THE NEW REGISTERED SPECIES OF APHIDS (HEMIPTERA: APIDOIDEA) IN CROATIA

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The paper presents the description of 24 newly established species of aphids in Croatia that have been collected and determined during the three-year research (1996 – 1998) using the following two methods: Rothamsted suction trap (RST) and yellow water trap (YWT), Zagreb locality. Out of 24 species, 11 were collected and determined by IGRIC BARČIĆ in the 80’s (the determinations have not been published), while the same species have also been determined during this research. They are as follows: Capitophorus horni (Börner, 1931), Cavanella theobaldi (Gillete & Bragg, 1918), Elatobium abietinum (Walker, 1849) Megourelia purpurea (Hille Ris Lambers, 1949), Microlophium carnosum (Buckton, 1876), Pterocallis alni (de Geer, 1773), Uroleucon tussilaginis (Walker, 1850), Chaitophorus leucocerus (Koch, 1835), Eriosoma ulmi (Linnaeus, 1758), Thelaeus dritrophydi (Schrank, 1801) and Tuberculatus quereri (Kaltenbach, 1844). 13 species of aphids have been collected and determined for the first time in Croatia (GOTOVLIĆ ULJAK): Hyperomyzus lampasae (Börner, 1932), Macrosiphum gei (Koch, 1855), Callipterinella callipteri (Hartig, 1841), Callipterinella minitissima (Stroyn, 1953), Tynocallis platani (Kaltenbach, 1842), Tuberculatus moerickei (Hille Ris Lambers, 1972) 1974, Chaitophorus populeti (Panzer, 1804), Periphyllus californiensis (Shinji, 1917), Drapeanothium aceris (Koch, 1855), Drapeanaphus acerinum (Walker, 1858), Drapeanaphus dixoni (Hille Ris Lambers, 1971), Hormaphis betulæ (Mordvilko, 1903) and Eucnemis sp. (del Guercio, 1909). The species have been classified into 1 family, 8 subfamilies, 6 tribes and 19 genera. According to domination, the species were marked as nondominant, dominant, subdominant, recent or subrecent, while, according to the frequency of their occurrence, they have been marked as constant, dominant, subdominant, recent or subrecent. Aphididae, aphids, newly established species, domination, frequency of occurrence.
vraća subrastelj je i determinirala IGRC BARČIĆ osamdesetih godina (determinacijskim objavljene), a to iste vrste utvrđene su i tijekom ovog istraživanja. To su ali jedne vrste: Capitophorus horai (Börner, 1931), Cauveriella theobaldi (Gillette & Bragg, 1918), Elatobium abietinum (Walker, 1849) Megoura purpurea (Hille Ris Lambers, 1949), Microtopsis carnifex (Buckton, 1876), Pierocelis ulmi (de Geer, 1773), Uroleucon tussilaginis (Walker, 1833), Chiotopthrus leucoselas (Koch, 1854), Eriotheca ulmi (Linnaeus, 1758), Thelaxce driaphylo (Schrank, 1801) i Tuberisara quadricornis (Kaltenbach, 1843). 13 vrsta listih uli su burlja i determinirana po prvi put u Hrvatskoj (GOTLIM ČULIJA): Hypermyzus lamproae (Börner, 1932), Macrophasphum gei (Koch, 1855) Callipterinella calliptera (Hartig, 1841) Callipterinella minuscula (Stroyan, 1953), Tinocallis platani (Kaltenbach, 1842), Tuberculatus moerickei (Hille Ris Lambers, 1972) 1974), Chiotopthrus populeti (Panzer, 1804), Periphyllus californiensis (Shinji, 1917), Drepanosiphum aceri (Koch, 1855), Drepanosiphum acerinum (Walker, 1838), Drepanosiphum dissimile (Hille Ris Lambers, 1971), Hennaphis berthae (Mordvilko, 1901) i Eulachus sp. (del Guercio, 1909). Vrste su surovine u 1. periodu, 8 potporodice, 6 tribusa i 19 rodova. Vrste su prema dominanciji označene kao euodominante, dominantne, sub- dominantne, recenzije ili suvratne, a prema svojoj učestalosti pojave označene su kao euconstantne, konstantne, akcesorne ili accidentalne.

Aphididae, listne uli, novootvrđene vrste, dominancnost, učestalost pojave

Introduction

Aphids (Aphidoidea) feature as the most significant pests attacking agricultural crops. There is hardly a plant species that has not been attacked by these pests. There are around 4500 various aphid species in the world (EASTOP and BLACKMAN, 2001), while, according to the estimate by Leclant (quot. DINARINA, 1994), there are around 700 – 800 different species in Croatia. However, there is not much data or papers on the fauna of aphids in Croatia. Kovačević (1927) thus mentions 20 species, and, in 1956, in his book on forest pests, he lists 26, while later (1961) in the book on agricultural pests he lists 33 species of aphids. Tanasidiev and EASTOP (1963, 1968), while conducting a faunistic research across the entire ex Yugoslavia, determined the presence of 115 species of aphids. Out of this number, 18 were expressly listed in terms of sites on the territory of the Republic of Croatia. IGRC and MACELJSKI (1988) claim that – during their research work from 1981 – 1987 – they have identified around 50 species of aphids. Dinarina (1994) claims to have found 24 species of aphids while exploring the entomofauna of the weed Cardaria draba. IGRC BARČIĆ in MACELJSKI (1999, 2002) provides the description of 73 species of aphids, mostly agricultural crops pests. Through faunistic research, GOTLIN ČULIJA (2001) has determined 83 species of aphids, 13 out of which were completely new in

the fauna of aphids in Croatia. GOTLIN ČULIJA (2001) and GOTLIN ČULIJA, IGRCA BARČIĆ (2002), having reviewed all the available references, unpublished determinations by Igrc and Dinarina, and their own three-year (1996 – 1998) faunistic research results, have provided the list of aphid species in Croatia. Thus the list of aphid species, including those newly established, encompasses 199 species. The list of aphid species obtained through the review of references includes 156 species, the unpublished aphid species determined by Igrc Barčić, 24, those by Dinarina 6 species, while 13 newly established species were determined by Gotlin Čuliak. The list is not final but rather constitutes the basis which needs to be built upon i.e. continuously added and updated.

The paper shall present 24 species of aphids 13 out of which were collected and determined by Gotlin Čuliak (the determinations were confirmed by professor J. Igrc Barčić, DSc and professor F. Leclant, DSc) and 11 species that were in the 80’s collected and determined by Igrc Barčić (the determinations were confirmed by professor dr. F. Leclant), which have been collected and determined also during this research. The data on these species have not been published yet.

Materials and Methods

The research of the fauna of aphids lasted three years (1996 – 1998). It was conducted using two methods: visual and mechanical. The visual method consisted in the use of the yellow water trap (YWT) of the size 70 x 70 cm placed at the permanent height of 70 cm above the ground. The vessel depth is 12 cm. The vessel’s interior is painted by the yellow colour of the butternut flower, proven to attract aphids the best. The yellow water trap was placed 50 m away from the Rothamsted Suction Trap (RST) in the trial garden of the Institute for Agricultural Zoology of The Zagreb University Faculty of Agronomy. The mechanical method consisted in the use of the suction trap (RST) built in 1988 in the garden of the Department for Agricultural Zoology of The Zagreb University Faculty of Agronomy in Maksimir, according to standard measures of Rothamsted Suction Trap. The suction trap, which is 12.2 m high, consists of a hermetically closed box of the size 0.76 x 0.76 m, 3.05 m high, with a pipe of 25.4 cm in diameter, 9.15 m long. At the bottom of the box there is a centrifugal ventilator which sucks all the insects flying over it into the pipe. The opening of the pipe has a grid preventing the birds from entering. Smaller insects pass through the filter and are collected into a vessel containing alcohol. Until 1992, daily intake of samples was not automatized, while it has been so since. Device for automatic exchange of the vessels makes it possible to replace vessels at midnight, which is why
every vessel contains aphids catch for the interval od 24 h. The time of replacing vessels is set by a specially programmed clock. The daily air capacity is 45000 m³

For identifying aphid species we have used the following keys: RUPAIS, 1961.; TAYLOR, 1980.; BLACKMAN and EASTOP, 1984, 1994; notes by Igrc Barčić and the collection of permanent samples Leclant.

The determinations have been confirmed by prof. Jasminka Igrc Barčić, DSc and prof. F. Leclant, DSc, of Montpelier. The determination of around a dozen aphid species is still under way.

Based on the research of the representation level of the newly established species of aphids, the domination has been calculated according to Balogh, using the following equation:

\[ D_1 = \frac{a_1}{\sum a_1} \times 100 \]

where \( a_1 \) is the number of aphids of a certain kind, and \( \sum a_1 \) is the total number of aphids. According to Tischler and Heydemann, the species have been classified into the following groups:

1. EUDOMINANT – species with over a 10% share
2. DOMINANT – species with a 5 –10% share
3. SUBDOMINANT – species with a 2 – 5% share
4. RECENT – species with a 1 – 2% share
5. SUBLCENT – species with a share below 1%

The frequency has been calculated according to the following equation:

\[ C_{a1} = \frac{U_{a1}}{\sum U_{a1}} \times 100 \]

where \( U_{a1} \) is the number of samples in which a certain species is present, while \( \sum U_{a1} \) is the total number of samples inspected. According to Tischler, the species have been classified into the following groups:

1. ACCIDENTAL species from 0-25% of frequency
2. ACCESSORY species from 25-50% of frequency
3. CONSTANT species from 50-75% of frequency
4. EUCONSTANT species from 75 –100% of frequency

Presentation of the newly established species of aphids in Croatia (systemized according to Nieto Nafria, 1998)

Order Hemiptera

Suborder Homoptera

infraorder Sternorrhyncha

Superfamily Aphidoidea

Fam. Aphididae

Subfam. Aphidinae Latreille, 1802

Trib. Macrosiphini Wilson, 1910

Gen. Capitophorus van der Goot, 1913

• Capitophorus horni Börner, 1931 (determined by Igrc Barčić & Gotlin Čuljak)

Gen. Cavariella del Guercio, 1911

Subgen. Cavariella del Guercio, 1911

• Cavariella (Cavariella) theobaldi Gillete&Bragg, 1918 (determined by Igrc Barčić & Gotlin Čuljak)

Gen. Elatobium Mordvilko, 1914

• Elatobium abietinum Walker, 1849 (determined by Igrc Barčić & Gotlin Čuljak)

Gen. Hyperomyzus Borner, 1932

Subgen. Hyperomyzus Borner, 1932

• Hyperomyzus (Hyperomyzus) lampsanae Börner,1932 (determined by Gotlin Čuljak)

Gen. Macrosiphum Passerini, 1860

Subgen. Macrosiphum Passerini, 1860

• Macrosiphum (Macrosiphum) gei Koch, 1855 (determined by Gotlin Čuljak)

Gen. Megourella Hille Ris Lambers, 1949

• Megourella purpurea Hille Ris Lambers, 1949 (determined by Igrc Barčić & Gotlin Čuljak)

Gen. Microlophium Mordvilko, 1914

• Microlophium carnosum Buckton, 1876 (determined by Igrc Barčić & Gotlin Čuljak)

Gen. Uroleucon Mordvilko, 1850

Subgen. Uroleucon Mordvilko, 1850

• Uroleucon (Uroleucon) tusilaginis Walker, 1850 (determined by Igrc Barčić & Gotlin Čuljak)

Subfam. Calaphidinae Oeslund, 1919

Trib. Calaphidini Oeslund, 1919

Gen. Callipterinella van der Goot, 1913

• Callipterinella calliptera Hartig, 1841 (determined by Gotlin Čuljak)
**Callipterinella minutissima** Stroyan, 1953 (determined by Gotlin Čuljak)
Trib. Panaphidini Oestlund, 1919
Gen. Pterocallis Passerini, 1860

**Pterocallis alni de Geer, 1773** (determined by Igrc Barčić & Gotlin Čuljak)
Gen. Tinocallis Matsumura, 1919
Subgen. Tinocallis Matsumura, 1919

**Tinocallis (Tinocallis) platani Kaltenbach, 1842** (determined by Gotlin Čuljak)
Gen. Tuberculatus Mordvilko, 1894
Subgen. Tuberculatus Mordvilko, 1894

**Tuberculatus (Tuberculatus) quercus Kaltenbach, 1843** (determined by Igrc Barčić & Gotlin Čuljak)
Subgen. Tuberculoides van der Goot, 1915

**Tuberculatus (Tuberculoides) moerickei Hille Ris Lambers, 1972** 1974 (determined by Gotlin Čuljak)
Subfam. Chaitophorinae Mordvilko, 1908
Trib. Chaitophorini Mordvilko, 1908
Gen. Chaitophorus Koch, 1854

**Chaitophorus leucomelas** Koch, 1854 (determined by Igrc Barčić & Gotlin Čuljak)

**Chaitophorus populetii** Panzer, 1804 (determined by Gotlin Čuljak)
Gen. Periphyllus van der Hoven, 1863

**Periphyllus californiensis** Shinji, 1917 (determined by Gotlin Čuljak)
Subfam. Drepasophinae Herrich-Schaeffer, 1857
Trib. Drepasophimi Herrich-Schaeffer, 1857
Gen. Drepasophium Koch, 1855

**Drepasophium aceris** Koch, 1855 (determined by Gotlin Čuljak)

**Drepasophium acerinum** Walker, 1838 (determined by Gotlin Čuljak)

**Drepasophium dixoni** Hille Ris Lambers, 1971 (determined by Gotlin Čuljak)
Subfam. Eriosomatinae Kirkaldy, 1905
Trib. Eriosomatini Kirkaldy, 1905
Gen. Eriosoma Leach, 1818

**Eriosoma ulmi** Linnaeus, 1758 (determined by Igrc Barčić & Gotlin Čuljak)
Subfam. Hormaphidinae Mordvilko, 1908
Trib. Hormaphidini Mordvilko, 1908
Gen. Hormaphis Osten-Sacken, 1861

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**Hormaphis betulae** Mordvilko, 1901 (determined by Gotlin Čuljak)
Subfam. Lachnininae Herrich-Schaeffer, 1857
Trib. Lachnchini Baker, 1920
Gen. Lachnchus del Guercio, 1909

**Eulachus sp. del Guercio, 1909** (determined by Gotlin Čuljak)
Subfam. Thelaxinae Baker, 1920
Gen. Thelaxes Westwood, 1840

**Thelaxes driophyllica** Schrank, 1801 (determined by Igrc Barčić & Gotlin Čuljak)

Distribution, biology and some morphology of the winged forms of the newly established species has been described according to BLACKMAN, EASTOP (1985, 1995), TAYLOR (1980), and according to the notes from the specialization of professor Jasmina Igrc Barčić. The largest part of the morphological description of the winged forms is based on the authors’ own perceptions during the work.

**Description of the newly established species of aphids**

**CAPITOPHORUS** van der Goot, 1913
Aphidinae: Macrosiphini

*Capiophorus horni* Börner, 1931

The species is small to medium in size, of light green colour. The head front is shaped in the form of letter W with a well pronounced medial tubercle. The final rostrum segment is thin at the end with a well observable white ring behind which is the tip of a somewhat darker colour. This particular morphological characteristic of the rostrum is of exceptional importance to us, because this is how we differentiate it from the species of the genus *Cryptomyzus* which has a short final rostrum segment, rounded and quite bright. The antennae have a large number of rhinaria, while the end of the sixth segment is eight times longer than the base. The abdomen has a dark spot of a regular rectangular appearance below which transversal stripes may or may not be located. The lateral abdomen sides show well visible marginal points. The cauda is short and bright. The cornicles are long, with no pigmentation, and slightly broadened towards the top. Mixing up is possible also within other species of the genus *Capiophorus*. The species is monoecious and holocyclic. Its hosts are the species of the genus *Cirsium*, while, in Europe, they sometimes damage and inhabit the species *Cynarum scolymus*. It is a subrecent species both in the RST (0.75%) and in the YWT (0.3%). In terms of the frequency of its occurrence, it pertains to the accidental species. In the samples of the RST it was identified in the course of 1996, 1997, and 1998 respectively. In the YWT samples it was identified in the course of 1996 and 1997 respectively.
CAVARIELLA del Guercio, 1911
Aphidinae: Macrosiphini
Cavariella (Cavariella) theobaldi Gillette & Berger, 1918
The species is spread in Europe, southwestern Asia, Siberia, and North America. It appears in springtime on Salix sp. It comes in colonies of yellow-greenish to greenish colour. It is 1.6-2.0 mm long. The head front is completely flat. On the third segment of the antennae it has many spread rhinaria, which makes the said segment uneven. The end of the sixth segment is four times longer than the base. The abdomen has a spot which is more or less pigmented, but it may also be spread or reduced to stripes. The cauda is pigmented, while above it there is a protuberance (like a little horn) characteristic for all the species of the same genus. The cornicles are flat; slightly, but evenly pigmented. They may be mistaken for other species of the genus Cavariella. The species C. pastinacea and C. aegopodii have rounded cornicles, while the cornicles of the species C. theobaldi are flat. Other morphological characteristics are very similar, nearly identical. The species starts flying late in the month of April and it lasts until June. Its secondary hosts are the plants from the family Umbelliferae (Heracleum, Pastinaca, Aegopodium, Angelica, Chaerophyllum). In late September, and also in October, they migrate back to the winter host. It is a subrecent species both in the RST (0.3%) and in the YWT (0.2%). As regards the frequency of its occurrence, it is an accidental species. It was found among the RST samples in 1996 and 1998 respectively, while it was present among the YWT samples throughout the three years of research.

ELATOBium Mordvilko, 1914
Aphidinae: Macrosiphini
Elatobium abietinum Walker, 1849
The species is spread in Europe, Tasmania, New Zealand, and the western part of North America. Apterous are light green with two dark longitudinal stripes. The antennae are medium pigmented with large round rhinaria. 7-9 rhinaria on the third and 1 rhinaria on the fourth segment. On the abdomen, we may see light marginal spots, as well as tiny little spots across the entire abdomen. Long, light pigmented cornicles. The cauda has a sag and is less well pigmented. The male looks very much like the female. The species is monoeccious and holocyclic. It appears on the species of the genera Picea and Abies. It is a subrecent species in the RST (0.08%). It has not been established in the YWT samples. As regards its frequency, it is accidental. It has been determined in the course of 1997 and 1998 respectively.

HYPEROMYZUS Börner, 1932
Aphidinae: Macrosiphini
Hyperomyzus (Hyperomyzus) lampsean Börner, 1932
It is spread all over Europe. The front is flat in the shape of letter W. The abdomen has a spot which is compact and highly pigmented. The cornicles are medium pigmented and rounded. The cauda is much lighter with regard to the species H. lactucae. The male of this species has many rhinaria on the third and fourth segment of the antennae and 5-7 rhinaria on the fifth segment. The cornicles are much lighter and more rounded than those of the female. The species is holocyclic and heterœcious. It was not found among the RST samples. Its share in the YWT samples is 0.2% and it pertains to the subrecent species. In terms of its frequency it is accidental. It has been identified in all three years of the research.

MACROSIPHUM Passerini, 1860
Aphidinae: Macrosiphini
Macroischium (Macroischium) gei Koch, 1855
It is spread all over Europe, to the east all the way to Kazakhistan, and in North America. The size of the species ranges from 1.9-4.5 mm; it is light, of yellow-green colour. The abdomen is light, with less well pigmented lateral spots. Sometimes one may see light stripes. The cornicles are pigmented with a light base. The cauda is long and bright. It is a subrecent species in the RST (0.08%). It has not been identified in the YWT samples. In terms of its frequency, it is accidental. It was determined in the course of 1996 and 1998.

MEGOURELLA Hille Ris Lambers, 1949
Aphidinae: Macrosiphini
Megourella purpurea Hille Ris Lambers, 1949
It is spread in the Netherlands and Great Britain. The species has hairy antennae with numerous rhinaria on the third and fourth segment. The legs are dark with a white tibia base. On the abdomen, there are heavily pigmented and large marginal spots. At the pleural fields there are two smaller, but well pigmented spots, while on the spinal fields from the dorsal side, the spots are large and heavily pigmented. The cornicles are long, well pigmented and dark, and slightly rounded. The cauda is light. Its host are the species Lathyrus pratensis and Vicia sp. on which they infect the bottom part of the leaves. The species' share in total population is 0.03% in both methods. The species is subrecent and accidental. It was identified only in 1997.

MICROLOPHUM Mordvilko, 1914
Aphidinae: Macrosiphini
Microlophium carnosum Buckton, 1876
The species is medium sized from 1.5-1.9 mm. On each side of the abdomen it has three poorly pigmented marginal spots (on the second, third and fourth segment of the abdomen). The pleural and the spinal fields on the back side of the abdomen are with no morphological marks or pigmentation whatsoever. The cauda is long and bright. The cornicles are very bright and long, widened at the very top. Its hosts are the species of the genus Urtica. It is very frequently found on the species Urtica dioica. It lives on the back side of leaves. The species is subrecent in the RST (0.8%), and recent in the YWT (1%). In the RST samples, as well as in the YWT, it was identified in 1997 and 1998.
UROLEUCON Mordvilo, 1850

Aphidinae: Macrosiphini

Uroleucon (Uroleucon) tussilaginus Walker, 1850

The species is spread in Europe and in the subtropic region. It is medium sized. On the abdomen, the marginal spots are well visible. The cornicles are long with well visible reticulation of the top. The top and the base of the cornicles are more pigmented. The cauda is long and light.

It is a subrecent species in the RST (0.08%). It has not been identified among the YWT samples. According to the frequency of its occurrence, the species is accidental. It was determined in the course of 1996 and 1997.

CALLIPTERINELLA van der Goot, 1913

Calaphidinae: Calaphidini

Callipterinella calliptera Hartig, 1841

The species is spread all over Europe and across northern Asia all the way to Siberia, Korea and Japan. It was introduced in North America. Apterae are yellow-greenish to greenish, from 1.5 – 2.5 mm long, often with dark transversal stripes on all the tergits. On the third segment of the antennae it has eight rhinaria in line. On the fourth segment it has no rhinaria. The male of the species has got - on the third segment - 11-15 rhinaria in a row. Alatae have dorsal markings less well developed. The cornicles are small. The cauda is light. The most frequent host of this species is Betula pendula; it comes less frequently to Betula pubescens, while in Japan we find it on Betula platyphylla. It appears on the bottom side of the leaves, but we may find it also within the leaf together with butterfly larvae. The species secretes honey dew in abundance. Oviparous and alate males appear from the month of September to the end of October. It is a subrecent species both in the RST (0.05%) and in the YWT (0.01%). In terms of its frequency of occurrence, it is an accidental species. The species has been determined in the RST and the YWT in the course of 1996 and 1997 respectively, while its finding was not recorded in 1998.

Callipterinella minutissima Stroyan, 1953

The species is spread throughout Europe and was introduced into the western part of North America. Apterae are small, with fat oval body, green to yellow-green, with a dark stripe on the eight abdominal tergites. The body length ranges from 0.9-1.4 mm. Alatae have a completely light abdomen with abdominal tubercules on the lower part, along the entire abdomen. The antennae are dark with 6–8 rhinaria on the third segment. The cornicles are short and narrowed down towards the top, while their length is lower than the cornicles base diameter. The cauda is short, light, like a button. The males have transversal dark stripes on the dorsal part of the abdomen, pigmented cornicles and 8-9 rhinaria in a row on the third segment of the antennae. Its host plants in Europe are Betula pendula, Betula pubescens, and in North America it colonizes the vegetable species Betula populifera. Oviparae and alate males are found on leaves from the month of September to the month of November. It is a subrecent species both in the RST (0.8%) and in the YWT (0.05%). As for the frequency of its occurrence, it is one among the accidental species. It was found in the samples of both methods in all three years of the research.

PTEROCALLIS Passerini, 1860

Calaphidinae: Panaphidini

Pterocallis alni de Geer, 1773

The species is spread in Europe to the east all the way to Turkey, in Iran and Lebanon, and was introduced into North America, New Zealand, Australia and Chile. It comes in two morphological forms: as winged and non-winged. Both forms are yellow-white to yellow-greenish, of the length 1.3 –2.0 mm. According to our measurements, the species’ length ranges from 1.1 –1.5 mm. The tips of the antennae joints are pigmented. The species has black tarsi. It is easily mistaken for Appendiseta robini. They differ in terms of vein distribution on the front pair of the wings and by the fact that Pterocallis alni has a black knee and very pigmented cornicles. In Europe, it comes on Alnus glutinosa, on the lower part of the leaves. The species does not secrete honey dew in any abundance, so that ants accompany its appearance only rarely. In North America, it is capable of feeding itself with various species of genus Alnus. The species is monoecious and holocyclic. Oviparous and alate males appear in the month of October. The species is eudominant in the RST (14%), and subdominant in the YWT (2.8%). In terms of the frequency of its occurrence, it pertains to accidental species. Its finds were not recorded in 1996 in the YWT.

TINOCALLIS Matsumura, 1919

Calaphidinae: Panaphidini

Tinocallis (Tinocallis) platani Kaltenbach, 1842

The species is spread all over Europe, in Asia, to the east to Siberia, and was introduced into the western part of North America. Alatae are yellowish to greenish-white with black-brown marks on the head, chest, abdomen, by the veins (radial, medial and anal), on the wings and the black cornicles. The length ranges from 2.0-2.2 mm, which is consistent with our measurements. The problems of determination are associated with seasonal variations. Thus, for instance, in the course of May, the species has 17–25 rhinaria (usually 20-23) on the third segment, while, in the months of July and August, it has 7-20 rhinaria (usually 11-17). Its hosts are the species of genus Ulmus. It is found on the bottom part of the leaves, while it is especially numerous on the Ulmus laevis species. In North America, the species was found on Ulmus americana. Oviparae and alate males appear in the month of October. Only several individuals were
determined in the RST in 1997, which is why we categorize it as a subrecent (0.008%) and accidental species. There were no finds of the species in the YWT samples.

**TUBERCULATUS Mordvilko**

**Calaphidinae: Panaphidini**

*Tuberculatus (Tuberculatus) quercus* Kaltenbach, 1843

A medium size aphis of light yellowish color. Long antennae segments. On the third segment of the abdomen it has a spinal tubercle shaped as the letter Y, and large black lateral tubercules, which largely facilitates the determination of this kind. The cornicles are black. The species is recent in the RST (1.13%), and subrecent in the YWT (0.02%). In the YWT samples it was identified in 1997 and 1998 respectively, while – among the samples of the RST - it was present throughout the three years of research.

*Tuberculatus (Tuberculoides) moerckei* Hille Ris Lambers, (1972) 1974

Spread in the Mediterranean region and northwestern Asia. Alatae are light yellow with dark segment edges and dark cornicles ends, 1.4 –2.6 mm long. Its hosts are the species of genus *Quercus*, while it is particularly numerous on *Q. inferotera*. The species is subrecent in the suck-in station (0.6%) and the yellow vessel (0.2%). It is subrecent in the RST (0.08%) and YWT (0.2%). In terms of the frequency of its occurrence it is accidental. Among the RST samples, it was present throughout the three years of the research. Among the YWT samples it was identified in 1997 and 1998 respectfully.

**CHAI TOPHORUS Koch, 1854**

**Chai tophorinae: Chai tophorini**

*Chai tophorus leuc omelas* Koch, 1854

The species is spread throughout Europe, southwestern and central Asia, and was introduced into South Africa, North and South America. The length of the species is 1.2 – 2.4 mm, which is consistent with our measurements. The aper tuous forms have a prolonged oval shape, of light green or yellow color, with typical dark or dark green pleural stripes. These stripes may also be segmented. It has dark cornicles. Those alatae have a straight with well visible hairs. The third, the fourth and a half of the fifth segment are completely light with 10 –12 rhinaria on the third segment of the antennae. The rostrum is long and dark. The medial vein of the wings is split in two parts with a visible dark stigma on the upper part. Across the abdomen it has dark parallel stripes and is entirely covered with thick and long hairs. These stripes need not always be clear and very pigmented, but they may also be lighter. The cauda is light and small in the shape of a little button, narrowed down at the top. The cornicles are short, wider on the base, very pigmented, while the length of the siphon is equal to the diameter of the base. It may be mistaken for the species of genus *Periphyllus*. The difference is that the species of genus *Periphyllus* generally have larger dimensions,

the hairs that cover their body are numerous along the entire body, the cauda is completely short and round, while the length of the cornicles exceeds its base’s diameter. The males of the species may have medium to dark abdominal stripes and marginal points. In springtime it appears on young shoots of *Populus sp.*, while later it appears on the bottom side of the leaves. We may find it in leave *galae* abandoned by other insects. The species secretes honey dew in abundance, so that its appearance is always accompanied by a large ant population. Host plants in Europe are mostly *Populus nigra* and other related species and hybrids, while in Northern America it has much more host species. Oviparae and alate males appear in the months of October and November. It is a recent species in the RST (1.9%), and subrecent in the YWT (0.2%). In terms of its occurrence it is accidental. Among the samples of the RST the species was present throughout the three years of the research. Among the YWT samples it was present in 1997, by only two individuals.

**Chai tophorus populet Panzer, 1804**

Aper tuae are oval, dark green to black, with dark green to black antennae, 1.5 – 2.9 mm long. The forms of this species have 15 rhinaria on the third and three rhinaria on the fourth segment of the antennae. The antennae are dark. The first half of the third antennae segment is bright, and these are the morphological marks by which we differentiate it from the previous species. On the abdomen there are dark dorsal stripes, and, from the ventral side, we have 5 dark stripes. The cornicles are very pigmented. The cauda is bright. It is a subrecent species in both the RST (0.05%) and the YWT (0.01%). In terms of the frequency of its occurrence, the species is accidental. In the RST samples it was present in 1996 and 1997. In the YWT it was present throughout the three years of the research.

**PERIPHyllus van der Hoeven**

**Chai tophorinae: Chai tophorini**

*Periphyllus californiensis* Shinji, 1917

It is spread in Europe, North America, Australia and New Zealand. Aper tuae are dark olive green to brown, with dark brown head and the first segment of the chest, 2.3 –3.5 mm long. On the abdomen it has dark dorsal segmental spots or stripes. Alatae have 20 scattered rhinaria on the third segment of the antennae, while the end of the sixth joint is 4 times longer than the base. The front is flat, with no protrusions. Across the entire abdomen there are stripes which are very pigmented. The cornicles are conical, longer than the base diameter, but short. The cauda is very short and round. It is easily mistaken for the species of genus *Chai tophorus*. The species lives on the bottom side of the leaves next to the veins of the species *Acer pseudoplatanus*, but also on *Aesculus turbinata* in Japan. The species is subrecent in the RST (0.2%), and subdominant in the YWT (2.02%). According to the frequency of its occurrence, it is an
accidental species. In the samples of the RST it was identified in 1996 and 1997. Among the YWT samples, the species has been identified in all three years of the research.

**DREPNOSIPHUM** Koch, 1855

Drepanosiphinae: Drepanosiphini

*Drepanosiphum acerinum* Walker, 1838

The species is spread in the whole of Europe, except for the Baltic region. The species is whitish-greenish or yellow, with dark thoracic pendants, 2.1 – 3.3 mm long. The antennae are long with many oval rhinaria on the front half of the third segment. On the fourth and fifth abdominal tergites one may often find a dark transversal stripe. The cornicles are large, elongated and usually dark, while they may also be bright with a dark spot. In our research we have not found an individual of the species with completely dark cornicles, most frequently mentioned in the references. All the individuals of this species within our research had lighter cornicles with a darker pigmented spot. It appears on the species *Acer pseudoplatanus* on the bottom side of the leaves, which usually lie in the shade. We find it also on other species of the genus *Acer*. Oviparous and alate males appear in September and October. There are no finds in the RST, while, in the YWT, it is a subrecent species (0.03%). As for its frequency of occurrence, the species is accidental. The species was present among the YWT samples in 1997 and 1998 respectively.

*Drepanosiphum aceris* Koch, 1855

The species is spread in the whole of Europe, to the east all the way to Caucasus. Those alateus are yellowish or light white-green 2.7 – 4.2 mm long, which is consistent with our measurements. They have dark thoracic pendants. On the fourth and fifth abdominal tergites there is usually a transversal stripes which is medium pigmented and marginal spots which are to the opposite of the cornicles base. The cornicles are usually light with dark distal ends. It appears on the species *Acer campestris*, most frequently on the bottom side of the leaves in the lower part of the tree top. There were no finds in the RST, while in the YWT it is a subrecent species (0.05%). As to the frequency of its occurrence, the species is accidental. Its finding was recorded only in 1996.

*Drepanosiphum dixoni* Hille Ris Lambers, 1971

The species is spread in England, the Netherlands, northern Italy, Yugoslavia (after reviewing the literature there were no indications as to its finds in Croatia), which is why we are here providing both its description and its first find on our territory. Alateus are greenish-whitish with a brown head, 2.5 – 3.3 mm long. They have dark thoracic pendants. On the fourth and fifth abdominal tergites there are two transversal stripes which are very pigmented, and marginal spots opposite to the baze cornicles base. The cornicles are light brown to black, but they may also be bright with pigmented distal tops. We find it on the species *Acer campestris* on the bottom side of the leaves, as well as all *Drepanosiphum sp.* Alateus males and oviparous appear in the month of October. There are no finds in the RST, while in the YWT it is a subrecent species (0.05%). In terms of the frequency of its occurrence, the species is accidental. It was found throughout the three years of research.

**ERIOSOMA** Leach, 1818

Eriosomatinae: Eriosomatini

*Eriosaoma ulmi* Linnaeus, 1758

Spread in Europe, southwestern and central Asia, all the way to Mongolia and China. Fundatrix and apterous fundatrigene aphids are covered with a dark green wax cover, while alateus are brown. The head front is flat. The antennae are short, but the third segment is extremely long given other antennae segments. The rhinaria are very big, completely surrounding the third and the fourth segment, and look like arranged plates. The median vein on the wings is bifurcated. On the abdomen, there are no marginal spots, the stripes are narrow and well visible. The cornicles are extremely short and hence visible only as circles. The cauda is short, elongated, and hardly visible. It may easily be mistaken for the species of the genus *Tetraneura*. The species is holocyclic and heterocercal. We find it in *galae* on the species of genus *Ulmus*. It migrates in the course of June and July on *Ribes rubrum* and *R. nigrum*. The species is subrecent (0.07%) in both the RST and the YWT (0.03%). As for the frequency of its occurrence, the species is accidental. It was found throughout the three years of research.

**HORMAPHIS** Osten-Sacken, 1861

Hormaphidinae: Hormaphidini

*Hormaphis betulae* Mordvikko, 1901

It is spread in northern and central Europe, while it was described also in Japan. The species has low length, of yellow-green or yellow-brown colour. In our determinations, 5 antennae segments were identified with big and wide similar to *Eriosaoma sp*. It usually has a single vein on the back wings. It has no cornicles. The abdomen is bright, without marks. The species is similar to *Pemphigus sp.* It is an holocyclic species on the species of genus *Betula* (pendula, pubescens, nana) in northern and central Europe. In Japan, it is described as the species *Hormaphis gallfolia* which is holocyclic and forms *galae* on the bottom part of the leaves of the species *Hamanazelis japonica*. Alateus leave the *galae* from the month of May all the way until June. The species is subrecent at the RST (0.04%), while there are no finds in the YWT. In terms
of the frequency of its occurrence, the species is accidental. It was identified in 1996 and 1998 respectively.

**EULACHNUS del Guercio, 1909**

*Eulachnus sp. del Guercio, 1909*

The genus includes ten species with elongated bodies living on the needles of the species of genus *Pinus*. Not a single species of the said genus is strictly monophagous, although every species shows the tendency towards feeding itself on certain *Pinus spp.*. The species of this genus have a flat head and very long legs. The cauda is triangular, and the cornicles are very much reduced (they have the form of circllets). The male and the female have no morphological differences. On the head, the antennae, the legs, and the cauda, they have numerous hairs. We were not able to establish exactly which one of the species it is. Only 5 individuals were found among the RST samples in 1997 and 1998, so that it pertains to subrecent species (0.03%), while there were no finds of the species among the YWT samples. In terms of the frequency of its occurrence, the species is accidental.

**THELAXES Westwood, 1840**

*Thelaxes dryophila* Schrank, 1801

The species is spread all over Europe and the Mediterranean region. Alateae are widely oval, dorsoventrally flat, with dark brown reddish to purple-greyish back stripes which need not be easily observable. Alateae have dark marginal sclerites and dorsal transversal stripes on the back abdominal segments. The antennae are made of five short segments. The cauda looks like a button. The cornicles are reduced; there are only their indications similar to circllets. It is a monoeocious and holocyclic species. It is hosted by vegetable species from the genus *Quercus*. The sexual forms are covered with wax and appear from June to October on the bottom part of the leaves next to the veins. It is a subrecent species in the RST (0.23%), but it was not found after 1996, while it was not found in the YWT at all. The species is accidental.

**Discussion**

By the most part, the newly established species of aphids are forest species who come most frequently on the species of the genus *Betula, Populus, Acer, Pinus, Ulmus* and *Quercus*. Several species (*Capitophorus horni, Cavaariella theobaldi, Hyperomyzus lampasanae*, *Megourella purpurea, Microlophium carnosum*) of aphids come on the various kinds of weeds from the genus *Vicia, Urtica*, as well as on the species of the families Poaceae and Umbelliferae.
Conclusion

In the course of a three-year faunistic research, 24 species have appeared as the newly established species of aphids for which a site in Croatia has been found for the first time. Out of 24 species, 11 species of aphids were determined by Igor Barčić in the course of 80's (the determinations have not been published, while the same species have been established during this research as well. 13 species of aphids have been determined for the first time in Croatia (Gotlin Čuljak).

Given the importance of aphids, as well as their numerosity (there are around 4500 species worldwide, and 199 known in Croatia), we feel that our faunistic research should be both continued and broadened.

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