



The first occurrence of the family Homotomidae (Hemiptera: Psylloidea) and *Homotoma ficus* (Linnaeus, 1758) in Hungary

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RESEARCH ARTICLE

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ABSTRACT

The first author observed *Homotoma ficus* (Linnaeus, 1758) larvae on several street and garden fig trees in the city of Pécs in southern Hungary at the end of May 2022. In the first week of June 2022, imagoes were already flying. This is the first observation of this species in Hungary, together with the first report of the family Homotomidae. A diagnosis and illustrations of adults and larvae in Hungary with 21 figures are given.

KEYWORDS

Hungarian fauna, fig psylla, alien species, first records, *Ficus carica*

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INTRODUCTION

In recent years the first author has published two studies on insect species occurring in *Ficus* shrubs (Fazekas, 2015; Wirth et al., 2020). It has been shown that *Choreutis nemorana* (Hübner, 1799) (Lepidoptera) was established in Hungary. It has significant distribution in several geographical regions, such as southern Hungary, the Lake Balaton area, and the capital. Another very interesting discovery was the record of the insect species *Blastophaga psenes* (Linnaeus, 1758) (Hymenoptera) in the southernmost mountain range of Hungary, the Mecsek Mountains (Fazekas and Schmidt, 2016; Schmidt, 2010). It is unknown when *B. psenes* became exactly established in southern Hungary. It is also possible that it was present much earlier, but nobody noticed it.

During the past 5–6 years, the first author has continuously monitored fig trees in Baranya county in southern Hungary, close to the Croatian border. In the last days of May 2022, *Homotoma ficus* jumping plant louse larvae were observed for the first time on the underside of fig tree leaves. In the first week of June, adult specimens were flying.

In Pécs, the first author examined several fig trees. On almost every tree, there were larvae and imagoes of *H. ficus*. The altitude of his study sites was 200–300 m above sea level, on the southern side of the Mecsek Mountains (Misina Mount 535 m).

The original vegetation on the limestone soil is Mediterranean-style downy oak scrub woodlands (*Inulo spiraeifoliae-Quercetum pubescentis*). Fig trees were widely planted in private gardens, streets and squares.

According to Wirth et al. (2020) naturalisation of *Ficus carica* in Hungary is possibly the result of human activities (planting specimens in large numbers) and climate change at the same time (climatic factors, spread of pollinators). Because of the lack of information on the reproduction types of figs planted earlier and cultivated in the country, we do not have evidence on the origin of the viable seeds on fruit-bearing plants. The Hungarian horticultural trade is based on the cultivation of parthenocarpic cultivars primary, and experiments to cultivate and disseminate Smyrna- and San Pedro-type figs just started recently in the country. Therefore, the presence of planted individuals of fig types requiring pollination cannot be excluded in Hungary nowadays. The origin of male common figs (*caprifici*) in Pécs is questionable.

Our investigations showed that *Ficus carica* can produce viable seeds on parthenocarpic (Adriatic-type) plants and spread over the years, especially in the city of Pécs. The seedlings and young plants could also survive in harsh winter conditions, persist for a long time, and with endozoochoric dispersal, the seeds could reach a longer distance from the mother plants. Based on the observations of Hungarian botanists, fig-growers, and garden owners we assume that the escaping and naturalisation of common figs has been going on for some time now in Baranya and Zala counties (Tormafölde) and Budapest.

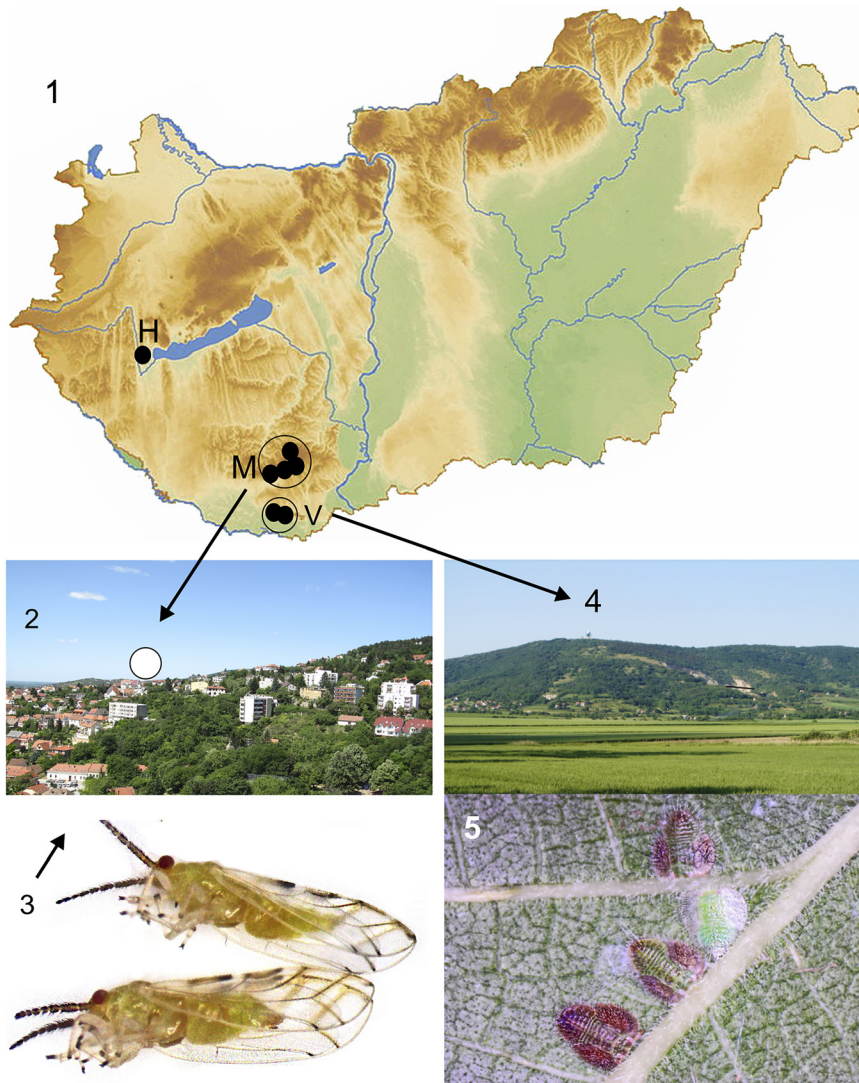
MATERIAL AND METHODS

The material was collected at the end of May and early June 2022 in altogether six sites in Pécs city (South Hungary, Mecsek Mountains), using a visual inspection of the *Ficus carica*. The first observations were followed by successful surveys in the Villányi Hills (Harkány, Siklós-Mária-gyüd), Hungary's southernmost mountain range. Specimens of *H. ficus* have been found not



only on the southern side of the Mecsek Mountains but also in the northern area (Komló). We also looked at the West Hungarian area. The species has also colonised the European spa town of Hévíz (Zala county) (Figs 1–5).

The adults were collected from the host plants with an aspirator. Adults and immatures were fixed in 70% ethanol for further examinations.



Figs 1–5. 1. Sites of *Homotoma ficus* occurrence in Hungary (details in the text): H = Hévíz, M = Mecsek Mountains, V = Villány Hills; 2. First observation of the species in Pécs (white circle); 3. First imagoes from Hungary; 4. Second observation in the Villány Hills near the Croatian border; 5. Larvae on the underside of a fig leaf



Psyllid nymphs were placed into 88% lactic acid with the aid of a bent insect pin. After clarifying the specimens in lactic acid, they were mounted on microscope slides in Hoyer's medium and Keifer's F-medium (Keifer, 1975). The slide preparations were dried and then sealed with commercial nail varnish. Specimens were examined with a compound microscope equipped with phase contrast (Nikon Eclipse E600).

The material examined is deposited in the following collections: Pannon Institute (H-Pécs); Plant Protection Institute, Centre for Agricultural Research, ELKH (H-Budapest), National Food Chain Safety Office, Directorate of Plant Protection, Soil Conservation and Agri-environment (H-Budapest).

RESULTS

According to the revised classification of jumping plant-lice, the superfamily Psylloidea consists of eight families: Aphalaridae, Carsidaridae, Calophyidae, Homotomidae, Liviidae, Phacopterionidae, Psyllidae and Triozidae (Burckhardt and Ouvrard, 2012). So far, representatives of five families, viz. Aphalaridae, Calophyidae, Liviidae, Psyllidae and Triozidae have been known from Hungary (Ripka, 2008).

Family Homotomidae Heslop-Harrison, 1958

Diagnosis of the family (according to Hollis and Broomfield, 1989). A pair of strong tubercles situated on metapostnotum; ventral sense organs of hind femur in basal position, proximal organ offset from distal pair; male proctiger bipartite; female subgenital plate without laterodorsal appendages; rs-m crossvein absent from forewing.

Notes. The family is divided into three subfamilies and the known species are associated with Moraceae, especially with species of *Ficus* (Hollis and Broomfield, 1989). The majority of the known species occur in the tropical and subtropical regions, and only one species (*H. ficus*) is known from the Palearctic realm.

Our work is the first report of the family in Hungary.

Besides the huge number of homotomid species, several members of families Psyllidae and Triozidae live on *Ficus* spp. as well in Australian, Oriental and Afrotropical Regions (Hollis and Broomfield, 1989).

Genus *Homotoma* Guérin-Ménéville, 1844.

Homotoma ficus (Linnaeus, 1758).

Chermes ficus Linnaeus, 1758.

Synonym: *Homotoma viridis* Klimaszewski (1961).

New localities in Hungary (Figs 1–5):

- Pécs Havi-hegyi út (46.08555, 18.23879; 46.08312, 18.23842), Kálvária utca (46.080181, 18.227104), Magaslati út (46.084705, 18.229463; 46.084693, 18.228773), Péter utca (46.085639, 18.226048), Surányi M. út (46.08536, 18.22479), Tettye utca (46.082509, 18.233811), Tettye tér (46.08752, 18.23439). Monitoring period: from 26.05.2022 to 24.06.2022. Larvae and imagoes.
- Harkány (45.883621, 18.238190). The time of observation: 11.06.2022. Only larval skins and eight imagoes.

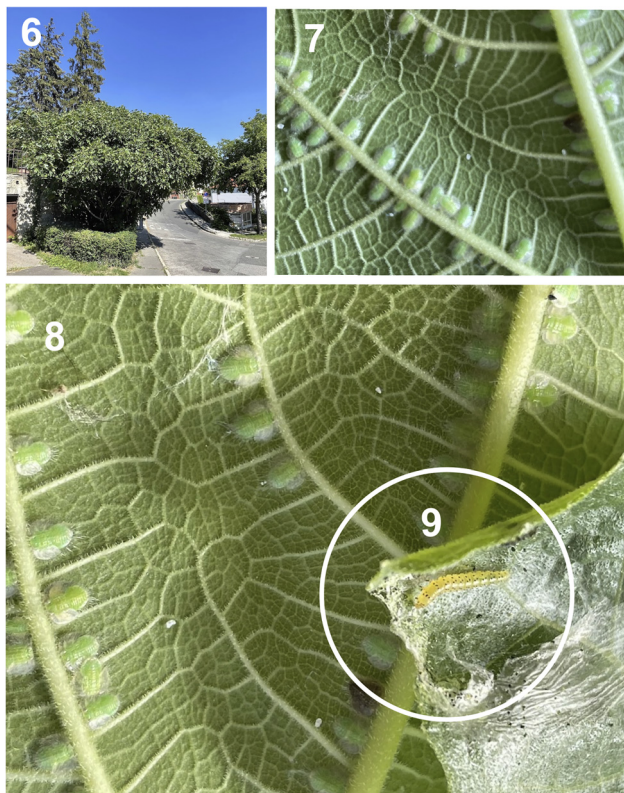


- Siklós-Máriagyüd (45.87784, 18.27269). The time of observation: 11.06.2022. Only larval skins and imagoes.
- Komló, Bartók B. u. 7 (46.19299, 18.23881). The time of observation: 17.06.2022. Only larval skins and four imagoes.
- Hévíz, Kossuth L. u. 18. (46.789742, 17.184735). The time of observation: 11.06.2022. Only larval skins and two imagoes.

Remarks: We collected specimens from each site and took photographs (Figs 6–9).

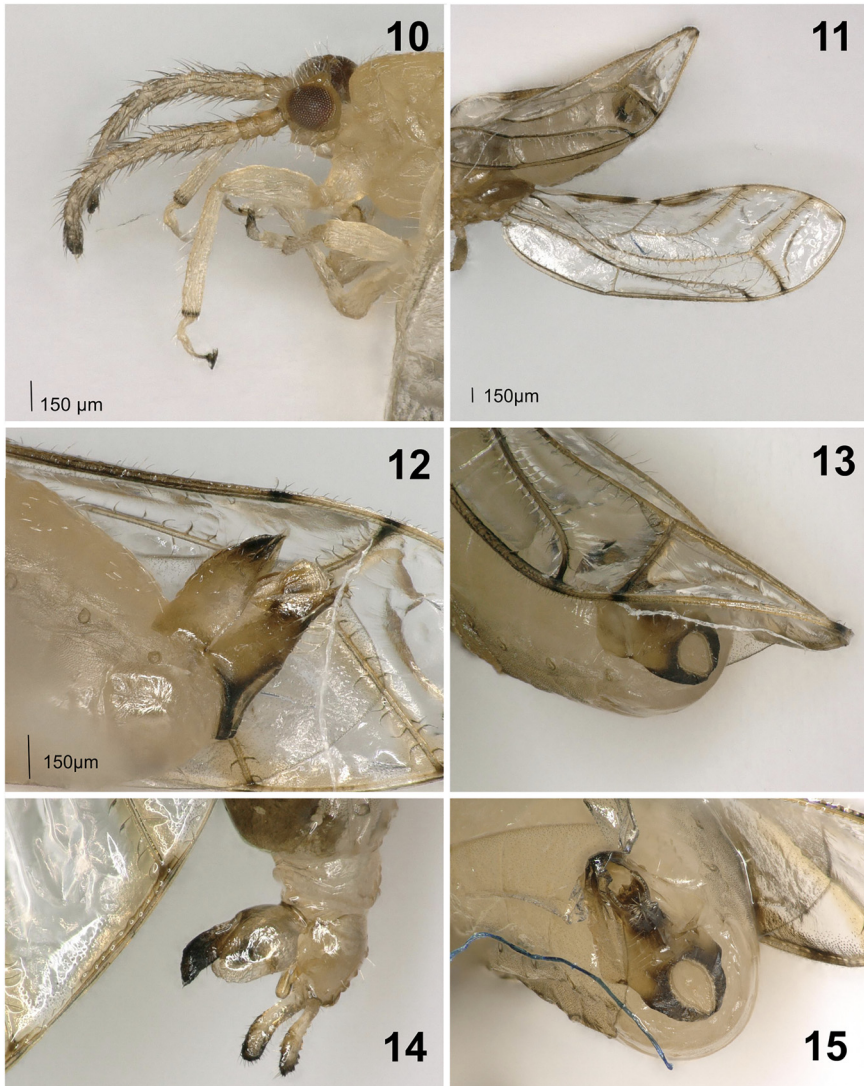
Diagnosis

In the adult phase, the specimens are characterised by having forewings between 3.0 and 4.3 mm long, apically angular, transparent, and often with brown spots around the veins (Fig. 11). Forewing with conspicuous brown bands along veins M_{1+2} , M_{3+4} , Cu_1 and Cu_2 , all of veins bearing long hairs. These are mainly yellow. The body of *H. ficus* is mainly yellowish brown, with dark brown markings, and brown antennae. A green body form can also be seen. The light green body is seen in individuals with recent moult, as they later turn dark brown, light green,



Figs 6–9. Infested fig trees in the centre of Pécs. Figures 8–9 show the larvae of *Homotoma ficus* and the larvae of the moth *Choreutis nemorana* on the leaves



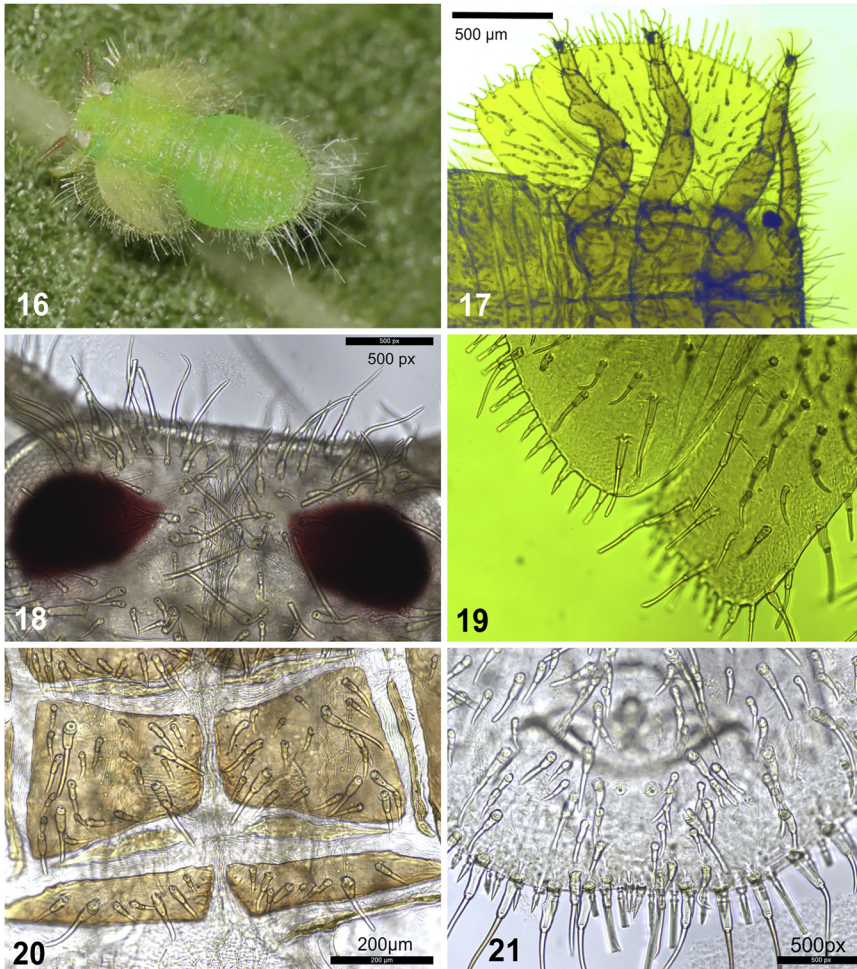


Figs 10–15. Photos about adults of *Homotoma ficus*. 10. Head and antennae; 11. Forewing; 12. Female terminalia from right; 13. Female proctiger from above; 14. Male terminalia from right; 15. Male terminalia from above.

and yellowish-brown. Antennae are covered with long setae with about 9–10 dark brown segments (Fig. 10). Genal cones absent. Male and female terminalia as in Figs 12–15.

Larva up to 2.5 mm. Larval body broadened, green (yellow in the first instar) and covered with setae, with brown legs and red eyes (Figs 16–21). Body margin completely bordered with pointed sectasetae. All ventral setae are simple seta. Dorsal surface with lanceolate setae. It has





Figs 16–21. Photos about nymphs of *Homotoma ficus*. 16. Habitus; 17. Forewing-pad, hindwing-pad and legs; 18. Dorsum of the head; 19. Forewing-pad and hindwing-pad with pointed marginal setae; 20. Dorsum of the thorax; 21. Dorsum of terminal abdominal segments (17–21 photos: M. Bozsó)

whitish wing pads and a pair of three-segmented antennae (Figs 17–19). Terminal setae on apical segment are subequal. Hind tibia (tibia of the third leg) is broadened (Fig. 17). Tarsal arolium as large as claws. On forewing-pads and hindwing-pads long wax filaments arise from the pointed marginal setae (Fig. 19). Anus situated ventrally, outer circumanal pore ring with densely arranged elliptic pores (Fig. 21).

Life cycle

Homotoma ficus is an univoltine species. Monophagous on *Ficus carica*. It overwinters as bright yellow eggs on its host plant, the fig tree. Hatching occurs in spring, with the nymphs appearing



along the nerves on the underside of the leaves. In May, after passing through five nymphal stages, the adults begin to appear and may eventually migrate to other wild or ornamental species, such as conifers. In any case, copulation occurs, and in October, the female lays eggs on the fig tree, singly or in small groups, and arranged in the vicinity of the terminal buds or in the buds themselves, as well as in the cracks of the wood. In this way, the insect will spend the winter and reappear the following spring, thus closing its life cycle.

It makes feeding stings from which it extracts sap from the plant, causing the weakening of the tree. It secretes a small amount of honeydew so that hardly any black mould settles on the leaves. Occasionally it can affect the fruit.

Several species of mirid bugs and minute pirate bugs (Hemiptera: Miridae and Anthocoridae) are predators of fig psylla eggs and larvae (Jerinić-Prodanović, 2011).

Family Homotomidae is the sixth psylloid family detected in the fauna of Hungary.

Distribution

Homotoma ficus originally distributed in the Middle East and the Mediterranean region, but later was introduced several different countries. Now we know this species from the following countries: Albania, Algeria, Austria, Armenia, Azerbaijan, Belgium, Bulgaria, Croatia, Cyprus, Georgia, Czech Republic, France, Germany, Greece, Hungary, Italy, Iran, Israel, Jordan, Lebanon, Malta, Montenegro, Morocco, Portugal, Romania, Russia, Serbia, Slovenia, Spain, Switzerland, Syria, Turkey, Tunisia, Ukraine, United Kingdom, United States (California).

Remarks

According to Gencer et al. (2007), in Turkey, the first instar larvae significantly preferred the bottom and the inside stipule of leaves. The second instar larvae were distributed not only on expanding green tissues but also on the upper and lower surface of leaves corresponding to the fig bud development period. Third to fifth instars colonised significantly more on the bottom of leaves compared with the stipule and upper surface. In addition, a significant linear relationship was found between fig phenology and cumulative larval counts.

According to observations in Germany, the risk is particularly high for fig plants overwintered indoors or when the temperatures are too warm. Figs that have been planted out are only attacked in spring, i.e. much less frequently, under special weather conditions.

Most intriguing is how the *H. ficus* reached Hungary. When did it settle in Hungary? It may have been in the country for a long time, but no one has noticed it. It was probably spontaneous colonisation from Croatia via flight of adults.

Currently, other species from the family Homotomidae are not expected from Hungary, maybe some exotic species can be introduced to the greenhouses, but they cannot colonise in the outdoor regions of Hungary.

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