

New records of Encyrtidae (Hymenoptera, Chalcidoidea) from Norway, with additional information on host associations

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The material of the family Encyrtidae at the Natural History Museum of Oslo is revised. A total of 22 species is reported for the first time from Norway. Thus, the total number of Norwegian encyrtid species is now 42. Biology and distribution for all species are briefly commented on. New information on host associations is given for several species.

Key words: Hymenoptera, Chalcidoidea, Encyrtidae, new records, host-associations, Norway.

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Introduction

One of the most important groups in biological control of insects harmful to plants is the chalcid family Encyrtidae. They are, together with the family Aphelinidae, successfully used against many pests, especially scale insects (Hemiptera, Coccoidea) (Noyes 1985, Nikolskaya & Yasnosh 1966). More than 400 species have been used worldwide as biological control agents of insect pests (Greathead 1986, Neueschwander et al. 1990, Noyes 1985, 2012). Parasitoids like encyrtids are the major component of many terrestrial ecosystems and may constitute up to 20% of all insect species (LaSalle & Gauld 1991, Godfray 1994, Memmot et al. 1994).

This is the first paper to highlight the

distribution of Norwegian chalcids. The aim is to produce a complete catalogue of Norwegian Chalcidoidea.

Material and Methods

All pinned material of Encyrtidae in the collection of the Natural History Museum of Oslo is revised. For hatched material both order and family affiliations of the hosts are given. For the distribution only occurrence on the continents and in the Nordic countries are usually given. The faunistic divisions within Norway are defined in accordance to Økland (1981), and given in bold in the list below. The «European Invertebrate System» (EIS) follows Endrestøl (2005), and

the coordinates given in the article refer to the «Military Grid Reference System» (MGRS). All records refer to fully labelled specimens in the collections at the Natural History Museum of Oslo.

List of species

Aphycooides clavellatus (Dalman, 1820)

Material examined. HES, Elverum: Star-moen NR [EIS 46, 32V PN 4624 4906 ±25m] 29 July–14 September 2004, 1♀, Malaise-trap [S] / sandy pine forest, leg. L.O. Hansen & E. Rindal.

Biology. Parasitoid on *Physokermes hemi-cryphus* (Dalman, 1826) (Hemiptera, Coccidae) (Voinovich 1986).

Distribution. Europe: Finland and Sweden; North America (Noyes 2012).

Ageniaspis fuscicollis (Dalman, 1820)

Material examined. AK, Oslo: Blindern [EIS 28, 32V NM 9630 4564 ±1000m] ex cocoons of *Yponomeuta evonymella* (Linnaeus, 1758) (Lepidoptera, Yponomeutidae), 2♀♀ 11♂♂ hatched July 1953, leg. A. Bakke; Asker: Brønnøya [EIS 28, 32V NM 8629 3670 ±1000m] ex Lepidoptera-larva [indet.] found on *Prunus spinosa* L., 23♀♀ 12♂♂ hatched 8 June 1980, leg. Torgeir Edland.

Biology. Parasitoid on larvae of Yponomeutidae and Geometridae (Noyes 2012).

Distribution. Europe: Finland and Sweden; North America; Asia (Noyes 2012).

Bothriothorax paradoxus (Dalman, 1820)

Material examined. Ø, Hvaler: Ørekroken [EIS 12, 32V PL 1535 4548 ±25m] 15 August–30 September 2003, 1♀, Malaise-trap [B] / sandy shore / open pine forest, leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Denmark and Sweden; Asia (Noyes 2012).

Bothriothorax ghesquieri Ferrière, 1956

Material examined. BØ, Lier: Gilhusodden NR [EIS 28, 32V NM 7148 2402 ±25m] ex *Lipara*

galls (Diptera, Chloropidae) picked 26 December 2003 on *Phragmites australis*, 2♀♀ hatched April 2004 [ref.4/15], leg. L.O. Hansen.

Biology. No biological information known until now (Noyes 2012); hatched in this study from *Lipara* galls on *Phragmites australis*.

Distribution. Europe: from Spain to Central Europe, not previously recorded from North Europe; Asia (Noyes 2012).

Cerchysius subplanus (Dalman, 1820)

Material examined. AK, Oslo: Østensjø-vannet, Oppsalskrenten [EIS 28, 135m a.s.l.; 32V PM 0257 4104 ±25m] 1–31 August 1996, 4♀♀, Malaise-trap / slope, leg. M. Falck & L.O. Hansen; Oslo: Lindøya [EIS 28, 32V NM 9606 4057 ±50m] 19 July–24 August 2005, 1♀, Malaise-trap, leg. A. Endrestøl & S. Olberg; BØ, Drammen: Underlia [EIS 28, 32V NM 6611 2476 ±25m] 1–31 July 1996, 1♀, Malaise-trap / S-faced slope, leg. L.O. Hansen; Hurum: Verket [EIS 28, 32V NM 7989 0946 ±25m] 6 June–8 July 1995, 1♀, Malaise-trap / sandy slope, leg. L.O. Hansen & O. Hanssen; Modum: Vestre Spone, Verksted [EIS 28, 32V NM 5020 5690 ±25m] May–September 2004, 1♀, Malaise-trap / sandy slope / pine forest, leg. L.O. Hansen & O.K. Hesthagen; BV, Rollag: Vårviken [EIS 35, 32V NM 1443 5315 ±50m] 1–31 August 1994, 1♀, Malaise-trap / sand-pit, leg. L.O. Hansen & B.A. Sagvolden; VE, Tjøme: Sandø N [EIS 19, 32V NL 8379 5031 ±25m] 14 June–20 July 2007, 1♂, Malaise-trap sandy shore [trap A / west of stream] leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden; Asia (Noyes 2012).

Cercobelus jugaeus (Walker, 1837)

Material examined. AK, Oslo: Blindern [EIS 28, 32V NM 9630 4564 ±1000m] 27 May 1953, 1♀, leg. A. Bakke; Oslo: Ullernåsen [EIS 28, 32V NM 9194 4579 ±1000m] 31 May 1953, 1♀, leg. A. Bakke; Asker: Nesøya, Storenga [EIS 28, 32V NM 8622 3794 ±25m] 1–30 May 2003, 1♀, yellow pan-trap / meadow [lok.E], leg. L.O. Hansen; AAY, Arendal: Arendal [Barbu; EIS 6, 2V MK 8689 8060 ± 500m] ex sack of ♀ *Psyche*

?*crassiorella* (Bruand, 1851) (Lepidoptera, Psychidae) picked 18 July 1954, 1♂ hatched, leg. A. Bakke.

Biology. No biological information available until now (Noyes 2012); hatched from sack of *Psyche* (Lepidoptera, Psychidae) (this study).

Distribution. Europe: Sweden and Finland (Noyes 2012).

Cheiloneurus paralia (Walker, 1837)

Material examined. ON, Nordre Land: Austsinni [EIS 45, 177 m a.s.l.; 32V NN 5733 4650 ±50m] 2–3 July 2010, 1♀, yellow pan-trap, leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden; Asia; North Africa (Noyes 2012).

Cheiloneurus submuticus Thomson, 1876

Material examined. BV, Rollag: Vårviken [EIS 35, 32V NM 1443 5315 ±50m] 1–31 July 1994, 1♀, Malaise-trap / sand-pit, leg. L.O. Hansen & B.A. Sagvolden; AAY, Arendal: Tromøy, [Bjelland; EIS 6, 32V MK 9325 7962 ±250m] 18 July 1953, 1♀ 1♂, leg. A. Bakke.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia (Noyes 2012).

Copidosoma tibiale Hoffer, 1970

Material examined. HOI, Ullensvang: Lofthus, Ullensvang forsøksgard [EIS 32, 3–400 m a.s.l., 32V LM 7175 8975 ±500m] ex geometrid larva (Lepidoptera, Geometridae) found 1 July 1962 on *Salix caprea*, 6 exx hatched 12 August 1962 in lab. [1 larva preserved], Leg. T. Edland.

Biology. No information known until now (Noyes 2012); hatched from larva of Geometridae (Lepidoptera) (this study).

Distribution. Europe: Sweden and Finland; Asia (Noyes 2012).

Copidosoma boucheanum Ratzeburg, 1844

Material examined. AK, Oslo: Østensjøvannet, Oppsalskrenten [EIS 28, 135m a.s.l., 32V PM 0257 4104 ±25m] 1–31 August 1996, 1 ex,

Malaise-trap / slope, leg. M. Falck & L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden; Asia (Noyes 2012).

Copidosoma filicorne (Dalman, 1820)

Material examined. AK, Oslo: Lindøya [EIS 28, 32V NM 9606 4057 ±50m] 19 July–24 August 2008, 1 ex, Malaise-trap, leg. A. Endrestøl & S. Olberg; Oslo: Ekebergskråningen SE [EIS 28, 32V NM 9891 4023 ±25m] 17 June–8 July 2008, 1x, Malaise-trap / w-faced slope, leg. A. Endrestøl.

Biology. Parasitoid on *Exoteleia dodecella* (Lepidoptera, Gelechiidae) (Sierpinski 1963).

Distribution. Europe: Finland; Asia; North America (Noyes 2012).

Discodes aeneus (Dalman, 1820)

Material examined. VAY, Mandal: Mandal omegn [EIS 2, 32V MK 0863 3288 ± 2500m] 1–31 August 1923, 1♀, leg. T. Munster.

Biology. Parasitoid on Coccidae (Hemiptera) (Noyes 2012).

Distribution. Europe: Sweden; Asia; North America (Noyes 2012).

Encyrtus swederi Dalman, 1820

Material examined. BØ, Hurum: Mølen [EIS 19, 32V NL 8476 9499 ±250m] 2–4 July 1990, 1♀, sweep-netted, leg. L.O. Hansen; AAY, Grimstad: Reddalsvann [EIS 6, 32V MK 6873 6566 ±100m] 16 July–2 August 1996, 1♀, Malaise-trap, leg. K. Berggren.

Biology. Parasitoid on Coccidae (Hemiptera) (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia; South America (Noyes 2012).

Epitetracnemus intersectus (Fonscolombe, 1832)

Material examined. BØ, Øvre Eiker: Hokksund [EIS 28, 32V NM 5112 2608 ±2500m] picked 1 September 1981, 1♀ hatched July 1982 [no host given], leg. T. Edland.

Biology. Parasitoid on Diaspididae (Hemiptera) (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia; North America (Noyes 2012).

***Eugahania fumipennis* (Ratzeburg, 1852)**

Material examined. **AK**, Sørum: Lørenfallet, Egner [EIS 37, 32V PM 2495 6125 ±25m] 1–30 May 1994, 1♀, Malaise-trap, leg. L.O. Hansen & O. Sørlibråten; Asker: Nesøya, Storenga [EIS 28, 32V NM 8627 3793 ±25m] May–July 2003, 1♀, Malaise-trap/meadow [lok.E], leg. L.O. Hansen; **HES**, Eidskog: Matrand, Midtskogsæter [EIS 38, 33V UG 4326 5694 ±100m] 14 August 2004, 1♂, leg. O. Sørlibråten; Kongsvinger: Dragonmoen [EIS 38, 33V UG 5393 7620 ±25m] 28 May–22 June 2005, 1♂, Malaise-trap, leg. K. Sund; **BØ**, Drammen: Underlia [EIS 28, 32V NM 6611 2476 ±25m] 1–30 May 1994, 1♀, 1–31 August 1994, 1♀, 1–31 August 1995, 2♀♀, 1–31 July 1997, 1♀, Malaise-trap/S-faced slope, leg. L.O. Hansen; Nedre Eiker: Hagatjern, Ryggsetra [EIS 28, 32V NM 5879 2218 ±25m] 1–31 August 1994, 1♀, Malaise-trap/hay-meadow [trap-A], leg. Y. Berg & L.O. Hansen; **BV**, Rollag: Vårviken [EIS 35, 32V NM 1443 5315 ±50m] 1–31 August 1994, 1♀, Malaise-trap/sand-pit, leg. L.O. Hansen & B.A. Sagvolden.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia (Noyes 2012).

***Habrolepis pascuorum* Mercet, 1921**

Material examined. **BØ**, Røyken: Kinnartangen [Kolåsen; EIS 28, 32V NM 7515 2043 ±25m] ex twigs of oak (*Quercus* sp.) 1♀ hatched May 1996, leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012); hatched from twigs of oak (*Quercus*) in this study.

Distribution. Europe: Sweden and Finland; Asia; North America (Noyes 2012).

***Homalotylus flaminus* (Dalman, 1820)**

Material examined. **AK**, Oslo: Lindøya [EIS 28, 32V NM 9606 4057 ±50m] 19 July–24 August 2005, 1♀, Malaise-trap, leg. A. Endrestøl & S. Olberg.

Biology. Parasitoid on coccidiphagous coccinellids (e.g. *Scymnus*, *Chilocorus*) (Cole-optera,

Coccinellidae) (Noyes 2012).

Distribution. Europe: Sweden; Asia; Africa; America; Australia (Noyes 2012).

***Isodromus vinulus* (Dalman, 1820)**

Material examined. **AK**, Oslo: Lindøya [EIS 28, 32V NM 9606 4057 ±50m] 19 July–24 August 2005, 1♀, Malaise-trap, leg. A. Endrestøl & S. Olberg.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia; America (Noyes 2012).

***Microterys lunatus* (Dalman, 1820)**

Material examined. **Ø**, Rygge: Ekeby, Telemarkslunden [EIS 19, 32V NL 9489 8440 ±25m] 21 July–24 August 1992, 1♀, Malaise-trap/oak grove, leg. L.O. Hansen & G. Walberg; **AK**, Oslo: Hovedøya NE, «Kong Sverres utsikt» [EIS 28, 32V NM 9739 4103 ±25m] 7–29 June 2005, 1♀, Malaise-trap/slope, leg. Ø. Gammelfmo & O.J. Lønnve; Oslo: Kastelet [EIS 28, 32V PM 0022 3847 ±1000m] 15–19 June 1887, 1♀, [ref. diary 333a], leg. H. Kiær; **HES**, Kongsvinger: Langerudberget [EIS 38, 33V UG 3548 7514 ± 200m] 15 May 2004, 1♀, leg. O. Sørlibråten; Kongsvinger: Åranstorpet [EIS 38, 33V UG 5787 7682 ±25m] 22 April–16 May 2004, 1 ex, Malaise-trap, leg. Karsten Sund; Kongsvinger: Abborhøgda [EIS 38, 33V UG 5912 7465 ±25m] 10 August–6 September 2003, 1 ex, Malaise-trap/slop, leg. L.O. Hansen & K. Sund; **HEN**, Åmot: Rena [EIS 55, 32V PN 2774 7998 ±2500m] 13 May 1980, 1♀, sweep-netted on *Picea abies*, leg. R. Fardal; **BØ**, Drammen: Underlia [EIS 28, 32V NM 6611 2476 ±25m] June 1992, 1♀, Malaise-trap, leg. L.O. Hansen; **BV**, Rollag: Rollag [centre; EIS 35, 32V NM 1665 5010 ±100m] 5 June 1995, 2♀♀, leg. B. A. Sagvolden.

Biology. Parasitoid on *Physokermes hemicyphus* (Dalman, 1826) (Hemiptera, Coccidae) (Santas 1988).

Distribution. Europe: Sweden and Finland; Asia; Africa; America (Noyes 2012).

***Tetracnemoidea spilococci* Ferrière, 1957**

Material examined. **AK**, Asker: Nesøya

Storenga [EIS 28, 32V NM 8622 3794 ±25m] 1–30 June 2003, 1♀, yellow pan-trap/meadow [lok.E], leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Only Finland, Germany, Russia and China (Noyes 2012).

Trichomasthus cyanifrons (Dalman, 1820)

Material examined. AK, Asker: Nesøya, Storenga [EIS 28, 32V NM 8627 3793 ±25m] 1–30 June 2003, 1♀, Malaise-trap [loc E] / meadow, leg. L.O. Hansen.

Biology. No biological information available (Noyes 2012).

Distribution. Europe: Sweden and Finland; Asia; America (Noyes 2012).

Tyndarichus scaurus (Walker, 1837)

Material examined. Ø, Marker: Øymark, Aspegrend [EIS 20, 32V PL 5134 8963 ±2500m] ex larva *Ypsolopha* sp. (Lepidoptera, Ypsolophidae) on *Malus domestica* found 29 June 1974, 5♀♀1♂ hatched 22 July 1974 in lab. [larva preserved], leg. T. Edland.

Biology. No information known until now (Noyes 2012; hatched from *Ypsolopha* sp. (Lepidoptera, Ypsolophidae) (this study).

Distribution. Europe: Sweden and Finland; Asia (Noyes 2012).

Discussion

With the addition of 22 species of Encyrtidae, the Norwegian list comprises a total of 42 species. However, Hedqvist (2003) gives a total of 170 species from Sweden, so we are to expect to find numerous species in Norway. Ottesen (1993) estimated the number of encyrtids in Norway to be 120 species.

Several of the records in this study give valuable information about host associations. Many species have no biological information at all in the online chalcid database (Noyes 2012). *Bothriothorax ghesquieri* was hatched from *Lipara* galls (Diptera, Chloropidae) on *Phragmites australis*, but we cannot draw any conclusions about the

host association here, because several different species of insects may hide among the *Phragmites* leaves, including easy overlooked scale insects (Hemiptera, Coccoidea). However, *Lipara* is highly unlikely as host. Surprisingly, this was the first record of *B. ghesquieri* from Northern Europe. *Cercobelus jugaeus* was hatched from a sack of *Psyche*, probably *P. crassiorella* (Lepidoptera, Psychidae). This must be considered as a good observation, and represents certainly valuable host information. *Copidosoma tibiale* is certainly associated with geometrid moth larvae, which this hatching clearly shows. Also for this species the biology was previously unknown (Noyes 2012). *Tyndarichus scaurus* attacks larva of *Ypsolopha* sp. (Lepidoptera, Ypsolophidae), which also represents new information.

This revised material represents only a small part of the encyrtids in the collections at the Natural History Museum of Oslo. The next step is to start with the ethanol preserved material. In further works the plan is to sample fresh material, including scale insects and moth larvae for hatching. This may add «new» species to the Norwegian list, but also give more valuable information about host associations, as well.

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