

# Diptera from rich fens and other habitats in eastern part of Innlandet, southeastern Norway. III. Cylindrotomidae, Limoniidae and Pediciidae (Tipuloidea)

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Records of four species of Cylindrotomidae, 78 species of Limoniidae and eleven species of Pediciidae from eastern part of Innlandet County, southeastern Norway, are presented, partly based on material collected in 2016 and 2017 during a survey of insects inhabiting rich fens in the region and partly on other material collected in the region. One species, *Diogma caudata* Takahashi, 1960 (Cylindrotomidae), is recorded for the first time in Norway, and 53 species are recorded for the first time from southern and/or northern Hedmark (Strand-regions HES and/or HEN). All four species of Cylindrotomidae were collected on rich fens, while 58 species of Limoniidae and ten species of Pediciidae were collected on these fens. Most of the material was collected in eight Malaise traps situated on different rich fens and collecting continuously from early spring to late autumn 2016. A total of eleven specimens of Cylindrotomidae belonging to three species were taken in these traps. Of Limoniidae, a total of 1982 specimens belonging to 46 species were collected in the traps. *Molophilus flavus* Goetghebuer, 1920 was the most abundant species, constituting 45.4% of the material, *Phylidorea fulvonervosa* (Schummel, 1829) ranged second with 12.1%, and *Scleroprocta sororcula* (Zetterstedt, 1851) third with 6.5%. Of Pediciidae, a total of 880 specimens belonging to six species were collected in the Malaise traps. The most abundant species, *Tricyphona immaculata* (Meigen, 1804), constituted 52.0% of the material, *Pedicia rivosa* (Linnaeus, 1758) ranged second with 29.2%, and *Tricyphona unicolor* (Schummel, 1829) third with 18.4%.

Key words: Rich fens, Diptera, Tipuloidea, Cylindrotomidae, Limoniidae, Pediciidae, new records, Hedmark, Innlandet County, Norway.

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## Introduction

Four main groups of crane flies (Tipuloidea) are traditionally recognized and generally treated as separate families: Cylindrotomidae, Pediciidae, Limoniidae and Tipulidae (e.g. Starý 1992, 2021). The larvae of crane flies occupy a wide range of habitats from entirely terrestrial to strictly aquatic. Many aquatic species live in streams and

rivers, and on wet rock surfaces. Semi-aquatic species live in wet mats of mosses and liverworts or in rotting leaves or rich organic mud along the edges of streams, lakes and ponds. Semi-terrestrial or terrestrial species are known from moist to saturated soils in woods, meadows and open land. Some species live in decaying plant material, in fungi that are often in advanced stages of decay, and in dead wood. Some Pediciidae

and Limoniidae larvae are predacious, while the larvae of most species feed on decaying plant material and its associated microflora, others on mosses and liverworts (Jong *et al.* 2008).

Recently, Olsen *et al.* (2018) recorded 40 species of limoniid crane flies as new to Norway and provided a check-list with distributional data for the Norwegian Limoniidae and Pediciidae. Kolcsár *et al.* (2021) added 41 more species of Limoniidae from Norway. Up until now four species of Cylindrotomidae, about 212 species of Limoniidae and 19 species of Pediciidae are known to occur in Norway.

In 2016, the project "Insects on rich fens in Hedmark, eastern Norway" was initiated, aiming to increase the knowledge of the insect fauna on rich fens in Norway (see Artsdatabanken 2016, Andersen & Hagenlund 2019). Rich fens are among our most vulnerable and threatened nature types. Five types of lowland rich fens are listed in the Norwegian Red List of Nature Types (Lindegaard & Henriksen 2011). These fens are rich in calcium and usually fed by ground water and several rare and red-listed vascular plants inhabit them. During the project, insects were collected at nearly 100 localities in Hedmark (now the eastern part of Innlandet County) (see Jonassen & Andersen 2020). The insect fauna on rich fens were the main target, but insects were also collected in several other habitats to get a better understanding of the habitat preferences of the different species. Below we present a list of Cylindrotomidae, Limoniidae and Pediciidae species from Hedmark mainly based on the insects collected during the project, but we have also added some additional records from the region that are not included in the check-list published by Olsen *et al.* (2018).

## Material and methods

Fieldwork was conducted during 2016 and 2017. The main part of the material was collected in Malaise traps, but adult Diptera were also collected with other methods, like sweep-nets, window traps, light traps, and yellow pan traps. A total of 94 localities in Hedmark were visited

during the project. Each locality is given a HeLoc number, which is used in the species list below. Although the fieldwork was focused on rich fens, several other habitats were also explored. In the species list, rich fen localities are marked with an asterisk after the HeLoc number. All localities including HeLoc numbers are listed in Jonassen & Andersen (2020: Table 1).

The Malaise traps were situated on eight different rich fens in 2016 and were emptied bi-weekly from the snow melted in April–May until winter started in late October. The fens are of different sizes and structure and a gradient from lowland fens to upland fens were strived for. Several of the fens are a mosaic of different nature types, with areas varying from comparatively poor to extremely rich. The fens may include both firm substrate and areas with fen carpet and mud bottom, and some are to a various degree covered with shrubs and forest. In some of the fens there are springs and spring-brooks, others have streams or brooks running through, and some have pools or ponds of various sizes and shapes.

During the fieldwork, the material was preserved in 75–80% ethanol, then brought to the Department of Natural History, University of Bergen, and sorted to family level. The material from the project is stored in 75–80% ethanol and housed in the entomological collection at the Department of Natural History, University Museum of Bergen (ZMBN). In addition, some material collected in ten localities in Hedmark, among them Deifjell-lia (Figure 1) and Kjølla (Figure 2) in Åmot municipality by Lars Ove Hansen, Kjell Magne Olsen, Eirik Rindal, Karsten Sund, and Geir E. Søli, but not included in the check-list published by Olsen *et al.* (2018), is listed as additional material. This material is housed in the Natural History Museum, University of Oslo (ZMO) or in Kjell Magne Olsen's private collection (coll. K.M. Olsen).

The former counties Oppland and Hedmark were merged into Innlandet County on the 1 January 2020. None of the municipalities in Hedmark were, however, altered or merged, and the municipality boundaries are still as before 2020. All fieldwork was performed in former Hedmark County, and the biogeographical regions



FIGURE 1. The collecting site at Deifjell-lia. Photo: K.M. Olsen.

southern Hedmark (HES) and northern Hedmark (HEN), following the "Strand-system" as revised by Økland (1981), are used in this paper.

In the remarks, "First record from southern Hedmark (HES)" or "First record from northern Hedmark (HEN)" means that species is not recorded from either southern (HES) or northern Hedmark (HEN) by Olsen *et al.* (2018); "First record from Hedmark (HEN)" means that the species is not recorded from Hedmark before, and that records presented herein are from HEN.

#### *The Malaise trap localities*

**HeLoc17\***, Northern Hedmark (HEN), Åmot, Kildesaga, 61.178778°N 11.402167°E, 290 m a.s.l. (Malaise trap no. 1). Small (6.8 daa), extremely rich wood and scrub-covered lowland fen with firm substrate.

**HeLoc32\***, Northern Hedmark (HEN), Stor-

Elvdal, Nabbtjern, 61.378417°N 11.191750°E, 251 m a.s.l. (Malaise trap no. 2). Medium large (117 daa), intermediate to rich carpet / mud bottom lowland fen with interspersed flarks.

**HeLoc47\***, Northern Hedmark (HEN), Rendalen, Sekserbua NE, 61.556056°N 11.168556°E, 520 m a.s.l. (Malaise trap no. 3). Medium large (64 daa), intermediate to rich wood and scrub-covered fen with firm substrate.

**HeLoc45\***, Northern Hedmark (HEN), Rendalen, Jøgåsmyra, 61.774556°N 11.593472°E, 640 m a.s.l. (Malaise trap no. 4). Large (694 daa), rich to extremely rich fen with a mosaic of firm substrate and loose mats.

**HeLoc70\***, Northern Hedmark (HEN), Engerdal, Ulvåkjølen–Sundsetra, 61.836556°N 11.791250°E, 660 m a.s.l. (Malaise trap no. 5). Large (2403 daa) fen complex with poor to rich fens. The Malaise trap was situated in one of the



FIGURE 2. The collecting site at Kjølla. Photo: K.M. Olsen.

richest parts, with gently sloping terrain.

**HeLoc74\***, Northern Hedmark (HEN), Engerdal, Åsen, 61.885861°N 11.782833°E, 700 m a.s.l. (Malaise trap no. 6). Small (18 daa), fragmented, extremely rich fen in upland area, close to a larger rich fen. At the sampling site the fen is gently sloping with a mix of scattered conifers and deciduous trees.

**HeLoc75\***, Northern Hedmark (HEN), Tolga, Bjørvollen, 62.387028°N 11.118861°E, 770 m a.s.l. (Malaise trap no. 7). Medium large (335 daa), intermediate to extremely rich fen in upland area. The fen is partly covered with mixed forest and has mostly firm substrate, in places with exposed stones, but there are also smaller areas with fen carpet and mud bottom.

**HeLoc78\***, Northern Hedmark (HEN), Tynset, Brydalskjølen, 62.255444°N 10.907250°E, 780 m a.s.l. (Malaise trap no. 8). Large (990 daa),

intermediate to extremely rich fen complex in upland area. Mostly open fen with firm substrate, but also areas with fen carpet and some areas are covered with mixed forest.

More thorough descriptions of the different fens are given by Jonassen & Andersen (2020) and in Naturbase (Miljødirektoratet 2017).

## Results

### The species

#### CYLINDROTOMIDAE

#### *Cylindrotoma distinctissima* (Meigen, 1818)

(Figure 3)

**Material.** HeLoc34, 21 June–20 July 2017, 1♀, light trap; HeLoc74\*, 11–21 July 2016, 1♂, Malaise trap.



FIGURE 3. *Cylindrotoma distinctissima* (Meigen, 1818), male. Photo: K.M. Olsen.

***Diogma caudata* Takahashi, 1960 (Figure 4)**

**Material.** HeLoc74\*, 1 June–15 July 2016, 1♂, window trap.

**Remarks.** First record from Norway.

***Diogma glabrata* (Meigen, 1818)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 7♂♂, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♂1♀, light trap; HeLoc74\*, 11–21 July 2016, 1♂, Malaise trap.

**Remarks.** First record from Hedmark (HEN).

***Phalacrocera replicata* (Linnaeus, 1758)**

**Material.** HeLoc32\*, 31 May 2016, 1♂, sweep net; HeLoc74\*, 23 June–11 July 2016, 1♀; 17 August–2 September 2016, 1♂, Malaise trap.

**Remarks.** First record from northern Hedmark (HEN).

**LIMONIIDAE**

**CHIONEINAE**

***Cheilotrichia cinerascens* (Meigen, 1804)**

**Material.** HeLoc74\*, 17 August–2 September 2016, 1♂, Malaise trap.

***Crypteria limnophiloides* Bergroth, 1913**

**Material.** HeLoc34, 21 June–20 July 2017, 2♀♀, light trap.

**Additional material.** HEN, Stor-Elvdal: Gardbekken S, 61.614135°N 10.849115°E, 660 m a.s.l., 28 July 2017, 1♀, net, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN).

***Erioconopa diuturna* (Walker, 1848)**

**Material.** HeLoc78\*, 17 August–2 September 2016, 1♂; 2–16 September 2016, 20 ex.; 16–29



FIGURE 4. *Diogma caudata* Takahashi, 1960, male terminalia, ventral view. Photo: K.M. Olsen.

September 2016, 22 ex., Malaise trap.

***Erioconopa trivialis* (Meigen, 1818)**

**Material.** HeLoc59, 24 July 2017, 3 ex., light trap; HeLoc68, 26 July 2016, 3 ex., sweep net; HeLoc75\*, 16 July–19 September 2016, 1♀, window trap.

**Remarks.** First record from Hedmark (HEN).

***Erioptera flavata* (Westhoff, 1882)**

**Material.** HeLoc06, 23 July 2017, 1♂, sweep net; HeLoc07, 22 July 2017, 1♂, sweep net; HeLoc32\*, 9–23 June 2016, 1♂; 23 June–11 July

2016, 11♂♂; 11–21 July 2016, 1♀, Malaise trap; 15 July 2016, 1♂, sweep net; HeLoc43, 24 July 2017, 1♂, sweep net; HeLoc73\*, 28 July 2016, 1♀, sweep net.

**Remarks.** First records from Hedmark (HES & HEN).

***Erioptera lutea* Meigen, 1804**

**Material.** HeLoc25, 16 September–5 October 2016, 1♂, light trap; HeLoc34, 21 June–20 July 2017, 85 ex., light trap; HeLoc47\*, 9–23 June 2016, 1♂1♀, Malaise trap.

***Gonomyia simplex* Tonnoir, 1920**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♀; 11–21 July 2016, 1♂, Malaise trap.

**Remarks.** First records from Hedmark (HEN).

***Molophilus appendiculatus* (Staeger, 1840)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 4♂♂; 21 July–4 August 2016, 3♂♂, Malaise trap.

**Additional material.** HEN, Åmot: Deifjellia, 61.284273°N 11.504971°E, 515 m a.s.l., 6 July–22 September 2018, 1♂, Malaise trap, leg. K.M. Olsen.

**Remarks.** First record from Hedmark (HEN).

***Molophilus ater* (Meigen, 1804)**

**Material.** HeLoc70\*, 25 July 2016, 1♀, sweep net; HeLoc74\*, 1 June–15 July 2016, 1♂; 15 July–18 September 2016, 2♀♀, window trap; HeLoc75\*, 16 July 2016, 1♂, sweep net; HeLoc94\*, 30 June 2016, 4 ex., sweep net.

***Molophilus corniger* Meijere, 1920**

**Material.** HeLoc17\*, 11–21 July 2016, 5♂♂; 21 July–4 August 2016, 3♂♂, Malaise trap.

**Additional material.** HEN, Åmot: Deifjellia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 1♂, Malaise trap, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway based on material from Østfold and Telemark (Olsen *et al.* 2018).

***Molophilus crassipygus* Meijere, 1918**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap.

**Remarks.** First record from Hedmark (HEN).

***Molophilus flavus* Goetghebuer, 1920**

**Material.** HeLoc17\*, 9–23 June 2016, 40 ex.; 23 June–11 July 2016, 5♂♂; 11–21 July 2016, 4♂♂; 21 July–4 August 2016, 1♂, Malaise trap; HeLoc47\*, 23 June–11 July 2016, 10 ex.; 21 July–4 August 2016, 1♂, Malaise trap; HeLoc64\*, 28 July 2016, 1♂, sweep net; HeLoc70\*, 25 July 2016, 1♂, sweep net; HeLoc71\*, 23 June–11 July 2016, 3♂♂; 11–21 July 2016, 3♂♂; 21 July–4

August 2016, 2♂♂, Malaise trap; HeLoc74\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 200 ex.; 11–21 July 2016, 462 ex.; 21 July–4 August 2016, 150 ex.; 17 August–2 September 2016, 1♂, Malaise trap; 15 July–18 September 2016, 7♂♂, window trap; HeLoc75\*, 11–21 July 2016, 12 ex., Malaise trap; 16 July–19 September 2016, 1♂, window trap; HeLoc78\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 2♂♂; 21 July–4 August 2016, 1♂, Malaise trap.

***Molophilus medius* Meijere, 1918**

**Material.** HeLoc17\*, 23 June–11 July 2016, 15♂♂; 11–21 July 2016, 7♂♂, Malaise trap; HeLoc47\*, 21 July–4 August 2016, 1♂, Malaise trap; HeLoc64\*, 28 July 2016, 3♂♂, sweep net; HeLoc78\*, 21 July–4 August 2016, 1♂, Malaise trap.

**Remarks.** First record from Hedmark (HEN).

***Molophilus propinquus* (Egger, 1863)**

**Material.** HeLoc70\*, 25 July 2016, 3 ex., sweep net.

***Neolimnophila carteri* (Tonnoir, 1921)**

**Material.** HeLoc34, 21 June–20 July 2017, 4♀♀, light trap.

**Remarks.** First record from Hedmark (HEN).

***Neolimnophila placida* (Meigen, 1830)**

**Material.** HeLoc34, 21 June–20 July 2017, 5♀♀, light trap; HeLoc72, 15–18 August 2016, 7 ex., light trap.

***Ormosia depilata* Edwards, 1938**

**Material.** HeLoc17\*, 9–23 June 2016, 5 ex.; 23 June–11 July 2016, 3 ex., Malaise trap.

**Additional material.** HES, Kongsvinger: Viker, Vikeraa, 60.202567°N 12.450709°E, 276 m a.s.l., 26 May–29 June 2007, 1♂, Malaise trap, leg. K. Sund. HEN, Åmot: Deifjellia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 2♂♂, Malaise trap, leg. K.M. Olsen (ZMO).

**Remarks.** First records from Hedmark (HES & HEN). The species was recently recorded as new to Norway based on material from Akershus and Telemark (Olsen *et al.* 2018).

***Ormosia lineata* (Meigen, 1804)**

**Material.** HeLoc47\*, 23 June–11 July 2016, 1♂, Malaise trap; HeLoc75\*, 11–21 July 2016, 3♂♂, Malaise trap.

**Additional material.** HES, Kongsvinger: Åranstorpet, 60.202808°N 12.434014°E, 300 m a.s.l., 22 April–14 June 2004, 1♂, Malaise trap, leg. K. Sund. HEN, Åmot: Deifjell-lia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 8♂♂, Malaise trap, leg. K.M. Olsen (ZMO).

**Remarks.** First records from Hedmark (HES & HEN).

***Ormosia pseudosimilis* (Lundström, 1912)**

**Material.** HeLoc04, 22 July 2017, 1♂, sweep net; HeLoc59, 24 July 2017, 2♂♂, light trap; HeLoc74\*, 4–17 August 2016, 3♂♂; 17 August–2 September 2016, 7♂♂, Malaise trap; HeLoc87, 26 July 2016, 1♂, sweep net.

**Remarks.** First records from Hedmark (HES & HEN).

***Ormosia ruficauda* (Zetterstedt, 1838)**

**Material.** HeLoc05, 23 July 2017, 1♂, sweep net; HeLoc17\*, 11–21 July 2016, 1♂, Malaise trap; HeLoc47\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 1♀; 21 July–4 August 2016, 1♂1♀, Malaise trap; HeLoc71\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 1♂; 21 July–4 August 2016, 5♂♂, Malaise trap; HeLoc74\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 22 ex.; 21 July–4 August 2016, 10 ex.; 4–17 August 2016, 4♂♂, Malaise trap; 15 July–18 September 2016, 2♂♂, window trap; HeLoc75\*, 11–21 July 2016, 6♂♂, Malaise trap; HeLoc78\*, 11–21 July 2016, 1♂; 21 July–4 August 2016, 1♂, Malaise trap.

**Additional material.** HES, Kongsvinger: Abborhøgda, 60.183802°N 12.459788°E, 326 m a.s.l., 10 July–10 August 2003, 1♂, Malaise trap, leg. L.O. Hansen & K. Sund. HEN, Stor-Elvdal: Krokmyra, 61.605800°N 10.839907°E, 790 m a.s.l., 26 July–21 September 2012, 1♂, Malaise trap, leg. K.M. Olsen (ZMO).

**Remarks.** First record from southern Hedmark (HES).

***Ormosia staegeriana* Alexander, 1953**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 1♂; 21 July–4 August 2016, 1♂, Malaise trap; HeLoc34, 21 June–20 July 2017, 4 ex., light trap; HeLoc47\*, 21 July–4 August 2016, 1♂, Malaise trap; HeLoc74\*, 11–21 July 2016, 3♂♂; 21 July–4 August 2016, 5♂♂; 17 August–2 September 2016, 1♂, Malaise trap; 15 July 2016, 1♂1♀, sweep net; HeLoc78\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 2♂♂, Malaise trap; HeLoc86, 25 July 2017, 7 ex., sweep net.

***Scleroprocta pentagonalis* (Loew, 1873)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway based on material from Akershus by Olsen *et al.* (2018) and has subsequently been found in outer Troms (TRY).

***Scleroprocta sororcula* (Zetterstedt, 1851)**

**Material.** HeLoc17\*, 9–23 June 2016, 50 ex.; 23 June–11 July 2016, 1♂, Malaise trap; HeLoc71\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 3 ex.; 11–21 July 2016, 1♀, Malaise trap; HeLoc74\*, 9–23 June 2016, 10 ex.; 23 June–11 July 2016, 50 ex.; 11–21 July 2016, 10 ex.; 21 July–4 August 2016, 2♂♂, Malaise trap.

**Remarks.** First record from Hedmark (HEN).

***Symplecta hybrida* (Meigen, 1804)**

**Material.** HeLoc35, 6 June 2016, 2♂♂, sweep net.

***Tasiocera fuscescens* (Lackschewitz, 1940)**

**Material.** HeLoc17\*, 21 July–4 August 2016, 2♂♂, Malaise trap.

**Additional material.** HEN, Åmot: Deifjell-lia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 1♂, Malaise trap, leg. K.M. Olsen.

**Remarks.** First record from Hedmark (HEN).

LIMNOPHILINAE

***Dicranophragma separatum* (Walker, 1848)**

**Material.** HeLoc06, 23 July 2017, 2♀♀,



sweep net; HeLoc17\*, 9–23 June 2016, 5 ex.; 23 June–11 July 2016, 25 ex.; 11–21 July 2016, 16 ex.; 21 July–4 August 2016, 5 ex., Malaise trap; HeLoc47\*, 23 June–11 July 2016, 1♂1♀; 11–21 July 2016, 6 ex.; 21 July–4 August 2016, 3♀♀, Malaise trap; HeLoc54, 28 July 2017, 1♀, sweep net; HeLoc70\*, 25 July 2016, 1♂, sweep net; HeLoc71\*, 11–21 July 2016, 1♂; 21 July–4 August 2016, 1♀, Malaise trap; HeLoc74\*, 23 June–11 July 2016, 25♀♀; 11–21 July 2016, 27 ex.; 21 July–4 August 2016, 10♀♀; 4–17 August 2016, 1♂, Malaise trap; 15 July–18 September 2016, 1♀, window trap; HeLoc75\*, 11–21 July 2016, 5 ex, Malaise trap; 1 June–16 July 2016, 2♂♂; 16 July–19 September 2016, 2♀♀, window trap; HeLoc78\*, 9–23 June 2016, 1♀; 23 June–11 July 2016, 5 ex.; 11–21 July 2016, 5 ex.; 21 July–4 August, 6 ex., Malaise trap; HeLoc86, 25 July 2017, 1♀, sweep net.

**Additional material.** HES, Kongsvinger: Vikar, Vikeraa, 60.202562°N 12.450705°E, 260 m a.s.l., 29 June–12 August 2007, 1♂, Malaise trap, leg. K. Sund. HEN, Stor-Elvdal: Gardbekken S, 61.614135°N 10.849115°E, 660 m a.s.l., 28 July 2017, 1♂1♀, net, leg. K.M. Olsen.

**Remarks.** First records from Hedmark (HES & HEN).

#### *Eloephila maculata* (Meigen, 1804)

**Material.** HeLoc17\*, 23 June–11 July 2016, 2♀♀; 11–21 July 2016, 3♀♀; 21 July–4 August 2016, 1♀, Malaise trap; HeLoc47\*, 11–21 July 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN).

#### *Eloephila mundata* (Loew, 1871)

**Material.** HeLoc54, 28 July 2017, 2♂♂1♀, sweep net.

**Remarks.** First record from Hedmark (HEN).

#### *Eloephila trimaculata* (Zetterstedt, 1838)

**Material.** HeLoc90\*, 30 June 2016, 4 ex., sweep net.

**Additional material.** HEN, Stor-Elvdal: Gardbekken S, 61.614135°N 10.849115°E, 660 m a.s.l., 28 July 2017, 1♂, net, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN).

#### *Epiphragma ocellare* (Linnaeus, 1761)

(Figure 5)

**Material.** HeLoc34, 21 June–20 July 2017, 5 ex., light trap.

**Additional material.** HES, Kongsvinger: Åranstorpet, 60.202806°N 12.434010°E, 300 m a.s.l., 22 April–14 June 2004, 1♂, Malaise trap, leg. K. Sund. HEN, Åmot: Deifjell-lia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 4 ex., Malaise trap, leg. K.M. Olsen.

**Remarks.** First records from Hedmark (HES & HEN).

#### *Euphylidorea meigenii* (Verrall, 1886)

**Material.** HeLoc75\*, 9–23 June 2016, 1♂, Malaise trap.

**Additional material.** HEN, Åmot: Kjølla, 61.328722°N 11.866260°E, 490 m a.s.l., 5 July 2018, 3 ex., net, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN).

#### *Euphylidorea phaeostigma* (Schummel, 1829)

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♀, Malaise trap; HeLoc34, 21 June–20 July 2017, 4♀♀, light trap; HeLoc47\*, 23 June–11 July 2016, 1♂; 17 August–2 September 2016, 1♂, Malaise trap; HeLoc74\*, 11–21 July 2016, 4 ex., Malaise trap; HeLoc78\*, 21 July–4 August 2016, 1♂, Malaise trap.

#### *Idioptera linnei* Oosterbroek, 1992

**Material.** HeLoc75\*, 11–21 July 2016, 1♂, Malaise trap.

#### *Idioptera pulchella* (Meigen, 1830)

**Material.** HeLoc86, 25 July 2017, 1♂, sweep net.

#### *Phylidorea ferruginea* (Meigen, 1818)

**Material.** HeLoc06, 23 July 2017, 2♂♂, sweep net.

**Remarks.** First record from Hedmark (HES).

#### *Phylidorea fulvonervosa* (Schummel, 1829)

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 2♂♂; 21 July–4 August 2016, 1♂, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♀, light trap; HeLoc37\*, 27 July



FIGURE 5. *Epiphragma ocellare* (Linnaeus, 1761), male. Photo: K.M. Olsen.

2016, 1♂, sweep net; HeLoc47\*, 32 June–11 July 2016, 1♂; 21 July–4 August 2016, 2♂♂, Malaise trap; HeLoc63, 17 August 2016, 1♂, sweep net; HeLoc70\*, 25 July 2016, 1♂, sweep net; HeLoc71\*, 23 June–11 July 2016, 25 ex.; 11–21 July 2016, 50 ex.; 21 July–4 August 2016, 15 ex., Malaise trap; HeLoc73\*, 28 July 2016, 1♂, sweep net; HeLoc74\*, 23 June–11 July 2016, 20♂♂; 11–21 July 2016, 75 ex.; 21 July–4 August 2016, 40 ex.; 4–17 August 2016, 5♂♂; 17 August–2 September 2016, 2♂♂, Malaise trap; HeLoc87, 26 July 2016, 4 ex., sweep net.

***Phylidorea longicornis* (Schummel, 1829)**

**Material.** HeLoc73\*, 28 July 2016, 1♂1♀, sweep net.

**Remarks.** First record from northern Hedmark (HEN).

***Phylidorea nigronotata* (Siebke, 1870)**

**Material.** HeLoc35, 6 June 2016, 1♂, sweep net.

**Remarks.** First record from Hedmark (HEN).

***Phylidorea squalens* (Zetterstedt, 1838)**

(Figure 6)

**Material.** HeLoc07, 28 June 2016, 1♂; 22 July 2017, 1♀, sweep net; HeLoc14, 26 June 2016, 1♂, sweep net; HeLoc32\*, 26 May–9 June 2016, 23 ex., 9–23 June 2016, 62 ex., 23 June–11 July 2016, 6 ex., Malaise trap; 6–8 June 2016, 2♂♂, sweep net; HeLoc47\*, 9–23 June 2016, 4 ex.; 23 June–11 July 2016, 2♂♂, 11–21 July 2016, 7♂♂; 21 July–4 August 2016, 1♂, Malaise trap; HeLoc73\*, 28 July 2016, 2♀♀, sweep net; HeLoc78\*, 23 June–11 July 2016, 2♀♀, Malaise trap; HeLoc94\*, 30 June 2016, 2♂♂, sweep net.

**Additional material.** HES, Kongsvinger:



FIGURE 6. *Phylidorea squalens* (Zetterstedt, 1838), female. Photo: K.M. Olsen.

Viker, Vikeråa, 60.202567°N 12.450709°E, 276 m a.s.l., 29 June–12 August 2007, 1♂, Malaise trap, leg. K. Sund (ZMO).

**Remarks.** First record from southern Hedmark (HES).

***Pilaria decolor* (Zetterstedt, 1851)**

**Material.** HeLoc86, 25 July 2017, 2♂♂, sweep net.

**Remarks.** First record from Hedmark (HEN).

***Pilaria meridiana* (Staeger, 1840)**

**Material.** HeLoc32\*, 11–21 July 2016, 1♂, Malaise trap; HeLoc61, 25 July 2016, 1♂, sweep net.

LIMONIINAE

***Atypophthalmus inustus* (Meigen, 1818)**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap.

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia autumnalis* (Staeger, 1840)**

**Material.** HeLoc63, 17 August 2016, 1♂, sweep net.

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia caledonica* Edwards, 1926**

**Material.** HeLoc78\*, 23 June–11 July 2016, 1♂2♀♀; 11–21 July 2016, 1♂, Malaise trap.

***Dicranomyia distendens* Lundström, 1912**

**Material.** HeLoc47\*, 9–23 June 2016, 3 ex.; 23 June–11 July 2016, 12 ex.; 11–21 July 2016,

1♂1♀, Malaise trap; HeLoc71\*, 23 June–11 July 2016, 5 ex.; 11–21 July 2016, 1♂1♀, Malaise trap; HeLoc74\*, 23 June–11 July 2016, 6 ex., 21 July–4 August 2016, 7 ex., Malaise trap; HeLoc75\*, 1 June–16 July 2016, 1♂, window trap; HeLoc78\*, 23 June–11 July 2016, 1♂; 11–21 July 2016, 3 ex.; 21 July–4 August 2016, 1♀; 2–16 September 2016, 1♀, Malaise trap.

***Dicranomyia frontalis* (Staeger, 1840)**

**Material.** HeLoc25, 16 September–5 October 2016, 5♂♂, light trap; HeLoc34, 21 June–20 July 2017, 50 ex., light trap.

***Dicranomyia halterella* Edwards, 1921**

**Material.** HeLoc74\*, 17 August–2 September 2016, 15♂♂; 16–29 September 2016, 15 ex., Malaise trap; 15 July–18 September 2016, 15 ex.; 18 September–27 October 2016, 12 ex., window trap.

**Additional material.** HEN, Stor-Elvdal: Gardbekken, 61.615227°N 10.847389°E, 675 m a.s.l., 4 October 2017, 1♂, net, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia handlirschi* Lackschewitz, 1928**

**Material.** HeLoc25, 16 September–5 October 2016, 1♂, light trap.

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia modesta* (Meigen, 1818)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂, Malaise trap; HeLoc25, 16 September–5 October 2016, 4♂♂, light trap; HeLoc32\*, 17 September 2016, 1♂, sweep net; HeLoc34, 21 June–20 July 2017, 25 ex., light trap; HeLoc47\*, 21 July–4 August 2016, 1♂, Malaise trap; HeLoc59, 24 July 2017, 1♂1♀, light trap; HeLoc63, 17 August 2016, 2♂♂, sweep net; HeLoc68, 15 August 2016, 3 ex., sweep net; HeLoc72, 15–18 August 2016, 36 ex., light trap; HeLoc74\*, 17 August–2 September 2016, 1♂, Malaise trap; HeLoc93, 17 August 2016, 1♂, sweep net.

***Dicranomyia occidua* Edwards, 1926**

**Material.** HeLoc32\*, 23 June–11 July 2016, 1♂, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♂, light trap; HeLoc86, 25 July 2017, 1♂,

sweep net.

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia patens* Lundstrom, 1907**

**Material.** HeLoc74\*, 4–17 August 2016, 1♂, Malaise trap.

***Dicranomyia ponojensis* Lundstrom, 1912**

**Material.** HeLoc45\*, 8–17 September 2016, 1♂, window trap.

***Dicranomyia radegasti* Stary, 1993**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂3♀, light trap.

**Remarks.** First record from Hedmark (HEN).

***Dicranomyia rufiventris* (Strobl, 1901)**

**Material.** HeLoc37\*, 27 July 2016, 1♂, sweep net; HeLoc57, 18 August 2016, 1♂, sweep net; HeLoc68, 15 August 2016, 1♂, sweep net; HeLoc70\*, 16 August 2016, 2♂♂, sweep net; HeLoc74\*, 21 July–4 August 2016, 10 ex.; 4–17 August 2016, 42 ex.; 17 August–2 September 2016, 60 ex., Malaise trap; HeLoc78\*, 17 August–2 September 2016, 3 ex., Malaise trap.

***Dicranomyia stigmatica* (Meigen, 1830)**

**Material.** HeLoc45\*, 8–17 September 2016, 1♂, window trap; HeLoc74\*, 17 August–2 September 2016, 20 ex.; 16–29 September 2016, 10 ex., Malaise trap; HeLoc75\*, 16 July–19 September 2016, 5 ex.; 19 September–27 October, 1♀, window trap; HeLoc78\*, 17 August–2 September 2016, 4 ex.; 2–16 September 2016, 5 ex.; 16–29 September 2016, 2♂♂, Malaise trap.

***Dicranomyia terraenovae* Alexander, 1920**

**Material.** HeLoc32\*, 17 September 2016, 2♂♂, sweep net; HeLoc54, 28 July 2017, 1♂, sweep net; HeLoc63, 17 August 2016, 1♂, sweep net; HeLoc74\*, 21 July–4 August 2016, 10♂♂; 4–17 August 2016, 30 ex.; 17 August–2 September 2016, 5 ex., Malaise trap; 18 August 2016, 7♂♂, sweep net; HeLoc78\*, 17 August–2 September 2016, 1♀; 2–16 September 2016, 4 ex., Malaise trap.

***Dicranomyia zernyi* Lackschewitz, 1928**

**Material.** HeLoc34, 21 June–20 July 2017, 9 ex., light trap.

***Discobola annulata* (Linnaeus, 1758)**

**Material.** HeLoc32\*, 15 August–17 September 2016, 1♂1♀, window trap.

**Remarks.** First record from Hedmark (HEN).

***Helius longirostris* (Meigen, 1818)**

**Material.** HeLoc32\*, 9–23 June 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway based on material from Østfold, Buskerud, Vestfold, Telemark, Rogaland, and Hordaland (Olsen *et al.* 2018).

***Limonia flavipes* (Fabricius, 1787)**

**Material.** HeLoc17\*, 21 July–4 August 2016, 1♂, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♂1♀, light trap.

***Limonia interjecta* Stary, 1974**

**Material.** HeLoc75\*, 1 June–16 July 2016, 8 ex.; 16 July–19 September 2016, 3 ex., window trap.

**Remarks.** First record from Hedmark (HEN). The species was recently verified as belonging to the Norwegian fauna, partly based on material from the present project (Kolcsár *et al.* 2021, see also Olsen *et al.* 2018).

***Limonia macrostigma* (Schummel, 1829)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♀, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♂1♀, light trap; HeLoc59, 24 July 2017, 2♀♀, light trap.

***Limonia maculicosta* (Coquillett, 1905)**

**Material.** HeLoc74\*, 11–21 July 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway based on material from Sogn og Fjordane (Olsen *et al.* 2018).

***Limonia phragmitidis* (Schrank, 1781)**

(Figure 7)

**Material.** HeLoc32\*, 23 June–11 July 2016, 1♀, Malaise trap; HeLoc34, 21 June–20 July 2017, 1♀, light trap; HeLoc59, 24 July 2017, 1♂, light trap.

***Limonia stigma* (Meigen, 1818)**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway based on material from Vestfold and Sogn og Fjordane (Olsen *et al.* 2018).

***Limonia sylvicola* (Schummel, 1829)**

**Material.** HeLoc74\*, 17 August–2 September 2016, 1♂, Malaise trap; HeLoc86, 25 July 2017, 1♂, sweep net.

***Limonia trivittata* (Schummel, 1829)**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap; HeLoc59, 24 July 2017, 3 ex., light trap; HeLoc72, 15–18 August 2016, 1♂, light trap.

**Remarks.** First record from Hedmark (HEN).

***Metalimnobia bifasciata* (Schrank, 1781)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂; 17 August–2 September, 1♂, Malaise trap; HeLoc32\*, 15 August–17 September 2016, 1♂, window trap; HeLoc34, 21 June–20 July 2017, 1♂, light trap; HeLoc74\*, 21 July–4 August 2016, 1♀, Malaise trap.

***Metalimnobia charlesi* Salmela & Starý, 2008**

**Material.** HeLoc74\*, 1 June–15 July 2016, 1♂, window trap.

**Additional material.** HES, Våler: Kas-konsbekken, Nordre Bølsjøen, 60.856387°N 12.089265°E, 390 m a.s.l., 7 June–6 August 2009, 1♂, Malaise trap, leg. E. Rindal & G. Søli (ZMO).

**Remarks.** First records from Hedmark (HES & HEN). The species was recently recorded as new to Norway based on material from Akershus (Olsen *et al.* 2018). It has subsequently been found in several counties.



FIGURE 7. *Limonia phragmitidis* (Schränk, 1781), male. Photo: K.M. Olsen.

***Metalimnobia quadrimaculata* (Linnaeus, 1761)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂1♀, Malaise trap; HeLoc32\*, 17 August–2 September 2016, 1♂, Malaise trap; 15 August–17 September, 1♂, window trap; HeLoc86, 25 July 2017, 1♂, sweep net.

***Metalimnobia quadrinotata* (Meigen, 1818)**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap; HeLoc35, 29–31 July 2016, 1♂, light trap; HeLoc37\*, 27 July 2016, 1♂, sweep net; HeLoc70\*, 25 July 2016, 1♂, sweep net.

***Metalimnobia tenua* Savchenko, 1976**

**Material.** HeLoc34, 21 June–20 July 2017, 1♂, light trap.

**Additional material.** HEN, Stor-Elvdal: Trya, 61.556093°N 10.835734°E, 400 m a.s.l., 26 July 2017, 1♂, net, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to

Norway based on material from Buskerud and Telemark (Olsen *et al.* 2018).

***Metalimnobia zetterstedti* (Tjeder, 1968)**

**Material.** HeLoc74\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 9 ex., Malaise trap; 1 June–15 July 2016, 1♂, window trap.

***Neolimonia dumetorum* (Meigen, 1804)**

**Material.** HeLoc05, 23 July 2017, 1♀, sweep net.

**Remarks.** First record from southern Hedmark (HES).

***Orimarga attenuata* (Walker, 1848)**

**Material.** HeLoc94\*, 30 June 2016, 1♂, sweep net.

**Additional material.** HEN, Åmot: Deifjellia, 61.284273°N 11.504971°E, 515 m a.s.l., 5 May–6 July 2018, 1♂, Malaise trap, leg. K.M. Olsen (ZMO).

**Remarks.** First record from Hedmark (HEN). sweep net.

***Orimarga juvenilis* (Zetterstedt, 1851)**

**Material.** HeLoc75\*, 11–21 July 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway, partly based on material from HeLoc75 (Kolcsár *et al.* 2021).

***Orimarga virgo* (Zetterstedt, 1851)**

**Material.** HeLoc75\*, 11–21 July 2016, 1♀, Malaise trap; HeLoc78\*, 11–21 July 2016, 1♀, Malaise trap.

**Remarks.** First record from Hedmark (HEN). The species was recently recorded as new to Norway, partly based on material from HeLoc75 (Kolcsár *et al.* 2021).

***Rhipidia maculata* Meigen, 1818**

**Material.** HeLoc25, 16 September–5 October 2016, 9ex., light trap; HeLoc32\*, 15 August–17 September 2016, 1♂2♀♀, window trap; HeLoc34, 21 June–20 July 2017, 5 ex., light trap; HeLoc72, 15–18 August 2016, 2♀♀, light trap; HeLoc74\*, 11–21 July 2016, 1♀; 21 July–4 August 2016, 1♂, Malaise trap; 18 September–27 October 2016, 4 ex., window trap; HeLoc78\*, 21 July–4 August 2016, 1♂, Malaise trap.

**PEDICIIDAE**

**PEDICINAE**

***Dicranota bimaculata* (Schummel, 1829)**

**Material.** HeLoc73\*, 28 July 2016, 1♀, sweep net.

***Dicranota exclusa* (Walker, 1848)**

**Material.** HeLoc07, 22 July 2016, 1♂, sweep net; HeLoc14, 26 June 2016, 1♂, sweep net; HeLoc59, 24 July 2017, 6 ex., light trap; HeLoc93, 17 August 2016, 1♂1♀, sweep net.

**Remarks.** First record from southern Hedmark (HES).

***Dicranota gracilipes* Wahlgren, 1905**

**Material.** HeLoc76\*, 17 August 2016, 1♂,

***Dicranota pavida* (Haliday, 1833)**

**Material.** HeLoc90\*, 30 June 2016, 4 ex., sweep net.

**Remarks.** First record from Hedmark (HEN).

***Pedicia rivosa* (Linnaeus, 1758)**

**Material.** HeLoc05, 23 July 2017, 1♂, sweep net; HeLoc17\*, 9–23 June 2016, 13♂♂; 11–21 July 2016, 23♂♂; 21 July–4 August 2016, 1♂; 17 August–2 September 2016, 4♂♂1♀, Malaise trap; HeLoc32\*, 9–23 June 2016, 2♂♂; 23 June–11 July 2016, 1♂; 17 August–2 September 2016, 1♂, Malaise trap; HeLoc45\*, 21 July–4 August 2016, 2♂♂1♀, Malaise trap; HeLoc47\*, 26 May–9 June 2016, 4♂♂1♀; 11–21 July 2016, 17♂♂3♀♀; 21 July–4 August 2016, 1♂; 4–17 August 2016, 18♂♂, Malaise trap; HeLoc71\*, 23 June–11 July 2016, 33♂♂2♀♀; 21 July–4 August 2016, 4♂♂, Malaise trap; HeLoc74\*, 9–23 June 2016, 12♂♂1♀; 23 June–11 July 2016, 1♂; 11–21 July 2016, 67♂♂4♀♀; 4–17 August 2016, 23♂♂1♀, Malaise trap; HeLoc75\*, 9–23 June 2016, 1♀; 11–21 July 2016, 13♂♂2♀♀, Malaise trap.

***Pedicia straminea* (Meigen, 1838)**

**Material.** HeLoc17\*, 23 June–11 July 2016, 1♂, Malaise trap.

**Additional material.** HEN, Stor-Elvdal: Gardbekken S, 61.614135°N 10.849115°E, 660 m a.s.l., 28 July 2017, 7 ex., net, leg. K.M. Olsen.

**Remarks.** First record from Hedmark (HEN).

***Tricyphona immaculata* (Meigen, 1804)**

**Material.** HeLoc07, 28 June 2016, 1♂, sweep net; HeLoc14, 26 June 2016, 3♂♂, sweep net; HeLoc17\*, 9–23 June 2016, 40 ex.; 23 June–11 July 2016, 4ex., Malaise trap; 8 June 2016, 6 ex., sweep net; HeLoc21\*, 6 June 2016, 2♂♂, sweep net; HeLoc34, 21 June–20 July 2017, 1♂1♀, light trap; HeLoc36\*, 29 July 2016, 1♂, sweep net; HeLoc37\*, 27 July 2016, 5♂♂, sweep net; HeLoc41, 29 July 2016, 3♂♂, sweep net; HeLoc47\*, 9–23 June 2016, 26 ex.; 23 June–11 July 2016, 100 ex., 11–21 July 2016, 10 ex.; 21 July–4 August 2016, 10 ex., Malaise trap; HeLoc58, 23–25 July 2016, 3♂♂, sweep net;

HeLoc59, 24 July 2017, 1♀, light trap; HeLoc64\*, 28 July 2016, 3 ex., sweep net; HeLoc66\*, 16–17 August 2016, 1♂, sweep net; HeLoc70\*, 25 July 2016, 3 ex., sweep net; HeLoc71\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 17♂♂; 11–21 July 2016, 20 ex.; 21 July–4 August 2016, 30 ex., Malaise trap; HeLoc74\*, 23 June–11 July 2016, 50 ex.; 11–21 July 2016, 42 ex.; 21 July–4 August 2016, 50 ex.; 4–17 August 2016, 5 ex.; 17 August–2 September 2016, 4♂♂; 16–29 September 2016, 1♂, Malaise trap; 15 July–18 September 2016, 1♂, window trap; HeLoc75\*, 11–21 July 2016, 5♂♂, Malaise trap; HeLoc78\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 20 ex.; 11–21 July 2016, 15 ex.; 21 July–4 August 2016, 7 ex., Malaise trap; 17 August 2016, 7♂♂, sweep net; HeLoc87, 26 July 2016, 7 ex., sweep net; HeLoc91, 25 July 2017, 1♂, sweep net.

**Additional material.** HES, Kongsvinger: Åranstorpet, 60.202808°N 12.434014°E, 300 m a.s.l., 22 April–14 June 2004, 1♂, Malaise trap, leg. K. Sund.

**Remarks.** First record from southern Hedmark (HES).

### *Tricyphona schummeli* Edwards, 1921

**Material.** HeLoc05, 23 July 2017, 1♂, sweep net; HeLoc47\*, 23 June–11 July 2016, 1♀, Malaise trap; HeLoc74\*, 1 June–15 July 2016, 1♂; 15 July–18 September 2016, 3♂♂, window trap; HeLoc78\*, 17 August 2016, 1♂, sweep net.

**Remarks.** First record from southern Hedmark (HES).

### *Tricyphona unicolor* (Schummel, 1829)

**Material.** HeLoc17\*, 9–23 June 2016, 1♂; 23 June–11 July 2016, 2♀♀, Malaise trap; HeLoc32\*, 26 May–9 June 2016, 1♂1♀; 9–23 June 2016, 4♀♀, Malaise trap; 6–8 June 2016, 1♂, sweep net; HeLoc47\*, 9–23 June 2016, 50 ex.; 23 June–11 July 2016, 100 ex., 11–21 July 2016, 1♂1♀, Malaise trap; HeLoc70\*, 25 July 2016, 3 ex., sweep net.

**Remarks.** First record from northern Hedmark (HEN).

## ULINAE

### *Ula mixta* Starý, 1983

**Material.** HeLoc71\*, 9–23 June 2016, 1♀, Malaise trap; HeLoc75\*, 1 June–16 July 2016, 1♂, window trap.

**Additional material.** HES, Kongsvinger: Dragonmonen, 60.19641°N 12.36511°E, 196 m a.s.l., 14 August–6 September 2005, 2♂♂, Malaise trap, leg. K. Sund. HEN, Åmot: Deifjellia, 61.284273°N 11.504971°E, 515 m a.s.l., 6 July 2018, 1♀, net, leg. K.M. Olsen (ZMO).

**Remarks.** First records from Hedmark (HES & HEN).

### *Ula sylvatica* (Meigen, 1818)

**Material.** HeLoc32\*, 17 September–7 November 2016, 1♂, window trap; HeLoc74\*, 1 June–15 July 2016, 1♂, window trap; HeLoc75\*, 1 June–16 July 2016, 1♂, window trap.

## The Malaise trap catches

Only eleven specimens of *Cylindrotomidae* belonging to three species, *Cylindrotoma distinctissima*, *Diogma glabrata* and *Phalacrocer replicata*, were taken in the Malaise traps at Kildesaga and Åsen.

A total of 2032 specimens of *Limoniidae* belonging to 46 species were collected in the Malaise traps. There are large differences in the number of specimens and species collected in the different traps. Most specimens, 1397, belonging to 21 species were collected in the Malaise trap at Åsen. At Kildesaga, 214 specimens belonging to 19 species were collected, at Ulvåkjølen–Sundsetra, 120 specimens belonging to 6 species, at Nabbtjern, 109 specimens belonging to seven species and at Brydalskjølen, 104 specimens belonging to 15 species. In the remaining traps, less than 100 specimens were collected.

A total of twelve species constituted more than 1% of the material of *Limoniidae*, Table 1. The most abundant species, *Molophilus flavus*, was taken in 899 specimens or 44.2% of the material. It ranged first at Åsen and Bjørvollen and second at Ulvåkjølen–Sundsetra, but was not



collected at Nabbtjern and Jøgåsmyra. *Phylidorea fulvonervosa* was the second most abundant species, with 239 specimens or 11.8% of the material. It ranged first at Ulvåkjølen–Sundsetra and second at Åsen. *Dicranophragma separatum* was the third most abundant species, with 152 specimens or 7.5% of the material. It ranged first at Kildesaga and second at Brydalskjølen. *Scleroprocta sororcula* was the fourth most abundant species, with 128 specimens or 6.3% of the material. It ranged first at Kildesaga and fourth at Åsen. *Dicranomyia rufiventris* was the fifth most abundant species with 115 specimens or 5.7% of the material. It ranged third at Åsen. *Phylidorea squalens* was the sixth most abundant species, with 107 specimens or 5.3% of the material. It ranged first at Nabbtjern and second at Sekserbua NE. *Ormosia ruficauda*, *Dicranomyia terraenovae*, *D. distendens*, *Erioconopa diuturna*, *D. stigmatica*, and *D. halterella*, were each taken in 58 to 28 specimens and constituted from 2.9% to 1.4% of the material. The remaining 34 species were each taken in less than 20 specimens.

Most of the species collected in the Malaise traps had a rather wide altitudinal range, but of the most abundant species, *Dicranomyia halterella*, *D. rufiventris*, *D. stigmatica*, and *D. terraenovae* were all collected only in the traps situated at

700 m a.s.l. or above, and *Erioconopa diuturna* was only collected at 780 m a.s.l. In the two traps at Nabbtjern and Kildesaga, situated below 300 m a.s.l., a total of 25 species were collected, while in the three traps at Åsen, Bjørvollen and Brydalskjølen, situated at or above 700 m a.s.l., no less than 30 species were caught.

A total of 880 specimens of Pediciidae belonging to six species were collected in the Malaise traps. There are large differences in the number of specimens and species collected in the different traps. Most specimens, 343, belonging to four species were collected at Sekserbua NE. At Åsen, 261 specimens belonging to two species were collected, at Ulvåkjølen–Sundsetra, 107 specimens belonging to two species and at Kildesaga, 90 specimens belonging to four species were caught. In the remaining traps, less than 50 specimens were collected.

Three species constituted more than 1% of the total material of Pediciidae, Table 2. The most abundant species, *Tricyphona immaculata*, was taken in 458 specimens or 52.0% of the material. It ranged first at Kildesaga, Ulvåkjølen–Sundsetra, Åsen and Brydalskjølen and second at Sekserbua NE and Bjørvollen, but was not taken at Nabbtjern and Jøgåsmyra. *Pedicia rivosa* was the second most abundant species, with 257

**TABLE 1.** Number of specimens of the most abundant Limoniidae species collected in the Malaise traps. Malaise trap no. 1 = Kildesaga, no. 2 = Nabbtjern, no. 3 = Sekserbua NE, no. 4 = Jøgåsmyra, no. 5 = Ulvåkjølen–Sundsetra, no. 6 = Åsen, no. 7 = Bjørvollen, no. 8 = Brydalskjølen.

Species / Trap no.	1	2	3	4	5	6	7	8	Totalt	%
<i>Molophilus flavus</i>	50	-	11	-	8	814	12	4	899	44.2
<i>Phylidorea fulvonervosa</i>	4	-	3	-	90	142	-	-	239	11.8
<i>Dicranophragma separatum</i>	51	-	11	-	2	63	5	17	152	7.5
<i>Scleroprocta sororcula</i>	51	-	-	-	5	72	-	-	128	6.3
<i>Dicranomyia rufiventris</i>	-	-	-	-	-	112	-	3	115	5.7
<i>Phylidorea squalens</i>	-	91	14	-	-	-	-	2	107	5.3
<i>Ormosia ruficauda</i>	1	-	4	-	8	37	6	2	58	2.9
<i>Dicranomyia terraenovae</i>	-	-	-	-	-	45	-	5	50	2.5
<i>Dicranomyia distendens</i>	-	-	17	-	7	13	-	6	43	2.1
<i>Erioconopa diuturna</i>	-	-	-	-	-	-	-	43	43	2.1
<i>Dicranomyia stigmatica</i>	-	-	-	-	-	30	-	11	41	2.1
<i>Dicranomyia halterella</i>	-	-	-	-	-	28	-	-	28	1.4

specimens or 29.2% of the material. It ranged first at Jøgåsmyra and Bjørvollen, second at Kildesaga, Nabbtjern, Ulvåkjølen–Sundsetra and Åsen, and third at Sekserbua NE, but was not caught at Brydalskjølen. *Tricyphona unicolor* was the third most abundant species, with 162 specimens or 18.4% of the material. It ranged first at Nabbtjern and Sekserbua NE and third at Kildesaga, but was not collected in any of the other Malaise traps. The remaining three species were only collected as single specimens.

*Tricyphona immaculata* and *Pedicia rivosa* both had a wide altitudinal range, while *Tricyphona unicolor* was only found below 520 m a.s.l. In the two traps at Nabbtjern and Kildesaga, situated below 300 m a.s.l., a total of five species were collected, while in the three traps at Åsen, Bjørvollen and Brydalskjølen, situated at or above 700 m a.s.l., only two species were collected.

**Discussion**

Of the four species of *Cylindrotomidae* collected during the project, *Diogma caudata* is recorded for the first time in Norway. The species was described from Japan by Takahashi (1960) and has a Trans-Palaearctic distribution. In Europe it is previously recorded from most parts of central and northern Finland and from northern Sweden (Tjeder 1975, Salmela 2011, FinBIF 2021). In addition, *Diogma glabrata* and *Phalacrocera replicata* are recorded for the first time from Hedmark and northern Hedmark (HEN), respectively. Of the 78 species of *Limoniidae*, *Limonia interjecta*, *Orimarga juvenilis* and *O. virgo* were recently published by Kolcsár *et al.* (2021) as verified for or new to Norway, partly based on material from the present project. In addition, 14 species are recorded for

the first time from southern Hedmark (HES) and 47 species for the first time from northern Hedmark, raising the number of species recorded from these regions to 22 and 101, respectively. Of the eleven species of *Pediciidae*, four species are recorded for the first time from southern Hedmark and four species from northern Hedmark, raising the number of species recorded from the regions to five and 14, respectively.

A total of four species of *Cylindrotomidae*, 55 species of *Limoniidae* and ten species of *Pediciidae* were taken on the rich fens, of which three, 22 and five species, respectively, were collected on rich fens only. Among the *Limoniidae*, *Molophilus flavus* was taken only on rich fens and it was the most abundant species in the Malaise traps catches, with 44.2% of the material. The species is widely distributed in Norway (Olsen *et al.* 2018, Artsdatabanken 2017). As part of a biological survey along the Atna River in Innlandet County, Solem & Mendl (1989) collected the species in a Malaise trap situated at Dørålseter. Salmela (2011b) found *M. flavus* to be associated with head water streams and springs in a study of the semiaquatic nematoceran fly assemblages in three wetland habitats in northern Finland. *Phylidorea fulvonervosa* ranged second in the Malaise trap catches on the rich fens and was also collected in other types of habitats. It is widely distributed in Norway (Olsen *et al.* 2018, Artsdatabanken 2017). According to Salmela (2008), the species is a eurytopic wetland species. *Dicranophragma separatum* ranged third the Malaise trap catches and was also collected in other types of habitats. It is widely distributed in Norway (Olsen *et al.* 2018, Artsdatabanken 2017). *Scleroprocta sororcula* ranged fourth in the Malaise trap catches and was taken only on rich fens during the project. The species is also widely distributed in

**TABLE 2.** Number of specimens of the most abundant *Pediciidae* species collected in the Malaise traps. Malaise trap no. 1 = Kildesaga, no. 2 = Nabbtjern, no. 3 = Sekserbua NE, no. 4 = Jøgåsmyra, no. 5 = Ulvåkjølen–Sundsetra, no. 6 = Åsen, no. 7 = Bjørvollen, no. 8 = Brydalskjølen.

Species / Trap no.	1	2	3	4	5	6	7	8	Totalt	%
<i>Tricyphona immaculata</i>	44	-	146	-	68	152	5	43	458	52.0
<i>Pedicia rivosa</i>	42	4	44	3	39	109	16	-	257	29.2
<i>Tricyphona unicolor</i>	3	7	152	-	-	-	-	-	162	18.4

Norway (Olsen *et al.* 2018, Artsdatabanken 2017). According to Salmela (2011b), both *D. separatum* and *S. sororcula* are associated with head water streams. Of the remaining abundant species, *Phylidorea squalens*, *Dicranomyia distendens*, *D. rufiventris*, *D. stigmatica* and *D. terranova* were among the most common species in a comprehensive study of the semiaquatic fly fauna of fens, springs, headwater streams and alpine wetlands in northern Finland (Salmela 2008).

Among the Pediciidae, *Tricyphona immaculata* was the most abundant species in the Malaise trap catches on the rich fens, constituting 52.0% of the material. *Pedicia rivosa* ranged second with 29.2%. Both species were also taken in other types of habitat and both are widely distributed in Norway (Olsen *et al.* 2018, Artsdatabanken 2017). They are both eurytopic wetland species and are among the most common species in fens, springs, headwater streams and alpine wetlands in northern Finland (Salmela 2008, 2011b). *Tricyphona unicolor* ranged third in the Malaise trap catches and was collected on rich fens only. The species is also widely distributed in Norway (Olsen *et al.* 2018, Artsdatabanken 2017). According to Salmela (2008), it inhabits peatland.

It is generally assumed that species richness is higher in southern, lowland areas than in northern, upland areas. This seems to hold for the Pediciidae collected on the rich fens during the project. However, of Limoniidae, more species were taken in the Malaise traps situated at 700 m a.s.l. or above, than in the traps situated below 300 m a.s.l. Salmela (2012) studied the biogeographic pattern of crane flies in Finland and found that mire dwelling species had a reversed latitudinal species richness pattern. More species were taken on mires in northern Finland than in southern Finland. It was suggested that this could be due to sheer area effect, as the total surface area of mires is higher in northern Finland and that the northern mires are more heterogenous environmentally than the southern ones. Southern mires were also more subjected to drainage and other human activities, while northern mires are more pristine. In the present study, the number of species collected in the different Malaise traps varied strongly and probably reflect local differences between the

fens. The fens varied both in size, structure, and vegetation, and on some of the fens there were springs, streams or ponds.

Salmela & Ilmonen (2005) explored the use of Tipuloidea as bio-indicators in relation to mire trophic status, and found that *Phylidorea squalens*, *Pedicia rivosa* and *Tricyphona immaculata* were indicators for mesotrophic mires. Salmela (2008) classified 34 wetland sites in the northern boreal ecoregion of Finland into five groups, and listed indicator species for the different groups. Several of these species were taken in the Malaise traps during the present study. According to Salmela (2008), *Phylidorea squalens* was an indicator for southern aapa mires with rich fen vegetation. For sloping fens with rich fen vegetation, *Phylidorea fulvonervosa*, *Dicranomyia stigmatica* and *Tricyphona unicolor* were indicator species and for palsa mires, alpine wetlands and rich fen vegetation, *Eriocnopa diuturna* was an indicator. He also assessed the conservation value of the different sites based on the semiaquatic flies and found that the sites were important for the conservation of boreal and alpine wetlands. Rare and possibly threatened species occurring in wetlands in Finland have been reviewed by Salmela (2008), Salmela *et al.* (2007) and Salmela & Ilmonen (2005). Salmela *et al.* (2007) concluded that nematocerans have a great potential as tools for bioassessment, conservation and monitoring of wetlands in the boreal region. In Norway, there are no previous comprehensive studies specifically targeting the fauna of semiaquatic flies on mires and fens, and crane flies are not properly evaluated in the Norwegian Red List of species (Gammelmo *et al.* 2015). More studies are thus needed to evaluate the importance of rich fens for the conservation of semiaquatic flies in Norway.

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