

## NEW INVASIVE SPECIES OF APHIDS (HEMIPTERA, APHIDIDAE) IN SERBIA AND MONTENEGRO

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**Abstract** - Three new invasive species of aphids have been found in Serbia: *Chaitophorus populifolli* Essig, *Myzocallis walshii* (Monell) and *Trichosiphonaphis polygonifoliae* (Shinji) and two have been found in Montenegro: *Aphis illinoisensis* Shimer and *Tinocallis kahawaluokalani* (Kirkaldy). *A. illinoisensis* is a pest of the grapevine, *T. polygonifoliae*, feeds on a decorative shrub (*Lonicera*) and the other three feed on trees (*Populus*, *Quercus* and *Lagerstroemia*). Three of the species are American aphids and two are of Asian origin. Their morphology, illustrated by original drawings and data on the biology and distribution are given.

**Keywords:** aphids, Aphididae, invasive species, Serbia, Montenegro, *Aphis illinoisensis*, *Chaitophorus populifolli*, *Myzocallis walshii*, *Tinocallis kahawaluokalani*, *Trichosiphonaphis polygonifoliae*.

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### INTRODUCTION

In the present condition of world globalization and climate change, invasive species impose a big cost on the economy and bring about damage to the environment, especially in recent years. The aphids (Hemiptera, Aphididae) are small insects which are very easily transferred to new countries and continents. Eggs, viviparous parthenogenetic females and larvae are carried by host plants. With the help of wind, alatae viviparous females also disseminate these species. In total, 102 invasive species of Aphididae have been introduced into Europe, which is about 7% of the European aphid fauna (Coeur d'acier et al., 2009).

### MATERIALS AND METHODS

In the course of regular study on aphids and aphid parasitoids research on the invasive species of aphids has been done in recent years in Serbia and Montenegro. All parts of plants, especially terminal shoots and leaves were examined for aphids. The

collected aphids were brought to the laboratory alive, together with the parts of their host plants. They were conserved in 70% alcohol, marked and prepared by the standard methods. The prepared species are stored in the Collection of the Faculty of Agriculture, University of Belgrade.

### RESULTS AND DISCUSSION

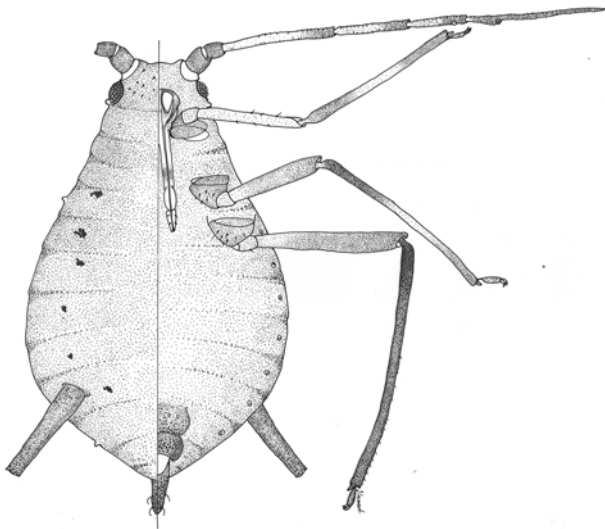
The grapevine aphid, an American species, was found for the first time in Montenegro in September 2007, on vineyards near Podgorica. Aphids also occurred on the grapevine in 2008 and 2009 and have been found on many localities in grapevine-growing regions. The first record of the aphid outside the American continent was in south Turkey, where it was found in 2002 (Remaudière et al., 2003). In Greece (island of Crete) it was detected in 2005 (Tsitsipis et al., 2005).

The aphid prefers the leaves on young terminal shoots and it is more abundant when there is no

regular cutting of shoots. We have not found sexual forms of *A. illinoisensis*, nor have they been found in Europe (Remaudière et al., 2003, Tsitsipis et al., 2005). It seems that it reproduces parthenogenetically in Europe, developing all year round on the grapevine, while *Viburnum prunifolium* is its primary host in North America (Blackman and Eastop, 2000).

Apterous and alatae aphids are dark brown to almost black and shiny, forming colonies on young leaves and shoots. From the other species of the *Aphis* genus that have been found on grapevine, such as *Aphis fabae* Scopoli, *Aphis gossypii* Glover and *Aphis craccivora* Koch, it can be distinguished by its wholly black hind tibiae (Fig. 1).

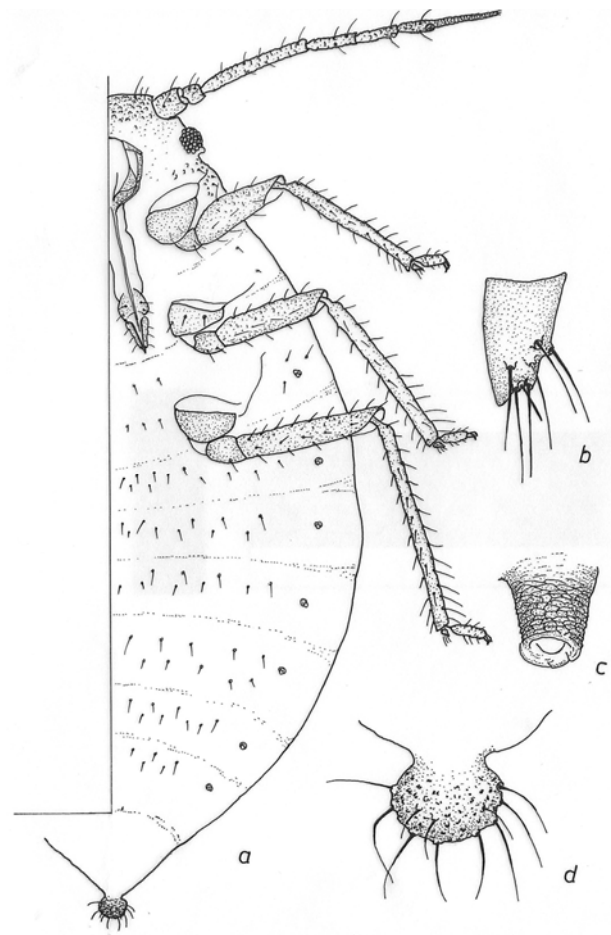
This is an American aphid, widespread in the USA, Canada and Mexico and introduced into Germany about 20 years ago (Blackman and Eastop, 1994). Serbia is the second European country where it has been detected. Its introduction probably occurred at the same time as in Germany, at the beginning of 1980s, with the importation of balsam poplar cuttings. In those years, under the auspices of the International Poplar Commission, a large exchange of poplar cuttings between the USA and several countries in Europe was carried out.



**Fig. 1.** *Aphis illinoisensis* Shimer, apterous viviparous female, left: dorsal side, right: ventral side

In Serbia, it was found on *Populus x euramericana* cl. I-124, Kać, at 7<sup>th</sup> April 1998 and on *Populus deltoides* cl. S<sub>1</sub>-8, Novi Sad, at 9<sup>th</sup> April 1999. Only small colonies have been present on the upper part of leaves. It seems that in Europe *Ch. populifolli* has not found very favorable conditions and it explains why it hasn't yet been found in other countries.

The host plants of *Ch. populifolli* are many of the *Populus* species: *Populus angustifolia*, *Populus balsamifera*, *Populus deltoides* and *Populus tremuloides*. As all other species from the genus *Chaitophorus*, it is holocyclic and monoecious, and host alternation does not occur.



**Fig. 2.** *Chaitophorus populifolli* Essig: a - apterous viviparous female, ventral side; b - first tarsal segment; c - siphunculus; d - cauda.

In Serbia, *Chaitophorus leucomelas* and *Chaitophorus populeti* have been on *Populus x euramericana*, and on *Populus deltoids*, *Ch. leucomelas* has been detected. (Poljaković-Pajnik, 2005). *Ch. populifolli* can be easily distinguished from both of these by its color. The apterous viviparous females of *Ch. populifolli* are yellowish-green and the head, first and second antennal segments and tergum are usually pale (Fig. 2a). The first tarsal segment has 7 hairs, the siphunculi are pale, the cauda is knobbed (Fig. 2b, c, d). The apterae of *Ch. leucomelas* are pale green with typical dark-green longitudinal pleural stripes on the dorsal side of abdomen. The apterous viviparous females of *Ch. populeti* are dark green to black.

*Myzocallis walshii* is native to North America but it has been detected in Europe for the first time by Remaudière, 1989, in France. Later, it was found in many countries: Spain (Mier Durante and Nieto Nafria, 1994), Italy (Patti and Lozzia 1994), Belgium (Nieto Nafria et al, 1999), Germany (Thieme and Eggers-Schumacher, 2003), Czech Republic (Havleka et al, 2005) and Hungary (Ripka, 2008). In Serbia, it has been found many times during 2006, 2007 and 2008 in Belgrade and in Novi Sad. In Serbia, as well as in Europe, it has been found only on its main host plant, the red oak, *Quercus rubra*. In North America it can be found on *Quercus agrifolia*, *Q. alba*, *Q. bicolor*, *Q. imbricaria* and *Q. velutina*. It is monoecious and holocyclic.

Colonies of *M. walshii* consist of yellow alatae viviparae and very pale yellow immatures. As in all *Myzocallis* species, the cauda is knobbed and the anal plate is bilobed (Fig. 3a). In Serbia, *Myzocallis boernerii* Stroy and *Myzocallis komareki* (Pašek) can be found on *Quercus* spp. (Petrović-Obradović, 2003). *M. walshii* can be distinguished from both of them by the longitudinal lateral stripes on its thorax and by the dark band of pigment on the costal margins of its forewings (Fig. 3a, b). Also, very characteristic are antennae (ringed with black) and black fore tibiae.

This aphid of Asian origin was introduced into Europe more than 20 years ago. It was first detected

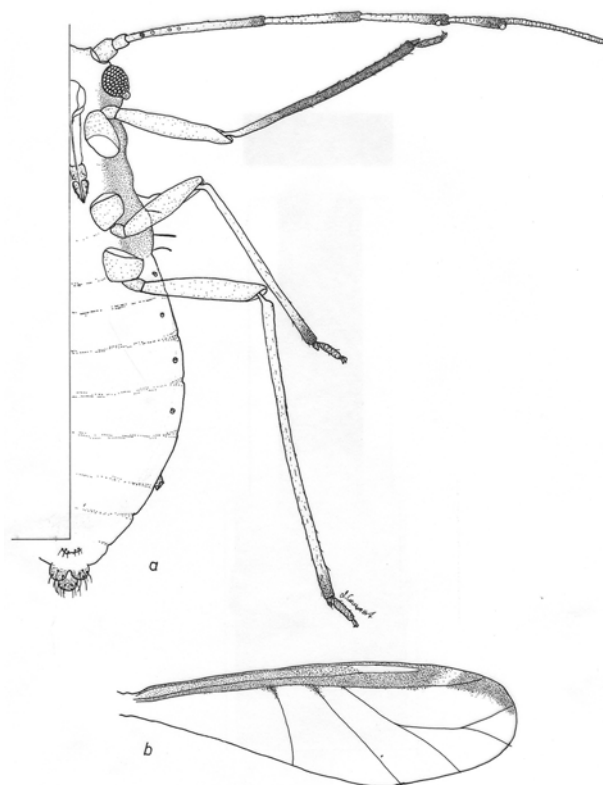
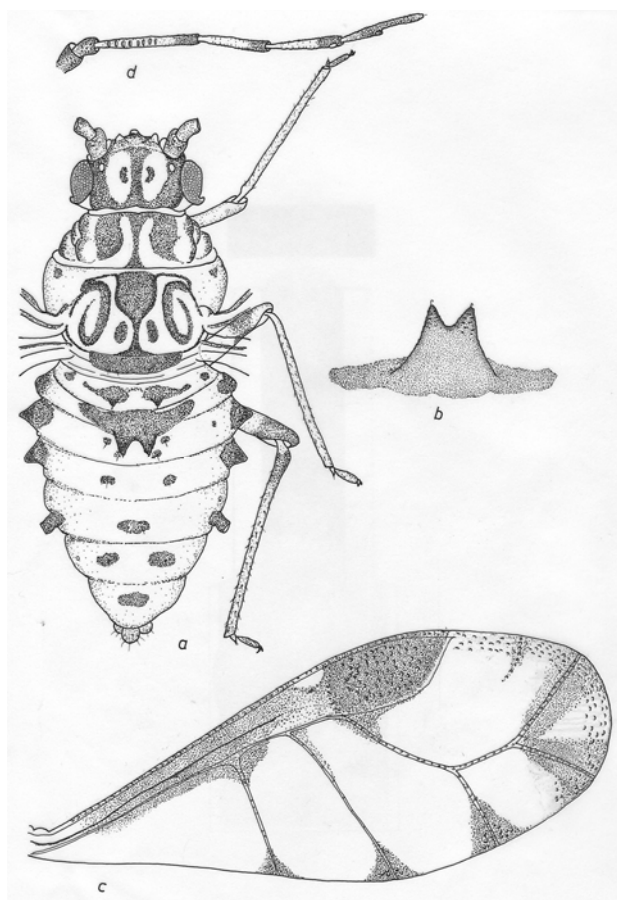


Fig. 3. *Myzocallis walshii* (Monell): a - apterous viviparous female, ventral side; b - forewing

in Italy (Pati, 1984), than France (Leclant and Renoust, 1986), Spain (Mier Durante et al., 1995) and Germany (Thieme and Eggers-Schumacher, 2003). In Montenegro it was found on 5 September 2007, in Miločer (near Budva), on many *Lagerstroemia indica* trees. It makes big colonies consisting of immatures and alatae viviparous females on the undersides of leaves. The alatae are broad-bodied (Fig. 4a) and pale yellow with dark brown markings on the head and prothorax. The paired tubercles on abdomen and forewings are very distinctively marked (Fig. 4b, c). The processus terminalis on the antennal segment VI is less than 1.5 times as long as the base (Fig. 4d).

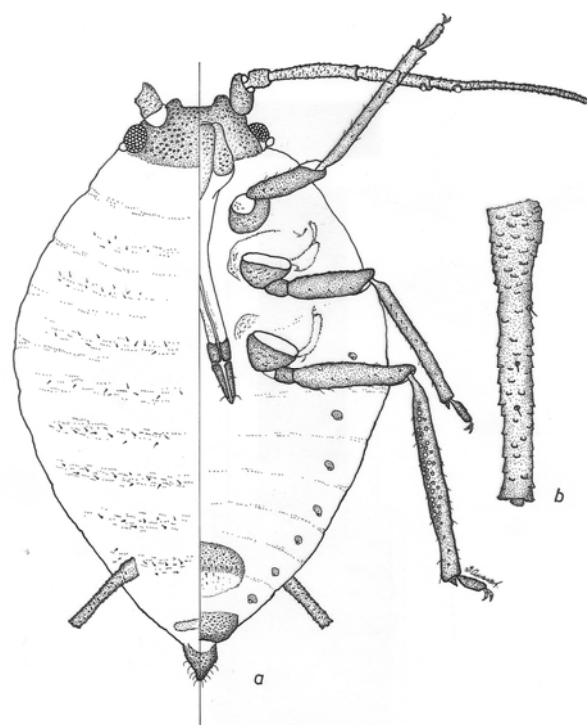
*T. kahawaluokalani* is widely distributed in East and Southeast Asia and has also been introduced into North America (Blackman and Eastop, 1994).



**Fig. 4.** *Tinocallis kahawaluokalani* (Kirk.): a - alata viviparous female, dorsal side; b - tubercles on abdomen; c - forewing; d - antenna of alata viviparous female.

The host plants of the aphid are from the family Lythraceae: *Lagerstroemia* spp. and *Lawsonia alba*. It can cause complete defoliation of the crape myrtle trees (Mier Durante et al., 1995). *T. kahawaluokalani* is a monoecious and holocyclic species, producing oviparae and alate males in autumn.

This is an aphid of East Asian origin that has been reported in Europe (France) by Remaudière et al., 1992. It has also been detected in the UK (Martin, 2000), Turkey (Özdemir et al., 2005) and Italy (Coceano and Petrović-Obradović, 2006). In a garden in Zemun (Belgrade) large colonies consisting of alatae viviparous female, oviparous females (Fig. 5a) and alatae males have been found on twigs of *Lo-*



**Fig. 5.** *Trichosiphonaphis polygonifoliae* (Shinji): a - oviparous female, left: dorsal side, right: ventral side; b - siphunculus.

*nicera* sp. in October and November 2007. Even though eggs were also found on the stems of the plant, the aphids were not detected the next spring. It is the first time sexuals have been found on *Lonicera* in Europe (Holman, 2009). In eastern Asia it host-alternates between *Lonicera* and *Polygonum* spp., where it colonizes the roots during the summer. The aphids were vigorously attended by ants.

*T. polygonifoliae* is a blackish brown to black aphid with dirty yellow siphunculi and cauda. Very typical are the many small hairs on the siphunculi (Fig. 5b) and *T. polygonifoliae* can be distinguished from the other *Lonicera*-feeding species by this characteristic.

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НОВЕ ИНВАЗИВНЕ ВРСТЕ БИЉНИХ ВАШИЈУ (HEMIPTERA, ARHIDIDAE)  
У СРБИЈИ И ЦРНОЈ ГОРИ

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Три нове инвазивне врсте биљних вашију нађене су у Србији: *Chaitophorus populifolli* Essig, *Myzocallis walshii* (Monell) и *Trichosiphonaphis polygonifoliae* (Shinji) а две су утврђене у Црној Гори: *Aphis illinoisensis* Shimer и *Tinocallis kahawaluokalani* (Kirkaldy). *A. illinoisensis* је штеточина винове лозе, на декоративном жбуну (*Loni-*

*sera*) јавља се *T. polygonifoliae* док се преостале три врсте хране на дрвећу (*Populus*, *Quercus* и *Lagerstroemia*). Три врсте су пореклом из Северне Америке а две из Азије. У раду су приказани елементи морфологије врста, илустровани оригиналним цртежима као и подаци о биологији и распрострањењу.