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## Fifty leafhoppers new to Belgium (Hemiptera: Cicadellidae)

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Front cover: *Iassus scutellaris* (Fieber, 1868), lateral view (photo by Koen Lock).

## **Fifty leafhoppers new to Belgium (Hemiptera: Cicadellidae)**

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### **Abstract**

Leafhoppers or Cicadellidae are the largest family of the Auchenorrhyncha in Belgium, however, this family did not yet receive a lot of attention. In a short time-span, 50 species were found that were not previously reported for the Belgian fauna. Three of these are alien species from outside Europe that recently colonised Belgium and another six live on introduced plants and could therefore also be considered as alien species. Several southern species recently colonised Belgium, possibly due to climate changes. For two of these, the present records are even the northernmost so far. However, most species were just overlooked in the past due to the limited attention for leafhoppers in Belgium.

**Keywords:** alien species, Auchenorrhyncha, Belgian fauna, climate change

### **Samenvatting**

Dwergcicaden of Cicadellidae zijn de grootste familie van de Auchenorrhyncha in België, maar de familie kreeg er nog niet veel aandacht. Op korte tijd konden 50 soorten worden gevonden, die nog niet werden gemeld voor de Belgische fauna. Drie daarvan zijn exotische soorten van buiten Europa die recent België koloniseerden en zes andere leven op ingevoerde planten en kunnen dus ook als exoten worden beschouwd. Enkele zuidelijke soorten profiteerden mogelijks van klimaatveranderingen en koloniseerden België pas recent. Voor twee daarvan zijn dit zelfs de meest noordelijke vondsten tot nu toe. De meeste soorten werden echter gewoon nog niet eerder gevonden door de beperkte aandacht voor dwergcicaden in België.

### **Résumé**

La famille des Cicadellidae est la plus importante des Auchenorrhyncha en Belgique. Or, jusqu'à présent elle a retenu peu d'attention alors qu'en peu de temps, 50 espèces nouvelles peuvent être ajoutées à la faune belge. Parmi celles-ci, trois sont des espèces exotiques non européennes colonisant la Belgique depuis peu et six autres vivent sur des plantes introduites et peuvent donc aussi être considérées comme des espèces exotiques. En outre, quelques espèces méridionales occupent actuellement la Belgique, peut-être suite aux changements climatiques. Pour deux d'entre-elles, ces observations sont actuellement les plus septentrionales.

## Introduction

Leafhoppers or Cicadellidae belong to the Cicadomorpha, along with froghoppers (Aphrophoridae and Cercopidae), cicadas (Cicadidae), treehoppers (Membracidae) and Ulopidae. Together with the Fulgoromorpha, they constitute the Auchenorrhyncha, a suborder of the Hemiptera. In Cicadomorpha, the insertions of the median coxae are situated close to the body axis, while these insertions are widely separated in the Fulgoromorpha. In Cicadellidae, the fore femur is not thickened and does not bear stiff spines and the hind tibia is angular or edged in cross-section, without stiff spines on the outer margin. Leafhoppers or Cicadellidae are the largest family of Auchenorrhyncha in Belgium: about three quarters of the species belong to this family.

LETHIERRY (1878) was the first who studied the Belgian Auchenorrhyncha and reported 80 leafhoppers from Belgium. A few years later in an updated checklist, the same author already mentioned 113 species (LETHIERRY, 1892). COUBEAUX (1891, 1892a,b) made a checklist of the Belgian Hemiptera. COUBEAUX (1892a) listed 84 leafhoppers from Belgium, but several species reported by LETHIERRY (1878, 1892) were not included while others were added without any further explanation. COUBEAUX (1892a) also listed 102 leafhoppers that could be expected in Belgium. However, it was only mentioned in the first part that the expected species were put in italics (COUBEAUX, 1891), which resulted in a lot of confusion. LAMEERE (1900) mentioned only 62 leafhoppers from Belgium, but it is unclear how his list was compiled. Mainly based on literature data, FAGEL (1949) made a checklist of the Belgian leafhoppers and listed 132 species from Belgium. Exclusively based on literature data, VAN STALLE (1989a) made a checklist of the Belgian Auchenorrhyncha, including 257 leafhoppers, but unfortunately he included all the species that were marked as expected by COUBEAUX (1892a). More recently, DEN BIEMAN *et al.* (2011) made a checklist of the Belgian Auchenorrhyncha based exclusively on literature data and also here, the species marked as expected by COUBEAUX (1892a) were included. However, since the occurrence in Belgium of some of the species mentioned in literature was perceived as unlikely, these were omitted from the checklist by DEN BIEMAN *et al.* (2011), without reviewing any collection material and this resulted in a list of 259 leafhopper species.

A lot of species have been described since the nineteenth century and even more names have been updated. Especially for closely related species, it is often not possible to ascertain which species the authors of historic articles examined if no material was conserved. It can therefore be concluded that an updated checklist of the Belgian leafhoppers should be made based on revised collection material instead of literature.

For most families of Auchenorrhyncha, a revised checklist has already been made: Cixiidae (VAN STALLE, 1987a), Membracidae (VAN STALLE, 1987b), Aphrophoridae and Cercopidae (VAN STALLE, 1989b), Delphacidae (BEAUGNÉE, 2003) and Issidae (LOCK, 2018). Despite a few recent additions, these revisions are still quite up to date. Here, 50 leafhoppers are reported for the first time for the Belgian fauna, but a revised checklist of the Belgian Cicadellidae is still needed.

## Material and methods

All examined leafhoppers were sampled by the author by sweeping the vegetation. Oriented searches were not yet carried out on specific plants or in specific habitats. Specimens were never counted and species that could be recognised in the field were not always collected. Most species were identified using BIEDERMANN & NIEDRINGHAUS (2009) in combination with KUNZ *et al.* (2011). Some species that occur in the Benelux, but not in Germany, were

identified with DEN BIEMAN *et al.* (2011). For three species reported here, additional literature was needed: *Penestrangania apicalis* (Osborn & Ball, 1898) is depicted by DEN BIEMAN & BELGERS (2017), *Cicadula (Henriana) placida* (Horváth, 1897) is treated in RIBAUT (1952) and *Edwardsiana platanicola* (Vidano, 1961) is included in DELLA GIUSTINA (1989). Photographs of living animals were made with a Canon 600D with an MP-E 65 mm and a Macro Twin Lite MT-24EX was used for illumination. Conserved animals were photographed under an Olympus SZX10 stereomicroscope with an Olympus UC30 camera and details were photographed under an Olympus BX41 biological microscope with the same camera. Specimens were conserved in ethanol and if necessary, slides were made in dimethyl hydration formaldehyde after clearing with lactic acid. Specimens of all 50 reported species were deposited in the entomological collection of the Royal Belgian Institute of Natural Sciences (I.G.: 33.967).

## Results

### Order Hemiptera Linnaeus, 1758

#### Suborder Auchenorrhyncha Duméril, 1806

#### Infraorder Cicadomorpha Evans, 1946

#### Superfamily Membracoidea Rafinesque, 1815

#### Family Cicadellidae Latreille, 1825

Fifty species are reported here for the first time for Belgium. Each species is illustrated and diagnostic characteristics are briefly summarized based on BIEDERMANN & NIEDRINGHAUS (2009), unless stated otherwise. The host plant is mentioned as well as the months during which adults can be found (indicated with roman numerals) according to BIEDERMANN & NIEDRINGHAUS (2009), unless stated otherwise. For all examined material, dates and places are listed, including GPS coordinates in decimal degrees. The species are treated in alphabetical order and the observations per species in chronological order.

#### *Acericerus heydenii* (Kirschbaum, 1868)

Males of *Acericerus* Dlabola, 1974 have a dark longitudinal stripe on the frons, which is thinner in *A. heydenii* than in the other species of this genus. Both males and females of *A. heydenii* can easily be recognised by the black Y-shaped mark at the base of the vertex next to the eyes (Fig. 1). Common in woody habitats, especially parks, on *Acer* spp., mostly *Acer pseudoplatanus* L. VII-VI.

MATERIAL EXAMINED: Oudenaarde, Wallebos (50.843, 3.638), 2.XI.2014; Gent, Blaarmeersen (51.049, 3.680), 13.VIII.2017; Sint-Amandsberg, Sint-Baafskouterpark (51.058, 3.758), 21.VIII.2017; Turnhout, stadspark (51.309, 4.944), 22.VIII.2017; Bernissart, Marais d'Harchies (50.467, 3.685), 3.IX.2017; Mariakerke, Groene Velden (51.079, 3.666), 10.IX.2017; Sint-Amandsberg, Sint-Baafskouterpark (51.058, 3.758), 10.IX.2017; Mariakerke, Arbedpark (51.046, 3.752), 11.IX.2017; Mechelen, Tivolipark (51.047, 4.471), 20.IX.2017; Merendree, Durmplassen (51.091, 3.565), 21.IX.2017; Auderghem, Jardin Jean Massart (50.814, 4.439), 10.VIII.2018; Gentbrugge, Arbedpark (51.046, 3.751), 16.VIII.2018; Gent, Muinkpark (51.042, 3.731), 24.VIII.2018; Torhout, Bos van Wijnendale (51.063, 3.047), 26.VIII.2018; Westouter, Rodeberg (50.789, 2.761), 1.IX.2018; Trooz, La Rochette (50.586, 5.667), 22.IX.2018.

***Acericerus ribauti* Nickel & Remane, 2002**

Males have two brown longitudinal stripes on the frons that do not reach the ocelli and are separated by a pale midline; the antennal palettes are only about an eighth as long as the remainder of the antennae (Fig. 2). On *Acer* spp. I-XII.

MATERIAL EXAMINED: Auderghem, Jardin Jean Massart (50.814, 4.438), 10.VIII.2018; Mariakerke, Bourgoyen-Ossemeersen (51.064, 3.685), 4.IX.2018; Gent, Houtdok (51.072, 3.734), 19.IX.2018.

***Alebra neglecta* Wagner, 1940**

*Alebra* Fieber, 1872 is the only genus of the Typhlocybinae in which the forewing has a distinct apical membrane. Males of *A. neglecta* can be recognised by the black apical appendage on the pygofer (Fig. 3). The species was recently also recorded in the Netherlands (DEN BIEMAN & BELGERS, 2017). In forest edges on *Carpinus betulus* L., *Prunus padus* L. and *Crataegus* spp. VI-IX.

MATERIAL EXAMINED: Oudenaarde, Bos t'Ename (50.860, 3.644), 19.VI.2014; Oudenaarde, Wallebos (50.844, 3.638), 11.VII.2015 & 1.IX.2015.

***Alebra viridis* Rey, 1894**

This species can be distinguished from other *Alebra* Fieber, 1872 species by the dark underside of both thorax and abdomen (Fig. 4). In males, the apodemes of the first abdominal sternite are dark except the bottom and they have an oval enclosure and a narrow aperture (Fig. 5). Usually on *Quercus petraea* (Mattuschka) Lieblein. VII-X.

MATERIAL EXAMINED: Oudenaarde, Bos t'Ename (50.853, 3.644), 16.VIII.2015; Wetteren, Warandeduinen (51.007, 3.904), 6.VIII.2017; Stekene, Steengelaag (51.204, 4.054), 21.VII.2018.

***Arboridia velata* (Ribaut, 1952)**

The species of this genus have two black spots on both the vertex and the scutellum, but male genitalia should be studied for species identification. The hind margin of the aedeagus of *A. velata* is strongly arched (Fig. 6). On sun-exposed trees, especially *Quercus* spp. VII-V.

MATERIAL EXAMINED: Opoeteren, Bosbeekvallei (51.072, 5.660), 2.IX.2017; Lanaken, Vallei van de Ziepbeek (50.932, 5.638), 16.IX.2017; Meerhout, Grote Netewoud (51.135, 5.026), 17.IX.2017; Mechelen, Tivolipark (51.047, 4.471), 20.IX.2017; Gellik, Hoefaert (50.890, 5.588), 15.IV.2018; Lanaken, Vallei van de Ziepbeek (50.932, 5.638), 18.VIII.2018; Gerhagen, Pinnekensweier (51.046, 5.014), 8.IX.2018.



Fig. 1. *Acericerus heydenii* (Kirschbaum, 1868), lateral view (photo by Koen Lock).



Fig. 2. *Acericerus ribauti* Nickel & Remane, 2002, frontal view (photo by Koen Lock).

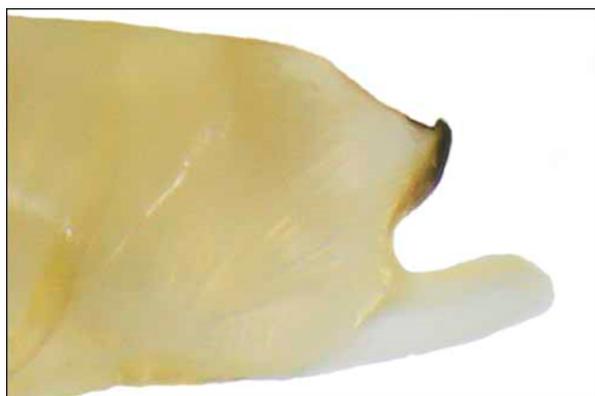


Fig. 3. *Alebra neglecta* Wagner, 1940, lateral view pygofer (photo by Koen Lock).



Fig. 4. *Alebra viridis* Rey, 1894, ventral view (photo by Koen Lock).

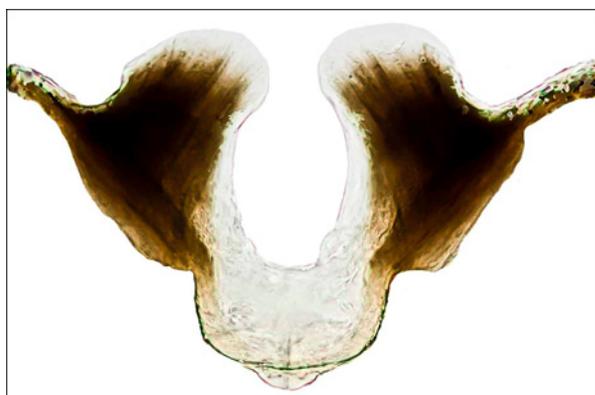


Fig. 5. *Alebra viridis* Rey, 1894, apodemes of first abdominal sternite (photo by Koen Lock).



Fig. 6. *Arboridia velata* (Ribaut, 1952), lateral view aedeagus (photo by Koen Lock).

***Athysanus argentarius* Metcalf, 1955**

A large and distinctive straw-coloured species with a dark transversal line on the vertex continuing across the eyes and a narrow longitudinal line along the scutellum and the posterior half of the pronotum (Fig. 7). Common on tall grasses. VI-IX. The species was marked as expected by COUBEUX (1892a).

MATERIAL EXAMINED: Trooz, La Rochette (50.586, 5.667), 22.VII.2017; Averbode, Vierkensbroek (51.015, 4.981), 26.VIII.2017; Heist, Baai van Heist (51.341, 3.231), 12.IX.2017; Lommel, Balimheide (51.200, 5.268), 16.VI.2018; Andenne, Sclaigneaux (50.501, 5.052), 14.VII.2018; Mouscron, Fontaine Bleue (50.752, 3.213), 28.VII.2018; Lommel, Balimheide (51.199, 5.265), 12.VIII.2018.

***Chlorita dumosa* (Ribaut, 1933)**

The species of this genus have short green bodies with white markings on head, pronotum and scutellum (Fig. 8). *Chlorita dumosa* is smaller than the next species, with a body length of only 2.3-2.6 mm. Males can be recognised by the aedeagus with three pairs of appendages, the middle one directed backwards and shorter than the shaft (Fig. 9). In dry grasslands on *Thymus* spp. V-X.

MATERIAL EXAMINED: Andenne, Sclaigneaux (50.501, 5.048), 30.IX.2017 & 14.VII.2018.

***Chlorita paolii* (Ossiannilsson, 1939)**

*Chlorita paolii* is larger than the previous species, with a body length of 2.7–3.0 mm. Males have an aedeagus with one large pair of appendages that possess a small tooth (Fig. 10). On *Achillea millefolium* L. and *Artemisia campestris* L. at sunny sites. V-X.

MATERIAL EXAMINED: Dilsen-Stokkem, Kerkeweerd (51.021, 5.756), 11.VIII.2018; Kinrooi, Kessenich (51.143, 5.850), 26.IX.2018.

***Cicadula (Henriana) placida* (Horváth, 1897)**

*Cicadula* Zetterstedt, 1840 is a speciose and difficult genus. This species differs from the closely related *Cicadula (Henriana) frontalis* (Herrich-Schäffer, 1835) by the shorter antennae and the appendages of the aedeagus are inserted close to the base of the shaft and stay close to it over their entire length (Fig. 11) (RIBAUT, 1952). On *Phalaris arundinacea* L. in marshy locations near river borders (RIBAUT, 1952). VI-XI (GUGLIELMINA *et al.*, 2017).

MATERIAL EXAMINED: Villers-sur-Lesse, Outre Lesse (50.151, 5.128), 16.IX.2018.

***Dryodurgades antoniae* (Melichar, 1907)**

The dark clavus, the broad dark stripes on the pronotum and the face markings, with a longitudinal stripe that is usually connected with the ocellar spot, should make this species unmistakable (Fig. 12). On *Cytisus scoparius* (L.) Link in clearings, fallows and forest edges. VIII-XI.

MATERIAL EXAMINED: De Pinte, Parkbos (50.994, 3.673), 25.IX.2017.



Fig. 7. *Athysanus argentarius* Metcalf, 1955, dorsal view (photo by Koen Lock).



Fig. 8. *Chlorita dumosa* (Ribaut, 1933), lateral view (photo by Koen Lock).



Fig. 9. *Chlorita dumosa* (Ribaut, 1933), lateral view aedeagus (photo by Koen Lock).

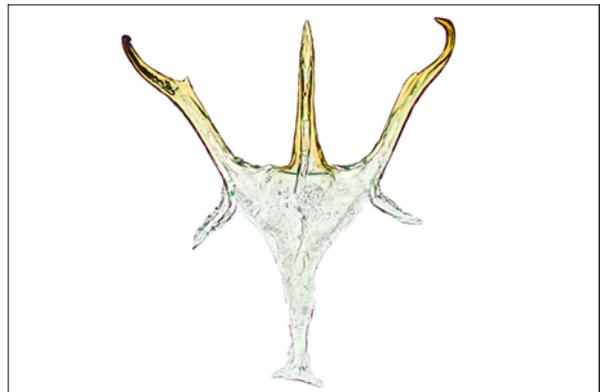


Fig. 10. *Chlorita paolii* (Ossiannilsson, 1939), caudal view aedeagus (photo by Koen Lock).



Fig. 11. *Cicadula (Henriana) placida* (Horváth, 1897), lateral view aedeagus (photo by Koen Lock).



Fig. 12. *Dryodurgades antoniae* (Melichar, 1907), frontal view (photo by Koen Lock).

***Edwardsiana avellanae* (Edwards, 1888)**

This species belongs to a speciose genus with mostly uniformly greenish species that can only be identified based on the male genitalia. The aedeagus of *E. avellanae* only bears one pair of unbranched appendages, together forming a smooth half circle, with at their base sometimes a pair of small filiform appendages (Fig. 13). Common in forest margins and thickets on *Coryllus avellana* L. VI-X, but during the present study also in May.

MATERIAL EXAMINED: Oudenaarde, Wallebos (50.844, 3.638), 11.VII.2015; Gent, Sifferdok (51.094, 3.742), 4.VIII.2017; Gent, Blaarmeersen (51.042, 3.687), 13.VIII.2017; Merendree, Kalevallei (51.076, 3.609), 15.IX.2017; Koersel, Vallei van de Zwarte Beek (51.090, 5.338), 26.V.2018; Stekene, Steengelaag (51.204, 4.051), 21.VII.2018; Torhout, Bos van Wijnendale (51.077, 3.057), 26.VIII.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 12.IX.2018.

***Edwardsiana candidula* (Kirschbaum, 1868)**

The outer pair of appendages of the aedeagus is long, thin and V-shaped in posterior view; the inner appendages form a right angle with the shaft, are forked at the base and have about the same length as the outer pair in lateral view, but the four tips are all bent inwards (Fig. 14). On *Populus alba* L. V-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Oudenaarde, Bos t'Ename (50.865, 3.654), 16.VII.2015; Lommel, Balimheide (51.198, 5.241), 16.VI.2018.

***Edwardsiana geometrica* (Schrank, 1801)**

In contrast to most *Edwardsiana* Zachvatkin, 1929 species, *E. geometrica* can easily be identified in the field by the blackish longitudinal stripe on the forewing along the corial-claval suture (Fig. 15). On banks and in wet habitats on *Alnus* spp., especially *Alnus glutinosa* (L.) Gaertn. VI-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Oudenaarde, Bos t'Ename (50.865, 3.654), 16.VII.2015 & 23.VIII.2017; Brugge, Blauwe Toren (51.260, 3.195), 1.VIII.2018; Torhout, Bos van Wijnendale (51.070, 3.045), 26.VIII.2018.

***Edwardsiana gratiosa* (Boheman, 1852)**

Also this species can be recognised in the field: the clavus of the forewings is blackish along the scutellum and in the apical third (Fig. 16). Near water on *Alnus glutinosa* (L.) Gaertn. VII-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Reppel, Abeekvallei (51.148, 5.542), 7.VII.2018; Stekene, Steengelaag (51.204, 4.050), 21.VII.2018; Brugge, Blauwe Toren (51.260, 3.195), 1.VIII.2018.

***Edwardsiana ishidai* (Matsumura, 1932)**

The outer pair of appendages of the aedeagus is long, thin and forms a straight line in posterior view, the inner appendages are forked about halfway and especially the upper branch is bent upwards in lateral view (Fig. 17). Recently, *E. ishidai* was also recorded in the Netherlands (DEN BIEMAN & VAN KLINK, 2015). Mainly on *Ulmus* spp. V-X.

MATERIAL EXAMINED: Dilsen-Stokkem, Kerkeweerd (51.025, 5.751), 2.IX.2017; Houthulst, Vrijbos (50.976, 2.955), 1.IX.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 12.IX.2018.

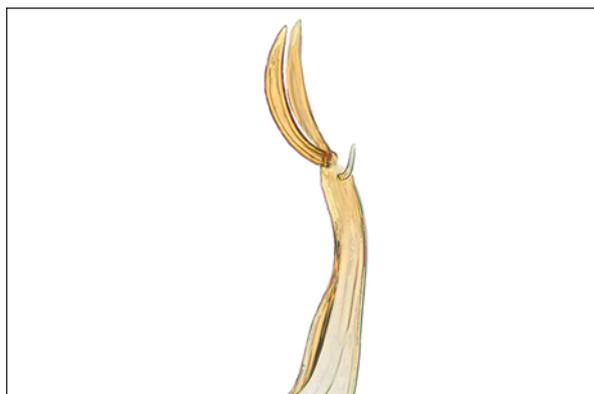


Fig. 13. *Edwardsiana avellanae* (Edwards, 1888), lateral view tip of aedeagus (photo by Koen Lock).

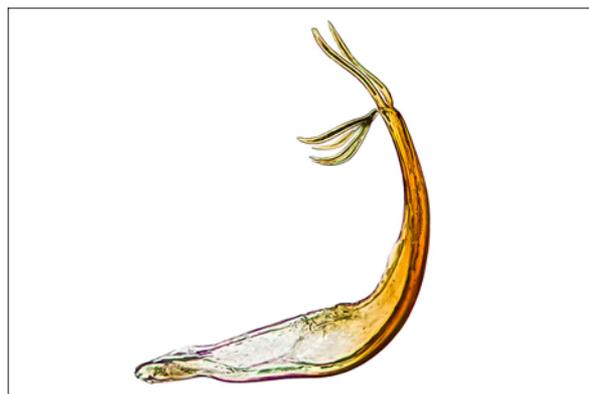


Fig. 14. *Edwardsiana candidula* (Kirschbaum, 1868), lateral view aedeagus (photo by Koen Lock).



Fig. 15. *Edwardsiana geometrica* (Schrank, 1801), lateral view (photo by Koen Lock).



Fig. 16. *Edwardsiana gratiosa* (Boheman, 1852), dorsal view (photo by Koen Lock).



Fig. 17. *Edwardsiana ishidai* (Matsumura, 1932), lateral view aedeagus (photo by Koen Lock).



Fig. 18. *Edwardsiana lamellaris* (Ribaut, 1931), lateral view aedeagus (photo by Koen Lock).

***Edwardsiana lamellaris* (Ribaut, 1931)**

The outer pair of appendages of the aedeagus is thin and short, the inner appendages are broadened and forked at their base, while the shaft is strongly broadened in lateral view (Fig. 18). In dry, warm habitats on *Rosa* spp. V-X (RIBAUT, 1936).

MATERIAL EXAMINED: Rochefort, Maupas (50.110, 5.209), 16.IX.2018.

***Edwardsiana platanicola* (Vidano, 1961)**

The outer pair of appendages of the aedeagus is short and directed slightly upwards, the inner appendages are forked halfway and the lower branch forms a right angle with the shaft as well as the outer appendages, while the upper branch is directed upwards at an angle of about 45° with the lower branch (Fig. 19) (DELLA GIUSTINA, 1989). This species was recently also found in the Grand Duchy of Luxembourg (LOCK & VAN BUTSEL, unpublished data). On *Platanus x hispanica* Miller ex Münchh. (DELLA GIUSTINA, 1989). IV-X (MÜHLETHALER *et al.*, 2018).

MATERIAL EXAMINED: Brugge, centre (51.212, 3.210), 19.X.2018.

***Edwardsiana tersa* (Edwards, 1914)**

The outer pair of appendages of the aedeagus is short and directed slightly forwards and upwards, the inner appendages are forked close to the base, while the first half of the shaft is broadened in lateral view (Fig. 20). On *Salix viminalis* L., mostly along running water. V-IX.

MATERIAL EXAMINED: Dilsen-Stokkem, Kerkeweerd (51.025, 5.751), 2.IX.2017.

***Eupterycyba jucunda* (Herrich-Schäffer, 1837)**

In this very distinctive species, the pronotum has two lateral round spots, a rhomboidal central spot and often two lateral spots on the front edge (Fig. 21). The prominent markings on the scutellum and dark streaks on the forewings are to some extent variable and may sometimes be almost completely absent. The yellow and black-banded nymph is equally striking and easily recognisable (STÖCKMANN *et al.*, 2013). Near water or in moist areas on *Alnus glutinosa* (L.) Gaertn. VII-X. The species was marked as expected by COUBEUX (1892a).

MATERIAL EXAMINED: Berg, Torfbroek (50.927, 4.542), 15.VII.2018; Stekene, Steengelaag (51.204, 4.050), 21.VII.2018; Brugge, Blauwe Toren (51.260, 3.195), 1.VIII.2018; Neerpelt, Hageven (51.252, 5.415), 4.VIII.2018; Gentbrugge, Arbedpark (51.046, 3.751), 16.VIII.2018; Franes-les-Anvaing, Bois de Leuze (50.699, 3.640), 8.IX.2018.

***Eupteryx decemnotata* Rey, 1891**

The head bears ten black spots, those on the transition between the vertex and the frons are line-shaped (Fig. 22). Often in gardens, parks and ruderal habitats on Lamiaceae such as *Salvia officinale* L. V-X.

MATERIAL EXAMINED: Gent, plantentuin (51.036, 3.723), 23.VIII.2017; Gent, Brugse Poort (51.064, 3.698), 23.VIII.2017; Dilsen-Stokkem, Kerkeweerd (51.025, 5.751), 2.IX.2017; Stekene, Steengelaag (51.204, 4.050), 21.VII.2018; Auderghem, Jardin Jean Massart (50.814, 4.438), 10.VIII.2018; Gent, Houtdok (51.072, 3.734), 19.IX.2018.



Fig. 19. *Edwardsiana platanicola* (Vidano, 1961), lateral view aedeagus (photo by Koen Lock).

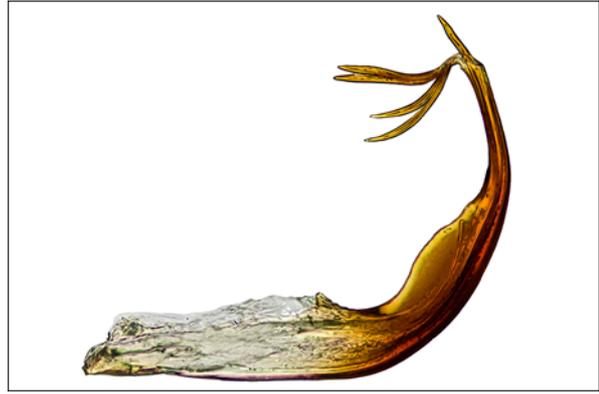


Fig. 20. *Edwardsiana tersa* (Edwards, 1914), lateral view aedeagus (photo by Koen Lock).



Fig. 21. *Eupterycyba jucunda* (Herrich-Schäffer, 1837), lateral view (photo by Koen Lock).



Fig. 22. *Eupteryx decemnotata* Rey, 1891, dorsal view (photo by Koen Lock).



Fig. 23. *Eupteryx thoulessi* Edwards, 1926, dorsal view (photo by Koen Lock).



Fig. 24. *Eupteryx thoulessi* Edwards, 1926, lateral view tip of aedeagus (photo by Koen Lock).

***Eupteryx thoulessi* Edwards, 1926**

The rear spot on the vertex is irregular and variable in shape (Fig. 23) and does not allow a reliable identification of this species. Although the habitat is a good indication, the identity needs to be confirmed by examining the aedeagus, that has a pair of spines at the tip in addition to the pair of appendages that is folded backwards (Fig. 24). In moist habitats such as water edges on *Mentha aquatica* L. and *Lycopus europaeus* L. VI-XI.

MATERIAL EXAMINED: Hoboken, Hobokense Polder (51.195, 4.343), 22.VIII.2017; Dilsen-Stokkem, Kerkeweerd (51.024, 5.752), 2.IX.2017; Merendree, Durmplassen (51.093, 3.578), 9.VI.2018.

***Fagocyba carri* (Edwards, 1914)**

The shape of the male styli, which have an elongated double tip in *Fagocyba carri* (Fig. 25) is the best discriminating character with the very similar *F. cruenta* (Herrich-Schäffer, 1838). On *Quercus* spp. V-IX.

MATERIAL EXAMINED: Dilsen-Stokkem, Kerkeweerd (51.025, 5.751), 2.IX.2017; Mariakerke, Park Claeys-Bouüaert (51.025, 5.751), 10.IX.2017; Merendree, Kalevallei (51.076, 3.609), 15.IX.2017; Niel, Walenhoek (51.104, 4.345), 20.IX.2017; Mariakerke, Bourgoyen-Ossemeersen (51.062, 3.685), 4.IX.2018.

***Fieberiella florii* (Stal, 1864)**

The genus can be recognised by the mottled wing tips (Fig. 26), but species can best be recognised by the aedeagus, which is slender in lateral view (Fig. 27). Polyphagous in sunny thickets, often in parks. VII-X.

MATERIAL EXAMINED: Gent, Blaarmeersen (51.042, 3.686), 13.VIII.2017; Nazareth, Dragonder (51.042, 3.686), 19.VIII.2017; Sint-Amandsberg, Sint-Baafskouterpark (51.058, 3.758), 21.VIII.2017; Turnhout, stadspark (51.309, 4.944), 22.VIII.2017; Hoboken, Hobokense Polder (51.190, 4.339), 24.VIII.2017; Averbode, Averbode Bos en Heide (51.032, 4.974), 27.VIII.2017; Gent, Citadelpark (51.037, 3.717), 11.IX.2017; Merendree, Kalevallei (51.076, 3.609), 15.IX.2017; Lanaken, Ziepbeekvallei (50.928, 5.647), 16.IX.2017; Mechelen, Tivolipark (51.047, 4.471), 20.IX.2017; Gentbrugge, Arbedpark (51.046, 3.751), 16.VIII.2018; Gent, Blaarmeersen (51.041, 3.687), 28.VIII.2018.

***Forcipata forcipata* (Flor, 1861)**

It can be recognised by the broad aedeagus with a hook-shaped, angled tip (Fig. 28). In open forests and forest margins on *Carex* spp. VI-X. The species was already reported by LETHIERRY (1880), but this turned out to be an incorrect identification (LETHIERRY, 1992).

MATERIAL EXAMINED: Oudenaarde, Wallebos (50.843, 3.639), 23.VIII.2015, 1.IX.2015 & 26.IX.2015; Beloeil, Forêt de Stambruges (50.527, 3.735), 20.VIII.2017.



Fig. 25. *Fagocyba carri* (Edwards, 1914), lateral view tip of stylus (photo by Koen Lock).



Fig. 26. *Fieberiella florii* (Stal, 1864), lateral view (photo by Koen Lock).



Fig. 27. *Fieberiella florii* (Stal, 1864), lateral view aedeagus (photo by Koen Lock).



Fig. 28. *Forcipata forcipata* (Flor, 1861), lateral view aedeagus (photo by Koen Lock).



Fig. 29. *Fruticidia bisignata* (Mulsant & Rey, 1855), lateral view (photo by Koen Lock).



Fig. 30. *Grypotes puncticollis* (Herrich-Schäffer, 1834), caudal view aedeagus (photo by Koen Lock).

***Fruticidia bisignata* (Mulsant & Rey, 1855)**

A small species with greenish wings and two black spots on the vertex (Fig. 29). Recently, it was also recorded in the Netherlands (DEN BIEMAN & VAN KLINK, 2015). On sun-exposed woody Rosaceae, especially *Crataegus* spp. VIII-VII.

MATERIAL EXAMINED: Hoboken, Hobokense polder (51.190, 4.339), 24.VIII.2017; Bernissart, Marais d'Harchies (50.467, 3.685), 3.IX.2017; Sint-Amandsberg, Sint-Baafskouterpark (51.058, 3.758), 10.IX.2017; De Panne, Westhoek (51.093, 2.565), 12.IX.2017; Lanaken, Vallei van de Ziepebeek (50.932, 5.638), 16.IX.2017; Honelles, Onnezies (50.363, 3.707), 29.IX.2017; Furfooz, Parc de Furfooz (50.214, 4.952), 7.IV.2018; Merelbeke, Gontrode Heirweg (51.010, 3.775), 17.V.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 10.VIII.2018; Dilsen-Stokkem, Kerkeweerd (51.025, 5.751), 11.VIII.2018; Gentbrugge, Arbedpark (51.046, 3.751), 16.VIII.2018; Gent, Blaarmeersen (51.040, 3.689), 28.VIII.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 12.IX.2018; Trooz, La Rochette (50.586, 5.667), 22.IX.2018; Kinrooi, Kessenich (51.150, 5.843), 26.IX.2018; As, Terril Klaverberg (51.008, 5.541), 30.IX.2018; Lanaye, Montagne Saint-Pierre (50.777, 5.678), 6.X.2018.

***Grypotes puncticollis* (Herrich-Schäffer, 1834)**

The head is broader than the pronotum, with a dark sinuous line on the vertex, two dark spots near the eyes and the scutellum with two dark spots and a dark transversal line. The aedeagus has a slender shaft with apically two long, almost straight appendages (Fig. 30). On *Pinus sylvestris* L. VI-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Lommel, Balimheide (51.206, 5.280), 3.VII.2017; Stambruges, Mer de Sable (50.499, 3.727), 20.VIII.2017; Andenne, Sclaigneaux (50.503, 5.048), 14.VII.2018; Neerpelt, Hageven (51.251, 5.415), 4.VIII.2018; Lanaken, Vallei van de Ziepebeek (50.928, 5.650), 19.VIII.2018.

***Iassus scutellaris* (Fieber, 1868)**

Vertex, pronotum and scutellum may be entirely green or variably dark mottled (Fig. 31), becoming red-brown in older specimens (Fig. 32); the similar *Iassus lanio* (Linnaeus, 1761) is associated with *Quercus* spp. and has the vertex, pronotum and scutellum more heavily dark mottled (BOTTING & BANTOCK, 2012). On *Ulmus* spp. VI-X.

MATERIAL EXAMINED: Hoboken, Hobokense Polder (51.189, 4.339), 22.VIII.2017; Merelbeke, Makegemse Bossen (50.948, 3.720), 18.IX.2017; Dilsen-Stokkem, Kerkeweerd (51.021, 5.753), 11.VIII.2018; Frasnes-lez-Anvaing, Bois de Leuze (50.698, 3.652), 8.IX.2018.

***Idiocerus similis* Kirschbaum, 1868**

Species of this genus are quite similar and all of them live on *Salix* spp., but they can be separated based on the wing venation. In *I. similis*, the first apical cell starts more to the base than the second and the third apical cell, the cell before the first apical cell is triangular and reaches the wing margin (Fig. 33). In the vicinity of running waters on *Salix purpurea* L. VII-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Villers-sur-Lesse, Outre Lesse (50.151, 5.128), 16.IX.2018.



Fig. 31. *Iassus scutellaris* (Fieber, 1868), lateral view (photo by Koen Lock).



Fig. 32. *Iassus scutellaris* (Fieber, 1868), lateral view (photo by Koen Lock).

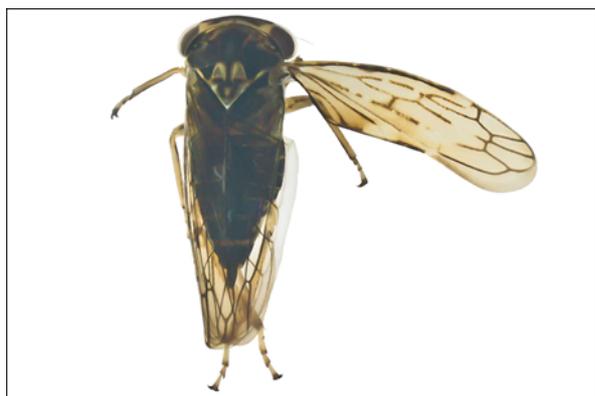


Fig. 33. *Idiocerus similis* Kirschbaum, 1868, dorsal view (photo by Koen Lock).



Fig. 34. *Japananus hyalinus* (Osborn, 1900), lateral view (photo by Koen Lock).



Fig. 35. *Liguropia juniperi* (Lethierry, 1876), lateral view (photo by Koen Lock).



Fig. 36. *Macropsis fuscinervis* (Boheman, 1845), right forewing (photo by Koen Lock).

***Japananus hyalinus* (Osborn, 1900)**

This striking species has hyaline forewings, with three dark bars in strongly coloured specimens (Fig. 34). This alien species originates from Eastern Asia. In 1942, it was already reported from Austria and since then, it has colonised large parts of Central and Southern Europe (DEN BIEMAN, 2017). It lives on *Acer* spp. in urban areas. VIII-X.

MATERIAL EXAMINED: Gent, Citadelpark (51.037, 3.717), 11.IX.2017.

***Liguropia juniperi* (Lethierry, 1876)**

The wings are mainly yellow-green with the apical third unpigmented and the veins noticeably pale, the subcostal cell is divided by several transversal veins (Fig. 35). In urban areas on *Chamaecyparis lawsoniana* (A. Murray) Parl. and other Cupressaceae. VIII-IX.

MATERIAL EXAMINED: Turnhout, stadspark (51.306, 4.945), 22.VIII.2017; Gent, Citadelpark (51.037, 3.717), 11.IX.2017; Gent, Houtdok (51.070, 3.735), 19.IX.2018.

***Macropsis fuscinervis* (Boheman, 1845)**

*Macropsis* Lewis, 1834 is a speciose and difficult genus, however, *M. fuscinervis* can usually be recognised by the dark bar on the forewing and the dark stripe along the outer margin (Fig. 36). The ground colour is yellow to brown and mostly, there are distinct dark spots on the frons. In females, the median gynapophysis has one large secondary tooth, with a large gap to the primary teeth. On *Populus tremula* L. VI-VIII. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Oudenaarde, Volkegembos (50.836, 3.648), 14.VII.2014; Dilsen-Stokkem, Kerkeweerd (51.022, 5.775), 8.VII.2017; Kinrooi, Vijverbroek (51.161, 5.824), 2.VI.2018; Lommel, Balimheide (51.198, 5.274), 17.VI.2018; Stekene, Steengelaag (51.201, 4.053), 21.VII.2018.

***Macropsis vicina* (Horváth, 1897)**

This species looks similar to the previous species, but the ground colour is whitish (Fig. 37). In females, the median gynapophysis also has one large secondary tooth, with a large gap to the primary teeth. On sun-exposed *Populus alba* L. VI-VIII.

MATERIAL EXAMINED: Hoboken, Hobokense Polder (51.193, 4.339), 24.VIII.2017.

***Macrosteles lividus* (Edwards, 1894)**

*Macrosteles* Lewis, 1834 is a speciose and difficult genus and for identification, male genitalia should be studied. In *M. lividus*, the cylindrical appendages of the aedeagus converge apically (Fig. 38). In moist habitats on *Eleocharis palustris* (L.) Roem. & Schult. VI-IX.

MATERIAL EXAMINED: Neerpelt, Hageven (51.262, 5.424), 4.VIII.2018.



Fig. 37. *Macropsis vicina* (Horváth, 1897), lateral view (photo by Koen Lock).



Fig. 38. *Macrosteles lividus* (Edwards, 1894), caudal view aedeagus (photo by Koen Lock).



Fig. 39. *Macrosteles quadripunctulatus* (Kirschbaum, 1868), frontolateral view (photo by Koen Lock).



Fig. 40. *Metidiocerus elegans* (Flor, 1861), dorsal view (photo by Koen Lock).



Fig. 41. *Mocuellus (Erzaleus) metrius* (Flor, 1861), laterocaudal view aedeagus (photo by Koen Lock).



Fig. 42. *Neoaliturus fenestratus* (Herrich-Schäffer, 1834): lateral view (photo by Koen Lock).

***Macrosteles quadripunctulatus* (Kirschbaum, 1868)**

The cylindrical appendages of the aedeagus are bifurcated in the middle (Fig. 39). In sandy, moderately dry grasslands, often disturbed pioneer habitats, hostplant unknown. V-X.

MATERIAL EXAMINED: Nieuwpoort, Ijzermonding (51.146, 2.744), 31.VIII.2017; Uitbergen, Kalkense Meersen (51.014, 3.956), 7.IX.2017.

***Metidiocerus elegans* (Flor, 1861)**

The forewings are reddish brown with dark veins, the apex is light greyish brown, in the middle there is a light bar with white veins (Fig. 40). Males have a brown longitudinal stripe on the frons and the clypeus. In cool and wet habitats on *Salix caprea* L., *S. cinerea* L. and *S. aurita* L. III-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Kinrooi, Vijverbroek (51.162, 5.833), 2.VI.2018.

***Mocuellus (Erzaleus) metrius* (Flor, 1861)**

This is a straw-coloured species that resembles many other Deltocephalinae. The aedeagus has a pair of forked appendages (Fig. 41). The seventh abdominal sternite of the female has rounded hind corners and two small incisions in the hind margin. In moist meadows and mires and on watersides of lakes and rivers on *Phalaris arundinacea* L. VI-X. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Zichem, Demerbroeken (51.010, 4.979), 26.VIII.2017; Villers-sur-Lesse, Outre Lesse (50.151, 5.128), 16.IX.2018.

***Neoliturus fenestratus* (Herrich-Schäffer, 1834)**

This is a distinctive species that has dark forewings with characteristic light spots, mainly near the tip (Fig. 42). In dry grasslands on Asteraceae, especially *Leontodon* spp. I-XII. The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Andenne, Sclaigneaux (50.500, 5.048), 30.IX.2017; Rochefort, Maupas (50.110, 5.209), 16.IX.2018; Wiesme, Bois de Roi (50.152, 4.988), 16.IX.2018; Lanaye, Montagne Saint-Pierre (50.779, 5.680), 6.X.2018.

***Orientalis ishidae* (Matsumura, 1902)**

This is another distinctive species. The forewing has a mesh-like pattern, black veins and some white spots (Fig. 43). This exotic leafhopper originates from Japan and possibly Korea, Taiwan and the Philippines. In 1998, it was first observed in Europe in Northern Italy and afterwards it rapidly colonised Central and Western Europe (DEN BIEMAN, 2017). It has now also been introduced in North America. It is a polyphagous species living on low trees and bushes, including *Salix* spp., *Betula* spp., *Carpinus betulus* L., *Coryllus avellana* L., *Acer* spp. and *Malus* spp. VIII, but during the present study, the species was found from VII-IX.



Fig. 43. *Orientus ishidae* (Matsumura, 1902), lateral view (photo by Koen Lock).



Fig. 44. *Paramesus obtusifrons* (Stal, 1853), lateral view (photo by Koen Lock).

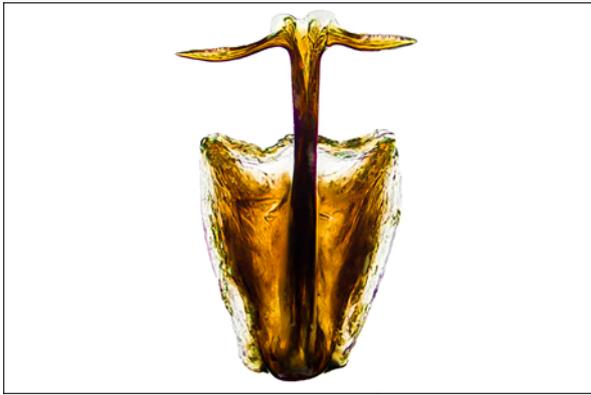


Fig. 45. *Paramesus obtusifrons* (Stal, 1853), caudal view aedeagus (photo by Koen Lock).



Fig. 46. *Penstragania apicalis* (Osborn & Ball, 1898), lateral view (photo by Koen Lock).



Fig. 47. *Populicerus albicans* (Kirschbaum, 1868), dorsal view (photo by Koen Lock).



Fig. 48. *Psammotettix excisus* (Matsumura, 1906), caudal view aedeagus (photo by Koen Lock).

MATERIAL EXAMINED: Sint-Amandsberg, Sint-Baafskouterpark (51.058, 3.758), 21.VIII.2017; Turnhout, stadspark (51.309, 4.944), 22.VIII.2017; Hoboken, Hobokense Polder (51.190, 4.339), 22.VIII.2017 & 24.VIII.2017; Gent, Citadelpark (51.037, 3.717), 11.IX.2017; Lanaken, Vallei van de Ziepbeek (50.927, 5.648), 16.IX.2017; Mouscron, Argilière du Sterreberg (50.759, 3.214), 28.VII.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 10.VIII.2018; Gentbrugge, Arbedpark (51.046, 3.751), 16.VIII.2018; Lanaken, Vallei van de Ziepbeek (50.931, 5.639), 18.VIII.2018; Trooz, La Rochette (50.584, 5.663), 22.IX.2018.

***Paramesus obtusifrons* (Stal, 1853)**

The vertex of *Paramesus* Fieber, 1866 is rounded, with a strong dark line parallel to the anterior margin and another dark band on the face just below the ocelli (Fig. 44). The species can be separated from the closely related *P. major* Haupt, 1927 by the broad shaft of the aedeagus that bears long, laterally directed appendages at the top (Fig. 45). In salt and brackish water on *Bolboschoenus maritimus* L. Palla. VII-X.

MATERIAL EXAMINED: Doel, Schor van Doel (51.337, 4.245), 24.VIII.2018; Doel, Paardenschor (51.333, 4.253), 8.VII.2018.

***Penestrangia apicalis* (Osborn & Ball, 1898)**

A green species with three dark oval spots on the hind margin of the hairy forewing, however, the green colour fades in ethanol (Fig. 46) (DEN BIEMAN & BELGERS, 2017). This exotic species originates from the eastern and central parts of the United States and was first observed in Europe in 2010 in France (CALLOT, 2013) and has since also been observed in Germany, Switzerland, Austria and the Netherlands (DEN BIEMAN & BELGERS, 2017). On *Gleditsia triacanthos* L., a tree of the Fabaceae that is often planted in gardens and parks (DEN BIEMAN & BELGERS, 2017). VI-X (MÜHLETHALER *et al.*, 2018).

MATERIAL EXAMINED: Dilsen-Stokkem, Kerkeweerd (51.333, 4.253), 8.VII.2017.

***Populicerus albicans* (Kirschbaum, 1868)**

This species is distinctively milky white (Fig. 47). In Belgium common on *Populus alba* L. VI-X.

MATERIAL EXAMINED: Bredene, Spanjaardduinen (51.241, 2.940), 1.VIII.2017; Hoboken, Hobokense Polder (51.193, 4.339), 22.VIII.2017 & 24.VIII.2017; Gentbrugge, Arbedpark (51.046, 3.752), 11.IX.2017; De Panne, Westhoek (51.093, 2.569), 12.IX.2017; Merendree, Durmplassen (51.091, 3.564), 9.VI.2018; Lommel, Balimheide (51.198, 5.242), 16.VI.2018; Brugge, Blauwe Toren (51.260, 3.195), 1.VIII.2018; Dilsen-Stokkem, Kerkeweerd (51.014, 5.767), 11.VIII.2018; Gent, Blaarmeersen (51.040, 3.689), 28.VIII.2018.

***Psammotettix excisus* (Matsumura, 1906)**

*Psammotettix* Haupt, 1929 is a speciose and difficult genus, which can only be identified based on male genitalia. The shaft of the aedeagus is straight and slender, interiorly only slightly arched in the middle, exteriorly straight. The aperture is spoon-shaped, slightly less than half the length of the shaft, broadest in the middle, the distal margin is almost straightly truncated (Fig. 48). On dry, sandy habitats in dunes or heathland on *Corynephorus canescens* (L.) Beauv. V-X.

MATERIAL EXAMINED: Mechelen-aan-de-Maas, Mechelse Heide (50.978, 5.636), 12.V.2018; Oostduinkerke, Ter Yde (51.134, 2.694), 19.V.2018; Koksijde, Doornpanne (51.120, 2.659), 19.V.2018; Koersel, Vallei van de Zwarte Beek (51.083, 5.336), 26.V.2018; Lommel, Balimheide (51.202, 5.270), 16.VI.2018.

### ***Rhopalopyx elongata* Wagner, 1952**

This straw-coloured species resembles many other Deltocephalinae. The shaft of the aedeagus is slender and slightly curved in lateral view, with the tip narrowing stepwise. The appendages of the lateral lobes of the pygofer are narrowing stepwise, the macrosetae do not reach the apex (Fig. 49). In sunny, dry habitats on grasses. V-X.

MATERIAL EXAMINED: Wondelgem, Langerbrugge (51.106, 3.723), 11.IX.2018; Trooz, La Rochette (50.585, 5.665), 22.IX.2018.

### ***Ribautiana alces* (Ribaut, 1931)**

In this genus, at least one of the apical veins of the forewing ends in a darkened dot or streak. The aedeagus has short forwards-directed inner appendages and long outer appendages that compose a half circle together (Fig. 50). On sun-exposed *Quercus robur* L., sometimes *Q. petraea* (Mattuschka) Lieblein. VI-IX.

MATERIAL EXAMINED: Stambruges, Mer de Sable (50.499, 3.727), 20.VIII.2017.

### ***Ribautiana scalaris* (Ribaut, 1931)**

The aedeagus has backwards directed inner appendages and upwards directed outer appendages (Fig. 51). On sun-exposed *Q. petraea* (Mattuschka) Lieblein, rarely *Quercus robur* L. VI-IX.

MATERIAL EXAMINED: Oudenaarde, Wallebos (50.844, 3.638), 11.VII.2017; Mariakerke, Park Claeyss-Bouüaert (51.025, 5.751), 10.IX.2017; Meerhout, Grote Netewoud (51.135, 5.026), 17.IX.2017; Mechelen, Tivolipark (51.047, 4.471), 20.IX.2018; Auderghem, Jardin Jean Massart (50.814, 4.439), 12.IX.2018.

### ***Zygina lunaris* (Mulsant & Rey, 1855)**

This is a striking species with two scarlet bands on the forewings and a pair of black spots on the vertex and the scutellum (Fig. 52). On *Salix alba* L., *S. fragilis* L. and *S. purpurea* L., hibernation of adults on conifers. VII-III.

MATERIAL EXAMINED: Bernissart, Marais d'Harchies (50.467, 3.685), 3.IX.2017; Gentbrugge, Arbedpark (51.046, 3.752), 11.IX.2017, 12.X.2017 & 16.VIII.2018; Gent, Houtdok (51.072, 3.734), 19.IX.2018; Lanaye, Montagne-Saint-Pierre (50.779, 5.683), 6.X.2018.

### ***Zygina nivea* (Mulsant & Rey, 1855)**

Young adults are completely white at first and can then only be identified based on the male genitalia, however, after five days, they become easily distinguishable, with a purple spot on the tip of the vertex and two more on the corners of the scutellum (Fig. 53). Recently, the

species is extending to the north and it was first observed in England in 2010 and in the Netherlands in 2016 (DEN BIEMAN & DE HAAS, 2017). The species is mainly associated with *Populus alba* L. I-XII (MÜHLETHALER *et al.*, 2018). The species was marked as expected by COUBEAUX (1892a).

MATERIAL EXAMINED: Wetteren, Warandeduinen (51.007, 3.904), 6.VIII.2017; Gent, Blaarmeersen (51.041, 3.687), 13.VIII.2017; Antoing, Bois de Fouage (50.541, 3.476), 20.VIII.2017; Hoboken, Moretusburg (51.172, 4.335), 22.VIII.2017; Hoboken, Hobokense Polder (51.193, 4.339), 22.VIII.2017 & 24.VIII.2017; Gentbrugge, Arbedpark (51.046, 3.752), 11.IX.2017; De Panne, Westhoek (51.093, 2.569), 12.IX.2017; Mechelen, Tivolipark (51.047, 4.471), 20.IX.2017; Gentbrugge, Arbedpark (51.046, 3.752), 12.X.2017; Gent, Sifferdok (51.094, 3.742), 14.IV.2018; Koksijde, Doornpanne (51.121, 2.661), 19.V.2018; Dilsen-Stokkem, Kerkeweerd (51.014, 5.767), 11.VIII.2018; Gent, Arbedpark (51.046, 3.751), 16.VIII.2018; Gent, Blaarmeersen (51.040, 3.689), 28.VIII.2018; Gent, Houtdok (51.072, 3.734), 19.IX.2018; Kinrooi, Vijverbroek (51.162, 5.833), 9.X.2018.

### ***Zygina ordinaria* (Ribaut, 1936)**

The genus *Zygina* Fieber, 1866 contains a lot of species with a red zig-zag pattern on the forewings. Males of *Z. ordinaria* can be recognised by the short hind tarsi with black third and distal half second segment, the short, tongue-shaped apodemes on the second sternite, the extensively darkened fore margin of the forewings and the clavus which is slightly darker than the corium (Fig. 54). Near water on narrow-leaved *Salix* spp. I-XII.

MATERIAL EXAMINED: Merendree, Kalevallei (51.076, 3.609), 15.IX.2017; Wavreille, Ri d'Howisse (50.111, 5.254), 23.IX.2017; Gentbrugge, Arbedpark (51.046, 3.752), 12.X.2017.

### ***Zygina schneideri* Gunthart, 1974**

This species also has a red zig-zag pattern on the forewing. *Z. schneideri* can be distinguished by the short hind tarsi with black third and distal half second segment, the broad apodemes of the second sternite that nearly reach the third sternite and the light clavus and fore margin of the forewing (Fig. 55). Recently, *Z. schneideri* was also recorded in the Netherlands (DEN BIEMAN & VAN KLINK, 2015). On sun-exposed woody Rosaceae such as *Prunus spinosa* L. and *Rosa* spp. I-XII.

MATERIAL EXAMINED: Honelles, Onnezies (50.363, 3.707), 29.IX.2017; Gentbrugge, Arbedpark (51.046, 3.752), 12.X.2017; Gent, Sifferdok (51.094, 3.742), 14.IV.2018; Dilsen-Stokkem, Kerkeweerd (51.021, 5.756), 11.VIII.2018.

### ***Zygina tiliae* (Fallen, 1806)**

This is another species with a red zig-zag pattern on the forewing. It can be recognised by the long hind tarsi (about half as long as hind tibia) that are entirely dark, the short, tongue-shaped apodemes of the second sternite and the slightly darkened clavus and fore margin of the forewings (Fig. 56). Mainly on *Alnus glutinosa* (L.) Gaertn., sometimes on *A. incana* (L.) Moench and *Tilia cordata* Mill., hibernation as adults on *Picea* spp. I-XII. The species was marked as expected by COUBEAUX (1892a).



Fig. 49. *Rhopalopyx elongata* Wagner, 1952, lateral view appendage of lateral lobes of pygofer (photo by Koen Lock).



Fig. 50. *Ribautiana alces* (Ribaut, 1931), caudal view aedeagus (photo by Koen Lock).

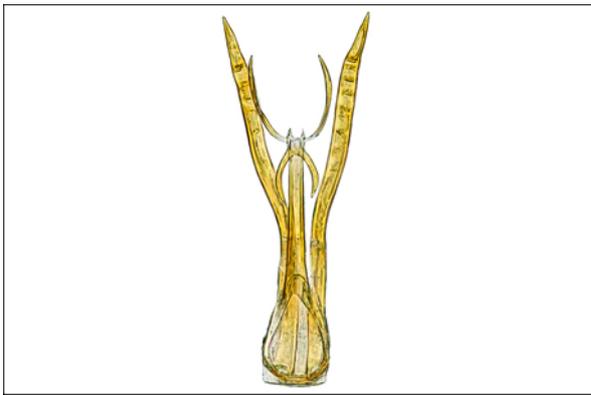


Fig. 51. *Ribautiana scalaris* (Ribaut, 1931), caudal view aedeagus (photo by Koen Lock).



Fig. 52. *Zygina lunaris* (Mulsant & Rey, 1855), dorsal view (photo by Koen Lock).



Fig. 53. *Zygina nivea* (Mulsant & Rey, 1855), lateral view (photo by Koen Lock).



Fig. 54. *Zygina ordinaria* (Ribaut, 1936), dorsal view (photo by Koen Lock).



Fig. 55. *Zygina schneideri* Gunthart, 1974, dorsal view (photo by Koen Lock).

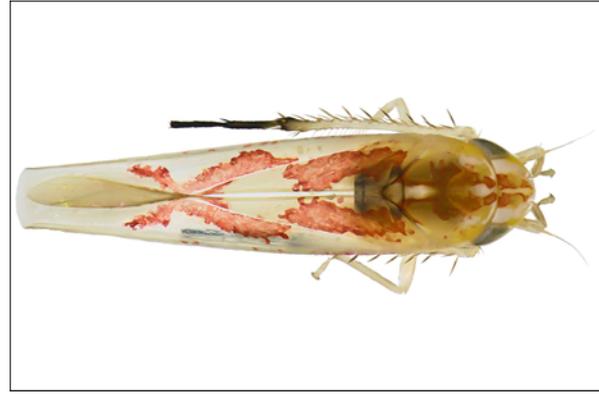


Fig. 56. *Zygina tiliae* (Fallen, 1806), dorsal view (photo by Koen Lock).

MATERIAL EXAMINED: Oudenaarde, Bos t'Ename (50.858, 3.647), 29.VIII.2014; Averbode, Averbode Bos en Heide (51.032, 4.974), 27.VIII.2017; Merendree, Kalevallei (51.076, 3.609), 15.IX.2017; Niel, Walenhoek (51.104, 4.343), 20.IX.2017; Gent, Blaarmeersen (51.041, 3.686), 10.III.2018; Kinrooi, Groot Broek (51.173, 5.696), 26.IX.2018.

### Discussion

Three of the reported species are alien species that originate from outside Europe: *Japananus hyalinus* (Eastern Asia), *Orientalis ishidae* (Eastern Asia) and *Penestragania apicalis* (eastern and central parts of the United States). Several other species are indigenous in Europe, but their host plants are alien species in Belgium that mainly originate from Southern Europe. Therefore, the following leafhoppers should also be considered as alien species in Belgium: *Edwardsiana candidula* (on *Populus alba*), *Edwardsiana platanicola* (on *Platanus x hispanica*), *Liguropia juniperi* (on *Chamaecyparis lawsoniana*), *Macropsis vicina*, *Populicerus albicans* and *Zygina nivea* (all three on *Populus alba*). In addition, several southern species recently extended their distribution range northwards, probably due to climate change: *Cicadula (Henriana) placida*, *Eupteryx decempunctata*, *Fieberiella florii* and *Fruticidia bisignata*. For *C. placida* and *E. platanicola*, the Belgian records are even the northernmost observations. However, most species reported here have so far been overlooked because leafhoppers did not receive a lot of attention in Belgium.

All species reported here have already been observed in Germany. Only *Edwardsiana ishidae* has not yet been reported from France, although it was included as an expected species in the key of DELLA GIUSTINA (1989). *Chlorita dumosa*, *Cicadula (Henriana) placida*, *Edwardsiana platanicola*, *Macropsis vicina* and *Ribautiana alces* have not yet been found in the Netherlands. Although the latter species was reported from the Netherlands by NAST (1987), it is unclear on which source this was based and therefore, *R. alces* was not retained in the checklist of DEN BIEMAN *et al.* (2011). Forty out of the fifty species were reported from the Grand Duchy of Luxembourg (NIEDRINGHAUS *et al.*, 2010), although several of the lacking species will undoubtedly be found there in the near future.

At least 56 leafhoppers, that have not yet been found in Belgium, have been reported from the Netherlands (DEN BIEMAN *et al.*, 2011) and 55 from the Grand Duchy of Luxembourg (NIEDRINGHAUS *et al.*, 2010). For both countries together, this number rises to 82. These numbers should probably be higher, because some of the species reported from Belgium might be wrongly identified and especially because it will probably not be possible to confirm all previously reported species. In addition, some of the species from the French departments

and the German states bordering Belgium can be expected in Belgium. To obtain an overview of the leafhoppers occurring in Belgium, a checklist should be made that is based on a revision of collected specimens. The expected number of leafhoppers in Belgium is probably close to 400 species.

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