An annotated checklist of whiteflies (Hemiptera, Aleyrodidae) in Luxembourg

Carl-Axel Gertsson

Murarevägen 13, SE-227 30 Lund, Sweden (carlaxel.gertsson@gmail.com)

Gertsson, C.-A., 2020. An annotated checklist of whiteflies (Hemiptera, Aleyrodidae) in Luxembourg. *Bulletin de la Societé des naturalistes luxembourgois* 122: 247-251.

Published online 16 October 2020 (ISSN 2716-750X), printed volume 7 December 2020 (ISSN 0304-9620).

Abstract. Nine species of whiteflies (Hemiptera, Aleyrodidae) are reported from Luxembourg, of which seven species are new to Luxembourg. Notes on biology, morphology, host plants and life cycles on the species are given.

Key words. Hemiptera, whiteflies, checklist, Luxembourg.

1. Introduction

Whiteflies belong to a single family Aleyrodidae within the superfamily Aleyrodoidea and suborder Sternorrhyncha. They are closely related to the scale insects (Coccoidea, now Coccomorpha) and aphids (Aphidoidea) (Gullan & Cranstone 2005, Williams & Hodgson 2014). According to Martin & Mound (2007) they contain 1,556 extant species in 161 genera. Adult whiteflies are very small insects, most of them measuring 1-3 mm in body length. Adults are covered with a mealy wax (Martin et al. 2000).

An increasing introduction of whiteflies due to the increase of worldwide trade of plants has facilitated introduction and spread of many species in Europe (Malumphy et al. 2009b).

This article is the first modern survey of whiteflies from Luxembourg. An early 20th century article describing two species, *Aleurodes fragariae* Walk and *A. brassicae* Walk, was published by Ferrant (1910).

Life-cycles of whiteflies involve eggs, four larval instars (the first instar is a crawler able to walk over short distances on the host plant, the remaining three instars are sessile), and imagos. All larval instars, as well in the adults, puparia, have a characteristic organ called *orificium vasiformae* situated on the dorsal surface of the last abdominal segment. This structure is unique to the aleyrodids. The organ has a "lingual" and an "operculum". The larval instars and the puparia with this structure have important characters of taxonomic value. The wing venation is always much reduced (Fig. 1). Honeydew is excreted in relatively large quantities by the insect in all stages (Huldén 1986, Martin et al. 2000).

2. Material and methods

The present study is based on both the material collected in Luxembourg from 2015 to 2020 and the literature. Whiteflies were collected by visual survey of host plant leaves. The material was preserved in 80 % alcohol. The whiteflies (puparium) were slide-mounted first through gently heating in 95 % ethyl alcohol, 10 % KOH and 50% lactic acid, respectively. The final step was to transfer the specimens into clove oil as clearing solution. Euparal was used as mounting medium. This is a method modified from Danielsson (1984). The keys of Huldén (1986) and Martin et al. (2000) were used for species identifications. The nomenclature follows Martin & Mound (2007). Slide-mounted specimens have been deposited at Museé national d'histoire naturelle, Luxembourg.



Fig. 1. Adult ash whitefly, *Siphoninus phillyreae*. Lund, Sweden 2018. Photo: C. Fägerström.

3. Results

Aleurochiton aceris (Modeer, 1778) – Norway maple whitefly (Fig. 2)

Rumelange, 31.08.2015 on *Acer platanoides*.

The species occurs in Europe on *Acer platanoides* and *A. tartaricum* (Martin et al. 2000). It hibernates as a puparium. In central Europe it occurs in two morphologically different forms: an early summer generation with puparia which moult the same year and a late summer generation with puparia which moult only after overwintering (Huldén 1986). Male and female puparia can be separated on the basis of their difference in size. *Aleurochiton aceris* is a typical woodland species adapted to a continental climate (Malumphy et al. 2009a).



Fig. 2. Slide-mounted puparium of, Norway maple whitefly, *Aleurochiton aceris*. Scale bar: 0.5 mm. Rumelange 2015. Photo: C.-A. Gertsson.



Fig. 3. Puparium of viburnum whitefly, *Aleurotuba jelinekii*. Colmar-Berg 2016. Scale bar: 0.5 mm. Colmar-Berg 2016. Photo: C.-A. Gertsson.



Fig. 4. Slide-mounted puparium of the azalea whitefly, *Pealius azalea*. Scale bar: 0.5 mm. Ettelbruck 2018. Photo: C. Fägerström.



Fig. 5. Slide-mounted puparium of the oak whitefly, *Pealius quercus*. Bar: 0.5 mm. Colmar-Berg 2017. Photo: C. Fägerström.

Aleyrodes lonicerae Walker, 1852 – honeysuckle or strawberry whitefly

Howald, 06.09.2015 on *Aegopodium podagraria*.

The species occurs in the Palaearctic Region. *Aleurodes lonicerae* is a very common species, it is polyphagous, and hibernates as an adult female (Malumphy et al. 2009a, Martin et al. 2000).

Aleyrodes proletella (Linnaeus, 1758) – cabbage whitefly

Mersch along the railway station, 23.08.2017 on *Chelidonium majus*, egglaying females.

The species occurs in the Palaearctic, Afrotropical, Oriental, Australian, Pacific, Neotropical and Nearctic Regions (Martin et al. 2000). It is frequent in ruderal vegetation on *Chelidonium majus*, *Brassica* espe-



Fig. 6. Puparium of the ash whitefly, *Siphoninus phillyreae*. Ettelbruck 2018. Photo: C. Fägerström.

cially kale, Brussels sprout and green cabbage (Jansen 2011). It hibernates as an adult female (Malumphy et al. 2009a, Martin et al. 2000). Large populations of whiteflies have been reported as important pest in commercial cabbage fields in the Netherlands and Sweden (Jansen 2011, Weimers 2016).

Aleurotuba jelinekii (Frauenfeld, 1867) – viburnum whitefly (Fig. 3)

Colmar-Berg, on pot plants (*Viburnum tinus*), 02.08.2016.

The distribution is in Europe and Mediterranean countries It is a common species in Europe, even in the northern localities as the British Isles (Martin et al. 2000). It is widespread in the southern half of Europe and in many Mediterranean countries where it may be a pest in public greenery. *Aleurotuba jelinekii* is a typical synantropic species occurring in urban areas. The species is univoltine (Jansen 2011).

Massilieurodes chittendeni (Laing, 1928) – rhododendron whitefly

Walferdange (in a garden, close to the zone along the river Alzette), 03.07.2020, exuviae on *Rhododendron catawbiense*.

This species is known from several European countries (Martin et. al. 2000). The host plant is *Rhododendron* spp., and these whiteflies prefer plant species with bare leaves (Huldén 1986, Martin et al. 2000).

Pealius azaleae (Baker & Moles, 1920) – azalea whitefly (Fig. 4)

Ettelbruck, greenhouse of Lycée technique agricole, 27.09.2018, on *Amaryllis*.

This is an East-Palaearctic species, which has been introduced in many parts of the world: Europe, USA, Canada, Australia and New Zealand. This whitefly is closely associated to the azaleas (*Rhododendron* spp.). as host plants. The occurrence of this species in Europe is sporadic, where it is a minor pest (Jansen 2011, Martin et al. 2000).

Pealius quercus (Signoret, 1868) – oak whitefly (Fig. 5)

Colmar-Berg, 26.12.2017 on *Corylus avellana*.

According to Martin et al. (2000) this species has been recorded in many countries of northern and central Europe. In the Mediterranean region of Europe, it was reported from Spain and, more recently, from Croatia (Martin et al. 2000, Šimala & Masten Milek 2014). *Pealius quercus* is oligophagous on the plant families Betulalaceae and deciduous Fagaceae (Martin et al. 2000). It hibernates as a puparium (Šimala et al. 2014).

Siphoninus phillyreae (Haliday, 1835) – ash whitefly (Fig. 6)

Budersberg, 31.08.2015 on *Fraxinus excelsior*. Rumerlange, 31.08.2015 on *Crataegus monogyna*. Luxembourg city, city park, 03.08.2016 on *Crataegus monogyna*. Ettelbruck, Lycée technique agricole, arboretum, 28.09.2018, on *F. exelsior*.

The species occurs in the Palaearctic, Afrotropical, Oriental, Australien, Pacific, Neotropical and Nearctic Regions (Martin et al. 2000). An oligophagous species, especially on *Crataegus*, *Fraxinus*, *Olea*, *Phillyrea* and *Pyrus* (Martin et al. 2000). According to CABI (2018) the species is polyphagous.

Trialeurodes vaporariorum (Westwood) – greenhouse whitefly

Reckenthal Gäertnerei (greenhouse), 11.09.2019 on *Colocasia esculenta*, *Fuchsia* spp., and *Pelargonium* spp.

The species is extremely polyphagous, and is distributed worldwide. In northern Europe it can survive only in indoor conditions. This species is one of the most common and economically important whitefly species (Martin et al. 2000).

4. Discussion

Seven species of whiteflies are recorded as new to Luxembourg. Ferrant (1910) described two species, *Aleurodes fragariae* Walk. and *A. brassicae* Walk., but without mentioning collection sites and dates. The present survey is only preliminary because the whitefly fauna of Luxembourg remains inadequately collected. If we compare with the number of species in the neighbouring countries, the numbers for Belgium are 12 (Belgian Species List 2020), the Netherlands

23 (Jansen 2011) and Germany 16 (Bährman 2002). The following species recorded from Belgium were so far not found in Luxembourg: *Aleurochiton pseudoplantani* Visnya, 1936, *Aleuroclava similis* (Takahashi, 1938), *Asteobemisia carpini* (Koch, 1857), *Bemisia afer* (Priesner & Hosny, 1934), *Tetralicia ericae* Harrison, 1917, and *Trialeurodes ericae* Bink-Moenen, 1976. For Germany: *Aleurochiton acerinus* Haupt, 1934, *A. pseudoplantani*, *Aleurolobus wunni* (Ryberg, 1938), *Aleuroclava similis* (Takahashi, 1938), *Aleyrodes asari* (Schrank, 1801), *A. carpini, Asterobemisia paveli* (Zahadnik, 1961), and *Siphoninus immaculatus* (Heeger, 1856). For the Netherlands: *A. pseudoplantani*, *A. similis, A. carpini, S. immaculatus, Tetralicia ericae*, *Trialeurodes ericae*, and the greenhouse species *Aleurocanthus spiniferus* (Quaintance,1903), *Aleurolobus marlatti* (Quaintance, 1903), *Aleurothrixus floccosus* (Maskell, 1896), *Bemisia afer*, *Dialeurodes citri* (Ashmead, 1885), and *Parabemisia myricae* (Kuwana, 1927).

Acknowledgements

I am indebted in particular to Thierry Helminger, Musée national d'histoire naturelle Luxembourg for plant identifications. I would like to express my sincere gratitude to Eike Jablonski, Ettelbruck, Lycée technique agricole, for access to the arboretum and greenhouses and to Martine Rasquin and Marc Theis, Reckenthal, Service des parcs de la Ville de Luxembourg, for access to greenhouses. I am also very thankful to Nico Schneider for providing information on collecting sites and literature. I wish to extend my sincerest thanks to Christoffer Fägerström, Biological Museum, Lund University, who photographed the slide-mounted whiteflies.

References

Belgian Species List 2020. Aleyrodidae. http://www.species.be/nl/57428 [Accessed: June 2020].

Bährman, R., 2002. Die Mottenschildläuse - Aleyrodina. Die Neue Brehm-Bücherei Bd. 664, 240 S.

CABI. 2019. *Siphoninus* (ash whitefly). In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc/datasheet/51036 [Accessed: June 2020].

Danielsson, R. 1984. Polyviol as mounting medium for aphids (Homoptera: Aphidoidea) and other insects. *Entomologica scandinavica* 15: 383-385.

Ferrant, V., 1910. Die der Landwirtschaft schädlichen Insekten, deren Lebensweise und Bekämpfung. *Bulletin de la Societé des naturalistes luxembourgeois* 20: 36.

Gullan, P.J. & P.S. Cranston, 2005. The insects: An outline of entomology. 3 ed. Blackwell Publishing Ltd.

Huldén, L, 1986. The whiteflies (Homoptera, Aleyrododea) and their parasites in Finland. *Notulae Entomologicae* 66: 1-40.

Jansen, M.G.M., 2011. The whiteflies of the Netherlands, including two species new for the Dutch fauna (Hemiptera: Aleyrodidae). *Nederlandse Faunistische Mededelingen* 36: 69-97.

Martin, J.H., D. Misfud & C. Rapisarda, 2000. The whiteflies (Hemiptera: Aleyrodidae) of Europe and the Mediterranean. *Bulletin of Entomological Research* 90: 407-448.

Martin, J.H. & L.A. Mound, 2007. An annotated checklist of the world's Aleyrodidae (Insecta: Hemiptera: Sternorrhynca). *Zootaxa* 1492: 1-84.

Malumphy, C., H. Ostraukas & D. Pye, 2009a. A faunistic review of whiteflies (Hemiptera, Aleyrodoidea) of Lithuania. *Acta Zoologica Lituanica* 19: 49-57.

Malumphy, C., K. Walsh, B. Suarez, D.W. Collins & N. Boonham, 2009b. Morphological and molecular identification of all developmental stages of four whitefly species (Hemiptera: Aleyrididae) commonly intercepted in quarantine. *Zootaxa* 2118: 1-29.

Šimala, M. & T. Masten Milek, 2014. First record of the whitefly species *Pealius quercus* (Signoret, 1868) (Hemiptera, Aleyrodoidea, Aleyrodidae) in Croatia. *Natura Croatica* 23: 229-233.

Weimers, J., 2016. IPM-strategies for the cabbage whitefly *Aleyrodes proletella* – a new pest on the doorstep to Sweden (in Swedish with English abstract). Swedish University of Agricultural Sciences. http://stud. epsilon. slu.se [Accessed: June 2020].

Williams, D.J. & C.J. Hodgson, 2014. The case of using the infraorder Coccomorpha above the superfamily Coccoidea for the scale insects (Hemiptea: Sternorrhyncha). *Zootaxa* 3869 (3): 348-350.