Second addendum to the Leafhoppers and Planthoppers of Germany (Hemiptera: Auchenorrhyncha)

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Summary: This paper presents new faunistic and ecological data on 21 species of planthoppers and leafhoppers in Germany. *Delphax armeniacus* An., *Javesella bottnica* Huld., *Micantulina teucrii* (Cer.), *Ficocyba ficaria* (Horv.), *Placotettix taeniatifrons* (Kbm.), *Allygidius furcatus* (Ferr.), *Phlogotettix cyclops* (M. & R.) and *Thamnotettix exemtus* Mel. are new to the country. New distributional and ecological data are given for *Megamelodes lequesnei* W. Wg., *Cercopis arcuata* Fieb., *Macropsis mulsanti* (Fieb.), *Dryodurgades antoniae* (Mel.), *Hishimonus hamatus* Kuoh, *Maiestas horvathi* (Then), *Anoplotettix fuscovenosus* (Ferr.), *Cicadula placida* (Horv.), *Ederranus discolor* (J. Shlb.), *Paralimnus lugens* (Horv.), *Psammotettix albomarginatus* W. Wg., *Pinumius areatus* (Stål) and *Cosmotettix evanescens* Oss. An analysis of 28 species recorded as new for Germany in the last two decades showed that the increase is caused in equal shares by better taxonomic and faunistic knowledge on the one hand and real ecological changes through anthropogenic introductions and northward range expansions (presumably driven by climatic factors) on the other hand.

Keywords: Fulgoromorpha, Cicadomorpha, checklist, invasive species, Neozoa

1. Introduction

Twelve years have passed since the first addendum (Nickel 2010) to a monograph on ecology and distribution of the leafhoppers and planthoppers of Germany and its analysis (Nickel 2003) and the checklist on which it was based (Nickel & Remane 2002). Whilst the original work covered 620 species, the first addendum added ecological and distributional details for 6 new species and 4 species that where only little known within Germany.

In the meantime a lot of new material has been identified, new records and revisions have been published, new species have been described and a detailed red list of the Auchenorrhyncha of Germany has been made (Nickel et al. 2016). This increased the number of published Auchenorrhyncha species from Germany to 640.

This paper presents faunistic and ecological data on 8 species new to Germany and 13 rarely recorded or little-known species. It also briefly summarises records of new species to Germany published elsewhere as well as nomenclatural changes. Finally, a brief analysis of the causes of the increase in species number is made.

2. New species records for Germany

Delphax armeniacus Anufriev, 1970 Fig. 1, Map 1

Brandenburg: Trechwitz, Netzener See, 22.VII.2021, 1 ♂, 1 ♀. Emstal, 23.07.2021, 1 ♀; Hennickendorf, below Wachtelberg, 23.VII.2021, 1 ♂. Lehnin, Mühlenteich, 23.VII.2021, 2 ♂♂. **Mecklenburg-Vorpommern**: Waren, Müritzhof, 22.VIII.2021, 1 ♂. Manfred Asche (Berlin) kindly confirmed the identification.

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A rather surprising record for Germany and the whole of central Europe, this species has been mentioned so far only a few times in literature. Described from Armenia (Anufriev 1970), it was later found in northeastern Greece (Drosopoulos 1982, Drosopoulos et al. 1983), eastern Ukraine (Anufriev & Enjutina 1980), Krasnodar region of southern Russia (Gnezdilov 2000), western Kazakhstan (Mitjaev 2002) and, recently, south-eastern Bulgaria (Gjonov 2022). The nearest localities are more than 1.500 km away in Bulgaria and Greece. At least some of the German localities have already been studied in recent years. So it is unclear whether this series resulted from a transient influx or might lay the basis for a permanent occurrence. At least one of the ♀♀ was short-winged and should therefore have hatched from eggs deposited in the previous year. ♂♂ in this genus are usually long-winged. A targeted search in the next years should prove whether this occurrence will become permanent.

Concerning its life cycle, it can be assumed – like in other central European species of this genus – that *D. armeniacus* is univoltine with a single generation per year and overwintering in the egg stage. This assumption is also plausible because of the mid- and late summer records published here. According to Drosopoulos et al. (1983) it feeds on *Phragmites australis*, which occurred on all 5 localities.

***Javesella bottnica* Huldén, 1974** **Map 1**

Bavaria: Teuschnitz, Kremnitz valley, acidic sedge swamp with dominating *Carex rostrata*, 3.VII.2021, 1 macropterous ♂ in a motor suction sample.

This is a globally rare species which has been recorded only very few times. The first central European record was gathered by Malenovský (2013) near Přebuz in the Bohemian Ore Mountains (Erzgebirge) on 21.VI.2011, 3 ♂♂ 7 ♀♀ (all brachypterous) less than 90 km to the east of the locality given here, in a larger mire complex at 910 m. Meanwhile there is a second central European record: a single brachypterous ♂ from Styria, Riesachsee, 1.360 m, 22.VII. 1994. lakeside mire with tall sedges (Holzinger et al. 2016, Holzinger personal communication).

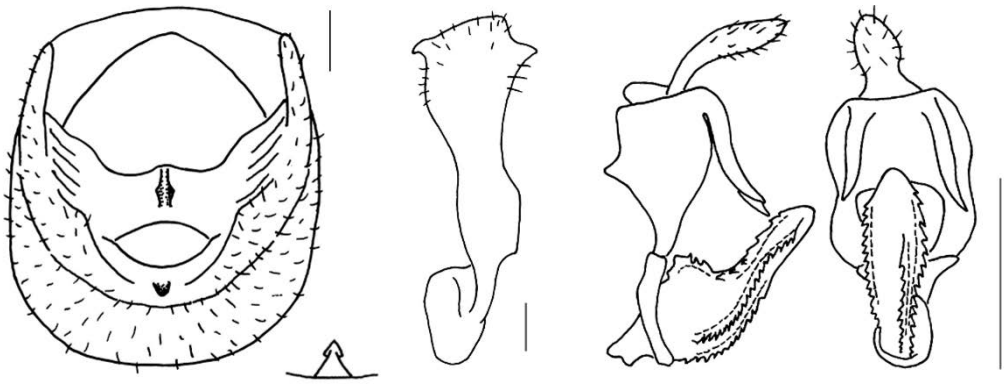


Fig. 1: *Delphax armeniacus* An., from left to right: male pygophor, caudal view, prolongation of genital phragm from above, left stylus (scale so far: 0,1 mm), anal tube and aedeagus from left, same in caudoventral view. Drawings after Anufriev (1970), redrawn by Lisa Stöckmann.

Photo 1: *Micantulina teucrii* (Cer.), ♀, Austria, Burgenland, 7.VI. 2013 (Photo: G. Kunz).

Photo 2: *Ficocyba ficaria* (Horv.), ♂, Ivrea, Monti Pelati (Italy), 8.IX.2007 (Photo: G. Kunz).

Otherwise, this species is worldwide only known from 12 localities in Finland and a few (not specified in detail) on the Russian side of Karelia and Sweden (Huldén 1974, Ossiannilsson 1978, Söderman 2007, Söderman et al. 2009). There are no specimens in the collections of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN) (V. Gnezdilov, personal communication). In central Europe it should be interpreted as a rare glacial relict which should be of particular concern for conservation.

However, the macroptery of the sampled specimen means that this record is not a proof of reproduction in the Kremnitz valley. The site is only at 450 m NN and clearly at lower altitude than those in Czechia and Styria. On the other hand, many valley bottoms in that region are known for their special microclimate that involves lakes of cold air and significant shading due to their steepness.

Söderman (2007) found adult specimens on *Carex acuta* in Finland, Igor Malenovský (personal communication) assumes that *Carex rostrata* which was also locally abundant in the Kremnitz valley is the host plant in the Czech locality. In Finland adults were found between early June and late July which indicates a single annual generation and overwintering in the larval stage.

Future targeted field search should be carried out in the Kremnitz valley as well as in similar habitats in order to prove whether *Javesella bottnica* Huld. reproduces in Germany or not. Such field work could also clarify the occurrence of the rare *Cosmotettix evanescens* Oss. (see below).

***Micantulina teucrii* (Cerutti, 1938)** **Map 1, Photo 1**

Bavaria: Oberstorf, Oytal, descent from Seealpsee downward, 14.VIII.2016, 6 ♀♀; Nationalpark Berchtesgaden, Sigeretsteig, 18.VII.2017, a large population; both localities on *Teucrium montanum* on steep, south-exposed and rocky hillsides on limestone at c. 1.100 m.

Despite frequent and intense search on this plant in all non-alpine parts of southern Germany for three decades this species could not be found elsewhere and other published records from Germany are erroneous. Although it is frequently found in much lower altitudes in more south-eastern parts of Europe (e.g. Burgenland, Austria: Breitenbrunn, Thenau, 190 m, 7.VI. 2013, a large population) it is apparently confined to the montane belt in Germany.

Originally it was described from Valais, Switzerland (Cerutti 1938, 1939). In Austria it was so far known from Lower Austria, Styria and Carinthia (Holzinger 2009, Wagner & Franz 1961). Otherwise it is reported from Italy, Bulgaria, Greece, Ukraine (Nast 1972, 1987), Moravia and Slovakia (Lauterer 1983), Serbia and Montenegro (Arzone et al. 2007) and Anatolia (Dlabola 1971).

The life cycle is not clear. At least in southern parts of lowland Europe there should be 2 annual generations, but the overwintering stage is not known. Its close relative *M. stigmatipennis* (M. & R.) shows 2 generations per year with occasional late nymphs of a possible third one which, however, will die in winter (Röthel & Witsack 2007).

***Ficocyba ficaria* (Horvàth, 1897)** **Map 1, Photo 2**

Baden-Württemberg: Ladenburg, 15.IX.2020, 4 ♂♂, 10 ♀♀, some exuvia seen, on cultivated fig trees (*Ficus carica*) in a nursery garden.

Ficus carica is frequently cultivated along streets and in private farmyards and gardens of many vine-growing villages particulary in the northern Upper Rhine plain. Despite occasional searches during the past three decades this species was never found until now. It is uncertain if the recorded population will be stable and perhaps a source of a further spread.

This species is quite peculiar among leafhoppers concerning its obligatory dioecy described by Vidano (1960). Accordingly the overwintering eggs and a spring generation are found on *Lonicera* spp., these adults migrate to *Ficus carica* where two generations are built up in summer and autumn. Adults of the latter migrate back to *Lonicera*. This type of life cycle was also confirmed by Quartau et al. (1995). Arzone et al. (2008) specified the honeysuckle as *Lonicera caprifolium*, *L. japonica*, *L. implexa*.

Ficocyba ficaria (Horv.) is a typical Mediterranean species, being known from Spain, France, Switzerland, Italy, Bulgaria, Israel, Morocco (all after Nast 1972, 1987), Portugal (Quartau et al. 1995), Slovenia (Holzinger & Seljak 2001), Croatia, Montenegro (Arzone et al. 2008), Malta (D'Urso & Mifsud 2012), Greece (Drosopoulos et al. 1986) and Lebanon (Abdul-Nour 2005).

***Placotettix taeniatifrons* (Kirschbaum, 1868)** **Map 2, Photo 3, Photo 4**

Baden-Württemberg: Freiburg im Breisgau, Hauptfriedhof, 260 m, 3.VIII.2013, 2 ♂♂, 1 nymph, on cultivated *Rhododendron*. A second locality was kindly communicated by Sabine Walter: **Saxony**: Dresden-Pillnitz, Kammeyergarten der Hochschule für Technik und Wirtschaft, 125 m, Malaise trap, 5.VIII.2014, 1 ♀; 1.IX.2014, 1 ♂; 8.IX.2014, 1 ♀; 8.X.2014, 1 ♀; 20.X.2014, 1 ♀, cultivated *Rhododendron* nearby.

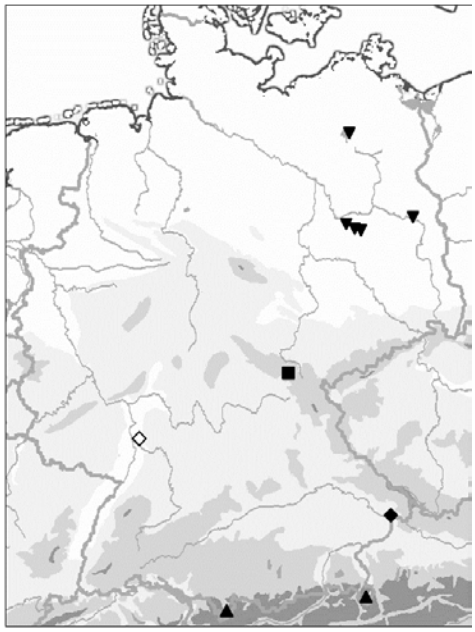
Placotettix taeniatifrons is a complex of at least 6 morphologically more or less distinct taxa which have been described and analysed in detail by Meyer-Arndt & Remane (1992). Accordingly, its distribution extends around the central and western Mediterranean (Tunisia, Algeria, Spain, France, Italy, Croatia, Greece, with a northwestward wedge up to the Netherlands and England. Specimens not included in this revision were published from Portugal, Romania and Belgium. However, the latter would – due to its geographic proximity – plausibly belong to this group, too.

It is usually found on evergreen bushes and shrubs. Meyer-Arndt & Remane (1992) mention *Erica*, *Phillyrea*, *Myrtus*, *Pistacia* and *Nerium* as host plants of nymphs, *Arbutus*, *Buxus*, *Coriaria* and *Quercus* as additional food plants of adults. Populations in Belgium, the Netherlands, England and Germany (and probably northern France) live on cultivated *Rhododendron* (Baugnee 2003, Le Quesne 1969) and should therefore be considered as synanthropic.

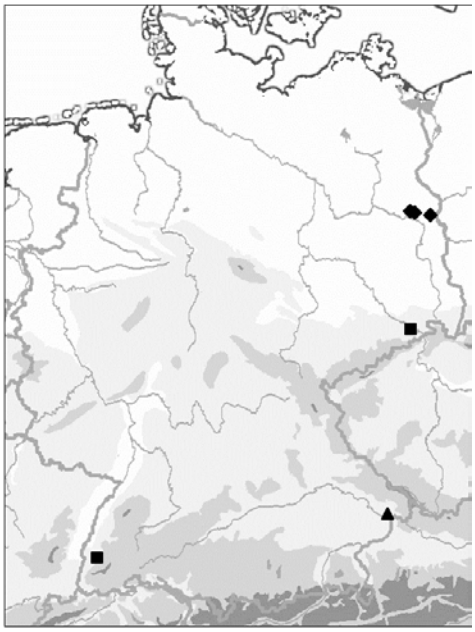
Adults appear rather late: 10 records from the Netherlands published online (www.waarneming.nl) were gathered between mid August and end of October, supporting the few phenological data presented here as well as those from Le Quesne (1969). This pattern provides evidence for a single annual generation which overwinters in the egg stage. On the other hand Meyer-Arndt & Remane (1992) point out that in Mediterranean regions an annual synchronisation might be lacking.

Photo 3: *Placotettix taeniatifrons* (Kbm.), ♂, Freiburg im Breisgau, 3.VIII.2013 (Photo: G. Kunz).

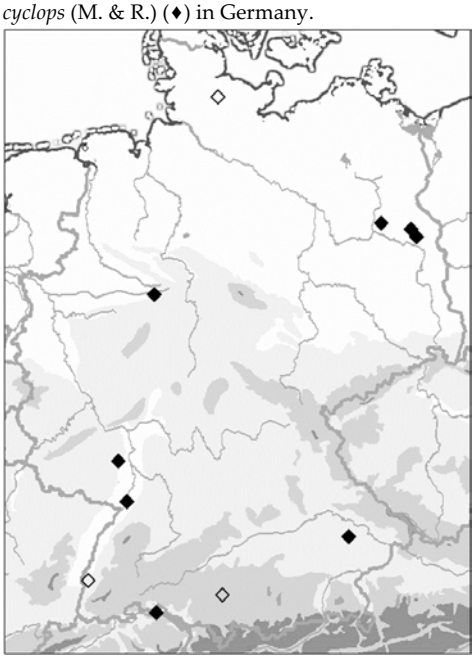
Photo 4: *Placotettix taeniatifrons* (Kbm.), nymph, Freiburg im Breisgau, 3.VIII.2013 (Photo: G. Kunz).



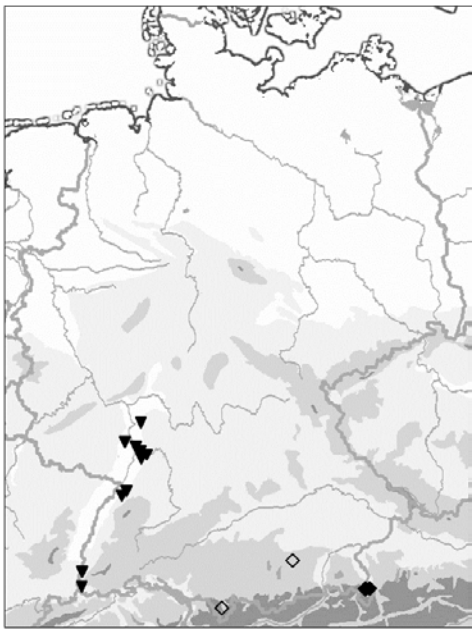
Map 1: Records of *Delphax armeniacus* An. (▼), *Javesella bottnica* Huld. (■), *Micantulina teucrii* (Cer.) (▲), *Ficocyba ficaria* (Horv.) (◊), *Phlogotettix cyclops* (M. & R.) (♦) in Germany.



Map 2: Records of *Placotettix taeniatifrons* (Kbm.) (■), (Saxony: S. Walter rec.), *Allygidius furcatus* (Ferr.) (♦), and *Thamnotettix exemtus* Mel. (▲) in Germany.



Map 3: Records of *Megamelodes lequesnei* W.Wg. in Germany. ♦ = Nickel rec., ◊ = others rec. (s. text).



Map 4: Records of *Cercopis arcuata* Fieb. (◊ = historical, ♦ = Nickel rec.); *Maiestas horvathi* (Then) (▼).

***Allygidius furcatus* (Ferrari, 1882)** **Map 2**

Brandenburg: Hennickendorf, Lange-Damm-Wiesen, northwestern parts, 1.VIII.2016, 1 ♂, 1 ♀, 16.VI.2021, 3 nymphs, respectively, at two different sites; Lange-Damm-Wiesen, northern parts, 25.VII.2021, 11 ♂♂, 11 ♀♀; Podelzig, Priesterschlucht, 18.VI.2021, 5 nymphs. More similar localities have targetedly and unsuccessfully been searched for the species in the meantime. All localities were xerothermic woodland margins, mostly with oak, on sandy substrates.

This species is found from Iran and Armenia westward to southern France, in central Europe northward to the southern Alps, Lower Austria, Moravia, Bohemia and central Poland (Nast 1972, 1976, 1987, Holzinger 2009, Malenovský et al. 2011, Świerczewski & Gruca 2010). The nearest known localities are to the north of Prague and in the vicinity of Poznań, c. 200 km southward and eastward, respectively, of the new records. In Czchechia, from where most details of biology have been published, it lives on woody plants on dry grassland and along xerothermic margins of woodland; adults were recorded from mid June until beginning of September; eggs overwinter, nymphs probably feed on grasses, adults ascend to woody plants (Malenovský et al. 2011, Malenovský & Lauterer 2012).

***Phlogotettix cyclops* (Mulsant & Rey, 1855)** **Map 1, Photo 5**

Bavaria: Jochenstein, below castle Neujochenstein, glade in xerothermic oak-dominated forest on steep acidic south-facing slope above the Danube river, 320 m, August 2016, 1 ♂ in a Malaise trap catch.

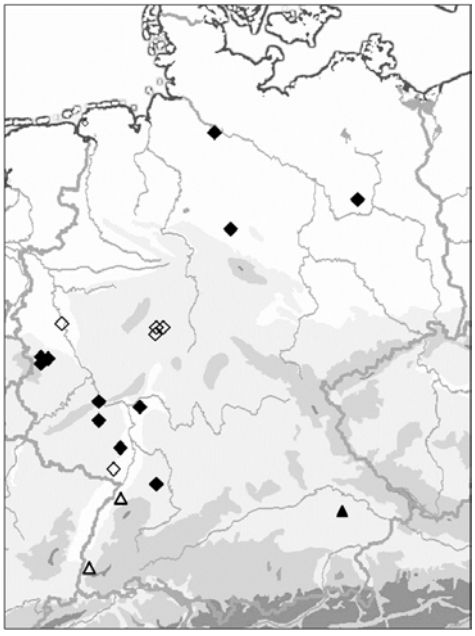
According to Nast (1972) this species' range extends from Primorye region, Korea and Japan westward to Slovakia, Hungary, Romania, Italy, France, Turkey and Israel. Lauterer (1984) reported the first records from southern Moravia collected in 1963 and 1964, Riedle-Bauer et al. (2006) the first records from Lower Austria and Burgenland in 2004, Kunz et al. (2017) from Styria in 2009. In France it apparently spread from the southeast westward into the Bordeaux region during the last 3 decades and was found to reproduce on grapevine canes (Chuche et al. 2010). Strauss & Reisenzein (2018) found *Phlogotettix* to occur widespread in Austrian vineyards on *Vitis vinifera*, *Clematis vitalba* and *Ulmus laevis* and also being infected with Flavescence dorée phytoplasma (FDp).

According to Holzinger (2009) it inhabits xerothermic woodland margins. In Austria adults so far have been found from end of July until September, overwintering takes place in the egg stage. It is polyphagous and a number of food plants have been recorded in various parts of its range, including raspberry, apricot, Salicaceae, *Castanea*, *Rhododendron* (summarised by Chuche et al. 2010).

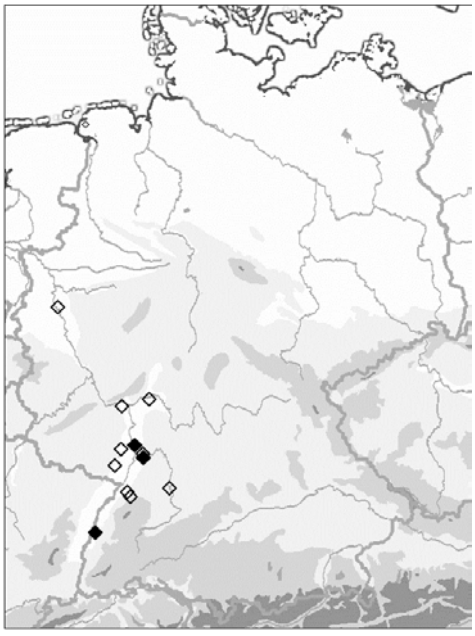
***Thamnotettix exemtus* Melichar, 1896** **Map 2**

Bavaria: Jochenstein, below castle Neujochenstein, glade in xerothermic oak-dominated forest on steep acidic south-facing slope above the Danube river, 320 and 380 m, altogether 21 ♂♂, 8 ♀♀, between May and September, in 2 different Malaise traps. Another identical trap design in 2016 produced only 2 ♂♂ in May and June in the upper trap. These are the first records for Germany.

This is essentially a southeast European species that prefers xerothermic pasture landscapes with scattered trees and shrubs. Its distribution extends from Georgia and Ukraine westward to Italy and southern France, the Austria and Czechia (Nast 1972, 1987, della Gius-



Map 5: *Macropsis mulsanti* (Fieb.) ▲: recent; Δ: extinguished. *Dryodurgades antoniae* (Mel.) ♦: Nickel rec. (1992-2022) ◊: others (see text).



Map 6: *Hishimonus hamatus* Kuoh. ♦ = Nickel rec., ◊ = others (see text).

tina 1989). In Austria it is confined to the eastern half (Lower Austria, Burgenland, Styria, Carinthia), with nymphs feeding on grasses and adults on oaks; there is a single annual generation with adults being found from mid May until end of September and overwintering nymphs (Holzinger 2009). It is also locally found in Moravia and central Bohemia (Malenovský & Lauterer 2012).

3. Records of rare and little-known species

***Megamelodes lequesnei* W. Wagner, 1963** **Map 3**

Berlin: Tegeler Fließ, 40 m, 8.X.2013, 3 ♂♂, 4 ♀♀, 9 nymphs. **Brandenburg**: Kienbaum near Fürstenwalde, Löcknitz valley, 40 m, 4.VI.2011, 1 ♀. Hennickendorf, Lange-Damm-Wiesen, 50 m, 29.VIII.2013, 4 ♂♂, 1 ♀, 3 nymphs, plus many seen. **North Rhine-Westphalia**: Salzkotten, Sültsoid, a large population. **Rhineland-Palatinate**: Neuleiningen, Gemeindeberg, 12.IX.2011, 10 ♂♂, 14 ♀♀, 10 nymphs. **Baden-Württemberg**: Huttenheim, Erlach, 100 m, 4.IX.2012, 13 ♂♂, 3 ♀♀, 5 nymphs. Gaienhofen, Segete, 450 m, 14.IX.2013, 1 ♂. Wasenweiler Ried near Freiburg, 190 m, 3. and 5.XII.2013, several ♀♀ along the margin of a fishing pond (K. and S. Rennwald, www.nafoku.de/zikaden/delphacidae). **Bavaria**: Königsauer Moos, Großköllnbach, 350 m, 26.VIII. 2015, 40 ♂♂, 6 ♀♀, 50 nymphs plus many seen.

This species is only rarely found though perhaps more widespread (but usually very localized) than formerly believed. According to Nast (1972, 1987) it has been published from Ireland, UK, the Netherlands, France, Romania, Spain, also from Hungary (Györffy et al. 2009) and Serbia (Šćiban & Kosovac 2022). From Germany there were only three published localities

Photo 5: *Phlogotettix cyclops* (M. & R.), ♂, Kranachberg (Styria), 4.VIII.2009 (Photo: G. Kunz).

Photo 6: *Cercopis arcuata* Fieb., ♂, Feistritzklamm (Steiermark), 24.IV.2008 (Photo: G. Kunz). Note the entirely red connexiva (latero-ventral plates) without black centres as in *C. sanguinolenta* (Scop.).

in Holstein (Remane & Fröhlich 1994a), Bavaria (Benninger Ried: Bückle & Guglielmino 2005) and Westphalia (Sültsoid near Salzkotten: Kunz et al. 2011) until now.

Its biology is not well known. It has been reported from base-rich marshes and fens in UK, and *Juncus subnodulosus* has been suggested as a possible hostplant (Kirby 1992). Bückle & Guglielmino (2005) published some details about a large population in Benninger Ried, Bavaria. They suggested *Juncus effusus* and *J. inflexus* as hostplant and – according to breeding from plants taken home – two generations per year and overwintering in the egg stage. However, they state that development may have been faster than in the field. In UK adults are reported from mid-July to late October and again in March, rather suggesting overwintering as adult and a single generation.

All new records published here are definitely from *Juncus subnodulosus*, and all sites are base-rich and rather wet. The largest populations were in the surroundings of springs or near running or seeping water. Others appeared to be rather relictary, notably the one around an artificial pond within a drained fen in Wasenweiler and the one in a young alder succession forest near Huttenheim.

None of the new localities published here were managed by cutting, except the one at Gaienhofen where only a single specimen was found and the one in Berlin where all individuals were collected literally on the last few unmown stems of rush around scattered trees. The Salzkotten and Hennickendorf sites which both held large populations were grazed lightly by cattle. The sites of Neuleiningen, Kienbaum, Huttenheim and Wasenweiler appeared to be unmanaged for decades. The Großköllnbach site was managed patchily by hand-mowing, but all individuals were found in very small, unmown patches. In the meantime more than 30 sites with large stands of *Juncus subnodulosus* in various parts of Germany (notably Thuringia, Bavaria, Baden-Württemberg) and Luxembourg which are frequently managed by mowing have been specifically searched for this species in recent years without any record. Apparently, it does not tolerate mowing but may endure years or perhaps decades after cessation of management. As already suggested by Kirby (1992) only grazing at low densities and perhaps fractional mowing (i.e. only rotational mowing of smaller patches per year) seem to be appropriate for its conservation.

Concerning its phenology, the new field data, especially the large numbers of nymphs late in the summer and even in October, rather confirm a single generation and overwintering in the adult stage.

***Cercopis arcuata* Fieber, 1844** **Map 4, Photo 6**

Bavaria: Marktschellenberg, Almbachklamm, 600 – 700 m, 3.VI.2015, 3 ♂♂, 18 ♀♀, plus >30 individuals seen, sunexposed limestone slopes with dominating *Sesleria albicans* and *Molinia coerulea* and scattered *Pinus sylvestris*, many individuals resting on *Laserpitium siler*. Winkl near Bischofswiesen, c. 700 m, 3 ♀♀, 3.VI.2015, open xerothermic pine forest on southwest-facing limestone slope.

Despite the conspicuousness of this species these are the first German records for probably more than 80 years. According to Nickel (2003) there are only 4 records in Germany so far, all along the northern fringe of the Alps: "Bayerisches Allgäu"; Geiselgasteig; Schellenberg, 3.VI.1938; and Almbachklamm near Markschellenberg, 5.VI.1938 (Wagner & Franz 1961, specimens deposited in ZSM and LIB, formerly ZIMH).

The distributional range of this species comprises mainly southeastern Europe. Metcalf (1961), Nast (1987) and Jach & Hoch (2022) list Germany, Bohemia, Moravia, middle Russia, France, Austria, Hungary, Romania, Italy, Serbia, Bulgaria and Greece. It is found in xerothermic habitats usually with taller herbs, shrubs or trees. Originally it was described from Jičin in northern Bohemia, far away from any mountainous site (Fieber 1844).

According to Holzinger (2009) it is confined in Austria to the eastern part (Upper and Lower Austria, Burgenland, Styria), living in xerothermic meadows, vineyards, woodland and wayside margins. Adults are found between end of April until end of July.

***Macropsis mulsanti* (Fieber, 1868)** **Map 5**

Bavaria: Mamming, 25.VII.2022, 1 ♂, 1 nymph. This is a new species for Bavaria and the third record for Germany. To the north of the Alps it is also the first definite record on a natural stand of its host plant. Apparently, densities on the site are very low because searching was done extensively and had already been done without success in 2015.

It is a monophagous species on *Hippophae rhamnoides* mostly on gravel banks of unregulated rivers and on sun-exposed rocky slopes. Its geographic range extends from France, Switzerland and Italy through former Yugoslavia and Romania to the Caucasus and Middle Asian mountains, secondarily also in the surroundings of Moscow where its host occurs as ornamental plant (Tishechkin 2002). In Europe it is mainly confined to southern countries. There are only very few records to the north of the Alps: near Lake Constance (Bodensee) and along the Alpine part of the Rhine: Bludenz and Röthis, both Vorarlberg, Austria, c. 500 m (Moosbrugger 1946) and Ragaz, St. Gallen, Switzerland, c. 500 m (Kirschbaum 1868, as *Pediopsis hippophaes* Kbm.), Strasbourg, Alsace, France, c. 140 m, VIII.1952, 2 ♀♀ and 12.XI.1953, 1 ♀ (in coll. Ribaut, MNHN: Tishechkin 1993) and along the upper Rhine of Baden (Germany): Heitersheim, 06.VIII.1997, 230 m, 3 ♀♀ on a roadside embankment, and Sandweier, 120 m, 26.VI.2009, several ♂♂, 7.IX.2012, 3 ♀♀ on an abandoned military training area. Both Baden sea buckthorn stands were spontaneous on non-natural sites and have been destroyed since. Therefore, the species had to be considered as extinct in Germany before this record was made.

***Dryodurgades antoniae* (Melichar, 1907)** **Map 5**

Hamburg: Waltershofer Straße, 14.VII.2022, 10 nymphs. **Brandenburg**: Elstal, Döberitzer Heide, 26.VII.2021, 1 ♂, 1 ♀. Two unexpected records; the nearest known locality which appears already isolated, is near Braunschweig, more than 150 km away. These are the northernmost and easternmost records of this species known so far.

It is a western European species, so far only known from Portugal, Spain, France (Nast 1972, 1987), Luxemburg, the Netherlands (den Bieman et al. 2011), England (Wilson et al. 2015) and the western part of Germany (Nickel 2003). Published records from Bulgaria are in need of revision. In Germany it is so far known from less than 20 localities, mostly along the eastern fringe of the Pfälzerwald (Palatinate Forest), along the Upper and Middle Rhine, in the Eifel and Lahn valley up to Marburg; isolated localities are near Braunschweig and Ludwigsburg.

It lives monophagously on *Cytisus scoparius* on heathland and its degenerating successional stages, e. g. woodland glades, fallows, margins and embankments. Highest localities are at only 500m. It is a rather late species, adults being found between end of July until early

October, exceptionally until early November, overwintering takes place in the egg stage (Remane & Fröhlich 1994a, Nickel & Bückle 2023, Nickel 2003, data base Nickel).

***Hishimonus hamatus* Kuoh, 1976** **Map 6, Photo 7**

Baden-Württemberg: Heidelberg-Wieblingen, 16.VIII.2018, 1 ♀ (Klaus Schrameyer, personal communication); Kappel-Grafenhausen, Wilde Weide Taubergießen, 31.VIII.2018, 1 ♂; Heidelberg-Eppelheim, 30.VIII.2018, > 30 individuals, mostly on cultivated *Pyracantha coccinea* (firethorn), a few on *Prunus* and *Ligustrum*; Ilvesheim, 27.VIII.2019, 1 ♀; Malsch, altogether 4 ♂♂, 13 ♀♀ in a Malaise trap in a private garden emptied between 15.III. and 16.VIII.2020 (Christoph Bückle det.). **Rhineland-Palatinate**: Landau, Berwartsteinstraße, in a private garden, summer 2020, 1 ♀ (Verena Rösch, personal communication); Mainz-Bretzenheim, 30.VII.2020, 1 ♀, 13.VIII.2020, 1 ♂, both at light, leg. Judith König, 16.VI.2021 and 2.VII.2022 1 individual photographed Judith König (Roland Mühlethaler, det. and personal communication).

Further photographs of this species have been posted online on www.insektenfotos.de and www.entomologie.de. Although the genitalia were not dissected, it is highly likely that they refer to this species since no other *Hishimonus* species has been recorded to the north of the Alps: Gernsbach, old city, 26.XI.2019, 1 individual (Manfred Zapf); Ludwigsburg-Neckarweihingen, private garden, 14.VII., 2.VIII. und 9.XI. 2020, 11.IX.2022, 1 individual, respectivlely (Beate Steinmeyer); Frankfurt-Sachsenhausen, 27.X.2021, 1 individual (Chris Ortmeyer). **North Rhine-Westphalia**: Düsseldorf-Golzheim, 5.VIII.2022, 1 individual (Patrick Nash).

This is an eastern Palaearctic Neozoon known from Japan, Korea and China which was published already from Germany by Winterhagen (2020): **Rhineland-Palatinate**: Neustadt an der Weinstraße, altogether 12 individuals between July and September 2020. The first European record was from Slovenia in 2012 (Seljak 2013). Later it was also found in Switzerland (Trivellone et al. 2015), Italy (Guglielmino et al. 2017), Corse (Albre & Gibernau 2019) and Austria (Holzinger et al. 2020). More recently, Bella et al. (2022) added records from the mainland of southern France and northeastern Catalonia.

It is found in semi-open anthrogenic habitats on a variety of shrub and tree species. Adults have been found from mid June until September and even November indicating a single annual generation and overwintering as egg. Seljak (2013) described adults and nymphs and gave details about its biology in Slovenia. He found them both on *Ligustrum lucidum*, *L. japonicum*, *Lagerstroemia indica*, *Euonymus japonicus*, *Chamaecyparis lawsoniana* and *Cupressus sempervirens*.

Bella et al. (2022) just recently reported the occurrence of the very similar *Hishimonus diffractus* Dai, Fletcher & Zhang, 2013 (described from China and Thailand) from Madeira, southern Spain, Mallorca, Sicily, southern France and – on a recently imported jasmine plant in a garden center – England. Accordingly, this species is another possible candidate for becoming established in Germany. In Europe it was so far found on *Jasminum* spec., *Nerium oleander*, *Pittosporum tobira*, in citrus orchards and vineyards. They also pointed out that related species in this genus are known as potential phytoplasma vectors.

***Maiestas horvathi* (Then, 1896)** **Map 4, Photo 8**

Hesse: Darmstadt, 30.8.2008, 1 ♂. **Rhineland-Palatinate**: Birkenheide, 12.IX.2011, a small series. **Baden-Württemberg**: Efringen-Kirchen, Blansinger Grien, 20.VIII.2012, 1 ♂, 1 ♀; Oftersheim, Friedenshöhe, 30.V.2012, 1 ♂; Schwetzingen, Dossenwald-Süd, 16.VI.2012, 9 ♂♂, 8 ♀♀; Schwet-

Photo 7: *Hishimonus hamatus* Kuoh, Graz, Liebenau, 20.VIII.2020 (Photo: G. Kunz).

Photo 8: *Maiestas horvathi* (Then), nymph, Rheinau, Dossenwald, 1.VIII.2013 (Photo: G. Kunz).

zingen, Dossenwald-Nord, 14.VIII.2012, 18 ♂♂, 8 ♀♀, 2 nymphs; Rheinau, railway area, 14.VIII.2012, 1 ♂♂, 5 ♀♀. Further records from Baden-Württemberg were kindly contributed by Christoph Bückle: Grißheim, 15.VI.2012, 1 ♂, and 21.VIII.2012, 4 ♂♂,4 ♀♀; Sandweier, 17.VI. 2012, 1 ♂ plus 1 ♂, 1 ♀; Rastatt, IX.2010, 1 ♂, respectively, in Malaise traps of 2 different sites; Malsch, VI.2009, 1 ♂, Malaise trap. All localities are situated between 110 and 230 m. Adults have been collected between end of May until end of September indicating (at least) two annual generations and overwintering in the egg stage.

According to Nast (1972, 1987) this species is known from Mongolia, Kazakhstan, Georgia, Ukraine, Bulgaria, Romania, the former Yugoslawia, Italy, Slovakia, the Czech Republic, Austria, Germany and Tunisia, the latter record certainly being in need of revision. Webb & Viraktamath (2009) further mention Serbia.

From Germany it was hitherto only known from two localities on inland sand dunes near Heidelberg: "… (nur ♂♂) in Baden-Württemberg auf den Flugsanddünen bei Sandhausen im NSG Pferdstriebdüne am Südabbruch am 26.8.1981 und im NSG Pflege Schönau am 26.8.und am 27.9.1982 im östlichen und zentralen Teil, mit größeren, offenen Sandstellen an Silbergras (*Corynephorus canescens*)" (Heller 1996). The author also pointed out that earlier German records published by Hüeber (1904) and Nast (1972, 1987) – the latter probably based on Metcalf's catalogue – are probably erroneous.

All new records published here were gathered on sunny or slightly shaded, dry and sparsely vegetated inland sand dunes in somewhat disturbed patches with both annual and perennial vegetation. The species was believed to live on *Corynephorus canescens* (see above), but this is apparently erroneous. Despite extensive search on this grass in a variety of localities all over the northern Upper Rhine plain (and elsewhere in central Europe) it was never found until the first definite records were made on *Digitaria ischaemum* which is probably the main hostplant at least in Germany. This annual grass is widespread all over lowland Germany (FLORAWEB 2012), and *M. horvathi* (Then) may turn out to have been overlooked at least in parts of the southern half. This record of a leafhopper feeding (perhaps exclusively) on an annual plant is quite surprising. After Nickel (2003) annuals are generally avoided by Auchenorrhyncha in Central Europe since they are generally less favourable for overwintering insects.

***Anoplotettix fuscovenosus* (Ferrari, 1882)** **Map 7, Photos 9, 10**

Berlin: Johannisthal, former military airfield, 17.IX.2009, a small series (also collected by R. Mühlethaler), 16.V.2010, 2 ♂, 6 nymphs; 12.VIII.2010, 5 ♀♀. **Brandenburg**: Wustermark-Elstal, Döberitzer Heide, 26.VII.2021, 1 ♂, 1 ♀, on *Betula pendula*. There are two more Berlin records from 2015: Karlshorst, Wuhlheide and Frohnau, on the former border to the GDR (Mühlethaler et al. 2019) and a more recent record from southwestern Germany kindly communicated by Verena Rösch in **Baden-Württemberg**: Karlsruhe, Drachenwiese, early June 2020, 1 ♂, 3 ♀♀.

This species is essentially of Mediterranean and submediterranean distribution (Nast 1972, 1987). Therefore, it is rather surprising that the first German records were not made in the southern half but in an isolated position in the northeast. The nearest known localities are in southern Moravia, over 400 km to the south-southeast (Malenovský et al. 2011). It is more widespread in the warmer parts of eastern Austria: Lower Austria, Burgenland, Styria (Holzinger 2009). In Germany it was found as a vertical migrant in xerothermic localities on sandy

Photo 9: *Anoplotettix fuscovenosus* (Ferr.), ♀, Pfaffstätten (Lower Austria), 16.VIII.2009 (Photo: G. Kunz).

Photo 10: *Anoplotettix fuscovenosus* (Ferr.), nymph, Illmitz (Burgenland), 9.VI.2013 (Photo: G. Kunz).

substrates with very scattered trees, mostly birch and oak. Nymphs were swept in the grass layer with dominating *Festuca ovina* (sensu lato), most adults on *Betula pendula* and *Quercus robur*, a few also on *Populus nigra italica*. None of the mentioned localities can be classified as synanthropic or ruderal so that a passive introduction seems unlikely. At least Johannisthal, Wuhlheide and Döberitzer Heide are rather historical pasture landscapes. Alma (1995) studied this species more closely in vineyards of Piedmont, northern Italy. He found nymphs to live in the herb layer feeding on mono- and dicotyledons, and adults on fruit trees, grapevine, shrubs and broad-leaved trees. It showed one generation per year and overwintered as egg under grapevine bark.

***Cicadula placida* (Horvàth, 1897)** **Map 8, Photos 11, 12, 13**

After Nast (1972, 1987) this species is published from Southern Russia, Ukraine, Moldavia, Bulgaria, Romania, Hungary, Slovakia, Greece, Italy and (southern) France, furthermore from Austria (Holzinger 2009), the Czech Republic (Lauterer 1986), Slovenia (Holzinger & Seljak 2001) and Anatolia (Lodos & Kalkandelen 1987). At least in central Europe it is rapidly expanding its range. The first record of Moravia was gathered in 1973 (Lauterer 1986), in Austria (Styria) in 1992 (Holzinger 1995).

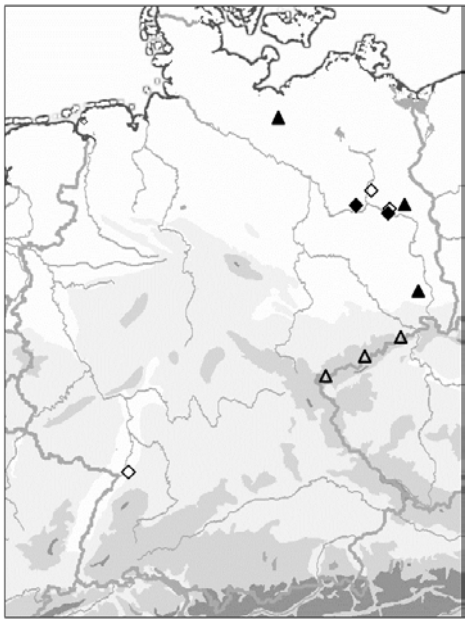
For Germany it was first recorded in 2008 in a Malaise trap along the Lower Bavarian Danube (Rainer Wald, 2.VII.2008, 1 ♀, and almost simultaneously on 4 other Malaise traps along the Danube and in the Bavarian Forest nearby). These records were briefly mentioned by Nickel (2011). Meanwhile this species has performed a remarkable spread through large parts of the country in only one and a half decades. It is now common and locally abundant in large parts of lowland Bavaria and Baden-Württemberg (where first recorded in 2012 in the northern Upper Rhine valley), as well as in Thuringia (2019), Brandenburg (2021) and (after S. Walter, personal communication) Saxony. More localities which appear to be isolated so far are in Westphalia (Haltern am See, 2020: Hanning et al. 2021) and along the lower course of the Elbe (Bleckede, 2022: Jann Wübbenhorst, personal communication, photo posted on www.insektenfotos.de). It has reached Belgium not later than 2018 (Koen 2018), the Netherlands not later than 2019 (den Bieman et al. 2022) and it is quite likely that it will appear at least in UK, Denmark, Sweden, Finland and Poland within the next few years.

There is no known case of any leafhopper showing such a rapid and strong increase in central Europe. Already in 2011 *Cicadula placida* comprised 24 % of the total catch (2.823 out of 10.718 individuals) of Malaise traps exposed in 15 sites in Lower Bavaria. In a fen area in Lower Bavaria (Königsauer Moos near Dingolfing) there was a single occupied transect out of 13 in 2015; in 2022 all 13 transects were occupied. In a third fenland area nearby (Vilstal near Marklkofen) there were 11 occupied transects in 2017, but 16 in 2020, with almost 3 times as many individuals in the catch. In another study it newly colonised 15 out of 28 sampled transects in Alperstedter and Hasslebener Ried near Erfurt (Thuringia) between 2016 and 2021.

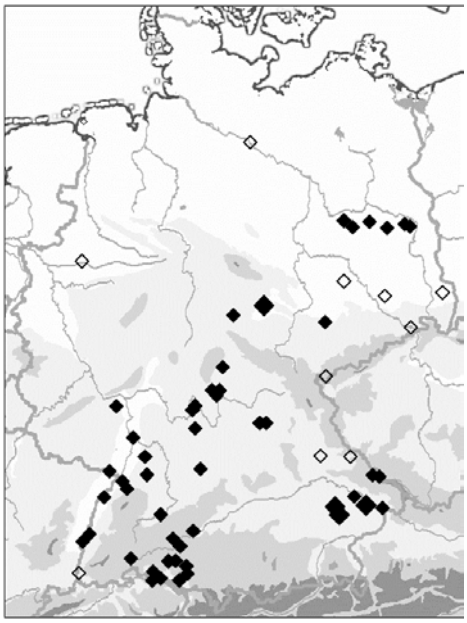
Concerning host plant and habitat most specifications include *Phalaris arundinacea* mostly in more or less wet habitats (Bückle pers. comm., Ribaut 1952) and this is also valid for Germany. Alma (1995) made a more detailed study in northwestern Italy that showed a somewhat different picture. Accordingly, *C. placida* is found abundantly along field margins, in wastelands and also on cereals. Host plants include grasses such as *Dactylis glomerata*, *Festuca arundinacea*, *Lolium perenne*, *Elymus repens*, *Holcus lanatus* as well as *Zea mays*, *Hordeum vulgare*,

Photo 11: *Cicadula placida* (Horv.) f. *typica*, Hainersdorf (Styria), 10.X.2022 (Photo: G. Kunz).

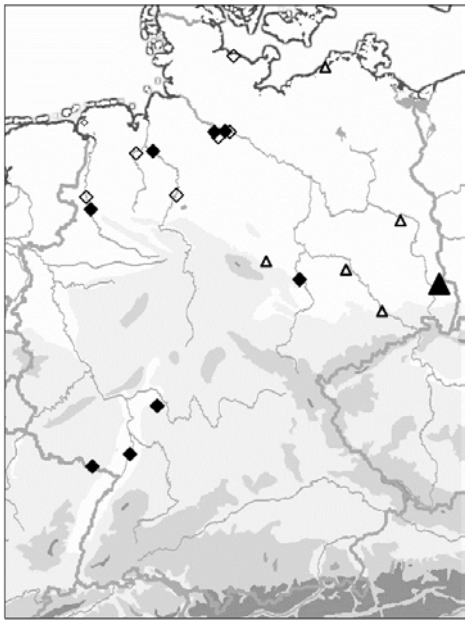
Photo 12: *Cicadula placida* (Horv.) f. *inornata*, ♂, Schirning (Styria), 11.VII.2006 (Photo: G. Kunz).



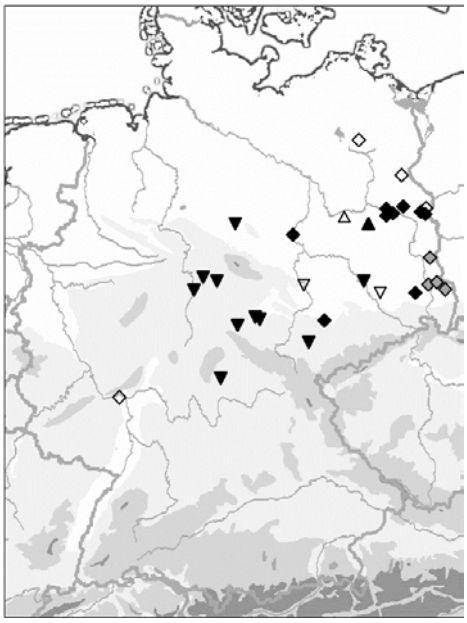
Map 7: *Anoplotettix fuscovenosus* (Ferr.) in Germany: ♦ = Nickel rec., ◊ = others rec. (see text). *Cosmotettix evanescens* Oss.: ▲ = Nickel rec., Δ = Walter rec.



Map 8: *Cicadula placida* (Horv.): ♦ = Nickel recorded, ◆ = >10 sampling plots positive, ◊ = others rec.



Map 9: *Psammotettix albomarginatus* W. Wg.: ◊ = Wagner (1941), Remane (1958), Schaefer (1973). ▲ = S. Walter, 5 localities in small area; Δ = Schiemenz et al. (1996), revision needed; ♦ = Nickel rec.



Map 10: *Pinumius areatus* (Stål): ◊ = before 1970; ♦ = Nickel rec. 2012-2022; ◇ = others (see text). *Ederranus discolor* (J. Shlb.): Δ = Fröhlich (1996), ▲ = Nickel rec. *Paralimnus lugens* (Horv.): ▼ = Nickel rec., ▽ = others

Secale cereale, *Triticum aestivum*, *Avena sativa*, with most specimens being found on wheat and corn. In Moravia it has been found on *Carex acuta* (Lauterer 1986, Malenovsky et al. 2011).

Adults are found from end of June until October and (at least in the Upper Rhine plain) even December and January indicating at least two annual generations and overwintering in the egg stage, with occasional adults attempting to survive the winter.

Ribaut (1952) described a peculiar colour dimorphism which might deserve further attention. Whereas forma *typica* shows a contrasting colouration with black markings on head and mesonotum and whitish fore wing veins and hind margin (photo 11), forma *inornata* (described by him as var. nova) is almost entirely greenish yellow (photo 12). It seems that forma *typica* appears only in late summer and autumn, but this should be studied more in detail.

***Ederranus discolor* (J. Sahlberg, 1871)** **Map 10**

Brandenburg: Gröben am See, 08.VI.2003, 17 ♂♂ 25 ♀♀, 2 nymphs, in a moderately saline marsh on *Scolochloa* cf. *festucacea*. There are only two other German records of this rare species: Trechwitz, Netzener See, 5.VI.1993, 1♂, 9.IX.1993, 4 ♂♂, 1 ♀, and Gröben am See, 10.IX.1993, 6 ♂♂, 4 ♀♀ (Fröhlich 1996).

The new finding published here is only a confirmation of the latter together with a definite host plant record. Since then both localities, as well as a number of similar ones bearing the hostplant, have been intensely checked with sweepnet and suction sampler, respectively, but without any positive results. Therefore, the species has to be considered as extinct in Germany.

There are several pecularities to note for this species, concerning its host plant, global distribution and conservation management. Early authors mention *Phragmites australis* (Sahlberg 1871), *Glyceria spectabilis* (Lindberg 1947) and *G. aquatica* (Emelyanov 1964); the two latters' valid name being *G. maxima* today (Conert 1998). Both *Phragmites* and *Glyceria* were checked in this locality and elsewhere all over the northeastern half of Germany without finding this species. Therefore, the host plant is either a different one in central Europe (which is rather unlikely) or the older host identifications are erroneous.

The German localities of *Scolochloa festucacea* are on the extreme western border of the species' range, which more or less encompasses the southern part of the Eurasian and North American boreal zone with few isolated sites in central Europe. However, shortly before this leafhopper record was made this grass had been split up in two species, with a description of the very similar *Scolochloa marchica* (Düvel et al. 2001). As a consequence the situation has become more complicated since the specific identity of the Gröben host plant is only clear to the genus level.

Another uncertainty refers to the global distribution of *Ederranus discolor*: Ossiannilsson (1983) and Söderman et al. (2017) mention only 2 original localities in present-day Finland and 6 in adjacent parts of Russian Karelia. The only other published record is apparently a light trap catch in the Russian Pskov oblast (Söderman & Goltsova 2005) and there is a female specimen from the upper reaches of Pudost' River, Gatchina District, 27.VIII.1925 (Kirichenko leg.) in the collections of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN) (V. Gnezdilov, personal communication).

However, repeated imprecise listing of this species in catalogues and general overviews (e.g. Metcalf 1967a, Zahniser 2022) has apparently resulted in frequent citation of countries like Denmark, Norway, Sweden and even USA which are most probably erroneous.

Photo 13: *Cicadula placida* (Horv.) f. *typica,* portrait Hainersdorf (Styria), 10.X.2022 (Photo: G. Kunz).

Photo 14: *Cosmotettix evanescens* Oss., ♀, Grambower Moor, 4.VIII.2011 (Photo: G. Kunz).

Finally, it must be noted that there is plausible evidence about the cause of the loss of this species in both German localities: They are both mown during the summer which does not only reduce the above-ground biomass of any tall grass such as *Scolochloa* (growing up to 1.8 m) but also causes a serious disruption of microclimatic conditions for such a small insect when oviposition sites and shelter from summer heat is needed. This might be the first documented case of a species being actively exterminated through management measures.

***Psammotettix albomarginatus* W. Wagner, 1941** **Map 9**

North Rhine-Westphalia: Hörstel, Heiliges Meer, 45 m, 17.IX.2006, 5 ♂♂, 7 ♀♀, 19.VI.2007, 1 ♂, 4 ♀♀, 2 nymphs, in two different sites, both on dry, sandy and sheep-grazed pastures. **Hesse**: Babenhausen, 130 m, 12.IX.2008, 28 ♂♂, 24 ♀♀, on an abandoned military airfield. **Rhineland-Palatinate**: Speyer, Dudenhofener Düne, 100 m, 19.VII.1995, 4 ♂♂, 5 ♀♀; Fischbach bei Dahn, "South Area", 290 m, 15.VI.2012, 5 ♀♀ on a former military training area. **Saxony-Anhalt**: Wettin-Mücheln, Porphyrkuppen, 110 m, 27.V.2016, 10 ♂♂, 2 ♀♀, 5 nymphs. **Hamburg**: Boberger Dünen, 5 m, 31.V.2019, a small series; 15.VII.2022, 2 ♂♂, 7 ♀♀, 2 nymphs; Fischbeker Heide, 60 m, 14.VII.2022, 12 ♂♂, 8 ♀♀. A number of records from **Saxony** was kindly communicated by Sabine Walter: Nochten, 10.VI.1995, 1 ♂, 1 ♀; 29.VII.1995, 1 ♂, 1 ♀; Nochten, second site, 10.VI.1995, 2 ♂♂, 1 ♀; 28.VI.1995, 2 ♂♂; 20.VIII.1995, 4 ♂♂; Weißwasser, 10.VI.1995, 1 ♂; 7.IX.1995, 1 ♂; Rietschen, 31.VIII.2016, 4 ♂♂, 2 ♀♀; Weißkollm (Hoyerswerda), 19.VI.1998, 1 individual, the latter Reinhard Remane rec.

All specimens were found on *Agrostis vinealis* on dry and moderately disturbed sites mostly without lichens (unlike as suggested by Nickel 2003). In eastern Germany it is also locally found on rocky ridges of porphyry. Söderman (2007) mentions also *Agrostis mertensii* as hostplant, but apparently based only on a single own record. Some authors mention *Corynephorus canescens* as hostplant, but this is certainly erroneous, and some of their records might refer to the very similar *Psammotettix excisus* (Mats.).

This species is difficult to identify according to its genital morphology. However, in the sweepnet it shows contrasting whitish fore wing margins and a whitish longitudinal stripe on the vertex. Moreover, hostplant and habitat are quite different from those of similar species: *P. excisus* (Mats.) on *Corynephorus canescens* usually on more open and more oligotrophic sand; *P. nodosus* Rib., (at least mostly) on *Festuca ovina* on heaths and a variety of very open habitats, preferentially grazed by cattle; *P. putoni* (Then) probably on *Puccinellia maritima* and other grasses in saltmarshes; *P. dubius* Oss. on yet unidentified sedge plants (Cyperaceae) in bogs (at least in central Europe). Other representatives of this taxonomically very complicated species group include *P. erraticus* Linnavuori, 1965, described from central Italy. Its relationship with *P. nodosus* Rib. and perhaps *P. dubius* Oss. needs further clearing. *P. albomarginatus* W.Wg. is rare throughout its range and has so far been recorded only from Sweden, Finland and Denmark (Söderman et al. 2009), Irland and UK (Wilson et al. 2015), the Netherlands (Gravestein 1976) and Germany (see Nickel 2003, Nickel & Niedringhaus 2009). Records published from Kazakhstan (Mityaev 2002) should be checked.

***Pinumius areatus* (Stål, 1858)** **Map 10**

Saxony-Anhalt: Gerwisch, 24.IX.2016, a small series. **Berlin**: Im Jagen, 9.VIII.2010, a small population, including nymphs. Johannisthal, 15.VI.2009, few specimens. Biesenhorster Sand, 5.VII.2015, 5 ♀♀. **Brandenburg**: Hennickendorf, 15.VI.2021, 4 ♂♂, 1 ♀, 7 nymphs. Mallnow,

18.VI.2021, 1 ♀ and 3 ♂♂, 16 ♀♀ on two different sites, respectively. Peitz, Lieberoser Endmoräne, 17.VII.2013, 3 ♀♀ (kindly communicated by Rolf Niedringhaus). Thuringia: Prößdorf, Prößdorfer See, 30.VIII.2019, a small series. **Saxony**: Zeißholz, 14.VI.2012, 3 ♀♀. Further records from Saxony were kindly communicated by Sabine Walter: Neustadt an der Spree, Innenkippe Nochten, 10.VI.1995, 3 ♂♂; 28.VI.1995, 1 ♀. Boxberg/Oberlausitz, 1.VI.2011, 8 ♀♀; 26.VI.2017, 3 ♀♀. Rietschen/Oberlausitz, 18.VII.2017, 3 ♀♀.

Despite its occurrence in former coal mining areas and sandpits there is strong evidence that the species is in a long-term decline since anthropogenic habitats will be lost due to succession and 4 populations published by Wagner (1939), Kuntze (1937) and (Schiemenz 1969) could not be confirmed anymore (**Rhineland-Palatinate**: Mainzer Sand; Mecklenburg-Vorpommern: Neustrelitz; Brandenburg: Niederfinow and Podelzig). So altogether there are 13 recent plus 4 historic localities all of which are situated below 150 m.

Pinumius areatus is of Holarctic distribution, though in Eurasia it is a more eastern species. In central Europe there are only isolated sites and it is confined to dry, sun-exposed and only sparsely vegetated aeolian und moraine sand, feeding monophagously on *Festuca ovina* (sensu lato, i.e. including bluish-green subspecies). In Germany 11 localities are extensively grazed grassland, the other 6 are anthropogenic.

***Cosmotettix evanescens* Ossiannilsson, 1976** **Map 7, Photo 14**

Mecklenburg-Vorpommern: Lützow, Grambower Moor, 50 m, floating mat around the central lake of a raised bog, with dominating *Calamagrostis canescens*, *Eriophorum vaginatum*, *Carex rostrata* and *Juncus effusus*, 21.VI.2011, 4 ♂♂, 3 ♀♀, 2 nymphs (fifth instar), and 4.VIII.2011, 1 ♀, all collected with a motor suction sampler. **Saxony**: Wittichenau, Dubringer Moor, 125 m, intermediate mire with dominating *Carex rostrata*, also *C. echinata*, *Eriophorum angustifolium* and *Molinia caerulea*, 14.VI.2012, 1 ♂. **Brandenburg**, Hennickendorf, Lange-Damm-Wiesen, 50 m, extensively cattle-grazed fen with boggy patches, 3.VII.2015, 1 ♂.

The Grambow catch is the first identified record for central Europe. It was then communicated among colleagues and they were requested to revise all their collected specimens of the very similar *Cosmotettix caudatus* (Fl.). Sabine Walter found a single previously misidentified female specimen of *C. evanescens* Oss. from Geising, Erzgebirge, that she had already collected in 2001. Her targeted further search for the species in Saxony, notably in the Ore Mountains (Erzgebirge) and Elstergebirge revealed a small population on the first mentioned locality plus two new localities all of which were kindly communicated by her and which are listed here: Geising, Erdbachtal, 660 m, 29.VIII.2001, 1 ♀; 15.VIII.2016, 6 ♀; 28.V.2018, 3 nymphs; 4.VII.2018, 2 ♂♂, 7 ♀♀; 22.VIII.2018, 2 ♀♀; Satzung, Kriegswiese, 880 m, 1.VIII.2019, 3 ♂♂, 1 ♀; 1 nymph. Bad Brambach, 580 m, 4.VII.2022, 1 ♀.

This is a rare and localized species that occupies a relatively small geographical range and was hitherto not known from central Europe. It was described only in 1976 after 3 ♂♂ found in southern Sweden. Later, Ossiannilsson (1983) published it from 7 more localities in southern and middle Sweden, and Söderman (2007, 2017) added altogether 9 localities from southern Finland. It is also absent from the collections of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN) (V. Gnezdilov, personal communication).

However due to its epigeic life habits it seems possible that it is more widespread in northern and central Europe and perhaps elsewhere. At least in one of the German localities (Du-

bringer Moor) the leafhopper fauna has been intensively studied by an experienced hemipterologist (Schiemenz 1987, unpublished manuscript) who apparently overlooked it despite application of a variety of sampling methods.

Summarising all data presented here the species is apparently associated with wet or quaking, acidic, but slightly minerotrophic mires and bogs, feeds monophagously on *Carex rostrata* and occurs from sea level at least up to c. 900 m. Adults have been found from mid June until end of August, with few September and October records from Sweden and Finland. Therefore, it can be assumed that it overwinters in the egg stage with a single generation per year (like its congeners). It is quite likely that it is more widespread and will in the future be found also in Bavaria, Thuringia, Czechia and perhaps also Poland. However, despite intensive search in most localities with suction samplers the numbers of collected specimens were always small.

From Finland (2007) mentions adults on *Eriophorum vaginatum*, but without information whether *Carex rostrata* was also there. Measurements taken from Mecklenburg specimens revealed that they were slightly larger than the Swedish ones, ♂♂ measuring 3,5 – 3,9 mm, ♀♀ measuring 4,2 – 4,4 mm (versus 3,5 – 3,6 mm and 4,0 – 4,2 mm, respectively, in Sweden).

4. Additional species already treated in the first addendum (Nickel 2010)

***Paralimnus lugens* (Horvàth, 1897)** **Map 10, Photo 15**

Lower Saxony: Landolfshausen, Schweckhäuser Wiesen, 200 m, 7.VIII.2013, 4 ♂♂, 3 ♀♀ and 10.VIII.2013, 2 ♂♂. Gimte, Kiesgrube Ballertasche, 125 m, 2013, a small series. Braunschweig-Veltenhof, Oker floodplain, 60 m, 14.VII.2018, 2 ♀♀. **Thuringia**: Frießnitz, Frießnitzer See, water buffalo pasture, 310 m, 23.VII. 2017, 1 ♂, 2 ♀♀; Großenlupnitz, Kindel, 320 m, 11.VII.2022, 1 ♂; Hasslebener Ried, 150 m, out of 8 sampled transects there were 2 occupied in 2015 with altogether 4 individuals, but 3 in 2021 with 50 individuals; Alperstedter Ried, 155 m, out of 22 sampled transect there were 2 occupied in 2015 with altogether 8 individuals, but 3 in 2015 with 8 individuals. **Saxony**: Arzberg, 85 m, 9.VII.2018, 1 ♀, on a yellow sticky trap; Zabeltitz, Elligastwiesen, 105 m, 11.VII.2020, 1 ♂, the latter communicated by Sabine Walter. **Bavaria**: Bad Neustadt, Salzwiesen, 225 m, 18.VII.2021, 30 ♂♂, 6 ♀♀, 15 nymphs.

Nomenclature and distribution of this species were discussed in more detail by Nickel (2010). At that time there was only a single known locality in Germany despite ample revision of collected material labelled as *P. phragmitis* (Boh.). It was then concluded that *P. lugens* (Horv.) was rare and probably threatened in central Europe. Meanwhile it is known from altogether 12 localities in wider parts of central Germany by the author, Sabine Walter (personal communication) and Witsack (2020) (see Map 10). This raises the question whether it is currently in range expansion. It was also published from 4 localities in Slovenia between 2005 and 2010 (Seljak 2016). All localities were (at least in summer) only moderately wet, preferably non-managed or only extensively grazed, and not higher than 320 m. At least one of them was an anthropogenic sandpit indicating a certain dispersal capability and one was moderately saline. Adults have been found from early July until early September.

Nymphs can be easily distinguished from other species of *Paralimnus* even in the sweepnet by their withish body colouration with distinctive brown markings, two pairs of conspicuous black streaks on abdominal segments IV and VII and pairs of narrow orange-red bars on hind margins at least of segments V – VIII (Photo 15, 16, see also Stöckmann et al. 2013).

Photo 15: *Paralimnus lugens* (Horv.), nymph, Adelebsen, Schwülme floodplain, 10.VII.2009 (Photo: G. Kunz).

Photo 16: *Paralimnus phragmitis* (Boh.), nymph, Attemsmoor (Styria), 9.VII.2007 (Photo: G. Kunz).

5. Nomenclatural changes since 2010

5.1 *Cicadetta montana* sensu lato

After long field work it became clear that *Cicadetta montana* sensu lato comprised a number of species which can be distinguished most easily by their song (e.g. Gogala & Trilar 2004, Gogala 2006, Puissant & Boulard 2000, Sueur & Puissant 2007). Gogala & Trilar (2004) published the first decisive work and cleared the identity of *C. montana* s.str. through field work on the type locality. For two other taxa they proposed the names *C. cerdaniensis* Puissant & Boulard 2000 and *C. brevipennis* Fieber, 1876. A few years later *C. cantilatrix* Sueur & Puissant 2007 was described from France, which later turned out to be widespread in central Europe. Until then the situation including the research history all over Europe was summarised by Gogala (2013). Later Hertach et al. (2016), mainly based on bio-acoustic and bio-molecular evidence, found that within the complex of *C. brevipennis* Fieb. there is a distinct western European species which had already been described as *C. petryi* Schumacher, 1924 from the Kyffhäuser hills in Thuringia.

Meineke (2012) was the first who published oscillograms of 3 species from central parts of Germany. In fact *C. montana* (Scop.) s.str., *C. cantilatrix* Sueur & Puiss. and *C. petryi* Schum. are all apparently widespread (though uncommon) in the southeastern half of Germany, but details are lacking.

5.2. Empoascini Distant, 1908

Recently Xu et al. (2021) published a phylogeny and reclassification of this complicated and highly diverse tribe, including a subdivision of the genus *Empoasca* Walsh, 1862. Firstly, they followed Liu *et al.* (2014) who had reinstated *Asymmetrasca* Dlabola 1958 as a valid genus for *Empoasca decedens* Paoli, 1932.

Secondly, they gave *Hebata* DeLong, 1931 a new status and established *Empoasca nigra* Gillette & Baker, 1895 as a type species. According to their reclassification, seven species occurring in Germany formerly placed in *Empoasca* now have new names:

***Hebata* DeLong, 1931 (subgenus *Alboneurasca* Xu, Dietrich & Qin in Xu et al. 2021)**
Hebata (*Alboneurasca*) *affinis* (Nast, 1937)
Hebata (*Alboneurasca*) *decipiens* (Paoli, 1930)

***Hebata* DeLong, 1931 (subgenus *Signatasca* Xu, Dietrich & Qin in Xu et al. 2021)**
Hebata (Signatasca) apicalis (Flor, 1861)
Hebata (Signatasca) dealbata (Cerutti, 1939)
Hebata (Signatasca) ossiannilssoni (Nuorteva, 1948)
Hebata (Signatasca) pteridis (Dahlbom, 1850)*
Hebata (Signatasca) vitis (Göthe, 1875)

*Note that Xu et al. (2021) suggested the name *Empoasca solani* (Curtis, 1846) for this species but Wilson & Walker (2007) argued that – in the absence of a clear description and any type material – *Empoasca solani* Curt. should be treated as a *nomen dubium* and regard *E. pteridis* (Dahlbom, 1850) as the valid name. This has already been proposed by Remane & Fröhlich (1994b). Therefore the name *Hebata pteridis* (Dhlb.) will be preferred here. Finally, populations published from south Germany as *Empoasca ossiannilssoni* (Nuort.) will now be treated as

Hebata dealbata (Cer.), in accordance with Wagner & Franz (1961) and Holzinger et al. (2020). Both are probably conspecific and the types should be revised.

5.3 Macrostelina Kirkaldy, 1906

Within this highly diverse group Kwon & Kwon (2022) just recently presented an extensive taxonomic revision of the genera *Macrosteles*, *Davisonia*, *Nabiya*, *Sagatus* and *Sonronius*. They suggested two changes relevant for the German list which should be followed here: *Erotettix* Haupt, 1929 is treated as a younger synonym of *Macrosteles* Fieber, 1866, and second, *Sonronius dahlbomi* (Zetterstedt, 1838) is treated as a younger synonym of *Sonronius maculipes* (Zetterstedt, 1838) based on the priority of *maculipes* given be Metcalf (1967b).

6. Discussion

In 2003 the number of Auchenorrhyncha species known from Germany was 620 (Nickel & Remane 2002, Nickel 2003), in 2010 it was 626 (Nickel 2010). In the meantime a lot of new material has been collected and identified and new records have been published and even new species have been described: *Cicadula placida* (Horvàth, 1897) (Nickel 2011), the first documented sound recordings of *Cicadetta cantilatrix* Sueur & Puissant, 2007 and *C. petryi* Schumacher, 1924 (Meineke 2012, see also Hertach et al. 2016), *Penestragania apicalis* (Osborn & Ball, 1898) (Nickel et al. 2013), *Metcalfa pruinosa* (Say, 1830), *Anoplotettix horvathi* Metcalf, 1955 and *Edwardsiana tshinari* Zachvatkin, 1947 (Nickel & Bückle 2014, see also Nickel et al. 2016), the latter being in need of a thorough taxonomic revision, together with *E. iranicola* Zachv. and *E. platanicola* (Vidano 1961). The most recent published new records were *Prokelisia marginata* (Van Duzee, 1897) (den Bieman & van Klink 2016), *Cosmotettix evanescens* Ossiannilsson, 1976 (records specified here were briefly mentioned by Deutschmann, 2014, and listed by Nickel et al. 2016), *Anoplotettix fuscovenosus* (Ferrari, 1882) (Nickel & Mühlethaler 2017) and *Hishimonus hamatus* Kuoh, 1976 (Winterhagen 2020).

Three species have been newly described (also) from Germany: *Dicranotropis remaniaca* Guglielmino, D'Urso & Bückle, 2016 (one locality, respectively, in Baden-Württemberg and Bavaria), *Macropsis fragilicola* Holzinger, Nickel & Remane, 2013 (with holotype and numerous paratype localities almost all over Germany) and *Hardya helgae* Nickel, Holzinger & Remane, 2017 (with numerous holotype and paratype localities in southwestern parts). Another one, *Cicadetta cantilatrix* Sueur & Puissant, 2007, was newly described from France and later found in Germany (see above).

Together with the new species mentioned in the present paper, *Delphax armeniacus* An., *Javesella bottnica* Huld., *Micantulina teucrii* (Cer.), *Ficocyba ficaria* (Horv.), *Placotettix taeniatifrons* (Kbm.), *Allygidius furcatus* (Ferr.), *Phlogotettix cyclops* (M. & R.) and *Thamnotettix exemtus* Mel. the German list now includes 648 species.

All 28 new species for Germany recorded since Nickel & Remane (2002) and Nickel (2003) and the most plausible factors for their recent discoveries are listed in Table 1. Nine species mentioned here have been overlooked in the field in Germany so far, a recent range expansion being rather unlikely. They are all geographically confined to small and mostly peripheral regions and some of them, notably *Javesella bottnica* Huld., *Cixidia lapponica* (Zett.) and *Cosmotettix evanescens* Oss. are difficult to collect with conventional Auchenorrhyncha equipment. Four species have been newly described for science (see above).

Table 1: Overview of 28 Auchenorrhyncha species newly recorded for Germany since 2002 and the most plausible causes of their finding. **New** = newly described; **Mis** = Misinterpreted or misidentified; **Ov** = overlooked; **Exp** = range expansion; **Neo** = Neozoon. Total of column sums exceeds 28 because 2 newly described species were present in collections for long time but have been misinterpreted. SE = from south-eastern Europe, SW = from southwestern Europe, EA = East Asian origin, NA = North American, MED = Mediterranean.

Species	New	Mis	Ov	Exp	Neo	Reference
Cixidia lapponica (Zett.)			X			Nickel (2010)
Asymmetrasca decedens Paoli			X	?		Nickel (2010)
Kyboasca maligna (Walsh)					NA	Nickel (2010)
Ribautiana cruciata (Rib.)				SW		Nickel (2010)
Synophropsis lauri (Horv.)				SW		Nickel (2010)
Paralimnus lugens (Horv.)		X		?		Nickel (2010)
Cicadula placida (Horv.)				SE		Nickel (2011)
Cicadetta cantilatrix Sueur & Puiss.	X					Meineke (2012)
Macropsis fragilicola Hlz., Nick., Rem.	X	X				Holzinger et al. (2013)
Penestragania apicalis (Osb. & Ball)					NA	Nickel et al. (2013)
Cosmotettix evanescens Oss.			X			Deutschmann (2014), this paper
Edwardsiana tshinari Zachv.				SW?	?	Nickel & Bückle (2014)
Anoplotettix horvathi Metc.			X			Nickel & Bückle (2014)
Dicranotropis remaniaca Gugl., D'Ur., Bck.	X					Guglielmino et al. (2016)
Prokelisia marginata (V. Duz.)					NA	den Bieman & van Klink (2016)
Cicadetta petryi Schum.		X				Hertach et al. (2016)
Metcalfa pruinosa (Say)					NA	Nickel (2016)
Hardya helgae Nick., Hlz., Rem.	X	X				Nickel et al. (2017)
Anoplotettix fuscovenosus (Ferr.)			X			Nickel & Mühlethaler (2017)
Hishimonus hamatus Kuoh					EA	Winterhagen (2020)
Delphax armeniacus An.				SE		This paper
Javesella bottnica Huld.			X			This paper
Micantulina teucrii (Cer.)			X			This paper
Ficocyba ficaria (Horv.)					MED	This paper
Placotettix taeniatifrons (Kbm.)				SW	?	This paper
Allygidius furcatus (Ferr.)			X			This paper
Phlogotettix cyclops (M. & R.)				SE?		This paper
Thamnotettix exemtus Mel.			X			This paper
Total	**4**	**4**	**9**	**7**	**6**	

Four species had been collected earlier without being recognised as distinct, two of these have been described as new to science (see above). Six species are Neozoa (for origin see Table 1), 7 native European species have expanded their range into Germany. Among the latter the more frequent expansion direction in insects is from the southwest up the French Rhone valley through the Belfort Gap ("Burgundische Pforte") into the Upper Rhine valley. However, this is unlikely in at least 3 cases which probably immigrated from the southeast (see Table 1).

In summary the increase of the known species number is caused in more or less equal shares by lack of taxonomic and faunistic knowledge on the one hand and real ecological changes through anthropogenic introductions and (mostly northward and most likely climatically induced) range expansions of thermophilous species on the other hand.

6. Zusammenfassung

Diese Arbeit präsentiert neue faunistische und ökologische Daten zu 21 Zikadenarten aus Deutschland. *Delphax armeniacus* An., *Javesella bottnica* Huld., *Micantulina teucrii* (Cer.), *Ficocyba ficaria* (Horv.), *Placotettix taeniatifrons* (Kbm.), *Allygidius furcatus* (Ferr.), *Phlogotettix cyclops* (M. & R.) und *Thamnotettix exemtus* Mel. sind neu für das Land. Neue Daten zu Verbreitung und Ökologie werden zu *Megamelodes lequesnei* W. Wg., *Cercopis arcuata* Fieb., *Macropsis mulsanti* (Fieb.), *Dryodurgades antoniae* (Mel.), *Hishimonus hamatus* Kuoh, *Maiestas horvathi* (Then), *Anoplotettix fuscovenosus* (Ferr.), *Cicadula placida* (Horv.), *Ederranus discolor* (J. Shlb.), *Paralimnus lugens* (Horv.), *Psammotettix albomarginatus* W. Wg., *Pinumius areatus* (Stål) und *Cosmotettix evanescens* Oss. vorgelegt. Eine Analyse der 28 in den letzten beiden Jahrzehnten neu für Deutschland publizierten Funde zeigt, dass die Zunahme zu etwa gleichen Teilen auf verbesserte taxonomische und faunistische Kenntnisse einerseits und tatsächliche ökologische Veränderungen durch anthropogene Einschleppungen und nordwärts gerichtete Arealausweitungen (vermutlich im Zusammenhang mit klimatischen Veränderungen) andererseits zurückzuführen ist.

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