

# The Danish Tingidae – Distribution and identification (Hemiptera, Heteroptera)

*Danske Tingidae - Udbredelse og identifikation (Hemiptera, Heteroptera)*

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## Sammenfatning

Udbredelsen af de 24 danske arter af masketæger er beskrevet, illustreret og kortlagt, og en nøgle til identifikation af disse er forelagt. Herudover er de syv potentielle danske arter af masketæger beskrevet og inkluderet i bestemmelsesnøglen for de danske masketæger. Fire nye arter er tilføjede til den danske fauna, hvilket er *Dictyla humuli* (Fabricius, 1794), *Stephanitis takeyai* (Drake & Maa, 1955), *Tingis crispata* (Herrich-Schäffer, 1838) og *Physatocheila smreczynskii* (China, 1952). Detaljerede registreringer af danske masketæger er blevet uploadet til [www.gbif.org](http://www.gbif.org).

## Abstract

The distribution of the 24 Danish species of Tingidae are described illustrated and mapped, and a key for their identification is presented. Furthermore, the seven potential Danish species of Tingidae are described and included in the identification key for the Danish Tingidae. Four new species are added to the Danish fauna, which are *Dictyla humuli* (Fabricius, 1794), *Stephanitis takeyai* (Drake & Maa, 1955), *Tingis crispata* (Herrich-Schäffer, 1838) and *Physatocheila smreczynskii* (China, 1952). Detailed records of Danish Tingidae have been uploaded to [www.gbif.org](http://www.gbif.org).

## Introduction

Tingidae is a family belonging to the hemipteran suborder Heteroptera (True Bugs). About 2000 species of Tingidae are known worldwide (Miller, 2004; Grimaldi & Engel, 2008). 24 of these are known to occur in Denmark. The family is especially characterized by its networks of cells on pronotum and hemelytra and are therefore referred to as Lace Bugs. The species are mostly coloured in shades of brown and they are all relatively small with a body length ranging from 1.5-5.0 mm (Grimaldi & Engel, 2008).

Tingidae can appear similar to the species of the family Piesmatidae (Ash-Grey Leaf Bugs). Earlier both families were classified in the same infraorder, Cimicomorpha. It was later discovered that they are not as closely related as first assumed, and the two families are now placed in separate infraorders, with the Tingidae remaining in Cimicomorpha and the Piesmatidae moved to Pentatomomorpha (Leston et al., 1954; Miller, 2004; Grimaldi & Engel, 2008). The main characteristic that distinguishes Tingidae and Piesmatidae and the primary reason why the families are now classified in separate infraorders is the lack of ocelli in Tingidae (Miller, 2004), whereas ocelli are often present in adult macropterous specimens of Piesmatidae (Grimaldi & Engel, 2008). While this paper focuses on the Danish species of Tingidae, the Danish species of Piesmatidae were treated in 2018 (Jensen, 2018).

The similarity between the species of Tingidae makes it difficult to identify the currently known Danish species and the potential new records for Denmark. One aim of this paper is therefore to construct an identification key including updated names as well as an extended set of characters relative to the 'classical' identification key for the Danish species and the species that could potentially occur in Denmark already or in the future (Jensen-Haarup, 1912). Moreover, concise descriptions of species and diagnoses of genera are included. These descriptions provide information on morphology, comparison to similar species, host plant(s) and general distribution. Maps of the currently known distribution in Denmark are included.

The records on which the maps are based have been uploaded to the Global Biodiversity Information Facility ([www.gbif.org](http://www.gbif.org)) as a dataset.

## **Material and methods**

### *Identification and descriptions*

It is possible to identify Tingidae solely by their outer morphological characteristics. Some of the most important characteristics to look for include the number of rows of cells on paranota and hemelytra, as well as the number of keels on pronotum and the appearance of their antennae. A microscope is often necessary for identification due to the small body size.

To ease identification the key includes scanning electron microscope (SEM) pictures illustrating tiny significant details. This has been done by using a JEOL JSM-6335F scanning electron microscope. In preparation for SEM specimens were purified with 96% ethanol, followed by acetone. The cleaned insects were then placed on aluminium stubs, coated with platinum and palladium, and finally inserted into the vacuum chamber of the SEM. Additional images were taken with a digital camera fitted with a macro lens to illustrate colour patterns.

The identification key and species descriptions build on the original key in “Danmarks Fauna 12 – Tæger by A. C. Jensen-Haarup” (Jensen-Haarup, 1912) as well as identification keys from UK (Southwood & Leston, 1959), Germany (Wagner, 1959) and France (Heiss & Péricart, 2007). The characters described in these identification keys were compared, and new characters were added. Additional information of the species was obtained from Fauna Europaea (2017), Global Biodiversity Information Facility (2017), Hurd (1946) and Allearter.dk (2017).

### *Data and processing*

The distribution maps are based on 2282 specimens of Tingidae from Denmark. These specimens primarily come from the collection of the Natural History Museum of Denmark (NHMD) and from the collection of the Natural History Museum Aarhus (NHMA). Remaining specimens have come from collectors around the country. The information on the specimens was used to construct a data sheet with information on species name, collection locality and date, host plant, name of collector and name of identifier.

## **Results**

### *Data set*

The dataset (2282 records) is available through the Global Biodiversity Information Facility, GBIF: <http://doi.org/10.15468/wpw5ly>. The information available on the label for each specimen has been of varying degree. GPS coordinates have been found for the locations by using [www.mapper.acme.com](http://www.mapper.acme.com), [www.google.dk/maps](http://www.google.dk/maps) and [www.fugleognatur.dk](http://www.fugleognatur.dk). Because of differences in the precision noted for the locations of the various specimens, coordinate uncertainties in meters have been created around the GPS coordinates. These coordinate uncertainties have the purpose of including the uncertainty for locations of specimens that have little information about the place of collection. Few specimens have very unprecise locations noted on their labels such as Jutland or Zealand. For these locations, coordinate uncertainties have not been created because of their size that would dominate the distribution maps and thereby overshadow other coordinate uncertainties. Although the locations of these specimens do not have coordinate uncertainties, they are still marked on the maps to include some information on where the specimens have been found.

Besides the currently registered species in Denmark, the descriptions include potentially unrecorded or future Danish species. These species have been selected by their known occurrence close to Danish borders, and are mostly species known from Germany, but also

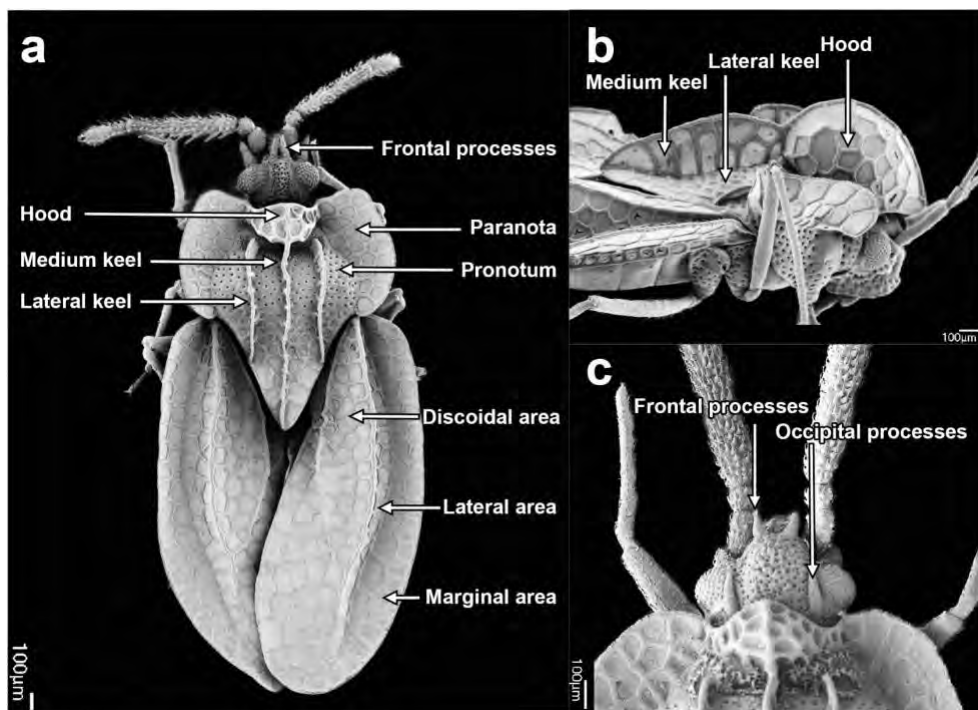
one species from Southern Sweden. The descriptions of the potential species are shown by being within [ ] and written with normal text type and not bold like the known Danish species.

### Family Tingidae (Laporte, 1832)

>280 genera worldwide, 10 of them in Denmark. About 2618 species worldwide, 23(24) of them in Denmark.

#### Morphology

The species of Tingidae are characterized by their network of cells on pronotum, paranota and hemelytra. These lace-like networks result in unique characteristics that differ in size and shape and can form bloated parts on hemelytra and/or pronotum. The head usually has frontal processes, which can vary in number, size and position - and ocelli are absent (Fig. 1a, c). The antennae contain four segments that can differ in presence of hairs, shape, and length: The pronotum often has three keels, a hood, and lateral expansions on the sides, which are called paranota (Fig. 1a, b). Paranota are either folded tightly to pronotum or flat and protruding from pronotum (Fig. 1a). Scutellum is absent or reduced, as it is replaced by the elongated pronotum (Greve, 1985). Furthermore, the antennae consist of 4 segments, and tarsi are two-jointed. The species are often with brown colours and around 1.5-5.0 mm in body length (Grimaldi & Engel, 2008).



**Fig. 1.** Dorsal and lateral view of habitus of species of Tingidae: (a) *Kalama tricomis*, (b) *Stephanitis oberti* and (c) *Dictyonota strichnocera*.

Some important characters that distinguish the Danish species of Tingidae are the number of rows of cells on paranota and hemelytra, the appearance of the antennae and the number, and the length of the frontal processes.

#### Ecology

Tingidae are phytophagous and host specific. The species are often living a whole life cycle on the same plant and in some cases on the same leaf or part of the plant (Schuh & Slater,

1995; Guidoti et al., 2015). They found on the lower surface of leaves, where they feed on plant chlorophyll by penetrating the epidermis with their stylets (Guidoti et al., 2015). The reduction of chlorophyll content leads to a lower photosynthesis rate, which then results in reduced fitness for the plant (Rosetta, 2013). In some cases, these injuries are so severe that the insects act as pests to their host plant. Particularly the species *Stephanitis rhododendri*, which primarily feeds on leaves of rhododendron, is known to cause great damage to its host plant. When the rhododendron is heavily infested the leaves discolour with yellow and white areas where the tingids have fed (Barta & Bibeň, 2016).

The diversity of plants preferred by these insects is great. Most of the Danish species are living on different smaller plants like species of *Carduus*, *Echium* and *Juncaceae*. But also, trees like *Betula* and *Alnus* act as host plants. Furthermore, mosses which are more primitive plants are highly preferred by the species of *Acalypta*.

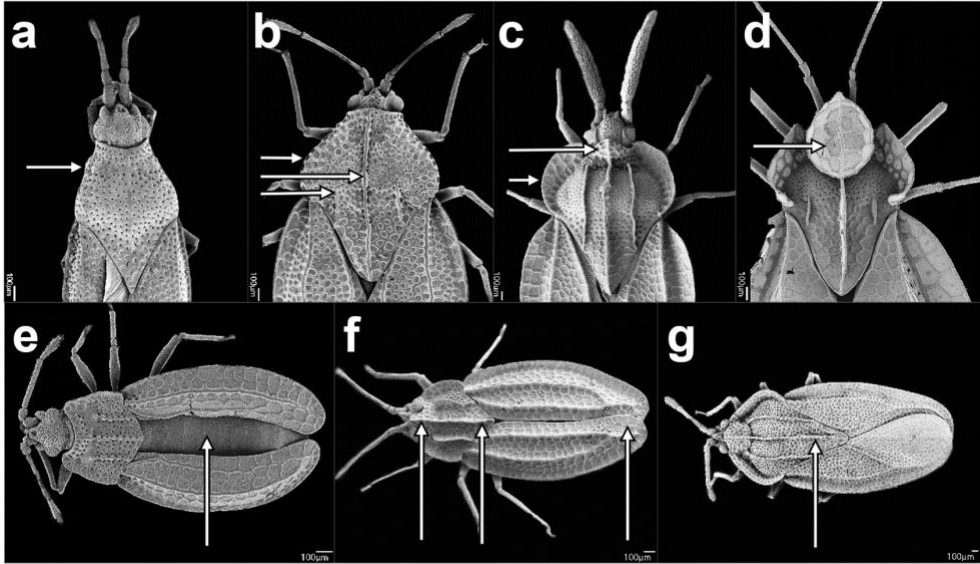
### Key for identification of Danish species and potential Danish species of Tingidae

The key only applies to adult specimens.

#### Key A: General key to species of Tingidae

1. Pronotum without paranota and keels (Fig. 2a); All cells small, punctuation-like (Fig. 2a); L. 1.5-3.5 mm ..... **Agramma** (Key C)
- Pronotum with paranota and keels; Pronotum and hemelytra with larger cells..... 2.
2. Paranota not expanded but appressed to the upper surface of pronotum (Fig. 2b) 3.
- Paranota expanded (Fig. 2c) ..... 4.
3. Pronotum with all three keels reaching hood ..... **Physatocheila** (Key H)
- Pronotum with only the central keel reaching hood (Fig. 2b) ..... **Dictyla** (Key E)
4. Hemelytra do not overlap (Fig. 2e); L. 1.6-2.3 mm..... **Campylosteira verna**
- Hemelytra overlap (Fig. 2f) ..... 5.
5. Hood big, bloated and covers most of the head (Fig. 2d) ..... 6.
- Hood small, slightly bloated or not bloated at all and covers a smaller part of the head (Fig. 2f) ..... 9.
6. Marginal area has more than 2 rows of cells ..... 7.
- Marginal area has maximum 2 rows of cells ..... 8.
7. Spikes at margins of paranota and half of the hemelytra and on the hood; 2 brown spots on hemelytra; On *Platanus* sp.; L. 3.3-3.7 mm ..... [*Corythucha ciliata*]
- Paranota, hemelytra and hood without spikes; Pattern on hemelytra different or absent; On *Pieris japonica*, *Rhododendron* spp. or *Vaccinium* spp. .... **Stephanitis** (Key I)
8. Paranota and marginal area with 1 row of big cells; Lateral keels often big and leaf or shell shaped; Antennae thin ..... [*Galeatus*](Key G)
- Paranota and marginal area with more than 1 row of cells; Lateral keels smaller and straight; Antennae thick ..... **Derephysia** (Key D)
9. Antennae clearly hairy, rest of the body without hairs (Fig. 2c) ..... 10.
- Antennae with little to no hair and rest of body without hairs (Fig. 2f) or both antennae and the rest of the body with hairs (Fig. 2g) ..... 11.
10. Antennae with short appressed hairs ..... **Dictyonota** (Key F)

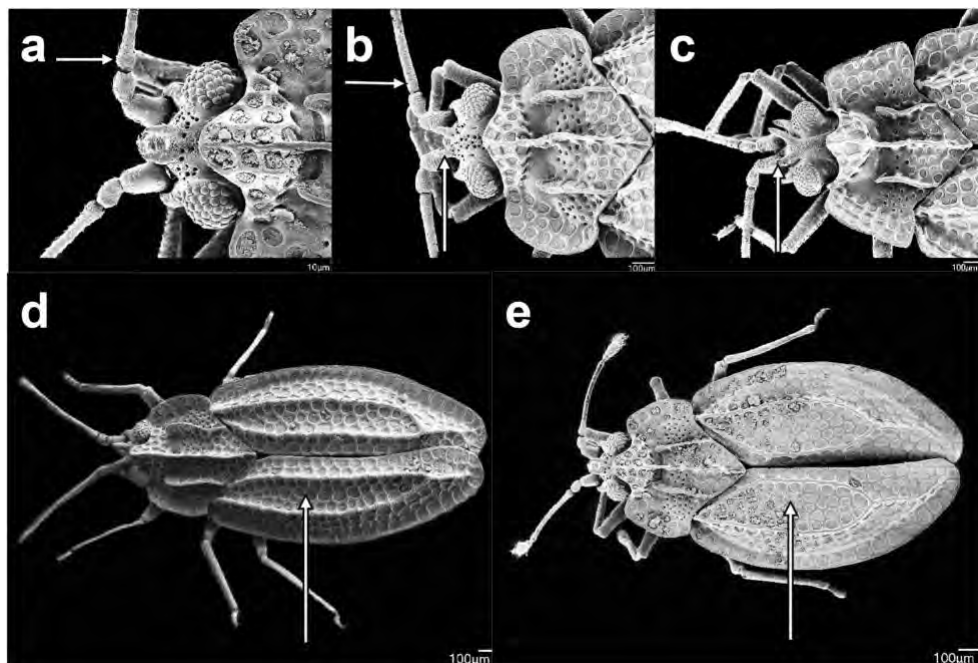
- Antennae with long hairs; L. 3.0-3.5 mm ..... ***Kalama tricornis***
- 11. Head with 2 frontal processes; Surface without hairs; Pronotum not elongated (Fig. 2f); Body length less than 3.0 mm ..... ***Acalypta*** (Key B)
- Head with 3 frontal processes; Surface with hairs; Pronotum elongated (Fig. 2g); Body length rarely less than 3.0 mm ..... ***Tingis*** (Key J)



**Fig. 2.** Dorsal view of habitus: (a) *Agramma laetum*, (b) *Dictyla convergens*, (c) *Dictyonota strichnocera*, (d) *Stephanitis oberti*, (e) *Campylosteira verna*, (f) *Acalypta gracilis* and (g) *Tingis cardui*.

**Key B: *Acalypta***

- 1. 3rd antennal segment thicker at base (Fig. 3a) ..... 2.
- 3rd antennal segment the same width throughout (Fig. 3b) ..... 3.
- 2. Discoidal areas are hollowed and narrow with 3-4 rows of cells (Fig. 3d); L. 2.0-2.6 mm ..... ***Acalypta gracilis***
- Discoidal areas are flat and wide with 5-6 rows of cells (Fig. 3e); L. 1.6-2.5 mm ..... ***Acalypta parvula***
- 3. Marginal areas have 2 rows of cells; L. 2.3-3.0 mm ..... ***Acalypta carinata***
- Marginal areas have 1 row of cells for most of the length ..... 4.
- 4. Frontal processes short (Fig. 3b); L. 2.1-3.2 mm ..... ***Acalypta nigrina***
- Frontal processes long (Fig. 3c); L. 2.1-3.2 mm ..... ***Acalypta platycheila***



**Fig. 3.** Dorsal view of habitus of species of *Acalypta*: (a) *A. parvula*, (b) *A. nigrina*, (c) *A. platycheila*, (d) *A. gracilis* and (e) *A. parvula*.

#### Key C: *Agramma*

1. Antennae yellow-brown; L. 1.9-2.4 mm ..... [*Agramma ruficorne*]
- Antennae black ..... 2
2. 3rd antennal segment shorter than the combined length of the 1st and 2nd antennal segment; L. 1.8-2.5 mm ..... ***Agramma laetum***
- 3rd antennal segment longer than the combined length of the 1st and 2nd antennal segment; L. 2.3-3.0 mm ..... [*Agramma confusum*]

#### Key D: *Derephysia*

1. Hood wide and raised; Paranota rounded; Discoidal area strongly raised; L. 2.6-3.7 mm ..... ***Derephysia foliacea***
- Hood narrow and longer than it is raised, Paranota wavy; Discoidal area not strongly raised; L. 3.4-4.1 mm ..... [*Derephysia sinuatocollis*]

#### Key E: *Dictyla*

1. Pronotum brown; L. 2.9-3.6 mm ..... ***Dictyla convergens***
- Pronotum black ..... 2
2. The appressed paranota narrow (Fig. 4a); L. 3.1-3.8 mm ..... ***Dictyla echii***
- The appressed paranota wide (Fig. 4b) ..... 3.
3. All antennal segment yellowish, 4th antennal segment can be darker apically; All leg segments yellowish, tarsi darker L. 3.1-3.8 mm ..... ***Dictyla humuli***
- All antennal segments black, except 3rd antennal segment that is yellowish; All leg segments black, except tibia and femur apically; L. 2.7-3.1 mm ..... [*Dictyla lupuli*]

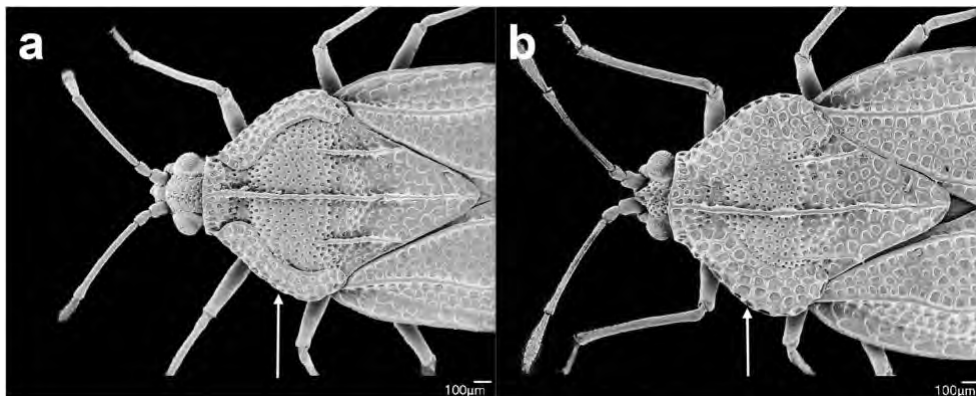


Fig. 4. Dorsal view of habitus of species of *Dictyla*: (a) *D. echii* and (b) *D. convergens*.

**Key F: *Dictyonota***

- 1. All antennal segments robust and of same width; Occipital processes short; Paranota smaller and more rounded than *D. fuliginosa*; L. 3.5-4.0 mm..... ***Dictyonota strichnocera***
- All antennal segments slender and 3rd antennal segment thinner distally; Occipital processes long; Paranota larger and more angled in the front than *D. strichnocera*; L. 4.5-5.0 mm ..... ***Dictyonota fuliginosa***

**Key G: *Galeatus***

- 1. Pronotum and hemelytra with dark spots; On *Hieracium pilosella*; L. 2.4-3.6 mm..... [*Galeatus maculatus*]
- Pronotum and hemelytra without dark spots; On *Artemisia campestris*, Asteraceae spp. and *Hieracium* spp.; L. 3.0-4.7 mm ..... [*Galeatus spinifrons*]

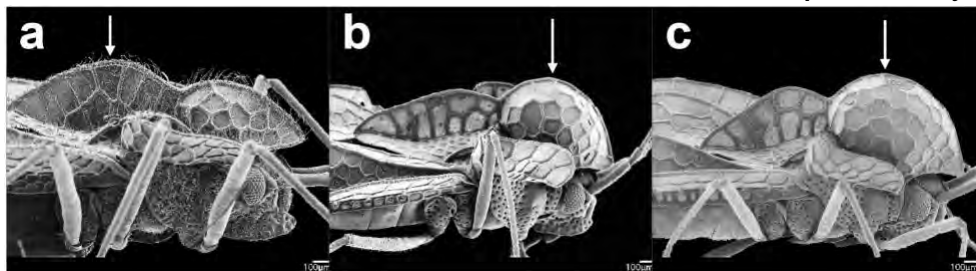
**Key H: *Physatocheila***

- 1. Marginal areas in the front with 2 rows of cells and 1 row of cells behind the dark band; L. 2.5-3.0 mm ..... ***Physatocheila dumetorum***
- Marginal areas with more than 2 rows of cells ..... 2.
- 2. 4-5 rows of cells in the dark area of the marginal areas, 2 rows of cells behind the dark band and then only a short part with 1 row of cells; L. 3.3-4.0 mm..... ***Physatocheila costata***
- 4 rows of cells in the dark band of the marginal areas, 2 rows of cells behind the dark band and then a long part with 1 row of cells; L. 3.3-4.0 mm..... ***Physatocheila smreczynskii***

**Key I: *Stephanitis***

- 1. Surface with fine short hairs; Marginal areas wide with 5 rows of cells; Central keel at pronotum raised higher than the hood and 4 times as high as the lateral keels (Fig. 5a); L. 3.2-4.0 mm ..... ***Stephanitis rhododendri***
- Surface without hairs; Marginal areas with less than 5 rows of cells; Central keel at pronotum lower than the hood and less than 4 times as high as the lateral keels; Hemelytra with dark x-shaped pattern..... 2.
- 2. Hood pale and smaller than *Stephanitis takeyai* (Fig. 5b); Usually on *Rhododendron* spp.; L. 3.2-4.0 mm ..... ***Stephanitis oberti***

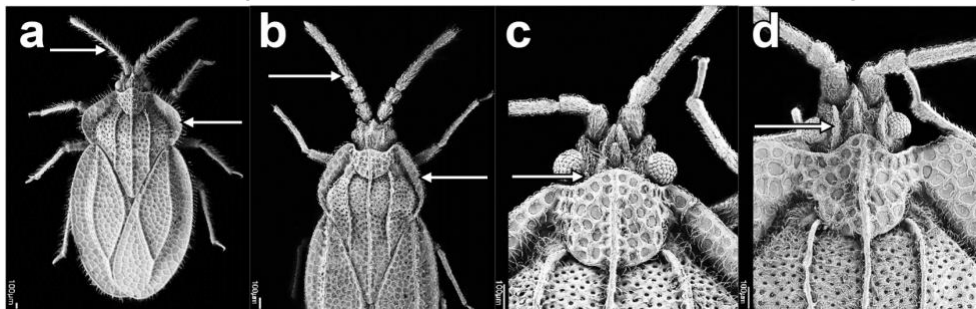
- Hood dark and bigger than *Stephanitis oberti* (Fig. 5c); Usually on *Pieris japonica*; L. 3.0-3.5 mm ..... ***Stephanitis takeyai***



**Fig. 5.** Lateral view of habitus of species of *Stephanitis*: (a) *S. rhododendri*, (b) *S. oberti* and (c) *S. takeyai*.

#### Key J: *Tingis*

1. Pronotum, hemelytra, antennae and legs clearly covered with hair (Fig. 6a, b) ..... 2.
  - Pronotum, hemelytra, antennae and legs not clearly covered with hair (Fig. 6c, d) ..... 3.
2. Covered with long hairs (Fig. 6a); Paranota with 3-4 rows of cells; Marginal areas with 3-4 rows of cells; L. 4.0-4.5 mm ..... ***Tingis reticulata***
  - Covered with short hairs (Fig. 6b); Paranota with 2-3 rows of cells; Marginal areas with 2 rows of cells; L. 2.6-3.2 mm ..... ***Tingis crispata***
3. Occipital processes short (Fig. 6c); Paranota and marginal areas with 2-3 rows of cells; Front corners on pronotum not protruding; L. 3.0-4.0 mm ..... ***Tingis cardui***
  - Occipital processes long and passes the base of the frontal processes (Fig. 6d); Paranota and marginal areas with 4 rows of cells; Front corners on pronotum angled and protruding; L. 3.0-4.0 mm ..... ***Tingis ampliata***



**Fig. 6.** Dorsal view of habitus of species of *Tingis*: (a) *Tingis reticulata*, (b) *Tingis crispata*, (c) *Tingis cardui* and (d) *Tingis ampliata*.

#### Danish species of Tingidae

Genus ***Acalypta*** Westwood, 1840

Genus *Acalypta*: Jensen-Haarup, 1912

~ 55 species, 5 in Denmark.

**Diagnosis:** Head brown-black otherwise with yellow-brown to greyish or darker brown colours. Head with 2 frontal processes and pronotum with 1 or 3 keels. Hood of pronotum small and covers the base of the head. Males often with more robust antennae than the antennae of the females. Length: 1.5-3.0 mm.

***Acalypta carinata*** (Panzer, 1806)

*Acalypta carinata*: Jensen-Haarup, 1912



Fig. 7

**Description:** Length 2.3-3.0 mm. Always brachypterous. Head, pronotum, paranota and hemelytra pale brown. Pronotum and head sometimes darker. Legs and antennae are yellow-brown, except the 4th antennal segment, which is dark-brown (Fig. 7, Fig. 62). Head with long frontal processes. Pronotum with 3 keels, where the lateral keels are converging in front. Hood often tapered. Paranota with 3 rows of cells and marginal areas with 2 rows of cells. Antennal segments are of the same width throughout (Fig. 7).

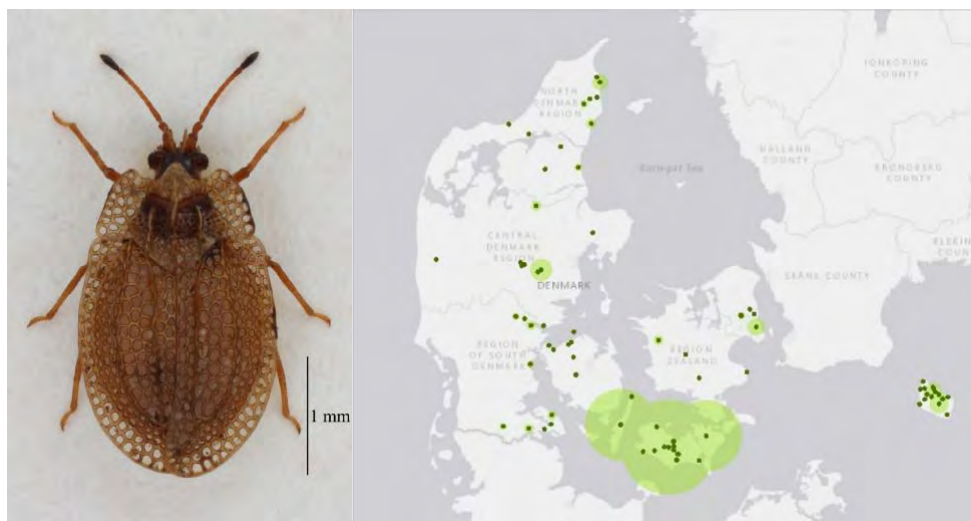
**Comparison:** Most similar to *Acalypta platycheila*. Agrees with this species in having antennal segments of the same width throughout. Differs by having paler colours and converged lateral keels, instead of parallel lateral keels in *Acalypta platycheila*. Furthermore, *Acalypta platycheila* has a bigger part of the marginal areas that has only 1 row of cell, which *Acalypta carinata* has not.

**Host plants:** Bryophyta spp.

**Phenology:** Adults and nymphs occur throughout the year.

**Distribution:** *Acalypta carinata* occurs throughout Denmark but has few records in Western Jutland. Furthermore, the species occurs in most of Bornholm (Fig. 8). The distribution map is based on 211 specimens.

Recorded from Austria, Belarus, Belgium, Britain I., Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, East Palearctic, Estonia, Finland, French mainland, Germany, Hungary, Ireland, Italian mainland, Kaliningrad Region, Latvia, Luxemburg, Moldova, North European Russia, Norwegian mainland, Poland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland and The Netherlands (Péricart & Golub, 1996).



**Fig. 7.** Dorsal view of *Acalypta carinata*. **Fig. 8.** Distribution map of *Acalypta carinata* in Denmark. Based on 211 specimens.

***Acalypta gracilis*** (Fieber, 1844)

*Acalypta gracilis*: Jensen-Haarup, 1912

Fig. 2f; 3d 9

**Description:** Length 2.0-2.6 mm. Macropterous forms 2.4-2.6 mm; Brachypterous forms 2.0-2.3 mm. Head dark brown. Pronotum, paranota and hemelytra, antennae and legs brown to greyish. 3rd antennal segment and tibia paler (Fig. 9, Fig. 62). Pronotum with 3 keels. Hood slender. Paranota with 2-3 rows of cells. Marginal area with of 1 row of cells. Discoidal area hollowed, narrowed and with 3-4 rows of cells. 3rd antennal segment thicker at base (Fig. 9).

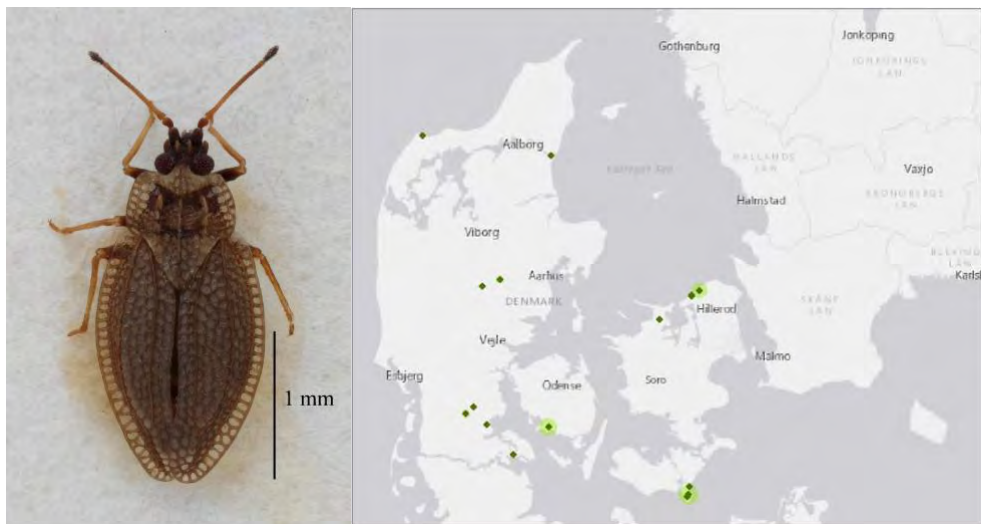
**Comparison:** Similar to *Acalypta parvula*. Agrees with this species in having 3. antennal segment thicker at base. Differs by having a slenderer hood and a smaller and hollowed discoidal area, which is flat and with 5-6 rows of cells in *Acalypta parvula*.

**Host plants:** *Artemisia campestris*, Bryophyta spp., *Calluna vulgaris*, *Corynephorus* spp., *Hieracium* spp., *Sedum* spp. and *Thymus* spp.

**Phenology:** Adults and nymphs occur throughout the year.

**Distribution:** *Acalypta gracilis* is recorded throughout Denmark except on Bornholm, but in relatively few localities and often together with *Acalypta nigrina* (Fig. 10). The distribution map is based on 83 specimens.

Recorded from Austria, Belarus, Belgium, Bulgaria, Central European Russia, Czech Republic, Denmark, East European Russia, East Palaeartic, Estonia, Finland, French mainland, Germany, Greek mainland, Hungary, Italian mainland, Kaliningrad Region, Latvia, Lithuania, Luxembourg, Macedonia, Moldova, North European Russia, Northwest European Russia, Norwegian mainland, Poland, Romania, Slovakia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 9.** Dorsal view of *Acalypta gracilis*. **Fig. 10.** Distribution map of *Acalypta gracilis* in Denmark. Based on 83 specimens.

***Acalypta nigrina*** (Fallen, 1807)

*Acalypta nigrina*: Jensen-Haarup, 1912

Fig. 3b; 11

**Description:** Length 2.1-3.2 mm. Macropterous forms 2.8-3.2 mm; Brachypterous forms 2.1-2.7 mm. Pronotum, paranota and hemelytra yellow brown to grey brown. Head is brown-black and the antennae are black, except for the 3rd. antennal segment, which is often red-yellow. The legs are of same colour, but femur is often darker (Fig. 11, Fig. 62). The frontal processes at the head are comparatively short and slightly divergent. Pronotum with 3 keels and the hood at pronotum is small and barely covering the base of the head. Paranota has 2-3 rows of cells, while the marginal area has only 1 row of cells and the discoidal area has 4-5 rows of cells. All antennal segments are of the same width throughout (Fig. 11).

**Comparison:** Similar to *Acalypta platycheila* but is distinguished from this species by the length of the frontal processes, which are longer for *Acalypta platycheila*.

**Host plants:** Bryophyta spp.

**Phenology:** Adults most likely occur throughout the year.

**Distribution:** *Acalypta nigrina* is recorded throughout Denmark except on Bornholm, but in relatively low numbers and often together with *Acalypta gracilis* (Fig. 12). The distribution map of this species is based on 26 specimens.

Recorded from Andorra, Austria, Belarus, Britain I., Bulgaria, Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, East Palearctic, Estonia, European Turkey, Finland, French mainland, Germany, Greek mainland, Hungary, Iceland, Italian mainland, Latvia, Lithuania, North European Russia, Norwegian mainland, Poland, Romania, Slovakia, Slovenia, Spanish mainland, Sweden, Switzerland, The Netherlands and Ireland (Péricart & Golub, 1996).



**Fig. 11.** Dorsal view of habitus of *Acalypta nigrina*. **Fig. 12.** Distribution map of *Acalypta nigrina* in Denmark. Based on 26 specimens.

***Acalypta parvula*** (Fallen, 1807)

*Acalypta parvula*: Jensen-Haarup, 1912

Fig. 3a, e; 13

**Description:** Length 1.6-2.5 mm. Mostly brachypterous and rarely macropterous. Macropterous forms 2.3-2.5 mm; Brachypterous forms 1.6-2.0 mm. Pronotum, paranota and hemelytra dark brown to greyish. The head and 1st antennal segment are black. The rest of the antennal segments are brown. The legs are brown, although femur is darker proximally (Fig. 13, Fig. 62). The frontal processes at the head are short. Pronotum has 3 keels and the hood is wide. Paranota often has 2 rows of cells and the marginal area has 1 row of cells. The discoidal area is flat and consists of 5-6 rows of cells. 3rd antennal segment thicker at base (Fig. 13).

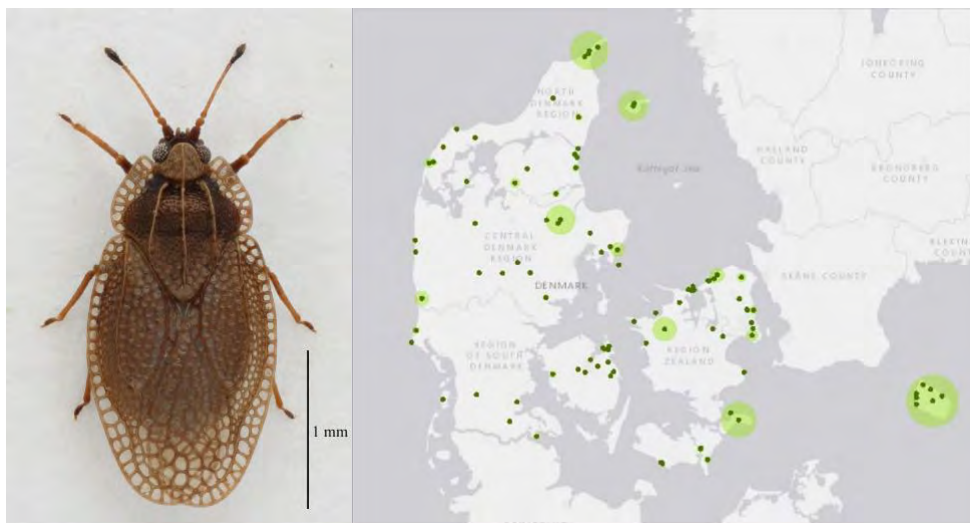
**Comparison:** Similar to *Acalypta gracilis* but is distinguished by the difference in number of rows of cells at the discoidal area and shape of this area (see *Acalypta gracilis*).

**Host plants:** Bryophyta spp., *Calluna vulgaris*, *Genista* spp., *Sedum* spp. and *Thymus* spp.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Acalypta parvula* is the most common of the Danish species of *Acalypta* and it is distributed throughout the country (Fig. 14). The distribution map of this species is based on 243 specimens.

Recorded from Austria, Azores Is., Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Canary Is., Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, Estonia, Finland, French mainland, Germany, Greek mainland, Hungary, Ireland, Italian mainland, Kaliningrad Region, Liechtenstein, Luxembourg, Macedonia, Madeira Is., Nearctic region, North Africa, Norwegian mainland, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 13.** Dorsal view of habitus of *Acalypta parvula*. **Fig. 14.** Distribution map of *Acalypta parvula* in Denmark. Based on 243 specimens.

***Acalypta platycheila*** (Fieber, 1844)

*Acalypta platychila*: Jensen-Haarup, 1912

Fig. 3c; 15

**Description:** Length 2.1-3.2 mm. Brachypterous, rarely macropterous. Macropterous forms 2.8-3.2 mm (♀); Brachypterous forms 2.1-2.4 mm (♂♀). Pronotum, paranota, hemelytra, antennal segments and the legs are brown to grey brown. The head and the 4th antennal segment are darker (Fig. 15, Fig. 62). Head with long and divergent frontal processes. Pronotum has 3 keels, and the hood is extended forward and covers the head almost to the base of the frontal processes. Paranota often has 3 rows of cells, and the bigger part of the marginal area has 1 row of cells. All antennal segments same size throughout (Fig. 15).

**Comparison:** Similar to *Acalypta carinata* and *Acalypta nigrina*. Agrees with both species in having the antennae same size throughout. Differs from *Acalypta carinata* by having parallel lateral keels and the bigger part of the marginal area has 1 row of cells. Distinguished from *Acalypta nigrina* by having longer frontal processes.

**Host plants:** Cyperaceae spp., Juncaceae spp. and *Pleurozium* spp.

**Phenology:** Adults probably occur throughout the year but are usually found in April-June.

**Distribution:** *Acalypta platycheila* is the rarest occurring species of *Acalypta* in Denmark as it only occurs in a few localities in Jutland and on Bornholm (Fig. 16). The distribution map of this species is based on 7 specimens.

Records from Austria, Belarus, Belgium, Britain I., Central European Russia, Croatia, Czech Republic, Denmark, East Palaeartic, Estonia, Finland, French mainland, Germany, Hungary, Kaliningrad Region, Latvia, Luxembourg, North European Russia, Norwegian mainland, Slovakia, Slovenia, Sweden, The Netherland and Yugoslavia (Péricart & Golub, 1996).



**Fig. 15.** Dorsal view of habitus of *Acalypta platycheila*. **Fig. 16.** Distribution map of *Acalypta platycheila* in Denmark. Based on 7 specimens.

Genus ***Agramma*** Stephens, 1829

Genus *Serénthia*: Jensen-Haarup, 1912

~ 91 species, 1 in Denmark.

*Diagnosis:* Pronotum often black and hemelytra yellow-brown. Antennae usually black or red-brown to brown and most of the leg generally red-brown. Body elongated and oval shape. Pronotum without paranota and keels and both pronotum and hemelytra punctuated instead of being lace-like as other Tingidae. Pronotum without hood unlike most Tingidae. Length: 1.5-3.5 mm.

[*Agramma confusum* (Puton, 1879)]

Fig. 17

*Description:* Length 2.3-3.0 mm. Always pseudomacropterous. Pronotum black except along the edge near the head, which is yellow-brown like hemelytra. Antennae black, however 3rd segment apically and 4th segment proximal are red-brown. The legs are red-brown (Fig. 17, Fig. 63). Body elongated and narrow. Pronotum without paranota and keels, and both pronotum and hemelytra are punctuated. 3rd antennal segment longer than the combined length of 1st and 2nd segments (Fig. 17).

*Comparison:* Similar to *Agramma laetum* and [*Agramma ruficorne*]. See *Agramma laetum* for comparison.

*Host plants:* *Cyperaceae* spp., *Juncaceae* spp. and *Luzula* spp.

*Phenology:* Adults occur throughout the year.

*Distribution:* Potential species for Denmark.

Records from Austria, Bosnia and Herzegovina, Croatia, Czech Republic, European Turkey, French mainland, Germany, Greek mainland, Hungary, Italian mainland, Macedonia, Moldova, North European Russia, Poland, Portuguese mainland, Slovakia, Slovenia, South European Russia, Spanish mainland and Yugoslavia (Péricart & Golub, 1996).



**Fig. 17.** Dorsal view of habitus of *Agramma confusum*

***Agramma laetum*** (Fallén, 1807)

*Serénthia læta*: Jensen-Haarup, 1912

Fig. 2a; 18

**Description:** Length 1.8-2.5 mm. Always brachypterous. Pronotum black except along the edge near the head, which is yellow-brown like hemelytra. Antennae black, however 3rd segment apically and 4th segment proximal is red-brown. The legs are red-brown (Fig. 18, Fig. 62). Body elongated and narrow. Pronotum without paranota and keels, and both pronotum and hemelytra are punctuated. 3rd antennal segment shorter than the combined length of 1st and 2nd segments (Fig. 18).

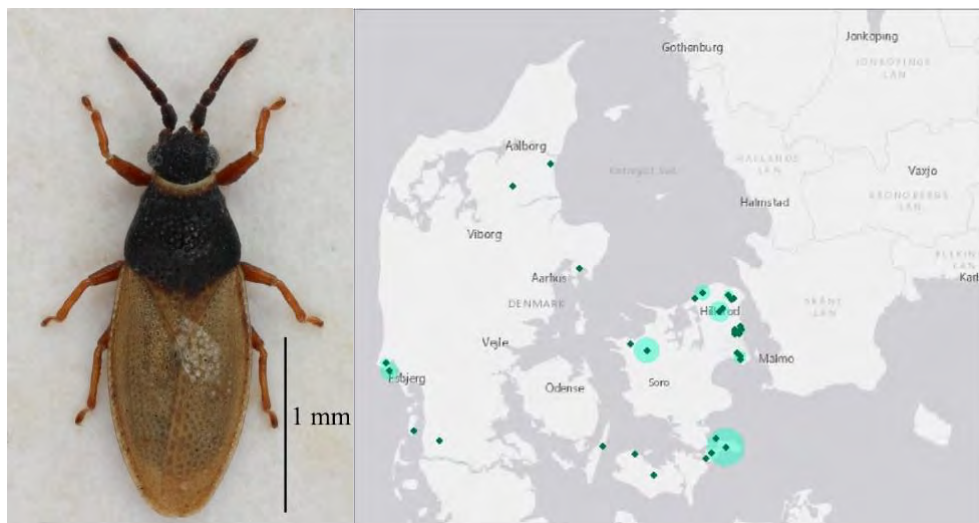
**Comparison:** No similar species recorded in Denmark, but similar to the species [*Agramma ruficorne*] and [*Agramma confusum*], which are both potential species for Denmark. Agrees with both species in the lack of paranota and keels on pronotum, pronotum and hemelytra punctuated, marginal area with maximum 1 row of cells, head and most of pronotum black, hemelytra yellowish and legs red-brown coloured. Differs from [*Agramma ruficorne*] in having black antennae instead of red-brown. Differs from [*Agramma confusum*] in having 3rd antennal segment shorter than the combined length of 1st and 2nd segments, whereas [*Agramma confusum*] has 3rd antennal segment longer than the combined length of 1st and 2nd segments.

**Host plants:** *Cyperaceae* spp., *Juncaceae* spp. and *Luzula* spp.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Agramma laetum* has not yet been found on Fyn and Bornholm; otherwise, it occurs scattered in the rest of Denmark, with most records on Zealand (Fig. 19). The distribution map of this species is based on 139 specimens.

Records from Azores Is., Belgium, Britain I, Denmark, French mainland, Germany, Italian mainland, Luxembourg, Norwegian mainland, Sweden, Switzerland, The Netherlands and Albania (Péricart & Golub, 1996).



**Fig. 18.** Dorsal view of habitus of *Agramma laetum*. **Fig. 19.** Distribution map of *Agramma laetum* in Denmark. Based on 139 specimens.

[*Agramma ruficorne* (Germar, 1835)]

Fig. 20

*Description:* Length 1.9-2.4 mm. Mostly brachypterous, rarely pseudomacropterous. Pseudomacropterous forms 2.3-2.4 mm; Brachypterous forms 1.9-2.2 mm. Pronotum black except along the edge near the head, which is yellow-brown like hemelytra. Antennae and legs yellow-brown coloured (Fig. 20, Fig. 63). Body elongated and narrow. Pronotum without paranota and keels, and both pronotum and hemelytra are punctuated (Fig. 20).

*Host plants:* *Carex* sp., *Eriophorum* sp. and *Juncaceae* sp.

*Phenology:* Adults occur throughout the year.

*Comparison* Similar to *Agramma laetum* and [*Agramma confusum*]. See *Agramma laetum* for comparison.

*Distribution:* Potential species for Denmark.

Records from Austria, Belarus, Croatia, Czech Republic, East Palaearctic, French mainland, Germany, Hungary, Kaliningrad Region, Liechtenstein, Poland, Slovakia, Slovenia, Switzerland, Yugoslavia, Italian mainland, North Africa and Portuguese mainland (Péricart & Golub, 1996).



**Fig. 20.** Dorsal view of habitus of *Agramma ruficorne*.

Genus ***Campylosteira*** Fieber, 1844

Genus *Campylosteira*: Jensen-Haarup, 1912



20 species, 1 in Denmark

*Diagnosis:* Often homogeneous coloured red brown, yellow brown or dark brown. Pronotum and head often darker. Head with 2 small and rounded frontal processes and pronotum without a hood. Hemelytra rarely with developed marginal area. Length: ~ 1.35-2.7 mm

***Campylosteira verna*** (Fallén, 1826)

*Campylosteira vérna:* Jensen-Haarup, 1912

Fig. 2e; 21

*Description:* Length 1.6-2.3 mm. Mostly brachypterous, rarely macropterous. Macropterous forms 2.1-2.3 mm; Brachypterous forms 1.6-2.0 mm. Pronotum, paranota, hemelytra, legs and all the antennal segments are reddish brown, although the 4th segment and the pronotum is darker (Fig. 21, Fig. 62). Pronotum with 3 keels and without a hood. Paranota with 1-2 rows of cells. Hemelytra do not overlap, which leads to a wide gap between the wings (Fig. 21).

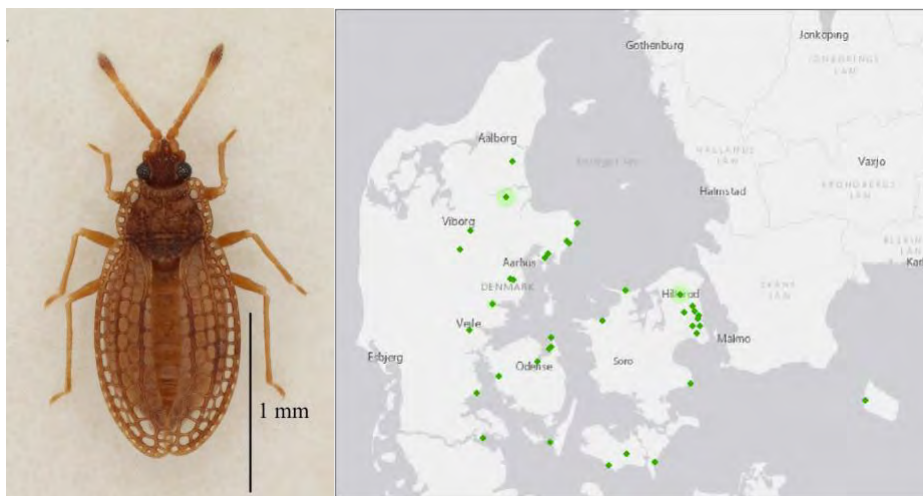
*Comparison:* Most similar to the species of *Acalypta* but is distinguish from these by the non-overlapping hemelytra, which leaves a wide gap between them, which is not present for *Acalypta*.

*Host plants:* Bryophyta spp.

*Phenology:* Adults occur throughout the year.

*Distribution:* *Campylosteira verna* occurs in most of Denmark but is lacking presence in Western Jutland (Fig. 22). The distribution map of this species is based on 84 specimens.

Records from Austria, Belgium, Bosnia and Herzegovina, Britain I., Croatia, Czech Republic, Denmark, French mainland, Germany, Hungary, Italian mainland, Kaliningrad Region, Luxemburg, North European Russia, Norwegian mainland, Poland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 21.** Dorsal view of habitus of *Campylosteira verna*. **Fig. 22.** Distribution map of *Campylosteira verna* in Denmark. Based on 84 specimens.

[Genus *Corythucha* Stål, 1873]

~ 63 species, 0 in Denmark.

*Diagnosis:* The hood covers the head. Antennae are long, thin and with hairs. Paranota wide and with spines at the margins. Hood and hemelytra also with spines.

[*Corythucha ciliata* (Say 1832)]

Fig. 23

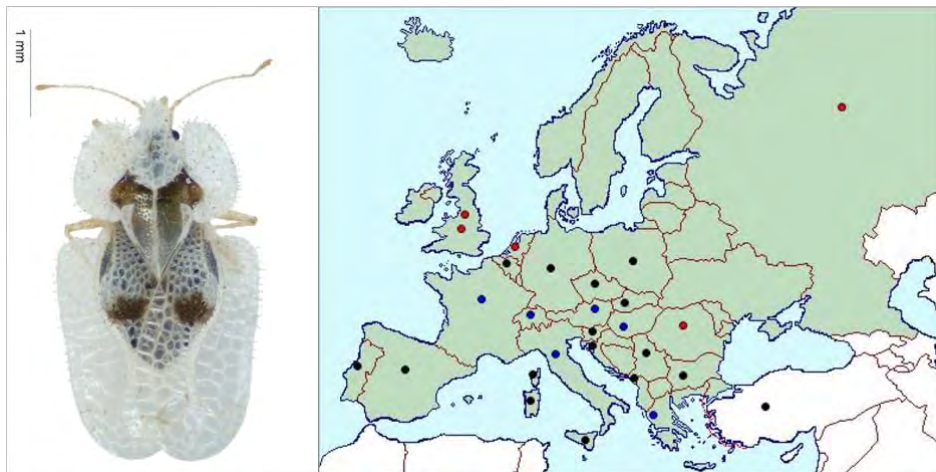
*Description:* Length 3.3-3.7 mm. Macropterous only known. Pronotum brown, except for the hood, which is white to yellowish like paranota and hemelytra. Hemelytra has two brown spots and the antennae and legs are pale brownish (Fig. 23, Fig. 63). Short spikes at the margins of paranota, margins of half of the hemelytra, and on the hood at pronotum, which is covering the whole head. The marginal area has 3-4 rows of cells like the inward sloping discoidal area and paranota has 5-6 rows of cells. The antennae are covered with hair (Fig. 23).

*Host plants:* *Platanus* spp.

*Phenology:* Adults occur throughout the year. Adults hibernate under bark of host plant from October/November to early spring.

*Distribution:* [*Corythucha ciliate*] is a potential species for Denmark and easy to distinguish from other Danish species. It is also known as the sycamore lace bug, due to its host plants of *Platanus* (sycamore trees), which it can cause great damages to (Halbert & Meeker, 1998). It is a North American species that was first discovered in Europe in Padua in Italy, and it has since spread through much of Europe (Grosso-Silva & Aguiar, 2007). Because this species is hibernating as an adult under the bark of its host plant, it is possible to find it throughout the year (Péricart, 1983). Species of *Platanus* are common in Denmark and with the addition that *Corythucha ciliata* has spread widely throughout Europe, it is possibly that this species will reach Denmark as well (Fig. 24).

Records from Austria, Belgium, Britain I., Bulgaria, Corsica, Czech Republic, Germany, Greek mainland, Hungary, Italian mainland, Nearctic region, Poland, Portuguese mainland, Romania, Sicily, Slovakia, Slovenia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 23.** Dorsal view of habitus of *Corythucha ciliate*. **Fig. 24.** Distribution map of *Corythucha ciliata* in Europe. Colour code: present (black), widespread (blue), local (red) (www.cabi.org).

Genus *Derephysia* Spinola, 1837

Genus *Derephysia*: Jensen-Haarup, 1912

~ 16 species, 1 in Denmark

*Diagnosis:* Brown to yellow-brown or blackish network of cells. Head without occipital processes but sometimes with 2 small frontal processes. Pronotum has 3 high keels. The marginal area often wide and the discoidal area often inward sloping. Antennae covered with fine short hairs. Length: 1.5-4.1 mm.

***Derephysia foliacea* (Fallén, 1807)**

*Derephysia foliacea:* Jensen-Haarup, 1912

Fig. 25

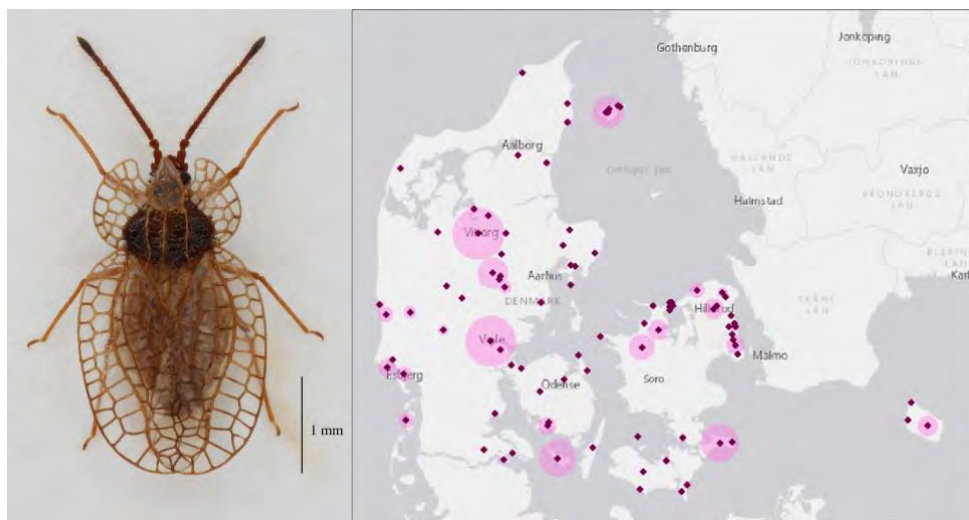
*Description:* Length 2.6-3.7 mm. Always macropterous. Pronotum, paranota and hemelytra light brown to yellow-brown, but area of pronotum just behind the hood dark-brown to black. Head, antennae, and legs also darker (Fig. 25, Fig. 62). Pronotum with 3 keels and a hood that is wide and raised. Paranota rounded. Marginal area of hemelytra often has 1-2 rows of cells and the discoidal area is strongly raised. The antennae are covered with hair (Fig. 25).

*Comparison:* No similar species in Denmark, but similar to the potential species [*Derephysia sinuatocollis*]. Differs from this species by having a more rounded paranota, a wider and more raised hood and a discoidal area which is strongly raised.

*Host plants:* *Artemisia* spp., *Climacium dendroides*, *Deschampsia flexuosa*, *Echium vulgare*, *Hedera helix*, *Hieracium* spp., *Leucanthemum* spp., *Limonium* spp., *Salvia* spp. and *Thymus* spp.

*Phenology:* Adults occur throughout the year.

*Distribution:* *Derephysia foliacea* occurs in most of Denmark, but with few records in North-western Jutland and Southern Zealand (Fig. 26). The distribution map of this species is based on 223 specimens.



**Fig. 25.** Dorsal view of habitus of *Derephysia foliacea*. **Fig. 26.** Distribution map of *Derephysia foliacea* in Denmark. Based on 223 specimens.

Records from Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Canary Is., Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, Estonia, Finland, French mainland, Germany, Greek mainland, Hungary, Ireland, Italian mainland, Kaliningrad Region, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Nearctic region, North European Russia, Norwegian mainland, Poland,

Portuguese mainland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).

[*Derephysia sinuatocollis* (Puton, 1879)]

Fig. 27

*Description:* Length 3.4-4.1 mm. Submacropterous only known. Pronotum, paranota and hemelytra light brown, but has darker colours at pronotum just behind the hood and at the discoidal area. Head, antennae, and legs also darker (Fig. 27, Fig. 63). Pronotum with 3 keels and hood narrow and longer than it is raised. Paranota is wavy. Marginal area has 1-2 rows of cells and discoidal area flat. The antennae are covered with hair (Fig. 27).

*Comparison:* See *Derephysia foliacea* for comparison

*Host plants:* *Clematis vitalba*.

*Phenology:* Adults occur throughout the year.

*Distribution:* Potential species for Denmark.

Records from Belgium, French mainland, Germany, Italian mainland, Macedonia, Slovenia, Switzerland and The Netherlands (Péricart & Golub, 1996).

Genus ***Dictyla*** Stål, 1874

Genus *Monánthia*: Jensen-Haarup, 1912

~ 81 species, 3 in Denmark

*Diagnosis:* Black, brown, yellow, and greyish coloured. Head without processes or has 2-5 frontal processes. Pronotum with 3 keels, where only the central keel reaches the low hood. Length: 2.2-4.0 mm.

***Dictyla convergens*** (Herrich-Schäffer, 1835)

*Monánthia húmuli*: Jensen-Haarup, 1912

Fig. 2b; 4b; 28

*Description:* Length 2.9-3.6 mm. Always macropterous. Pronotum, paranota and hemelytra brown with yellow-grey and dark shades. Head and 4th antennal segment dark. Rest of antennal segments and legs light brown to yellowish (Fig. 28, Fig. 62). Pronotum with 3 keels, where only the central keel is reaching the hood. The lateral keels are converging in front. Paranota wide and appressed to pronotum. Marginal area has 1-2 rows of cells (Fig. 28).

*Comparison:* Similar to *Dictyla humuli* and the potential species [*Dictyla lupuli*] in all having wide paranota. Differs from these in having brown pronotum instead of black.

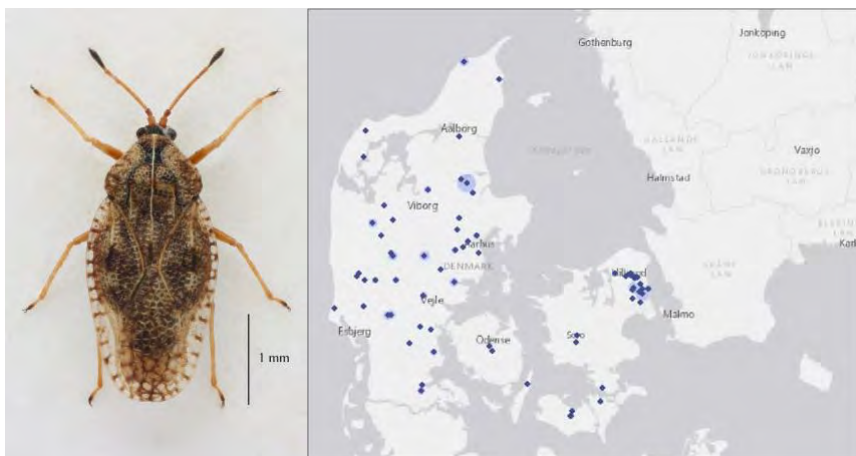
*Host plants:* Boraginaceae spp., *Echium vulgare* and *Myosotis* spp. especially *Myosotis palustris*.

*Phenology:* Adults occur throughout the year.

*Distribution:* *Dictyla convergens* is the most common *Dictyla* species in Denmark. It occurs throughout most of the country but has not been recorded from Bornholm (Fig. 29). The distribution map of this species is based on 207 specimens.

Records from Austria, Belarus, Belgium, Britain I., Bulgaria, Croatia, Czech Republic, Denmark, East European Russia, Estonia, Finland, French mainland, Germany, Hungary, Ireland, Italian mainland, Latvia, Liechtenstein, Lithuania, Luxembourg, North European

Russia, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 28.** Dorsal view of habitus of *Dictyla convergens*. **Fig. 29.** Distribution map of *Dictyla convergens* in Denmark. Based on 207 specimens.

***Dictyla echii*** (Schrank, 1782)

*Monánthia échii*: Jensen-Haarup, 1912

Fig. 4a; 30

**Description:** Length 3.1-3.8 mm. Always macropterous. Pronotum black, while paranota and hemelytra are brown with yellow-grey and dark shades. Head, 4th antennal segment, and femur dark. Rest of the antennal segments and the legs brown (Fig. 30, Fig. 62). Pronotum with 3 keels, where only the central keel is reaching the hood. The lateral keels are parallel. Paranota narrow and appressed to pronotum. Marginal area has 1-2 rows of cells (Fig. 30).

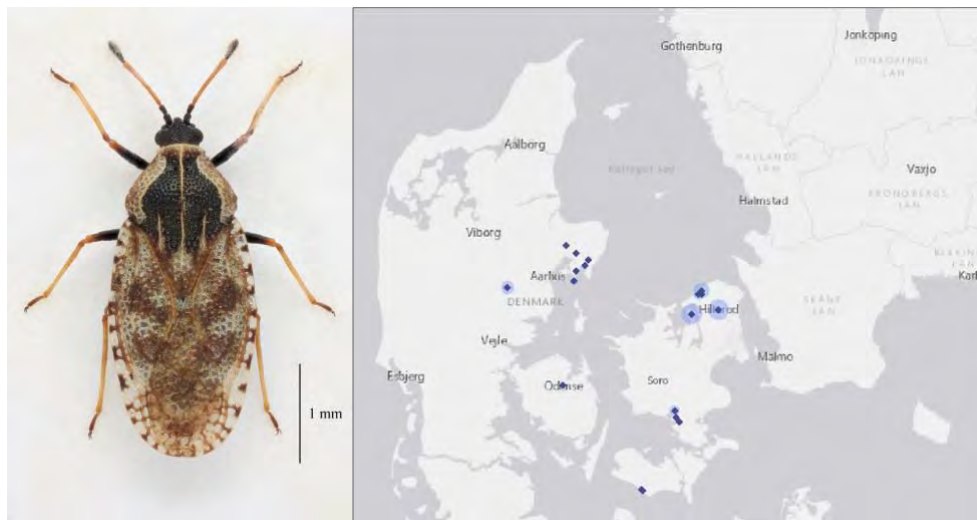
**Comparison:** Similar to *Dictyla humuli* and the potential species [*Dictyla lupuli*] in all having black pronotum. Differs from these in having narrow paranota instead of wide.

**Host plants:** *Anchusa* spp., *Cynoglossum* spp., *Echium vulgare* and *Symphytum* spp.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Dictyla echii* is distributed with only a few local occurrences, e.g. in Jutland it only occurs locally on Djursland and Skanderborg. It is not recorded from and Bornholm (Fig. 31). The distribution map of this species is based on 85 specimens.

Records from Albania, Andorra, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Turkey, Finland, French mainland, Germany, Greek mainland, Hungary, Italian mainland, Kaliningrad Region, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, North European Russia, Northwest European Russia, Norwegian mainland, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 30.** Dorsal view of habitus of *Dictyla echii*. **Fig. 31.** Distribution map of *Dictyla echii* in Denmark. Based on 85 specimens.

***Dictyla humuli*** (Fabricius, 1794)

**Fig. 32**

*Description:* Length 3.1-3.8 mm. Macropterous or subbrachypterous. Pronotum black, while paranota and hemelytra are yellow brown to greyish with dark shades. Head black. All antennal segments yellowish except 4<sup>th</sup> antennal segment which is dark brown to black apically. Legs yellowish, with tarsi dark brown to black apically (Fig. 32, Fig. 62). Pronotum with 3 keels, where only the central keel is reaching the hood. Paranota wide and appressed to pronotum. Marginal area has 1-2 rows of cells (Fig. 32).

*Comparison:* Similar to *Dictyla convergens* and *Dictyla lupuli*. Agrees with *Dictyla convergens* in having wide paranota, but differs by having black pronotum instead of brown. Agrees with *Dictyla lupuli* in having black pronotum and wide paranota. Differs from this species in having most of the antennal and leg segments yellowish instead of having most of the antennal and leg segments black.

*Host plants:* *Symphytum* spp.

*Phenology:* Adults occur throughout the year.

*Distribution:* The first specimens of *Dictyla humuli* was recorded by Jan Pedersen the 3rd of July 2016, and additional specimens again on the 12th of May 2017 both times on *Symphytum* sp. in Karlstrup Kalkgrav (Zealand) (Fig. 33), and in large numbers. The locality has since been destroyed and turned into a truck rest area. It is thus unknown if the species still persists in the area. The distribution map of this species is based on 5 specimens.

Records from Austria, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, French mainland, Germany, Hungary, Italian mainland, Kaliningrad Region, Liechtenstein, Luxembourg, Macedonia, Moldova, North European Russia, Poland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 32.** Dorsal view of habitus of *Dictyla humuli*. **Fig. 33.** Distribution map of *Dictyla humuli* in Denmark. Based on 5 specimens.

[*Dictyla lupuli* (Herrich-Schäffer, 1837)]

Fig. 34

*Description:* Length 2.7-3.1 mm. Macropterous, rarely submacropterous. Pronotum black, while paranota and hemelytra are yellow-brown to greyish with dark shades. Head black. All antennal segments black, except 3rd antennal segment which is yellowish. All leg segments black, except tibia and femur apically (Fig. 34, Fig. 63). Pronotum with 3 keels, where only the central keel is reaching the hood. The lateral keels are parallel. Paranota wide and appressed to pronotum. Marginal area has 1-2 rows of cells (Fig. 34).

*Comparison:* See *Dictyla humuli* for comparison.

*Host plants:* *Myotis* spp.

*Phenology:* Adults occur throughout the year.

*Distribution:* Potential species for Denmark.

Records from Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Central European Russia, Croatia, Czech Republic, East European Russia, Estonia, European Turkey, Germany, Hungary, Italian mainland, Kaliningrad Region, Latvia, Macedonia, North European Russia, Poland, Romania, Slovakia, Slovenia, South European Russia and Yugoslavia (Péricart & Golub, 1996).



**Fig. 34.** Dorsal view of habitus of *Dictyla lupuli*.

Genus ***Dictyonota*** Curtis, 1827

Genus *Dictyonóta*: Jensen-Haarup, 1912

~ 60 species, 2 in Denmark.

*Diagnosis*: Yellow-brown to black coloured. Head with 2 frontal processes and 2 occipital processes. Antennae with short hairs, especially developed at 3rd antennal segment. Hood can be absent. Pronotum with 3 keels. Antennae longer and more robust in males than in females. Length: 2.3-5.0 mm.

***Dictyonota fuliginosa*** A. Costa, 1853

Fig. 35

*Description*: Length 4.5-5.0 mm. Always macropterous. Pronotum, paranota and hemelytra have yellow-brown colours. Head, 4th antennal segment, and tarsi. Rest of the antennal segments and leg segments are yellow-brown (Fig. 35, Fig. 62). Head with long frontal and occipital processes. Pronotum has 3 keels that each has 1 row of cells. Paranota is angled forward, and the marginal area has 2-3 rows of cells. The antennae have short hairs, are slender and the 3rd antennal segment is thinner distally (Fig. 35).

*Comparison*: Similar to *Dictyonota strichnocera* but is distinguished from this species by having thinner antennae and the 3rd antennal segment is thinner distally. *Dictyonota*



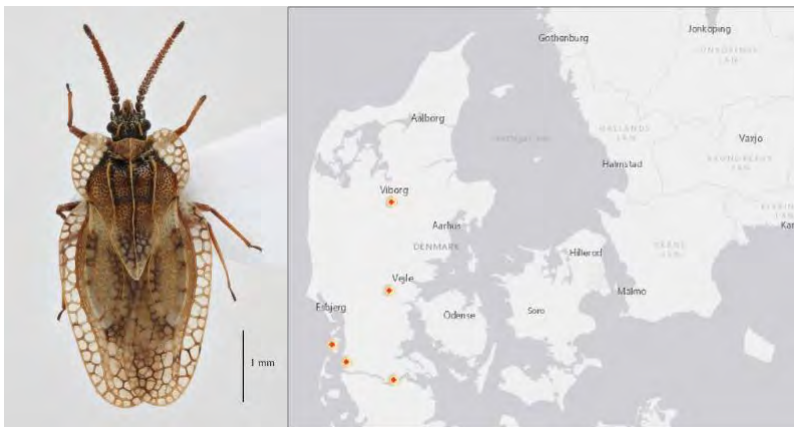
*fuliginosa* also has long frontal and occipital processes and the paranota is more angled forward. Furthermore, it has lighter colours.

*Host plants:* *Cytisus* spp., *Echium vulgare* and Fabaceae spp.

*Phenology:* Adults occur from June-September.

*Distribution:* *Dictyonota fuliginosa* has been recorded by Rune Bygebjerg the 15th of August 2001 at Lakolk Strand on the island Rømø (Southern Jutland) (Fig. 36) (Bygebjerg, 2005; Skipper, 2013). Shortly after it was also recorded from Tingdal Plantage near Hjerpsted and now known from several sites across south and central Jutland. The distribution map of this species is based on 17 specimens.

Records from Belgium, Britain I., Czech Republic, Denmark, French mainland, Germany, Italian mainland, Luxembourg, Nearctic region, Portuguese mainland, Spanish mainland, Switzerland and The Netherlands (Péricart & Golub, 1996).



**Fig. 35.** Dorsal view of habitus of *Dictyonota fuliginosa*. **Fig. 36.** Distribution map of *Dictyonota fuliginosa* in Denmark. Based on 17 specimens.

### **Dictyonota strichnocera** Fieber, 1844

*Dictyonota strichnocera:* Jensen-Haarup, 1912

Fig. 1c; 2c; 37

*Description:* Length 3.5-4.0 mm. Always macropterous. Pronotum, paranota and hemelytra dark brown to black like the antennae. The head is black. Femur and tarsi are dark, while tibia has lighter colours (Fig. 37, Fig. 62). Head with short frontal and occipital processes. Pronotum has 3 keels that each has 1 row of cells. Paranota is rounded and the marginal area has 2-3 rows of cells. The antennae have short hairs, are robust and of same width throughout (Fig. 37).

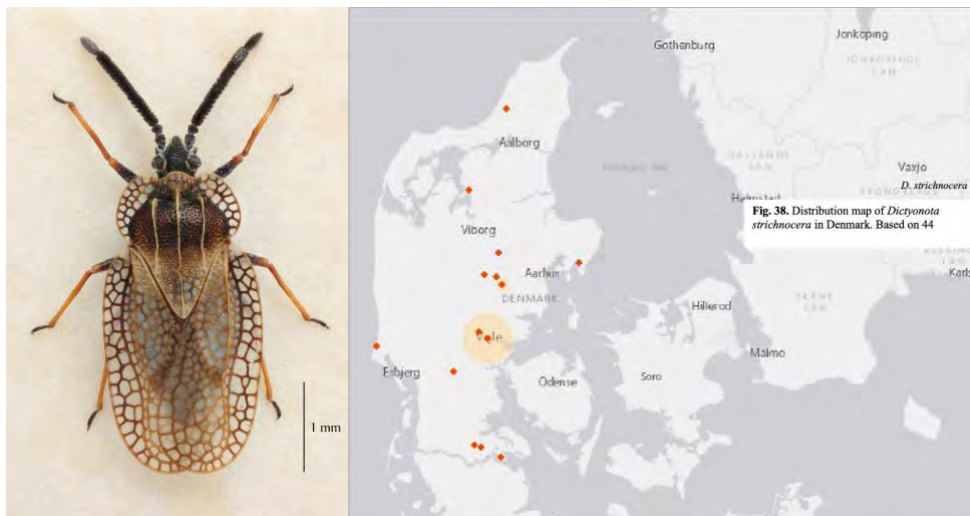
*Comparison:* Similar to *Dictyonota fuliginosa* (see *Dictyonota fuliginosa*) and to *Kalama tricornis* from which it is different by having antennae with short hairs instead of long hairs.

*Host plants:* *Cytisus scoparius*, *Genista tinctoria* and *Ulex* spp.

*Phenology:* Adults occur from June-October.

*Distribution:* *Dictyonota strichnocera* is only found in Jutland, where its distribution is scattered (Fig. 38). The distribution map of this species is based on 44 specimens.

Records from Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Croatia, Czech Republic, Denmark, French mainland, Germany, Hungary, Italian mainland, Macedonia, Moldova, North European Russia, Northwest European Russia, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 37.** Dorsal view of habitus of *Dictyonota strichnocera*. **Fig. 38.** Distribution map of *Dictyonota strichnocera* in Denmark. Based on 44 specimens.

[Genus *Galeatus* Curtis, 1833]

~ 10 species, 0 in Denmark.

**Diagnosis:** Network of big cell. Head with 5 long spines, but absent in the species *Galeatus inermis*. Antennae are long and thin. Pronotum usually with patterns and lateral keels at pronotum sometimes shell shaped. Marginal area wide and with 1 row of 4-6 large cells. Length: 1.9-4.8 mm.

[*Galeatus maculatus* (Herrich-Schäffer, 1838)]

Fig. 39

**Description:** Length: 2.4-3.6 mm. Macropterous or brachypterous. Macropterous forms 3.0-3.6 mm; Brachypterous forms 2.4-2.9 mm. Pronotum, paranota and hemelytra brownish to transparent. Pronotum and hemelytra with dark spots. Head dark brown to black. All antennal segments brown, except 4th antennal segment which is black. All leg segments brown with tarsi apically darker (Fig. 39, Fig. 63). Head with 5 very long frontal processes. Pronotum with 3 high keels. Lateral keels shell shaped and higher than the central keel. Paranota with 1 row of 4 cells and marginal area has 1 row of cells. All cells big. Antennae long, thin and with hairs (Fig. 39).

**Host plants:** *Hieracium pilosella*.

**Phenology:** Adults occur throughout the year.

**Comparison:** Not similar to any Danish species, but similar to another potential Danish species [*Galeatus spinifrons*]. Differs from this species by having darker colours and black spots on pronotum and hemelytra.

**Distribution:** Potential species for Denmark.

Records from Austria, Belarus, Belgium, Czech Republic, French mainland, Germany, Hungary, Italian mainland, Kaliningrad Region, Luxembourg, Poland, Slovakia, Spanish mainland and Switzerland (Péricart & Golub, 1996; Büttner, 2004).



**Fig. 39.** Dorsal view of habitus of *Galeatus maculatus*.

[*Galeatus spinifrons* (Fallen, 1807)]

Fig. 40

*Description:* Length 3.0-4.7 mm. Mostly macropterous, rarely brachypterous. Macropterous forms 3.2-4.7 mm; Brachypterous forms 3.0-4.0 mm. Pronotum, paranota and hemelytra brownish to transparent. Pronotum and hemelytra without dark spots. Head brown. All antennal and leg segments yellow-brown, but 4th antennal segment and tarsi apically darker (Fig. 40, Fig. 63). Head with 5 very long frontal processes. Pronotum with 3 high keels. Lateral keels shell shaped and higher than the central keel. Paranota with 1 row of 4 cells and marginal area has 1 row of cells. All cells big. Antennae long, thin and with hairs (Fig. 40).

*Host plants:* *Artemisia campestris*, Asteraceae spp. and *Hieracium* spp.

*Phenology:* Adults occur throughout the year.

*Comparison:* See [*Galeatus maculatum*] for comparison.

*Distribution:* Potential species for Denmark.

Records from Austria, Czech Republic, East European Russia, Estonia, Finland, Germany, Hungary, Italian mainland, Kaliningrad Region, Latvia, Lithuania, Nearctic region, North

European Russia, Norwegian mainland, Poland, Slovakia, South European Russia, Sweden and Switzerland (Péricart & Golub, 1996).



**Fig. 40.** Dorsal view of habitus of *Galeatus spinifrons*

Genus ***Kalama*** Puton, 1876

Genus *Dictyonóta*: Jensen-Haarup, 1912

~ 28 species, 1 in Denmark.

*Diagnosis*: Head without occipital processes. The hood does not cover the head and the antennae are with long hairs. Length: 1.7-3.4 mm.

***Kalama tricornis*** (Schrank, 1801)

*Dictyonóta tricórnis*: Jensen-Haarup, 1912

Fig. 1a; 41

*Description*: Length 3.0-3.5 mm. Macropterous or submacropterous. Pronotum dark brown to black except for the keels, which are brown to greyish. Hemelytra, paranota, hood and legs are brown to greyish. The head and the antennae are black (Fig. 41, Fig. 62). Head with 2 close frontal processes and without occipital processes. Pronotum with 3 keels that all have 1 row of cells. Paranota almost angular forward and the marginal area has 1-2 rows of cells. Antennae covered with long hairs (Fig. 41).

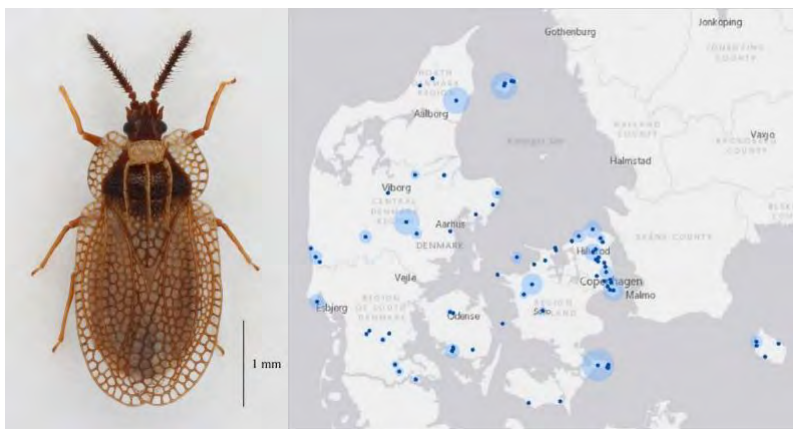
*Comparison*: See *Dictyonota strichnocera* for comparison.

*Host plants:* *Artemisia* spp., Bryophyta spp., *Hieracium pilosella*, *Mentha* spp. and *Thymus* spp.

*Phenology:* Adults occur from June-October.

*Distribution:* *Kalama tricornis* is common throughout most of Denmark. The most noticeable element is its lack of presence in North-eastern Jutland and Southern Zealand (Fig. 42). The distribution map of this species is based on 196 specimens.

Records from Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Croatia, Czech Republic, Denmark, East European Russia, Estonia, European Turkey, Finland, French mainland, Germany, Greek mainland, Hungary, Ireland, Italian mainland, Kaliningrad Region, Latvia, Liechtenstein, Lithuania, Macedonia, Malta, Moldova, Nearctic region, North European Russia, Northwest European Russia, Norwegian mainland, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 41.** Dorsal view of habitus of *Kalama tricornis*. **Fig. 42.** Distribution map of *Kalama tricornis* in Denmark. Based on 196 specimens.

Genus ***Physatocheila*** Fieber, 1844

Genus ***Monánthia***: Jensen-Haarup, 1912

~ 60 species, 2(3) in Denmark

*Diagnosis:* Red brown to dark brown coloured. Head with 3 frontal processes and 2 occipital processes. Pronotum with 3 low keels that all reach the hood. Marginal area with more than 1 row of cells at the widest part of hemelytra and a dark transversal region. Antennae longer and more robust in males than in females. Length: ~ 2.5-4.0 mm.

***Physatocheila costata*** (Fabricius, 1794)

***Monánthia quadrimaculáta***: Jensen-Haarup, 1912

Fig. 43

*Description:* Length: 3.3-4.0 mm. Macropterous only known. Pronotum, paranota and hemelytra are red-brown varying from pale to dark. Central area of hemelytra has a darker region, which is especially visible at the marginal area as the rest of the marginal area is more transparent. The head is darker like the 4th antennal segment and tarsi. The rest of the antennal segments and the leg segments are red-brown (Fig. 43, Fig. 62). Head with occipital processes and 3 frontal processes. Pronotum with 3 keels that all reach the hood. Paranota

narrow and appressed to pronotum. Marginal area has 4-5 rows of cells in the dark region, 2 rows of cells behind this region and a short part with 1 row of cells distally (Fig. 43).

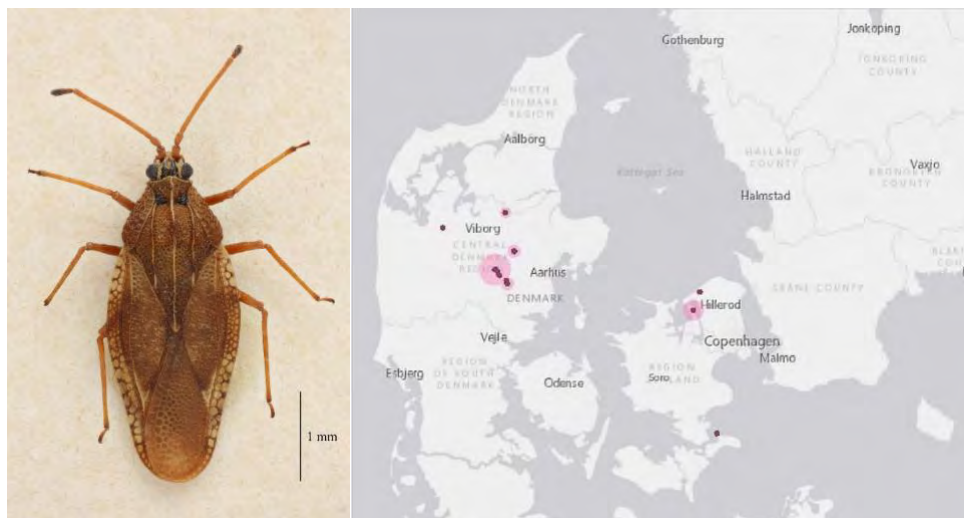
**Comparison:** Very similar to *Physatocheila smreczynskii*. Differs from this species in having a short part with 1 row of cells at the marginal area, where *Physatocheila smreczynskii* has a longer part. The only host plant known that they have in common is *Malus* spp.

**Host plants:** *Alnus glutinosa*, *Alnus incana*, *Alnus viridis*, *Betula* spp., *Crataegus* spp. and *Malus sylvestris*.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Physatocheila costata* has only been found in Central Jutland, Northern Zealand and on the island Møn (Fig. 44). The distribution map of this species is based on 49 specimens.

Records from Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, Estonia, Finland, French mainland, Germany, Hungary, Italian mainland, Kaliningrad Region, Latvia, Lithuania, Macedonia, North European Russia, Norwegian mainland, Poland, Romania, Slovenia, Spanish mainland, Sweden, Switzerland and The Netherlands (Péricart & Golub, 1996).



**Fig. 43.** Dorsal view of habitus of *Physatocheila costata*. **Fig. 44.** Distribution map of *Physatocheila costata* in Denmark

***Physatocheila dumetorum*** (Herrich-Schäffer, 1838)

*Monánthia dumetórum*: Jensen-Haarup, 1912

Fig. 45a, b

**Description:** Length 2.5-3.0 mm. Macropterous only known. Pronotum, paranota, hemelytra, are red-brown and varying from pale to dark. Central area of hemelytra has a darker region, which is especially visible at the marginal area as the rest of the marginal area is more transparent. The head, 4th antennal segment, and tarsi are darker. The rest of the antennal segments and the leg segments are red-brown (Fig. 45a, Fig. 62). Head with occipital processes and 3 frontal processes. Pronotum with 3 keels that all reach the hood. Paranota narrow and appressed to pronotum. Marginal area has 2 rows of cells in the dark region and 1 row of cells behind this region (Fig. 45a, b).

*Comparison:* Similar to *Physatocheila costata* and *Physatocheila smreczynskii*. Differs from these species in having 2 rows of cells in the dark region of the marginal area and a smaller body length.

*Host plants:* *Crataegus monogyna*, *Prunus padus* and *Prunus spinosa*.

*Phenology:* Adults occur throughout the year.

*Distribution:* There are two known records with good locality information from Naturbasen. These are from Paradiset, Vordingborg, Zealand and Nakskov Indrefjord, near Holleby, Lolland. Furthermore, there are 11 specimens of *Physatocheila dumetorum* present in the collections that the distribution of Danish Tingidae is based on. However, these specimens are not labelled and therefore there is no information available.

Records from Albania, Austria, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Croatia, Czech Republic, Denmark, European Turkey, French mainland, Germany, Greek mainland, Italian mainland, Luxembourg, Moldova, North European Russia, Northwest European Russia, Romania, Slovakia, Slovenia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).

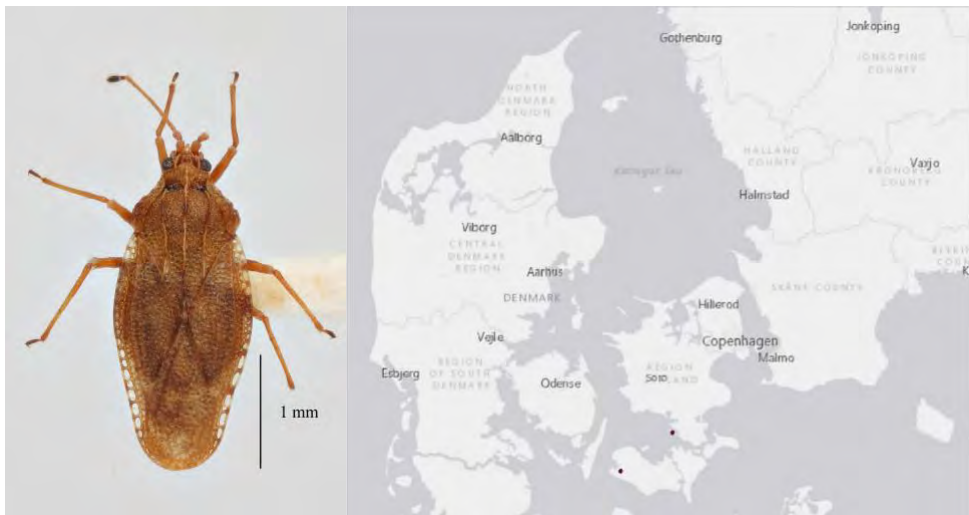


Fig. 45. Dorsal view of habitus of *Physatocheila dumetorum*

***Physatocheila smreczynskii*** (China, 1952)

Fig. 46

*Description:* Length 3.3-4.0 mm. Macropterous only known. Pronotum, paranota, hemelytra, are red-brown and varying from pale to dark. Central area of hemelytra has a darker region, which is especially visible at the marginal area as the rest of the marginal area is more transparent. The head, 4th antennal segment, and tarsi are darker. The rest of the antennal segments and the leg segments are red-brown (Fig. 46, Fig. 62). Head with occipital processes and 3 frontal processes. Pronotum with 3 keels that all reach the hood. Paranota narrow and appressed to pronotum. Marginal area has 4 rows of cells in the dark region, 2 rows of cells behind this region and a long part with 1 row of cells distally (Fig. 46).

*Host plants:* *Malus* spp., *Prunus padus*, *Pyrus communis*, *Pyrus* spp., Rosaceae spp. and *Sorbus aucuparia*.

*Phenology:* Adults occur throughout the year.

*Distribution:* *Physatocheila smreczynskii* has currently been confirmed from Northern Zealand and Southern Jutland. Furthermore there are potential records from Mols Bjerger, Asserbo, and Ulvshale (see notes). The distribution map of this species is based on 3 specimens.

Records from Albania, Belarus, Belgium, Britain I., Czech Republic, (Denmark), French mainland, Germany, Hungary, Italian mainland, Lithuania, Moldova, North European Russia, Northwest European Russia, Norwegian mainland, Poland, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, and The Netherlands (Péricart & Golub, 1996).

*Notes:* Two specimens which were determined to be *Physatocheila smreczynskii* have been found in Denmark by Linda Kjær-Thomsen the 14. of May 2016 in Burevang (Zealand) and by Lars Thomas the 21. of May 2017 in Sortedam (Zealand) (Fig. 47). Although these are difficult to confirm due to the great similarities between this species and *Physatocheila costata*. It was established that these belong to *Physatocheila smreczynskii* due to their difference in their number of rows of cells in the marginal area, where *Physatocheila smreczynskii* has a longer part with only 1 row of cells distally in contrast to *Physatocheila costata* that has a shorter part. Even though this characteristic is difficult to assess these two newly found specimens are definitely different from the specimens of *Physatocheila costata* from various collections. This is because they in one of their marginal area have a short part with 1 row of cells and in the other marginal area have a longer part (Fig. 46). However, these two specimens have both been collected from *Sorbus aucuparia*, which is a host plant for *Physatocheila smreczynskii* but so far not a host plant for *Physatocheila costata*, confirming that they must be of *Physatocheila smreczynskii*, which is thus new to the Danish fauna. In addition, 1 specimen (coll. NHMD) found in Draved Skov the 26. of June 2016 by Jan Pedersen, is similar to these specimens.

Other specimens were found to have similar traits that made them difficult to assess their true affinity. These specimens include 1 specimen from Ulvshale found by Johan Georg Worm-Hansen the 30. of August 1944 (coll. NHMD) and 1 specimen that has been found near Asserbo Slotsruin the 16. of September 1951 from the collection of Stenn Rasmussen (coll. NHMD). It also includes 2 specimens that have been found by Lars Skipper in Mols Bjerger the 25. of April 2009 and in Ulvshale the 09. of July 2010 respectively. This suggests that *Physatocheila smreczynskii* was found earlier, but not registered as a Danish species, as the specimens have been determined to be *Physatocheila costata* due to the similarities between the two species.





**Fig. 46.** Dorsal view of habitus of *Physatocheila smreczynskii*. **Fig. 47.** Distribution map of specimens of *Physatocheila smreczynskii*. Based on 3 specimens.

Genus ***Stephanitis*** Stål, 1873

~ 77 species, 3 in Denmark.

**Diagnosis:** Usually pale in colours with various darker patterns. Body with or without hairs. Head with 5 small processes. Hood at pronotum big and covers the head. Pronotum with 3 keels, where the lateral keels are smaller than the central keel. Antennae slender and 3rd antennal segment often the same length as half of the body Length: Legs are slender. Length: ~ 2.6-4.0 mm.

***Stephanitis oberti*** (Kolenati, 1857)

Fig. 1b; 2d; 5b; 48

**Description:** Length 3.2-4.0 mm. Always macropterous. Pronotum brown to black like the head. Paranota, hood and hemelytra pale cream. Hemelytra has a dark pattern in the shape of an 'X'. Antennae and legs pale, except 4th antennal segment and tarsi, which are brown (Fig. 48, Fig. 62). Pronotum with 3 keels. The central keel is lower than the hood, and it is the only keel that is reaching the hood. The lateral keels are small. The hood is large and covers the head. Marginal areas broad with 3-4 rows of cells at centre. Antennae long and thin. Surface not covered with hair (Fig. 48).

**Comparison:** Similar to *Stephanitis takeyai* and *Stephanitis rhododendri*. Especially agrees with the dark X-shaped pattern on hemelytra and the small lateral keels of *Stephanitis takeyai*. Differs from this species by having pale and smaller hood. Paranota is also pale and the pattern at hemelytra has browner and less intense colours than the blacker colours of *Stephanitis takeyai*. From *Stephanitis rhododendri* these are more clearly different by the surface without hairs, marginal areas with less than 5 rows of cells, and central keel at pronotum lower than the hood and less than 4 times as tall as the lateral keels.

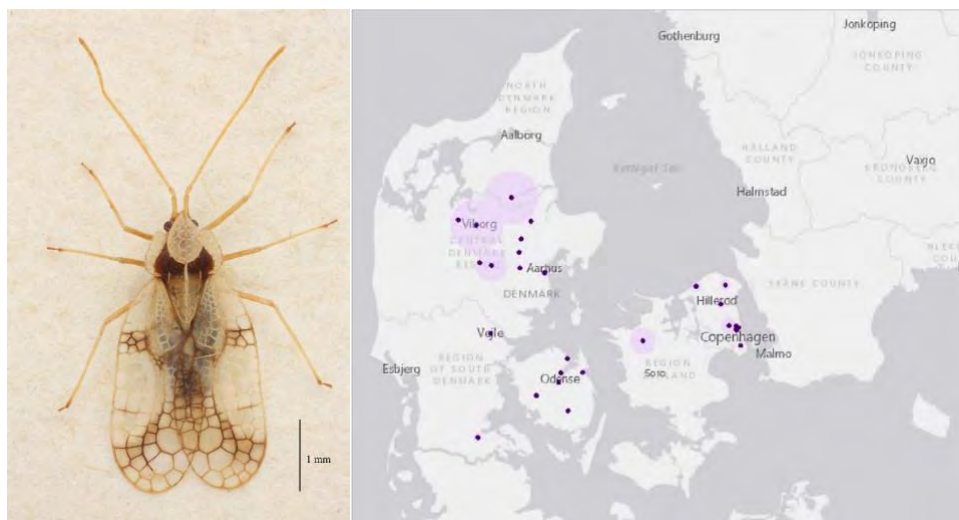
**Host plants:** *Pieris japonica*, *Rhododendron* spp. and *Vaccinium* spp.

**Phenology:** Adults occur from June-October.

**Distribution:** *Stephanitis oberti* is the most common of the Danish *Stephanitis*, with presence in Jutland, Fyn, Zealand and Amager. However, it is not known from Western Jutland,

Southern Zealand, Lolland-Falster-Møn or Bornholm (Fig. 49). The first specimen was found the 21. of July 1902 by Carl C. R. Larsen, although the first registration as a Danish species was not done until 1974 (Andersen & Gaun, 1974). The distribution map of this species is based on 115 specimens.

Records from Albania, Austria, Belarus, Belgium, Central European Russia, Czech Republic, Denmark, East European Russia, Estonia, Finland, Germany, Kaliningrad Region, Latvia, North European Russia, Norwegian mainland, Poland, Sweden and The Netherlands (Péricart & Golub, 1996).



**Fig. 48.** Dorsal view of habitus of *Stephanitis oberti*. **Fig. 49.** Distribution map of *Stephanitis oberti* in Denmark. Based on 115 specimens.

***Stephanitis rhododendri*** Horvath, 1905

Fig. 5a; 50

**Description:** Length 3.2-4.0 mm. Always macropterous. Pronotum brown like the head. Paranota, hood and hemelytra pale cream and hemelytra with a brown transverse region. Antennae and legs pale, except 4. antennal segment and tarsi, which are brown to black (Fig. 50, Fig. 62). Pronotum with 3 keels that are all reaching the hood. The central keel is higher than the hood and 4 times as high as the lateral keels. The hood is convex, large and reaches the front of the head. Marginal area broad with 5 rows of cells. Antennae long and thin. The surface is covered with fine short hairs (Fig. 50).

**Comparison:** See *Stephanitis oberti* for comparison.

**Host plants:** *Rhododendron* spp.

**Phenology:** Adults occur from June-October.

**Distribution:** *Stephanitis rhododendri* has only been found in Allerød (Zealand) and Soesmarke (Lolland) (Fig. 51). The first registration of this species was made in 1964, and this was based on the specimens found in Soesmarke. The distribution map of this species is based on 92 specimens.

Records from Afro-tropical region, Australian region, Belgium, Britain I., Bulgaria, Czech Republic, Denmark, French mainland, Germany, Nearctic region, Poland, Sweden, Switzerland and The Netherlands (Péricart & Golub, 1996).



**Fig. 50.** Dorsal view of habitus of *Stephanitis rhododendri*. **Fig. 51.** Distribution map of *Stephanitis rhododendri* in Denmark. Based on 92 specimens.

***Stephanitis takeyai* Drake & Maa, 1955**

Fig. 5c; 52

*Description:* Length 3.0-3.5 mm. Always macropterous. Pronotum, paranota and hood black. Head dark brown to black and hemelytra pale cream with a black pattern in the shape of an 'X'. Antennae and legs pale (Fig. 52, Fig. 62). Pronotum with 3 keels. The central keel is lower than the hood, and it is the only keel that is reaching the hood. The lateral keels are small. The hood is large and covers the head. Marginal areas broad with 3-4 rows of cells at middle. Antennae long and thin. Surface not covered with hair (Fig. 52).

*Comparison:* See *Stephanitis oberti* for comparison.

*Host plants:* *Pieris japonica* and *Rhododendron* spp.

*Phenology:* Adults occur from June-October.

*Distribution:* The first specimens of *Stephanitis takeyai* in Denmark was found by Henrik Enghoff in Denmark the 10th and the 20th of August 2016 both on *Pieris japonica* at two distinct locations in Gentofte (Zealand). Furthermore, the species has been found by Morten Kofoed-Hansen the 5th of July 2017 in Vaserne (Zealand) and the 7th of July 2017 in Holte (Zealand) (Fig. 53). The distribution map of this species is based on 10 specimens.

Records from Belgium, Bosnia and Herzegovina, Britain I., Czech Republic, Denmark, French mainland, Germany, Italian mainland, Nearctic region, Oriental region, Poland, Switzerland and The Netherlands (Péricart & Golub, 1996).



**Fig. 52.** Dorsal view of habitus of *Stephanitis takeyai*. **Fig. 53.** Distribution map of *Stephanitis takeyai* in Denmark. Based on 10 specimens.

Genus *Tingis* Fabricius, 1803

Genus *Monánthia*: Jensen-Haarup, 1912

~ 122 species, 4 in Denmark.

**Diagnosis:** Yellow-brown to brown, but appear with greyish shades because a white powdery wax that covers the body. Head with often with 3 frontal processes and 2 occipital processes. Pronotum elongated and has 3 keels and the hood is usually low. Surface with varying hairiness and hemelytra without bloated parts. Only minor difference between the sexes. Length: ~ 1.7-4.4 mm.

***Tingis ampliata*** (Herrich-Schäffer, 1838)

Fig. 6d; 54

**Description:** Length 3.0-4.0 mm. Always macropterous. Pronotum, paranota and hemelytra yellow-brown to greyish mottled with brown-black colours. Antennae yellow-brown, except 1st and 4th antennal segments, which are brown-black. Leg segments yellow-brown, except brown-black femur (Fig. 54, Fig. 62). Head with long occipital processes that passes base of the frontal processes. Pronotum with 3 keels. Both paranota and marginal area have 4 rows of cells. Front corners of pronotum angled and protruding (Fig. 54).

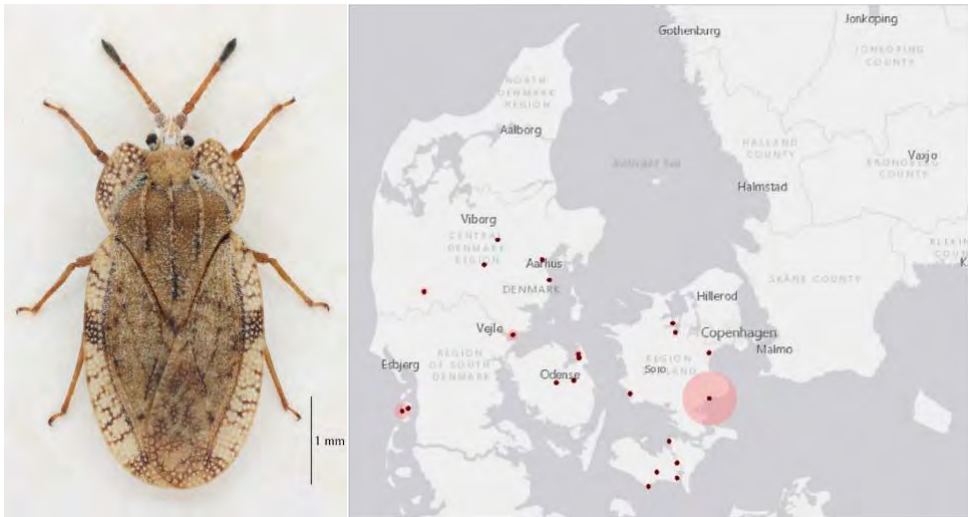
**Comparison:** Similar to *Tingis cardui*. Differs from this species by having long occipital processes, 4 rows of cells at both paranota and hemelytra and protruding front corners of pronotum, while *Tingis cardui* has short or negligible occipital processes, 2-3 rows of cells at paranota and hemelytra and non-protruding front corners of paranota.

**Host plants:** *Cirsium arvense*, *Cirsium palustre* and *Cirsium vulgare*.

**Phenology:** Adults occur throughout the year.

**Distribution:** The first registration of *Tingis ampliata* in Denmark is based on a specimen found at Billitse Mølle (Zealand) the 27th of May 1947 (Andersen & Gaun, 1974). This species is scattered across most of Denmark, but most noticeably it is not collected from Northern Jutland or Bornholm (Fig. 55). The distribution map of this species is based on 23 specimens.

Records from Austria, Belarus, Belgium, Britain I., Czech Republic, Denmark, French mainland, Germany, Hungary, Italian mainland, Liechtenstein, Luxembourg, Moldova, North European Russia, Poland, Romania, Slovakia, South European Russia, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 54.** Dorsal view of habitus of *Tingis ampliata*. **Fig. 55.** Distribution map of *Tingis ampliata* in Denmark. Based on 23 specimens.

***Tingis cardui*** (Linnaeus, 1758)

*Monánthia cárdui*: Jensen-Haarup, 1912

Fig. 2g; 6c; 56

**Description:** Length 3.0-4.0 mm. Always macropterous. Pronotum, paranota and hemelytra yellow-brown to greyish mottled with brown-black colours. Antennae yellow-brown, except 1st and 4th antennal segments, which are brown-black. Femur also brown-black and rest of the leg segments yellow-brown (Fig. 56, Fig. 62). Head with short or negligible occipital processes. Pronotum with 3 keels. Both paranota and marginal area have 2-3 rows of cells. Front corners of paranota non-protruding (Fig. 56).

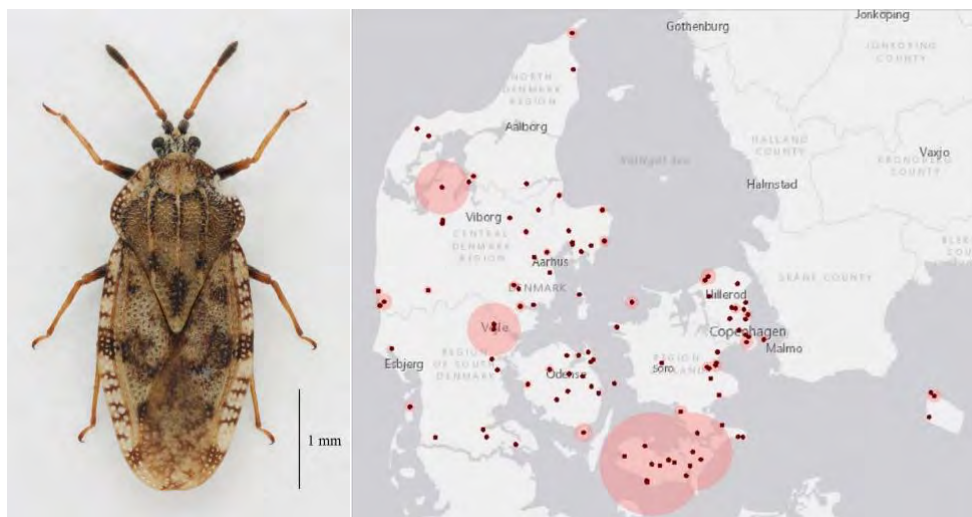
**Comparison:** See *Tingis ampliata* for comparison.

**Host plants:** Asteraceae spp., *Carduus* spp. and *Cirsium* spp.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Tingis cardui* is the most common species of *Tingis* in Denmark and the only one found on Bornholm (Fig. 57). The distribution map of this species is based on 292 specimens from 101 locations.

Records from Albania, Andorra, Austria, Azores Is., Belarus, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Canary Is., Central European Russia, Croatia, Czech Republic, Denmark, East European Russia, Estonia, European Turkey, Finland, French mainland, Germany, Greek mainland, Hungary, Ireland, Italian mainland, Kaliningrad Region, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, North European Russia, Northwest European Russia, Norwegian mainland, Poland, Portuguese mainland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Sweden, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 56.** Dorsal view of habitus of *Tingis cardui*. **Fig. 57.** Distribution map of *Tingis cardui* in Denmark. Based on 292 specimens.

***Tingis crispata*** (Herrich-Schäffer, 1838)

Fig. 6b; 58

**Description:** Length 2.6-3.2 mm. Macropterous only known. Pronotum, paranota and hemelytra yellow-brown to greyish mottles with brown-black colours. All antennal segments and legs red-brown, except tarsi that are sometimes darker apically (Fig. 58, Fig. 62). Head with short occipital processes and pronotum with 3 keels. Paranota has 2-3 rows of cells and marginal areas has 2 rows of cells. Upper surface, antennae and legs covered with short hairs (Fig. 58).

**Comparison:** Similar to *Tingis reticulata*. Agrees in their coverage of hair but differs from this species in having short hairs instead of long hairs like *Tingis reticulata*.

**Host plants:** *Artemisia absinthium* and *Artemisia vulgaris*.

**Phenology:** Adults occur throughout the year.

**Distribution:** The first and only specimens of *Tingis crispata* found in Denmark were found by Jan Pedersen in Denmark the 7th of November 2009 in Gedser (Falster) (Fig. 59). The locality has since been destroyed and turned into a car rest area for the ferry port. It is thus unknown if the species still persists in the area. The distribution map of this species is based on 3 specimens.

Records from Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, French mainland, Germany, Hungary, Italian mainland, Luxembourg, Macedonia, Moldova, North European Russia, Northwest European Russia, Poland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 58.** Dorsal view of habitus of *Tingis crispata*. **Fig. 59.** Distribution map of *Tingis crispata* in Denmark. Based on 3 specimens.

***Tingis reticulata*** (Herrich-Schäffer, 1835)

*Monánthia ciliáta*: Jensen-Haarup, 1912

Fig. 6a; 60

**Description:** Length 4.0-4.5 mm. Always macropterous. Pronotum, paranota and hemelytra yellow-brown to greyish mottled with brown-black colours. Antennae yellow-brown, except 1st and 4th antennal segments, which are brown-black. Leg yellow-brown, except femur, which are brown-black (Fig. 60, Fig. 62). Head with short occipital processes and 3 close together frontal processes that are directed upwards. Pronotum with 3 keels. Both paranota and marginal area have 3-4 rows of cells. Upper surface, antennae and legs covered with long fine hairs (Fig. 60).

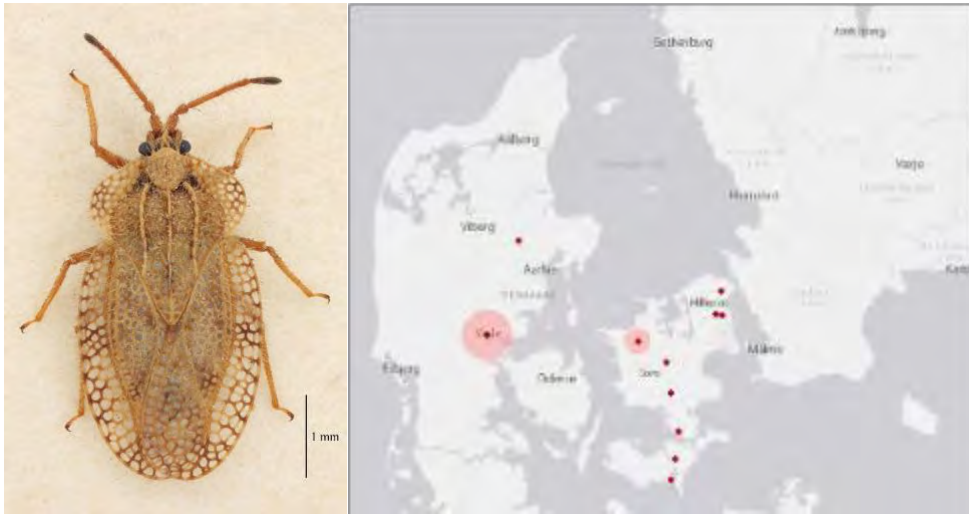
**Comparison:** See *Tingis crispata* for comparison

**Host plants:** *Prunella* spp., *Stachys* spp. and *Verbascum* spp.

**Phenology:** Adults occur throughout the year.

**Distribution:** *Tingis reticulata* has not been recorded for the last 100 years in Denmark. Older records are mostly from Zealand, but there are also records from Jutland, Lolland and Falster (Fig. 61). The distribution map of this species is based on 140 specimens.

Records from Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Britain I., Bulgaria, Croatia, Czech Republic, Denmark, East European Russia, European Turkey, French mainland, Germany, Greek mainland, Hungary, Italian mainland, Kaliningrad Region, Liechtenstein, Luxembourg, Macedonia, Moldova, North European Russia, Northwest European Russia, Poland, Romania, Slovakia, Slovenia, South European Russia, Spanish mainland, Switzerland, The Netherlands and Yugoslavia (Péricart & Golub, 1996).



**Fig. 60.** Dorsal view of habitus of *Tingis reticulata*. **Fig. 61.** Distribution map of *Tingis reticulata* in Denmark. Based on 140 specimens.

## Discussion

### *Challenges of georeferencing*

There can be some bias in the distribution maps since some areas are more likely to be visited by collectors, such as forests and nature areas near cities. This might make the maps a bit unprecise as the species could exist in places where no collecting has been made. Furthermore, there is a tendency that newly found specimens have more accurate locality information (often with GPS-coordinates), while older specimens differ more in the accuracy of the noted localities. This has been considered by marking coordinate uncertainties around locations that have limited georeferencing information.

### *Conclusion*

Most of the Danish Tingidae are easy to identify solely by looking at external morphological characteristics. However, the identification of some species can be challenging because of similar morphological characteristics, but also because of variations among specimens of the same species, which has, especially been the case when investigating the newly found specimens of *Physatocheila smreczynskii* that had long been confused with *Physatocheila costata*.

The fact that *Dictyla humuli*, *Stephanitis takeyai* and *Tingis crispata* have been recently discovered in Denmark suggests that more species are already present or that species are shifting their range, especially from the South as the climate gets warmer. It is therefore very plausible that some of the other potential species are already present or soon to be found in Denmark. The most likely candidate to already be present is *Corythucha ciliata*, due to its already widespread distribution in Europe with records close to the Danish border. It is most likely that this and other new species for Denmark are found Southern parts of Denmark or around larger cities as most of the potential species are xerophilic and have a southern distribution (North Germany). One exception is *Galeatus spinifrons*, which is present in Sweden and therefore the chances of finding this species is higher on Zealand or Bornholm.

There is great variation in the distribution of the distinct species of Danish Tingidae, where some are solely found at one location like *Dictyla humuli*, *Dictyonota fuliginosa* and *Tingis crispata*, and others are widely distributed across the country like *Acalypta parvula* and *Tingis cardui*.



Hopefully this work will be a useful tool in identifying Tingidae and may contribute to the discovery of new species and added phenological, bionomic and distributional knowledge of this family of true bugs.

## Acknowledgment

I wish to thank Curator Henrik Enghoff at the Natural History Museum of Denmark for his expert advice throughout and for making this work possible by providing specimens for observation and georeferencing. Thanks are due to Isabel Calabuig because of her help with the construction of data to make them available for GBIF. I wish to express my appreciation to Curator Thomas Simonsen for providing specimens of the collection at Natural History Museum Aarhus. I wish to offer my gratitude to Jan Pedersen and Anders Alexander Illum for their extraordinary support. Furthermore, I wish to thank Sree Gayathree, Cecilie Svenningsen, Arn Rytter Jensen, Line Kræmer and Frederik Vad for their assistance in realising this project. Thanks, are also due to Lars Skipper, Otto Buhl, Rune Bygebjerg, Lars Thomas, Linda Kjær-Thomsen and the Biowide-project for the supply of specimens, which increases the amount of data and thereby improving the results. My thanks are given to Rune Møenbo Jensen, Christian Lerche Neergaard and Marine Delahaye for proofreading this.

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