

## Exploring Tydeoidea mites in Armenia

### Исследование клещей Tydeoidea в Армении

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**Key words:** Diversity, host plant, Iolinidae, Tydeidae, Armenia.

**Abstract.** A survey of Iolinidae and Tydeidae mite species presence on fruit trees conducted in Armenia during 2019–2023 is presented. Nine species from four genera, *Brachytydeus dumosus* (Kuznetsov, 1973), *B. mali* (Oudemans, 1929), *B. placita* (Livshitz in Kuznetsov & Livshitz, 1973), *B. subularis* (Kuznetsov, 1972), *Neopronematus rapidus* (Kuznetsov, 1972), *Tydeus californicus* (Banks, 1904), *T. goetzi* Schruft, 1972, *T. gloveri* (Ashmead, 1879) and *Proctotydaeus (Proctotydulus) oblongus* (Kuznetsov, 1973) are registered for Armenia for the first time. New host plant associations are registered for some Tydeoidea species.

**Резюме.** В ходе исследования фауны, проведённого в Армении с 2019 по 2023 год, был выполнен мониторинг присутствия видов Iolinidae и Tydeidae на фруктовых деревьях. В процессе исследования выявлено девять видов из четырёх родов, которые указаны для Армении впервые: *Brachytydeus dumosus* (Kuznetsov, 1973), *B. mali* (Oudemans, 1929), *B. placita* (Livshitz in Kuznetsov & Livshitz, 1973), *B. subularis* (Kuznetsov, 1972), *Neopronematus rapidus* (Kuznetsov, 1972), *Tydeus californicus* (Banks, 1904), *T. goetzi* Schruft, 1972, *T. gloveri* (Ashmead, 1879) и *Proctotydaeus (Proctotydulus) oblongus* (Kuznetsov, 1973). Для некоторых видов Tydeoidea были выявлены новые растения-хозяева.

## Introduction

In addition to taxonomic advancements, studies on the ecological associations of Tydeoidea mites have highlighted their role as indicators of environmental change and ecosystem health [Walter, Proctor, 1999]. Changes in land use, climate, and habitat fragmentation can have profound effects on Tydeoidea mite communities, influencing their abundance, diversity, and species composition [Colloff, 2009]. Understanding the responses of these mites to environmental perturbations is crucial for predicting the resilience of terrestrial ecosystems to anthropogenic disturbances and climate change.

Tydeidae and Iolinidae mites, families within the superfamily Tydeoidea, are significant constituents of terrestrial arthropod communities globally. These mites

play pivotal roles in essential ecosystem processes like decomposition, nutrient cycling, and pest regulation [Walter, O'Dowd, 1995]. However, their diversity and distribution patterns remain relatively understudied compared to other invertebrate groups in Armenia.

These mites demonstrate various ecological adaptations, inhabiting diverse habitats ranging from agricultural fields and grasslands to forests and urban environments [Krantz, Walter, 2009]. Serving as detritivores, predators, and herbivores, Tydeoidea mites contribute significantly to ecosystem functioning by decomposing organic matter, regulating populations of other arthropods, and influencing plant dynamics [Bolland et al., 1998]. Despite their ecological importance, the taxonomy and biogeography of Tydeoidea mites remain poorly understood, impeding our ability to assess their conservation status and ecological roles.

Furthermore, alongside taxonomic advancements, research on the ecological associations of these mites has underscored their significance as indicators of environmental change and ecosystem health [Walter, Proctor, 1999]. Alterations in land use, climate, and habitat fragmentation can profoundly impact Tydeoidea mite communities, affecting their abundance, diversity, and species composition [Colloff, 2009]. A comprehensive understanding of the responses of these mites to environmental perturbations is critical for predicting the resilience of terrestrial ecosystems to anthropogenic disturbances and climate change.

Despite of their ecological significance, Tydeoidea are often overlooked in biodiversity surveys and conservation efforts, leading to gaps in our understanding of their distribution patterns and ecological requirements. By conducting comprehensive faunal surveys across different geographic regions and ecosystems, we can elucidate the factors driving these mite diversity and distribution, informing conservation strategies and management practices aimed at preserving their ecological functions and ecosystem services.

Table 1. Data of Tydeoidea mites collection localities in Armenia  
Таблица 1. Данные о местах сбора клещей Tydeoidea в Армении

No.	Site	Coordinates	Elevation m.a.s.l.
1	Alaverdi	41.09766, 44.67316	690
2	Armash	39.76672, 44.8111	840
3	Arpi	39.73889, 45.26672	1059
4	Aygeshat	40.23608, 44.28888	940
5	Berkarat	40.67602, 44.16801	2080
6	Garni	40.11931, 44.73442	1413
7	Geghadir	40.15466, 44.65141	1628
8	Geghard	40.15636, 44.79686	1912
9	Goght	40.1347, 44.78332	1578
10	Gosh	40.73053, 45.00012	1212
11	Hnaberd	40.00611, 44.57433	884
12	Hatsavan	40.13713, 44.65217	1510
13	Koghb	41.18184, 44.97608	750
14	Lukashin	40.18726, 44.0039	874
15	Mkhchyan	40.02228, 44.4917	850
16	Mughni	40.31671, 44.37231	1275
17	Nalbandyan	40.0639, 43.98889	870
18	Saghmosavank	40.38348, 44.40008	1529
19	Vanadzor	40.80456, 44.4939	1344
20	Yenokavan	40.91291, 45.10742	1138
21	Zartonk	40.10828, 44.16388	850

In this paper, we exhibit the existing knowledge on the faunistics and biogeography of Tydeoidea mites in Armenia [Dilbaryan et al., 2022; Stepanyan, 2022, 2023] and recently collected material based on our field surveys in various regions in Armenia.

## Material and methods

The collection of material was carried out in 2019–2023 in seven provinces of Armenia (34 sites) during April and November months each year (Table 1). Over 202 specimens of Tydeoidea were identified. The collection of mites was carried out by inspecting the substrate shaking it off and hand-picking. Leaf samples were collected randomly from any part of the plants and placed in plastic containers. For the permanent preparations the Faure-Berlese mixture was used. Identification of mites was carried out according to the available identification literature [Kuznetsov, Livshitz, 1973; André, 1981; André, Fain, 2000; Kaźmierski, 1989, 1998a; Kaźmierski, Sikora, 2008; Mondin et al., 2016].

The leaf samples were taken from 14 plant species, namely: *Armeniaca vulgaris* Lam., *Ficus carica* L., *Malus baccata* (L.) Borkh., *Malus domestica* (Suckow) Borkh., *Prunus avium* (L.) L., *Prunus cerasifera* Ehrh., *Prunus cerasus* L., *Pyrus communis caucasica* (Fed.) Browicz, *Pyrus takhtadzhianii* Fed., *Cydonia oblonga* Mill., *Ribes rubrum* L., *Rubus idaeus* L., *Vitis vinifera* L.

The material was examined using a biological microscope MBC 10 attached to a Canon EOS 2000 camera. Species distribution is shown in the map (Fig. 1). All the material and the preparations are deposited in the Acarological collection of the Scientific Center of Zoology and Hydroecology NAS RA.

The present work is registered in ZooBank (www.zoobank.org) under LSID urn:lsid:zoobank.org:pub:EA224744-CFAB-4650-96B6-B4B70CF84A73.

## Results

Iolinidae Pritchard, 1956: Pronematinae André, 1979

### *Neopronematus*

Panou, Emmanouel & Kazmierski, 2001

*Neopronematus rapidus* (Kuznetsov, 1972)

Fig. 2.

*Pronematus rapidus* Kuznetsov, 1972

**Material.** *Aragatsotn* prov.: 3♀♀ — Berkarat, 19.VIII.2021, on *Malus domestica*.

**Distribution.** Recorded from Crimea, Greece, Turkey, Hungary and Iran.

**Comments.** Reported on eggplant in neighboring Turkey [Kumral, Çobanoğlu, 2016] and on the bean, eggplant, cucumber, apple, and pear trees in Iran [Darbemamieh et al., 2015]; first record for Armenian fauna.

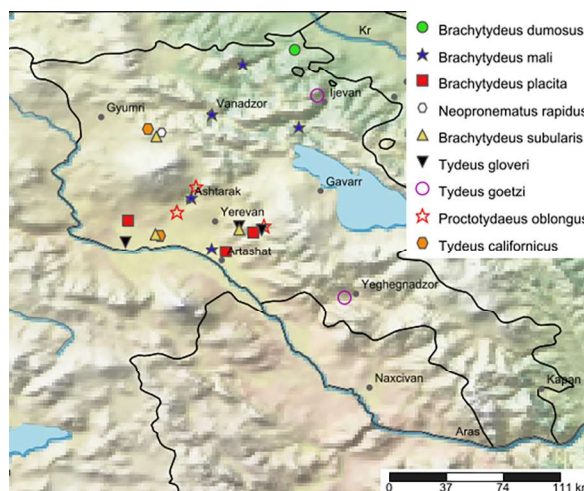


Fig. 1. Distribution map of Tydeoidea mite species in Armenia.

Рис. 1. Карта распространения видов клещей Tydeoidea в Армении.

**Proctotydaeus** Berlese, 1911*Proctotydaeus (Proctotydulus) oblongus* (Kuznetsov, 1973)

Fig. 3.

**Material.** *Aragatsotn Prov.*: 3♀♀ — Saghmosavank, 25.V.2020, on *Prunus avium*; *Armavir Prov.*: 2♀♀ — Aygeshat, 27.V.23, on *Malus baccata*; *Kotayk Prov.*: 2♀♀ — Geghard, 20.VIII.2020, on *Cydonia oblonga*.

**Distribution.** Eastern Europe, and Iran.

**Comments.** This species is firstly recorded for Armenia and Caucasus.

**Tydeidae** Kramer, 1877: Tydeinae André, 1979 sensu Kaźmierski, 1996

**Brachytydeus** Thor, 1931*Brachytydeus dumosa* (Kuznetsov, 1973)

Fig. 4.

*Tydulosus dumosus* Kuznetsov, 1973,*Lorryia dumosa* (Kuznetsov, 1973): Cooreman, 1958;*Brachytydeus dumosa* (Kuznetsov, 1973): Kuznetsov, Livshitz, 1973b.

**Material.** *Tavush Prov.*: 7♀♀ — Koghb, 16.VIII.2021, on *Malus domestica*.

**Distribution.** Rare, recorded in Europe.

**Comments.** This species was recorded as *Tydulosus dumosus* Kuznetsov, 1973 [Stepanyan, 2023] for Armenia, not recorded from the neighbouring countries.

*Brachytydeus mali* (Oudemans, 1929)

Fig. 5.

*Tydeus mali* Oudemans 1929;*Paralorryia mali* (Oudemans, 1929);*Lorryia mali* (Oudemans, 1929).

**Material.** *Aranat Prov.*: 12♀♀ — Mkhchyan, 1.VII.2022, on *Pyrus takhtadzhjanii* Fed.; *Aragatsotn Prov.*: 8♀♀ — Gosh, 30.V.2019, on *Armeniaca vulgaris*, 6♀♀ — Mughni, 30.V.2019, on *Malus domestica*; *Lori Prov.*: 4♀♀ — Vanadzor, 1.IX.2020, on *Ribes rubrum*, 6♀♀ — Alaverdi, 3.IX.2022, on *Prunus cerasus*.

**Distribution.** This species has a global distribution.

**Comments.** This species is the first record for Armenia and no other records from the Caucasus; recorded in Turkey on *Prunus cerasus* L. [Soysal, Akyazi, 2018], and Iran [Hajizadeh, Noei, 2013].

*Brachytydeus placita*

(Kuznetsov &amp; Livshitz, 1973)

Fig. 6.

=*Tydeus placitus* Kuznetsov, Livshitz, 1973, Castagnoli, 1984;*Lorryia placita* (Kuznetsov & Livshitz, 1973): Kaźmierski, 1998.

**Material.** *Aranat Prov.*: 3♀♀ — Armash, 15.X.2019, on *Vitis vinifera*, 2♀♀ — Hnaberd, 1.XI.2022, on *Pyrus communis caucasica*; *Armavir Prov.*: 4♀♀ — Lukashin, 13.IX.2019, on *Rubus idaeus*; *Kotayk Prov.*: 2♀♀ — Garni, 12.V.2021, on *Rubus idaeus*.

**Distribution.** Europe.

**Comments.** This species was not noticed in any Caucasian country, nor in Turkey and Iran. It is the first record for Armenia.

*Brachytydeus subularis* (Kuznetsov, 1972)

Fig. 7.

*Paralorryia subularis* Kuznetsov, 1972;*Lorryia subularis* (Kuznetsov, 1972): Kaźmierski, 1998.

**Material.** *Aragatsotn Prov.*: 3♀♀ — Berkarat, 20.V.2020, on *Prunus avium*; *Armavir Prov.*: 6♀♀ — Zartonk, 27.VIII.2023, on *Malus baccata*; *Kotayk Prov.*: 4♀♀ — Hatcavan, 20.VIII.2020, on *Pyrus cydonia*.

**Distribution.** Europe.

**Comments.** This species is the first record for Armenia. It has been recorded in Greece from lichens [Panou, Emmanuel, 1995].

**Tydeus** Koch, 1835 sensu Kaźmierski, 1989*Tydeus californicus* (Banks, 1904)

Fig. 8.

*Tetranychoides californicus* Banks, 1904.

**Material.** *Aragatsotn prov.*: 9♀♀ — Berkarat, 18.V.2020, on *Prunus vulgaris*, 12♀♀ — Zartonk, 11.IX.2020, on *Vitis vinifera*.

**Distribution.** Cosmopolitan.

**Comments.** Small-sized mites feed on eggs of other mites and invertebrates. Reported on hazelnut, pome, and stone fruit trees in neighbouring Turkey [Çobanoğlu, Kaźmierski, 1999].

*Tydeus gloveri* (Ashmead, 1879)

Fig. 8.

*Acarus gloverii* Ashmead, 1879.

**Material.** *Armavir Prov.*: 12♀♀ — Nalbandyan, 2.X.2019, on *Armeniaca vulgaris*; *Kotayk Prov.*: 6♀♀ — Geghardir, 16.VIII.2020, on *Malus domestica*, 4♀♀ — Goght, 19.VIII.2020, on *Prunus cerasifera*.

**Distribution.** Worldwide.

**Comments.** This species was recorded on orange tree in the USA [Ashmead, 1879], and in Iran on an unknown plant [Khalilmanesh, 1979; Modarres, 1997]. This is the first record for Armenia.

*Tydeus goetzi* Schruft, 1972

Fig. 10.

*Tydeus caudatus* (Duges, 1834): Stepanyan, 2023.

**Material.** *Vayots Dzor Prov.*: 2♀♀ — Arpi, 13.X.2020, on *Prunus vulgaris*; *Tavush Prov.*: 6♀♀ — Yenokavan, 15.X.2019, on *Malus domestica*.

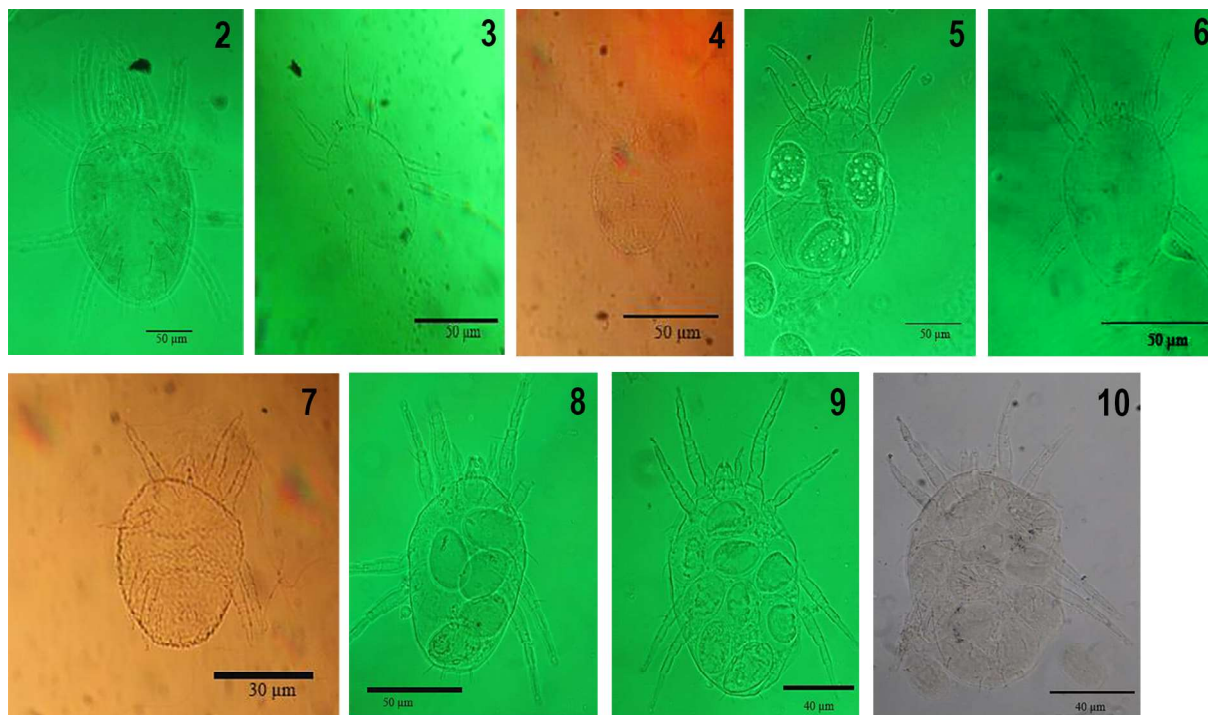
**Distribution.** Widespread worldwide.

**Comments.** This species was recorded as *Tydeus caudatus* (Duges, 1834) [Stepanyan, 2023]. Feeds on Trombidiformes Eriophyidae mites [Schruft, 1972] and was recorded on sour cherry, grape, plum, walnut, and greengage, soil in Iran [Darbemamieh et al., 2010], also recorded in Turkey [Akyazi et al., 2017].

**Discussion**

The study of Tydeoidea in Armenia remains limited, reflecting the broader global understanding of this group, which is still in its nascent stages. Several factors contribute to the lack of attention given to this group, notably the absence of accurate identification keys and taxonomic inconsistencies. Despite of these challenges, most of the species investigated were found to be new records for Armenia. Particularly noteworthy is the discovery of *Brachytydeus dumosus* (Kuznetsov, 1973) and *B. placita* (Kuznetsov & Livshitz, 1973), which had not been previously recorded in the Caucasus region, Turkey, or Iran.

Additionally, new host plant associations were registered for several species, namely: *Tydeus gloveri* (Ashmead, 1879) was found on *Armeniaca vulgaris* Lam., *Malus domestica* (Suckow) Borkh., and *Prunus cerasifera* Ehrh.; *T. californicus* (Banks, 1904) on *Prunus vulgaris* L.; *Brachytydeus placita* (Kuznetsov & Livshitz, 1973) on *Pyrus communis caucasica* (Fed.) Browicz and *Rubus idaeus* L.; *B. subularis* (Kuznetsov,



Figs 2–10. Tydeidae mite species collected in Armenia. 2 — *Neopronematus rapidus* (Kuznetsov); 3 — *Proctotydaeus oblongus* (Kuznetsov); 4 — *Brachytydeus dumosus* (Kuznetsov); 5 — *B. mali* (Oudemans); 6 — *B. placita* (Kuznetsov, Livshitz); 7 — *B. subularis* (Kuznetsov); 8 — *Tydeus californicus* (Banks); 9 — *T. gloveri* (Ashmead); 10 — *T. goetzi* Schruft.

Рис. 1–10. Виды клещей Tydeidae, собранные в Армении. 2 — *Neopronematus rapidus* (Kuznetsov); 3 — *Proctotydaeus oblongus* (Kuznetsov); 4 — *Brachytydeus dumosus* (Kuznetsov); 5 — *B. mali* (Oudemans); 6 — *B. placita* (Kuznetsov, Livshitz); 7 — *B. subularis* (Kuznetsov); 8 — *Tydeus californicus* (Banks); 9 — *T. gloveri* (Ashmead); 10 — *T. goetzi* Schruft.

1972) on *Prunus avium* (L.) L., *Malus baccata* (L.) Borkh. and *Cydonia oblonga* Mill.; *B. mali* (Oudemans, 1929) on *Ribes rubrum* L. Among these, the two most abundant species were *Brachytydeus mali* (Oudemans, 1929) and *B. reticulata* (Oudemans, 1928).

However, many undescribed and unidentified species in our collection still require in-depth study and will be reported in our future papers.

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