

New and interesting true hoppers for the Netherlands (Homoptera: Cixiidae, Delphacidae & Cicadellidae)

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Our knowledge on the Dutch true hopper fauna is growing. Since the most recent species list of 2011, 46 new species have been reported. In 2018-2020, four species were found new for the Netherlands: *Hyalesthes obsoletus*, *Cicadella lasiocarpae*, *Alebra viridis* and *Kybos mucronatus*. The presence of *Idiocerus vicinus* in the Netherlands is confirmed. Moreover, three species of which their distribution was restricted to the south of the province of Limburg, were discovered outside this region: *Trigonocranus emmeae*, *Asiraca clavicornis* and *Errhomenus brachypterus*. The xerothermophilic *Nealiturus fenestratus* is rarely collected in the Netherlands, but showed an invasion in 2019-2020. The ecology and distribution of each species are discussed.

Introduction

The knowledge on the Dutch true hopper fauna is rapidly increasing since the latest fauna list (Den Bieman *et al.* 2011). In recent years, 46 species were added to the Dutch fauna list (De Haas & Den Bieman 2018, Den Bieman 2016, 2017, Den Bieman & Belgers 2017, Den Bieman & De Haas 2017, 2018, 2019, Den Bieman & Van Klink 2015, Den Bieman *et al.* 2020, 2021, Van Klink *et al.* 2019). This increase is due to extensive fieldwork and collecting hoppers by light traps. Citizen scientists uploading their records to the website Waarneming.nl are a third source.

Here we provide information on four species new to the Dutch fauna: *Hyalesthes obsoletus* Signoret, *Cicadella lasiocarpae* Ossiannilsson, *Alebra viridis* Rey and *Kybos mucronatus* (Ribaut). In his revision of the Dutch Idiocerinae, Mol (2013) mentioned that the presence of *Idiocerus vicinus* Melichar, 1898 in the Netherlands needed confirmation. We present new data on this species.

In the south of the province of Limburg, many plant and animal species occur that are not found elsewhere in the Netherlands, as they are often restricted to the warm chalk nature reserves. Nineteen true hopper species belong to this southern fauna. However, recently several of these species were discovered outside their known area: *Trigonocranus emmeae* Fieber, *Asiraca clavicornis* (Fabricius) and *Errhomenus brachypterus* Fieber. *Nealiturus fenestratus* (Herrich-Schäffer) is a xerothermophilic species rarely collected in the Netherlands. In 2019/2020 an invasion of this species was observed.

The Dutch geographical coordinates (Amersfoortcoördinaten = AC) are given for each collection site. Unless stated otherwise, the material was collected by the authors and preserved in their collections. Identifications of all treated species are based on Biedermann & Niedringhaus (2004).

New species for the Dutch fauna

Cixiidae

Hyalesthes obsoletus (figure 1)

Material Province of Limburg: Meertensgroeve, Vilt, Berg en Terblijt (AC 184.3-319.2), 14.vi.2020, 1 ♂ caught with a sweeping net in low herbaceous vegetation, photo on website Waarneming.nl, leg. J. van Leeuwen.

Hyalesthes species are characterized by the combination of five (often weak) keels on the mesonotum, a vertex with a single transverse keel and sickle-shaped styles in males (Holzinger *et al.* 2003). The pronotum of *H. obsoletus* is yellow-white and strongly contrasts with the black mesonotum. The edges of the black vertex and frons are white.

Recently, *H. obsoletus* was found in the neighbouring part of Belgium (Lock 2020) and a discovery in southern Limburg was expected. The distance between the Belgian and Dutch collecting sites is only about 13 km. The distribution of *H. obsoletus* includes the whole Mediterranean, North Africa, the southern parts of Central Europe and extends in the east till the Ukraine, southern and central European Russia, Kazakhstan and Iran (Holzinger *et al.* 2003, Jach & Hoch 2013, Mozaffarian 2018). Its northern boundary is central Germany (Kunz *et al.* 2011). It is not yet known from Poland and Belarus. The recent findings in Luxembourg (Niedringhaus *et al.* 2010) and Belgium suggest an expansion to the north.

Hyalesthes obsoletus is a monovoltine species. Eggs are deposited in the soil near the base of a host plant and the nymphs feed at the roots of its host plant. This species hibernates as a nymph. Details on rearing, reproduction and larval development are given by Sforza *et al.* 1999. In Germany adults occur from May till August (Nickel 2003).



1. Male of *Hyalesthes obsoletus*, Geddelsbach, Baden-Württemberg, Germany, 6.vii.2009. Photo: Gernot Kunz
1. Mannetje van *Hyalesthes obsoletus*, Geddelsbach, Baden-Württemberg, Duitsland, 6.vii.2009.

In Central and Southern Europe *H. obsoletus* is primarily found in sun-exposed ruderal places like the borders of vineyards and abandoned vineyards, fallow land, degraded habitats along roads, old gardens and in disturbed patches in xerothermic grassland (Kosovac et al. 2018, Nickel 2003). It is a polyphagous species, adults and nymphs are found on a variety of herbs like *Artemisia vulgaris*, *Convolvulus arvensis* (field bindweed), *Cardaria draba*, *Crepis foetida*, *Lavendula angustifolia*, *Ranunculus bulbosus*, *Senecio erucifolius*, *Urtica dioica* (stinging nettle) and *Vitex agnus-castus*. Adults are also recorded from *Solanum nigrum*, *Galeopsis angustifolia*, *Daucus carota*, *Chrysanthemum vulgare* and *Calystegia sepium*. Occasionally *H. obsoletus* feeds on woody plants as *Vitis* and *Salix* (Kosovac et al. 2018, Mori et al. 2020, Nickel 2003, Sforza et al. 1999). Until about 2000, *H. obsoletus* occurred almost exclusively on *C. arvensis* in the northern parts of its range, while *U. dioica* and *C. arvensis* are the traditional host plants near the centre of its range as Italy (Boudon-Padieu & Maixner 2007) and the Balkans (Kosovac et al. 2018). From 2003 onwards, *H. obsoletus* was also often found on *U. dioica* in the German wine-growing areas resulting in high population densities on stinging nettle and the spread of this species to previously unoccupied vineyards. This is in line with the discovery of *H. obsoletus* on stinging nettle in Belgium and large populations on stinging nettles in Moravia (Safarova et al. 2011). Phenological studies showed that the populations from stinging nettle occurred 2-3 weeks later than the population from field bindweed from the same German localities (Boudon-Padieu & Maixner 2007). This divergence in phenology was also observed in northern Italy (Mori et al. 2020). A hypothesis was proposed that the lower food quality of stinging nettle leads to a lower growth rate (Boudon-Padieu & Maixner 2007). However, in northern Italy the stinging nettle population hibernates as second instar, while the field bindweed population hibernated as third instar, explaining the clear temporal difference of emergence (Mori et al. 2020). Interestingly, ecological studies in northern Italy revealed more differences between *H. obsoletus* populations from *U. dioica* and *C. arvensis*, such as survival rate, flight period and host preference, suggesting that it might be a case of incipient or cryptic speciation (Mori et al. 2020). Yet, in a study using mitochondrial and nuclear genetic markers on *H. obsoletus* from four host plants (*C. arvensis*, *U. dioica*, *Vitex agnus-castus* and *Crepis foetida*) from Serbia, differences were found between the populations from *V. agnus-castus*, *C. foetida* and the combination *C. arvensis* and *U. dioica*. Hence, these genetic differences showed, contrary to the mentioned ecological

differences in host plant use, that the populations from *U. dioica* and *C. arvensis* constitute a homogenous genetic group (Kosovac et al. 2018).

There is extensive literature on the pest status of *H. obsoletus*. This lacehopper is known as vector of grapevine 'Bois noir' and is reported from southern and eastern Europe as vector of Stolbur disease of solanaceous crops as pepper, potatoes and tomatoes (Nickel 2003, Safarova et al. 2011, Sforza et al. 1999). Bois noir is caused by phytoplasmas of the stolbur (16SrXII-A) group and is transmitted from wild herbaceous plants to grapevine. Such weeds represent a natural reservoir of the pathogen in the vineyard environment (Boudon-Padieu & Maixner 2007). The main host plants harbour a specific stolbur phytoplasma strain, *tuf-a* (type I) in *U. dioica* and *tuf-b* (type II) in *C. arvensis*, which lead to two independent types of plant-based epidemiology (Kosovac et al. 2018, Mori et al. 2020). Severe outbreaks of stolbur-mediated Bois Noir disease of grapevine occurred in Germany, Austria and Switzerland from about 2005 onwards. These outbreaks were linked to the recent northward colonization of new habitats by populations affiliated with *U. dioica* on the species' northernmost distribution range (Kosovac et al. 2018).

Cicadellidae-Cicadellinae

Cicadella lasiocarpae (figure 2)

Material Province of Drenthe: Anderen-Holtstukken, Drentsche Aa (AC 241.4-558.8), at the edge of a pasture near a stream, 22.viii.2020, 1 ♀, photo on website Waarneming.nl, leg. A. Langbroek; same location, 12.ix.2020, 1 ♀, leg. & col. M. de Haas.

The discovery of *Cicadella lasiocarpae* in the Netherlands was already expected for a long time. The related species *C. viridis* (Linnaeus, 1758) is one of the most common true hoppers in the Netherlands. In most cases *C. lasiocarpae* occurs syntopically with *C. viridis* (Nickel 2003).

Both species can be distinguished by the colour pattern of the head and body, the size of the male apodemes and the serration of the female ovipositor (Biederman & Niedringhaus 2004, Ossiannilsson 1981, Szwedo & Gebicki 1998, Tishechkin 2000). The calling signals in these two species are similar, but male courtship signals are distinctly different (Tishechkin 2000).

Though *C. lasiocarpae* was described quite recently in 1981, it has been found in large parts of the northern Palearctic: Belarus, Czech Republic, Denmark, East Palearctic (Siberia and Korea),



2. Female of *Cicadella lasiocarpae*, Immenstadt, Alpsee, Bayern, Germany, 7.vii.2010. Photo: Gernot Kunz
2. Vrouwtje van *Cicadella lasiocarpae*, Immenstadt, Alpsee, Beieren, Duitsland, 7.vii.2010.



3. Male of *Alebra viridis*, Freistritzklamm, Steiermark, Austria, 13.viii.2008. Photo: Gernot Kunz

3. Mannetje van *Alebra viridis*, Freistritzklamm, Stiermarken, Oostenrijk, 13.viii.2008.

Finland, Germany, Great Britain, Ireland, Luxembourg, North European Russia, Poland, Sweden (Jach & Hoch 2013, Malenovský 2013, Niedringhaus et al. 2010, Szwedo & Gebicki 1998).

Cicadella lasiocarpae is a univoltine species, overwinters in the egg stage and in Germany adults were found from June to September (Nickel 2003). This species has a limited ecological range and occurs in very wet bogs, peaty meadows and pastures, fens and along lakeshores (Malenovský 2013, Ossiannilsson 1981). Only *Carex* species are mentioned as host plant: *C. chordorrhiza*, *C. lasiocarpae*, *C. nigra* and *C. vesicaria* (Ossiannilsson 1981, Malenovský 2013, Söderman 2007, Szwedo & Gebicki 1998). Of these species, only *Carex nigra* is known from the Dutch collection site, which is also the main host plant in Germany (Nickel 2003). The female collected on September 12, 2020 was swept from vegetation without *Carex*, but with a mix of herbs and *Juncus*. Because of the unsuitable habitat, it is probably a vagrant specimen. There are suitable biotopes in the neighborhood, and additional fieldwork may yield some populations. The sister species *Cicadella viridis* is a polyphagous eurytopic species living on humid and mesic meadows, along ditches and various humid secondary biotopes. Occasionally it is found on rather dry sites as well. Nymphs and adults of *C. viridis* feed on *Juncus*, *Carex*, *Scirpus* and *Phragmites* (Nickel 2003, Söderman 2007).

Cicadellidae-Typhlocybinae

Alebra viridis (figure 3)

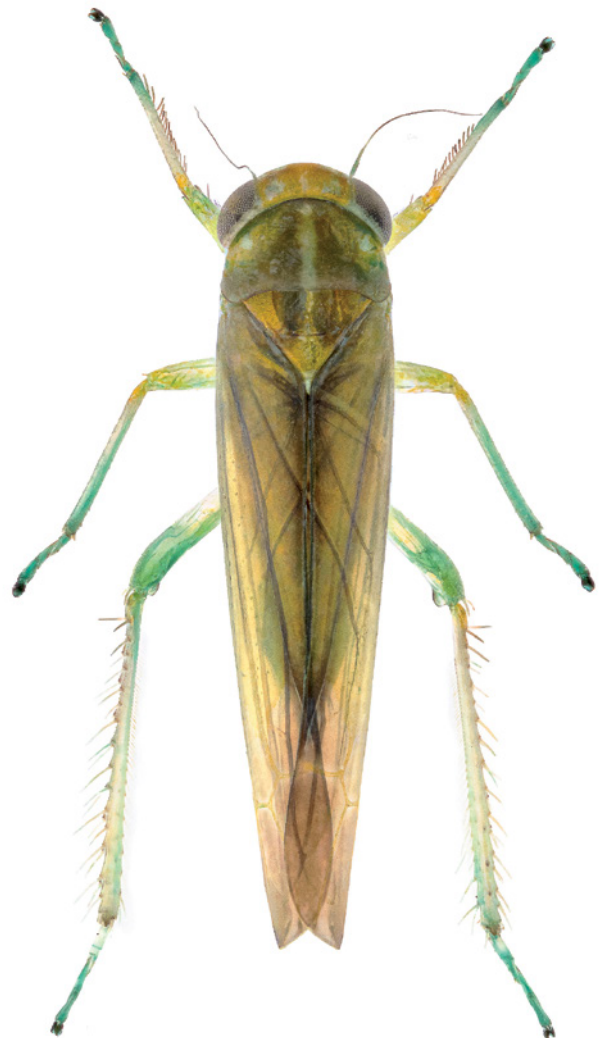
Material Province of Gelderland: Ede, Edese bos (AC 176.2-451.4), light trap in a mixed forest, 24.vii.2018, 1♂, leg. & col. M. de Haas; same location, 7.viii.2020, 1♂, leg. J. Jacobsen, col. M. de Haas. The light trap was placed along an old *Fagus sylvatica*/*Quercus robur* avenue adjacent to coniferous plots. The nearest known *Q. petraea* tree was about 50 m away.

Alebra viridis and the more common *A. albobstriella* (Fallén) were treated as conspecific till the biosystematics studies of Gillham (1991, 1992): differences in acoustic signals and host plant associations were discriminating. The main morphological differences are found in the dark colour of the ventral side of the thorax and abdomen, the green body colour and the grey apical cells in the forewing and the form of the apodemes of the first abdominal sternite in males (Biedermann & Niedringhaus 2004, Gillham 1991).

The distribution of *A. viridis* is limited to the western Palaearctic: Austria, Belgium, Czech Republic, Germany, Great Britain, Greece, Luxembourg, Italy, Madeira, Portugal, Spain and Switzerland (Aguin Pombo 2002, Della Giustina 1989, Gillham 2011, Holzinger 2009, Jach & Hoch 2013, Lock 2019, Niedringhaus et al. 2010). The hostplant of *A. viridis* is *Q. petraea* in the northern parts of the area like Belgium, Germany and Great Britain while *A. albobstriella* is more polyphagous and occurs mainly on *Q. robur*, *Alnus*, *Betula* and sometimes other deciduous trees (Gillham 1991, Nickel 2003). In southern regions as Greece and the Iberian Peninsula *A. viridis* and *A. albobstriella* often occur together on *Castanea sativa* (Aguin Pombo 2002, Gillham 1992). In Germany *A. viridis* is a univoltine species, but in southern regions it may have two generations. Overwintering takes place in the egg stage and adults are found from July till October (Holzinger 2009, Nickel 2003).

Kybos mucronatus (figure 4)

Material Province of Noord-Brabant: Ulvenhout A/C (AC 116.5-395.5), 13.vii.2013, 1♂ on *Alnus glutinosa* in a marsh with a mixed hedge of deciduous trees and bushes, the identity is confirmed by H. Nickel; Breda border river Mark and near de Klokkenberg (figure 5) (AC 112.9-395.1), 20.vii.2020, 1♂ 1♀ on



4. Female of *Kybos mucronatus*, Breda, border river Mark (province of Noord-Brabant), the Netherlands, 20.vii.2020. Photo: Theodoor Heijerman

4. Vrouwtje van *Kybos mucronatus*, Breda, oever Mark (Noord-Brabant), Nederland, 20.vii.2020.



5. Location of *Kybos mucronatus*, Breda (province of Noord-Brabant), the Netherlands, 22.vii.2020. Photo: Kees den Bieman
5. Vindplaats van *Kybos mucronatus*, Breda (Noord-Brabant), Nederland, 22.vii.2020.

Alnus glutinosa, all leg. & col. C.F.M. den Bieman; Udenhout, nature reserve De Brand (AC 137.4-404.8), 27.vi-4.vii.2020, 1 ♂ in malaisetrapp, leg. IWG KNNV-Tilburg, col. M.C. de Haas; same location, 18-25.vii.2020, 1 ♂ in malaisetrapp, leg. IWG KNNV-Tilburg, col. M.C. de Haas.

Within the large and difficult genus *Kybos*, a group of five species are closely related: *K. calyculus* (Cerutti), *K. mucronatus*, *K. strigilifer* (Ossiannilsson), *K. strobli* (W. Wagner) and *K. virgator* (Ribaut). These species are distinguishable by details in male genitalia and male abdominal acoustic structures as apodemes of the second and third sternite and third tergite (Biedermann & Niedringhaus 2004). The latter structures are only visible in unparasitized males, while the structures are not yet well developed in fresh males (Bückle & Guglielmino 2005). *Kybos strobli* was not yet reported from the Netherlands.

Kybos mucronatus is widely distributed in Central and Southern Europe: Austria, Bulgaria, Central European Russia, Czech Republic, France, Germany, Greece, Latvia, Luxembourg, Poland, Slovakia, Switzerland and former Yugoslavia (Holzinger et al. 2016, Jach & Hoch 2013, Mühlethaler et al. 2009, Niedringhaus et al. 2010). This species is probably restricted to *Alnus glutinosa* (Biedermann & Niedringhaus 2004), reports from other host plants such as *Salix* (Mühlethaler et al. 2009) should be confirmed and might be due to confusion with other *Kybos* species. It has probably one generation and hibernates in the egg stage. Adults occur from July (Poland) to September (Switzerland) (Dworakowska 1976, Günthart 1987).

Confirmation of the occurrence of *Idiocerus vicinus* in the Netherlands

Cicadellidae- Idiocerinae

Idiocerus vicinus (figure 6)

Material Province of Gelderland: Bergherbosch, Montferland (AC 211.3-433.6), 27.x.2020, 1 ♂, photos on website Waarneming.nl, leg. R. Soethof, identification confirmed by A.W.M. Mol; Wageningen, Onderlangs (AC 176.2-441.5), 4.viii.2020, 1 ♂, leg D. Belgers, col. C.F.M. den Bieman. Province of Noord-Holland: nature reserve Zwanenwater (176.2-441.5), 17.vii.2020, 1 ♂, leg D. Belgers, col. C.F.M. den Bieman. Province of Noord-Brabant: 1,5 km west of Galder, Kerzelseweg (AC 111.2-390.6), 6.ix.2020, 3 ♂ on *Salix purpurea*, leg. & col. C.F.M. den Bieman.

Mol (2013) stated in his revision of the Dutch Idiocerinae fauna that the occurrence of *I. vicinus* in the Netherlands needs confirmation; *Idiocerus vicinus* was mentioned by Gravestain (1976) as a Dutch species but his material concerned only four females (Mol 2013). The biology of *I. vicinus* is given in Mol (2013): a species living on *Salix purpurea* and hibernating in the adult stage.



6. Male of *Idiocerus vicinus*: (a) dorsolateral, (b) frontal. NR Gesäuse, Steiermark, Austria, 22.vii.2007. Photo: Gernot Kunz

6. Mannetje van *Idiocerus vicinus*: (a) dorsolateraal, (b) frontaal. NR Gesäuse, Stiermarken, Oostenrijk 22.vii.2007.



7. Location of *Trigonocranus emmeae*, Sint Philipsland (province of Zeeland), the Netherlands, 10.vi.2020. Photo: Kees den Bieman
7. Vindplaats van *Trigonocranus emmeae*, Sint Philipsland (Zeeland), Nederland, 10.vi.2020.



8. Female of *Asiraca clavicornis*, Perchtoldsdorfer Heide, Niederösterreich, Austria, 03.vi.2007. Photo: Gernot Kunz
8. Vrouwtje van *Asiraca clavicornis*, Perchtoldsdorfer Heide, Neder-Oostenrijk, Oostenrijk, 03.vi.2007.

Species in the past restricted to south Limburg

Cixiidae

Trigonocranus emmeae

Material Province of Zeeland: 2.5 km nnw Sint Philipsland (AC 72.2-405.7), 10.vi.2020, 10 ♀♀ shore Grevelingen, sparse vegetation (2-5 cm thick) with moss on top of concrete slabs on a south-west slope of a dyke (figure 7).

The first observation of *T. emmeae* in the Netherlands was in 2017 by De Haas & Den Bieman (2018) in the most southern region of Limburg. The second location was also in the south of Limburg (Groeve 't Rooth, AC 182-316, 5.ix.2019, 1 ♀ swept along a forest edge, leg. & col. C.F.M. den Bieman). *Trigonocranus emmeae* was pictured in De Haas & Den Bieman (2018) and its biology was discussed. The discovery of this species on a complete artificial location was surprising. The location was relatively warm: a south-west slope near a salt-water lake. The large number of individuals swept from this location suggests that it is a well-established population.

Delphacidae

Asiraca clavicornis (figure 8)

Material Province of Gelderland: Doetinchem (AC 217.4-441.9), 8.vi.2020, 1 ♀ brachypterous, leg. F. Leiden & M. de Vries, photo on website Waarneming.nl; Etten (AC 220.1-437.6), 10.xi.2020, 1 adult macropterous forewings passing abdomen tip, photo on website Waarneming.nl, leg. A. van Bijsterveld.

Asiraca clavicornis has been considered as a typical species of the southern part of Limburg. It is the sole representative of the tribus Asiracini in Europe. It is a large, very characteristic, planthopper with distinctly large and flattened antennae and front legs. Confusion with other planthoppers is not possible.

In the Dutch collections, 21 records (1955-2020) from twelve locations in southern Limburg are present and it has always been considered as a rare species. One third of the records are from 2019-2020. However, data on the website Waarneming.nl clearly show that there has been a strong increase from 2017 onwards. In 2015 and 2016, only one observation each year and of prior years no data on this website. In 2017, 3 observations were made; in 2018 6 observations; in 2019 19 observations and in 2020 44 observations. Fifty percent of the data on Waarneming.nl concern locations in the south of Limburg, but from 2017 onwards, *A. clavicornis* was also observed in north and central Limburg and at this moment this planthopper is known from 16 locations in the province of Limburg outside the southern part. In 2020 also two places outside the province of Limburg were reached and the data of these locations are given. The female collected in Doetinchem is a brachypterous (non-migrating) female implicating that there exists at this location a population of *A. clavicornis* that reproduced at least one generation.

The biology of *A. clavicornis* is not well known. It is a widespread species but usually only collected in small numbers. Even its hostplants are not well known. It is suggested that it is a polyphagous species on grasses as *Dactylus glomerata* (Della Giustina 2019) and *Hordeum* (S. Drosopoulos personal communication), but it is also reared on the dicotyle *Bellis perennis* (Müller 1942). However, Müller (1942) stated that *B. perennis* is not a natural hostplant. It is a univoltine species and both sexes hibernate (Müller 1942) or only females (Della Giustina 2019). Adults are found all year round but are rare in June and July in France (Della Giustina 2019). The Dutch data show that adults were collected from March till December with a maximum in April and May, in July and August larvae were collected on three locations (data of Waarneming.nl and collection material combined). *Asiraca clavicornis* is found in sunny, moderately dry to dry, often disturbed locations as roadsides, abandoned vineyards and the border of meadows (Nickel 2003, own observations). In the south of Limburg, it has been collected since 1956 till 2020 along a road close to the nature reserve Vrakelberg, always in low numbers, mostly single specimen.

The distribution of *A. clavicornis* extends from central and southern Europe to central Asia and North Africa. This species is absent from most Scandinavian and north eastern European countries (Jach & Hoch 2013, Ødegaard 2011). Based on historical distribution data, it is suggested that *A. clavicornis* has under-

gone a considerable geographical range reduction in England (Kirby 1992). Data from northern Germany and Poland suggest that *A. clavicornis* also declined in central Europe (Nickel 2003).

Most planthoppers show macropterous and brachypterous specimen. This variation in wing length is also shown by *A. clavicornis*. Brachypterous specimens have forewings that reach the abdomen tip and reduced hindwings. However, the macropterous specimens with forewings passing the abdomen tip show a variation in the length of the hindwing. The hindwings can be considerable shorter than the forewings only reaching to the middle of the abdomen while in others the hindwings are almost as long as the forewings. Probably only the specimens with long front and backwings are capable of migration by flight. It is unknown however whether the registered specimens on Waarneming.nl were able to migrate as only variation in forewings is visible but not in hindwings.

It is of course speculation what the cause is of the recent expansion of the range of *A. clavicornis* to the north. However, it is obvious to see a relation between this thermophilic species and the warmer summers of the last four years and the general increase in temperature. Until 2016, *A. clavicornis* was a rare species in the south of Limburg and within only four years, it is not only more generally in this traditional distribution area of south Limburg but also expands its range far to the north. Considering the recent distribution in Belgium of *A. clavicornis* (website Waarneming.be), this species is also expected in the Dutch southern provinces of Noord-Brabant and Zeeland.

Cicadellidae-Cicadellinae

Errhomenus brachypterus (figure 9)

Material Province of Gelderland: Windesheim, Uiterwaarden Tichelgaten (AC 204.3-495.0), 12.ii.2018, 1 brachypterous adult, photos on website Waarneming.nl, leg G. Beersma.

Errhomenus brachypterus is known from six localities in southern Limburg. The specimen seen in Windesheim is the first one collected in the Netherlands outside this region.

The biology of *E. brachypterus* is not well known probably due to its cryptic live style. It lives in the forest litter probably sucking at the roots of plants (Malenovský & Lauterer 2012, Nickel 2003). Based on the distribution of *E. brachypterus* in series of pitfall traps from the nature reserve Gerendal in southern Limburg, Cobben & Rozeboom (1978) confirmed that this species

is associated with forests. At this location, there is a *Quercus-Carpinus* forest with a dense groundcover of *Hedera helix* and patches of *Lamium galeobdolon*. Collecting with pit fall traps is the proper method to sample this species. At all but one location in Southern Limburg it was collected with a pitfall trap.

Adults are found year-round and besides adults also nymphs hibernate. Almost all European true hoppers complete their life cycle within one year, yet *E. brachypterus* seems to be semivoltine. It is likely a polyphagous species (Nickel 2003). Cobben & Rozeboom (1978) suggest that an association with *H. helix* might be possible.

Errhomenus brachypterus has an European distribution but is absent from Scandinavia, Great Britain and most Mediterranean countries. Its distribution stretches to Ukraine in the east (Jach & Hoch 2013).

Errhomenus brachypterus is found in the litter of deciduous and coniferous forests, often on wet locations on alkali as well as acidic soils. All south Limburg locations were in deciduous forests on limestone. The single individual seen in Windesheim was found in a very small deciduous forest about 100 m from the IJssel river.

The species name *brachypterus* implicates that it is a short-winged species and macropterous specimens are not known to us. Short-winged hoppers are not capable to fly and migrate by air. This aspect makes the finding of a specimen about 200 km away from the populations in the south of Limburg interesting. Also, the nearest known German populations are at least 100 km apart (Nickel 2003). The Windesheim individual was found close to a river and was most probably transported by water from Germany. Haupt (1935) mentioned that *E. brachypterus* can be sieved from the washing up of a river.

Cicadellidae-Deltocephalinae

Neoliturus fenestratus (figure 10)

Material Province of Limburg: nature reserve Sint Pietersberg, groeve bij Franse Batterij (AC 175-315), 17.ix.1949, 2 ♂ 3 ♀, leg. Excursie St Pietersberg, col. Naturalis; Bemelen, nature reserve Bemelerberg, 9.vi.2019, 1 ♀, photo on website Waarneming.nl, leg. P. Hoekstra; same locality (AC 181.5-317.8), 24.vi.2020, 3 ♂ 3 ♀, leg. & col. C.F.M. den Bieman; Brunssum-Treeberg (AC 194.6-327.6), 24.viii.2019, one adult on light; same locality, 25.viii.2019, one adult on light, both photos on website Waarneming.nl, leg.



9. Male of *Errhomenus brachypterus*, NR Gesäuse, Steiermark, Austria, 23.vii.2007. Photo: Gernot Kunz

9. Mannetje van *Errhomenus brachypterus*, NR Gesäuse, Stiermarken, Oostenrijk, 03.vi.2007.



10. Male of *Neoliturus fenestratus*, Darmstadt, Hessen, Germany, 01.ix.2008. Photo: Gernot Kunz

10. Mannetje van *Neoliturus fenestratus*, Darmstadt, Hessen, Duitsland, 01.ix.2008.

G. Lommen; Roermond (AC 196.8-355.0), 26.viii.2020, one adult on light, photo on website Waarneming.nl, leg. W. Vergoossen. Province of Gelderland: Renkum, Telefoonweg (AC 180.4-445.6), 15.viii.2020, 3 ♂ 2 ♀, leg. D. Belgers, col. C.F.M. den Bieman; same locality, 16.viii.2020, one nymph; same locality, 18.x.2020, 3 adults, both photos on website Waarneming.nl, leg. D. Belgers; Lunteren, zandgroeve (AC 173.0-456.7), 3 adults, leg. M. de Haas. Province of Overijssel: Holten, nature reserve De Borkeld (AC 231.7-476.8), 27.viii.2020, one adult, photo on website Waarneming.nl, leg. J. Wessels; Holten, nature reserve De Borkeld (AC 230.7-477.1), 1.ix.2020, one adult, photo on website Waarneming.nl, leg. H Exterkate, J. Ligtenberg & G. van de Maat; Holten, nature reserve De Borkeld (AC 231.8-476.80), 4.ix.2020, one nymph, photo on website Waarneming.nl, leg. J. Ligtenberg. Province of Friesland: nature reserve Drents-Friese Wold, Aekingerzand (Kale Duinen) (AC 215.8-549.0), one adult collected on *Juniperus*, photo on website Waarneming.nl, leg. J. Breidenbach & R. Mullers.

The first record of *N. fenestratus* (as *Thamnotettix fenestratus* (H.-S.)) for the Netherlands was from Blöte (1927a) mentioning Den Haag (province of Zuid-Holland) as collecting site. This material could not be retrieved in the Dutch collections. However, Blöte (1927b) did not list *N. fenestratus* as a species from the Netherlands because he stated that he had not seen Dutch material. Therefore, this species was not mentioned in the next fauna list of Reclaire (1944). Afterwards, Nast (1972) was the first to mention *N. fenestratus* for the Netherlands, the data on which this record was based are unknown.

The oldest Dutch record of *N. fenestratus* in the Dutch collections is from 1949 in south Limburg. It took 70 years until it was observed again at two localities, also in south Limburg. However,

its distribution rapidly expanded in 2020 with records of four provinces including a record from the north of the Netherlands.

The xerothermophilic *N. fenestratus* is a widespread species in Europe, but does not occur in Great Britain and most of Scandinavia (Jach & Hoch 2013). In Germany it is a bivoltine species, adults hibernate and adults can be found year-round. It prefers dry and sunny, often sparsely vegetated, mostly disturbed sites on both alkali and acidic soils (Nickel 2003). Abandoned fields, roadsides, grazed low-productivity grassland and inland dunes are proper habitats (Nickel 2003). Host plants include various species of Asteraceae as *Leondodon* and perhaps other dicotyledonous herbs (Nickel 2003). At two Dutch locations, *N. fenestratus* was collected with a light-trap, showing that this species is capable to fly. The rapid increase in the Dutch distribution of this thermophilic species in 2020 may be related to the warm summer of 2020. The capture of nymphs at two locations indicates that there are reproducing populations. Whether this area expansion is definitive will become clear in the coming years.

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Samenvatting

Nieuwe en interessante cicaden voor de Nederlandse fauna (Homoptera: Cixiidae, Delphacidae & Cicadellidae)

De kennis over de Nederlandse cicadenfauna blijft groeien. Sinds het verschijnen van de laatste naamlijst van Nederlandse cicaden in 2011 zijn 46 soorten als nieuw voor ons land gerapporteerd. In 2018-2020 zijn weer vier soorten nieuw voor Nederland verzameld: *Hyalesthes obsoletus*, *Cicadella lasiocarpae*, *Alebra viridis* en *Kybos mucronatus*. Over het voorkomen van *Idiocerus vicinus* in Nederland bestond onduidelijkheid. Nieuwe vangsten tonen aan dat *I. vicinus* echt in Nederland voorkomt. Van drie soorten waarvan de verspreiding tot voor kort beperkt was tot Zuid-Limburg zijn vangsten gedaan buiten dit gebied: *Trigonocranus emmeae*, *Asiraca clavicornis* en *Errhomenus brachypterus*. *Neoaliturus fenestratus* is een warmteminnende dwergcicade die zelden in ons land verzameld is. In 2019/2020 was sprake van een invasie. Van alle soorten wordt de ecologie en de verspreiding besproken. De ontdekking van *Hyalesthes obsoletus* als nieuw voor Nederland en de areaal uitbreiding van *T. emmeae*, *A. clavicornis* en *N. fenestratus* zou kunnen samenhangen met de warmere zomers in recente jaren.

