

# FIRST RECORD OF THE WHITEFLY SPECIES *PEALIUS QUERCUS* (SIGNORET, 1868) (HEMIPTERA, ALEYRODOIDEA, ALEYRODIDAE) IN CROATIA

MLADEN ŠIMALA<sup>1</sup> & TATJANA MASTEN MILEK<sup>2</sup>

<sup>1</sup>Croatian Centre for Agriculture, Food and Rural Affairs, Institute for Plant Protection Rim 98,  
10000 Zagreb, Croatia (mladen.simala@hcphs.hr)

<sup>2</sup>Croatian Centre for Agriculture, Food and Rural Affairs, Svetošimunska 25, 10000 Zagreb, Croatia

Šimala, M. & Masten Milek, T.: First record of the whitefly species *Pealius quercus* (Signoret, 1868) (Hemiptera, Aleyrodoidea, Aleyrodidae) in Croatia. *Nat. Croat.*, Vol. 23, No. 1, 229–233, 2014, Zagreb.

QUAINTANCE & BAKER (1914) described the whitefly genus *Pealius* and designated *Aleurodes maskelli* Bemis, 1904 as the type species. *Pealius quercus* (Signoret, 1868) is a predominantly northern and central European species. It has been found in Croatia on the English oak (*Quercus robur* L.) in a mixed forest in Zagreb. The genus *Pealius* and the species *P. quercus* are new for the whitefly fauna of Croatia.

**Key words:** whiteflies, *Pealius quercus*, first record, Croatia

Šimala, M. & Masten Milek, T.: Prvi nalaz vrste štitačnog moljca *Pealius quercus* (Signoret, 1868) (Hemiptera, Aleyrodoidea, Aleyrodidae) u Hrvatskoj. *Nat. Croat.*, Vol. 23, No. 1, 229–233, 2014, Zagreb.

QUAINTANCE & BAKER opisali su rod štitačnog moljca *Pealius* i kao tipsku vrstu roda odredili *Aleurodes maskelli* Bemis, 1904. *Pealius quercus* (Signoret, 1868) je pretežito sjeverna i srednje europska vrsta. Ta je vrsta nađena u Hrvatskoj na hrastu lužnjaku, u mješovitoj šumi u Zagrebu. Rod *Pealius* i vrsta *P. quercus* novo su zabilježeni u fauni štitačnog moljca Hrvatske.

**Cljučne riječi:** štitači moljci, *Pealius quercus*, prvi nalaz, Hrvatska

## INTRODUCTION

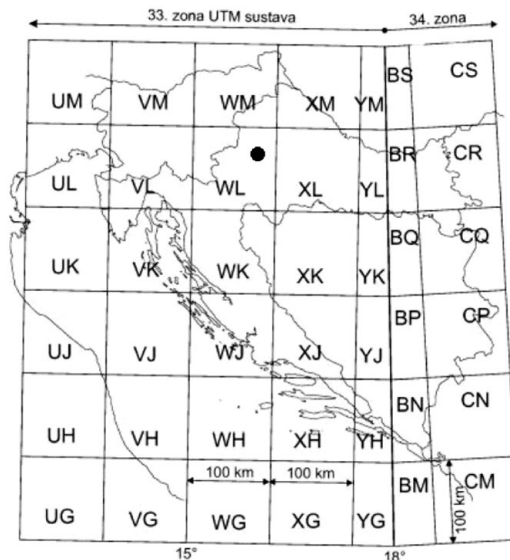
The last updated check list of the world's whiteflies comprises 1556 species from 161 genera (MARTIN & MOUND, 2007). The genus *Pealius* includes 45 species widely distributed in the Nearctic, Palearctic, Ethiopian, Oriental, Australasian, Pacific Islands and Hawaii regions (EVANS, 2006). The whitefly fauna of Europe and the Mediterranean basin comprises 56 species that are considered to be native or naturalized, accommodated within 25 genera (MARTIN *et al.*, 2000). The genus *Pealius* is one of them and includes 2 species occurring in Europe, *P. azaleae* and *P. quercus*. According to EVANS (2006), the species *P. quercus* is only distributed in the Western Palearctic zoogeographical region. It has been recorded in the following European and Mediterranean countries: Austria, the former Czechoslovakia, Denmark, England, Finland, France, Germany, Hungary, Ireland, Lithuania, Netherlands, Poland, Romania, Scotland, Spain, Sweden, Wales and the former Federation of Independent States as a part of Palaearctic region (MARTIN *et al.*, 2000; ZAHRADNIK, 1987; 1991). In Croatia, the genus *Pealius* and the species *P. quercus* have not been recorded before (ŠIMALA & MASTEN MILEK, 2008). This paper describes the morphology and the chaetotaxy of the puparial stage of this species.

## MATERIALS AND METHODS

Whitefly puparia were collected on oak leaves with the help of a magnifying lens of 10 times magnification. Leaves with puparia were taken to the laboratory for slide preparation (MARTIN, 1987; 1999). The oak species was identified according to DOMAC (1967; 1994) and ŠILIC (1988). In the laboratory, puparia and pupal cases were removed from host plant leaves and slide-mounted in Canada balsam according to a modified WATSON & CHANDLER (1999) method. Puparial terminology generally follows MARTIN (1999) and MARTIN *et al.* (2000). The genus and species were identified on the basis of morphological characters of puparium and/or pupal case, using the identification key according to MARTIN *et al.* (2000). For an accurate identification, a stereomicroscope (Nikon SMZ 800) and a compound microscope (Olympus BX 50) were used. The locality of the finding was mapped according to the Universal Transverse Mercator (UTM) coordinate system (HORVAT *et al.*, 2003). Slide-mounted specimens were deposited in the Laboratory for Zoology of the Institute for Plant Protection (Croatian Centre for Agriculture, Food and Rural Affairs) in Zagreb.

## RESULTS AND DISCUSSION

Specimens of *P. quercus* were found during visual surveys of English oak (*Quercus robur* L.) leaves in a mixed forest with beech (*Fagus sylvatica* L.) and hornbeam (*Carpinus betulus* L.) in Zagreb (33 T WL 7772) (Fig. 1), near the building of the Institute for Plant Protection in 2008 and 2009. The population was rather small with mostly solitary puparia on oak leaves. This indicates that *P. quercus* may be very rare and poorly distributed in Croatia. *P. quercus* is an oligophagous species (ZAHRADNIK, 1987). According to MOUND & HALSEY (1978), its host plants are several woody plants belonging to the families Betulaceae and Fagaceae. It has been recorded on *Carpinus betulus* L., *Carpinus* sp.,



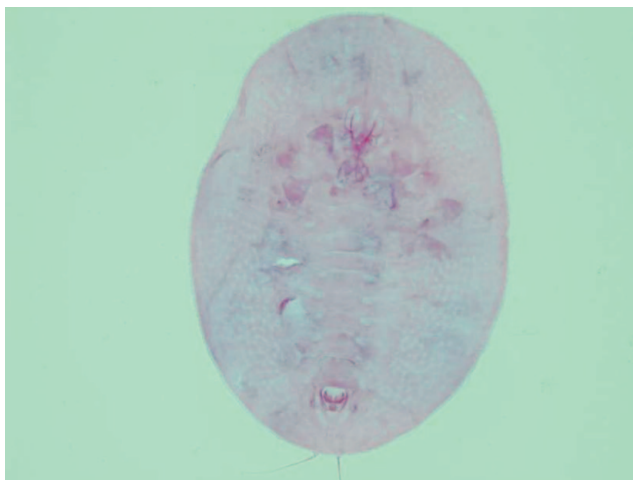
**Fig. 1.** UTM grid of Republic of Croatia and the finding place of *Pealius quercus* (Signoret, 1868)

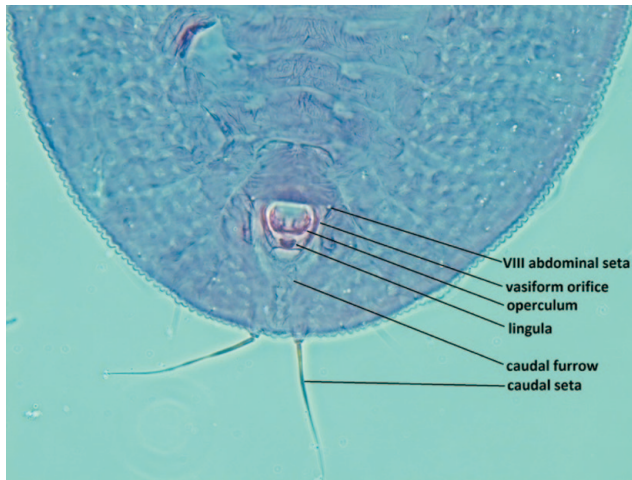
**Tab. 1.** Whitefly species identified on host plants of the families Betulaceae and Fagaceae in Croatia in 2005-2007.

Plant family	Plant species	Whitefly species	Finding place (UTM)
Betulaceae	<i>Carpinus betulus</i> L.	<i>Asterobemisia carpini</i> (Koch, 1857)	Rešetari (33 T XL 9014)
		<i>Bemisia afer</i> (Priesner & Hosny, 1934)	Požega (33 T YL 0923)
	<i>Corylus avellana</i> L.	<i>Trialeurodes vaporariorum</i> (Westwood, 1856)	Zagreb (33 T WL 7772)
Fagaceae	<i>Quercus frainetto</i> Ten.	<i>Aleuroviggianus adrianae</i> Iaccarino, 1982	Poreč (33 T UL 9009)
		<i>Simplaleurodes himisphaerica</i> Goux, 1945	Poreč (33 T UL 9009)
	<i>Quercus ilex</i> L.	<i>Aleuroviggianus adrianae</i> Iaccarino, 1982	Malinska (33 T VK 6397) Poreč (33 T UL 9009)
	<i>Fagus sylvatica</i> L.	<i>Asterobemisia carpini</i> (Koch, 1857)	Veliki Zdenci (33 T XL 6257)

*Corylus avellana* L., *Ostrya virginiana* (Mill) K. Koch, *Corylus heterophylla* Fisch. ex Trautv., *Castanea sativa* Mill., *Fagus sylvatica* L., *Fagus* sp., *Quercus hartwissiana* Stev., *Quercus ilex* L., *Quercus robur* L., *Quercus sessiliflora* Salisb., and *Quercus* spp. Faunistic investigations conducted in Croatia in 2005-2007 resulted in the finding of 5 whitefly species hosted on plants of the families Betulaceae and Fagaceae (Tab. 1), but not the species *P. quercus* (ŠIMALA, 2008). Not one of these species was found on *Q. robur*, on which *P. quercus* was identified. Puparia of the species *P. quercus* occur solitarily on the underside of the leaves of the most of the host plants. A greater number of puparia may only be found on hazel leaves (*C. avellana*) (ZAHRADNIK, 1987). According to the same author, *P. quercus* overwinters in the puparium stage on the host plant leaves. The adults are usually only to be seen during the early summer (MOUND, 1966).

The morphological characteristics of a *P. quercus* puparium are the following (Figs. 2 & 3): white or yellowish in colour, pear-shaped, 0,8-1 mm in length and 0,6-0,7 mm

**Fig. 2.** Permanent microscopic slide of a pupal case of *Pealius quercus* (Signoret, 1868) (photo: M. Šimala)



**Fig. 3.** Abdominal part of a slide-mounted pupal case of *Pealius quercus* (Signoret, 1868) (photo: M. Šimala)

width, covered with a thin wax film (ZAHRADNIK, 1987); puparial outline broadly oval; margin irregularly crenulate; submargin not defined from subdorsum; cephalic, eight abdominal and caudal setae present; transverse moulting sutures not closely approaching margin; all dorsal setae are normally minute, much shorter than opercular length, with the occasional exception of the posterior marginal pair; abdominal segment VII much reduced in length medially; thoracic tracheal openings at margin modified into rather long combs of teeth faintly marked on the ventral submargin, but marginal crenulations themselves not modified; vasiform orifice occupying anterior end of a longer shallow pit; operculum occupies most of true vasiform orifice but lingula head is exposed, short and broad, respectively "D"-shaped; vasiform orifice leads into marked caudal furrow (MARTIN, 1999; MARTIN *et al.*, 2000).

*Received December 10, 2013*

## REFERENCES

- DOMAC, R., 1967: Ekскурzijska mala flora Hrvatske i susjednih područja. Medicinska naklada, Zagreb, 543 pp.
- DOMAC, R., 1994: Flora Hrvatske, priručnik za određivanje bilja. Školska knjiga Zagreb, 504 pp.
- EVANS, G. A., 2006: The Whiteflies (Hemiptera: Aleyrodidae) of the World and Their Host Plants and Natural Enemies. Version 070606. USDA/Animal Plant Health Inspection Service (APHIS), 708 pp.
- HORVAT, S., ŽELEZNIK, Ž. & LAPAINE, M., 2003: Vojni topografsko-kartografski sustav Republike Hrvatske. Kartografija i geoinformacije 2 (2), 75-85.
- MARTIN, J. H., 1987: An identification guide to common whitefly pest species of the world (Homoptera, Aleyrodidae). Tropical Pest Management 33 (4), 298-322.
- MARTIN, J. H., 1999: The whitefly fauna of Australia (Sternorrhyncha: Aleyrodidae). A taxonomic account and identification guide. Technical Paper 38, CSIRO Australia. 197 pp.
- MARTIN, J. H., MIFSUD, D. & RAPISARDA, C., 2000: The whiteflies (Hemiptera: Aleyrodidae) of Europe and the Mediterranean Basin. Bulletin of Entomological Research 90, 407-448.
- MARTIN, J. H. & MOUND, L. A., 2007: An annotated check list of the world's whiteflies (Insecta: Hemiptera: Aleyrodidae). Zootaxa 1492, 1-84.

- MOUND, L. A., 1966: A revision of the British Aleyrodidae (Hemiptera: Homoptera). Bulletin of the British museum (Natural history) Entomology **17** (9), 400-428.
- MOUND, L. A. & HALSEY, S. H., 1978: Whitefly of the world. A systematic catalogue of the Aleyrodidae (Homoptera) with host plant and natural enemy data. British Museum (Natural History) and John Wiley and Sons, Chichester, 340 pp.
- QUAINTANCE, A. L. & BAKER, A. C., 1914: Classification of the Aleyrodidae Part II. Technical Series, Bureau of Entomology, United States Department of Entomology **27**, 95-109.
- ŠILIC, Č., 1988: Atlas drveća i grmlja. Svjetlost, Sarajevo, 218 pp.
- ŠIMALA, M., 2008: Fauna štitaštih moljaca (Insecta: Hemiptera: Aleyrodidae) u Republici Hrvatskoj s posebnim osvrtom na vrstu *Bemisia tabaci* (Gennadius, 1889). Doktorska disertacija, Poljoprivredni fakultet u Osijeku, Sveučilište J. J. Strossmayera u Osijeku, 279 pp.
- ŠIMALA, M. & MASTEN MILEK, T., 2008: A check-list of whiteflies (Insecta: Hemiptera: Aleyrodidae) of Croatia. Nat. Croat. **17** (3), 169-181.
- WATSON, G. W. & CHANDLER, L. R., 1999: Identification of Mealybugs important in the Caribbean Region with notes on preparation of whitefly pupae for identification. Commonwealth Science Council and CAB International, 40 pp.
- ZAHRADNIK, J., 1987: La revision des aleurodes des pays Tcheques (Sternorrhyncha: Aleyrodinea) II. Věstník Československé Společnosti Zoologické **51**, 60-80.
- ZAHRADNIK, J., 1991: Taxonomisches und Faunistisches über europäische Mottenläuse (Aleyrodinea). Acta Universitatis Carolinae Biologica **35**, 111-118.

## SAŽETAK

### Prvi nalaz vrste štitaštog moljca *Pealius quercus* (Signoret, 1868) (Hemiptera, Aleyrodoidea, Aleyrodidae) u Hrvatskoj

M. Šimala & T. Masten Milek

Tijekom vizualnog pregleda listova hrasta lužnjaka (*Quercus robur* L.) u Zagrebu zabilježena je vrsta štitaštog moljca, *Pealius quercus* (Signoret, 1868). Rod *Pealius* Quaintance & Baker, 1914 novi je u fauni štitaštih moljaca Hrvatske, a vrsta *P. quercus* prvi je put nađena u Hrvatskoj. Populacija nađena na hrastu u listopadu 2008. i 2009. bila je vrlo niska. Detektirani pupariji naselili su solitarno listove biljke domaćina. U radu su opisane morfološke oznake puparija štitaštog moljca vrste *P. quercus*.

