

Preliminary Status of the Present Encyrtid Fauna in Denmark, 2 (Hymenoptera, Encyrtidae).

Foreløbig status for den danske encyrtid fauna, 2 (Hymenoptera, Encyrtidae)

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Sammenfatning

Artiklen giver nøglekarakterer og fotos for de 4 danske *Blastothrix* Mayr arter. Ligeledes gives nøglekarakterer og fotos for *Psyllaephagus lusitanicus* (Mercet, 1921), med kommentarer til identiteten af denne art. Endelig nævnes 9 arter, der er indsamlet i 2020-2021, og som er tilføjet listen af encyrtide arter, der er genfundet efter år 2000.

Abstract

The paper provides illustrated diagnoses of the 4 Danish *Blastothrix* Mayr species. Furthermore, an illustrated diagnosis is provided of *Psyllaephagus lusitanicus* (Mercet, 1921) and comments are given on the identity of this species. Finally, 9 encyrtid species are mentioned, collected in 2020-2021, which have been added to the list of encyrtid species recollected after year 2000.

Introduction

This paper is a continuation of the first paper on status of the present Danish encyrtid fauna (Jensen et al., 2019) by adding a number of species to the list of encyrtids collected after year 2000. Furthermore, there is special focus on the Danish *Blastothrix* Mayr species and on *Psyllaephagus lusitanicus* (Mercet), including diagnoses and photos of these species. Finally, trends and tendencies in this preliminary study are discussed. A map is also provided (fig 1) showing all the collecting sites of the encyrtids listed in the first paper on the preliminary status of the present encyrtid fauna in Denmark, and the 26 localities of the 130 Malaise traps, which in 2014 were a part of the major Biowide project that was carried out with the purpose to investigate the variation in natural terrestrial ecosystems in Denmark, for more information on the Biowide project see Brunbjerg et al. (2017). Details on all the collecting sites and Malaise trap localities were given in Jensen et al., 2019.

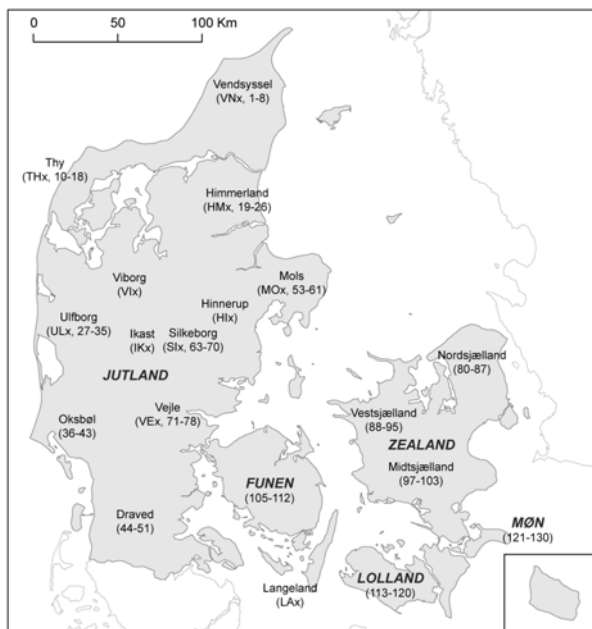


Figure 1: Map of collecting localities, numbers represent trap sites.

Kort over indsamlingslokaliteter, tal repræsenterer forskellige fældesteder.

Materials and methods

Most of the encyrtids were collected using a triangular net on ground vegetation, and a larger more robust beating net used on trees and bushes. All net collected encyrtids were killed using ethyl acetate. Furthermore, some encyrtids were reared from coccids on twigs and sprigs of Broom (*Cytisus*) and Oak (*Quercus*), and from gall midges' galls on Willow (*Salix*). Most encyrtids treated here were glued to card points, above a larger protective card rectangle. A few specimens were selected for slides. If nothing else is mentioned the specimens were collected by the author.

Photos were taken with a Canon EOS M6 mark II, connected to a stereo microscope, Leica M125C or Leica M205C, with a LMscope adapter. Photos were stacked using Zerene Stacker.

The diagnoses were primarily composed with inspiration from the relevant key couplets in the keys by Sugonjaev (1964) and Trjapitzin (1978, 1989) to *Blastothrix* Mayr and *Psyllaephagus* Ashmead (*Calluniphilus* Erdős), occasionally adding characters regarded important in the recognition of these species. In the diagnoses F1 and F2 means funicle segments 1 and 2; width of head (HW) measured in facial view is compared with the minimum width of frontovertex (FVW), see fig 2c.

Additional encyrtid species collected after year 2000

Blastothrix longipennis Howard, 1881 (treated below), *Blastothrix brittanica* Girault, 1917 (treated below), *Cerapterocerus mirabilis* Westwood, 1833 (Mols, near Trehøje, 56.207625, 10.534907, 29.vi.2021, on heather and grass vegetation, 3 ♀; findings of this species has also been reported on Naturbasen.dk by K.W.Sørensen), *Cerchysiella planiscutellum* (Mercet, 1921) (Mols, Strandkær, 56.224486, 10.584189, on Broom (*Cytisus*), 05.viii.2021, 2 ♀), *Copidosoma anceus* (Walker, 1837) (Eastern Jutland, Hinnerup, 56.262751, 10.081465, on Oak (*Quercus*), 13.viii.2020, 1 ♀), *Copidosoma flagellare* (Dalman, 1820) (Eastern Jutland, Mols near Trehøje, 56.207768, 10.534328, on oak (*Quercus*), 05.viii.2021, 1 ♀), *Ectroma arenarium* (Erdős, 1955) (Eastern Jutland, Mols near Trehøje, 56.207750, 10.534248, on oak (*Quercus*), 16.vii.2021, 1 ♀), *Pseudencyrtus misellus* (Dalman, 1820) (Zealand, Karlstrup Kalkgrav, 55.54935, 12.21013, reared from gall of *Rhabdophaga salicis* on Willow (*Salix*), iii.2021, leg. S. Haarder, 2 ♀; Eastern Jutland, Hinnerup, 56.252051, 10.066581, reared from gall of *R. salicis* on Willow (*Salix*), iv.2021, 21 ♀, 3 ♂), *Syrphophagus mamitus* (Walker, 1837) (Eastern Jutland, Hinnerup, 56.262751, 10.081465, on Oak (*Quercus*), 02.viii.2021, 1 ♀) have been added to the list of encyrtid species collected in Denmark after year 2000.

On the Danish *Blastothrix* Mayr species

Blastothrix brittanica Girault, 1917

Mols, near Trehøje, 56.207625, 10.534907, 29.vi.2021, on heather and grass vegetation, 2 ♀ (1 female used for photos).

Short diagnosis. *Female* (length 1.7-2.0 mm): F1 about 2X longer than wide, but shorter than pedicel (7:9), scape about 4X as long as wide (fig 2A); head (HW) about 2,6X as wide as frontovertex (FVW) (fig 2B and 2C); mesoscutum and scutellum with similar sculpture, colour green or green-bluish with golden metallic reflections (fig 2D), tegulae white with dark apices; forewing with linea calva interrupted by narrow bridge of setae below which the outer margin of linea calva is slightly bended towards wing tip (fig 2E), postmarginal vein a little longer than stigmal vein which is slightly longer than marginal vein; fore and hind tarsi distinctly darkened, mid tarsi with lighter metatarsi, mid tibiae with 2 dark band.

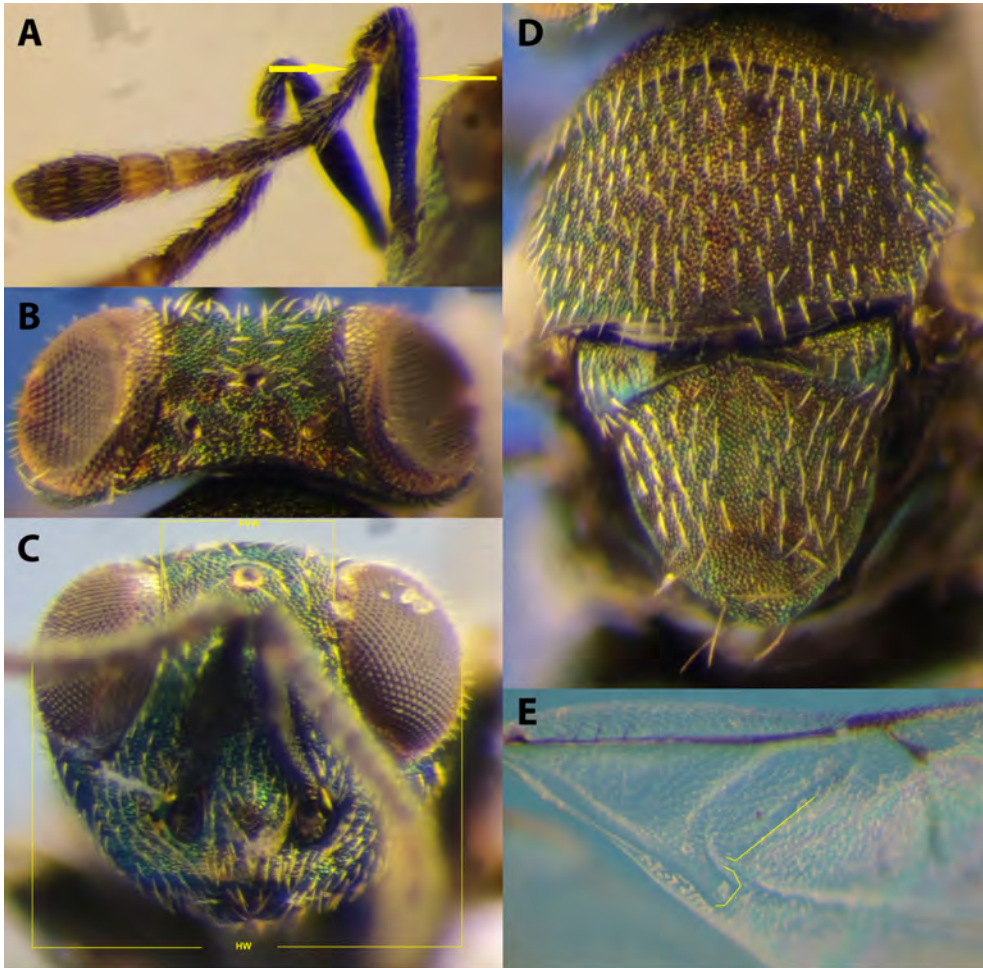


Figure 2: *Blastothrix brittanica* ♀ A. antenna. B. head dorsal view. C. head frontal view. D. thorax dorsal view. E. base of fore wing.

***Blastothrix brittanica* ♀** A. antennae. B. hoved set ovenfra. C. hoved set forfra. D. thorax set ovenfra. E. basis af forvinge.

***Blastothrix longipennis* Howard, 1881**

Mols, Strandkær, 23.viii.1981, leg. P.B.Jensen (1 ex.), Strandkær, 25.viii.1981, leg. P.B.Jensen (5 ex.), Strandkær, 56.229264, 10.579986, ex. *Parthenolecanium corni* (Bouché) on Broom (*Cytisus*) collected 30.vi.2020, 6 ♀ (1 female used for photos), 1 ♂ reared 03.vii.2020; Strandkær, 56.226493, 10.577853, 1 ♀ on oak (*Quercus*).

Short diagnosis. *Female* (length 1.4-1.7 mm): F1 shorter than pedicel (4,5:7), about 1,5X as long as wide, scape often distinctly flattened and broadened (fig 3A), from 2,5X to nearly 3X as long as wide [note: in the so-called "spring time"-generation scape is less wide, appearing cut off on the lower margin, and scape often about 3X as long as wide]; frontovertex relatively narrow, head (HW) 3,3X to 3,5X as wide as frontovertex (FWW) (fig 3B); mesoscutum blue or blue-green with golden metallic reflections, while scutellum appears much darker often almost blackish with weaker metallic reflections (fig 3C); tegulae white with dark apices; forewing with linea calva widely interrupted by bridge of setae below which the outer margin of linea calva is slightly bended towards wing tip (fig 3D), postmarginal vein a little longer than

marginal vein, which is as long as stigmal vein or slightly longer; fore tarsi darkened, mid and hind tarsi yellowish with apical segments darker, mid tibiae with 2 dark bands.

Comments: *Blastothrix longipennis* Howard was added to the list of Danish encyrtids by Skipper (2017) based on six specimens in the collections of Statens Naturhistoriske Museum, Copenhagen (SNM). These six specimens were labeled "DK, Mols, Strandkær, white 6/1 [one 6/2 and one red 0/7], 25.viii.1981, leg. P.B.Jensen", and were originally determined as *Blastothrix confusa* Erdős, det. P.B. Jensen, 1982 (*B. confusa* Erdős is a junior synonym of *B. longipennis* Howard).

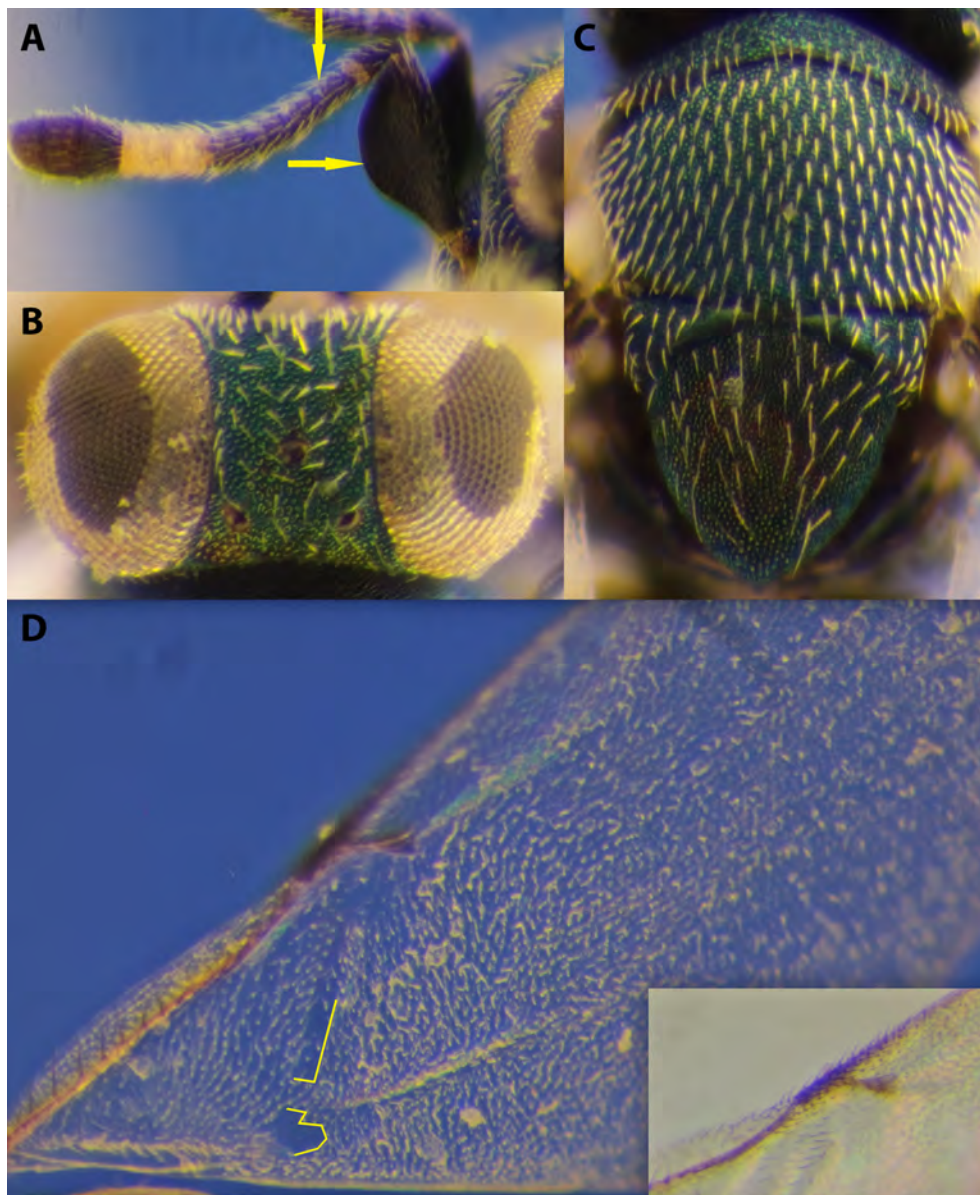


Figure 3: *Blastothrix longipennis* ♀ A. antenna. B. head dorsal view. C. thorax dorsal view. D. fore wing and venation.

Blastothrix longipennis ♀ A. antenne. B. hoved set ovenfra. C. thorax set ovenfra. D. forvinge og nervation.

Blastothrix sericea (Dalman, 1820)

Data of specimens used for diagnosis and photos: see Jensen et al., 2019: 60.

Short diagnosis. *Female* (length 1.5-1.7 mm): F1 at least 2X as long as wide and at least as long as pedicel (8:7,5), scape about 3,5X as long as wide (fig 4A); head (HW) about 2,6X as wide as frontoververtex (FVW) (fig 4B); mesoscutum and scutellum similar sculpture, colour green or green-bluish with golden metallic reflections (fig 4C), tegulae white with dark apices; forewing with outer margin of linea calva practically straight to the posterior margin of forewing, linea calva interrupted by narrow bridge of setae (fig 4D), postmarginal vein a little longer than marginal vein which is slightly longer than stigmal vein; fore and hind tarsi distinctly darkened, mid tarsi dark with lighter metatarsi, mid tibiae with 2 dark bands.

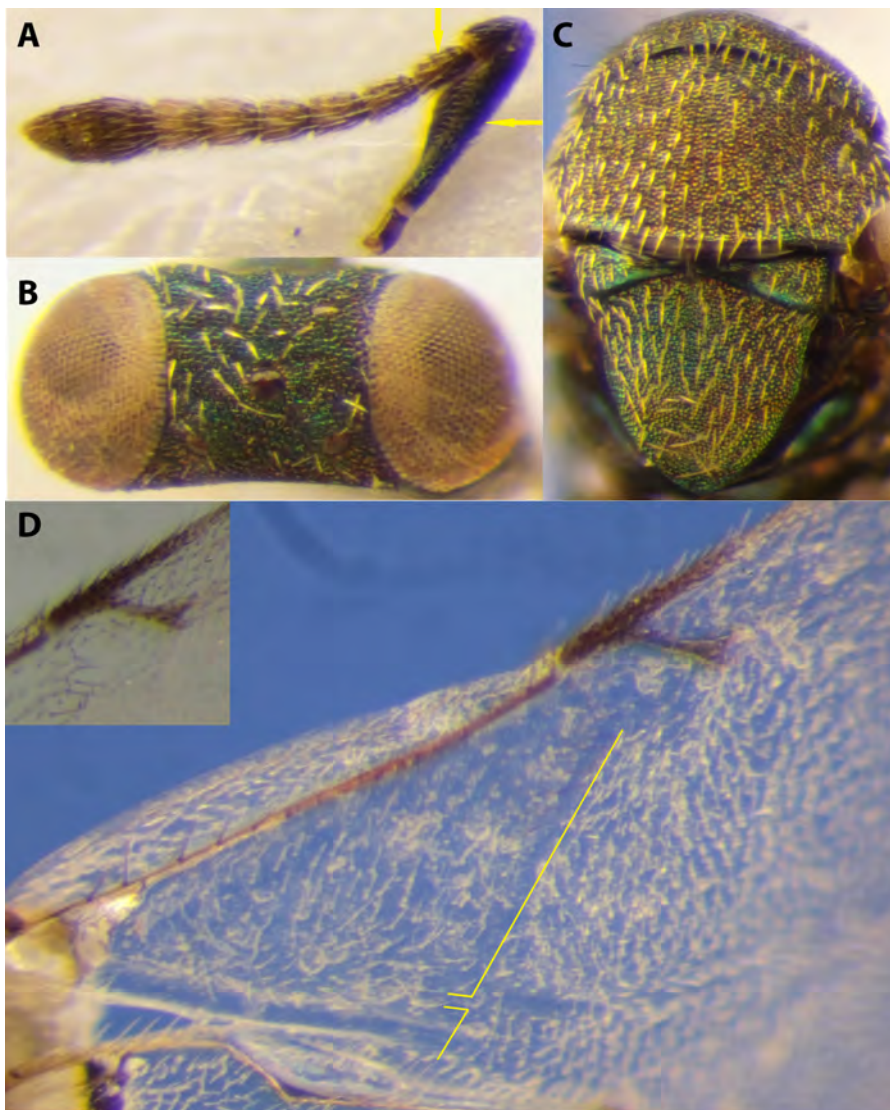


Figure 4: *Blastothrix sericea* ♀ A. antenne. B. head dorsal view. C. thorax dorsal view. D. base of fore wing and venation.

Blastothrix sericea ♀ A. antennae. B. hoved set ovenfra. C. thorax set ovenfra. D. basis af forvinge og nervation.

Blastothrix truncatipennis (Ferriere, 1955)

Data of specimens examined, see Bakkendorf, 1965: 152 (SNM, slides: 36-32, 36-33, 36-34, 36-35). Specimen used for photos: Sweden, BD, Kiruna kommun, Abisko nationalpark, dry alpine birch wood, N68°21.232' E18°46.929', 12.ix-21.ix.2004, Swedish Malaise Trap Project #1228 (Swedish Museum Natural History), Natural History Museum (London) OE Ent-2016-36 (photo label NHMUK 013457240).

Short diagnosis. *Female* (length: 1.1-1.5mm): F1 about half length of pedicel (3,5:7) and less than 1,5X as long as wide, scape about 3,5X as long as wide (fig 5A); head (HW) about 2,6X as wide as frontoververtex (FVW) (fig 5B); sculpture of mesoscutum more superficially reticulate than reticulate sculpture of scutellum, both with blue reflections (fig 5C); tegulae mostly blackish brown with the most proximal part yellowish-light brown; forewing shortened, hardly reaching posterior margin of 1st gastral tergite (fig 5C), fore and hind tarsi at most slightly darker yellow than mid tarsi, mid tibiae with single dark band in proximal half.

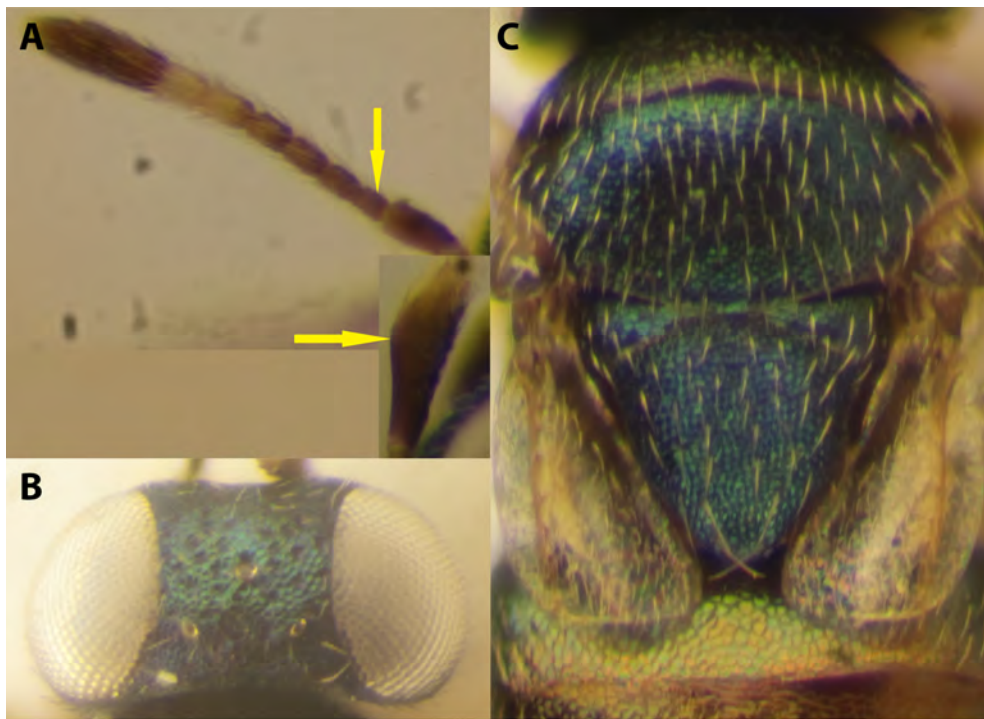


Figure 5: Blastothrix truncatipennis ♀. A. antenna. B. head dorsal view. C. thorax and base of gaster dorsal view.

Blastothrix truncatipennis ♀. A. antennae. B. hoved set ovenfra. C. thorax og basis af gaster set ovenfra.

Psyllaephagus lusitanicus (Mercet, 1921)

Ulfborg, Stråsø, 56.249455, 8.427756, 07.viii.2020, 1 ♀ on heather (used for fig. 6B, 6C, 6D, 6E); **Silkeborg**, Hjøllund, 56.077103, 9.342977, 01.viii.2020, 1 ♀ on on heather-grass vegetation (used for fig 6A); **Silkeborg**, Hjøllund, 56.066502, 9.410784, 22.vii.2021, 1 ♀ on heather-grass vegetation (used for fig 6H); **Mols**, near Trehøje, 56.207658, 10.534938, 17.

viii.2020, 1♂ heather-grass vegetation (used for fig 6F, 6G). For more data see Jensen et al., 2019: 62.

Diagnosis. *Female* (length 0.9-1.1 mm): all coxae brownish-black, all femora mostly black, knees yellow-white, fore tibiae yellowish somewhat darkened basally, mid tibiae yellowish with brown-blackish ring in basal half (fig 6A); scape about 5,5X as long as wide, pedicel about as long as F1+F2, club about as long as 4 preceding funicle segments, club indistinct and incomplete segmented (fig 6B); head (HW) about 2,4X-2,6X as wide as frontoververtex (FVW), ocelli in an obtuse angle (approx. 110°) (fig 6C); postmarginal vein about as long as marginal vein, both shorter than stigmal vein (fig 6D); sculpture of mesoscutum shagreen, colour bluish to golden-blue-green, sculpture of scutellum longitudinal striated, colour green often appearing darker than mesoscutum (fig 6E); interantennal prominence with several coarse whitish setae, fewer and less obvious than in males.

Short diagnosis. *Male* (length 0.9-1.1 mm): lower face and interantennal prominence covered with many coarse whitish setae (fig 6F), F1 about 1,9X as long as wide and longer than any of the following funicle segments (fig 6G).

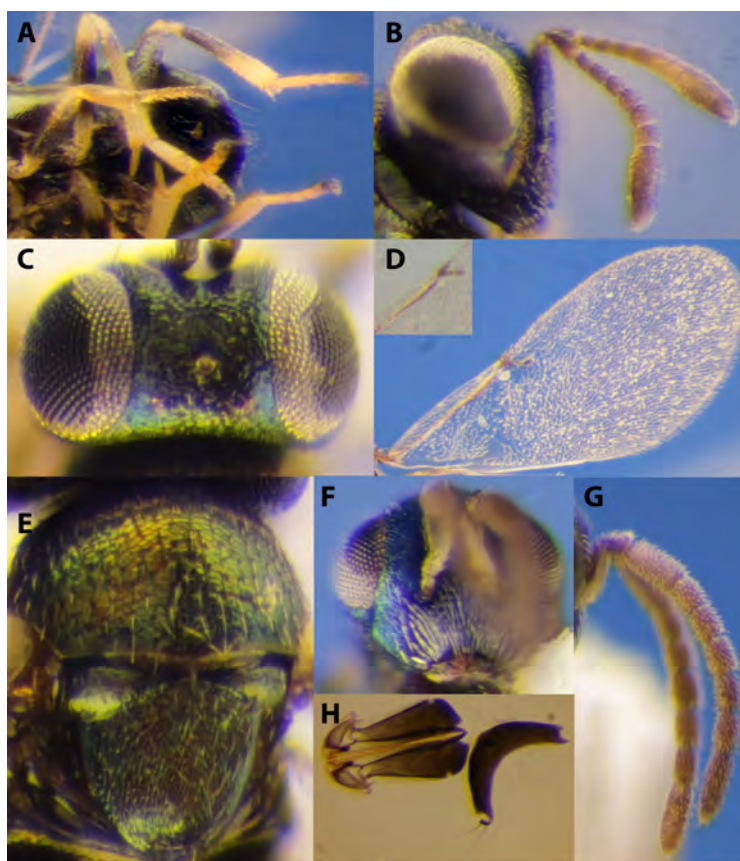


Figure 6: *Psyllaephagus lusitanicus* ♀ A. legs. B. head and antenna lateral view. C. head dorsal view. D. fore wing and venation. E. thorax laterodorsal view. H. ovipositor and syntergum. ♂. F. head frontal view. G. antenna.

Psyllaephagus lusitanicus ♀ A. ben. B. hoved og antenne set fra siden. C. hoved set ovenfra. D. forvinge og nervation. E. thorax set skævt ovenfra. H. ovipositor og syntergum. ♂. F. hoved set forfra. G. antenne.

Comments: Bakkendorf (1965: 140-142) described what he assumed was the female of *Copidosoma lusitanicum* Mercet, 1921, and designated this species the type-species of his new genus *Mercetia* (synonym of *Psyllaephagus* Ashmead). Graham (1969: 249) claimed that if Bakkendorf's interpretation of *lusitanicum* Mercet was correct, then *Copidosoma lusitanicum* Mercet was identical with *Psyllaephagus cocci* Alam, 1957. Noyes (1981: 171) stated that *cocci* Alam was a synonym of *lusitanicum* Mercet.

In Trjapitzin's keys to the European *Calluniphilus/Psyllaephagus* species (1978: 301) the specimens, used for the here given diagnosis of *lusitanicum* (Mercet), runs to *Calluniphilus vendicus* Erdős, 1961, likewise in Trjapitzin's key to Palaearctic species of *Psyllaephagus* (1989: 262) these specimens of *lusitanicum* (Mercet) runs to *Psyllaephagus vendicus* (Erdős, 1961).

Though Graham (1969: 249) proposed *Calluniphilus vendicus* Erdős, 1961 a synonym of *Psyllaephagus cocci* Alam, 1957, Trjapitzin apparently hesitated in following this synonymy, probably due to divergent details in the original descriptions of *cocci* by Alam and of *vendicus* by Erdős, respectively. According to Alam *cocci* has the occipital margin acute, tegulae dark brown, pedicel longer than F1+F2, club longer than the preceding 4 funicle segments, and the type specimens were reared from a coccid, *Asterolecanium variolosum* (Ratz.) (synonym of *Asterodiaspis variolosa* (Ratzeburg, 1870) on *Quercus robur*, while most known hosts of *Psyllaephagus* species are psyllids (Noyes & Hanson, 1996: 126; Trjap, 2012: 908). The diagnosis here presented is in accordance with Bakkendorf's interpretation of *Psyllaephagus lusitanicum* (Mercet, 1921). All of the *lusitanicum* specimens used for this diagnosis were collected on or near *Calluna vulgaris*, like the type specimens of *vendicus* Erdős. These specimens are conspecific with the specimens Bakkendorf used for his description of *Mercetia lusitanica* (Mercet), and they have occiput margined but not acute, tegulae whitish with dark brown apices, pedicel is about as long as F1+F2, and club about as long as the preceding 4 funicle segments.

Finally, it should be mentioned that there are no obvious differences between Alam's fig 69, of the ovipositor of *Psyllaephagus cocci*, and the ovipositor of one of the females (fig 6H) used for the present diagnosis; note the ovipositor of *Psyllaephagus lusitanicus* (Mercet) is slightly shorter than the length of mid tibia (11:13). Thus, the proposal of Graham that *Calluniphilus vendicus* Erdős, 1961 is a synonym of *Psyllaephagus lusitanicus* (Mercet, 1921) is hereby supported. Hopefully it will be possible in the future to compare reared material (males+females) conspecific with the lectotype of *Copidosoma lusitanicum* Mercet with primary type material of *Psyllaephagus cocci* Alam and *Calluniphilus vendicus* Erdős respectively, in order to decide conclusively whether Graham (1969) was correct in the suggested synonymies.

Conclusion

The first paper on the preliminary status of the Danish encyrtid fauna listed 73 species collected during 2014-2019. Further 9 species have been added to the list during 2020-2021. Being able to add new species to the list is dependent on the year, on the collecting sites and on the methods used for collecting encyrtids.

Not all of the 141 encyrtid species present on the list of encyrtids collected in Denmark (Skipper, 2017) are likely to be found in Denmark again. Some of the species on the list might have been visitors, given current climate developments, one might expect more visitors from southern countries. Some species may have disappeared due to loss of their preferred habitats. Nevertheless, the author expects to add more species to the list of encyrtids re-found

after year 2000, though for the moment it seems unlikely that the list of encyrtids collected after year 2000 ever again will reach 141 species.

Acknowledgements

Many thanks to Prof. H.Brix, Head of the Department, Biology, University of Aarhus, and to Prof. A. Schramm and Ph.D. J.J.Bjerg, Center of Electromicrobiology, for help in many ways. Also many thanks to S.V.Petersen and I.B.la Cour for help in the laboratory. Finally my sincere thanks to Dr. L.Vilhelmsen for much help with the collections at SNM, University of Copenhagen and to Curator N. Dale-Skey for loan of material from the collections of NHM, London.

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