samples were collected from five provinces in the Eastern Part of Turkey (Ağrı, Bitlis, Hakkari, Iğdır, and Van) between 2005 and 2008. Specimens were taken from both wild and cultivated plants twice a week during the spring and summer seasons of the three-year study. Collecting data, including host locality (name of the province, GIS coordinates, etc.), date of collection, collector, and data on the phenological stages of the host plant and the first author's personal CCVT collection numbers are given. Samples consisted of plant material that harboured scale insects and were collected mostly by the first author. Each sample was put into a plastic bag and taken to the laboratory for examination. Specimens were prepared for light microscopy using the slide-mounting method discussed by Kosztarab and Kozár (1988). Morphological terminology follows that of Kosztarab and Kozár (1988) and Williams (2005). Measurements and counts of the new species were taken from all available holotype and paratype specimens.

Earlier distribution and host plant data are given according to information taken from ScaleNet (Ben-Dov et al., 2010).

Both dry and mounted material is deposited in the Plant Protection Department, Faculty of Agriculture, Yüzüncü Yıl University, Van, Turkey (CCVT).

The species marked below with an asterisk (*) are recorded for Turkey for the first time.

RESULTS AND DISCUSSION

In this study a total of 623 samples were collected from eastern Anatolia. Among these samples, 60 species were identified, of which 25 species are new records for the Turkish scale insect fauna. Among these species, the collection data belongs to ten very common well known species (*Mirococcus inermis* (Hall, 1925), *Peliococcus chersonensis* (Kiritshenko, 1936), *P. kimmericus* (Kiritshenko, 1940), *P. turanicus* (Kiritshenko, 1932), *Phenacoccus aceris* (Signoret, 1875), *Ph. pumilus* Kiritshenko, 1936, *Ph. tergrigorianae* Borchsenius, 1956, *Puto superbus* (Leonardi, 1907), *Trionymus aberrans* Goux, 1938 and *T. multivorus* (Kiritshenko, 1936)) which had been earlier recorded many times in Turkey and neighboring countries were not represented here. Besides this, a new species, *Phenacoccus chatakicus* Kaydan & Kozár **sp. nov.** is described and illustrated. As a result of this study, the mealybug and putoid species number in Turkey is increased to 100 species.

Phenacoccus chatakicus sp. nov.

(Fig. 1)

Holotype. Adult female; **Turkey**, *Van Province*, Çatak-Narli, 37°55.258'N, 42°59.138'E, on undetermined herbaceous plant, 3 July 2007; coll. M.B. Kaydan; CCVT 3903.

Paratypes. 5 adult females; same data as for holotype; CCVT collection and one paratype to be sent to Zoological Institute of Russian Academy of Science, St. Petersburg.

Description of holotype (mounted adult female). Body elongate oval, 1.32–2.27 mm long, 0.66–1.47 mm wide. Eye marginal, 45–65 µm wide. Antenna 9 segmented, 320–370 µm long; apical segment 52.5–60.0 µm long, 22.5–25.0 µm wide. Clypeolabral shield 145.0–162.5 µm long, 135–155 µm wide. Labium 130–145 µm long, 70–85 µm wide. Anterior spiracles 52.5–57.5 µm long, 25–30 µm wide across atrium; posterior spiracles 50–65 µm long, 30–40 µm wide across atrium. Circulus small, oval, 20–45 µm wide. Legs well de-

veloped; coxa 125–135 µm long hind trochanter + femur 215.0–242.5 µm long, hind tibia + tarsus 260–275 µm long, hind claw 25–28 µm long. Ratio of lengths of hind tibia + tarsus to hind trochanter + femur 1.13–1.21, ratio of lengths of hind tibia to tarsus 2.17–2.48, ratio of length of hind trochanter + femur to greatest width of femur 3.90–5.10. Hind femur with 9–16 translucent pores and hind tibia with 5–14 translucent pores. Tarsal digitules subequal, each 27–35 µm long, hairlike. Claw digitules subequal, each 25–28 µm long, and knobbed. Both pairs of ostioles present; each anterior ostiole, with 9–18 trilocular pores and 2–5 setae; each posterior ostiole with 18–26 trilocular pores and 2–4 setae. Anal ring 67–78 µm wide, with 6 anal-ring setae, each seta 65–78 µm long. Cerarii numbering 4–5 pairs situated on last two abdominal segments, and on head (C_1 , C_2 and sometimes C_3); C_2 with 3 conical setae and 3 or 4 trilocular pores; anal lobe cerarii, each with 2 slender conical setae, 15–18 µm long, with 9–13 trilocular pores and 2 or 3 spine like auxiliary setae.

Dorsum. Body setae spine like, each 5–11 µm long. Multilocular disc pores present on metathorax (3–5 pores) and abdominal segments (except VIII + IX): 5–7 pores on segment I, 7–13 pores on segment II, 14–34 pores on segment III, 36–51 pores on segment IV, 44–54 pores on segment V, 19–36 pores on segment VI, 24–41 on segment VII; each pore 8–11 µm in diameter and with 12 loculi. Trilocular pores each 3–4 µm in diameter, scattered over entire body. Minute discoidal pores scattered, each 2.5 µm in diameter. Oral collar tubular ducts of one size totaling 138–175 on dorsum, each duct 12–15 µm long, 4.0–6.0 µm wide at mid-width, 5.0–7.0 µm wide at distal-width; ducts on head, thorax, and all abdominal segments, forming transverse rows on abdomen: 13–19 ducts on segment I, 14–17 ducts on segment II, 14–21 ducts on segment III, 14–17 ducts on segment IV, 11–18 ducts on segment V, 10–13 ducts on segment VI, 6–13 ducts on segment VII,

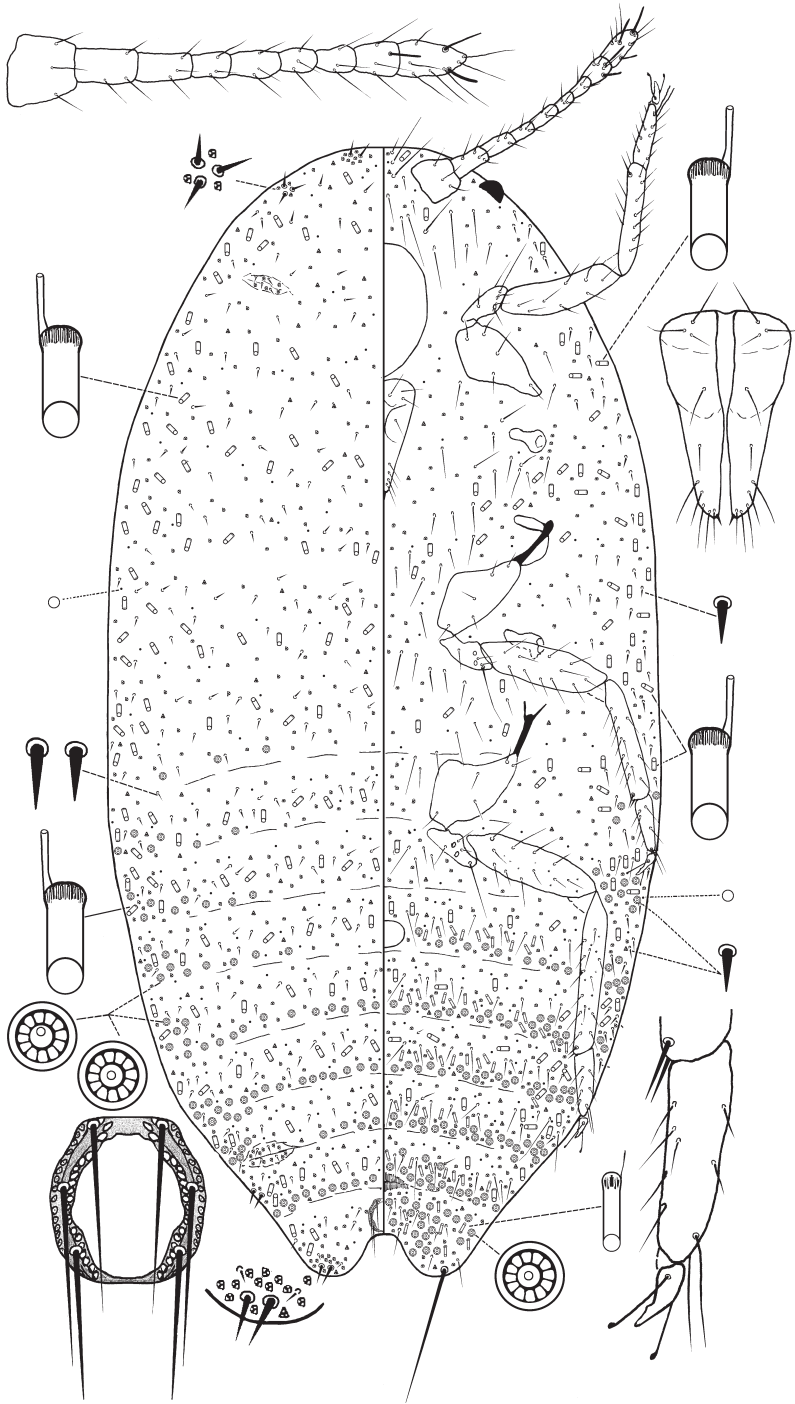


Fig. 1. *Phenacoccus chatakicus* sp. nov., holotype

4–7 ducts on segment VIII, and 50–63 ducts on head + thorax.

Venter. Body setae of two types: (i) hair-like setae slender, each 12–80 µm long, longest setae medially on head; (ii) spine-like setae each 7–8 µm long, situated submarginally in two or three rows. Apical setae of anal lobe 130–155 µm long. Multilocular disc pores present on posterior (IV – VIII + IX) abdominal segments: 2–9 pores on segment I, 9–21 pores on segment II, 34–46 pores on segment III, 44–71 pores on segment IV, 47–73 pores on segment V, 51–67 pores on segment VI, 56–63 on segment VII, 31–41 on segments VIII + IX; each pore 7–11 µm in diameter and with 12 loculi. Trilocular pores each 2–3 µm in diameter scattered over entire body. Minute discoidal pores scattered, each 2.5 µm in diameter. Oral-collar tubular ducts of two sizes: (i) larger oral collar tubular ducts each 12–15 µm long, 4.0–6.0 µm wide at mid-width, 5.0–7.0 µm wide at distal-width, totaling 126–167, ducts on head, thorax and abdominal segments, with 9–26 ducts on segment I, 9–17 ducts on segment II, 11–17 ducts on segment III, 12–21 ducts on segment IV, 10–17 ducts on segment V, 8–15 ducts on segment VI, 7–10 ducts on segment VII, 5–6 ducts on segment VIII + IX, and 40–64 ducts on head and thorax; (ii) small oral collar tubular ducts each 10–13 µm long, 2.0–3.0 µm wide at mid-width, 3 µm wide at distal-width, totaling 134–186, ducts on last abdominal segments (III– VIII + IX), with 9–29 ducts on segment III, 21–37 ducts on segment IV, 21–36 ducts on segment V, 23–37 ducts on segment VI, 14–24 ducts on segment VII, and 25–30 ducts on segment VIII + IX.

Diagnosis. *Phenacoccus chatakicus* sp. nov. (adult female) can be diagnosed by the following combination of characters: one size of oral collar tubular duct (larger) on dorsum and two sizes of oral collar tubular ducts on venter (larger tubular ducts two times wider than smaller oral collar tubular ducts); multilocular pores on both venter and dorsum; 4–5 pairs of cerarii present

(two on the last two abdominal segments and 2–3 pairs on head; circulus present; anal lobe cerarii each with 2 conical setae; abdominal and thoracic ostioles present; antennae 9 segmented, 320–370 µm long (apical segment 52.5–60.0 µm long).

Phenacoccus chatakicus sp. nov. is most similar to *Phenacoccus hordei* (Lindeman, 1886) as both species have a high number of multilocular pores on the dorsum. *Phenacoccus chatakicus* can be readily distinguished from *P. hordei* by having only 4–5 pairs of cerarii (vs. 18 pairs), a small rounded circulus (vs. no circuli), and by the absence of quinquelocular pores on the venter (vs. present at least around the mouth part). *Phenacoccus chatakicus* is also similar to *Phenacoccus madeirensis* Green, 1923 by having a circulus on the venter and multilocular pores on the dorsum of abdominal segments, but differs from the latter species by the absence of quinquelocular pores (vs. present), and by a small number of cerarii (4–5 vs. 18).

Etymology. The species name refers to Çatak (Turkey, Van Province), a collecting site of the new species.

Antonina graminis (Maskell, 1897)

Material examined. Ağrı, Hamur, 39° 36.382'N 42°57.857' E, 1646 m, 29 Sept. 2005, 2 females (CCVT 2485), on Poaceae. Van, Babacan, 39°05.96'N 43°46.084' E, 1961 m, 31 May 2006, 3 females (CCVT 2795), on Poaceae; Gevaş-Tatvan road, 38°21.926'N 42°43.91' E, 1951 m, 21 Sept. 2005, 3 females (CCVT 2410), on Poaceae.

This cosmopolitan species was recorded on Poaceae. *Antonina graminis* has been recorded previously in Turkey, in Van lake basin on *Lolium multiflorum* (Kaydan et al., 2001a).

**Atrococcus arakeliana* (Ter-Grigorian, 1964)

Material examined. Ağrı, Center, 39° 40.743'N 43°01.383' E, 1666 m, 29 Sept. 2005, 6 females (CCVT 2476a) on *Salvia* sp. İğdir, Digor road, 40°07.034'N 43°37.068' E, 978 m, 13 June 2007, 1 female (CCVT 3577) *Matricaria* sp.

****Atrococcus cracens* Williams, 1962**

Material examined. Ağrı, Center, 39°40.743'N 43°01.383'E, 1657 m, 29 Sept. 2005, 1 female (CCVT 2477) on Fabaceae; Patnos road, 39°17.641'N 42°46.827'E, 1640 m, 29 Sept. 2005, 2 females (CCVT 2460) on Centaurea sp. Iğdir, Aralık road, 39°58.082'N 44°18.379'E, 838 m, 1 Sept. 2005, 1 female (CCVT 2257) on Chenopodiaceae; Tuzluca-A.Su Taşı, 39°55.838'N 43°37.381'E, 1734 m, 30 Aug. 2005, 1 female (CCVT 2259) on Medicago sativa.

***Atrococcus saxatilis* (Ter-Grigorian, 1964)**

Material examined. Ağrı, Diyadin-Taşlıçay road, 39°37.950'N, 43°24'978'E, 1805 m, 8 June 2006, 2 females (CCVT 2854) on Asteraceae; Doğubeyazıt-Çaldıran, 39°25.973'N 43°59.11'E, 1975 m, 11 July 2007, 1 female (CCVT 4149) on Phlomis sp.; Erzurum road-Saç, 39°53.221'N 42°22.974'E, 2136 m, 8 June 2006, 2 females (CCVT 2858) on Salvia sp.; Hamur road, 39°35.849'N 42°55.851'E, 1561 m, 10 July 2007, 1 female (CCVT 4120) on Caryophyllaceae; Patnos-Gökçeali, 39°06.44'N 42°54.812'E, 1793 m, 10 July 2007, 2 females (CCVT 4079) on undetermined plant.

The species was recorded previously in Turkey (Van) on Salvia sp. (Kaydan et al., 2001a).

***Ceroputo pilosellae* Šulc, 1898**

Material examined. Bitlis, Hizan road, 38°14.260'N 42°19.479'E, 1909 m, 22 June 2006, 7 females (CCVT 2985) on Euphorbia sp. Hakkari, Beyköy road, 37°33.184'N 43°43.625'E, 1832 m, 14 Sept. 2005, 7 females (CCVT 2338) on Heliotropium europium; Beyköy road, 37°33.184'N 43°43.525'E, 1832 m, 14 Sept. 2005, 2 females (CCVT 2321) on Euphorbia sp.; Beyköy road, 37°33.184'N 43°43.525'E, 1832 m, 14 Sept 2005, 3 females (CCVT 2322) on E. sequieriana; Van, Çatak, 37°55.950'N 42°59.971'E, 1535 m, 3 July 2007, 3 females (CCVT 3900) on Euphorbia sp.

The species was recorded previously in Turkey on Salvia sp. and Sanguisorba minor in Ankara and Isparta (Kaydan et al., 2004, 2005).

***Chaetococcus phragmitis* (Marchal, 1909)**

Material examined. Hakkari, Esendere road, 37°42.405'N 44°32.040'E, 1785 m, 23 May 2008, 3 females (CCVT 4239) on Phragmites sp.

The species was recorded previously in Turkey on Phragmites sp. in Ankara (Kaydan et al., 2004).

****Coccurea circumscripta* (Kiritchenko, 1936)**

Material examined. Iğdir, Gaziler, 40°06.332'N 43°29.423'E, 1014 m, 3 May 2005, 5 females (CCVT 1402) on undetermined plant.

****Dysmicoccus brevipes* (Cockerell, 1875)**

Material examined. Van, Center, 1720 m, 18 June 2006, 3 females (CCVT 3120) on Ananas comosus.

***Euripersia amnicola* Borchsenius, 1948**

Material examined. Ağrı, Center, 39°39.99'N 43°01.032'E, 1643 m, 1 June 2005, 1 female (CCVT 1641) on undetermined plant; Doğubeyazıt, 39°35.420'N 43°46.092'E, 1822 m, 11 July 2007, 1 female (CCVT 4150) on Poaceae; Doğubeyazıt-Telçeker, 39°29.251'N 44°15.345'E, 1544 m, 7 June 2006, 3 females (CCVT 2925) on Poaceae; Nuh's Ark, 39°26.561'N 44°14.018'E, 1978 m, 7 June 2006, 2 females (CCVT 2914) on Poaceae. Bitlis, Adilcevaz-Aygır lake, 38°50.174'N 42°48.824'E, 1950 m, 14 June 2005, 1 female (CCVT 1777) on Poaceae; Hizan road, 38°17.425'N 42°16.572'E, 1550 m, 22 June 2006, 1 female (CCVT 3014) on Hordeum sp. Iğdir, Iğdir road, 34°46.438'N 44°08.495'E, 1515 m, 12 June 2007, 1 female (CCVT 3559) on Poaceae; Tuzluca-Gaziler, 40°06.198'N 43°27.931'E, 1037 m, 28 June 2005, 1 female (CCVT 1965) on Stipa sp. Van, Bahçe-saray, 38°09.232'N 42°58.240'E, 2450 m, 25 June 2007, 1 female (CCVT 3785) on undetermined plant; Başkale road, 39°06.188'N 44°06.494'E, 2074 m, 25 May 2007, 1 female (CCVT 3385) on Juncus sp.; Başkale-Hoşap road, 37°53.236'N 44°05.585'E, 1883 m, 14 June 2006, 1 female (CCVT 2967) on Juncaceae; Çaldıran, 39°07.467'N 43°53.153'E, 2053 m, 20 July 2005, 1 female (CCVT 2216) on Festuca sp.; Gürpınar-Kırkgeçit, 38°09.423'N 43°30.572'E, 2092 m, 29 June 2007, 5 females (CCVT 3880) on Bromus sp.; Hoşap-Başkale, 38°13.542'N 43°53.222'E, 2322 m, 14 June 2006, 3 females (CCVT 2946) on Poaceae; Hoşap road, 38°20.727'N 43°45.230'E, 1854 m, 9 June 2005, 5 females (CCVT 1733) on Stipa sp.; Özalp-Dönerdere road, 38°41.414'N

44°07.910'E, 2091 m, 5 July 2005, 4 females (CCVT 2015) on *Stipa* sp.

The species was collected previously on *Stipa holosenica* in Van (Kaydan et al., 2005).

****Fonscolombia europaea*** (Newstead, 1897)

Material examined. *Iğdir*, Tuzluca-Gaziler road, 40°06.198'N 43°27.931'E, 1037 m, 28 June 2005, 1 female (CCVT 1947) on undetermined plant.

****Helicococcus glacialis*** (Newstead, 1900)

Material examined. *Iğdir*, Tuzluca-Aşağısutası, 39°55.838'N 43°77.381'E, 1734 m, 31 Aug 2005, 4 females (CCVT 2244) on *Medicago* sp.

Helicococcus radicolica Goux, 1931

Material examined. *Bitlis*, Hizan, 38°14.696'N 42°27.373'E, 1420 m, 22 June 2006, 1 female (CCVT 2991) on Asteraceae; Hizan, 38°15.153'N 42°27.447'E, 1404 m, 22 June 2006, 1 female (CCVT 2992) on Asteraceae; Hizan road, 38°13.619'N 42°21.607'E, 1672 m, 22 June 2006, 1 female (CCVT 2999) on *Eryngium campestre*. *Hakkari*, Kırkağaçtan, 37°36.133'N 45°48.684'E, 1332 m, 4 July 2007, 3 females (CCVT 4042) on undetermined plant, Çukurca-Beytülşebap road, 37°29.205'N 43°28.689'E, 1098 m, 5 May 2007, 1 female (CCVT 3223) on *Poa* sp; *Hakkari* road, 37°41.673'N 42°52.296'E, 1539 m, 4 July 2007, 1 female (CCVT 4027) on undetermined plant. *Van*, Albayrak, 38°06.373'N 44°06.599'E, 2095 m, 25 May 2007, 1 female (CCVT 3348) on *Aethionema arabicum*.

The species was previously recorded in Turkey on *Dianthus* sp. (Güzelyurt-Nevşehir) (Kaydan et al., 2001b) and on a plant of the family Brassicaceae (Bala-Ankara) (Kaydan et al., 2004).

Heterococcopsis opertus Borchsenius, 1949

Material examined. *Bitlis*, Hizan-Gayda-Köprüağızı, 38°08.051'N 42°26.224'E, 1113 m, 10 Aug. 2005, 5 females (CCVT 2212) on *Agropyron repens*; *Van*, Çatak-Pervari road, 37°57.57'N 43°00.496'E, 1364 m, 19 July 2005, 7 females (CCVT 2054) on *Cynodon dactylon*; Özalp road, 38°36.285'N 43°34.146'E, 1820 m, 5

July 2005, 2 females (CCVT 2012) on *Cynodon dactylon*.

The species was recorded earlier in Turkey (Ankara) on *Cynodon dactylon* (Kaydan et al., 2005).

Heterococcus nudus (Green, 1926)

Material examined. *Hakkari*, Yüksekove-Büyük Çiftlik, 37°35.596'N 44°05.243'E, 1913 m, 4 Aug. 2005, 4 females (CCVT 2188) on Poaceae. *Iğdir*, Aralık, 39°52.246'N 44°30.748'E, 870 m, 2 May 2005, 2 females (CCVT 1394) on Poaceae.

This Holarctic species was recorded previously in Turkey on different host plants (Ankara) (Kaydan et al., 2005).

Longicoccus affinis (Ter-Grigorian, 1967)

Material examined. *Iğdir*, Tuzluca-Uç kaya, 39°56.484'N 43°38.985'E, 1652 m, 31 Aug. 2005, 3 females (CCVT 2275) on *Agropyron repens*.

The species was recorded previously in Turkey (Ankara) on *Hordeum bulbosa* (Kaydan et al., 2005).

Longicoccus clarus (Borchsenius, 1949)

Material examined. *Iğdir*, Doğubeyazıt Road, 39°46.438'N 44°08.481'E, 1515 m, 12 June 2007, 1 female (CCVT 3604) on Poaceae.

The species was recorded previously in Turkey (Ankara) on *Cynodon dactylon* (Kaydan et al., 2005).

****Metadenopus festucae*** Šulc, 1933

Material examined. *Ağrı*, Hamur-Tutak road, 39°35.724'N 42°55.389'E, 1616 m, 29 Sept. 2005, 9 females (CCVT 2484) on Poaceae. *Hakkari*, Esendere-Altınbaşak, 37°42.415'N 44°32.033'E, 1810 m, 3 Sept. 2005, 3 females (CCVT 2193) on Poaceae.

This species has a Palearctic distribution and is here recorded in Turkey for the first time.

****Mirococcopsis avetianae*** Ter-Grigorian, 1964

Material examined. *Van*, Gürpınar-Taşçene, 38°01.87'N 43°31.654'E, 2408 m, 1 June 2006, 1 female (CCVT 2800) on Poaceae.

**Mirococcopsis ammophila* Bazarov & Nurmamatov, 1975

Material examined. *Iğdir*, İpsiz, 40°02.967'N 43°24.769'E, 2001 m, 13 June 2007, 2 females (CCVT 3548) on Brassicaceae. *Van*, Gürpınar, 38°21.071'N 43°25.084'E, 1855 m, 29 June 2007, 1 female (CCVT 3815) on undetermined plant; Gürpınar-Kırkgeçit, 38°08.988'N 43°30.217'E, 2079 m, 9 June 2005, 3 females (CCVT 1728) on *Thymus* sp.; Çaldıran, 39°07.467'N 43°53.153'E, 2053 m, 21 July 2005, 2 females (CCVT 2082) on undetermined plant; Özalp-Dönerdere road, 38°41.414'N 44°07.91'E, 2091 m, 5 July 2005, 5 females (CCVT 1988) on *Papaver* sp.

**Mirococcopsis subalpina* (Danzig, 1985)

Material examined. *Van*, Hoşap-Başkale road, 38°13.542'N 43°53.222'E, 2322 m, 14 June 2006, 2 females (CCVT 2974) on Poaceae.

**Mirococcopsis teberdae* (Danzig, 1985)

Material examined. *Van*, Bahçesaray road, 38°08.765'N 42°51.506'E, 2605 m, 25 June 2007, 4 females (CCVT 3798) on Poaceae.

Neotrionymus monstatus (Ter-Grigorian 1973)

Material examined. *Hakkari*, Başkale road, 37°48.480'N 44°05.146'E, 1835 m, 22 May 2008, 3 females (CCVT 4243) on Phragmites sp.

The species was recorded previously in Turkey (Ankara) on *Phragmites communis* (Kaydan et al., 2005).

Peliococcopsis priesneri (Laing, 1936)

Material examined. *Iğdir*, Tuzluca-Aşağı Sutası, 39°55.838'N 43°37.351'E, 1734 m, 31 July 2005, 3 females (CCVT 2276) on *Cynodon dactylon*.

The species was recorded previously in Turkey (Ankara) on *C. dactylon* (Kaydan et al., 2005).

Peliococcus manifectus Borchsenius, 1949

Material examined. *Iğdir*, Aralık-Tigem, 39°44.295'N 44°29.998'E, 1196 m, 10 May 2006, 1 female (CCVT 2633) on *Artemisia vulgaris*.

Van, Bahçesaray-Gayda road, 28 June 2006, 38°07.371'N 42°36.893'E, 1807 m, undetermined plant, 2 female (CCVT 3084).

The species was recorded previously in Turkey (Ankara and Van) on different plants (Kaydan et al., 2001a, 2005).

Peliococcus salviae Hadzibejli, 1963

Material examined. *Ağrı*, Eleşkirt-Süzgeçli, 39°46.536'N 42°39.626'E, 1810 m, 30 May 2005, 1 female (CCVT 1609) on *Carduus* sp.; Doğubeyazıt-Iğdır road, 39°56.836'N 43°37.38'E, 1734 m, 31 Aug. 2005, 2 females (CCVT 2248) on Boraginaceae; Doğubeyazıt-Çaldıran, 39°25.973'N 43°59.11'E, 1975 m, 11 July 2007, 1 female (CCVT 4149) on *Phlomis* sp.

The species was recorded previously in Turkey (Ankara) on a plant of the family Brassicaceae (Kaydan et al., 2005).

Peliococcus tritubulatus Kiritshenko, 1940

Material examined. *Ağrı*, Doğubeyazıt-İshakpaşa, 39°31.255'N 44°07.915'E, 1940 m, 29 Sept. 2005, 2 females (CCVT 2478) on *Euphorbia sequieriana*; Doğubeyazıt-Iğdır road, 39°37.662'N 44°02.333'E, 1551 m, 12 June 2007, 3 females (CCVT 3589) on *E. sequieriana*; Doğubeyazıt, 39°26.847'N 44°14.405'E, 1865 m, 27 Sept 2005, 4 females (CCVT 2434) on *E. sequieriana*; Doğubeyazıt, 39°35.42'N 43°46.092'E, 1822 m, 11 July 2007, 1 female (CCVT 4136) on *E. sequieriana*; Doğubeyazıt-Gürbulak, 39°25.853'N 44°20.218'E, 1510 m, 27 Sept. 2005, 2 females (CCVT 2417) on *E. sequieriana*. *Van*, Çaldıran-Y. Yanıktaş, 39°13.856'N 43°52.863'E, 2218 m, 21 July 2005, 2 females (CCVT 2096) on *E. sequieriana*.

The species was recorded previously in Turkey (Ankara) on a plant of the family Asteraceae (Kaydan et al., 2005).

**Phenacoccus angustatus* Borchsenius, 1949

Material examined. *Van*, Başkale-Hoşap, 38°15.268'N 43°52.669'E, 2180 m, 25 May 2007, 2 females (CCVT 3376) on *Poa* sp.

Phenacoccus avenae Borchsenius, 1949

Material examined. *Bitlis*, Hizan Road, 38°14.26'N 42°19.479'E, 1906 m, 22 June 2006,

Poaceae, 1 female (CCVT 2995). *Van*, Çatak, 37°59.994'N 43°03.599'E, 1508 m, 16 May 2006, 1 female (CCVT 2646) on *Poa bulbosa*; Çatak, 37°59.994'N 43°03.559'E, 1508 m, 16 May 2006, 1 female (CCVT 2661) on *Poa bulbosa*; *Hakkari*, Çukurca road, 37°16.303'N 43°35.155'E, 810 m, 22 May 2006, 2 females (CCVT 2697) on *Avena sterilis*.

The species was recorded from plant stock of the families Poaceae, Amaryllidaceae, Iridaceae and Liliaceae, which were exported from Turkey to USA, England and Holland (Williams and Miller, 1985). Since then, this species has been collected in Turkey (Ankara) on different plants (Kaydan et al., 2005).

***Phenacoccus emansor* Williams & Kozarzhevskaya, 1988**

Material examined. *Iğdır*, Aralık road, 39°58.864'N 44°11.909'E, 846 m, 27 June 2005, 9 females (CCVT 1917) on Asteraceae.

The species was recorded on plant stock of the families Iridaceae and Liliaceae, which were exported from Turkey to Holland and England (Williams and Kozarzhevskaya, 1988).

****Phenacoccus eurotiae* Danzig, 1975**

Material examined. *Ağrı*, Doğubeyazıt-Iğdır road, 39°41.947'N 44°05.803'E, 1532 m, 30 Aug. 2005, 2 females (CCVT 2261) on Labiatae; Erzurum Road, 39°53.221'N 42°22.974'E, 2136 m, 9 June 2006, 1 female (CCVT 2872) on undetermined plant. *Van*, Albayrak-Bebleşin, 38°08.379'N 44°13.222'E, 2070 m, 11 May 2005, 3 females (CCVT 1450) on undetermined plant; Gürpınar-Kırkgeçit, 38°13.414'N 43°32.684'E, 2143 m, 9 June 2005, 2 females (CCVT 1724) on *Thymus* sp.

****Phenacoccus incertus* (Kiritshenko, 1940)**

Material examined. *Ağrı*, Mount Ağrı, 39°36.52'N 41°12.498'E, 1635 m, 7 June 2006, 4 females (CCVT 2942) on Poaceae; Doğubeyazıt-İshak Paşa, 39°31.103'N 44°07.719'E, 1929 m, 8 June 2006, 1 female (CCVT 2947) on Poaceae; Doğubeyazıt-Iğdır road, 39°41.847'N 44°05.8'E,

1532 m, 30 Aug. 2005, 2 females (CCVT 2241); *Lactuca* sp. *Bitlis*, Adilcevaz-Patnos road, 38°55.913'N 42°59.951'E, 1768 m, 10 July 2007, 2 females (CCVT 4098) on *Centaurea* sp. *Iğdır*, Doğubeyazıt road, 39°50.467'N 44°04.096'E, 935 m, 29 June 2005, 1 female (CCVT 1960) on *Hordeum* sp. *Van*, Muradiye-Beydağı, 38°55.511'N 43°46.185'E, 1781 m, 22 June 2007, 1 female (CCVT 3695) on *Capsella bursa-pastoris*; Özalp, 38°39.97'N 43°47.344'E, 1922 m, 18 June 2007, 3 females (CCVT 3628) on Brassicaceae; Özalp, 38°39.97'N 43°47.344'E, 1922 m, 18 June 2007, 2 females (CCVT 3642) on Poaceae; Özalp road, 38°36.285'N 43°34.146'E, 1820 m, 5 July 2005, 3 females (CCVT 2020) on *Aegilops* sp.

****Phenacoccus kokandicus* Nurmamatov, 1986**

Material examined. *Bitlis*, Hizan-Dağarkan, 38°16.139'N 42°25.058'E, 1635 m, 22 June 2006, 1 female (CCVT 2998) on Poaceae.

***Phenacoccus loiki* Danzig, 2001**

Material examined. *Ağrı*, Doğubeyazıt, 39°27.383'N 44°14.982'E, 1694 m, 7 June 2006, 1 female (CCVT 2929) on Poaceae. *Iğdır*, Tuzluca road, 40°02.95'N 43°44.683'E, 1015 m, 3 May 2005, 1 female (CCVT 1404) on dried leaf of Poaceae. *Van*, Bahçesaray-Gayda road, 38°07.299'N 42°36.282'E, 1603 m, 28 June 2006, 2 females (CCVT 3056) on Secale sp.

The species was recorded previously in Turkey (Ankara) on *Hordeum murinum* (Kaydan et al., 2005).

****Phenacoccus persimplex* Borchsenius, 1949**

Material examined. *Iğdır*, A. Aktaş, 40°06.089'N 43°30.858'E, 1197 m, 13 June 2007, 1 female (CCVT 3580) on Asteraceae; Digor road, 40°07.034'N 43°37.680'E, 978 m, 13 June 2007, 2 females (CCVT 3577) on *Matricaria* sp.; İpsiz, 40°03.942'N 43°25.244'E, 1807 m, 13 June 2007, 1 female (CCVT 3582); undetermined plant. *Van*, Albayrak, 38°08.935'N 44°12.835'E, 2064 m, 25 May 2007, 5 females (CCVT 3388) on *Artemisia* sp.; Bahçesaray road, 38°09.232'N 42°58.24'E, 2450 m, 25 May 2007, 2 females (CCVT 3781) on Apiaceae.

****Phenacoccus querculus*** (Borchsenius, 1949)

Material examined. Van, Gevaş-Artos, 38°16.159'N 43°08.421'E, 2248 m, 5 June 2007, 3 females (CCVT 3503) on *Quercus* sp.

****Phenacoccus prope schmelevi*** Bazarov, 1980

Material examined. Ağrı, Doğubeyazıt-Nuh's ark, 39°26.561'N 44°14.018'E, 1978 m, 7 June 2006, 1 female (CCVT 2831) on undetermined plant. *Hakkari*, Yüksekova-Şemdinli road, 37°25.931'N 44°26.213'E, 1924 m, 6 July 2007, 3 females (CCVT 4032) on undetermined plant. *Iğdır*, Digor road, 40°07.034'N 43°37.678'E, 978 m, 13 June 2007, 1 female (CCVT 3587) on undetermined plant; Tuzluca-Üç kaya, 39°56.484'N 43°38.985'E, 1652 m, 31 Aug. 2005, 1 female (CCVT 2269) on *Apiaceae*. Van, Bahçe-saray road, 38°14.705'N 43°14.558'E, 1932 m, 25 June 2007, 2 females (CCVT 3761) on *Alyssum* sp.; Gürpınar, 38°21.071'N 43°25.084'E, 1835 m, 29 June 2007, 1 female (CCVT 3840) on undetermined plant; Özalp road, 38°39.680'N 43°59.406'E, 1926 m, 18 June 2007, 6 females (CCVT 3660) on undetermined plant; Özalp road, 38°39.522'N 43°57.287'E, 2001 m, 5 July 2005, 1 female (CCVT 1992) on *Verbascum* sp.; Özalp road, 18 June 2007, 2 females (CCVT 3666) on *Poaceae*.

****Phenacoccus strigosus*** Borchsenius, 1949

Material examined. Van, Gürpınar-Çatak, 38°03.868'N 43°25.18'E, 1926 m, 29 June 2007, 1 female (CCVT 3870) on *Lactuca* sp.

Planococcus ficus (Signoret, 1875)

Material examined. Bitlis, Alaniçi, 38°12.792'N, 41°51.165'E, 850 m, 12 Oct. 2005, 2 females (CCVT 2504) on *Ficus carica*. *Hakkari*, Çukurca road, 37°20.340'N 43°30.547'E, 794 m, 15 Sept. 2005, 2 females (CCVT 2357) on *Ficus carica*; Çukurca-Narlı, 37°15.282'N 43°35.228'E, 792 m, 15 Sept. 2005, 5 females (CCVT 2324) on *Platanus orientalis*.

This cosmopolitan species was recorded previously in Turkey (Ankara, Burdur İzmir, Niğde, Marmara Region and Rize) on *Ficus* sp., *F. carica*, *Hoya* sp., *Marantha*

leuconeura, *Nerium oleander*, *Punica granatum* and *Vitis* sp. (Düzgüneş 1982; Lodos 1986; Kaydan et al., 2004, 2005).

Planococcus vovae (Nasonov, 1908)

Material examined. Bitlis, Adilcevaz-Center, 38°47.914'N 42°44.193'E, 1653 m, 14 June 2005, 10 females (CCVT 1756) on *Cupressus* sp.; Hizan-Gayda, 38°09.002'N 42°23.751'E, 1266 m, 10 Aug. 2005, 4 females (CCVT 2211) on *Juniperus oxycedrus oxycedrus*; Hizan-Gayda road, 38°11.68'N 42°23.372'E, 1276 m, 22 June 2006, 2 females (CCVT 3012) on *Juniperus* sp.; Karıncalar, 38°16.79'N 41°58.218'E, 1134 m, 12 Oct. 2005, 2 females (CCVT 2512) on *Juniperus* sp.; Bitlis road, 38°12.133'N 41°49.691'E, 797 m, 23 June 2006, 4 females (CCVT 3023) on *Juniperus* sp.

This Palearctic species was previously recorded in Turkey (Middle Anatolia, Marmara and Mediterranean regions) on *Cupressus sempervirens*, *C. goveniana*, *Cupressus* sp., *Juniperus excelsa*, *Laurus nobilis*, *Libocedrus decurrens*, *Taxus baccata*, and *Thuja occidentalis* (Çanakçıoğlu, 1977; Kaydan et al., 2005, 2007).

****Pseudococcus comstocki*** (Kuwana, 1902)

Material examined. Iğdır, Akyumak, 39°57.895'N 44°03.265'E, 880 m, 14 June 2007, 4 females (CCVT 3539) on *Morus* sp.; Kadıkışlak, 40°01.528'N 44°04.647'E, 862 m, 14 June 2007, 4 females (CCVT 3541) on *Vitis vinifera*; Melekli, 39°56.754'N 44°03.963'E, 863 m, 12 June 2007, 4 females (CCVT 3540) on *Morus* sp.; Center, 39°56.415'N 44°06.113'E, 850 m, 12 June 2007, 6 females (CCVT 3538) on *Morus* sp.; Center, 14 June 2007, 4 females (CCVT 3537) on *Platanus orientalis*; Center, 14 June 2007, 4 females (CCVT 3542) on *Morus* sp.; Aralık Tigem, 39°47.125'N 44°37.201'E, 842 m, 10 May 2006, 4 females (CCVT 2565) on *Morus* sp.; Center, 39°55.576'N 44°02.678'E, 871 m, 1 Sept. 2005, 9 females (CCVT 2228) on *Morus* sp.; Kadıkışlak, 40°01.496'N 44°04.627'E, 863 m, 29 June 2005, 4 females (CCVT 1951) on *Vitis vinifera*; Kadıkışlak, 40°01.513'N 44°04.623'E, 867 m, 30 Aug. 2005, 4 females (CCVT 2220) on *Vitis vinifera*; Kadıkışlak, 40°01.418'N 44°04.914'E, 868 m, 30 Aug. 2005, 2 females (CCVT 2229) on *Morus* sp.; Karakoyunlu road,

39°57.416'N 44°07.577'E, 835 m, 1 Sept. 2005, 5 females (CCVT 2226) on *Morus* sp.; Melekli, 39°57.196'N 44°07.213'E, 861 m, 10 June 2006, 4 females (CCVT 3052) on *Morus* sp.; Melekli, 39°56.775'N 44°06.219'E, 865 m, 27 June 2005, 4 females (CCVT 1842) on *Morus* sp.; Center, 39°55.549'N 44°02.678'E, 848 m, 3 June 2005, 8 females (CCVT 1395) on *Morus* sp.; Center, 39°55.516'N 44°02.696'E, 858 m, 1 June 2005, 7 females (CCVT 2225) on *Morus* sp.; Center, 29 June 2005, 3 females (CCVT 1892) on *Morus* sp.; Center, 39°58.522'N 44°02.733'E, 864 m, 27 June 2005, 9 females (CCVT 1844) on *Morus* sp.

****Puto megriensis* (Borchsenius, 1948)**

Material examined. Van, Çatak, 38°06.795'N 43°08.736'E, 2100 m, 16 May 2006, 2 females (CCVT 2664) on undetermined plant; Gürpınar-Kırkgeçit, 38°13.414'N 43°32.684'E, 2143 m, 9 June 2005, 2 females (CCVT 1729) on *Cnicus* sp.

***Rhodania porifera* Goux, 1935**

Material examined. Ağrı, Doğubeyazıt road, 39°21.139'N 44°00.152'E, 2600 m, 27 Sept. 2005, 9 females (CCVT 2442) on Poaceae; Eleşkirt-Yücekep, 39°43.959'N 42°44.477'E, 1717 m, 9 June 2006, 3 females (CCVT 2895) on Poaceae; Tendürek, 39°21.142'N 44°00.122'E, 2598 m, 7 June 2006, 3 females (CCVT 2915) on Poaceae; Lake Balık, 39°45.022'N 43°30.145'E, 2475 m, 8 June 2006, 2 females (CCVT 2927) on Poaceae; Lake Balık, 39°45.022'N 43°30.145'E, 2475 m, 8 June 2006, 4 females (CCVT 2983) on Poaceae. Van, Çaldıran-Doğubeyazıt road, 39°13.150'N 44°01.687'E, 2152 m, 7 June 2006, 2 females (CCVT 2923) on Poaceae; Muradiye-Çiçekli, 39°11.258'N 43°43.158'E, 2350 m, 31 May 2006, 1 female (CCVT 2770) on *Stipa* sp.

The species was previously recorded in Turkey (Ankara) on *Festuca* sp. (Kaydan et al., 2004).

****Ripersiella parva* (Danzig, 1985)**

Material examined. Ağrı, Tutak, 39°31.927'N 42°48.157'E, 1581 m, 10 July 2007, 2 females (CCVT 4124) on undetermined plant.

***Ripersiella periolana* Goux, 1985**

Material examined. Hakkari, Çukurca-Beytüleşap road, 37°29.205'N 43°28.689'E, 9 May

2007, 9 females (CCVT 3220) on *Poa* sp.; Van, Çatak, 37°59.994'N 43°03.559'E, 1508 m, 16 May 2006, 3 females (CCVT 2662) on *Poa bulbosa*.

The species was previously recorded in Turkey (Ankara) on *Stipa* sp. (Kaydan et al., 2005).

****Ripersiella petiti* (Goux, 1941)**

Material examined. Ağrı, Adilcevaz-Patnos road, 38°55.913'N 42°59.951'E, 1768 m, 10 July 2007, 6 females (CCVT 4121) on undetermined plant.

****Ripersiella poltavae* (Laing, 1929)**

Material examined. Hakkari, Çukurca road, 37°28.767'N 43°37.5'E, 1187 m, 9 May 2007, 1 female (CCVT 3225) on *Veronica* sp.

****Spilococcus vashlovanicus* Danzig, 1998**

Material examined. Bitlis, Bitlis river, 38°16.510'N 41°57.958'E, 1206 m, 23 June 2006, 2 females (CCVT 3027) on *Centaurea* sp. Hakkari, Çukurca road, 37°28.725'N 43°31.831'E, 1313 m, 4 July 2007, 2 females (CCVT 3979) on undetermined plant; Çukurca road, 37°28.725'N 43°32.831'E, 1313 m, 4 July 2007, 4 females (CCVT 3990) on Brassicaceae; Yüksekova road, 37°41.940'N 44°03.039'E, 1313 m, 6 July 2007, 4 females (CCVT 3994) on undetermined plant; Şemdinli road, 37°24.219'N 44°30.087'E, 1659 m, 6 July 2007, 2 females (CCVT 4010) on undetermined plant.

***Trionymus perrisii* (Signoret, 1875)**

Material examined. Ağrı, Center, 39°40.743'N 43°01.385'E, 1660 m, 29 Sept. 2005, 1 female (CCVT 2486) on Poaceae; Hamur, 39°35.728'N 42°55.389'E, 1616 m, 29 Sept. 2005, 1 female (CCVT 2481); *Aegilops* sp. Bitlis, Maunt Nemrut, 38°34.977'N 42°16.191'E, 2435 m, 23 June 2006, 1 female (CCVT 3046) on Poaceae. Van, Gürpınar-Çatak, 38°03.868'N 43°25.108'E, 1926 m, 29 June 2007, 1 female (CCVT 3877) on Poaceae.

The species was previously recorded in Turkey (Ankara and Van) on *Agropyron* sp., *Elymus* sp., *Hordeum murinum*, *Caucalis* cf. *platycarpus* (Kaydan et al., 2001 a; 2005).

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