

Chalcid wasps of the family Encyrtidae (Hymenoptera, Chalcidoidea) from Oslo Municipality, Norway, with description of a new species

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This contribution focuses on the family Encyrtidae from Oslo Municipality, one of the richer areas in Norway as biodiversity concerns. The following four species are reported for the first time from Norway: *Metaphycus punctipes* (Dalman, 1820), *Protyndarichoides aligarhensis* (Fatma & Shafee, 1985), *Psyllaephagus belanensis* (Hoffer, 1963) and *Trechnites trjapitzini* Sugonjaev, 1968, and one additional species, *Blastothrix osloensis* sp. n., is described and illustrated. This brings the total number of Norwegian encyrtids up to 141, and 30 of these are recorded from Oslo Municipality. Comments on biology and distribution of the species are given. The aim of this study is to highlight the distribution of Encyrtidae in Norway, and to provide a complete list of the Norwegian species.

Key words: Hymenoptera, Chalcidoidea, Encyrtidae, *Blastothrix osloensis*, new species, Norway, Oslo municipality, Malaise traps, Hemiptera, Coccoidea, Psylloidea, scale insects.

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Introduction

The chalcid family Encyrtidae represents one of the most important agents in biological control of insects occurring as plant pests. 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, 2017). 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 eight publication on Norwegian Encyrtidae based on the collections at the Natural History Museum of Oslo. The previous papers are Hansen *et al.* (2012), Japoshvili *et al.* (2013), Japoshvili & Hansen (2013, 2014, 2015) and Hansen & Japoshvili (2013, 2015). The aim of these contributions is to highlight the distribution of the family Encyrtidae in Norway, and finally provide a catalogue of Norwegian Chalcidoidea. Five species hitherto not reported from Norway are presented, including one species new to science.



FIGURE 1. Map of Norway with Oslo municipality inserted and the involved Malaise traps in this contribution marked with red dots.

Oslo Municipality

This study focuses in particular on the encyrtid fauna of Oslo Municipality (Figure 1), which represents one of the richest areas in Norway concerning biodiversity. The Natural History Museum at the University of Oslo have had ongoing entomological projects for more than a decade, and numerous contributions have been

made (e.g. Elven *et al.* 2014, 2016, Endrestøl 2011). These studies have been funded by various contributors, and the aim has been to investigate the entomofauna in the area. There has been particular focus on less known insect orders as Diptera and Hymenoptera, in particular parasitic species. A list of the species of Encyrtidae recorded from Oslo Municipality is given in Table 1.

TABLE 1. Species of Encyrtidae previously reported from Oslo municipality, Norway.

Species	Locality	Reference
<i>Adelencyrtus aulacaspidis</i> (Brèthes, 1914)	Bleikøya [N]	Hansen & Japoshvili 2015
<i>Ageniaspis fuscicollis</i> (Dalman, 1820)	Blindern	Hansen <i>et al.</i> 2012
<i>Blastothrix longipennis</i> Howard, 1881	Kirkeby, Maridalen,	Japoshvili & Hansen 2013
<i>Bothriothorax proximus</i> Nikol'skaya, 1952	Kværner	Hansen & Japoshvili 2013
<i>Cerchysius subplanus</i> (Dalman, 1820)	Oppsalskrenten, Østensjøvannet	Hansen <i>et al.</i> 2012
	Lindøya	Hansen <i>et al.</i> 2012
<i>Cercobelus jugaeus</i> (Walker, 1837)	Blindern	Hansen <i>et al.</i> 2012
	Ullernåsen	Hansen <i>et al.</i> 2012
<i>Copidosoma boucheanum</i> Ratzeburg, 1844	Oppsalskrenten, Østensjøvannet	Hansen <i>et al.</i> 2012
<i>Copidosoma filicorne</i> (Dalman, 1820)	Lindøya	Hansen <i>et al.</i> 2012
	Ekebergskråningen [SE]	Hansen <i>et al.</i> 2012
<i>Copidosoma floridanum</i> (Ashmead, 1900)	Manglerud, Østensjøvannet	Japoshvili & Hansen 2015
<i>Copidosoma terebrator</i> Mayr, 1876	Kirkeby, Maridalen	Japoshvili & Hansen 2014
<i>Copidosoma thebe</i> (Walker, 1838)	Abildsø, Østensjøvannet	Japoshvili <i>et al.</i> 2013
	Kirkeby, Maridalen	Japoshvili <i>et al.</i> 2013
<i>Copidosoma truncatellum</i> (Dalman, 1820)	Abildsø, Østensjøvannet	Japoshvili <i>et al.</i> 2013
<i>Encyrtus infidus</i> (Rossi, 1790)	Hengsenga, Bygdøy	Japoshvili & Hansen 2014
<i>Ericydnus aeneus</i> Nikol'skaya, 1952	Lindøya	Hansen & Japoshvili 2013
<i>Ericydnus apterogenes</i> Mayr, 1876	Lindøya	Hansen & Japoshvili 2013
<i>Homalotylus flaminus</i> (Dalman, 1820)	Lindøya	Hansen <i>et al.</i> 2012
<i>Isodromus vinulus</i> (Dalman, 1820)	Lindøya	Hansen <i>et al.</i> 2012
<i>Metaphycus zebratus</i> (Mercet, 1917)	Bleikøya [N]	Japoshvili & Hansen 2014
<i>Microterys duplicatus</i> (Nees, 1934)	Paradisbukta, Bygdøy	Hansen & Japoshvili 2013
<i>Microterys lunatus</i> (Dalman, 1820)	Hovedøya [NE]	Hansen <i>et al.</i> 2012
	Kastellet	Hansen <i>et al.</i> 2012
<i>Syrphophagus aeruginosus</i> (Dalman, 1820)	Kirkeby, Maridalen	Japoshvili & Hansen 2013
<i>Syrphophagus ariantes</i> (Walker, 1837)	Svatorsetra, Nordmarka	Japoshvili & Hansen 2015
<i>Syrphophagus pertiades</i> (Walker, 1837)	Bygdøy sjøbad, Bygdøy	Hansen & Japoshvili 2015
<i>Trjapitzinellus nigricornis</i> Hoffer, 1976	Ekebergskråningen [SE]	Japoshvili & Hansen 2013
<i>Zaomma lambinus</i> (Walker, 1838)	Ekebergskråningen [SE]	Japoshvili & Hansen 2013

Material and Methods

This contribution focuses on ethanol preserved material of Encyrtidae from Oslo Municipality in the collections at the Natural History Museum in Oslo. The material was sorted and dried using ethanol and hexamethyldisilazane (HMDS) or critical point dried (CPD), then card mounted,

or, if necessary, slide mounted, following the guidelines of Noyes (2017). For identification, the general key for Palearctic encyrtids was used (i.e. Trjapitzin 1989, Gibson *et al.* 1997), in addition to other related publications on lower taxa (e.g. Guerrieri & Noyes 2000, 2009, Hayat 2006).

The locations for the Malaise traps involved in this publication are shown in Figure 1. The

coordinates are given in decimal degrees (Grid: *Lat/Lon hddd.dddd°*; datum: *WGS84*). The taxonomy follows Noyes (2017). Data on biology and distribution is extracted from Noyes (2017), and for distribution in Europe all countries are listed, but not for other regions. All records refer to fully labeled specimens or slides deposited in the collections at the Natural History Museum of Oslo, and for some duplicates in the collection at the Institute of Entomology, Agricultural University of Georgia.

List of species

Blastothrix osloensis sp. n.

Figures 2A-E; Table 2.

Size: ♀ length about 1.3 mm (ovipositor not exerted) (Holotype) (CPD).

Color: Body mostly dark brown to black; head with green-golden reflection towards toruli, downwards from toruli brown with little metallic reflection; pronotum and mesoscutum with blue metallic reflection; scutellum brown with green-golden metallic reflection; propodeum, metanotum and mesosoma dark brown with green metallic reflection; legs, mesopleuron light brown; joints of legs and tarsi yellow; scape and pedicel brown, rest of antennae dirty yellow or light brown; tegulae basal half light yellow, upper ½ brown.

Characters: Head and scutellum with moderately deep reticulate sculpture on frontovertex of mesh size in ocellar area slightly less than eye facet; frontovertex, face, genae and temple almost without punctures; mandible with one tooth and truncation; torulus separated from mouth margin by about 0.7x its own length; malar space 0.8x as long as eye; antenna with F1 slightly longer than broad; pedicel shorter than F1-2 combined, F6 slightly shorter than broad; clava 3-segmented; Figure 1A; ocelli forming an angle of about 90°; lateral ocelli separated from occipital margin by about 0.7x diameter of ocellus and from eye margins by about ocellus diameter; occipital margin sharp; head 2.5x as wide as frontovertex (Figure 1C); frontovertex 0.8x as long as broad; frontovertex with moderately

dense setae, each slightly shorter than diameter of ocellus; setae on genae similar than those on frontovertex; metasoma almost 1(28:27) as long as gaster; mesoscutum (Figure 1E) with polygonally-reticulate sculpture; scutellum covered with setae as that of mesoscutum; hind tibia not conspicuously broadened and flattened, at least 7.5x as long as broad; fore wing almost without naked area in basal cell (Figure 1B); costal cell wide with numerous complete lines of submarginal setae; hypopygium reaching about 0.7x along gaster; ovipositor (Figure 1D) about 0.8x as long as mid tibia; ovipositor not exerted.

Material examined: HOLOTYPE: NORWAY OSLO [AK], Oslo: Hengsenga [N59.91551° E10.67054° ±10m; 12m asl.] 1♀ 25 June – 8 July 2007, Malaise trap, leg. Anders Endrestøl.

Male: Unknown.

Biology: Unknown, but probably associated with primary hosts from the superfamily Coccoidea (Hemiptera) as most other species of the genus *Blastothrix* (Noyes 2017).

Etymology: From the city of Oslo, the capital of Norway.

Distribution: Oslo, Norway.

Discrimination: *Blastothrix osloensis* sp.n. is similar to *Blastothrix matesovae* Sugonjaev, 1964, but can be separated by the characters given in Table 2.

Metaphycus punctipes (Dalman, 1820)

Material examined: OSLO [AK], Oslo: Ekebergskråningen [Southeast; N59.88775° E10.76745° ±5m; 57m asl], 1♀ 8 July – 19 August 2008, west facing slope / Malaise trap, leg. Andres Endrestøl.

Biology: Parasitoid of various coccids: *Asterolecanium* [= *Asterodiaspis*] *variolosum* (Ratzeburg, 1870) (Asterolecaniidae), *Coccus pseudomagnoliarum* (Kuwana, 1914), *Didesmococcus unifasciatus* (Archangelskaya, 1923), *Eulecanium* spp., *Lecanium* spp., *Parthenolecanium* spp., *Phyllostroma myrtilli* (Kaltenbach, 1874), *Pulvinaria betulae* auct. *Sphaerolecanium prunastri* (Boyer de Fonscolombe, 1834) (Coccidae), *Aspidiotus hederæ* Signoret, 1869, *Quadraspidotus zonatus* (Frauenfeld, 1868) (Diaspididae), *Kermococcus*

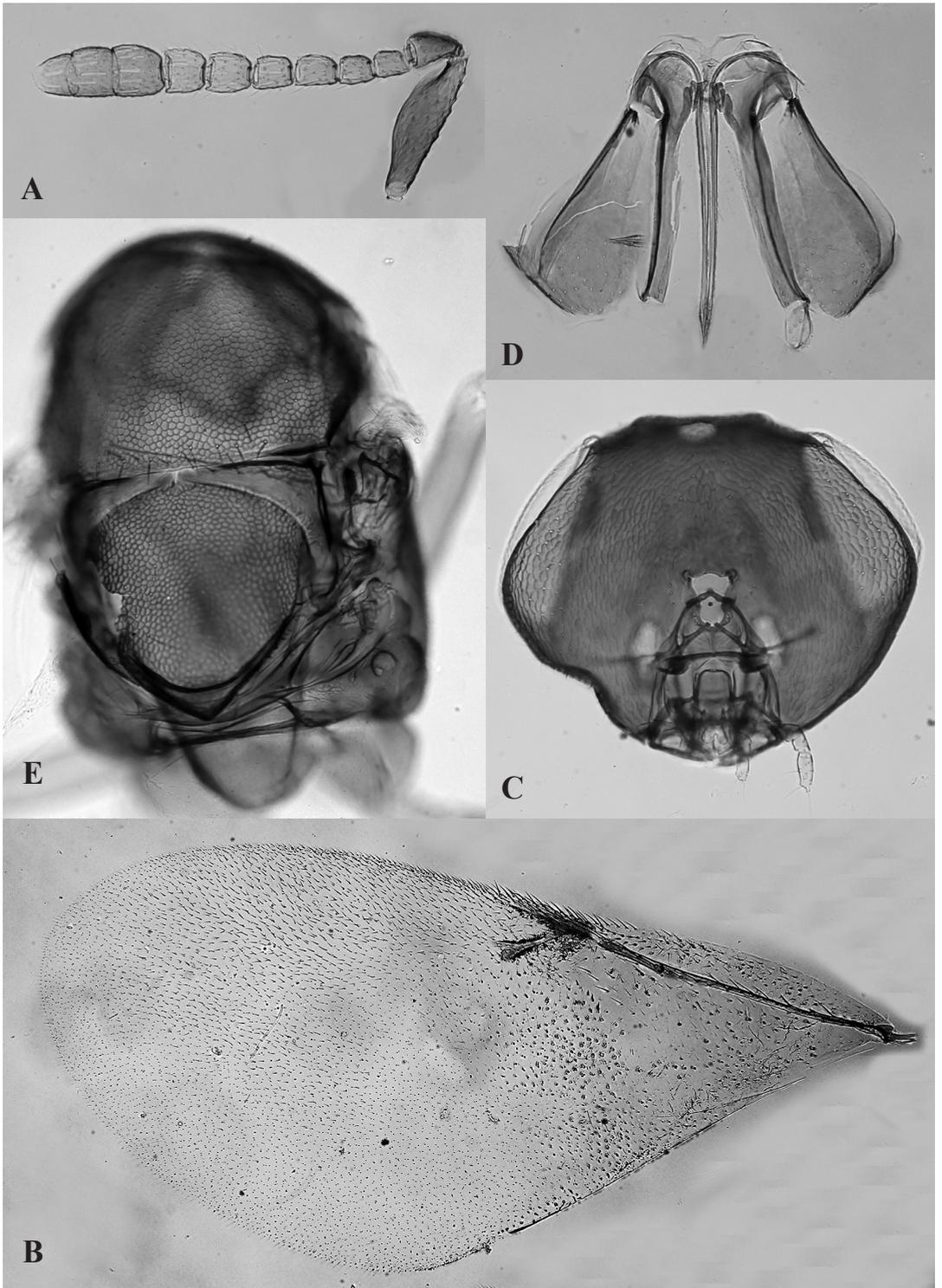


FIGURE 2 A-E. *Blastothrix osloensis* sp. n. imago ♀. A. Antenna; B. Wing; C. Head; D. Ovipositor; E. Thorax.

TABLE 2. *Blastothrix osloensis* sp. n. and *Blastothrix matesovae* Sugonjaev, 1964 can be separated by the following characters.

<i>Blastothrix osloensis</i> sp. n.	<i>Blastothrix matesovae</i> Sugonjaev, 1964
Ocelli forming obtuse angle	Ocelli forming right angle
Marginal vein shorter than postmarginal and post-marginal equal to stigmal	Marginal vein almost as long as postmarginal and post-marginal less than stigmal
HW:FVW =25:12	HW:FVW = 31:12
FV<FVW	FV>FVW
Midtibia brown	Midtibia with dark ring at base
Outer plate 1.7x as long as broad	Outer plate 2x as long as broad
3rd valvula 1/7x as long as ovipositor	3rd valvula 1/6x as long as ovipositor
F6 longer than broad	F6 slightly transverse

quercus (Linnaeus, 1758) (Kermesidae) (Hemiptera) (Noyes 2017).

Distribution: Europe: Austria, Croatia, Czech Republic, Denmark, England, Finland, France, Germany, Hungary, Ireland, Italy, Moldova, Poland, Romania, Russia (St. Petersburg), Serbia, Spain, Sweden, Switzerland and Ukraine; Asia: Azerbaijan, Lebanon, Iran and Japan (Fusu 2017, Noyes 2017).

***Protyndarichoides aligarhensis* (Fatma & Shafee, 1985)**

Material examined: OSLO [AK], Oslo: Hengsenga [N59.91551° E10.67054° ±10m; 12m asl.] 1♀ 25 June – 8 July 2007, Malaise trap, leg. Anders Endrestøl; Ekebergskråningen [Northwest; N59.89414° E10.75956° ±5m; 35m asl.] 1♀ 9 May – 17 June 2008, west facing slope / Malaise trap, leg. Andres Endrestøl.

Biology: No information about primary hosts, but probably associated with *Pinus* sp. (Noyes 2017).

Distribution: Europe: France and England; Asia: India (Karnataka, Uttar Pradesh and Uttarakhand) and Peoples' Republic of China (Fujian and Guangxi) (Fusu 2017, Noyes 2017).

***Psyllaephagus belanensis* (Hoffer, 1963)**

Material examined: OSLO [AK], Oslo: Bleikøya [North; N59.88916° E10.74232° ±10m; 6m asl.] 1♀ 15 July – 29 August 2008, forest edge / Malaise trap, leg. Anders Endrestøl.

Biology: *Eumetoecus kochiae* (Horvath, 1897) (Hemiptera: Psyllidae) is reported as primary host (Noyes 2017).

Distribution: Europe: Slovakia; Asia: Azerbaijan, Kazakhstan, Mongolia, Russia (Karachai-Cherkess AR and Volgograd Oblast) and Turkey (Fusu 2017, Noyes 2017).

***Trechnites trjapitzini* Sugonjaev, 1968**

Material examined: Oslo: Ekebergskråningen [Southeast; N59.88748° E10.76707° ±5m; 44m asl.] 1 ♀ 3 June 2008 West facing slope / sweep netted, leg. Csaba Thuróczy.

Biology: *Caillardia azurea* Loginova, 1956 and *C. robusta* Loginova, 1956 (Hemiptera: Psyllidae) are reported as primary hosts (Noyes 2015).

Distribution: Asia: Kazakhstan (Tselinograd Oblast), Mongolia and Uzbekistan (Noyes 2017).

Discussion

Five species of Encyrtidae not hitherto reported from Norway were recorded in this investigation, including one species new to science. This increases the number of Norwegian encyrtid species to 141. Ottesen (1993) estimated the number in Norway to 120, but this study shows that the true number is much higher, and all recent contributions have given considerable additions. The Swedish list counts 170 species (Hedqvist

2003), while the Finnish list gives 224 species (Koponen & Vikberg 2015).

Most of the studied material was collected using Malaise traps, which seems to be an efficient way of collecting, but gives reduced information about host associations on these species. However, the method reveals some valuable information, and may be used to give predictions about the habitat and probable hosts of the encyrtid species. There is to believe that Oslo Municipality and the adjacent areas, in particular the coastal areas, will reveal many more species of both encyrtids and other insect species.

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