

# Diptera from rich fens and other habitats in eastern part of Innlandet, southeastern Norway. II. Chloropidae

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Records of 48 species of Chloropidae from Hedmark in the eastern part of Innlandet County, southeastern Norway, are presented based on material collected in 2016 and 2017 during a survey of insects inhabiting rich fens in the region. Thirteen species, *Conioscinella abiskoi* Nartshuk & Andersson, 2013, *Conioscinella livida* Nartshuk, 1970, *Dicraeus rossicus* Stackelberg, 1955, *Incertella scotica* (Collin, 1946), *Oscinella nigerrima* (Macquart, 1935), *Oscinella ventricosi* Nartshuk, 1955, *Oscinella vindicata* (Meigen, 1830), *Pseudopachychaeta approximatonervis* (Zetterstedt, 1848), *Pseudopachychaeta oscinina* (Fallén, 1813), *Rhopalopterum anthracinum* (Meigen, 1830), *Rhopalopterum atricorne* (Zetterstedt, 1838), *Rhopalopterum brunneipenne* Beshovski & Lansbury, 1987, and *Rhopalopterum cf. fasciola* (Meigen, 1830), are recorded for the first time in Norway, and an additional 23 species are recorded for the first time from southern and/or northern Hedmark (Strand-regions HES and/or HEN). A total of 33 species of Chloropidae were collected on the rich fens. Most of the material was collected in eight Malaise traps situated on different rich fens and collected continuously from early spring to late autumn 2016. A total of 453 specimens belonging to 28 species were collected in these traps. *Elachiptera cornuta* (Fallén, 1820) was the most abundant species constituting 38.9% of the material, *Aphanotrigonum trilineatum* (Meigen, 1830) ranged second with 10.4%, and *Rhopalopterum atricillum* (Zetterstedt, 1838) third with 8.6% of the material. There were, however, large differences in the number of specimens and species collected in the different traps.

Key words: Rich fens, Diptera, Chloropidae, new records, Hedmark, Innlandet County, Norway.

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## Introduction

The Chloropidae is a species-rich family of acalyptrate Brachycera with about 3000 species described worldwide. Four subfamilies are recognized, Rhodesiellinae, Oscinellinae, Chloropinae and Siphonellopsinae, of which the latter does not occur in northern Europe (Nartshuk & Andersson 2013). The species are mostly minute to small with a body length of 1–5 mm, sometimes up to 8 mm. The body is stout to slender, usually with few bristles. They are often yellowish or greenish with black, brown, or red

markings, and the mesonotum often has a pattern of three to five dark, longitudinal stripes. Some species are partly or entirely shiny black or dusted grey. Most Chloropidae prefer open habitats like grasslands and meadows, clearings and edges of forests, and all kinds of wetlands such as marshes, fens, and bogs (Nartshuk & Andersson 2013). Comparatively few species are forest inhabitants. Some of these are known to occur in the canopy (Thunes *et al.* 2004), while others occur on the foliage or tree trunks closer to the ground. Larval habits and diets are very diverse. They generally feed on living plant or animal tissues or on

dead organic matter like rotting plant material, mushrooms and bracket fungi, carrion, nests of birds etc. Some also feed on eggs of spiders and grasshoppers and some woodland species live in rotting wood or under the bark of trees (Oosterbroek 2006).

The first Norwegian records of Chloropidae were published by Zetterstedt (1838, 1848), and Siebke (1872) gives a list of species collected in Østerdalen in 1870. During the last decades Greve (1983, 1999), Skrzypczńska (1987), Økland & Hågvar (1994) and Thunes *et al.* (2004) have added new faunistic data. But the Norwegian fauna of Chloropidae is still not well known. Nartshuk & Andersson (2013) listed 203 species in 48 genera from Fennoscandia and Denmark, later a few more species have been added (e.g. Nielsen 2014, 2015). According to Nartshuk & Kahanpää (2014) 189 species are known from Sweden, 147 species from Finland, 119 species from Denmark and 97 species from Norway. However, Elven & Söli (2016) states that only 73 species are known from Norway.

In 2016 the project "Insects on rich fens in Hedmark, eastern Norway" was initiated aiming at increasing 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 a number of rare and red-listed plants grow on these fens. During the project insects were collected in nearly 100 localities (see Jonassen & Andersen 2020). The insect fauna on rich fens were the main target, but insects were also collected in a number of other habitats to get a better understanding of the habitat preferences of the different species. Below we present a list of the Chloropidae species from Hedmark collected during the project.

## Material and methods

The 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, a number of 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 beginning after the snow had melted in April–May and continuing until the 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 trees. 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.

During the field work 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 mainly stored in 75–80% ethanol, but a few specimens are pinned. It is housed in the entomological collection at the Department of Natural History, University Museum of Bergen (ZMBN).

All species were identified by the senior author. Most Norwegian species of Chloropidae can be identified using the keys in Nartshuk & Andersson (2013); the article by Collin (1946) is a good additional help in the subfamily Oscinellinae. It must be noted however, that some taxonomic questions, especially within Oscinellinae, remain to be solved. The *Oscinella* species are small, dark flies with a shining frontal triangle (Figure 1). In the *Oscinella frit*-group,

there are still some unsettled questions in the delimitation of the species. In this article, the species *Oscinella nigerrima* (Macquart, 1835) and *Oscinella vindicata* (Meigen, 1830) are at least provisionally accepted as distinct, which seems to be the currently prevailing practice (e.g. Nartshuk & Kahanpää 2014).

The genus *Rhopalopterum* Duda, 1929 contains a questionable species pair, *R. fasciola* (Meigen, 1830) and *R. femorale* Collin, 1946. We failed to find any consistent, applicable differences in the external characters like leg color, pollinosity, etc., given in the keys. Further, the two species could not be separated based on existing figures of the male genitalia. These flies were rather abundant in the Hedmark material, and we record them as *R. cf. fasciola* (Meigen, 1830). According to Michael von Tschirnhaus (pers. comm) he might have found slight morphological differences for several of the species in this complex. Further studies using DNA barcoding, might resolve if two distinct species are involved. However, neither of the species are listed from Norway, but both species are recorded from Sweden and Finland (Nartshuk & Andersson 2013).

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 the eastern part of Innlandet, i.e. the former Hedmark County, and we have used the biogeographical regions southern Hedmark (HES) and northern Hedmark (HEN) following the "Strand-system" (Økland 1981, Endrestøl 2021).

A species is regarded as "new to Norway" or "new to southern and/or northern Hedmark" if it is not listed for Norway or for southern and/or northern Hedmark by Nartshuk & Andersson (2013) or if there are no documented records of the species in Artskart (Artsdatabanken 2017). However, as noted above the number of species stated to occur in Norway varies between different authors (see Nartshuk & Kahanpää 2014, Elven & Sævi 2016).

## The Malaise trap localities

The different fens were selected using Naturbase (Miljødirektoratet 2017) which includes a thorough descriptions of the different fens.

**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 (<https://faktaark.naturbase.no/?id=BN00075142>).

**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 (<https://faktaark.naturbase.no/?id=BN00026540>).

**HeLoc45\***, Northern Hedmark (HEN), Rendalen, Jøgåsmyra, 61.774556°N 11.593472°E, 640 m a.s.l. (Malaise trap no. 3). Large (694 daa), rich to extremely rich fen with a mosaic of firm substrate and loose mats (<https://faktaark.naturbase.no/?id=BN00026324>).

**HeLoc47\***, Northern Hedmark (HEN), Rendalen, Sekserbua NE, 61.556056°N 11.168556°E, 520 m a.s.l. (Malaise trap no. 4). Medium large (64 daa), intermediate to rich wood and scrub-covered fen with firm substrate (<https://faktaark.naturbase.no/?id=BN00026412>).

**HeLoc71\***, 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 richest parts, with gently sloping terrain (<https://faktaark.naturbase.no/?id=BN00026842>).

**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 (see Løvhuskjølen: <https://faktaark.naturbase.no/?id=BN00026820>).

**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 some places with exposed stones, but there are also smaller areas with fen carpet and mud bottom (<https://faktaark.naturbase.no/?id=BN00099251>).

**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 (<https://faktaark.naturbase.no/?id=BN00100041>).

## Results

### The species

#### *Aphanotrigonum nigripes* (Zetterstedt, 1848)

**Material.** HeLoc47\*, 26 May–9 June 2016, 2 ex., Malaise trap; HeLoc71\*, 26 May–9 June 2016, 1 ex., Malaise trap; HeLoc74\*, 2–16 September 2016, 1 ex., Malaise trap.

#### *Aphanotrigonum trilineatum* (Meigen, 1830)

**Material.** HeLoc07, 22 July 2017, 1♂, sweep net; HeLoc17\*, 28 April–11 May 2016, 6 ex.; 26 May–9 June 2016, 3 ex.; 21 July–4 August 2016, 1 ex.; 17 August–2 September 2016, 2 ex.; 2–16 September 2016, 2 ex.; 16–28 September 2016, 1 ex., Malaise trap; HeLoc24, 15 August 2016, 6 ex., sweep net; HeLoc32\*, 26 May–9 June 2016, 1 ex.; 4–17 August 2016, 2 ex.; 16–28 September 2016, 2 ex., Malaise trap; 31 May 2016, 10 ex., sweep net; HeLoc35, 29–31 July 2016, 1 ex., light trap; HeLoc47\*, 26 May–9 June 2016, 2 ex.; 11–21 July 2016, 1 ex., Malaise trap; HeLoc71\*, 9–23 June 2016, 1 ex.; 4–17 August 2016, 1 ex.; 17 August–2 September 2016, 2 ex.; 2–16 September 2016, 1 ex.; 16–28 September 2016, 1 ex., Malaise trap; 7 June 2016, 1 ex., sweep net; HeLoc74\*, 17 August–2 September 2016, 2 ex.; 2–16 September 2016, 1 ex.; 16–28 September 2016, 1 ex., Malaise trap; HeLoc78\*, 26 May–9 June 2016, 11 ex.; 9–23 June 2016, 2 ex.; 13–27 October 2016, 1 ex., Malaise trap.

#### *Cetema cereris* (Fallén, 1820)

**Material.** HeLoc06, 23 July 2017, 1♂, sweep net; HeLoc47\*, 4–17 August 2016, 1 ex., Malaise trap.

#### *Cetema elongatum* (Meigen, 1830)

**Material.** HeLoc06, 23 July 2017, 1♂, sweep net; HeLoc24, 15 August 2016, 5 ex., sweep net; HeLoc39, 24 July 2017, 3♂♂, sweep net.

#### *Cetema myopinum* (Loew, 1866)

**Material.** HeLoc04, 22 July 2017, 1♂, sweep net; HeLoc06, 23 July 2017, 2♂♂, sweep net; HeLoc12, 21 July 2017, 1♂, sweep net; HeLoc48, 24 July 2017, 3♂♂, sweep net; HeLoc84, 23 July 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Cetema neglectum* Tonnoir, 1921

**Material.** HeLoc19, 27 July 2017, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Chlorops calceatus* Meigen, 1830

**Material.** HeLoc19, 27 July 2017, 1♀, sweep net.

#### *Chlorops meigenii* Loew, 1866

**Material.** HeLoc17\*, 11–21 July 2016, 2 ex., Malaise trap; HeLoc47\*, 11–21 July 2016, 4 ex., Malaise trap; HeLoc70\*, 25 July 2016, 1 ex., sweep net; HeLoc74\*, 11–21 July 2016, 2 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Chlorops planifrons* (Loew, 1866)

**Material.** HeLoc35, 29–31 July 2016, 1 ex., light trap; HeLoc39, 24 July 2017, 1♀, sweep net; HeLoc47\*, 4–17 August 2016, 1 ex., Malaise trap; HeLoc71\*, 11–21 July 2016, 1 ex.; 4–17 August 2016, 1 ex.; 17 August–2 September 2016, 1 ex., Malaise trap; HeLoc78\*, 11–21 July 2016, 2 ex., Malaise trap.

***Chlorops riparius* Smirnov, 1958**

**Material.** HeLoc35, 29–31 July 2016, 1 ex., light trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN). Previously only collected in inner Sogn og Fjordane (SFI) in 1941 and 1942 (Nartshuk & Andersson 2013).

***Chlorops speciosus* Meigen, 1830**

**Material.** HeLoc01, 20 July 2017, 1♂, sweep net; HeLoc37\*, 27 July 2016, 1 ex., sweep net; HeLoc47\*, 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc74\*, 11–21 July 2016, 3 ex., Malaise trap.

***Chlorops troglodytes* (Zetterstedt, 1848)**

**Material.** HeLoc11, 21 July 2017, 1♀, sweep net; HeLoc48, 24 July 2017, 1♂, sweep net.

***Chlorops varsoviensis* Becker, 1910**

**Material.** HeLoc07, 22 July 2017, 1♀, sweep net; HeLoc32\*, 31 May 2016, 1 ex.; 15 July 2017, 1 ex., sweep net; HeLoc49\*, 7 June 2016, 2 ex., sweep net; HeLoc78\*, 11–21 July 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from southern and northern Hedmark (HES and HEN). Previously only taken in inner Finnmark (FI) (Nartshuk & Andersson 2013).

***Conioscinella abiskoi* Nartshuk & Andersson, 2013**

**Material.** HeLoc47\*, 9–23 June 2016, 2 ex., Malaise trap.

**Remarks.** New to Norway. The species was recently described from northern Sweden by Nartshuk & Andersson (2013).

***Conioscinella frontella* (Fallén, 1820)**

**Material.** HeLoc47\*, 23 June–11 July 2017, 3 ex., Malaise trap.

***Conioscinella livida* Nartshuk, 1970**

**Material.** HeLoc47\*, 26 May–9 June 2016, 8 ex., Malaise trap.

**Remarks.** New to Norway. A European species only known from Belarus, Czech Republic, Estonia, Finland, Germany, northwestern

European Russia, and Slovakia (Nartshuk 2013). The species inhabits bogs (Nartshuk & Andersson 2013).

***Cryptonevra flavitarsis* (Meigen, 1830)**

**Material.** HeLoc47\*, 7 June 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

***Dicraeus rossicus* Stackelberg, 1955**

**Material.** HeLoc35, 29–31 July 2016, 1♂, light trap.

**Remarks.** New to Norway. A Trans-Palaearctic species known from Europe eastwards to Japan. In northern Europe it has been recorded from Estonia, Finland, and northwestern European Russia (Nartshuk 2013). The larvae feed on seeds of bearded wheatgrass (*Elymus caninus*) (Nartshuk & Andersson 2013).

***Elachiptera cornuta* (Fallén, 1820)**

**Material.** HeLoc07, 22 July 2017, 1♂, sweep net; HeLoc17\*, 28 April–11 May 2016, 3 ex.; 11–26 May 2016, 1 ex.; 26 May–9 June 2016, 2 ex.; 9–23 June 2016, 1 ex.; 17 August–2 September 2016, 1 ex.; 2–16 September 2016, 1 ex., Malaise trap; HeLoc21\*, 6 June 2016, 2 ex., sweep net; HeLoc24, 15 August 2016, 1 ex., sweep net; HeLoc26, 18 September 2016, 1 ex., sweep net; HeLoc29, 18 September 2016, 1 ex., sweep net; HeLoc30, 4 June 2017, 5 ex., sweep net; HeLoc32\*, 26 May–9 June 2016, 1 ex., Malaise trap; 31 May 2016, 8 ex.; 17 September 2016, 1 ex., sweep net; HeLoc35, 29–31 July 2016, 3 ex., light trap; HeLoc36\*, 3 June–25 July 2017, 4 ex., Malaise trap; HeLoc37\*, 27 July 2016, 8 ex., sweep net; HeLoc44, 17 September 2016, 1 ex., sweep net; HeLoc45\*, 25 May–6 June 2016, 1 ex.; 21 July–4 August 2016, 1 ex.; 16–28 September 2016, 1 ex., Malaise trap; HeLoc47\*, 14–26 May 2016, 2 ex.; 26 May–9 June 2016, 2 ex.; 9–23 June 2016, 1 ex.; 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 2 ex.; 4–17 August 2016, 1 ex.; 17 August–2 September 2016, 13 ex.; 2–16 September 2016, 4 ex.; 16–28 September 2016, 2 ex.; 28 September–13 October 2016, 1 ex., Malaise trap; HeLoc59, 24 July 2017, 1 ex.,

light trap; HeLoc60\*, 7 June 2016, 1 ex., sweep net; HeLoc63, 17 August 2016, 10 ex., sweep net; HeLoc66\*, 16–17 August 2016, 1 ex., sweep net; HeLoc68, 26 July 2016, 2 ex., sweep net; HeLoc69, 16 August 2016, 1 ex., sweep net; HeLoc71\*, 13–26 May 2016, 2 ex.; 26 May–9 June 2016, 11 ex.; 9–23 June 2016, 2 ex.; 23 June–11 July 2016, 3 ex.; 21 July–4 August 2016, 1 ex.; 4–17 August 2016, 5 ex.; 17 August–2 September 2016, 11 ex.; 2–16 September 2016, 13 ex., Malaise trap; 7 June 2016, 1 ex., sweep net; HeLoc73\*, 28 July 2016, 1 ex., sweep net; HeLoc74\*, 14–26 May 2016, 3 ex.; 26 May–9 June 2016, 6 ex.; 9–23 June 2016, 1 ex.; 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 2 ex.; 4–17 August 2016, 4 ex.; 17 August–2 September 2016, 24 ex.; 2–16 September 2016, 19 ex.; 16–28 September 2016, 10 ex., Malaise trap; HeLoc75\*, 26 May–9 June 2016, 2 ex.; 9–23 June 2016, 1 ex., Malaise trap; HeLoc78\*, 26 May–9 June 2016, 8 ex.; 2–16 September 2016, 5 ex.; 16–28 September 2016, 2 ex., Malaise trap; 17 August 2016, 1 ex., sweep net.

#### *Elachiptera diastema* Collin, 1946

**Material.** HeLoc21\*, 6 June 2016, 1 ex., sweep net; HeLoc37\*, 27 July 2016, 1 ex., sweep net; HeLoc68, 15 August 2016, 1 ex., sweep net; HeLoc71\*, 4–17 August 2016, 1 ex.; 17 August–2 September 2016, 5 ex.; 2–16 September 2016, 2 ex., Malaise trap; HeLoc74\*, 14–26 May 2016, 2 ex.; 26 May–9 June 2016, 5 ex.; 4–17 August 2016, 2 ex.; 17 August–2 September 2016, 2 ex.; 2–16 September 2016, 2 ex.; 16–28 September 2016, 2 ex., Malaise trap; HeLoc75\*, 26 May–9 June 2016, 1 ex., Malaise trap; HeLoc78\*, 14–26 May 2016, 2 ex.; 9–23 June 2016, 2 ex.; 2–16 September 2016, 2 ex.; 16–28 September 2016, 1 ex., Malaise trap; HeLoc80\*, 17 August 2016, 4 ex., sweep net; HeLoc82\*, 8 June 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Elachiptera tuberculifera* (Corti, 1909)

**Material.** HeLoc17\*, 28 April–11 May 2016, 2 ex., Malaise trap; HeLoc35, 29–31 July 2016, 1 ex., light trap; HeLoc78\*, 17 August 2016, 1 ex.,

sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Epichlorops puncticollis* (Zetterstedt, 1848)

**Material.** HeLoc64\*, 28 July 2016, 1 ex., sweep net; HeLoc70\*, 25 July 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN). Previously only collected by Siebke in 1865 in Tønsberg in Vestfold (VE) (Siebke 1866).

#### *Eribolus nana* (Zetterstedt, 1838)

**Material.** HeLoc19, 27 July 2017, 1 ex., sweep net; HeLoc36\*, 3 June–25 July 2017, 2 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN). Previously only collected on Vannøya, in Karlsøy, Troms (TRY) in 1925 by Soot Ryen (Artsdatabanken 2017).

#### *Gaurax* sp.

**Material.** HeLoc17\*, 9–23 June 2016, 1 ♀, Malaise trap.

**Remarks.** Only a single female that could not be identified to species was collected. *Guarax dubius* (Macquart, 1835) is previously known from Hedmark (Nartshuk & Andersson 2013).

#### *Hapleginella laevifrons* (Loew, 1858)

**Material.** HeLoc17\*, 9–23 June 2016, 2 ex., Malaise trap; HeLoc47\*, 9–23 June 2016, 2 ex.; 23 June–11 July 2017, 1 ex.; 21 July–4 August 2016, 1 ex., Malaise trap; 7 June 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Incertella albipalpis* (Meigen, 1830)

**Material.** HeLoc75\*, 4–17 August 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Incertella kerteszi* (Becker, 1910)

**Material.** HeLoc04, 22 July 2017, 1 ♂, sweep net; HeLoc08, 22 July 2017, 1 ♀, sweep

net; HeLoc32\*, 31 May 2016, 1 ex., sweep net; HeLoc47\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc71\*, 4–17 August 2016, 1 ex., Malaise trap; HeLoc74\*, 17 August–2 September 2016, 1 ex.; 2–16 September 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

### *Incertella scotica* (Collin, 1946)

**Material.** HeLoc17\*, 9–23 June 2016, 1 ex., Malaise trap; HeLoc21\*, 6 June 2016, 1 ex., sweep net; HeLoc47\*, 26 May–9 June 2016, 1 ex.; 9–23 June 2016, 1 ex.; 23 June–11 July 2017, 1 ex., Malaise trap; HeLoc71\*, 26 May–9 June 2016, 2 ex.; 9–23 June 2016, 2 ex.; 23 June–11 July 2016, 3 ex.; 11–21 July 2016, 5 ex.; 21 July–4 August 2016, 1 ex., Malaise trap.

**Remarks.** New to Norway. A European species; in northern Europe it has been recorded from Denmark, Sweden, Finland, and northwestern European Russia. It lives on bogs with sedges (*Carex* spp.) (Nartshuk & Andersson 2013).

### *Melanum laterale* (Haliday, 1833)

**Material.** HeLoc07, 22 July 2017, 1♀, sweep net; HeLoc32\*, 21 July–4 August 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from southern and northern Hedmark (HES and HEN).

### *Meromyza* sp.

**Material.** HeLoc35, 29–31 July 2016, 1♀, light trap.

**Remarks.** Only a single female that could not be identified to species was collected. *Meromyza saltatrix* (Linnaeus, 1761) is previously known from Hedmark (Nartshuk & Andersson 2013).

### *Oscinella frit* (Linnaeus, 1758)

**Material.** HeLoc04, 22 July 2017, 1♂, sweep net; HeLoc06, 23 July 2017, 1♂, sweep net; HeLoc08, 22 July 2017, 1♀, sweep net; HeLoc19, 27 July 2017, 1♂, sweep net; HeLoc24, 15 August 2016, 30 ex., sweep net; HeLoc32\*, 17 August–2 September 2016, 1 ex., Malaise trap; 17 September 2016, 1 ex., sweep net; HeLoc35, 29–31 July 2016, 5 ex., light trap; 29 July 2016, 1 ex.,

sweep net; HeLoc43, 24 July 2017, 1♂, sweep net; HeLoc45\*, 6–17 June 2016, 1 ex.; 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc47\*, 9–23 June 2016, 1 ex.; 2–16 September 2016, 1 ex., Malaise trap; HeLoc69, 16 August 2016, 1 ex., sweep net; HeLoc74\*, 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc75\*, 23 June–11 July 2016, 1 ex.; 21 July–4 August 2016, 1 ex.; 4–17 August 2016, 1 ex., Malaise trap; HeLoc78\*, 16–28 September 2016, 1 ex., Malaise trap; HeLoc80\*, 17 August 2016, 6 ex., sweep net.

### *Oscinella nigerrima* (Macquart, 1935)

**Material.** HeLoc21\*, 6 June 2016, 1 ex., sweep net; HeLoc47\*, 9–23 June 2016, 1 ex.; 21 July–4 August 2016, 1 ex., Malaise trap.

**Remarks.** New to Norway. The distribution of *O. nigerrima* is not fully clarified, but it is evidently widespread in Denmark and Fennoscandia. The larvae develop on sheep fescue (*Festuca ovina*) and false oatgrass (*Arrhenatherum elatius*) (Nartshuk & Andersson 2013).

### *Oscinella ventricosi* Nartshuk, 1955

**Material.** HeLoc24, 15 August 2016, 1 ex., sweep net.

**Remarks.** New to Norway. A predominately northern Palaearctic species; in Fennoscandia it has been recorded from Sweden and Finland. It lives in rich meadows where the larvae develop in the shoots of various foxtail grasses (*Alopecurus* spp.) (Nartshuk & Andersson 2013).

### *Oscinella vindicata* (Meigen, 1830)

[= *O. hortensis* Collin, 1946]

**Material.** HeLoc06, 23 July 2017, 1♀, sweep net; HeLoc10, 22 July 2017, 1♂1♀, sweep net; HeLoc19, 27 July 2017, 1♀, sweep net; HeLoc24, 15 August 2016, 5 ex., sweep net; HeLoc43, 24 July 2017, 1♂, sweep net; HeLoc48, 24 July 2017, 2 ex., sweep net; HeLoc84, 23 July 2016, 2 ex., sweep net; HeLoc87, 26 July 2017, 1♀, sweep net.

**Remarks.** New to Norway. The distribution of *O. vindicata* is not fully clarified as it is difficult to distinguish from other species in the *O. frit* group. The larvae feed on grasses like ryegrass (*Lolium perenne*), wavy hairgrass (*Dechampsia*

*flexuosa*) and meadow-grass (*Poa* spp.) (Nartshuk & Andersson 2013).

***Oscinimorpha minutissima* (Strobl, 1900)**

**Material.** HeLoc07, 22 July 2017, 1♂, sweep net; HeLoc48, 24 July 2017, 2♂♂, sweep net.

**Remarks.** Recorded for the first time from southern Hedmark (HES).

***Oscinisoma cognatum* (Meigen, 1830)**

**Material.** HeLoc17\*, 28 April–11 May 2016, 4 ex.; 26 May–9 June 2016, 1 ex.; 16–28 September 2016, 3 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN). Previously only known from outer Vest-Agder (VAY) (Nartshuk & Andersson 2013).

***Pseudopachychaeta approximatonevris* (Zetterstedt, 1848)**

**Material.** HeLoc08, 22 July 2017, 1♂, sweep net.

**Remarks.** New to Norway. A Holarctic species; in Fennoscandia it has been recorded from Denmark, Finland, and Sweden. It was not recorded from Norway by (Nartshuk & Andersson 2013), but Nartshuk (2013) included Norway in the European distribution of the species. It lives in freshwater marshes and other wet places where the larvae are phytophagous in the flowers of sedges (Cyperaceae) (Nartshuk & Andersson 2013).

***Pseudopachychaeta oscinina* (Fallén, 1813)**

**Material.** HeLoc36\*, 29 July 2017, 3 ex., sweep net; HeLoc80\*, 2 June 2016, 1 ex., sweep net.

**Remarks.** New to Norway. A Palaearctic species known from most of Europe including Sweden and Finland (Nartshuk 2013). It is found in wet habitats and the larvae live in the flowers of various spikesedges (*Eleocharis* spp.) (Nartshuk & Andersson 2013).

***Pseudopachychaeta ruficeps* (Zetterstedt, 1838)**

**Material.** HeLoc04, 22 July 2017, 1♂, sweep net; HeLoc08, 22 July 2017, 1♀, sweep net; HeLoc32\*, 17 September 2016, 1 ex.; 15 July 2017, 1 ex., sweep net; HeLoc36\*, 3 June–25 July

2017, 5 ex., Malaise trap; HeLoc45\*, 25 May–6 June 2016, 1 ex.; 6–17 June 2016, 1 ex.; 21 July–4 August 2016, 1 ex.; 2–16 September 2016, 2 ex.; 16–28 September 2016, 1 ex., Malaise trap; 1 June 2016, 2 ex.; 7 June 2016, 1 ex.; 22 August 2016, 1 ex., sweep net; HeLoc47\*, 9–23 June 2016, 1 ex.; 23 June–11 July 2017, 1 ex.; 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc58, 23–25 July 2016, 1 ex., sweep net; HeLoc69, 16 August 2016, 2 ex., sweep net; HeLoc70\*, 25 July 2016, 1 ex., sweep net; HeLoc71\*, 26 May–9 June 2016, 2 ex.; 11–21 July 2016, 1 ex.; 17 August–2 September 2016, 1 ex., Malaise trap; HeLoc74\*, 26 May–9 June 2016, 8 ex.; 9–23 June 2016, 2 ex., Malaise trap; HeLoc78\*, 26 May–9 June 2016, 1 ex., Malaise trap; HeLoc80\*, 17 August 2016, 1 ex., sweep net.

**Remarks.** Recorded for the first time from southern and northern Hedmark (HES and HEN).

***Rhopalopterum anthracinum* (Meigen, 1830)**

**Material.** HeLoc44, 17 September 2016, 1 ex., sweep net.

**Remarks.** New to Norway. A Palaearctic, boreal species known from most of Europe including Denmark, Finland, and Sweden (Nartshuk 2013). It inhabits wetlands with *Carex* spp. (Nartshuk & Andersson 2013).

***Rhopalopterum atricillum* (Zetterstedt, 1838)**

**Material.** HeLoc01, 20 July 2017, 1♂, sweep net; HeLoc05, 23 July 2017, 1♀, sweep net; HeLoc08, 22 July 2017, 1♀, sweep net; HeLoc11, 21 July 2017, 2 ex., sweep net; HeLoc12, 21 July 2017, 2♂♂, sweep net; HeLoc17\*, 9–23 June 2016, 4 ex., Malaise trap; HeLoc18, 21 July 2017, 1♀, sweep net; HeLoc19, 27 July 2017, 1 ex., sweep net; HeLoc20\*, 6 June 2016, 1 ex., sweep net; HeLoc21\*, 6 June 2016, 1 ex., sweep net; HeLoc32\*, 31 May 2016, 2 ex.; 17 September 2016, 1 ex., sweep net; HeLoc35, 29–31 July 2016, 1 ex., light trap; HeLoc36\*, 29 July 2017, 3 ex., sweep net; HeLoc37\*, 27 July 2016, 1 ex., sweep net; HeLoc42, 3 August 2017, 7 ex., sweep net; HeLoc47\*, 9–23 June 2016, 3 ex.; 23 June–11 July 2017, 7 ex.; 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 1 ex.; 4–17 August 2016, 1 ex., Malaise trap; 7 June 2016, 1 ex.,



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

Species/trap no.	1	2	3	4	5	6	7	8	Total	Percent
<i>Elachiptera cornuta</i>	9	1	3	29	46	70	3	15	176	38,85%
<i>Aphanotrigonum trilineatum</i>	15	5	–	3	6	4	–	14	47	10,38%
<i>Rhopalopterum atricillum</i>	4	–	–	13	21	1	–	–	39	8,61%
<i>Elachiptera diastema</i>	–	–	–	–	8	15	1	7	31	6,84%
<i>Thaumatomyia trifasciata</i>	11	–	7	5	3	–	–	1	27	5,96%
<i>Pseudopachychaeta ruficeps</i>	–	–	6	3	4	10	–	1	24	5,30%
<i>Incertella scotica</i>	1	–	–	3	13	–	–	–	17	3,75%
<i>Rhopalopterum cf. fasciola</i>	1	–	–	–	7	–	1	1	10	2,21%
<i>Oscinella frit</i>	–	1	2	2	–	1	3	1	9	1,99%
<i>Chlorops meigenii</i>	2	–	–	4	–	2	–	–	8	1,77%
<i>Conioscinella livida</i>	–	–	–	8	–	–	–	–	8	1,77%
<i>Oscinisoma cognatum</i>	8	–	–	–	–	–	–	–	8	1,77%
<i>Chlorops planifrons</i>	–	–	–	1	3	–	–	2	6	1,32%
<i>Hapleginella laevifrons</i>	2	–	–	4	–	–	–	–	6	1,32%
<i>Tricimba cincta</i>	1	3	–	–	–	–	1	1	6	1,32%



**FIGURE 1.** The *Oscinella* Becker, 1909 species are small, dark flies with a shining frontal triangle. Photo: Raimo Peltonen.

sweep net; HeLoc64\*, 28 July 2016, 1 ex., sweep net; HeLoc70\*, 25 July 2016, 1 ex., sweep net; HeLoc71\*, 23 June–11 July 2016, 2 ex.; 11–21 July 2016, 8 ex.; 21 July–4 August 2016, 10 ex.; 4–17 August 2016, 1 ex., Malaise trap; HeLoc73\*, 28 July 2016, 3 ex., sweep net; HeLoc74\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc86, 25 July 2017, 1 male, sweep net.

**Remarks.** Recorded for the first time from southern and northern Hedmark (HES and HEN).

#### *Rhopalopterum atricorne* (Zetterstedt, 1838)

**Material.** HeLoc04, 22 July 2017, 1♂, sweep net; HeLoc05, 23 July 2017, 2♂♂, sweep net; HeLoc07, 22 July 2017, 2♂♂, sweep net.

**Remarks.** New to Norway. A Palaearctic, boreal species distributed in northern and central Europe including Finland and Sweden (Nartshuk 2013). It inhabits wetlands with *Carex* spp. (Nartshuk & Andersson 2013).

#### *Rhopalopterum brunneipenne* Beshovski & Lansbury, 1987

**Material.** HeLoc05, 23 July 2017, 1♂, sweep net; HeLoc59, 24 July 2017, 2 ex., light trap.

**Remarks.** New to Norway. The species was described from England by Beshovski & Lansbury (1987) and elsewhere only known from Finland, northwestern Russia, and Lithuania (Nartshuk 2013).

#### *Rhopalopterum cf. fasciola* (Meigen, 1830)

**Material.** HeLoc04, 22 July 2017, 2♂♂, sweep net; HeLoc17\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc19, 27 July 2017, 1 ex., sweep net; HeLoc24, 15 August 2016, 1 ex., sweep net; HeLoc36\*, 29 July 2017, 4 ex., sweep net; HeLoc37\*, 27 July 2017, 2 ex., sweep net; HeLoc39, 24 July 2017, 1♀, sweep net; HeLoc44, 17 September 2016, 2 ex., sweep net; HeLoc57, 28 July 2016, 1 ex., sweep net; HeLoc61, 25 July 2016, 1 ex., sweep net; HeLoc71\*, 11–21 July 2016, 2 ex.; 4–17 August 2016, 1 ex.; 17 August–2 September 2016, 1 ex.; 2–16 September 2016, 2 ex.; 16–28 September 2016, 1 ex., Malaise trap; HeLoc73\*, 28 July 2016, 3 ex., sweep net; HeLoc75\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc78\*, 11–21 July 2016, 1 ex., Malaise trap.

**Remarks.** New to Norway. Based on the material from Hedmark *R. fasciola* could not be separated from *R. femorale* Collin, 1946. If proved to be distinct species, the material might contain both species. *Rhopalopterum fasciola* is a Palaearctic, boreal species. It is known from most of Europe including Denmark, Finland, and Sweden (Nartshuk 2013). It inhabits wetlands with *Carex* spp. (Nartshuk & Andersson 2013).

#### *Siphonella oscinina* (Fallén, 1820)

**Material.** HeLoc47\*, 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 2 ex., Malaise trap; HeLoc71\*, 17 August–2 September 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Thaumatomyia glabra* (Meigen, 1830)

**Material.** HeLoc43, 24 July 2017, 1♀, sweep net.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Thaumatomyia hallandica* Andersson, 1966

**Material.** HeLoc11, 21 July 2017, 1♀, sweep net; HeLoc48, 24 July 2017, 1 male, sweep net.

#### *Thaumatomyia notata* (Meigen, 1830)

**Material.** HeLoc19, 27 July 2017, 1♀, sweep net; HeLoc32\*, 31 May 2016, 2 ex., sweep net; HeLoc45\*, 6–17 June 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

#### *Thaumatomyia trifasciata* (Zetterstedt, 1848)

**Material.** HeLoc05, 23 July 2017, 1♀, sweep net; HeLoc17\*, 26 May–9 June 2016, 1 ex.; 9–23 June 2016, 6 ex.; 11–21 July 2016, 4 ex., Malaise trap; HeLoc18, 21 July 2017, 1♀, sweep net; HeLoc36\*, 29 July 2017, 5 ex., sweep net; HeLoc45\*, 6–17 June 2016, 1 ex.; 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 5 ex., Malaise trap; HeLoc47\*, 23 June–11 July 2017, 3 ex.; 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc58, 23–25 July 2016, 1 ex., sweep net; HeLoc68, 26 July 2016, 2 ex., sweep net; HeLoc71\*, 23 June–11 July 2016, 1 ex.; 21

July–4 August 2016, 1 ex.; 4–17 August 2016, 1 ex., Malaise trap; HeLoc78\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc86, 25 July 2017, 1♀, sweep net.

### *Tricimba cincta* (Meigen, 1830)

**Material.** HeLoc17\*, 11–21 July 2016, 1 ex., Malaise trap; HeLoc32\*, 11–21 July 2016, 1 ex.; 21 July–4 August 2016, 2 ex., Malaise trap; HeLoc32\*, 17 September 2016, 1 ex., sweep net. HeLoc75\*, 21 July–4 August 2016, 1 ex., Malaise trap; HeLoc78\*, 23 June–11 July 2016, 1 ex., Malaise trap.

**Remarks.** Recorded for the first time from northern Hedmark (HEN).

### The Malaise trap catches

A total of 453 specimens of Chloropidae belonging to 28 species were taken in the Malaise traps. There were large differences in the number of specimens and species collected in the different traps. Most specimens, 114, belonging to 12 species were collected in the Malaise trap at Ulvåkjølen-Sundsetra; at Åsen 109 specimens belonging to 10 species were collected, at Sekserbua NE 90 specimens belonging to 19 species, at Kildesaga 56 specimens belonging to 12 species, and at Brydalskjølen 44 specimens belonging to 10 species were found. In the remaining traps less than 20 specimens were collected.

A total of 15 species constituted more than 1% of the Malaise trap material, Table 1. Of *Elachiptera cornuta* altogether 176 specimens were collected constituting 38.9% of the material. *Aphanotrigonum trilineatum* ranged second with 47 specimens (10.4%), *Rhopalopterum atricillum* third with 39 specimens (8.6%), *Elachiptera diastema* fourth with 31 specimens (6.8%), *Thaumatomyia trifasciata* fifth with 27 specimens (6.0%), and *Pseudopachychaeta ruficeps* ranged sixth with 24 specimens or 5.3% of the material. *Incertella scotica*, *Rhopalopterum* cf. *fasciola*, *Oscinella frit*, *Chlorops meigenii*, *Conioscinella livida*, *Oscinisoma cognatum*, *Chlorops planifrons*, *Hapleginella laevifrons*, and *Tricimba cincta* were each taken in 17 to 6 specimens and

constituted from 3.8% to 1.3% of the material. The remaining 13 species were each taken in less than 5 specimens.

In the four Malaise traps situated below 650 m a.s.l. no less than 26 species were collected, while 18 species were collected in the four Malaise traps situated above 650 m a.s.l. Most of the 15 most abundant species were collected in most of the Malaise traps between 250–780 m a.s.l. However, *Oscinisoma cognatum* was only collected in the Malaise traps situated below 300 m a.s.l., while *Elachiptera diastema*, *Conioscinella livida*, and *Chlorops planifrons* were only collected in the traps situated above 600 m a.s.l.

### Discussion

The project gave new data on the distribution and occurrence of many Chloropidae species, particularly of many Oscinellinae species. In addition to more ubiquitous and common chloropids, most of the species collected live on open land like grassy fields, bogs, marshes, swamps, and fens. The usually more southern genus *Meromyza* was represented only by a single female, which could not be identified to species level. The mainly wood-dwelling, more rarely encountered genus *Gaurax* was also represented only by a single female, and the genera *Calamoncosis*, *Lasiosina*, *Lasiambia* and *Lipara* were completely and a little surprisingly missing in the material altogether.

Thirteen species, *Conioscinella abiskoi*, *C. livida*, *Dicraeus rossicus*, *Incertella scotica*, *Oscinella nigerrima*, *O. ventricosi*, *O. vindicata*, *Pseudopachychaeta approximatonervis*, *P. oscinina*, *Rhopalopterum anthracinum*, *R. atricorne*, *R. brunneipenne*, and *R. cf. fasciola*, are recorded for the first time from Norway. Further, *Epichlorops puncticolis* and *Eribolus nana* are collected in Norway for the first time in 100 years. In addition, five species are recorded for the first time from southern Hedmark (HES) and 22 species for the first time from northern Hedmark (HEN), raising the number of species recorded from these regions to 40 and 48, respectively.

A total of 33 species of Chloropidae were

collected on the rich fens, of which 15 species were taken only on that type of fens. Some of the most abundant species collected in the Malaise traps are euryoecious, able to live in a variety of habitats, but most of the abundant species mainly inhabit wet places such as bogs, marshes, swamps, and fens. *Elachiptera cornuta* is a very common species occurring in different types of habitats. In Denmark Nielsen (2014) recorded the species both from wet places and from woodland edges. The species hibernates as adults and the larvae are saprophytophagous in the rotting tissue of different grasses. In southeastern Norway, Rygg (1966) reared it from seedlings of wheat damaged by *Phorbia fumigata* (Meigen, 1826) (Anthomyiidae). *Aphanotrigonum trilineatum* is a very common species on bogs and other wetlands, but also found in meadows and agricultural fields (Nartshuk & Andersson 2013). Rygg (1966) reared it from seedlings of oats and wheat. *Rhopalopteron atricillum* is a boreal species inhabiting wetlands with *Carex* spp. (Nartshuk & Andersson 2013). *Elachiptera diastema* inhabits wet places, where the larvae develop in shoots of grasses like cock's-foot (*Dactylus glomerata*) and tall fescue (*Festuca arundinacea*) (Nartshuk & Andersson 2013). *Thaumatomyia trifasciata* inhabits wet places such as bogs, marshes, swamps, fens, and the littoral zone of lakes. In Norway, the species has also been found by canopy fogging of Scots pine (*Pinus silvestris*) (Thunes *et al.* 2004). The larvae are carnivorous, feeding on root aphids among plant roots (Nartshuk & Andersson 2013). *Pseudopachychaeta ruficeps* is an arctic-boreal species common on peat bogs and mires. The larvae feed on the developing seeds of hare-tail grass (*Eriophorum vaginatum*) and other species of *Eriophorum* (Nartshuk & Andersson 2013).

It is generally assumed that the species richness of insects is highest in mires with a high trophic status and that it generally declines from eutrophic to oligotrophic mires, as has been demonstrated for Tipuloidea (e.g. Salmela & Ilmonen 2005). It is also generally assumed that the species richness is higher in lowland mires than in mires in more upland areas. This seems to hold for the Chloropidae collected on the rich fens in Hedmark. No less than 26 species were

collected in the four Malaise traps situated below 650 m a.s.l., while 18 species were collected in the four traps situated above 650 m a.s.l. However, the number of species collected in the different Malaise traps varied strongly and probably reflects 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.

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## References

- Andersen, T. & Hagenlund, L.K. 2019. Vårfluer på rikmyrer i nordre Hedmark. *Fauna (Oslo)* 71(1–2) (2018), 12–30.
- Artsdatabanken. 2016. *Insekter på rikmyrer i Hedmark*. Kartleggingsprosjekter. Available from: <https://www.artsdatabanken.no/Pages/197274> (18 April 2021).
- Artsdatabanken. 2017. *Artskart 2*. Artsdatabanken and GBIF-Norge. Available from: <https://artskart.artsdatabanken.no/> (18 April 2021).
- Beschovski, V.L. & Lansbury, I. 1987. Two new *Rhopalopteron* species from England (U.K.) and Hungary (Insecta, Diptera, Chloropidae). *Reichenbachia* 25, 91–96.
- Collin, J.E. 1946. The British genera and species Oscinellinae. *Transactions of the Royal Entomological Society of London* 97, 117–148.
- Elven, H. & Søli G. (red.) 2016. *Kunnskapsstatus for arts mangfoldet i Norge 2015*. Utredning for Artsdatabanken 1/2016. Artsdatabanken, Norge. Available from: [https://www.artsdatabanken.no/Files/16197/Kunnskapsstatus\\_for\\_arts\\_mangfoldet\\_i\\_Norge\\_2015](https://www.artsdatabanken.no/Files/16197/Kunnskapsstatus_for_arts_mangfoldet_i_Norge_2015) (26 May 2021).
- Endrestøl, A. 2021. Strand-systemet 4.0. *Insekt-Nytt* 46, 43–72. Available from: [https://www.researchgate.net/publication/349710866\\_Strand-systemet\\_40](https://www.researchgate.net/publication/349710866_Strand-systemet_40) (26 May 2021).
- Greve, L. 1983. *Platycephala umbraculata* (Fabr., 1794) (Dipt., Chloropidae) new to Norway. *Fauna*

- norvegica Series B 30, 111–112.
- Greve, L. 1999. *Gampsocera numerata* (Heeger, 1858) (Diptera, Chloropidae) new to Norway. *Norwegian Journal of Entomology* 46, 8.
- Jonassen, T. & Andersen, T. 2020. Diptera from rich fens and other habitats in eastern part of Innlandet, southeastern Norway. I. Dolichopodidae (Empidoidea). *Norwegian Journal of Entomology* 67, 101–124.
- Lindgaard, A. & Henriksen, S. 2011. *Norsk rødliste for naturtyper 2011*. 112 pp. Artsdatabanken, Trondheim. Available from: <https://www.artsdatabanken.no/roedlistefornaturtyper> (28 May 2021).
- Miljødirektoratet. 2017. *Naturbase*. Available from: <http://www.miljodirektoratet.no/no/Tjenester-og-verktoy/Database/Naturbase/> (10 April 2021).
- Nartshuk, E.P. 2013. *Fauna Europaea: Chloropidae*. In Beuk, P. & Pape, T. *Fauna Europaea: Chloropidae*. *Fauna Europaea* version 2017.06. Available from: <https://fauna-eu.org> (24 April 2021).
- Nartshuk, E.P. & Andersson, H. 2013. The frit flies (Chloropidae, Diptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* 43, vi + 1–282.
- Nartshuk, E. & Kahanpää, J. 2014. Checklist of the family Chloropidae (Diptera) of Finland. In Kahanpää, J. & Salmela, J. (Eds), *Checklist of the Diptera of Finland*. *ZooKeys* 441, 311–318.
- Nielsen, L.B. 2014. Distribution of Oscinellinae (Diptera, Chloropidae) in the Danish landscape. *Entomologiske Meddelelser* 82, 39–62.
- Nielsen, L.B. 2015. Distribution of Chloropinae (Diptera, Chloropidae) in the Danish landscape. *Entomologiske Meddelelser* 83, 3–20.
- Økland, B. & Hågvar, S. 1994. The insect fauna associated with carpophores of the fungus *Fomitopsis pinicola* (Fr.) Karst. in a southern Norwegian spruce forest. *Fauna norvegica Series B* 41, 29–42.
- Økland, K.A. 1981. Inndeling av Norge til bruk ved biogeografiske oppgaver - et revidert Strand-system. *Fauna (Oslo)* 34, 167–178.
- Oosterbroek, P. 2006. *The European Families of the Diptera. Identification, diagnosis, biology*. 208 pp. KNNV Publishing, Zeist.
- Rygg, T. 1966. Species of Chloropidae (Diptera) on Gramineae in south-eastern Norway. *Norsk Entomologisk Tidsskrift* 13, 160–162.
- Salmela, J. & Ilmonen, J. 2005. Crane fly (Diptera: Tipuloidea) fauna of a boreal mire system in relation to mire trophic status: implications for conservation and bioassessment. *Journal of Insect Conservation* 9, 85–94.
- Siebke, H. 1866. Entomologiske undersøgelser foretagne i sommeren 1865. *Nytt Magazin for Naturvidenskapene* 14, 389–420.
- Siebke, H. 1872. *Bidrag til Norges Insektfauna: beretning om en i Østerdalen foretagen Reise i 1870*. 64 pp. J. Dahl, Christiania [= Oslo].
- Skrzypczńska, M. 1987. Beitrag zur Kenntnis der Entomofauna der Fichtenzapfen, *Picea abies* (L.) Karst. in Norwegen. *Anzeiger für Schädlingskunde, Pflanzenschutz, Umweltschutz* 60, 25–27.
- Thunes, K.H., Skartveit, J., Gjerde, I., Starý, J., Solhøy, T., Fjellberg, A., Kobro, S., Nakahara, S., zur Strassen, R., Vierbergen, G., Szadziewski, R., Hagan, D.V., Grogan Jr., W.L., Jonassen, T., Aakra, K., Anonby, J., Greve, L., Aukema, B., Heller, K., Michelsen, V., Haenni, J.-P., Emeljanov, A.F., Douwes, P., Berggren, K., Franzen, J., Disney, R.H.L., Prescher, S., Johanson, K.A., Mamaev, B., Podenas, S., Andersen, S., Gaimari, S.D., Nartshuk, E., Søli, G.E.E., Papp, L., Midtgaard, F., Andersen, A., von Tschirnhaus, M., Bächli, G., Olsen, K.M., Olsvik, H., Földvári, M., Raastad, J.E., Hansen, L.O. & Djursvoll, P. 2004. The arthropod community of Scots pine (*Pinus sylvestris* L.) canopies in Norway. *Entomologica Fennica* 15, 65–90.
- Zetterstedt, J.W. 1838. *Insecta Lapponica. Sectio tertia. Diptera*. Pp. 477–868. Leopold Voss, Lipsiae [= Leipzig].
- Zetterstedt, J.W. 1848. Diptera Scandinaviae disposita et descripta. *Lundbergiana, Lundæ [= Lund]* 7, 2581–2934.

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