Preliminary status of the present encyrtid fauna in Denmark (Hymenoptera, Encyrtidae)

Records of Microlepidoptera from Denmark in 2018 (Lepidoptera)

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Abstract

The paper present data on the status of the contemporary encyrtid fauna in Denmark. During 2014-2019 73 encyrtid species were collected, of which 12 species were new to Denmark: *Ageniaspis longicornis* Trjapitzin, *Aphycus shutovae* (Nikolskaya), *Copidosoma charon* Guerrieri & Noyes, *Copidosoma floridanum* (Ashmead), *Copidosoma thebe* (Walker), *Ericydnus apterogenes* Mayr, *Ginsiana obscura* Erdös & Novicky, *Homalotyloidea nowickyi* Hoffer, *Ixodiphagus hookeri* (Howard), *Metaphycus nadius* (Walker), *Metaphycus unicolor* Hoffer and *Trichomasthus danzigae* Trjapitzin.

Sammenfatning

Artiklen giver en foreløbig status på den nuværende fauna af snyltehvepse tilhørende Chalcidoidea-familien Encyrtidae i Danmark, samt sammenligner det indsamlede materiale med listen over Encyrtidae indsamlet før år 2000.

I løbet af perioden 2014-2019 blev der med Malaise fælder og insekt-net fanget 73 encyrtide arter, hvoraf 12 arter var nye for Danmark: *Ageniaspis longicornis* Trjapitzin, *Aphycus shutovae* (Nikolskaya), *Copidosoma charon* Guerrieri & Noyes, *Copidosoma floridanum* (Ashmead), *Copidosoma thebe* (Walker), *Ericydnus apterogenes* Mayr, *Ginsiana obscura* Erdös & Novicky, *Homalotyloidea nowickyi* Hoffer, *Ixodiphagus hookeri* (Howard), *Metaphycus nadius* (Walker), *Metaphycus unicolor* Hoffer and *Trichomasthus danzigae* Trjapitzin.

Det indsamlede materiale giver ikke grundlag for at hævde at faunaen af Encyrtidae har ændret sig signifikant, sammenlignet med listen af arter indsamlet før år 2000, men materialet understreger vigtigheden af at bruge forskellige metoder til at estimere faunaen af disse snyltehvepse.

Introduction

Wasps of the chalcidoid family Encyrtidae are parasitoids of hosts of several insect orders, particularly of Homoptera (mainly Aphidoidea, Coccoidea and Psylloidea) and different families of Lepidoptera. Worldwide several encyrtid species are used in biological control of insect pests.

Papers on the Danish fauna of encyrtids have been published by Kryger (1943 and 1951), Bakkendorf (1965) and Jensen (1983, 1984, 1989a, 1989b). Furthermore, new Danish records were given for a number of species in *Copidosoma* Ratzeburg and *Metaphycus* Mercet by Guerrieri, E. & Noyes, J.S. (2000, 2005). Skipper (2017) lists 141 encyrtid species all collected and recorded from Denmark before year 2000.

This paper describe the first results of a project aiming to estimate the present status of the Danish encyrtid fauna. The idea of the project is to compare the fauna of encyrtids from this decade, with the list of encyrtids collected before the year 2000.

The project is inspired by the many papers concerning the global decline in biodiversity, particular Hallmann et al. (2017) reporting a massive decline in biomass of insects collected with Malaise traps in Germany during almost 30 years. Thus it is the initial goal of the project to investigate whether there has been a significant change in the Danish encyrtid fauna. Since parasitoids in general are placed higher in the trophic levels (Hochberg and Ives, 2000) they are presumed to be vulnerable to decline in the abundance of their hosts. Thus massive

decline in the size (biomass) of encyrtid host populations, might eventually be reflected in the loss of the dependent encyrtid species.

Material and methods

In 2017-2019 most of the encyrtids were collected by P.B.Jensen on warm to hot dry days - often starting before noon. These encyrtids were collected with a triangular sweep net, the Boucek design described and recommended by Noyes (1982). The net swept encyrtids were primarily collected in Jutland, and mostly in dry vegetation in non-cultivated, often protected areas or national parks.

In 2014 encyrtids were collected at sites in Jutland, Zealand, Funen, Lolland and Møn by the Malaise traps as part of the Biowide project (Biowide 2019). 100 of the Biowide project sites were designated by stratified random sampling in order to represent the variation in natural terrestrial ecosystems according to soil moisture, soil fertility and biomass (successional stage) and in addition 30 sites were designated to represent the cultivated landscape including rotational fields, grass leys, oldfields and silvicultural plantations (beech, norway spruce and pedunculate oak). The 130 sites were distributed evenly with 26 sites in each of 5 geographic regions. To collect flying insects a Malaise trap was erected in the center of each site for two periods of 7 days duration, the first period by the end of June and the second period in August. The Malaise trap had the following dimensions; height at the front 190 cm, height at the back 110 cm, length 165 cm and width 115 cm. At the front, a 500 mL collecting bottle was filled two-thirds with 95 % ethanol. In the case of grazing livestock an electric fence measuring approximately 4 × 3 m was erected around the Malaise trap to prevent the animals from knocking the trap over. For further information about design, methods and results of the Biowide project see Brunbjerg et al. (2017) and Biowide website (2019). The practical sorting of the huge trap collected material of insects was guided by L. Brøndum and the specific sorting of the Hymenopterous insects was guided by K.W. Sørensen. Most of the encyrtid material of the Biowide project is preserved in glass tubes with 75% ethanol. Some encyrtids has been dried with HMDS and card mounted, and slides (canada balsam) has been made of a few specimens. The Biowide encyrtid material is stored at the Natural History Museum, Aarhus.

Localities and collecting sites

[Locality, symbol of collecting site, if possible name of collecting site, decimal coordinates, dominating plants on collecting site.]

Himmerland: HMA, 56.835000, 10.250667, grasses below oaks; HMB, 56.846861, 10.228833, grasses below beeches; HMC, 56.835005, 10.250661, grasses below oaks; HMD, 56.845429, 10.208701, grasses on south facing slope; HME, 56.855917, 10.242976, grasses below oaks and alders; HMF, 56.835476, 10.253193, grasses among junipers; HMG, 56.840547, 10.260196, grasses along edge of oak and spruces; HMH, 56.846380, 10.191653, vegetation on raised bog; HMJ, 56.842090, 10.228670, grasses along wood road; HMK, 56.846744, 10.226890, grasses among junipers.

Hinnerup: HIA, Kvottrup skov, 56.223767, 10.078601, vegetation between 2 small wood ponds; HIB, Kvottrup skov, 56.224371, 10.077931, grasses along southern woodland edge; HIC, Teglværkssøerne, 56.270853, 10.074421 , vegetation between small lakes; HID, Søftendalen, 56.254999, 10.085441, grasses, heather and flowers on a slope; HIE, Nørreris skov, 56.230037, 10.055268, grasses along wood road; HIF, Teglværkssøerne, 56.268873, 10.072026, vegetation near small lake; HIG, Grundfør-Søften, 56.253076, 10.098268,

grasses along wood road; HIH, Trigevej, 56.245578, 10.121905, on trees of hazel, oak and alder; HIJ, Søften, 56.244580, 10.071604, wet area with alder trees.

Ikast: IKA, Harrild Hede, 56.030222, 9.207561, grass vegetation on wood path; IKB, Harrild Hede, 56.023542, 9.191602, grasses and heather; IKC, 56.025886, 9.191522, mainly cross-leaved heath, heather and grass; IKD, 56.026839, 9.193778, cross-leaved heath, heather and grass.

Langeland: LAB, Nær Gulstav Mose, 54.730171, 10.688764, slope with grasses and flowers; LAC, nær Ristinge, 54.818881, 10.641056, grass vegetation among trees.

Mols: MOA, Strandkær, 56.229250, 10.569389, grasses and flowers; MOB, Strandkær, 56.230026, 10.570147, grasses and flowers; MOC, Strandkær, 56.228758, 10.578391, grasses and flowers; MOD, Strandkær, 56.228956, 10.582752, grasses below oaks; MOE, Strandkær, 56.228758, 10.578391, grasses and flowers; MOF, Strandkær, 56.229240, 10.569394, grasses and flowers; MOG, Tyvelhøj, 56.226401, 10.543055, grasses along young beeches; MOH, Strandkær, 56.227588, 10.570977, heather; MOJ, Strandkær, 56.228380, 10.577971, grasses below oaks; MOK, Strandkær, 56.229329, 10.583523, grasses along a path; MOL, Strandkær, 56.229432, 10.583191, on oaks.

Silkeborg: SIA, Them-Fogstrup, 56.074139, 9.516284, grasses and flowers; SIB, Gludsted Plantage, 56.055719, 9.457342, grasses and heather; SIC, Vrads Sande, 56.45914, 9.435612, grasses and heather; SID, 56.049324, 9.683337, grasses along unpaved road; SIE, s.o. Asklev, 56.066233, 9.466207, grasses along conifers; SIF, Hjarbæksvej, 56.069182, 9.647867, grasses and populus; SIG, Gjern, Åshøj, 56.226658, 9.704431, grasses along wood road; SIH, Gjern, Åshøj, 56.225689, 9.705354, grasses along trees and bushes.

Thy: THA, Isbjerg, 57.043405, 8.614617, grasses in a wood clearing; THB, Isbjerg, 57.042828, 8.613410, grasses along unpaved road; THC, Nors, 57.022764, 8.623457, grasses, heather and blackberries; THD, Nors, 57.023314, 8.623176, grasses and heather along unpaved road.

Ulfborg: ULA, Stråsø plantage, 56.247549, 8.431017, grass vegetation on plantation path; ULB, Stråsø plantage, 56.246931, 8.498377, on cross-leaved heath and bog asphodel; ULC, Stråsø plantage, 56.239244, 8.488666, grass vegetation; ULD, 56.247311, 8.430250, grass vegetation on plantation path; ULE, 56.243654, 8.498291, sparse flowering vegetation along road; ULF, 56.219062, 8.451768, vegetation along edge of wood; ULG, 56.249824, 8.491103, on young beeches; ULH, 56.239537, 8.487348, heath vegetation along northern edge of wood; ULJ, 56.246238, 8.492986, on vegetation with heather and cross-leaved heath.

Vejle: VEA, Randbøl Hede, 55.672959, 9.174853, grass vegetation among spruce; VEB, Randbøl Hede, 55.672727, 9.180586, grass vegetation between rows of young oaks.

Vendsyssel: VNA, Ålbæk plantage, 57.587611, 10.370556, grasses, heather and shrubs; VNB, Ålbæk plantage, 57.587598, 10.370565, grasses, heather and shrubs.

Viborg: VIA, Hald Ege, 56.391778, 9.323472, grasses below oaks; VIB, Mønsted, 56.448500, 9.159016, grasses in a wood clearing; VIC, Mønsted, 56.454698, 9.165807, vegetation along path.

BIOWIDE. The 15 minor locations of the encyrtid collecting Malaise traps listed below are grouped into the 5 major locations, i.e. *JUTLAND, ZEALAND, FUNEN, LOLLAND* and *MØN*. For more information about placements of traps see Ejrnæs, 2018.

For each Malaise trap the name of the trap site is given first, next in parenthesis follow (**the trap number**, and the decimal coordinates).

Subsequently details on the collection periods are given.

***JUTLAND* - Vendsyssel:** Råbjerg Kirke (**1**; 57.628228, 10.363734); Uggerby Strand (**2**; 57.588226, 10.078023); Vandplasken (**5**; 57.517748, 9.879929); Bunken (**8**; 57.643159, 10.407023).

Thy: Kællingdal (**10**; 57.116895, 8.655690); Raspkær (**12**; 57.037415, 8.560815); Tømmerby Fjord (**13**; 57.054335, 8.929985); Tovsigvej (**17**; 57.044939, 8.911877); Østerild (**18**; 57.044871, 8.874824).

Himmerland: Buderupholm (**19**; 56.853786, 9.862110); Urskoven (**20**; 56.815345, 9.835868); Høstemark Engskov (**22**; 56.937466, 10.216155); Regan Vest (**24**; 56.823781, 9.800306); Gravlev Kær (**25**; 56.832969, 9.820184); Rold (**26**; 56.813824, 9.851000).

Ulfborg: Husby Klit (**27**; 56.313481, 8.128703); Ejstrup Mose (**28**; 56.167546, 8.378026); Sønderbyvej (**29**; 56.294944, 8.195222); Lilleå (**30**; 56.248835, 8.507933); Ejstrup Eng (**31**; 56.167293, 8.388856); Ejstrup Krat (**32**; 56.170650, 8.372400); Nissum (**33**; 56.318030, 8.162359); Ståsø Plantage (**35**; 56.245258, 8.493947).

Oksbøl: Nymindegab (**36**; 55.820063, 8.174340); Vrøgum Kær (**38**; 55.673837, 8.241797); Kjærgård løvklit (**39**; 55.694231, 8.190771); Lønne (**40**; 55.795078, 8.212821); Blåvand (**41**; 55.562928, 8.080258); Breddal (**42**; 55.684388, 8.169670); Filsøvej (**43**; 55.672621, 8.216409).

Draved: Lovrup (**44**; 55.143216, 8.897732); Helm Hede (**45**; 55.173198, 8.935220); Lindestykket (**46**; 55.011308, 8.959030); Lindet (**47**; 55.207095, 8.950998); Gråbjerg Mose (**50**; 55.017770, 8.984554); Gram å (**51**; 55.292581, 9.067597).

Mols: Elbjerg (**53**; 56.196428, 10.531287); Kalø (**54**; 56.291559, 10.480205); Glatved (**55**; 56.298513, 10.848804); Hestehaven (**56**; 56.287314, 10.471652); Helligkilde (**57**; 56.207091, 10.523338); Tyskertårnet (**58**; 56.100067, 10.529451); Sletterhage (**59**; 56.097140, 10.514068); Strandkær (**60**; 56.222477, 10.587232); Langemosen (**61**; 56.224318, 10.562633).

Silkeborg: Letmose (**63**; 56.103356, 9.358896); Mossø (**64**; 56.053253, 9.704436); Tørvefladen (**65**; 56.088471, 9.398251); Odderholm (**66**; 56.063740, 9.731842); Højkol (**67**; 56.075101, 9.638377); Hårup Sande (**68**; 56.167251, 9.620423); Knagerne (**69**; 56.134134, 9.527719); Gjessøvej (**70**; 56.126177, 9.496243).

Vejle: Bjergfald (**71**; 55.675799, 9.850811); Vejle Fjord (**72**; 55.691912, 9.730525); Brøndsted Fælled (**73**; 55.610451, 9.689242); Rands Fjord (**74**; 55.606601, 9.693193); Svinholt (**75**; 55.667135, 9.545472); Vesterskov (**76**; 55.683902, 9.857507); Rand skov (**77**; 55.688955, 9.869621); Grund skov (**78**; 55.691236, 9.752403).

ZEALAND* - Nordsjælland*: Melby Overdrev (**80**; 56.018518, 11.991503); Strødam (**81**; 55.956921, 12.272082); Birkemose (**82**; 55.968268, 12.271631); Maglemose (**83**; 55.999898,

12.316174); Toggerup Tørvemose (**84**; 55.984604, 12.292789); Ellemose (**85**; 56.022596, 12.100333); Tisvilde Hegn (**86**; 56.044201, 12.073409); Tibberup Holme (**87**; 55.987262, 12.250850).

Vestsjælland: Diesbjerg (**88**; 55.826565, 11.436194); Eskebjerg Enghave (**90**; 55.727489, 11.275177); Malles Næs (**91**; 55.705219, 11.201670); Kaldred Kær (**92**; 55.703663, 11.235818); Skamlebæk (**93**; 55.836474, 11.423247); Røsnæs Krat (**94**; 55.734746, 10.893507); Røsnæs (**95**; 55.740787, 10.897274).

Midtsjælland: Suserup skov (**97**; 55.379935, 11.556861); Brosby Vesterskov (**98**; 55.383699, 11.594105); Avnsø (**99**; 55.565767, 11.884746); Smuldmosen (**100**; 55.552631, 11.883814); Frederikskilde skov (**101**; 55.377402, 11.546706); Kongskilde Friluftsgård (**102**; 55.380196, 11.536214); Fuglebjerg (**103**; 55.315956, 11.534554).

FUNEN: Svanninge Bakker (**105**; 55.122926, 10.247658); Hestebakke (**106**; 55.129913, 10.246687); Dalkildegård (**107**; 55.133386, 10.253405); Iglesø (**108**; 55.120837, 10.317101); Rødme Svinehave (**109**; 55.101155, 10.499767); Skyttegård (**110**; 55.129189, 10.368941); Nybo Mose (**111**; 55.135031, 10.368833); Stævningen (**112**; 55.151529, 10.451618).

LOLLAND: Fuglsang Storskov (**113**; 54.780492, 11.805095); Løgnor (**114**; 54.786190, 11.811390); Bursø (**115**; 54.754579, 11.487209); Fuglsø Mose (**116**; 54.724834, 11.537112); Skelnæs (**117**; 54.751922, 11.554472); Søholt (**118**; 54.745745, 11.551383); Musse Mose (**119**; 54.714594, 11.645631); Hejrede Sø (**120**; 54.742699, 11.599170).

***MØN*:** Klinteskov (**121**; 54.980493, 12.539007); Ulvehale Klit (**122**; 55.054699, 12.270082); Ulvehale Hede (**123**; 55.039926, 12.270185); Busemarke Mose (**124**; 54.967524, 12.451418); Busemarke Sø (**125**; 54.960633, 12.455268); Høvblege (**126**; 54.964627, 12.509723); Timsø Bjerg (**127**; 54.966201, 12.538988); Jydeleje (**128**; 54.986042, 12.526581); Hegnede Bakke (**129**; 55.024282, 12.299520); Lindebakker (**130**; 54.972903, 12.538913).

Collecting periods - trap numbers with bold letters: June-July 2014 (J): 23-30.vi: **36-51+121-130**; 24.vi-01.vii: **53-61**+**71-78**+**97-103**+**113-120**; 25.vi-02.vii: **27-35**+**63-70**+**105-112**; 26.vi-03.vii: **10-26**+**88-95**; 27.vi-04.vii: **1-8**+**80-87**. August 2014 (A): 04-11.viii: **36-51**; 05-12.viii: **53-61**+**71-78**+**121-130**; 06-13.viii: **27-35**+**63-70**+**90-95**+**113-120**; 07-14.viii: **10-26**+**97-112**; 08-15.viii: **1-8**+**80-87.**

Results

The following species were collected by net-sweeping or with Malaise-traps, except for the reared *Blastotrhrix sericea* (Dalman) specimens.

[Species name, perhaps Danish record based on synonymous name, data of net collected encyrtids: site, datum, number of females and males - Biowide data: collecting period, trap number, number of females and males]

Tetracneminae

Aglyptus rufus (Dalman, 1820). ULC, 29.vi.2019, 1♂; ULH, 26.viii.2019, 1♀.

Anagyrus belibus (Walker, 1837) (*Doliphoceras belibus* in Jensen, 1984). HID, 15.v.2018, 1♀; HID, 20.v.2018, 1♀, 2♂; HMA, 24.vii.2018, 1♂; MOB, 26.vi.2018, 1♂; MOC, 26.vi.2018, 1♂. - A: **125**: 1♀.

Charitopus fulviventris (Förster, 1860). MOA, 13.viii.2017, 1♀; VNA, 23.v.2018, 1♂.

Dinocarsis hemiptera (Dalman, 1820). THA, 9.viii.2018, 1♀; ULE, 29.vi.2019, 11♀.

Ericydnus apterogenes Mayr, 1876 (**new record**). MOF, 13.viii.2017, 1♀; SIA, 19.vi.2018, 1♀ - A: **119**: 1♀.

Ericydnus strigosus (Nees, 1834). HID, 22.viii.2017, 1♀, 1♂; VIA, 02.viii.2018, 1♂; HID, 15.v.2018, 1♀. - J: **109**: 1♀; A: **59**: 1♀.

Ericydnus ventralis (Dalman, 1820). SIG, 15.viii.2018, 1♀. - J: **36**: 1♀.

Leptomastix epona (Walker, 1844). ULB, 24.vii.2019, 1♂.

Rhopus sulphureus (Westwood, 1837). J: **74**: 1♀.

Encyrtinae

Ageniaspis fuscicollis (Dalman, 1820). A: **94**: 1♀.

Ageniaspis longicornis Trjapitzin, 1968 (**new record**). J: **83**: 1♀.

Ageniaspis testaceipes (Ratzeburg, 1848). MOL, 03.vi.2019, 1♀ - A: **108**: 1♀.

Aphycoides clavellatus (Dalman, 1820). HMC, 24.vii.2018, 1♀ - A: **47**: 1♀.

Aphycus apicalis (Dalman, 1820). J: **28**: 1♀.

Aphycus shutovae (Nikolskaya, 1952) (**new record**). A: **53**: 1♀.

Baeocharis pascuorum Mayr, 1876. IKB, 03.viii.2019, 1♂ - A: **7**: 1♂.

Blastothrix sericea (Dalman, 1820). HIJ, 03.vi.2019, 3♀, reared from Eulecanium tiliae L.

Bothriothorax aralius (Walker, 1837). HIA, 07.viii.2018, 1♀; HIA, 22.viii.2018, 1♀; HME, 24.vii.2018, 1♀.

Bothriothorax intermedius Claridge, 1964. A: **75**: 1♀.

Bothriothorax clavicornis (Dalman, 1820). A: **7**: 1♀.

Cerchysius subplanus (Dalman, 1820). THC, 09.viii.2018, 1♀ - J: **126**: 1♀; A: **80**: 1♀.

Cheiloneurus elegans (Dalman, 1820). HMD, 07.vi.2018, 9♀; MOE, 26.vi.2018, 2♀.

Choreia inepta (Dalman, 1820). SIB, 02.viii.2017, 1♀, 1♂; HID, 22.viii.2017, 1♀; VIA, 02.viii.2018, 1♀, 3♂.

Copidosoma agrotis (Fonscolombe, 1832) (*Litomastix agrotis* in Jensen, 1984). J: **5**: 1♀; **31**: 4♀.

Copidosoma aretas (Walker, 1838). J: **84**: 1♀; **85**: 1♀; A: **40**: 1♀; **53**: 1♀.

Copidosoma cervius (Walker, 1846). J: **124**: 1♀; A: **67**: 1♀.

Copidosoma chalconotum (Dalman, 1820). HIH, 29.vii.2019, 1♀ - A: **78**: 1♀; **127**: 1♂.

Copidosoma charon Guerrieri & Noyes, 2005 (**new record**). J: **1**: 1♀.

Copidosoma dius (Walker, 1837) (*Copidosoma igneum* in Bakkendorf, 1965). HMF, 03.vi.2018, 1♀; HMH, 03vii.2018, 1♀ - J: **10**: 3♀; **128**: 1♀.

Copidosoma filicorne (Dalman, 1820). HMC, 24.vii.2018, 1♀ - J: **120**: 2♀; A: **103**: 1♂.

Copidosoma floridanum (Ashmead, 1900) (**new record**). HID, 22.viii.2017, 1♀; VIB, 02.viii.2018, 1♀; VIC, 02.viii.2018, 1♀; HIF, 31.vii.2018, 4♀; HME, 03.vii.2018, 8♀; HME, 24.vii.2018, 6♀; HMG, 24.vii.2018, 2♀; HMK, 24.vii.2018, 1♀ - J: **8**: 1♀,2♂; **58**: 1♀; **64**: 1♂; **66**: 1♀; **87**: 1♀; **92**: 1♀; **109**: 2♀; **122**: 2♀; **125**: 3♀; **129**: 2♀; A: **14**: 1♀; **16**: 2♀; **18**: 7♀; **23**: 2♀; **25**: 2♀; **30**: 1♀; **31**: 1♂; **40**: 11♀; **41**: 1♀; **44**: 2♀,1♂; **46**: 1♀; **53**: 3♀; **54**: 1♀; **60**: 1♀; **61**: 37♀; **64**: 6♀; **65**: 2♀; **66**: 4♀; **68**: 2♀; **71**: 2♀; **73**: 1♀; **74**: 1♀; **76**: 1♀; **90**: 1♀; **101**: 1♀; **108**: 1♀; **112**: 1♀; **115**: 5♀; **123**: 3♀; **124**: 6♀,1♂; **125**: 5♀.

Copidosoma genale (Thomson, 1876). J: **103**: 3♀,3♂; **125**: 1♀; **129**: 1♀.

Copidosoma peticus (Walker, 1846). J: **41**: 1♀; A: **29**: 1♀; **41**: 1♀.

Copidosoma serricorne (Dalman, 1820). J: **40**: 1♂.

Copidosoma thebe (Walker, 1838) (**new record**). J: **2**: 1♀; **8**: 1♀; **12**: 2♀; **13**: 1♀; **17**: 34♀; **19**: 1♀; **20**: 1♀; **22**: 2♀; **24**: 1♀; **32**: 1♀; **33**: 3♀; **46**: 6♀; **47**: 1♀; **59**: 2♀; **67**: 2♀; **68**: 2♀; **69**: 2♀; **71**: 6♀; **72**: 1♀; **75**: 1♀; **76**: 5♀; **78**: 6♀; **82**: 1♀; **83**: 3♀; **85**: 1♀; **86**: 6♀; **87**: 15♀; **88**: 1♂; **94**: 13♀; **98**: 1♀; **100**: 1♀; **105**: 21♀; **106**: 2♀; **107**: 1♀; **118**: 1♀; **126**: 1♂; A: **26**: 1♀ ; **59**: 1♀.

Copidosoma truncatellum (Dalman, 1820). SIB, 02.viii.2017, 1♀; HID, 27.vi.2017, 4♀; HIG, 20.vii.2017, 2♀; SIA, 19.vi.2018, 1♀; SIE, 19.vi.2018, 6♀; VIA, 02.viii.2018, 1♀; VIB, 02,viii.2018, 1♀; HIF, 30.vi.2018, 3♀; HID, 25.vi.2018, 6♀; HMC, 24.vii.2018, 4♀; HME, 03.vii.2018, 1♀; MOD, 26.vi.2018, 2♀; MOJ, 26.vi.2018, 1♀; MK, 26.vi.2018; 4♀; THB, 09.viii.2018, 1♀ - J: **40**: 1♂; **60**: 3♂; **63**: 1♂; **66**: 1♂; **75**: 1♀,2♂; **80**: 2♂; **88**: 3♂; **91**: 2♀,1♂; **92**: 1♀,5♂; **93**: 1♀,1♂; **94**: 2♀,1♂; **95**: 1♀,1♂; **102**: 1♀; **106**: 1♂; **108**: 1♀; **109**: 2♀,4♂; **111**: 1♂; **115**: 1♀; **119**: 1♀,1♂; **122**: 4♂; **124**: 9♀,3♂; **125**: 1♀; **126**: 1♀,3♂; **128**: 6♂; **129**: 1♂.

Encyrtus infidus (Rossi, 1790). MOD, 26.vi.2018, 1♀ - J: **27**: 1♀,1♂; **28**: 1♂: **42**: 1♀,4♂.

Epitetracnemus intersectus (Fonscolombe, 1832) (*Anabrolepis zetterstedtii* in Bakkendorf, 1965). MOF, 13.viii.2017, 1♀ - J: **108**: 2♂.

Eusemion cornigerum (Walker, 1838). HIB, 30.vii.2018, 1♀ - J: **119**: 1♀; A: **68**: 2♀.

Ginsiana carpetana (Mercet, 1921). MOE, 26.vi.2018, 1♀; LAB, 18.vi.2019, 2♀,6♂; ULF, 29.vi.2019, 3♀,6♂.

Ginsiana obscura Erdös & Novicky, 1955 (**new record**). ULA, 24.vii.2019, 1♀.

Habrolepis dalmanni (Westwood, 1837). SIF, 19.vi.2018, 1♀; HMC, 24.vii. 2018, 1♀ - A: **105**: 1♀.

Homalotyloidea nowickyi Hoffer, 1957 (**new record**). A: **92**: 1♀; **112**: 1♀.

Ixodiphagus hookeri (Howard, 1908) (**new record**). ULJ, 24.vii.2019, 1♀; ULA, 26.viii.2019, 1♀ - A: **21**: 1♀; **22**: 35♀; **23**: 6♀; **24**: 8♀; **32**: 5♀; **35**: 2♀; **39**: 3♀; **43**: 4♀; **47**: 4♀; **57**: 1♀; **67**: 2♀; **70**: 5♀; **75**: 1♀; **76**: 2♀; **77**: 2♀; **81**: 1♀; **98**: 1♀; **99**: 2♀; **100**: 2♀; **113**: 1♀; **114**: 3♀; **121**: 1♀; **130**: 1♀.

Lamennaisia ambigua (Nees, 1834) (*Mercetencyrtus ambiguus* in Jensen, 1984). HIA, 22.viii.2018, 1♀; HIC, 08.viii.2018, 1♀ - J: **119**: 1♀; **125**: 1♀; A: **10**: 10♀; **16**: 1♀; **20**: 1♀; **40**: 1♀; **47**: 1♀; **53**: 1♀,2♂; **54**: 1♀; **91**: 1♂; **95**: 1♀; **107**: 1♀; **116**: 1♀; **122**: 1♀; **124**: 1♂; **125**: 1♂: **128**: 1♀; **129**: 1♂.

Lamennaisia nobilis (Nees, 1834) (*Geniaspidius nobilis* in Jensen, 1984). SIG, 15.viii.2018, 1♀; HIE, 29.viii.2018, 1♀; THB, 09.viii.2018 - A: **7**: 1♀; **18**: 2♀; **59**: 1♀; **66**: 1♀; **85**:1♀; **92**:1♀; **95**: 2♀; **124**: 1♀.

Mahencyrtus comara (Walker, 1837) (*Protyndarichus metallicus* in Bakkendorf, 1965). SIH, 15.viii.2018; SID, 16.viii.2018, 1♀; HMC, 24.vii.2018; 2♀; ULD, 24.vii.2019, 1♀ - A: **74**: 7♂.

Mayrencyrtus imandes (Walker, 1837). J: **44**: 1♀; **47**: 1♀; **50**: 1♀; **72**: 2♀; **87**: 1♀; **97**: 1♀; **105**: 1♀; **117**: 1♀; **122**: 1♀; **128**: 1♀; A: **51**: 1♀; **72**: 1♀; **78**: 1♀; **110**: 1♀; **116**: 1♀.

Metaphycus insidiosus (Mercet, 1921). SIC, 02.viii.2017, 1♀ - J: **2**: 1♀.

Metaphycus nadius (Walker, 1838) (**new record**). J: **108**: 1♀; **123**: 1♀; A: **59**: 1♀,1♂.

Metaphycus unicolor Hoffer, 1954 (**new record**). MOF, 13.viii.2017, 1♀.

Microterys lunatus (Dalman, 1820). J: **86**: 1♀; A: **18**: 1♀.

Microterys tessellatus (Dalman, 1820). MOG, 06.v.2018, 1♀; IKA, 03.viii.2019, 1♀; VEA, 26.vii.2019, 3♀; LAC, 18.vi.2019, 1♀ - J: **27**: 1♂; **41**: 4♂; **67**: 1♀,2♂; **88**: 1♀.

Microterys zarina (Walker, 1837) (*Aschitus zarina* in Jensen, 1989a). VEB, 26.vii.2019, 1♀.

Ooencyrtus telenomicida (Vassiliev, 1904). IKC, 03.viii.2019, 1♀ - A: **122**: 1♀.

Prionomitus mitratus (Dalman, 1820). MOH, 13.viii.2017, 1♀.

Prionomitus tiliaris (Dalman, 1820). SIA, 19.vi.2018, 1♀; MOJ, 26.vi.2018, 1♀ - J: **13**: 2♀.

Psyllaephagus abbreviatus (Hoffer, 1963). ULD, 24.vii.2019, 1♀.

Psyllaephagus lusitanicus (Mercet, 1921). SIB, 02.viii.2017, 2♀; SIC, 02.viii.2017, 2♀.

Sectiliclava cleone (Walker, 1844). J: **66**: 1♀.

Subprionomitus festucae (Mayr, 1876). J: **59**: 2♀; **72**: 1♀; **115**: 1♀; A: **59**: 2♀; **61**:1♀; **74**: 2♀.

Syrphophagus aeruginosus (Dalman, 1820). HME, 03.vii.2018, 1♀ - J: **75**: 1♀.

Syrphophagus ariantes (Walker, 1837). HIF, 31.vii.2018, 1♀.

Syrphophagus aphidivorus (Mayr, 1876) (*Aphidencyrtus aphidivorus* in Bakkendorf, 1965). HIF, 31.vii.2018, 1♀ - A: **102**: 1♀.

Syrphophagus fuscipes (Dalman, 1820). A: **92**: 1♀.

Trechnites fuscitarsis (Thomson, 1876). A: **32**: 1♀; **92**: 1♀.

Trichomasthus cyanifrons (Dalman, 1820). HMJ, 24,vii.2018, 1♀.

Trichomasthus danzigae Trjapitzin, 1978 (**new record**). HMB, 03.vii.2018, 1♀.

Trichomasthus frontalis Alam, 1957. HMG, 03.vii.2018, 1♀.

Trichomasthus marsus (Walker, 1837). HIA, 30.vii.2018, 2♀; HIA, 7.viii.2018, 8♀; HIA, 22.viii.2018, 4♀; HIC, 31.vii.2018, 2♀; HMB, 24.vii.2018, 2♀; IKD, 03.viii.2019, 1♀ - J: **119**: 1♀; A: **68**: 1♀; **85**; 1♀.

Tyndarichus melanacis (Dalman, 1820). SIE, 19.vi.2018, 1♀; ULG, 24.vii.2019, 3♀ - J: **87**: 1♀; A: **16**: 1♀; **17**: 1♀; **57**: 1♀.

Tyndarichus scaurus (Walker, 1837). THD, 09.viii.2018, 1♀ - A: **75**: 1♀.

Zaomma lambinus (Walker, 1838). VNB, 23.v.2018, 1♀ - J: **51**: 1♀; **119**: 1♀.

Summary

In total 73 species are listed above, 12 of these species are new records to Denmark, while the remaining species all had been collected in Denmark before year 2000. The new species to Denmark are *Ageniaspis longicornis* Trjapitzin, *Aphycus shutovae* (Nikolskaya), *Copidosoma charon* Guerrieri & Noyes, *Copidosoma floridanum* (Ashmead), *Copidosoma thebe* (Walker), *Ericydnus apterogenes* Mayr, *Ginsiana obscura* Erdös & Novicky, *Homalotyloidea nowickyi* Hoffer, *Ixodiphagus hookeri* (Howard), *Metaphycus nadius* (Walker), *Metaphycus unicolor* Hoffer and *Trichomasthus danzigae* Trjapitzin.

According to Skipper (2017), 141 Encyrtidae species had been collected in Denmark before year 2000. 61 (43%) of these 141 species are listed above. 12 species (16 %) of the species listed above are new records. The fact that about 43% of the species collected before year 2000 were collected with passive Malaise traps during 2 weeks in 2014 and during the sweep-netting seasons of 2018-2019 hardly reflect a significant drop in the diversity of the Danish fauna of encyrtids. And even though the 12 new records might be interpreted as a change in the encyrtid fauna, it is worth to mention that 7 of the new records were collected only by Malaise traps, and thus these new records might as well reflect the benefit from using different collecting methods. The differences in the collecting methods is emphasized by the fact that 19 of the 73 collected species were collected only by sweep-netting, while 24 of the 73 species species were collected only by Malaise traps.

The Biowide Malaise trap material provide valuable information about the distribution of some of the encyrtids, thus 7 of the 54 species in this material, namely *Copidosoma floridanum* (Ashmead), *Copidosoma thebe* (Walker), *Copidosoma truncatellum* (Dalman), *Ixodiphagus hookeri* (Howard), *Lamennaisia ambigua* (Nees), *Lamennaisia nobilis* (Nees) and *Mayrencyrtus imandes* (Walker) were collected in at least 4 of the 5 geographical regions. In 2014 the Malaise traps collected 93 specimens of *Ixodiphagus hookeri* (Howard), a parasitoid of ticks related to deer, in all 5 regions. It is thus a bit surprising that this relatively common species is new record to Denmark. The fact these many specimens were collected by Malaise traps while only 2 specimens were net-swept emphasizing the importance of using different collecting methods when the fauna of this group of insects is estimated. Hopefully similar intelligently designed national projects like the Biowide project will be possible in the future.

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