

New records of Encyrtidae (Hymenoptera, Chalcidoidea) from Norway III

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The collection of the family Encyrtidae at the Natural History Museum of Oslo is revised, and this study focuses on the ethanol-preserved material in particular. Sixteen species are reported for the first time from Norway, bringing the total number of Norwegian encyrtids up to 87. Comments on the biology and distribution for these species are given. The aim of this study is to highlight the distribution of the family in Norway and to produce a complete list of the Norwegian Encyrtidae.

Key words: Hymenoptera, Chalcidoidea, Encyrtidae, new records, Norway.

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Introduction

One of the most important agents in biological control of insects harmful to plants is the chalcid family Encyrtidae. They are, together with the family Aphelinidae, successfully used against many pest-species, 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, 2013). 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 fourth paper on Norwegian Encyrtidae based on the collections at the Natural History Museum in Oslo. The previous were Hansen *et al.* (2012), Japoshvili *et al.* (2013) and Japoshvili & Hansen (2013). The aim of these

contributions is to highlight the distribution of the family Encyrtidae in Norway, to produce a complete list of the Norwegian species, and finally provide a catalogue of Norwegian Chalcidoidea.

Material and Methods

This contribution focuses on ethanol-preserved material of Encyrtidae in the collections at the Natural History Museum in Oslo. The material was dried using ethanol and hexamethyldisilazane (HMDZ), then card mounted, or, if necessary, slide mounted following the guidelines of Noyes (2013). For identification the general key for Palaearctic encyrtids (Trjapitzin 1989) was used, in addition to other related publications on lower taxa (e.g. Gibson *et al.* 1997, Guerrieri & Noyes 2009, Graham 1991).

The faunistic divisions within Norway follows Økland (1981), and are given in **bold**.

The coordinates are given in decimal degrees (Grid: *Lat/Lon* hddd.dddd°; datum: *WGS84*). The taxonomy follows Noyes (2013). Data on biology and distribution is extracted from Noyes (2013), and for distribution in Europe all countries are listed, but not for other regions. All records refer to fully labeled specimens deposited in the collections at the Natural History Museum of Oslo.

List of species

Aphycooides speciosus Hoffer, 1965

Material examined: BUSKERUD western [BV], Røllag: Vårviken [N60.01536° E9.25883° ±50m], 3♀ 1–30 September 1994, Malaise-trap / sand-pit, leg. Lars Ove Hansen & Bjørn A. Sagvolden.

Biology: No information (Noyes 2013).

Distribution: Europe: Czech Republic (Noyes 2013).

Bothriothorax proximus Nikol'skaya, 1952

Material examined: AKERSHUS [AK], Oslo: Kværner [N59.9039° E10.7950° ±100m], 1♀ 1–26 June 1990, Malaise-trap, leg. Morten Falck.

Biology: Primary host: Syrphidae (Diptera) (Noyes 2013).

Distribution: Asia [only Kazakhstan and Kyrgyzstan] (Noyes 2013).

Charitopus obscurus (Erdős, 1946)

Material examined: AKERSHUS [AK], Enebakk: Østmarka Nature Reserve, Østre Tonekolldalen [N59.831411° E11.019194° ±500m], 1♀ 20 August 2005, canopy fogging / *Picea abies* / tree # 3, leg. Stein Andersen.

Biology: No information (Noyes 2013).

Distribution: Europe: Bulgaria, Croatia, Czech Republic, Finland, Hungary, Moldova, Romania, Slovakia, Spain and Serbia; Asia (Noyes 2013).

Cheiloneurus claviger Thomson, 1876

Material examined: VESTFOLD [VE], Tjøme: Sandø N [N59.08389° E10.46206° ±10m;

4m asl.], 1♀ 20 July–30 August 2007, Malaise-trap [A] / sandy seashore, leg. Lars Ove Hansen.

Biology: Associated with primary hosts from a variety of species in the following families: Coccidae, Eriococcidae, Kermesidae and Pseudococcidae (Hemiptera); and the following parasitoid host species from the genera *Coccophagus* Westwood, 1833 (Aphelinidae), *Blastothrix* Mayr, 1876, *Metaphycus* Mercet, 1917 and *Microterys* Thomson, 1876 (Encyrtidae) (Hymenoptera) (Noyes 2013).

Distribution: Europe: Austria, Bulgaria, Croatia, Czech Republic, England, France, Germany, Greece, Hungary, Italy, Moldova, Montenegro, Netherlands, Romania, Russia, Serbia, Slovakia, Spain, Sweden and Ukraine; Asia; Africa (Noyes 2013).

Ericydnus aeneus Nikol'skaya, 1952

Material examined: AKERSHUS [AK], Oslo: Lindøya [N59.89147° E10.71670° ±100m], 1♂, 19 July–24 August 2005, Malaise-trap, leg. Anders Endrestøl & Stefan Olberg.

Biology: Reported from the following primary hosts: *Trionymus multivorus* (Kiritshenko, 1936) and *T. perrisii* (Signoret, 1875) (Hemiptera, Pseudococcidae) (Noyes 2013).

Distribution: Europe: Portugal, Romania, Spain and Turkey; Asia (Noyes 2013).

Ericydnus apterogenes Mayr, 1876

Material examined: AKERSHUS [AK], Bærum: Lilløya, Lilløyplassen [N59.8947° E10.5986° ±25m], 1♀ 1 June–31 July 2004, sweep-net / meadow / «Kjærkegårdsenga», leg. Lars Ove Hansen; Oslo: Lindøya [N59.89068° E10.71523° ±100m], 1–19 June 2006, Malaise-trap / meadow / forest edge, leg. Anders Endrestøl; AUST AGDER coastal [AAY], Lillesand: Lillesand, Furulia [N58.2422° E08.3589° ±50m], 1♀ 1 August–30 September 2004, south facing slope / Malaise-trap, leg. Gunnar Wiig.

Biology: No information (Noyes 2013).

Distribution: Europe: Austria, Czech Republic, France, Germany, Romania, Slovakia, Sweden, United Kingdom; Asia (Noyes 2013).

***Ericydnus longicornis* (Dalman, 1820)**

Material examined: BUSKERUD eastern [BØ], Drammen: Underlia [N59.75551° E10.17677° ±10m], 1♀ 1–30 June 1993, Malaise-trap / south facing slope / pine forest, leg. Lars Ove Hansen.

Biology: Reported from the following primary hosts: *Fonsscolombia tomlini* (Newstead, 1892) and *Trionymus multivorus* (Kiritshenko, 1936) (Hemiptera, Pseudococcidae) (Noyes 2013).

Distribution: Europe: Austria, Czech Republic, Finland, Germany, Hungary, Sweden, Switzerland and Ukraine; Asia (Noyes 2013).

***E. robustior* Mercet, 1921**

Material examined: MØRE OG ROMSDAL interior [MRI], Norddal: Tafjord, Fjæra [N 62.2950° E07.3117° ±500m], 1♀ 1♂ 23 June–18 July 1993, Malaise-trap, leg. Lars Ove Hansen & Oddvar Hanssen.

Biology: Reported from the following primary hosts: *Trionymus multivorus* (Kiritshenko, 1936), *T. perrisii* (Signoret, 1875), *Mirococcus inermis* (Hall, 1925) and *Peliococcopsis priesneri* (Borchsenius, 1936), (Hemiptera, Pseudococcidae) (Noyes 2013).

Distribution: Europe: Croatia, Czech Republic France, Germany, Montenegro, Portugal, Spain, Sweden and Turkey; Asia (Noyes 2013).

***Eusemion cornigerum* (Walker, 1838)**

Material examined: VESTFOLD [VE], Tjøme: Sandø N [N59.08389° E10.46206° ±10m; 4m asl.], 1♀ 20 July–30 August 2007, Malaise-trap [A] / sandy seashore, leg. Lars Ove Hansen.

Biology: Reported from a variety of primary hosts species from the families: Coccidae, Diaspididae, Eriococcidae and Pseudococcidae (Hemiptera); and the following parasitoid host species from the genera *Blastothrix* Mayr, 1876, *Metaphycus* Mercet, 1917 and *Microterys* Thomson, 1876 (Encyrtidae) (Hymenoptera) (Noyes 2013).

Distribution: Europe: Belarus, Croatia, Czech Republic, England, Finland, France, Germany, Hungary, Italy, Moldova, Netherlands, Poland, Romania, Slovakia, Spain, Sweden and Switzerland; Asia; Oceania (Noyes 2013).

***Homalotyloidea erginus* (Walker, 1837)**

Material examined: AKERSHUS [AK], Asker: Bjørkås [N59.7919° E10.4975° ±50m], 1♀ 4 June–2 July 1995, Malaise-trap / calcareous slope, leg. Lars Ove Hansen & Oddvar Hanssen; BUSKERUD eastern [BØ], Hurum: Østnestangen [N59.5269° E10.5083° ±50m], 1♀ 26 May – 8 July 1995, Malaise trap / pine forest, leg. Lars Ove Hansen.

Biology: Reported from an undetermined Scolytinae (Coleoptera, Curculionidae) on *Pinus sylvestris* (Noyes 2013).

Distribution: Europe: Czech Republic, France, Netherlands, Slovakia, Spain, Sweden and UK; Asia (Noyes 2013).

***Leptomastix tanasijtshuki* Sharkov, 1983**

Material examined: BUSKERUD eastern [BØ], Drammen: Underlia [N59.75551° E10.17677° ±10m], 1♀ 1–30 June 1992, Malaise-trap / south facing slope / pine forest, leg. Lars Ove Hansen; ROGALAND coastal [RY], Karmøy: Melstokke [N59.2567° E05.3242° ±500m], 1♀ 1–31 July 1995, Malaise-trap, leg. Magne-Henrik Velde.

Biology: No information (Noyes 2013).

Distribution: Asia [only Primor'ye Kraj, Russia] (Noyes 2013).

***Mahencyrtus pulcherrimus* (Hoffer, 1969)**

Material examined: VESTFOLD [VE], Tjøme: Sandø N [N59.08389° E10.46206° ±10m; 4m asl.], 1♀ 14 June–20 July 2007, Malaise-trap [A] / sandy shore, leg. Lars Ove Hansen.

Biology: No information (Noyes 2013).

Distribution: Europe: Czech Republic (Hoffer 1969).

***Mayrencyrtus imandes* (Walker, 1837)**

Material examined: AKERSHUS [AK], Enebakk: Østmarka Nature Reserve, Østre Tonekolldalen [N59.831411° E11.019194° ±100m-], 3♀♀ 20 August 2005, canopy fogging / *Picea abies* / tree # 3, leg. Stein Andersen.

Biology: No information (Noyes 2013).

Distribution: Europe: Austria, Czech Republic, Denmark, Germany, Hungary, Moldova, Romania, Sweden, Ukraine and UK (Noyes 2013).

***Microterys duplicatus* (Nees, 1934)**

Material examined: AKERSHUS [AK], Oslo: Bygdøy, Paradisbukta [N59.89972° E10.66904° ±25m], 1♀ 4 September –10 October 2006, Malaise-trap / meadow, leg. Anders Endrestøl & Stefan Olberg; BUSKERUD western [BV], Rollag: Bråtåsen [N60.0189° E09.2494° ±50m], 1♀ 1 – 30 September 1994, Malaise-trap, leg. Lars Ove Hansen & Bjørn Arve Sagvolden.

Biology: Associated with several primary host species from the genera: *Eulecanium* Cockerell, 1893, *Palaeolecanium* Sulc, 1908, *Parthenolecanium* Sulc, 1908, *Physokermes* Targioni Tozzetti, 1868, *Pulvinaria* Targioni Tozzetti, 1866 and *Rhodococcus* Borchsenius, 1953 (Hemiptera, Coccidae) (Noyes 2013).

Distribution: Europe: Czech Republic, Slovakia, (Kalina 1989), Austria, Belarus, Finland, Germany, Greece, Hungary, Italy, Moldova, Poland, Portugal, Russia, Serbia, Spain and Sweden; Asia (Noyes 2013).

***Trechnites flavipes* (Mercet, 1921)**

Material examined: BUSKERUD Eastern [BØ], Hurum: Tofteholmen [N59.5158° E10.5594° ±50m], 3♀♀ 31 July –1 September 1991, Malaise-trap, leg. Lars Ove Hansen.

Biology: Reported from the following primary hosts: Unidentified aphid species (Aphididae), *Eulecanium franconicum* (Lindinger, 1908) (Coccidae), *Caillardia* Bergevin, 1931 and *Cyamophila* Longinova, 1976 (Psyllidae) (Hemiptera) (Noyes 2013).

Distribution: Europe: Czech Republic (Kalina 1989), Denmark, France, Hungary, Italy, Poland, Slovakia, Spain and Turkey; Asia (Noyes 2013).

***Trichomasthus marsus* (Walker, 1837)**

Material examined: ØSTFOLD [Ø], Eidsberg: Mysen, Ertevatn [N59.49080° E11.46566° ±500m], 1♀ 14 June 2011, Malaise-trap, leg. Ove Sørlibråten.

Biology: Reported from *Phyllostroma myrtilli* (Kaltenbach, 1874) (Hemiptera, Coccidae) (Noyes 2013).

Distribution: Europe: Germany and UK; Asia (Noyes 2013).

Discussion

A total of 16 species of encyrtids not hitherto reported from Norway was recorded in this investigation, and the number of Norwegian species in the family increased to 87. Ottesen (1993) estimated the number of Norwegian encyrtids to 120, but we expect more species in Norway to be discovered in the future. The two species *Charitopus obscurus* and *Mayrencyrtus imandes* were captured by canopy fogging, and this seems to be a useful method for obtaining encyrtids. As most of the studied material was collected using Malaise-traps, we have no information about host associations on these species. However, this reveals valuable information, and may be used to give predictions about the fauna and probable hosts (Japoshvili & Toyganozu 2011) of Norwegian encyrtids.

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