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IRANIAN THRIPS OF THE FAMILY AEOLOTHRIPIDAE (INSECTA, THYSANOPTERA), WITH FOUR NEWLY RECORDED SPECIES

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Iranian Thrips of the Family Aeolothripidae (Insecta, Thysanoptera), with Four Newly Recorded Species. Mirab-balou M., Chen X.-X. — The family Aeolothripidae (Thysanoptera, Terebrantia) included seventeen species in four genera from Iran. Here, four species are recorded from Iran for the first time: *Aeolothrips albicinctus* Haliday, *A. cursor* Priesner, *A. montivagus* Priesner and *A. gloriosus* Bagnall. A checklist of all Iranian species of the family Aeolothripidae, with geographical distributions for each species is provided. New distribution records of eight species in Iran are reported.

Key words: Aeolothripidae, new records, distribution, Iran.

Трипсы семейства Aeolothripidae (Insecta, Thysanoptera) в фауне Ирана с четырьмя впервые отмеченными видами. Мираб-балу М., Чен С.-С. — Семейство Aeolothripidae (Thysanoptera, Terebrantia) было известно из Ирана по семнадцати видам из четырех родов. Впервые для фауны Ирана отмечены четыре вида: *Aeolothrips albicinctus* Haliday, *A. cursor* Priesner, *A. montivagus* Priesner и *A. gloriosus* Bagnall. Приведен список всех иранских видов Aeolothripidae с данными об их географическом распространении. Также приводятся точки новых находок еще восьми видов.

Ключевые слова: Thysanoptera, Aeolothripidae, новые находки, распространение, Иран.

Introduction

Thrips of the family Aeolothripidae (Thysanoptera, Terebrantia) can be recognized by their broad fore wings with rounded apex and usually with black and white transverse bands. They have 9-segmented antenna, elongate and parallel-sided segments III–V, sensoria on segments III and IV flat, linear or oval and upturned ovipositor (Nakahara, 1991). Adults and larvae of many species in this family are believed to be facultative predators of other small arthropods, feeding on both floral tissues as well as on thrips and mites that live in flowers (Mirab-balou et al., 2011). However, some species are almost certainly solely phytophagous, a few being univoltine in flowers of particular plant species (Tyagi et al., 2008); whereas in the warmer parts of the world, a considerable number of species are obligate predators (Hoddle, 2003).

This family includes about 210 species in 28 genera worldwide (Mound, 2012). Of these, only 17 species in four genera have been recorded from Iran (Bhatti et al., 2009; Fallahzadeh et al., 2011). Here, a key is provided for identifying these genera and species including four newly recorded species of *Aeolothrips* from Iran. All species of Aeolothripidae from Iran with their geographical distribution are listed in the table 1. The distribution map of Iranian Aeolothripidae is shown in figure 21.

Material and methods

Specimens were collected from different sites of Iran during 2008–2011. In laboratory, thrips have been prepared and mounted on slides using the method of Mirab-balou, Chen (2010). Photos were made with a Leica DM IRB microscope, a Leica MZ APO microscope with a Leica Image 1000 system; and all scale bars is 30 microns. The specimens are deposited in the Institute of Insect Sciences, Zhejiang University, Hangzhou, China (ZJUH).

Table 1. Aeolothripidae recorded from Iran with geographical distribution in Iran
Таблица 1. Представители семейства Aeolothripidae, обнаруженные в Иране, и их географическое распространение

Thrips species	Distribution in Iran (Province-wise)
<i>Aeolothrips afghanus</i> Jenser	Kerman
<i>Aeolothrips albicinctus</i> Haliday**	Hamedan*, Alborz*
<i>Aeolothrips balati</i> Pelikán	Fars
<i>Aeolothrips citricinctus</i> Bagnall	Fars
<i>Aeolothrips collaris</i> Priesner	Fars, Khuzestan, Kerman, Isfahan, Khorasan-e-Shomali, Golestan, Guilan, Hamedan*, Alborz*
<i>Aeolothrips cursor</i> Priesner**	Hamedan*
<i>Aeolothrips deserticola</i> Priesner	Khuzestan, Hamedan*
<i>Aeolothrips fasciatus</i> (Linnaeus)	Isfahan, Fars, Kerman, Yazd, Hamedan*, Alborz*, Kermanshah*, Zanzan*, Azarbaijan-e-Sharghi*, Azarbaijan-e-Gharbi*, Lorestan*, Markazi*, Ardabil*, Ghom*, Chehar Mahal Bakhtiari*
<i>Aeolothrips gloriosus</i> Bagnall**	Hamedan*, Zanzan*
<i>Aeolothrips heinzi</i> zur Strassen	Kerman
<i>Aeolothrips intermedius</i> Bagnall	Isfahan, Khuzestan, Yazd, Kerman, Fars, Golestan, Tehran, Alborz, Guilan, Zanzan*, Azarbaijan-e-Sharghi*, Qazvin*, Kermanshah*, Azarbaijan-e-Gharbi*, Kordestan*, Hamedan*
<i>Aeolothrips modestus</i> zur Strassen	Fars
<i>Aeolothrips mongolicus</i> Pelikán	Khuzestan, Golestan, Khorasan-e-Shomali, Fars
<i>Aeolothrips montivagus</i> Priesner**	Hamedan*
<i>Aeolothrips tenuicornis</i> Bagnall	Tehran, Ghom, Fars, Khuzestan, Golestan
<i>Aeolothrips versicolor</i> Uzel	Fars, Hamedan*
<i>Indothrips bhushani</i> Bhatti	Khuzestan
<i>Orothrips priesneri</i> (Titschack)	Fars
<i>Rhipidothrips brunneus</i> Williams	Azarbaijan-e-Sharghi, Golestan, Khuzestan, Hamedan*
<i>Rhipidothrips flavus</i> Tunç	Golestan, Hamedan*
<i>Rhipidothrips gratusus</i> Uzel	Azarbaijan-e-Sharghi, Fars, Kerman, Golestan, Hamedan*

* First record for each Province.
 ** First record for Iran.

Key to genera of Aeolothripidae in Iran

Таблица для определения родов семейства Aeolothripidae, встречающихся в Иране

1. Maxillary palps 2-segmented. Labial palp 3-segmented. [Antennal segments III and IV with broad lens-shaped sensory area ventrally at apex (same as *Rhipidothrips*)]. **Indothrips**
 — Maxillary palps 3-segmented. Labial palp 4-segmented. 2
2. Antennal segments III and IV each with two sense cone. **Orothrips**
 — Antennal segments III and IV each with one sense cone. 3
3. Antennal segments V to IX fused (fig. 6). Fore wing with dark transverse bands (fig. 1–3). Pronotum without elongate posteroangular setae (fig. 16). **Aeolothrips**
 — Antennal segments VII to IX fused (fig. 10). Fore wing completely transparent (fig. 4). Pronotum with a pair of elongate posteroangular setae (fig. 15). **Rhipidothrips**

Genus *Aeolothrips* Haliday

The members of this genus are widely distributed and predaceous on other thrips, spider mites, and young scale insects. Both adults and nymphs feed in the same manner as do the majority of Thysanoptera. This genus can be distinguished from other aeolothripids by the antennal segments V to IX fused (fig. 6), linear sensoria on antennal segments III and IV (fig. 7–8, 12) (but the length of antennal segments smaller than that of *Frankliniothrips*), metascutum broadly sculptured (fig. 18, 19), abdominal sternite VII without discal setae (fig. 14), and fore wings with dark transverse bands (fig. 1–3). The genus *Aeolothrips* includes 95 species in the world (Mound, 2012), of which 12 species have been recorded from Iran (Bhatti et al., 2009; Fallahzadeh et al., 2011).

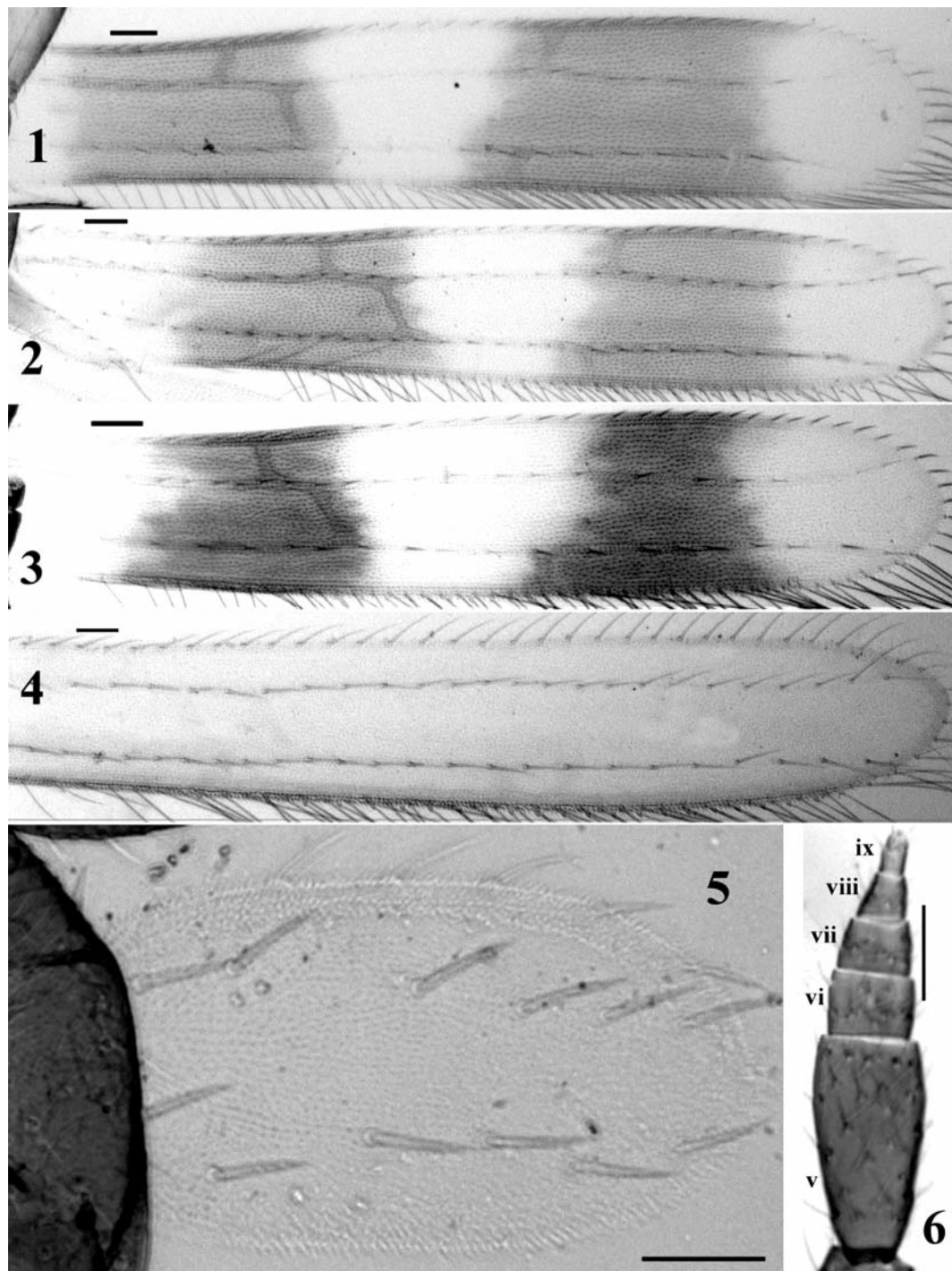


Fig. 1-6. Aeolothripidae in Iran. 1-5. Fore wings: 1 - *A. fasciatus*; 2 - *A. intermedius*; 3 - *A. gloriosus*; 4 - *R. graciosus*; 5 - *R. brunneus*, micropterous form; 6 - *A. intermedius*, antennal segments V-IX. Scale bar 30 μ m.

Рис. 1-6. Семейство Aeolothripidae из Ирана. 1-5. Передние крылья: 1 - *A. fasciatus*; 2 - *A. intermedius*; 3 - *A. gloriosus*; 4 - *R. graciosus*; 5 - *R. brunneus*, микроптерогус форма; 6 - *A. intermedius*, сегменты антенны V-IX. Масштабные линейки 30 мкм.

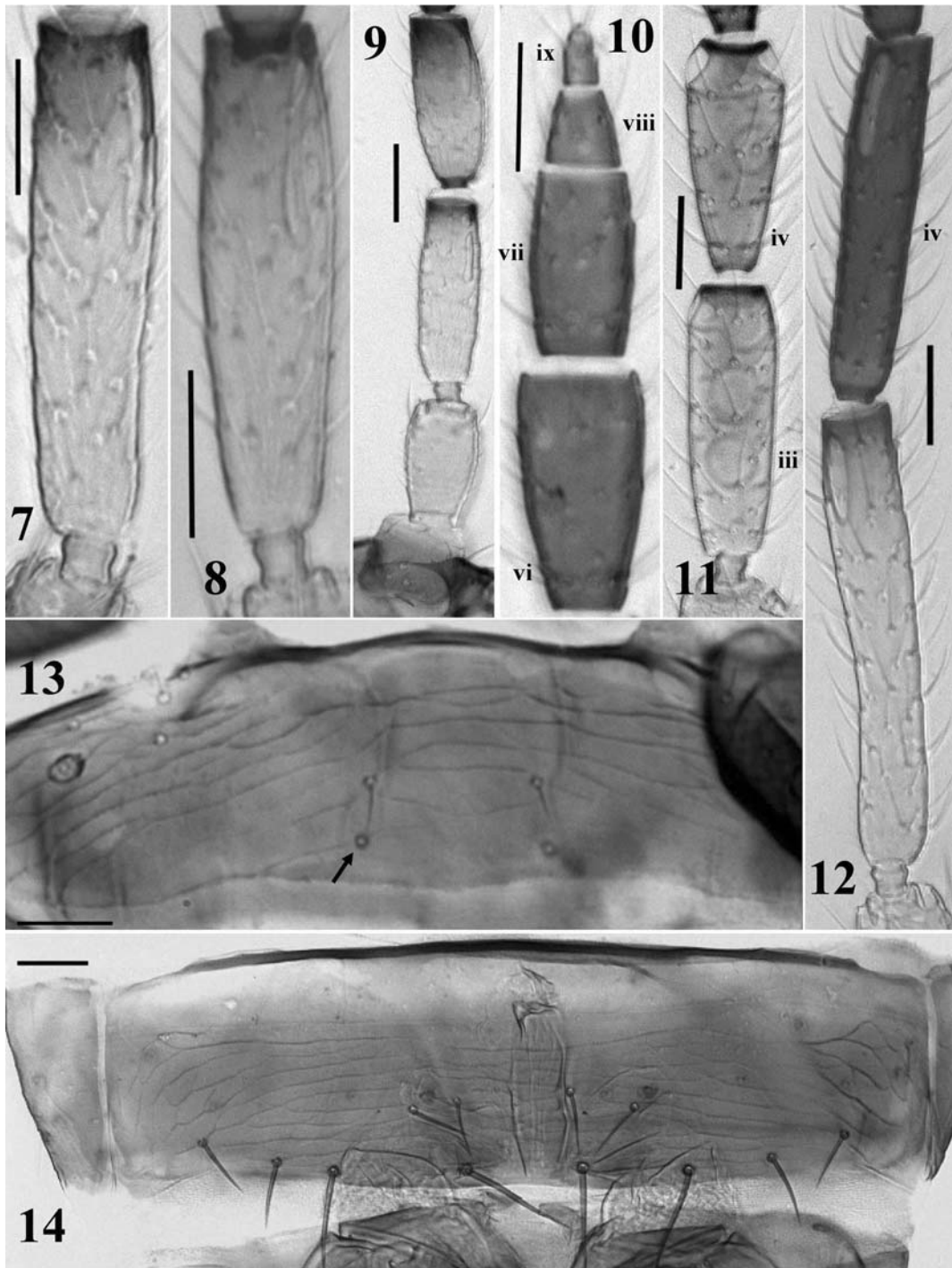


Fig. 7–14. Aeolothripidae in Iran. 7–12. Antennae: 7 – *A. fasciatus*, segment III; 8 – *A. intermedius*, segment III; 9 – *A. gloriosus*, segments I–IV; 10 – *R. graciosus*, segments VI–IX; 11 – *R. brunneus*, segments III–IV; 12 – *A. albicinctus*, segments III–IV; 13 – *A. fasciatus*, tergite I; 14 – *A. intermedius*, sternite VII. Scale bar 30 μ m.

Рис. 7–14. Семейство Aeolothripidae из Ирана. 7–12. Антенна: 7 – *A. fasciatus*, сегмент III; 8 – *A. intermedius*, сегмент III; 9 – *A. gloriosus*, сегменты I–IV; 10 – *R. graciosus*, сегменты VI–IX; 11 – *R. brunneus*, сегменты III–IV; 12 – *A. albicinctus*, сегменты III–IV; 13 – *A. fasciatus*, тергит I; 14 – *A. intermedius*, стернит VII. Масштабные линейки 30 мкм.

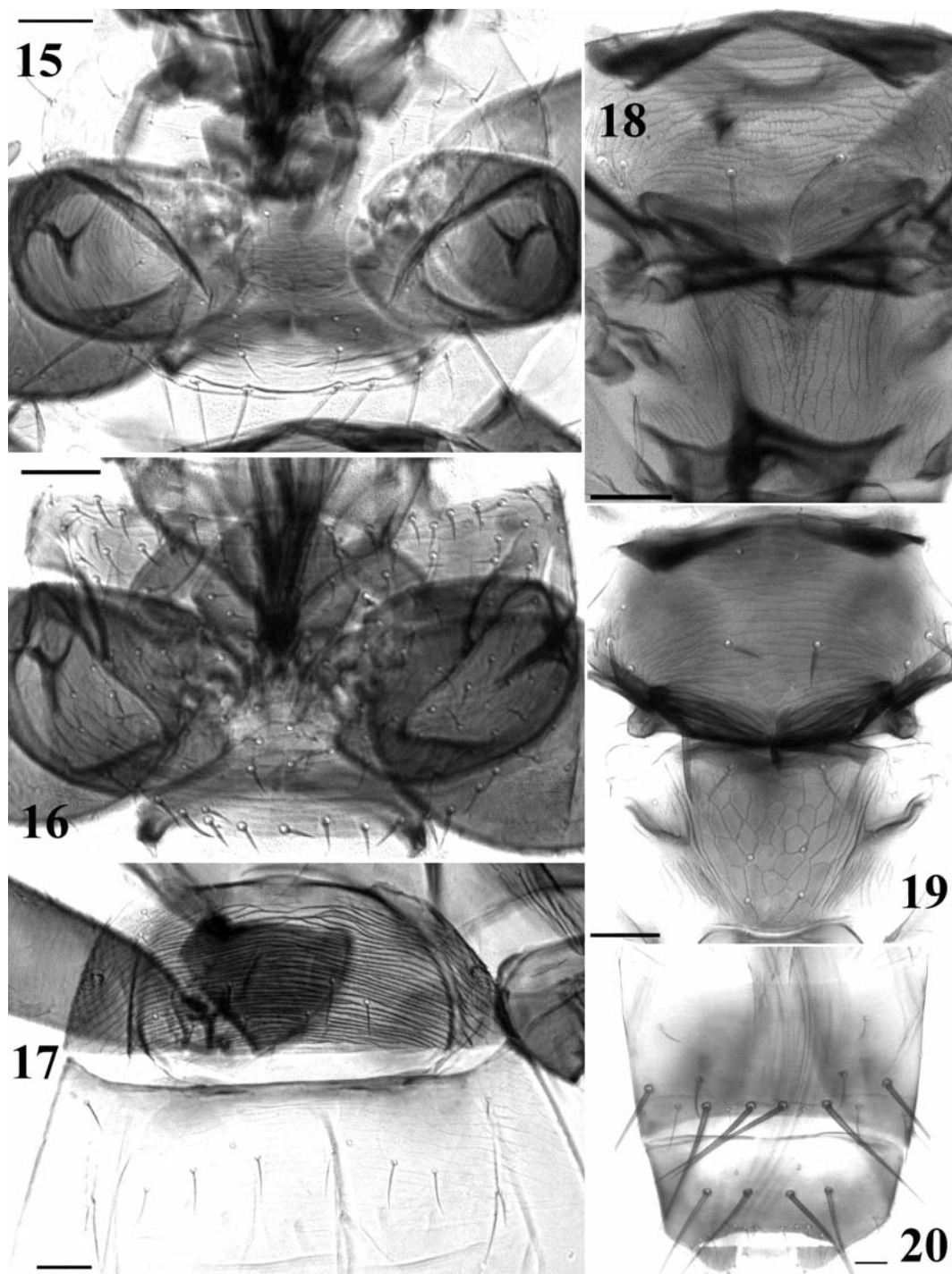


Fig. 15–20. Aeolothripidae in Iran. 15–16. Pronotum: 15 – *R. gratiosus*; 16 – *A. intermedius*; 17 – *A. albicinctus*, abdominal tergites I–II; 18–19. Meso- and metanotum: 18 – *R. gratiosus*; 19 – *A. gloriosus*; 20 – *A. gloriosus*, abdominal tergites IX–X. Scale bar 30 μ m.

Рис. 15–20. Семейство Aeolothripidae из Ирана. 15–16. Пронотум: 15 – *R. gratiosus*; 16 – *A. intermedius*; 17 – *A. albicinctus*, брюшные тергиты I–II; 18–19. Мезо и метанотум: 18 – *R. gratiosus*; 19 – *A. gloriosus*; 20 – *A. gloriosus*, брюшные тергиты IX–X. Масштабные линейки 30 мкм.

Keys to species of this genus are now available from the USA: California (Bailey, 1957); Illinois (Stannard, 1968); Korea (Woo, 1974); Central and South America (Mound, Marullo, 1996); Europe and Mediterranean (zur Strassen, 2003), and China (Han, 1997).

Aeolothrips albicinctus Haliday, 1836

Material examined. **Iran: Hamedan Province:** Nahavand (34.181 N, 48.371 E, 1710 m), ♀ from *Cynodon dactylon* (Poaceae), 3.07.2009, 4.06.2008; ♀ from *C. dactylon*, 4.06.2008. **Alborz Province:** Karaj (35.672 N, 51.424 E, 1149 m), ♀ from *C. dactylon*, 30.05.2009 (Mirab-balou) (ZJUH).

Diagnosis. Female apterous; bicolored, body, legs and antennae brown but abdominal segments II–III yellowish white, also antennal segments II–III. Head and pronotum with no long setae; maxillary palps 3-segmented. Antennae 9-segmented, segment III with linear sense cone near apex scarcely longer than width of segment, on IV about one third of length of this segment (fig. 12); segments IV and V subequal in length, segments V–IX short and sub-equal. Tarsi 2-segmented, fore tarsus with recurved hamus meeting apex of stout seta. Mesonotum with one pair of median setae. Metanotum with little sculpture medially, median setae arise near posterior margin of sclerite. Abdominal tergite I with close set transverse striate (fig. 17); tergites VI–VIII each with 4 pairs of long discal setae; tergite X with one pair of small trichobothria near posterior margin; sternites IV–VI each with four pairs of posteromarginal setae but the lateral two pairs arise submarginally; sternite VII with two pairs of small supernumerary setae between marginal setae S1 and S2.

Remark. The Iranian species of *Aeolothrips* are all associated with flowers except for *A. albicinctus* that is ground-living. This species is recorded from Iran for the first time. The first abdominal tergite in *Aeolothrips albicinctus* is narrow and bears numerous transverse striae; while, is smooth or with weakly striae in other species (fig. 13).

Aeolothrips cursor Priesner, 1939

Material examined. **Iran: Hamedan Province:** Bu-Ali Sina University (34.795 N, 48.514 E, 1824 m), ♀ from *Lolium* sp. (Poaceae), 20.04.2008 (Mirab-balou) (ZJUH).

Diagnosis. Female micropterous. Body and legs dark brown to black, wing gray in apex and white in basal half; antennal segment I dark, II and III white; abdominal segment I pale brown, II white. Head and pronotum with no long setae; eyes prolonged posteriorly on ventral surface of head. Antennae 9-segmented, segment III with linear small sense cone near apex that shorter than width of segment, on IV about one-third length of segment. Tarsi 2-segmented, fore tarsus with recurved hamus meeting apex of stout seta. Abdominal tergite X with paired trichobothria absent; sternite II with two pairs of marginal setae, III–VII with three pairs; sternite VII with 2 pairs of small supernumerary setae arising in front of marginal setae S1; sternites V–VII with lateral discal setae.

Remark. Amongst Iranian species of *Aeolothrips*, this species is readily distinguished by its micropterous wings. This species is recorded from Iran for the first time.

Aeolothrips gloriosus Bagnall, 1914

Material examined. **Iran: Hamedan Province:** Sadd-e-Ekbatan (34.714 N, 48.555 E, 2330 m), ♀ from *Euphorbia* sp. (Euphorbiaceae), 7.06.2009. **Zanjan Province:** Yengijeh (35.672 N, 51.424 E, 1149 m), from *Euphorbia* sp. (Euphorbiaceae), 25.06.2009, 2 ♀ (Mirab-balou) (ZJUH).

Diagnosis. Female macropterous. Color of body lemon yellow, head and a part of pterothorax brown, antennal segments I, half apex of V, and VI–IX brown to dark brown; fore tibiae brown laterally, middle and hind tibiae and tarsi completely dark brown, abdominal segment I pale brown, IX–X dark brown. Head barely elongated, without long

setae. Antennae 9-segmented, 2.5 times longer than head; antennal segments III and IV with linear sensorium that reach to middle of segment (fig. 9). Pronotum with no long setae. Mesonotum with longitudinal striate, median setae situated far from posterior margin. Metanotum with broad sculptures, median setae at anterior margin, campaniform sensilla present. Fore wings light, slightly brownish at base (fig. 3). Abdomen covered with small setae; only lateral setae of the tergites VIII–X longer (fig. 20); sternite II with 3 pairs of posteromarginal setae, III–VII with 4 pairs; sternite VII with 2 pairs of small supernumerary setae arising in front of marginal setae S1 and S2.

Remarks. This species, by its body yellow color, is easily distinguished from dark color species among the Iranian species of *Aeolothrips*. It is distinguished from *A. mongolicus* and *A. montivagus* by antennal segment I brown, II–III whitish yellow (vs. I–III whitish yellow in *A. mongolicus* and *A. montivagus*). This species is recorded from Iran for the first time.

***Aeolothrips montivagus* Priesner, 1948**

Material examined. Iran: **Hamedan Province:** Nahavand (34.181 N, 48.371 E, 1710 m), ♀ from *Euphorbia* sp. (Euphorbiaceae), 3.07.2009 (Mirab-balou) (ZJUH).

Diagnosis. Color of body light yellow with more or less noticeable grayish spots, particularly on the prothorax. Antennal segment III has a narrow gray stripe at the apex; segment IV mostly yellow except brown at apex, VI–IX brown, middle and hind tibiae and tarsi brown, abdominal segment X light brown. Head and pronotum without long setae. Antennae 9-segmented, sensory area on antennal segment III reaches middle of segment, on IV is broadly bent and occupies basal third of segment. Tarsi 2-segmented. Metanotum with broad reticulation. Fore wing with small distal dark transverse bands. Abdominal tergites with discal setae small; sternites IV–VII each with 4 pairs of posteromarginal setae; sternite VII with 2 pairs of small supernumerary setae arising in front of marginal setae S1 and S2.

Remarks. This species is distinguished from *A. mongolicus* by body yellowish white, except abdominal tergite X, antennal segments IV–IX, middle and hind tibiae and tarsi (head, prothorax, abdominal segment I and VI–X unicolorous dark brown, prothorax and abdominal segments II–V yellow, segment II clouded brownish in *A. mongolicus*) (zur Strassen, 2003). This species is recorded from Iran for the first time.

Genus *Indothrips* Bhatti, 1967

Indothrips bhushani Bhatti, the only species of this genus described from India (Bhatti, 1967), was recorded from Iran (Bhatti et al., 2009). This genus is closely related to *Mymarothrips*, but can be separated from the latter by the shape of and sensory areas on antennal segments III and IV, shape and chaetotaxy of head and prothorax, and the shape of wings (Bhatti, 1967).

Genus *Orothrips* Moulton, 1907

This genus includes three species (Mound, 2012), of them *O. priesneri* (Titschack) was recorded from Iran (Bhatti et al., 2009). This genus is easily recognized by having two sensoria on each antennal segment III and IV (Mound, Marullo, 1996; zur Strassen, 2003).

Genus *Rhipidothrips* Uzel, 1895

This genus includes six species in the world (Mound, 2012), of which three species has been recorded from Iran (Bhatti et al., 2009). The genus are easily distinguished from other aeolothripids by the following character: antennal segments VII to IX fused

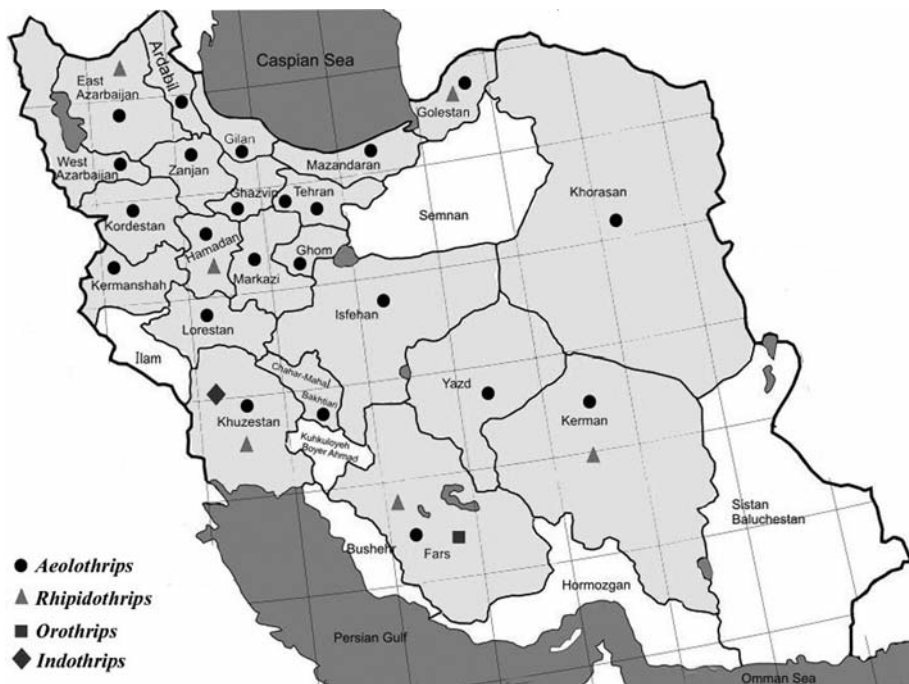


Fig. 21. Distribution of the family Aeolothripidae in Iran.

Рис. 21. Распространение представителей семейства Aeolothripidae в Иране.

(fig. 10); wings completely transparent (fig. 4); and pronotum with a pair of elongate posteroangular setae (Bailey, 1957; zur Strassen, 2003; Mirab-balou et al., 2011).

Key to Iranian species of *Rhipidothrips*

Таблица для определения видов рода *Rhipidothrips*, встречающихся в Иране

1. Macropterous (cf. fig. 4). Antennal segment II yellow. Pronotum with 3 pairs of posteromarginal setae. 2
- Micropterous (fig. 5). Antennal segment II dark. Pronotum only with 2 pairs of posteromarginal setae. [Antennal segments together VII–IX 3.4–4.0 times as long as segment VII wide]. *R. brunneus* Williams
2. Body brown, head and antennal segment I and end of abdomen dark brown, pronotum light yellow or yellow with a brown stain in the middle, often spotted abdomen. *R. graciosus* Uzel
- Body light yellow, pronotum and tergites with small, brown spots; antennal segment I white or pale yellow. *R. flavus* Tunç

***Rhipidothrips brunneus* Williams, 1913**

The genus and the species are recorded for the first time from **Hamedan Province** in Iran: Bu-Ali Sina University, 7 ♀ from *Lolium* sp. (Poaceae), 20.04.2008; Padegan Ghahraman, 1 ♀ from *Lolium multiflorum* (Poaceae), 12.05.2009 (Mirab-balou) (ZJUH).

***Rhipidothrips flavus* Tunç, 1991**

The genus and the species are recorded for the first time from **Hamedan Province** in Iran: Dizaj, 1 ♀ from *Erysimum cheiranthoides* (Cruciferae), 19.05.2009; Bu-Ali Sina University, 1 ♀ from *Lolium* sp. (Poaceae), 20.04.2008 (Mirab-balou) (ZJUH).

***Rhipidothrips graciosus* Uzel, 1895**

The genus and the species are recorded for the first time from **Hamedan Province** in Iran: Bu-Ali Sina University, 1 ♀ from *Lolium* sp. (Poaceae), 20.04.2008; Dizaj, 1 ♀ from *Erysimum cheiranthoides* (Cruciferae), 19.05.2009 (Mirab-balou) (ZJUH).

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