INTRODUCTION

The family of pearl midges (Cecidomyiidae) consists of three subfamilies: Ground midge (Lestremiinae), log midge (Porricondylinae) and gall midge (Cecidomyiinae) (Økland and Mamaev 1997). The best known representatives of this family seem to be the members of the subfamily gall midges, since they are visible to the human eye by different-shaped galls on a large variety of plants. However, the species in Lestremiinae develop in such substrates as decaying wood, under bark, in litter and fungi, while none of their species are gall-makers. Apparently, they are not so well-known to the public.

The research activity on ground midges (Lestremiinae) in Fennoscandia has been quite low. In early time, five ground midge species (Lestremiinae) were described by Scandinavians (Zetterstedt 1838, 1851, Siebke 1864). However, little attention was subsequently paid to this subfamily in Fennoscandia, and the Catalogue of Palaearctic Diptera published in 1986 contained only eight species from this area (Skuhrava 1986). Obviously, this low number was mainly due to a lack of research. Therefore, the number of pearl midge species in the Fennoscandian countries has so far been based on estimates (Ottesen 1993, Hedström 1994). However in the last few years, several species records of ground midge have been added by Økland (1995a,b), Jaschhof (1996) and Mamaev (1996a).

Knowledge of which species can be found in an area is basic to many kinds of studies. This paper is meant to be a contribution to future check lists of Diptera in the Fennoscandian countries. It presents an up-dated species list of ground midge (Lestremiinae) from Fennoscandia, based on:

I a new material of ground midge from 49 localities in various parts of Fennoscandia.
II previous records of ground midge found in publications.

METHODS

The present material was collected in 49 Fennoscandian localities in the period 1985-94. Various sampling methods were used, such as malaise trap, pitfall trap, light trap, rearing from larvae and sweep netting. For each locality, Table 1 gives local name (site), municipality, region code (Økland 1981, Chvála 1994), number of European Invertebrate Survey-system (EIS), date of sampling, name of collector (leg.), sampling method, and name of collection where the material is preserved in Canadian balsam on microscope slides. Region codes were based on province codes used in
Table 1. Information about sampling sites and previous records. reg. = region code (Norwegian sites: Økland 1981, other sites: Chvála 1994), EIS = European Invertebrate Survey-system, leg. = name of collector, collection = collection for preservation of the material.

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Former published records:

50 Swedish sites in Mamaev (1996)
51 Norwegian records in Økland (1995a,b)
52 Eight sites in Lapland, Jaschhof (1996)
53 Species included in Catalogue of Palaearctic Diptera, Skuhravá (1986)
Fauna Ent. Scand. (see f.ex. Chvala 1994). For Norway, the revised code of Økland (1981) was used instead.

The nomenclature of the species presentation follows the Catalogue of Palaearctic Diptera (Skuhrová 1986) with addition of recent publications, such as Berest (1993), Mamaev (1993), Jaschhof (1996) and Mamaev & Økland (1996).

RESULTS

Old and new records of ground midge (Lestremiinae) in Fennoscandia are listed in Table 2, including six species from Finland, 45 species from Norway and 58 species from Sweden, and altogether 73 species from Fennoscandia. In the present material, 25 species are new to the fauna in at least one Fennoscandian country. Three species are new to Finland, 17 species are new to Norway, and nine species are new to Sweden.

Table 2. New and former records of ground midge species (Diptera, Lestremiinae) in Fennoscandia, including information about number of individuals collected, capital letter of Fennoscandian country, region code (full names in Table 3), site reference (see Table 1), and period (month) of records. New species are denoted with a bold letter for the respective countries.

Catarete brevinervis (Zetterstedt, 1851); country: F, S; site: 53.
Catocha latipes Haliday, 1833; 14 ind.; country: N, S; region: Ø, AK, Dlr., T. Lpm.; site: 1, 4, 12, 50, 52; period: VI, VII, IX.
Anarete candidata Haliday, 1833; 1 ind.; country: S; region: Upl.; site: 50; period: VI.
Anarete coracina (Zetterstedt, 1851); country: S; site: 53.
Anarete lacteipennis Kieffer, 1906; country: F; site: 53.
Anaretella cincta Mamaev, 1964; 3 ind.; country: N, S; region: AK, Upl., Dlr.; site: 4, 44, 46; period: VI, VII, VIII.
Anaretella defecta (Winnertz, 1870); 26 ind.; country: F, N, S; region: AK, HES, OS, NTI, TRY, FN, FØ, Upl., LuLpm., Ab; site: 3, 4, 7, 8, 12, 15, 19, 20, 21, 34, 36, 38, 39, 48, 49, 50, 52; period: V, VII, VIII, IX.
Anaretella elegantula Mamaev, 1964; 1 ind.; country: N; region: AK; site: 4; period: VIII.
Anaretella glacialis Mamaev et Økland, 1996; 2 ind.; country: N; region: FØ; site: 38; period: IX.

Anaretellula iola Pritchard, 1951; 5 ind.; country: N, S; region: FN, T. Lpm.; site: 52; period: VII.
Anaretella magnicornis Mamaev, 1964; 12 ind.; country: F, N; region: AK, OS, SFY, TRY, TRI, Ab; site: 3, 11, 25, 33, 36, 37, 49; period: VI, VII, IX.
Anaretella supermagna Mamaev et Økland, 1996; 15 ind.; country: N; region: AK, NTI, TRY, FØ; site: 3, 34, 36, 38; period: VIII, IX.
Anaretella spiraeina (Felt, 1907); 36 ind.; country: N, S; region: AK, OS, TRY, Upl., Dlr., LuLpm.; site: 4, 9, 14, 19, 21, 25, 36, 48, 50; period: VI, VII, VIII.

Lestremia cinerea Macquart, 1826; 136 ind.; country: N, S; region: AK, HES, HEN, OS, ON, BØ, BV, TEI, NTI, NSI, TRY, FN, FØ, Upl., LuLpm., T. Lpm.; site: 2, 4, 5, 6, 8, 12, 14, 15, 16, 17, 18, 21, 24, 25, 26, 27, 28, 29, 32, 34, 35, 36, 39, 47, 48, 50, 52; period: V, VI, VII, VIII, IX.

Lestremia leucophaea (Meigen, 1818); 10 ind.; country: N, S; region: AK, OS, TEY, FØ, Upl., LuLpm.; site: 10, 25, 30, 47, 48, 50, 52, 53; period: VII, VIII.

Aprionus abiskoensis Jaschhof, 1996; 15 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Aprionus aequatus Mamaev, 1963; 1 ind.; country: S; region: Sk.; site: 50; period: V.

Aprionus angulatus Mamaev, 1963; 1 ind.; country: S; region: Dlr.; site: 46; period: VI.

Aprionus betulae Jaschhof, 1996; 18 ind.; country: N, S; region: FN, FØ, T. Lpm.; site: 52; period: VII.

Aprionus bifidus Mamaev, 1963; 7 ind.; country: N, S; region: OS, Upl., Dlr., T. Lpm.; site: 17, 50, 52; period: VI, VII, VIII.

Aprionus bipinatus Edwards, 1938; 28 ind.; country: N, S; region: FN, FØ, SM; site: 50, 52; period: V, VII.

Aprionus carinatus Jaschhof, 1996; 10 ind.; country: N, S; region: FØ, T. Lpm.; site: 52; period: VII.

Aprionus confusus Mamaev, 1969; 7 ind.; country: S; region: Dlr., T. Lpm.; site: 45, 52; period: V, VII.

Aprionus corniculatus Mamaev, 1963; 3 ind.; country: S; region: Dlr.; site: 45; period: VI.

Aprionus cornutus Berest, 1986; 2 ind.; country: N, S; region: AK, Dlr.; site: 13, 45; period: VI.

Aprionus dentifer Mamaev, 1965; 4 ind.; country: N, S; region: AK, OS, BØ, Dlr.; site: 8, 21, 28, 50; period: VI, VIII.

Aprionus ensiferus Jaschhof, 1996; 3 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Aprionus flavinus (Winnertz, 1870); 2 ind.; country: S; region: Dlr.; site: 50; period: VI.

Aprionus flavivelensis (Winnertz, 1870); 1 ind.; country: N; region: T. Lpm.; site: 32; period: V.

Aprionus giganteus Berest, 1991; 3 ind.; country: N; region: T. Lpm.; site: 32; period: V.

Aprionus inquisitor Mamaev, 1963; 16 ind.; country: N, S; region: AK, OS, BØ, FN, Upl., Dlr.; site: 4, 5, 7, 8, 9, 14, 22, 24, 28, 50, 52; period: VI, VII, VIII.
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<td>FN, Dlr., T. Lpm.</td>
<td>45, 46, 52</td>
<td>VI, VII</td>
</tr>
<tr>
<td>Aprionus longicollicus</td>
<td>N</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Aprionus miki</td>
<td>N, S</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Aprionus paludosus</td>
<td>N, S</td>
<td>FN, Dlr., T. Lpm.</td>
<td>41, 45, 46, 52</td>
<td>VI, VII</td>
</tr>
<tr>
<td>Aprionus sveeieus</td>
<td>N</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Aprionus lapponicus</td>
<td>N, S</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Xylopriona monotheea</td>
<td>N</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Myeopriona abnormis</td>
<td>N</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Monardia stirpium</td>
<td>S</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Mycoprionia abnormis</td>
<td>S</td>
<td>FN</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Trichopteromyia modesta</td>
<td>S</td>
<td>FN, Upl.</td>
<td>site 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Xylopriona monotheca</td>
<td>N, S</td>
<td>OS, Dlr.</td>
<td>site 24</td>
<td>period VI, VII</td>
</tr>
<tr>
<td>Bryomyia aspectra</td>
<td>F, N, S</td>
<td>OS, Sk., SM, Upl., Dlr., Ab</td>
<td>4, 7, 8, 11</td>
<td>12, 23, 24, 26, 49, 50; period V, VI, VII, VIII</td>
</tr>
<tr>
<td>Bryomyia bergrothi</td>
<td>N, S</td>
<td>Ø, FN, FØ, Upl., Dlr., Lu, Lpm.</td>
<td>site 47, 50, 52</td>
<td>period VI, VII, IX</td>
</tr>
<tr>
<td>Bryomyia gibbosa</td>
<td>N, S</td>
<td>AK, OS, FN, FØ, Dlr., T. Lpm.</td>
<td>4, 8, 12, 18, 24, 50, 52</td>
<td>period VI, VII, VIII</td>
</tr>
<tr>
<td>Bryomyia incisa</td>
<td>N, S</td>
<td>Sk.</td>
<td>site 50</td>
<td>period V</td>
</tr>
<tr>
<td>Bryomyia producta</td>
<td>N, S</td>
<td>FN, FØ, Dlr., T. Lpm.</td>
<td>site 36, 48, 50, 52</td>
<td>period V, VI, VII</td>
</tr>
<tr>
<td>Heterogenella hybrida</td>
<td>N, S</td>
<td>FN, FØ, Dlr., T. Lpm.</td>
<td>site 50, 52</td>
<td>period VII</td>
</tr>
<tr>
<td>Campylomyza alpina</td>
<td>N, S</td>
<td>STI, TRI, FØ, Dlr., Lu, Lpm.</td>
<td>site 37, 47, 50, 52, 53</td>
<td>period VII, VIII</td>
</tr>
<tr>
<td>Campylomyza bicolor</td>
<td>N</td>
<td>OS, FØ</td>
<td>site 23, 38</td>
<td>period VIII</td>
</tr>
<tr>
<td>Campylomyza dilatata</td>
<td>N</td>
<td>Ø, FN, T. Lpm.</td>
<td>site 1, 52</td>
<td>period VI, VII, IX</td>
</tr>
<tr>
<td>Campylomyza flavipes</td>
<td>N, S</td>
<td>OS, FN, SM, Upl., T. Lpm.</td>
<td>site 20, 50, 52</td>
<td>period V, VI, VII, VIII</td>
</tr>
<tr>
<td>Campylomyza fusca</td>
<td>N, S</td>
<td>TEI, NTI, FØ</td>
<td>site 31, 34, 52</td>
<td>period VII, VIII</td>
</tr>
<tr>
<td>Campylomyza monilicornis</td>
<td>N</td>
<td>ON</td>
<td>site 53</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents the number ground midge species recorded in each of the Fennoscandian regions. In this table, species records are lacking for 19 of 20 Finnish regions, for 20 of 37 Norwegian regions, and for nine of 15 Swedish regions. Furthermore, the number of species recorded vary greatly between the regions, ranging from one to 26. The highest species numbers in
Table 3. The number of ground midge species (Lestremiinae) recorded in each of the Fennoscandian regions. Map of Norwegi-an regions is found in Økland (1981), and other Fennoscandian regions in Chvala (1994).

<table>
<thead>
<tr>
<th>Reg.code</th>
<th>region</th>
<th>species</th>
<th>Reg.code</th>
<th>region</th>
<th>species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø</td>
<td>Østfold</td>
<td>3</td>
<td>TRY</td>
<td>Troms, outer</td>
<td>8</td>
</tr>
<tr>
<td>AK</td>
<td>Akershus</td>
<td>18</td>
<td>TRI</td>
<td>Troms, inner</td>
<td>2</td>
</tr>
<tr>
<td>HES</td>
<td>Hedmark, southern</td>
<td>2</td>
<td>FN</td>
<td>Finnmark, northern</td>
<td>16</td>
</tr>
<tr>
<td>HEN</td>
<td>Hedmark, northern</td>
<td>1</td>
<td>FØ</td>
<td>Finnmark, eastern</td>
<td>22</td>
</tr>
<tr>
<td>OS</td>
<td>Oppland, southern</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>Oppland, northern</td>
<td>2</td>
<td>Sk.</td>
<td>Skåne</td>
<td>5</td>
</tr>
<tr>
<td>BØ</td>
<td>Buskerud, eastern</td>
<td>3</td>
<td>Sm.</td>
<td>Småland</td>
<td>6</td>
</tr>
<tr>
<td>BV</td>
<td>Buskerud, western</td>
<td>1</td>
<td>Upl.</td>
<td>Uppland</td>
<td>17</td>
</tr>
<tr>
<td>TEY</td>
<td>Telemark, outer</td>
<td>1</td>
<td>Dlr.</td>
<td>Dalarn</td>
<td>23</td>
</tr>
<tr>
<td>TEI</td>
<td>Telemark, inner</td>
<td>1</td>
<td>Lu.Lpm.</td>
<td>Lule Lappmark</td>
<td>8</td>
</tr>
<tr>
<td>SFY</td>
<td>Sogn og Fjordane, outer</td>
<td>1</td>
<td>T. Lpm.</td>
<td>Torne Lappmark</td>
<td>26</td>
</tr>
<tr>
<td>STI</td>
<td>Sør-Trønderlag, inner</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTI</td>
<td>Nord-Trønderlag, inner</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSI</td>
<td>southern Nordland, inner</td>
<td>1</td>
<td>Ab</td>
<td>Regio aboensis</td>
<td>3</td>
</tr>
</tbody>
</table>

the table are found in regions in the north and east of Scandinavia (Torne Lappmark, Dalarn and eastern Finnmark).

**DISCUSSION**

This article shows a rapid progress in our knowledge about the Fennoscandian ground midge fauna (Lestremiinae) during the last ten years, raising the species number from eight in 1986 to 73 at present. However, there is considerable potential for further development of taxonomy and faunistics of ground midges in Fennoscandia.

The species listed in the Catalogue of Palaearctic Diptera (species with site reference 53 in Table 2) may need a closer examination. Altogether, nine Fennoscandian species are listed here; however, Monardia monilicornis (Zetterstedt, 1838) was excluded from the present list since Campylomyza monilicornis (Zetterstedt, 1838) and Monardia monilicornis (Zetterstedt, 1838) refer to the exactly same description. Also, some of the other ground midge species in the catalogue are more uncertain. However, Campylomyza alpina Siebke has been refound as a valid species (Jaschhof 1996) and is present in several localities of the present survey.

The most wide-spread and abundant species in the present study was Lestremia cinerea Macquart, which appeared in 66% of the regions included in the survey. Next to this, Anaretella defecta (Winnertz) was collected in 42% of the regions, Bryomyia aspecta Edwards and B. producta (Felt) in 29%, and Anaretella magnicornis Mamaev, A. spiraeina (Felt), Lestremia leucophaea (Meigen), A. inquisitor Mamaev, Bryomyia bergrothi Kieffer and B. gibbosa (Felt) in 25%.

Still, a lot of work is required before the regional distribution of each species within Fennoscandia can be outlined. It is assumed that the large variation in species numbers between the Fennoscandian regions in the present survey is mainly caused by an uneven sampling effort, and that different methods have been applied in the various regions. If Table 3 reflects any biogeographical trends at all, it is noteworthy that some of the northern and eastern regions were the most species-rich. Several species were restricted to the northern regions in the present survey. However, most of these species are newly described species and difficult to evaluate with respect to distribution, such as Anaretella glacialis Mamaev et Økland, Aprionus abiskoensis Jaschhof, A. betulae Jaschhof, A. carinatus Jaschhof, A. ensiferus Jaschhof and A. svecicus Jaschhof. Outside, Fennoscandia, Anaretella glacialis Mamaev et Økland is also
collected in Jamal in the northernmost part of Russia. It cannot be excluded that several ground midge species are confined to the northern areas or are significantly more abundant here. However, more research may reveal other patterns of regional species richness and distribution of single species.

ACKNOWLEDGMENTS

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SAMMENDRAG

Fennoskandiske funn av Lestremiinae (Diptera, Cecidomyiidae)

Underfamilien feltmygg (Lestremiinae) har vært dårlig undersøkt i Fennoskandia, og omfattet inntil nylig (1986) bare 9 kjente arter fra dette området. Artsantallet er betydelig økt gjennom undersøkelser i de siste årene. Denne artikkelen gir en oversikt over nye og tidligere funn av feltmygg i Fennoskandia. Oversikten er basert på et nytt matriale samlet inn i 49 lokaliteter fra ulike deler av Fennoskandia, samt en gjennomgang av tidligere publikasjoner. Det presenteres en liste på i alt 73 arter av feltmygg i Fennoskandia, hvorav 25 arter er nye for faunaen i Finland, Norge eller Sverige.

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Mamaev, B.M. & Økland, B. 1996. Description of two new species and key to the genus Anaretella Enderlein (Diptera, Cecidomyiidae). - All-Russian Institute of Continuous Education in Forestry 4: 1-12, Pushkino.


