

## Contributions to the terrestrial Parasitengona Fauna (Acari: Trombidiformes: Prostigmata) of Diyarbakır and Mardin (Turkey)

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### Abstract

Larval forms of some species belonging to the terrestrial Parasitengona (Acari: Trombidiformes: Prostigmata) group, which are common in the world, are the ectoparasites on some species causing economic damage. This study was carried out in 2020 to identify ectoparasitic larval mites and their hosts in Diyarbakır and Mardin provinces located in the Southeastern Anatolia Region. As a result of the study, *Grandjeanella bella* Zhang, 1996 and *Leptus* sp. belonging to Erythraeidae family; *Trichotrombidium muscarum* (Riley, 1878) belonging to Microtrombidiidae family were determined. All two species and one genus determined in this study are the first records for Southeastern Anatolia Region acari fauna.

**Keywords:** Ectoparasit, Larval mite, New records, Southeastern Anatolia, Turkey

### Introduction

Terrestrial Parasitengona (Acari: Trombidiformes: Prostigmata) is a widespread group in the world and has 247 genera and 19 families. Larvae of species belonging to the superfamilies Calyptostomatoidea, Erythraeoidea, and Trombidoidea in this group are the ectoparasites on some species causing crop damage (Saboori, 2016; Konikiewicz and Małkol, 2018; Buğa and Sevsay, 2019).

Erythraeidae family (Acari: Trombidiformes: Prostigmata), belonging to the Erythraeoidea superfamily, has approximately 300 species. Erythraeidae family species have a significant role in terms of biological control due to being mostly ectoparasitic on arthropods (Gerson *et al.*, 2003). In Turkey, 23 species have been identified in this family so far (Sevsay, 2017).

Microtrombidiidae family (Acari: Trombidiformes: Prostigmata), belonging to the Trombidoidea superfamily, has about 450 identified species in the world. Larval forms of this family species are mostly specialized as ectoparasitic on arthropods similar to the Erythraeidae family (Małkol *et al.*, 2017). In Turkey, 15 species belonging to Microtrombidiidae

family have been identified by now (Sevsay, 2017).

Access to healthy food has become important due to the Covid-19 pandemic. In this period, the importance of alternative biological control methods to chemical control methods has increased even more. In addition to this development, it has become more important to know the impact of global climate change on biodiversity especially in terms of harmful and beneficial insects, mites and their relations. There have been no studies on ectoparasitic larval mites, key players in biological control, in Diyarbakır and Mardin provinces located in the Southeastern Anatolia Region. In this context, this study was conducted in Diyarbakır and Mardin provinces to identify ectoparasitic larval mites and their hosts.

### Materials and Methods

This study was carried out in Diyarbakır and Mardin province, Turkey, in 2020. Çınar, Sur districts from Diyarbakır province and Artuklu district from Mardin province were selected for the study. Each district is divided into two sub-regions, provided that they are in different directions. Thus, at least six sampling regions were determined for each province.

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Samples were taken from the places that could best represent the working area.

In the surveys, almond, apricot, cherry, apple, pear, and walnut trees cultivated in agricultural areas as well as poplar, sycamore, willow, oak, pine, and wild fruit trees grown in non-agricultural areas, and herbaceous plants were inspected. Surveys were carried out in 15-day periods from the beginning of June to the end of September, as long as the weather conditions were appropriate. One branch from four different directions of the randomly selected trees was shaken gently, so the insects fell onto white cloth measuring 50 x 50 cm (width x length). Herbaceous plants, on the other hand, were shaken quickly several times, allowing insects to fall on the same cloth.

Insects falling on the cloth were carefully examined and mites were detached from host insects by a needle. The specimens were preserved in 75% ethanol and were sent to experts for identification. The identification of larval mites was made by Prof. Dr. İbrahim Çakmak (Department of Plant Protection, Faculty of Agriculture, Aydın Adnan Menderes University, Turkey). Measurements are given in micrometers ( $\mu\text{m}$ ).

#### Results and Discussion

As a result of the study, two species (one of them is at

genus level) from the Erythraeidae family and one from the Microtrombidiidae family (Acari: Trombidiformes: Prostigmata), were determined.

#### *Grandjeanella bella* Zhang, 1996

(Acari: Trombidiformes: Prostigmata: Erythraeidae)

**Material examined:** 1 larva (Figure 1), 16.08.2020, Çınar (Diyarbakır) (37°41'20"N-40°26'48"E, 667 m above sea level).

**Distribution in Turkey:** Balıkesir (Saboori and Çobanoğlu, 2010).

**General distribution:** Iran (Zhang and Goldarazena, 1996).

**Host insect;** *Sericothrips* sp. (Thysanoptera: Thripidae) (Zhang and Goldarazena, 1996), *Parlatoria oleae* (Colvee, 1880) (Hemiptera: Diaspididae) (Saboori and Çobanoğlu, 2010), from an undetermined Diptera (this study).

**Remarks;** This species is rare in Turkey. It is also a new record for Diyarbakır.

In the literature, *G. bella* was found to be an ectoparasit on insect species that generally have sucking mouth structure (Zhang and Goldarazena, 1996; Saboori and Çobanoğlu, 2010). Goldarazena and Zhang (1997) stated that *G. bella* was successful in controlling pest species belonging to the order Hemiptera.

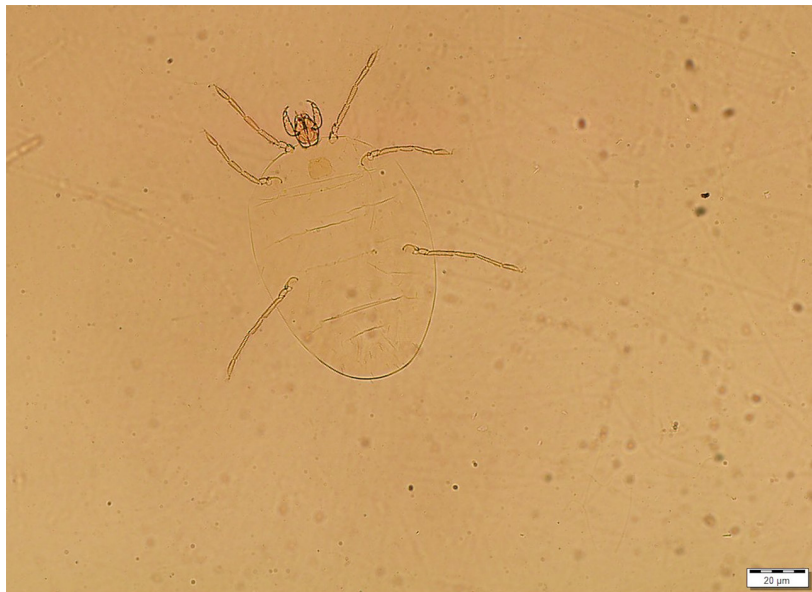


Figure 1. Larval form of *Grandjeanella bella*.

#### *Leptus* sp. (Acari: Trombidiformes: Prostigmata: Erythraeidae)

**Material examined:** 2 larvae (Figure 2), 16.08.2020, Artuklu (Mardin) (37°26'48"N-40°38'00"E, 981 m above sea level).

**Distribution in Turkey:** İzmir (Haitlinger, 1999).

**General distribution:** Larval species of the genus *Leptus* Latreille are widely distributed throughout the World (Saboori *et al.*, 2019).

**Host insect;** All known species in their larval stage are associated with various arthropods, especially with insects (Baker and Selden 1997; Seeman and Palmer 2011; Saboori *et*

*al.*, 2019), Coleoptera (Haitlinger, 1993; Mayoral and Barranco 2011). An undetermined Diptera (this study).

**Remarks;** This species is rare in Turkey. It is also a new record for Mardin.

In the previous studies, it was determined that the larvae of the species belonging to the genus *Leptus* are among the natural enemies of the species causing economic damage (Muñoz-Cárdenas *et al.*, 2015). In a study conducted by Tandon and Lal (1976), it was determined that *Leptus* sp., which is a host and harms mangoes in India, reduced the population density of mango mealy bug *Drosicha mangiferae* Green (Hemiptera: Margarodidae) by 15-20%. In another study, it



was also found that *Leptus* spp. negatively affected the flight behavior and fecundity of *Choristoneura fumifera* Clemens, 1865 (Lepidoptera: Tortricidae) (Houseweart *et al.*, 1980). In

Turkey, few studies have been conducted about *Leptus* and were only determined one species (Haitlinger, 1999).



Figure 2. Larval form of *Leptus* sp.

***Trichotrombidium muscarum* (Riley, 1878)**

(Acari: Trombidiformes: Prostigmata:

Microtrombidiidae)

**Material examined:** 23 larvae (Figure 3A to 3F), 31.07.2020, Sur (Diyarbakır) (38°00'20"N-40°26'16"E, 681 m above sea level).

**Distribution in Turkey:** Erzincan (Karakurt and Sevsay, 2013; Buğa and Sevsay, 2019).

**General distribution:** Australia, India, Madagascar, Iran,

Hungary, Romania, Spain, USA (Hakimitabar and Saboori, 2018).

**Host insect;** *Musca domestica* (L.) (Diptera: Muscidae) (Karakurt and Sevsay, 2013; Buğa and Sevsay, 2019; this study), *Stomoxys calcitrans* (L.) (Diptera: Muscidae) (Kontschán and Hornok, 2019) unknown species belonging to Ulidiidae family (Diptera) (Hakimitabar and Saboori, 2018).

**Remarks;** This species is rare in Turkey. It is also a new record for Diyarbakır.

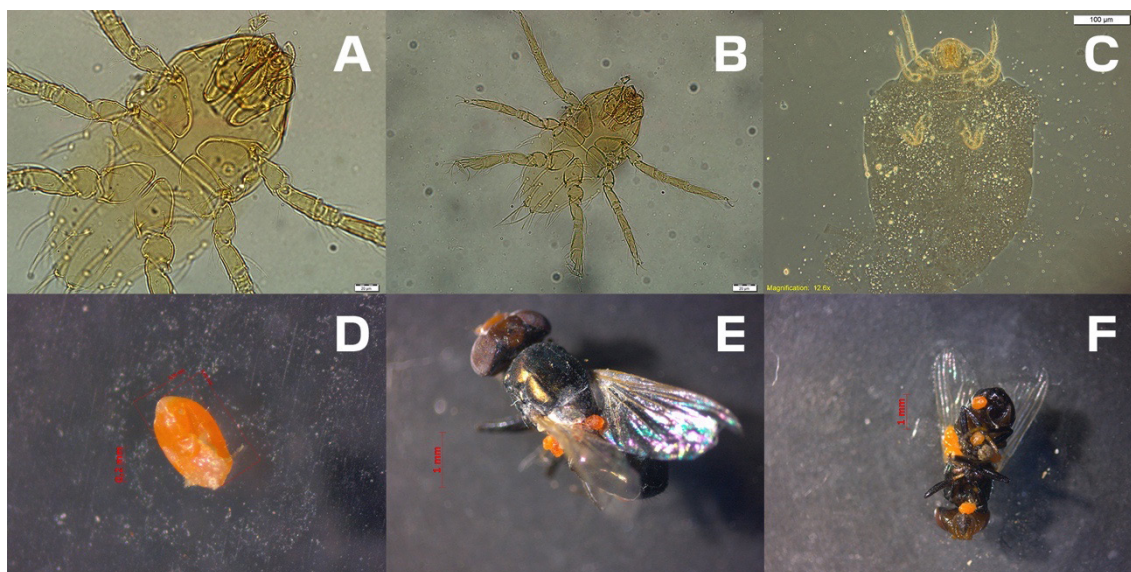


Figure 3. A, B, C, D) Larval form of *Trichotrombidium muscarum* E, F) *Trichotrombidium muscarum* on its host *Musca domestica*.

Main hosts of *T. muscarum*, one of the two species belonging to the genus *Trichotrombidium* 1951, are species belonging to the order Diptera. *T. muscarum*, to date, is only recorded from Erzincan in Turkey (Karakurt and Sevsay, 2013; Buğa and Sevsay, 2019). In the observations made in this study, it was seen that *T. muscarum* formed dense populations on its host *M. domestica*.

#### Conclusion

In the Southeastern Anatolia Region, where Diyarbakır and Mardin provinces are located, the Southeastern Anatolia Project (GAP) has been carried out to ensure efficient management of soil and water resources since 1989. Southeastern Anatolia Project (GAP) is one of the most important integrated irrigation and development projects in the world. The project is being carried out in stages and will be completed in 2023. Thanks to the stages that have been active in previous years within the scope of the project, significant increases have occurred in both the cultivation area and the production amount of many agricultural products. The findings obtained from this study are considered as an important opportunity in terms of suppressing pest species causing economic damage in GAP Region. For this reason, it is evaluated that the relationship between these species and especially economically damaging species should be examined well in future studies.

#### Compliance with Ethical Standards

##### Conflict of interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

##### Author contribution

The author read and approved the final manuscript. The author verify that the Text, Figures, and Tables are original.

##### Ethical approval

Not applicable.

##### Funding

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##### Data availability

Not applicable.

##### Consent for publication

Not applicable.

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