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The Siebke collection of Norwegian Moth flies (Diptera: Psychodidae)

Trond Andersen & Eli Amundsen

Andersen, T. & Amundsen, E. 1997. The Siebke collection of Norwegian Moth flies (Diptera: Psychodidae). - Fauna norv. Ser. B. 44: 91-93.

The Siebke collection of Norwegian Moth flies, presently lodged at the Museum of Zoology, University of Oslo, comprises 33 specimens of which 9 are males. Based mainly on the males 6 species were identified: *Satchelliella stammeri* (Jung, 1954), *Pericoma formosa* Nielsen, 1964, *Psychoda albipennis* Zetterstedt, 1850, *Psychoda lobata* Tonnoir, 1940, *Peripsychoda auriculata* (Curtis, 1839) and *Philosepedon humeralis* (Meigen, 1818). *Peripsychoda auriculata* is previously not recorded from Norway, while the record of *Satchelliella stammeri* is the second of this species from Norway.

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INTRODUCTION

In his list of Norwegian Diptera, Siebke (1877) included 8 species of Psychodidae, all recorded as belonging to the genus *Psychoda,* viz.: "*Ps. phalœnoides* Lin., *Ps. palustris* Meig., *Ps. trifasciata* Meig., *Ps. ocellaris* Latr., *Ps. calceata* Meig., *P. nervosa* Meig., *Ps. humeralis* Meigen, and *Ps. albipennis* Zett.". Recently, Andersen & Håland (1995) published a list of Norwegian Psychodidae, but regarded Siebke's (1877) records as doubtful and did not include them in the list. However, the Siebke collection of Psychodidae is lodged in the Museum of Zoology, University of Oslo, and the present study is aimed at identifying this material.

METHODS AND MATERIAL

All specimens were pinned; on some pins there were two or three specimens. The specimens were removed from the pins, and mounted on slides using Canada Balsam as mountant. All slides have been numbered; the numbers are referred to in the species list below.

The material consists of 33 specimens, of which nine were males still having a hypopygium. All males have been identified, while only a few females proved possible to identify to species, the rest have been identified to genus or tribe level.

The species

1. *Ps. phalaenoides* Lin.

Siebke (1877) gave the following records of the species: "Hab. ad Christiniam in Tøien, in parochiis Øier & Fron Gudbrandsdaliæ nec non in alpe Dovre ad Fokstuen. Juli." In his collection there are 10 specimens under this name. Slide no. 1: ♂ "7", "Toien 3.6.51" = *Psychoda albipennis* Zetterstedt, 1850. Slide no. 2: ♂ "Dovre" = *Psychoda lobata* Tonnoir, 1940. Slide no. 3: ♀ on same pin as previous = *Psychoda* sp. Slide no. 4: ♀, on same pin as previous = *Psychoda* sp. Slide no. 5: ♂ "D." = *P. lobata.* Slide no. 6: ♂ "Dovre" = *P. lobata.* Slide no: 7: ♀ "Kungsvold 29.7.73" = *Psychoda* sp. Slide no. 8: ♀"Kr.ania" = *Psychoda* sp. Slide no. 9: ♀ "Vaage" 1.7.61" = *Psychoda* sp. Slide no. 10: ♀ "Julius H 12.5.51" = *Psychoda* sp.

Based on Siebke's (1877) records the present males of *Psychoda lobata* most probably were taken at ON, Dovre: Fokstua (EIS: 71). In Norway *P. lobata* occurs in the southern parts of the country (Andersen & Håland 1995). For *P. albipennis,* see below.

2. *Ps. palustris* Meig.
Siebke (1877) gave the following records of the species: "Circa Christianiam passim observata ex. gr. in Tøien, Hovind et parochia Asker. Mai-August." In his collection three specimens are present under the name *Pericoma palustris* Mg. Slide no. 11: ♂ "Toien 28.5.46" = *Satchelliella stammeri* (Jung, 1954). Slide no. 12: ♀ "Hovind 7.6.49" = Pericomini. Slide no. 13: ♀ "Asker 5.8.51" = Pericomini.

In Norway *Satchelliella stammeri* has been taken in northern Hedmark (Andersen & Håland 1995). The present record, AK, Oslo: Tøyen (EIS: 28) 20 May 1846, is the first from Akershus.

3. *Ps. trifasciata* Meig.
Siebke (1877) gave the following record of the species: "Feminam (?) in alpe Dovre ad Jerkin 16 Juli 1861 deprehendi". In his collection one female is present under the name *Pericoma trifasciata* Mg. Slide no. 14: ♀ "Jerkin 27.7.53" = Pericomini.

4. *Ps. ocellaris* Latr.
Siebke (1877) gave the following record of the species: "In Skøien ad Christianiam 22 Juni 1851 a me reperta". In his collection four specimens are present under the name *Pericoma ocellaris* Mg. Slide no. 15: ♀"Skoien 22.6.51" = *Pericoma formosa* Nielsen, 1964. Slide no. 16: ♀ "Skóien 22.6.51" = Pericomini. Slide no. 17: ♀ "Kr.ania" = Telmatoscopini. Slide no. 18: ♀ "Kr.ania" = Pericomini.

The present record of *Pericoma formosa* is thus AK, Oslo: Skøien (EIS: 28) 22 June 1851. In Norway the species has been taken in Østfold and Akershus (Andersen & Håland 1995).

5. *Ps. calceata* Meig.
Siebke (1877) gave the following record of the species: "Utrumque sexum in horto botanico ad Christiniam mens. Jun. & Aug. cepi, ad Næs Værdaliæ mense Julio (Zett.)". In his collection three specimens are present under the name *Pericoma calceata* Mg. Slide no. 19: ♂ "Tøien" = *Peripsychoda auriculata* (Curtis, 1839). Slide no. 20: ♂ "Tøien" = *P. auriculata.* Slide no. 21: ♀ "Toien 1.8.51" = *P. auriculata.*

The present records of *Peripsychoda auriculata* from AK, Oslo: Tøyen (EIS: 28) 1 Aug. 1851, are the first from Norway. According to Wagner (1990) the species is distributed in most parts of South and Central Europe north to Denmark.

6. *Ps. nervosa* Meig.
Siebke (1877) gave the following record of the species: "Habitat circa Christianiam passim, in par. Vaage Gudbrandsdaliæ ad Svee, in alpibus Filefjeld ad Nystuen & Dovre ad Kongsvold et Fokstuen. Mai-August". In his collection four females are present under the name *Psychoda sexpunctata* Curtis. Slide no. 22: ♀ "Jerkind 27.7.53" = Pericomini. Slide no. 23: ♀ "Dovre" = Pericomini. Slide no. 24: ♀ "Fogstue 22.7.53" = Pericomini. Slide no. 25: ♀ "Kr.ania" = Telmatoscopini. Slide no. 26: ♀ "Øier" = Pericomini.

7. *Ps. humeralis* Meigen
Siebke (1877) gave the following record of the species: "Ad Christianiam in Kongshavn 3 Juni & in ædibus Universitas 12 Mai observata". In his collection two specimens are present under the name *Psychoda humeralis* Mg. Slide no. 27: ♀ "Univers 12.5.73" = *Philosepedon humeralis* (Meigen, 1818). Slide no. 28: specimen lacking abdomen "Kongshavn 3.6.51" = *P. humeralis.*

In Norway *Philosepedon humeralis* occurs in the southeastern part of the country and along the fjords in the inner parts of West Norway (Andersen & Håland 1995).

8. *Ps. albipennis* Zett.
Siebke (1877) gave the following record of the species: "Ad Christianiam in horto botanico mens. Majo & Julio a me detecta, etiam ad Jerkin in alpe Dovre 16 Juli 1861 capta". In his collection six specimens are present. Slide no. 29: specimen lacking abdomen "Dovre" = *Psychoda* sp. Slide no. 30: Phoridae on same pin as previous. Slide no. 31: ♂ "Tøien" = *Psychoda albipennis* Zetterstedt, 1850. Slide no. 32: ♂ "Toien 10.5.49" = *P. albipennis.* Slide no. 33: ♂ "Toien 24.6.51" = *P. albipennis.* Slide no. 34: ♀ "Tøien" = *Psychoda* sp.

Zetterstedt (1850) described *Psychoda albipennis* based on material collected by Siebke at Tøyen; the type locality is given as: "in Scandinavia boreali; in Töien prope Christianiam Norwegiæ". In Norway the species is taken in southern Norway, up to the outer part of southern Nordland (Andersen & Håland 1995).

ACKNOWLEDGEMENT

We are indebted to Lars Ove Hansen for the loan of Siebke's Psychodidae material.

SAMMENDRAG

Siebke's materiale av norske sommerfuglmygg (Diptera: Psychodidae)

Siebke publiserte i 1877 en liste med 8 arter av sommerfuglmygg fra Norge. Siebke's materiale oppbevares på Zoologisk Museum på Tøyen. Samlingen består av 33 eksemplarer, hvorav 9 er hanner. Alle eksemplarene ble montert for mikroskopering, og 6 arter kunne identifiseres: *Satchelliella stammeri* (Jung, 1954), *Pericoma formosa* Nielsen, 1964, *Psychoda albipennis* Zetterstedt, 1850, *Psychoda lobata* Tonnoir, 1940, *Peripsychoda auriculata* (Curtis, 1839) og *Philosepedon humeralis* (Meigen, 1818). *Peripsychoda auriculata* er ikke tidligere raportert fra Norge, mens funnet av *Satchelliella stammeri* er det andre av denne arten her i landet.

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Bokanmeldelse

Emmet, A.M. (ed.), Fletcher, D.S., Harley, B.H., Langmaid, J.R., Robinson, G.S., Skinner, B., Sokoloff & Tremewan, W.G.: The Moths and Butterflies of Great Britain and Ireland. Vol. 3. Yponomeutidae - Elachistidae. 454 sider, 11 fargeplansjer, 8 svart/hvitt plansjer, flere hundre tekstfigurer, 240 kart. Innbundet £ 75.00, paperback £ 37.50. Harley Books 1997

Det er fortsatt en påtagelig mangel på god bestemmelseslitteratur over småsommerfugler. Derfor er det en begivenhet hver gang det publiseres en bok om denne insektgruppen. Så det var med stor forventning jeg åpnet boka og begynte å bla. Det første jeg slo opp på var naturligvis fargeplansjene. Når det gjelder sommerfuglbøker er det det viktigste, og det hjelper ikke hvor god teksten er, dersom ikke plansjene holder mål. Bind 1 og 2 i serien var ikke spesielt vellykkede i så måte, men denne gangen ble jeg ikke skuffet. Akvarellene til Richard Lewington er av svært høy standard, og spesielt de av slekten *Argyresthia* er en fryd for øyet. Når det gjelder Elachistidae, er vi fra før bortskjemt med Traugott-Olsens bilder til Fauna entomologica scandinavica-bindet om denne familien. Det mangler *litt* før Lewington når opp til Traugott-Olsens standard. For første gang får vi den store familien Coleophoridae (sekkmøll) presentert i farger. Akvarellene her er også utmerkede, men på en måte lyver de fordi det allikevel kun er et fåtall av artene som lar seg bestemme etter ytre kjennetegn. Mange av artene er mer like enn man får inntrykk av ut fra fargeplansjene, og det er ofte overlappende variasjon. Men alt i alt: Bokas fargeplansjer får karakteren "Meget".

I boka dekkes følgende familier: Yponomeutidae (som her inkluderer Roeslerstammiidae, Ypsolophidae og Plutellidae), Schreckensteiniidae, Epermeniidae, Coleophoridae og Elachistidae. Som alltid i serien omtales biologien på en svært grundig måte; utbredelsen i Storbritannia og Irland vises på kart og utbredelsen utenom de britiske øyer presenteres kortfattet. Genitaliene til "vanskelige" arter er avbildet ved hjelp av utmerkede strektegninger. Alle arter er nøklet ut, og disse nøklene er til god hjelp der hvor det er meget like arter eller artskomplekser.

Spesielt nyttig for nordiske lepidopterologer er behandlingen av sekkmøllene, Coleophoridae. Av dem har vi knapt 90 arter i Norge, og bestemmelsen av dem er stort sett avhengig av genitalundersøkelse. Genitalfigurene her er lånt fra Razowskis arbeid over de polske artene, og er antagelig de beste som er publisert for denne gruppen. Rosinen i pølsa er imidlertid avbildningene av sekkene. Jeg har ikke sett slike bedre framstilt noe sted. Så denne boka burde inspirere flere til å lete etter disse sekkene og klekke fram de små sommerfuglene.

For oss er det nok behandlingen av familiene i overfamilien Yponomeutoidea og familien Colephoridae som særlig vil være til hjelp. Fra før har vi den nevnte monografien over Elachistidae. Men det vil likevel være mye nyttig informasjon om Elachistidae i boka. Elachistidene er blant de vanskeligste småsommerfuglene å bestemme, og genitalfigurene i denne boka, som er tegnet på en annen måte enn i tidligere litteratur, gir et nytt lys over flere av artene.

Som i øvrige bind i serien, innledes boka med et kapittel om et særskilt emne innen lepidopterologien, og i dette tilfelle er det "Invasions of Lepidoptera into the British Isles" som er temaet. Det slår leseren hvor godt dokumentert ekspansjonen til de enkelte artene er. Det forteller mye om den entomologiske aktiviteten i Storbritannia. For noen av disse ekspansjonsartene har vi indikasjoner på tilsvarende spredning i Norge.

For en aktiv microlepidopterolog er det vanskelig å komme utenom denne boka. Andre med en mer generell interesse for sommerfugler, vil også finne mye å glede seg over.

Leif Aarvik

Saproxylic beetle fauna associated with living sporocarps of *Fomitopsis pinicola* (Fr.) Karst. in four spruce forests with different management histories

Sigmund Hågvar & Bjørn Økland

Hågvar, S. & Økland, B. 1997. Saproxylic beetle fauna associated with living sporocarps of *Fomitopsis pinicola* (Fr.) Karst. in four spruce forests with different management histories. - Fauna norv. Ser. B 44: 95-105.

Trunk-window traps attached to living sporocarps of *Fomitopsis pinicola* (Fr.) Karst. caught a high number of saproxylic beetles. Comparison with free-hanging window traps showed that the sporocarps act as "attraction centra" for a number of species. Only one of these, *Gyrophaena boleti* (L.), regularly breeds in living sporocarps. The other ones probably visit sporocarps for feeding purposes (either as spore eaters or predators), and could be observed sitting on the hymenium of the sporocarps. As the visiting beetles were sometimes densely covered by fungal spores, we suggest that they may act as spore spreaders. *Gyrophaena boleti* and certain typical visiting species dominated the catches numerically in each of four spruce forest environments: (1) a small patch of little influenced "primeval forest", (2) a nature reserve with semi-natural forest, (3) a managed forest mature for cutting, and (4) a clear-cut area with small, 5 to 10-year-old planted trees. Due to the observed "baiting effect" of the sporocarps, only two sites with similar density of sporocarps and traps could be compared directly, the small patch of primeval forest and the nature reserve. Per trap, the primeval forest gave significantly more species of both saproxylic and red-listed beetles. Also, many species were more abundant in the primeval forest. It is noteworthy that fewest species were recorded in the clear-cut area.

Even some closely related species (e.g. within the genera *Cis, Anisotoma, Enicmus*) showed great differences in their relative catches between the four forest environments.

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INTRODUCTION

Nearly 700 Norwegian beetle species are obligate saproxylic, i.e. they depend on decaying wood or wood-inhabiting fungi for their development. More than 200 additional beetles are facultative saproxylic, i.e. they can also breed in alternative substrates (Stokland, pers. comm.). In Norway, Sweden and Finland, saproxylic beetles represent a large part of the red-listed insect species (Rassi et al. 1992, Størkersen 1992, Ehnstrøm et al. 1993).

Earlier studies of the saproxylic beetle fauna have often been based on destructive sampling procedures, especially by removing bark from decaying logs (e.g. Biström & Väisänen 1988, Väisänen, Biström & Heliovaara 1993, Siitonen 1994, Siitonen & Martikainen 1994). Because this method destroys the microhabitats, fails to catch wood-boring species, and is rather ineffective, Kaila (1993) proposed a "trunk-window trap" to collect insects which are active near dead wood. By placing such traps close to living sporocarps (fruiting bodies of wood-inhabiting fungi, Polyporaceae), he caught high numbers of saproxylic beetle species.

However, the catches depended on fungal and tree species. Also a study by Økland & Hågvar (1994) confirmed the great ability of this trap to collect saproxylic beetles. They suggested that living sporocarps act as "attraction centra" for certain saproxylic beetles, which were caught in high numbers.

In the present study, the trunk-window trap method was tested in four different spruce (*Picea abies* (L.) Karst.) forest environments. The polypore species used was *Fomitopsis pinicola* (Fr.) Karst., since this species is common both in managed and natural forests. We wanted to get more information about the role of living sporocarps as attraction centra for saproxylic beetles. In one locality (forest reserve), free-hanging window traps were operated simultaneously for comparison (Økland 1995, 1996), and direct observations were made about beetle species sitting on the underside of living sporocarps. Also, we wanted to evaluate whether the method is suitable for comparison of the saproxylic beetle fauna in different forest environments. Faunistic lists of saproxylic beetles are given, and the biology of some species is discussed.

MATERIAL AND METHODS

Study sites

All the four study sites were located in the Østmarka forest area, about 15 km SE of Oslo. They were placed within the dominant vegetation type (*Eu-Piceetum Myrtillus*), which is spruce forest with bilberry (*Vaccinium myrtillus* L.) in the field layer. In light open areas, *Deschampsia flexuosa* (L.) tends to dominate. UTM positions are given according to WGS84.

In the primeval forest and the forest reserve, sites with high density of dead wood were chosen. The amount of dead wood was measured in an area of 40x40 m.

1. A small "primeval forest" (PR) of about 0.1 km^2 was surrounded by managed forest in various successional stages. It was located in a valley named Styggvannsdalen, about 5 km north of the forest reserve. The absence of logging-related stumps, the occurrence of dead wood in all phases of decomposition, the heterogeneous age structure of the trees, and the difficult access to the site indicated a higher dead-wood continuity than in the forest reserve. Also certain indicator species of wood-inhabiting fungi and lichens were found (cf. Karström 1992, Bredesen et al. 1993, 1994). A lack of fire marks and a moist valley bottom may indicate that this site is a fire refuge (cf. Zackrisson & Östlund 1991). The forest was rather closed, with many high trees. The amount of dead wood in the sampling site was 109 m^3 per ha. Traps were separated by a mean distance of about 10 m. Sporocarps of *F. pinicola* occurred abundantly, on the mean every 1.3 meters. UTM position: PM 120424.

2. The reserve (RE), 12.5 km^2 large, was subjected to selective cutting until about 1930. The cutting has probably been rather intense along some parts of the watersheds, due to the possibility of timber floating. During World War II (1940-45), the amount of dead wood was reduced due to intensive firewood collection. Even though several parts of the reserve contain considerable amounts of dead wood today, there is a lack of continuity of dead wood in most of the area (Gauslaa 1994). Several of the hilltops have been subjected to forest fires. The traps were placed in the central part, and distributed in equal numbers on two plots (900 m apart) with high amounts of dead wood (372 m^3 per ha). The plots were half open due to many wind-felled trees 10-15 years ago. Some standing dead trees were probably killed by bark-beetles. Logs in more advanced states of decay occurred in the neighbouring area. The mean distance between traps was about 10 m. Sporocarps of *F. pinicola* were very abundant, on the mean every 0.8 meters. UTM position: PM 143367 and PM 141359.

3. The managed forest (MA) was situated close to site 1 and was largely mature for cutting. The density of decaying wood was on an average 3 m^3 per ha. The mean distance between traps was 125 m, with 79 m between sporocarps of *F. pinicola*. Some small clear-cut areas with a higher density of sporocarps (on stumps) occurred in the area, but these were avoided when placing traps. Because the traps had to be scattered over a large area, a wide spectrum of local forest habitats was included. UTM position: PM 116436.

4. The clear-cut area (CL) had been logged 5-10 years earlier, and contained small, planted spruce trees. It

covered about 0.06 km^2. While sporocarps (mainly on stumps) were rather abundant, on the mean every 21 meters, several grew so close to the ground that traps could not be attached to them. The mean distance between traps was about 40 m. Some remnants of dead wood after logging operations were present. UTM position: PM 088363.

Sampling of beetles

Trunk-window traps (Kaila 1993) consist of a window placed in a vertical split cut through a sporocarp, with a collecting funnel below. Our version (Økland et al. 1995, Økland 1996, Hågvar et al. 1995) was made of plastic, and had a roof to minimize rainwater and litter in the trap. Ethylene glycol with a small amount of detergent was used as preservative, and the traps were emptied monthly. Small holes halfway up in the wall of the collecting vial allowed surplus water to escape during heavy rain. For storage and identification the insects were transferred to 70 % alcohol. The size of the window was 20x20 cm, and the upper diameter of the collecting funnel 22 cm. The plastic funnel was adjusted so that it fitted closely to the trunk below the sporocarp. Most traps were placed 0.5-1.5 m above the ground, often on natural or man-made stumps. In each of the four habitats, 30 traps were operated from 28 April to 6 September 1992. Altogether, 15 387 individuals of obligate and facultative saproxylic beetles were collected.

Habitat ecology and nomenclature of the species

Information on the habitat ecology of the various beetle species was achieved from an extensive data base compiled by J. Stokland, based on both literature and personal communication.

Nomenclature is according to Silfverberg (1992), and we refer to this source concerning author names.

RESULTS

Faunal composition and baiting effects

Table 1 shows the catches of obligate and facultative saproxylic beetles among species represented by at least 20 individuals totally. In all four habitats, the catches were numerically dominated by "visiting species", i.e. certain species which were often observed sitting on living sporocarps, mainly on the underside. These species are marked with an asterisk in the table. Only one of these, *Gyrophaena boleti*, breeds in living sporocarps, having larvae in the pores.

The baiting effect of the sporocarps can be illustrated by comparing the catches with simultaneous catches in ordinary window traps placed about 0.7-1 m above the ground (Bakke 1975, Økland et al. 1995). Such comparisons, based on 30 traps of each type, have been performed in the reserve (cf. Økland 1996). Table 2 lists the most abundant saproxylic species from each trap type (minimum 10 individuals). Clearly, the beetle fauna swarming close to the sporocarps differs considerably from the general "air plankton". Only four species were common to the two lists. Several typical "visitor" species were poorly represented in the ordinary window traps. A closer statistical analysis of the differences in catches between the two methods has been made by Økland (1996).

The observed baiting effects makes it difficult to use the trunk-window traps in quantitative comparisons between habitats. Because several species actively search for sporocarps, the catches per trap will depend on the density of the sporocarps (i. e. the density of attraction centra). This can be clearly illustrated in *Gyrophaena boleti*, where all individuals aggregate on sporocarps during spring. Assuming that each trap collected a certain fraction of the individuals which were attracted to each sporocarp, the relative population size per area could be estimated by multiplying the catch per trap with the number of sporocarps per area. It turned out that the abundance per ha was highest in the two sites which had the lowest catches per trap (Figure 1). This was due to a very high density of sporocarps in the primeval forest and the reserve, so that the high number of beetle individuals per area was "diluted" over the many attraction centra. The data in Figure 1 were restricted to May, the month in which the overwintering adults colonize the

Table 1. Catches of obligate and facultative saproxylic species, trapped in at least 20 individuals. The species have been ranked according to total catches. Red-listed species (in Sweden or Norway) are underlined. Species observed sitting on living sporocarps are marked with an asterisk. MA=managed forest, PR=primeval forest, RE= reserve, CL=clearcut.

SPECIES	FAM**	MA	PR	RE	CL	SUM
Obligate saproxylic species:						
*Gyrophaena boleti**	STA	2375	1358	330	4556	8619
*Pteryngium crenatum**	CRY	238	194	72	58	562
*Cis glabratus**	CIS	243	131	21	109	504
Anisotoma axillaris	LEI	0	0	1	318	319
*Enicmus rugosus**	LAT	43	12	16	183	254
*Anisotoma humeralis**	LEI	39	93	12	44	188
*Rhizophagus dispar**	RHI	32	35	45	63	175
Hylastes cunicularius	SCO	145	15	6	0	166
*Enicmus testaceus**	LAT	60	48	51	2	161
*Atomaria alpina**	CRY	72	33	25	22	152
Anisotoma castanea	LEI	51	17	1	68	137
*Anisotoma glabra**	LEI	4	2	1	111	118
*Cis quadridens**	CIS	32	52	10	0	94
Anaspis rufilabris	ANA	12	21	27	4	64
Ptinus subpilosus	PTI	8	14	24	17	63
*Leptusa pulchella**	STA	22	17	9	5	53
*Hallomenus binotatus**	MELA	24	15	1	6	46
Nevraphes coronatus	SCY	0	37	3	2	42
Xylita laevigata	MELA	7	16	12	5	40
Dryocoetes autographus	SCO	4	32	4	0	40
Melanotus castanipes	ELA	11	11	7	6	35
Trypodendron lineatum	SCO	31	2	2	0	35
Crypturgus hispidulus	SCO	9	12	10	1	32
Hylurgops palliatus	SCO	18	11	1	0	30
Bolitochara mulsanti	STA	2	8	0	20	30
Ipidia quadriplagiata	NIT	13	13	3	0	29
Phloeonomus punctipennis	STA	13	6	3	7	29
*Thymalus limbatus**	TRO	7	9	8	5	29
Rhyncolus chloropus	CUR	4	4	10	4	22
*Ostoma ferruginea**	TRO	2	9	8	3	22
Bibloporus bicolor	PSE	10	4	5	2	21
Facultative saproxylic species:						
*Epuraea variegata**	NIT	128	83	44	454	709
*Lordithon lunulatus**	STA	201	52	164	86	503
*Scaphisoma agaricinum**	SCA	58	11	3	319	391
Bolitochara pulchra	STA	19	1	1	161	182
*Corticaria longicollis**	LAT	43	9	43	32	127
Lordithon thoracicus	STA	8	2	12	81	103
Gyrophaena affinis	STA	1	0	2	99	102
*Atomaria pulchra**	CRY	28	39	3	8	78
Quedius plagiatus	STA	26	39	10	0	75
Dienerella elongata	LAT	38	0	0	0	38
Sepedophilus testaceus	STA	9	2	1	26	38
Cychramus variegatus	NIT	12	13	7	0	32
Cryptophagus scanicus	CRY	6	8	17	0	31
Cryptophagus setulosus	CRY	7	2	0	11	20
*Sepedophilus littoreus**	STA	7	8	4	1	20

** Full family names are: Anaspidae, Cisidae, Cryptophagidae, Curculionidae, Elateridae, Latridiidae, Leiodidae, Melandryidae, Nitidulidae, Pselaphidae, Ptinidae, Rhizophagidae, Scaphidiidae, Scolytidae, Scydmaenidae, Staphylinidae, Trogositidae.

Table 2. Catches of saproxylic beetles from trunk-window traps and ordinary window traps in the same site (reserve, 30 traps of each type). Only the most abundant species (with ten or more individuals) are listed. O=obligate saproxylic, F=facultative saproxylic, *=species observed sitting on the underside of living sporocarps.

Trunk-window traps:				Window traps:			
O	*	*Gyrophaena boleti*	330	O	*	*Enicmus testaceus*	82
F	*	*Lordithon lunulatus*	164	O	*	*Enicmus rugosus*	36
O	*	*Pteryngium crenatum*	72	O		*Bibloporus bicolor*	36
O	*	*Enicmus testaceus*	51	F		*Cryptophagus abietis*	35
O	*	*Rhizophagus dispar*	45	O		*Crypturgus pusillus*	22
F	*	*Epuraea variegata*	44	O		*Dryocoetes autographus*	17
F	*	*Corticaria longicollis*	43	O		*Euplectus punctatus*	17
O		*Anaspis rufilabris*	27	O		*Dasytes niger*	15
O	*	*Atomaria alpina*	25	O	*	*Leptusa pulchella*	15
O		*Ptinus subpilosus*	24	F	*	*Henoticus serratus*	13
O	*	*Cis glabratus*	21	O		*Hylastes cunicularius*	12
F		*Cryptophagus scanicus*	17	O		*Melanotus castanipes*	12
O	*	*Enicmus rugosus*	16	O		*Ptinus subpilosus*	11
O	*	*Anisotoma humeralis*	12	O		*Anaspis rufilabris*	10
F		*Lordithon thoracicus*	12	O		*Atrecus pilicornis*	10
O		*Xylita laevigata*	12				
O		*Cerylon histeroides*	10				
O	*	*Cis quadridens*	10				
O		*Crypturgus hispidulus*	10				
F		*Quedius plagiatus*	10				
O		*Rhyncolus chloropus*	10				

sporocarps, in order to avoid inclusion of animals developed within the sporocarps.

Comparison between habitats

On this background, we have limited the statistical comparisons in Table 1 to the primeval forest and the reserve. These habitats had the same distance between the traps, and both had very high sporocarp densities. All significant differences ($p<0.05$) among obligate saproxylic species gave highest catches in the primeval forest (Pearson's chi square statistic for goodness of fit, according to Bhattacharyya & Johnson (1977)). This was found for the following species: *Cis glabratus, Cis quadridens, Pteryngium crenatum, Anisotoma castanea, Anisotoma humeralis, Hallomenus binotatus, Ipidia quadriplagiata, Dryocoetes autographus, Hylastes cunicularius, Hylurgus palliatus, Nevraphes coronatus, Bolitochara mulsanti, and Gyrophaena boleti.*

Even though Table 1 may misrepresent the relative abundance between habitats, we can observe that even closely related species may respond quite differently. Within the genus *Anisotoma, A. axillaris* and *A. glabra* were taken almost exclusively in the clear-cut area, while *A. humeralis* and *A. castanea* were also caught in the forest sites. *Cis quadridens* was absent in the clear-cut catches, but *C. glabratus* was taken in both types of environment. *Enicmus rugosus* was taken mainly in the clear-cut area, while *E. testaceus* was most often caught in the forested sites. Among the facultative saproxylic species, *Lordithon thoracicus* was taken abundantly only in the clear-cut site, while *L. lunulatus* was trapped frequently in all environments.

Table 3 shows the number of species trapped in the four habitats, distributed on three groups: obligate saproxylic, obligate plus facultative saproxylic, and red-listed species. The table also gives the mean number of species per trap for the same groups. Because the

Table 3. Catches of saproxylic beetles in four spruce forest environments: Total number of species and mean number of species per trap. MA=managed forest, PR=primeval forest, RE=reserve, CL=clearcut.

	Number of species:				*Species per trap:*			
Group	MA	PR	RE	CL	MA	PR	RE	CL
Obligate	92	105	83	70	14,2	15,8	11,4	11,0
Obligate + facultative	125	135	107	95	20,2	20,7	14,8	16,9
Red-listed	8	13	8	7	1,2	1,5	0,8	0,7

baiting effect may even have influenced the number of species, statistical comparisons have been limited to the primeval forest and the reserve. While no significant differences were found in total species number in the various groupings (Pearson's chi square), the primeval forest had significantly higher species numbers per trap in all three species groups (Fischer's least significant-difference test, Sokal & Rohlf (1981)).

Faunistical data

The catches of the less numerous saproxylic species are listed in Table 4. Clearly, a set of 30 trunk-window traps catches a large diversity of saproxylic species, but most species occur in low numbers. In total, 152 obligate and 47 facultative saproxylic species were trapped in the four habitats.

Sixteen red-listed species from Norwegian and Swedish lists have been underlined in Tables 1 and 4. Only one non-saproxylic red-listed species was recorded: one specimen of *Agonum mannerheimii* in the primeval forest. There were a total of 13 red-listed species in the primeval forest, 8 in the reserve, 8 in the managed forest, and 7 in the clearcut area.

DISCUSSION

Living sporocarps as attraction centra for saproxylic beetles

Trunk-window traps attached to living sporocarps of *Fomitopsis pinicola* and ordinary window traps in the same site yielded similar numbers of saproxylic beetle species, both among obligate and facultative species (Økland 1996). However, certain species were more abundant in the trunk-window traps (Table 2 and Økland 1996), and these dominated the catches numerically in all four environments (Table 1). Jonsell & Nordlander (1995) showed that the odour of chopped, living *Fomitopsis pinicola* attracts several saproxylic beetles, among them three of the typical "visiting species" in the present material: *Pteryngium crenatum, Cis glabratus and Cis quadridens.* There may be various reasons why living sporocarps act as attraction centra for saproxylic beetles:

1. *Breeding.* Only *Gyrophaena boleti* among the recorded species breeds in living, undamaged sporocarps of *Fomitopsis pinicola.* The larvae are spore-eaters and live in the pores (Ashe 1984). This species dominated the catches in all four habitats. *Cis glabratus* and *Cis quadridens* breed typically in dead sporocarps, although a few *Cis glabratus* have been extracted from living sporocarps (Økland & Hågvar 1994). Cisidae sometimes breed in weakened or dead parts of living sporocarps (Hågvar, unpubl.), and such "pioneer colonies" will have a good start when the sporocarp eventually dies.

2. *Feeding.* Among the other typical visiting species marked with an asterisk in Table 1, some are probably spore eaters, e.g. *Pteryngium crenatum, Atomaria alpina, Anisotoma humeralis,* and *Corticaria longicollis,* while some are predators, e.g. *Rhizophagus dispar* and *Quedius plagiatus* (Koch 1989-92). In addition to larvae of *Gyrophaena boleti,* the pores may contain dense populations of potential prey, especially Diptera larvae (Økland & Hågvar 1994) and white mites. Although these animals usually hide in the pores, they sometimes

Table 4. Catches of less common saproxylic species (less than 20 individuals in sum). To facilitate the overview, the families have been arranged in alphabetic order. Red-listed species are underlined. MA=managed forest, PR=primeval forest, RE=reserve, CL=clearcut.

Obligate saproxylic species:

Species	Fam*	MA	PR	RE	CL	Sum	Species	Fam*	MA	PR	RE	CL	Sum
Euglenes pygmaeus	ADE	0	0	0	1	1	*Dacne bipustulata*	ERO	0	1	0	0	1
Anaspis bohemica	ANA	1	0	0	0	1	*Xylophilus corticalis*	EUC	0	4	5	0	9
Anaspis flava	ANA	0	0	0	2	2	*Corticaria interstitialis*	LAT	2	2	0	0	4
Anaspis frontalis	ANA	7	0	0	0	7	*Enicmus fungicola*	LAT	1	2	0	0	3
Anaspis schilskyana	ANA	2	0	1	0	3	*Latridius hirtus*	LAT	0	1	0	0	1
Dorcatoma punctulata	ANO	2	3	4	10	19	*Agathidium nigripenne*	LEI	0	1	0	0	1
Hadrobregmus pertinax	ANO	0	0	2	1	3	*Anisotoma orbicularis*	LEI	0	0	1	1	2
Stagetus borealis	ANO	1	0	0	1	2	*Dictyoptera aurora*	LYC	6	2	6	1	15
Platystomus albinus	ANT	0	0	0	1	1	*Dictyoptera nigrorubra*	LYC	0	0	3	1	4
Anthaxia quadripunctata	BUP	0	0	2	0	2	*Lygistopterus sanguineus*	LYC	0	0	0	1	1
Absidia schoenherri	CAN	3	10	4	1	18	*Platycis minuta*	LYC	2	1	0	2	5
Malthodes brevicollis	CAN	7	6	1	0	14	*Hylecoetus dermestoides*	LYM	0	4	1	0	5
Malthodes crassicornis	CAN	4	1	0	5	10	*Hallomenus axillaris*	MELA	1	1	1	9	12
Malthodes flavoguttatus	CAN	0	1	0	0	1	*Dasytes niger*	MELY	3	8	2	0	13
Malthodes fuscus	CAN	6	4	4	1	15	*Curtimorda maculosa*	MOR	1	1	1	3	6
Malthodes marginatus	CAN	0	0	1	0	1	*Tomoxia bucephala*	MOR	0	0	1	1	2
Malthodes spathifer	CAN	3	0	0	1	4	*Epuraea bickhardti*	NIT	15	2	0	0	17
Alosterna tabacicolor	CERA	0	4	0	0	4	*Epuraea boreella*	NIT	2	0	2	0	4
Anoplodera maculicornis	CERA	0	4	4	0	8	*Epuraea laeviuscula*	NIT	1	0	0	0	1
Anoplodera rubra	CERA	0	0	0	4	4	*Epuraea pygmaea*	NIT	1	1	6	0	8
Evodinus borealis	CERA	0	1	0	0	1	*Epuraea silacea*	NIT	0	1	0	0	1
Judolia sexmaculata	CERA	1	1	0	0	2	*Glischrochilus hortensis*	NIT	1	0	1	12	14
Leptura melanura	CERA	2	0	0	8	10	*Glischrochilus quadripunctatus*	NIT	0	0	3	0	3
Oxymirus cursor	CERA	1	2	3	1	7	*Chrysanthia viridissima*	OED	0	0	0	3	3
Rhagium inquisitor	CERA	0	2	0	0	2	*Euplectus decipiens*	PSE	4	8	0	2	14
Rhagium mordax	CERA	0	1	0	0	1	*Pteryx suturalis*	PTI	2	6	4	4	16
Tetropium castaneum	CERA	2	1	1	0	4	*Rhizophagus cribratus*	RHI	0	1	0	0	1
Tetropium fuscum	CERA	1	0	0	0	1	*Rhizophagus depressus*	RHI	0	1	1	0	2
Cerylon fagi	CERY	6	1	0	2	9	*Rhizophagus ferrugineus*	RHI	3	0	0	0	3
Cerylon histeroides	CERY	0	3	10	0	13	*Rhizophagus parvulus*	RHI	1	0	0	0	1
Cis bidentatus	CIS	6	4	3	2	15	*Salpingus ruficollis*	SAL	2	2	3	0	7
Cis boleti	CIS	0	2	0	0	2	*Cryphalus abietis*	SCO	6	2	0	0	8
Cis fagi	CIS	0	9	0	0	9	*Crypturgus subcribrosus*	SCO	2	1	1	0	4
Cis hispidus	CIS	2	1	0	0	3	*Dryocoetes alni*	SCO	0	1	0	0	1
Cis lineatocribratus	CIS	0	2	1	3	6	*Hylastes brunneus*	SCO	3	0	0	0	3
Cis nitidus	CIS	0	2	0	1	3	*Ips typographus*	SCO	8	0	0	0	8
Cis punctulatus	CIS	0	0	1	0	1	*Pityogenes chalcographus*	SCO	9	2	8	0	19
Ennearthron cornutum	CIS	0	0	1	1	2	*Polygraphus poligraphus*	SCO	1	1	0	0	2
Ennearthron laricinum	CIS	4	0	8	0	12	*Trypodendron domesticum*	SCO	4	1	3	0	8
Hadreule elongatula	CIS	0	0	0	11	11	*Sphindus dubius*	SPH	1	1	0	5	7
Octotemnus glabriculus	CIS	0	1	0	0	1	*Anomognathus cuspidatus*	STA	0	0	1	0	1
Orthocis festivus	CIS	0	1	0	0	1	*Atrecus longiceps*	STA	1	1	2	0	4
Atomaria umbrina	CRY	0	3	0	0	3	*Atrecus pilicornis*	STA	0	2	0	0	2
Dendrophagus crenatus	CUC	0	1	0	1	2	*Dinaraea aequata*	STA	0	1	0	1	2

Table 4 (continued)

Obligate saproxylic species:

Species	Fam*	MA	PR	RE	CL	Sum	Species	Fam*	MA	PR	RE	CL	Sum
Silvanoprus fagi	CUC	0	1	0	0	1	*Dinaraea arcana*	STA	1	1	2	0	4
Hylobius abietis	CUR	4	0	0	0	4	*Euryusa castanoptera*	STA	0	2	0	0	2
Hylobius piceus	CUR	1	0	1	0	2	*Gabrius splendidulus*	STA	0	0	0	1	1
Hylobius pinastri	CUR	2	6	2	5	15	*Gyrophaena strictula*	STA	1	0	0	0	1
Pissodes pini	CUR	0	1	0	0	1	*Hapalarea linearis*	STA	4	6	1	0	11
Rhyncolus sculpturatus	CUR	0	0	1	0	1	*Leptusa fumida*	STA	6	2	0	0	8
Strophosoma capitatum	CUR	14	2	0	0	16	*Lordithon speciosus*	STA	0	0	3	0	3
Trachodes hispidus	CUR	1	0	0	5	6	*Oxypoda recondita*	STA	0	1	0	0	1
Ampedus balteatus	ELA	1	0	1	2	4	*Phloeonomus monilicornis*	STA	0	4	2	0	6
Ampedus nigrinus	ELA	5	3	1	2	11	*Phloeonomus pusillus*	STA	4	1	1	1	7
Ampedus pomorum	ELA	0	0	0	1	1	*Phloeonomus sjoebergi*	STA	0	1	1	0	2
Ampedus tristis	ELA	0	0	0	1	1	*Phymatura brevicollis*	STA	4	1	0	0	5
Dadobia immersa	ELA	1	0	1	2	4	*Placusa depressa*	STA	1	0	0	0	1
Denticollis linearis	ELA	0	1	0	0	1	*Placusa incompleta*	STA	1	0	0	0	1
Endomychus coccineus	END	0	0	1	0	1	*Placusa suecica*	STA	0	1	1	0	2
Triplax russica	ERO	1	2	0	1	4	*Bolitophagus reticulatus*	TEN	0	1	0	0	1

Facultative saproxylic species:

Species	Fam*	MA	PR	RE	CL	Sum	Species	Fam*	MA	PR	RE	CL	Sum
Dromius agilis	CAR	2	0	0	0	2	*Cychramus variegatus*	NIT	2	2	0	0	4
Anatis ocellata	COC	2	0	0	0	2	*Epuraea aestiva*	NIT	2	0	1	0	3
Orthoperus atomus	COR	1	0	1	0	2	*Epuraea binotata*	NIT	5	0	1	0	6
Atomaria contaminata	CRY	2	1	0	0	3	*Pocadius ferrugineus*	NIT	0	0	0	2	2
Cryptophagus abietis	CRY	11	5	1	0	17	*Tyrus mucronatus*	PSE	0	0	0	1	1
Gnathoncus buyssoni	HIS	0	1	1	0	2	*Phosphuga atrata*	SIL	0	0	0	1	1
Corticaria abietorum	LAT	1	0	0	2	3	*Arpidiphorus orbiculatus*	SPH	7	1	0	5	13
Corticaria serrata	LAT	0	1	0	0	1	*Acrulia inflata*	STA	3	7	0	2	12
Corticarina obfuscata	LAT	0	1	0	0	1	*Coryphium angusticolle*	STA	0	0	1	0	1
Latridius anthracinus	LAT	0	0	0	1	1	*Haploglossa villosula*	STA	6	1	1	0	8
Latridius minutus	LAT	3	0	0	0	3	*Ischnoglossa prolixa*	STA	0	1	0	0	1
Stephostethus rugicollis	LAT	1	0	0	0	1	*Mniusa incrassata*	STA	0	1	2	1	4
Agathidium badium	LEI	2	1	0	1	4	*Oxypoda vittata*	STA	0	0	0	3	3
Agathidium mandibulare	LEI	0	3	0	0	3	*Pachygluta ruficollis*	STA	0	0	0	4	4
Agathidium nigrinum	LEI	2	2	1	10	15	*Quedius maurus*	STA	0	1	0	0	1
Agathidium seminulum	LEI	5	2	6	6	19	*Quedius xanthopus*	STA	6	4	5	2	17

* Full family names are given at the bottom of Table 3, except for the following: Aderidae, Anobiidae, Anthribidae, Buprestidae, Cantharidae,Carabidae, Cerambycidae, Cerylonidae, Coccinellidae, Corylophidae, Cucujidae, Endomychidae, Erotylidae, Eucnemidae, Histeridae, Lycidae, Lymexylidae, Melyridae, Mordellidae, Oedemeridae, Ptilidae, Salpingidae, Silphidae, Sphindidae, Tenebrionidae.

emerge to the surface to change pore. The presence of these hidden groups may be demonstrated by putting the sporocarp into a tight-fitting plastic bag. When the oxygen concentration becomes low inside, both the Diptera larvae and the mites emerge from the pores,often in large numbers. The hymenium of the sporocarps may be a good hunting ground.

3. *Spore dispersal?* The fungus can probably afford to waste a fraction of the spores as insect food. Maybe the fungus attracts beetles for mutual benefit. Visiting beetles have often been observed with a white cover of fungal spores on their body. Since most of the visiting beetles will seek to dead wood to lay their eggs, they may be carriers of spores to new substrates.

4. *Kairomones?* Kaila (1993) suggested that saproxylic beetles might use the odour from sporocarps as orientation guides towards their breeding substrate, which in most cases is dead wood and not the sporocarp itself. It may even be favourable to breed in wood close to sporocarps, since many species use the wood-decomposing mycelium as their source of nutrition instead of the wood itself (Palm 1955).

Also living sporocarps of *Fomes fomentarius*, which usually grows on dead birch stems, act as attraction centra for saproxylic beetles. Kaila et al. (1994) obtained more species and individuals in traps attached to sporocarps than in traps attached to dead birch stems without sporocarps. Still fewer species were caught in traps placed on living birch stems. Just as for *Fomitopsis pinicola*, Jonsell & Nordlander (1995) found that chopped, living sporocarps of *Fomes fomentarius* attracted certain saproxylic beetles by odour. Some beetles were attracted to both fungal species, while some beetles preferred one of them.

We can conclude that living sporocarps may have a positive function for a larger number of saproxylic beetles than those few species which breed in them, at least as a source of food. A rich sporocarp flora will also indicate a good availability of dead wood substrates. Therefore, an attraction to sporocarp odours may automatically bring saproxylic beetles into a favourable breeding locality. Økland et al.(1995) found a positive relationship between the species number of obligatory saproxylic beetles and the density and species number of sporocarps (polypore fungi). This relationship, which was found at 1 and 4 km^2 area levels, might be helpful in mapping favourable sites for the saproxylic beetle fauna, since it is relatively easy to describe the community of polypore fungi. Other important factors for saproxylic beetles were dead wood of large diameter, and a high diversity of dead wood objects, including deciduous trees (Økland et al. 1996).

Comparisons between habitats

Because of the baiting effect connected with trunk-window traps, ordinary window traps screening the general "air plankton" are better for comparing the saproxylic beetle fauna in different habitats. However, this method requires a large-scaled sampling (Økland 1996). When trunk-window traps attached to sporocarps are used, the abundance of several species, and probably even the species number, will be underestimated with increasing sporocarp density. The reason for this is that there will be a higher number of attraction centra for the beetles to distribute themselves on, and even if a species has a high density per area, the catches per trap may be low (Figure 1).

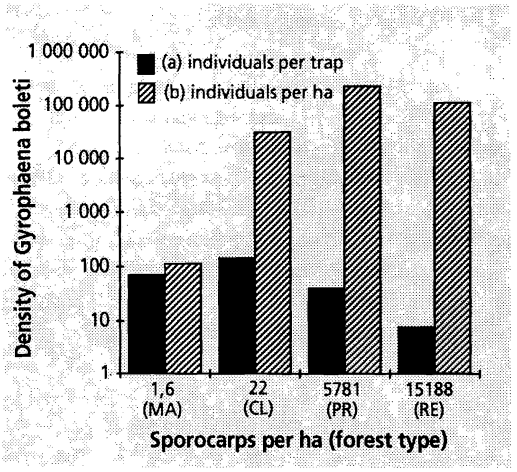

Figure 1
Relative densities of *Gyrophaena boleti* expressed as (a) the number of individuals per trap, and (b) the number of individuals per ha. MA=managed forest, CL=clearcut, PR=primeval forest, RE=reserve. The number of sporocarps per ha in each forest type has been given below.

Due to high sporocarp densities, the catches in the primeval forest and the reserve are probably underestimated compared to the clearcut area and the managed forest. This also indicates that the low species numbers recorded in the clearcut area (Table 3) may be a real trend. The clearcut area is the only habitat among the four which does not produce dead wood. The most overestimated species numbers in Table 3 are probably those from the managed forest, where there were both a greater distance between sporocarps and a large catching area which included a higher variety of forest environments. However, it is noteworthy that this habitat gave a rather high number of species, even if the density of dead wood was low. This indicates that even scattered dead wood substrates are localized and used by several species. Probably, any increase in dead wood in spruce forest will favour the saproxylic beetle community (cf. Økland et al. 1996, Hågvar et al. 1995).

The present material indicated higher populations of several species, and also higher numbers of species per trap, in the primeval forest compared to the reserve. The actual primeval forest also turned out to be a favourable habitat for Mycetophilidae (Diptera), with a high number of species (Økland 1994).

The biology of some species

It is interesting that closely related species within the genera *Anisotoma, Cis, Enicmus* and *Lordithon* responded quite differently to the four habitats (Table 1). This may reflect adaptations to different successional stages, from open areas to old forest. While some species were obviously very active on the clearcut area (e.g. *Anisotoma axillaris, Anisotoma glabra* and *Enicmus rugosus*), other species seemed to avoid the open area (e.g. *Cis quadridens* and *Enicmus testaceus*).

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SAMMENDRAG

Biller fanget ved levende rødrandkjuker i fire ulike granskogsmiljøer

En finsk-konstruert vindusfelle festet til levende rødrandkjuker gav høye fangster av biller som utvikler seg i dødt trevirke. Samtidige fangster i ordinære, frittstående vindusfeller viste at kjukene fungerte som "attraksjonssentra" for en rekke billearter. Kun en av disse, kortvingen *Gyrophaena boleti*, utvikler seg i levende rødrandkjuker. De andre "besøkerartene" trekkes trolig til kjukene for å ta til seg næring, enten som sporespisere eller som predatorer på insektlarver og midd, som kan forekomme i store tettheter i porene. Mange billearter kan observeres hyppig sittende på undersiden av levende rødrandkjuker. Da "besøkende" biller ofte var dekket av soppsporer, antas det at artene kan bidra til å spre sporer til annet død ved-substrat. *Gyrophaena boleti* og noen typiske besøkerarter dominerte fangstene i alle de fire undersøkte granskogsmiljøene: (1) et lite naturskogsparti med en viss kontinuitet, (2) Østmarka naturreservat med lite kontinuitet, (3) en hogstmoden kulturskog, og (4) en hogstflate med 5-10 år gamle trær. På grunn av kjukenes sterke tiltrekningsevne på mange arter, kunne direkte sammenligninger av fangstene bare foretas på to felter som hadde omtrent samme tetthet av kjuker og feller: naturskogspartiet og reservatet. Pr. felle hadde naturskogspartiet signifikant flest arter av både død ved -avhengige og rødlistede arter. Mange enkeltarter hadde også høyere individantall i naturskogens feller, sammenlignet med reservatet. Av alle de fire feltene ble færrest arter tatt på hogstflaten. Arter innen samme slekt (*Cis, Anisotoma, Enicmus*) kunne vise store forskjeller i deres relative fangster på de 4 lokalitetene. Det kan indikere at artene er knyttet til ulike suksesjonsstadier, fra flater til gammelskog.

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Bokanmeldelse

Kaare Aagaard og Dag Dolmen (red.):
Limnofauna norvegica
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Tapir forlag 1996

Limnofauna norvegica er utvilsomt en bok eller "katalog" som i alle fall norske ferskvannsbiologer har ventet lenge på. Den presenterer for første gang, samlet, de dyr som lever i tilknytning til ferskvann i Norge (unntatt protozoer eller encellede dyr). Til sammen er ca 2800 arter tatt med – alt fra flimmerormer til pattedyr. En mengde data i tilknytning til såvel arter som artsgruppers biologi og økologi presenteres. I tillegg gis opplysninger om enkeltarters vernestatus og hvordan det står til med vår generelle kunnskap om dem. Et relevant spørsmål er naturlig nok om det har noen hensikt med slike fremstillinger, og hvorfor det i så fall ikke har vært gjort tidligere.

De fleste med et visst naturengasjement har trolig hørt om "Riokonferansen", den internasjonale konferansen i Rio de Janeiro hvor spørsmål i tilknytning til klodens biologiske mangfold sto sentralt. De landene som ratifiserte den såkalte "Rio-konvensjonen" sa samtidig ja til å bevare det biologiske mangfoldet for kommende generasjoner. Dette ga støtet til at en rekke land måtte ta standpunkt til sin egen kunnskap vis a vis de levende organismer og den naturarv de var satt til å forvalte. Norske myndigheter engasjerte våre fagmiljø til å fremskaffe faunistiske oversikter i tilknytning til dyregrupper som så langt ikke hadde vært prioritert fra myndighetenes side. Den foreliggende katalogen er vel også et indirekte produkt av den "biologiske mangfoldbølgen" som har skyllet over store deler av verden opp gjennom 1990-årene.

Slik de to redaktørene påpeker i bokens forord, er det lett å forstå at den store kunnskapsmengden som her er samlet mellom to permer ikke er to manns verk alene. I alt 38 spesialister fra universiteter og miljøinstitutter, så vel som amatører, har bidratt med data og skriftlige fremstillinger. Det skal likevel ikke underslås at uten de to redaktørene hadde denne boken neppe blitt en realitet – i alle fall ikke like vellykket. Deres kunnskap og entusiasme har utvilsomt vært en viktig faktor for resultatet.

Kvaliteten på sluttproduktet bærer preg av et nitid og grundig arbeid fra begynnelse til slutt, og jeg regner med at *Limnofauna norvegica* vil bli stående i mange år som et standardverk såvel for forskere som studenter og lærere på ulike utdanningsnivå – fra grunnskole til universitet. Som vedlegg til boken finnes også en diskett med bl a en alfabetisk og systematisk oversikt over alle vitenskapelige navn i boka.

Jeg ser imidlertid også på denne første utgaven som en "begynnerbok" med klart potensiale for forbedringer. Det ligger en rekke muligheter til å raffinere og utvide materialet både faglig, og ikke minst pedagogisk. Eksempelvis er den "uendelighet" av tabeller som presenteres med fylkesvise forekomster av enkeltarter lite leservennlig. Jeg vil tro at fremtidige utgaver vil presentere forekomst og utbredelse på en helt annen måte, dvs kartografisk. Da blir det en *stor* bok. Dette til tross – kjøp *Limnofauna norvegica* – du vil garantert ikke angre.

Kjetil Bevanger

The Hoverfly genera *Anasimyia* Schiner, *Helophilus* Meigen, *Parhelophilus* Girschner and *Sericomyia* Meigen in Norway (Diptera, Syrphidae)

Tore R. Nielsen

Nielsen, T.R. 1997. The Hoverfly genera *Anasimyia* Schiner, *Helophilus* Meigen, *Parhelophilus* Girschner and *Sericomyia* Meigen in Norway (Diptera, Syrphidae). - Fauna norv. Ser. B 44: 107-122.

Five *Anasimyia*, six *Helophilus*, two *Parhelophilus* and five *Sericomyia* species are reported from the Norwegian fauna, with data on ecology, flight periods and distribution in Norway. *S. jakutica* (Stackelberg), previously only known from East Siberia, has been found in northern Norway and Sweden. The male genitalia of some of the species are figured and keys for Scandinavian *Helophilus* and *Sericomyia* species provided. A lectotype has been selected for *Syrphus borealis* Fallén and *Cinxia intermedia* Ringdahl.

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INTRODUCTION

Thirteen genera and fifty-four hoverfly species with aquatic larvae have been reported from the Norwegian fauna (Nielsen 1996). The present paper gives data on ecology, flight periods and distribution in Norway for four of the genera concerned.

Some of the *Anasimyia* and *Parhelophilus* species are rare in Norway in having a restricted occurrance (a few lowland lakes under influance of man). Such species should be regarded as threatened in our fauna.

A number of collectors and collections have contributed with material for this paper. The following abbreviations for these are:

ALØ Astrid Løken
AN Arne Nielsen
BJB Bjørnar Borgersen
BSA Bjørn Sagvolden
DJO D.W.B. Johansen
ESP Eva Songe Paulsen
FJB Arne Fjellberg
FRJ Fritz Jensen
GRE Lita Greve Jensen
HUR Helge Huru
IMN Inger M. Nielsen
IST Ivar Stokkeland
JSK John Skartveit
KHN Kristin H. Nielsen
LAA Leif Aarvik
LUC Jan A.W. Lucas, Rotterdam
MFA Morten Falck
ROG Knut Rognes
SCH W.M. Schøyen
SIE H. Siebke
TRY Tron Soot-Ryen
SSV Svein Svendsen
TAN Thorvald Arne Nielsen
TJO Terje Jonassen
TRM Tromsø Museum
TRN Tore R. Nielsen
VBI Vitezslav Bicík, Olomouc
WES A. Wessel
ZMB Zoological Museum, Bergen
ZMB Zoological Museum, Oslo

If nothing else is mentioned, the material has been collected by or is in the collection of the author. The faunal codes are in agreement with those of Økland (1981).

SYSTEMATIC LIST

Genus ***ANASIMYIA*** Schiner, 1864.
Claussen & Torp (1980), Speight (1981), Stubbs & Falk (1983) and Torp (1994) give useful characters and keys for the species of this genus.

A. contracta Claussen & Torp, 1980. Map 1.
AK, Oslo: Østensjøvann EIS 28, on swampy lake shore with *Typha* and *Potentilla palustris*, 21 July 1970 3♂♂, 2♀♀ leg. and coll. TRN., Bærum: Tjernsmyr EIS 28 28 June 1986 1♂ leg. GRE, in coll. ZMB. VE, Stokke: Robergsmyra EIS 19 12 July 1969 2♂♂ leg. FJB, in coll. ZMB.

Distribution and ecology: up till now only known from lowland localities (SE-Norway), on rich bogs and at the borders of eutrophic lakes.
Flowers visited: *Potentilla palustris*.
Flight period: the few finds indicate June-July.

A. interpuncta (Harris, 1776). Map 2.
VE, Stokke: Robergsmyra EIS 19 6 July 1969 1♀, leg. FJB, in coll. ZMB. TEY, Skien: Børsesjø EIS 18 15 June 1981 2♂♂,9♀♀ leg. and coll. TRN. Ø, Hvaler EIS 12 1♀ leg. SCH., in coll. ZMO. HES, Åmot EIS 55 1♀ leg. SIE, in coll. ZMO. TRI, Balsfjord: Sjåvikør EIS 154 13 Aug. 1941 1♀ leg. SRY, in coll. TRM.

Distribution and ecology: where the ecology of the localities is known, the finds refer to the borders of eutrophic lakes.
Flowers visited: no data.
Flight period: mid June - mid August.

A. lineata (Fabricius, 1787). Map 3.
Previous records: Siebke (1877), Nielsen (1966 and 1972a).

New records: a great number from all parts of the country.

Distribution and ecology: like the other species of the genus, also *lineata* seems to be a lowland species: on bogs, moors and humid meadows, at the borders of lakes, ditches and ponds, and along river banks.
Flowers visited: *Ranunculus acris, Caltha palustris, Potentilla palustris.*
Flight period: end May - beginning August.

A. lunulata (Meigen, 1822). Map 4.
Previous records: Siebke (1877) and Nielsen (1966, 1972a).
New records: AK, Oslo: «Kristiania» (= Oslo) EIS 28 1♀ leg. ESM, in coll. ZMO, Brønnøya EIS 28 15 June 1981 1♀, in humid meadow with *Carex, Phragmites* and *Ranunculus*; Ås: southern border of lake Årungen 17 July 1970 1♀. HEN, Åmot: Åset EIS 55 1♂ leg. SIE, in coll. ZMO. VE, Tjøme: Sandø EIS 19 10 July 1966 1♀ leg. FJB, Tjøme EIS 19 25 July 1966 1♀ in humid field close to the sea, leg. FJB, Mostranda EIS 19 24 June 1969 2♂♂ leg. FJB. RY, finnøy: Sevheim EIS 14 7-9 July 3♂♂ leg. JSK, Karmøy: Skudeneshavn EIS 13 9 June 1973 4♂♂ in swampy field with *Caltha palustris*. HOY, Bergen: Kronåsen EIS 30 9 June 1970 2♂♂, in coll. ZMB and TRN, Paradis EIS 30 27 May 1970 1♂, in coll. ZMB. TRI, Målselv: Takelvdal EIS 154 12 July 1979 1♀. FØ, Sør-Varanger: Fiskevann EIS 160 14 July 1969 2♂♂, in coll. ZMB, Øvre Pasvik, Hestefoss EIS 160 9 July 1974 1♂ leg. FJB.

Distribution and ecology: scattered finds in as well South as North Norway; in humid fields, on bogs and swamps.
Flowers visited: *Caltha palustris, Potentilla palustris, Taraxacum* sp.
Flight period: end May - beginning August.

A. transfuga (Linnaeus, 1758). Map 5.
Previous records: Oslo EIS 28 (Nielsen, 1972c).

New records: AK, Oslo: Østensjøvann EIS 28 21 July 1970 3♂♂, 1♀. Ås: southern border of lake Årungen EIS 28 17 July 1970 1♀. BØ, Nedre Eiker: Miletjern, Mjøndalen EIS 28 3 Aug. 1988 1♀, leg. DJO. TEY, Skien: Børsesjø EIS 18 15 June 1981 3♂♂.

Distribution and ecology: in lowland localities in South Norway, at the borders of eutrophic lakes.
Flowers visited: *Potentilla palustris.*
Flight period: mid June - beginning August.

Genus ***HELOPHILUS*** **Meigen,** 1822.
Key: Table 1.

H. affinis Wahlberg, 1844. Figure 4a. Map 6.
syn. *borealis* Siebke, 1864 nec Stæger.
syn. *siebkei* Verrall, 1901 (nom. nov. for *borealis* Siebke)
Previous records: East Norway (Siebke, 1877) and Jæren (Nielsen, 1966).

New records: ON, Fron: Harpefoss EIS 62 12 July 1981 1♂. VE, Brunlanes: Pauler EIS 19 15 Aug. and 1 Sept. 1982 1♂,1♀ leg. BJB. TEI, Nissedal EIS 17 26 July 1976 1♀. AAY, Grimstad: Metveit EIS 6 25 July 1976 1♂. VAY, Lindesnes: Jørgenstad at Spangereid EIS 1 8 Aug. 1978 3♂♂,

20 July 1979 1♂, 28 July 1981 1♂, Ramsland EIS 1 20 July 1980 1♂, Goksem EIS 1 6 Aug. 1981 1♀ leg. ROG., Lyngdal: Optedal EIS 1 6 Aug. 1975 1♂. RY, Sola: Rott EIS 7 3 Aug. 1924 1♂ leg. FRJ, in coll. TRM. FV, Alta: Gargia EIS 162 3 Aug. 1982 1♂ leg. GRE, in coll. ZMB. FN, Porsanger: Lakselv EIS 174 26-27 June 1979 2♀♀ leg. IMN. FØ, Sør-Varanger: Neiden EIS 168 7 July 1983 3♂♂,1♀ leg. KHN and TAN, Skogly EIS 160 18 July 1969 1♀, Svanevatn EIS 169 19 July 1899 1♂ and Jarfjord EIS 169 1 Aug. 1891 1♀ both leg. WES and in coll. TRM. An uncommon species, found in single or only a few specimens.

Distribution and ecology: found in all parts of Norway, in open forests and on flowering meadows, but also on the tundra of northern and eastern Finnmark.
Flowers visited: *Ranunculus acris, Achillea millefolium, Chrysanthemum leucanthemum, Senecio jacobaea, Valeriana* sp. and *Rubus idaeus.*
Flight period: mid June - early September, with a peak in July - beginning of August.

H. borealis Siebke, 1864.
As this name is a junior primary homonym of *borealis* Stæger, 1845, Verrall (1901) gave it a new name, *siebkei.* The species was described as new on basis of a male specimen from Vårstigen at Kongsvoll, Sør-Trøndelag (Siebke, 1864: 166). I have examined the type (in coll. ZMO) and agree that it is synonymous with *affinis* Wahlberg, as quoted by Soós and Papp (1988).

H. borealis Stæger, 1845.
Thompson has found *borealis* to be a junior synonym of *lapponicus* Wahlberg, 1844 (pers. comm.) and will publish this in his forthcoming catalog to Nearctic flower flies (Thompson, *in litt*).

H. borealis shows some variability in the presence of grey dust spots on tergites 3-4, «characters» which have been used to separate the two supposed species. The *«lapponicus»* form was without grey spots on the tergites, and the *«borealis»* form with such markings. Norwegian material from one and the same population (e.g. from Vadsø) shows both colour forms, with a series of different shades in between. The specimens are otherwise identical in male genitalia and in all other respects. I have also examined lectotypes and paralectotypes of both *borealis* and *lapponicus*, and fully support Thompsons conclusions.

H. groenlandicus (Fabricius, 1780). Figures. 3d-e, 4b. Map 7.
Previous records: under the name *arcticus* Zett. Siebke (1877) reported this species from Oslo (probably mislabeled specimen) and Dovre.

New records: HOI, Kinsarvik: Stavaliområdet, alpine pasture 1050 m a.s.l., EIS 32 3 Aug. 1968 1♀, leg. FJB, in coll. ZMB. TRI, Målselv: Frihetsli EIS 147 17 July 1922 1♂, 1♀, leg. SRY, in coll. TRM. FV, Alta: Jotkajavre EIS 165 15 July 1924 1♂, leg. SRY, in coll. TRM. FN, Vadsø: Vadsø, cultivated meadow near camping ground, 9-10 July 1983 4♀♀, one specimen on flowering *Allium sibiricum*; Tana: Seida EIS 176 24 July 1989 1♂ on *Matricaria indora.* FØ, Sør-Varanger: Fiskevann, Pasvik EIS 160 14 and 17 July 1969 3♂♂,5♀♀, in coll. ZMB and TRN.

Distribution and ecology: an alpine and high boreal tundra and taiga species.
Flowers visited: *Allium sibiricum* and *Matricaria indora.*
Flight period: July - early August.

H. hybridus Loew, 1846. Figure 1. Map 8.
Previous records: Nielsen (1966 and 1969).

New records: AK, Eidsvoll: Eidsvoll EIS 37 3 July 1981 1♂. OS, Ringebu: Ringebu EIS 63 9 July 1974 1♀. BV, Hol: Geilo EIS 43 18 July 1978 1♀. VE, Tjøme: Robergsmyra EIS 19 10 Aug. 1969 1♀ and Mostranda EIS 19 31 Aug. 1969 5♂♂, both leg. FJB, in coll. ZMB and TRN. TEY, Skien: Børsesjø EIS 18 15 June 1981 1♂, 1♀. VAY, Kristiansand: Stangenes EIS 2 13 June 1982 1♀, leg. SSV. RY, Hå: Ogna EIS 3 26 Aug. 1973 1♀; Sandnes: Skeiane EIS 7 17 May 1972 1♂; Stavanger: Ullandhaug EIS 7 12 May 1981 1♀, leg. TJO. HOY, Bergen: Åstveit EIS 39 12 July 1972 1♀, leg. GRE. FV, Alta: Stengelsen EIS 173 19 July 1986 1♂, leg. HUR, Malaisetrap, in coll. TRM. FI, Kautokeino: Kautokeino EIS 157 3-4 July 1979 8♂♂, 2♀♀. FN, Porsanger: Lakselv EIS 174 26-27 July 1979 5♀♀. FØ, Sør-Varanger: Gjøkvann, Pasvik EIS 160 11 July 1969 1♀, in coll. ZMB.

Distribution and ecology: scattered finds in South and North Norway. On flowering meadows, along ditches, on borders of eutrophic lakes and ponds (most abundant), on bogs and in open, humid confierous forests.
Flowers visited: *Ranunculus acris, Rubus idaeus, Potentilla palustris, Sanguisorba officinalis, Vaccinium myrtillus, Myosotis* sp., *Valeriana sambucifolia, Arnica montana, Taraxacum* sp.
Flight period: mid May - end August.

H. lapponicus Wahlberg, 1844. Figures 3a-c, 4c. Map 9.
ON, Skjåk: Marlo EIS 70 19 May 1980 1♀ leg. FJB. STI, Oppdal: Kongsvoll EIS 79 28 July 1873 1♀ leg. SIE, in coll. ZMO; 1 July 1963 4♂♂, 1♀ leg. AN. TRI, Målselv: Frihetsli EIS 147 13-31 July 1922 8♂♂, 2♀♀ leg. SRY, in coll. TRM.; Rundhaug EIS 154 13 July 1953 1♀ and Trosdal EIS

154 11 July 1955 1♀ both leg. ALØ and in coll. ZMB. FV, Alta: Jotkajavre EIS 165 15 and 26 July 1924 7♂♂, 1♀ leg. SRY, in coll. TRM; Grønnåsen, Gargia EIS 165 30 June 1979 1♂; Stengelsen EIS 173 14 July 1986 1♀ leg. HUR, in coll. TRM; Skjæragenta EIS 165 23 June 1984 3♂♂. FI, Kautokeino EIS 157 3-4 July 1979 1♂, 2♀♀; Suolovuobme EIS 165 24 June 1984 2♂♂. FN, Vadsø: Vadsø, on cultivated meadow near camping ground, EIS 177 9-10 July 1983 29♂♂, 3♀♀, in numbers visiting flowering *Allium sibiricum.* Porsanger: Lakselv EIS 174 1♀ leg. SCH, in coll. ZMO; Festningstuen EIS 166 29 July 1924 1♂ leg. SRY, in coll. TRM; Lakselv EIS 174 26-27 July 1979 2♂♂; Russenes EIS 181 28 June 1979 7♂♂ on pasture with dig ditches; Tana: Seida EIS 176 24 July 1989 2♂♂ on flowering, cultivated meadow near farm houses; Kongsfjordfjellet N of Julahøgda EIS 184 12 July 1985 1♂ leg. FJB, in coll. TRM; Nesseby: Varangerbotn EIS 177 3 July 1977 1♀. FØ, Sør-Varanger: Gjøkvann EIS 160 11-12 July 1969 1♂, 1♀; Fiskevann EIS 160 24 June 1966 1♀, leg. ZMO expedition; 14 and 17 July 1969 1♂, 4♀♀; Neiden EIS 168 July 1901 1♂, in coll. TRM; 7 July 1983 1♀ KHN and TAN, 21 July 1989 1♂.

Distribution and ecology: an arctic/subarctic tundra species with its main occurance in Norway in Finnmark and Troms counties, but probably also with populations in the alpine zones further south. I have found it most abundantly in arctic farmland areas, where it probably was attracted to and gaining from manure polluted ponds and ditches.
Flowers visited: *Allium sibiricum, Ranunculus acris* and *Matricaria indora.*
Flight period: late June - July/August.

Remarks: a rather variable species concerning the grey stripes on mesonotum and on tergite 3-4. See comments on *H. borealis* Stæger.

H. pendulus (Linnaeus, 1758). Map 10.
Previous records: Siebke (1877), Nielsen (1966).

New records: from all parts of the country.

Distribution and ecology: our most eurytope *Helophilus* species, inhabiting a great variety of biotopes, up till 1500 m a.s.l.
Flowers visited: *Salix repens, Ranunculus acris, Cakile maritima, Brassica rapa, Sedum acre, Sorbus aucuparia, Rubus idaeus, Potentilla palustris, P. fruticosa, P. erecta, Calluna vulgaris, Vaccinium myrtillus, Myosotis* sp., *Valeriana sambucifolia, Succisa pratensis, Matricaria indora, Arnica montana, Senecio jacobaea, Taraxacum* sp., *Leontodon autumnalis* and *Hieracium* sp.
Flight period: mid May - mid October.

H. trivittatus (Fabricius, 1805). Figure 2. Map 11.
Previous records: Nielsen (1966).

New records: AK, Oslo: Brønnøya EIS 28 15 June and 11 July 1981 2♀♀. HES, Elverum: Vestad EIS 55 24 Aug. 1979 1♀, leg. LAA. TEI, Rjukan EIS 26 4 June 1979 1♀, leg. and coll. BSA. AAI, Evje og Hornnes: Bjørndalsvann EIS 5 27 Aug. 1967 1♂, leg. FJB, in coll. ZMB. VAY, Kristiansand: Bjørnestad EIS 2 14 July 1972 1♀. Gimle-moen EIS 2 19 Aug. 1967 1♂, leg. FJB, in coll. ZMB; Lindesnes: Jørgenstad near Spangereid EIS 1 8 Aug. 1978 7♂♂, 7♀♀ and 24 July 1981 2♂♂, 1♀, Ramsland EIS 1 20 July 1980 1♀. RY, Klepp: Reve EIS 7 2 Sept. 1979 9♂♂, 5♀♀. NTI, Melhus: Melhus EIS 92 8 June 1985 1♂, leg. BJB.

Distribution and ecology: in south Norway, mainly in coastal areas, but also in the valleys inland: on flowering bogs, moors, lake shores, river banks, pastures and flowering meadows, sand-dunes by the sea.
Flowers visited: *Sedum acre, Potentilla palustris, Valeriana sambucifolia, Arnica montana, Senecio jacobaea, Hieracium* sp.
Flight period: early June - early September.

Genus *PARHELOPHILUS* Girschner, 1897.

Keys: Stubbs & Falk (1983), Torp (1994) and Stubbs (1996).

P. consimilis (Malm, 1863). Map. 12.
Previous records: the Jæren district, SW Norway (Nielsen 1966 and 1972a).

New records: AK, Bærum: Tjernsmyr EIS 28 28 June 1986 1♀, leg. GRE, in coll. ZMB. OS, Ringebu: Brandval EIS 63 10 July 1974 1♂. VE, Stokke: Robergsmyra EIS 19 6-15 July 1969 5♂♂,5♀♀, leg. FJB, in coll. ZMB and TRN. TEI, Notodden: Notodden EIS 27 11 July 1976 4♀♀. RY, Stavanger: Mosvatnet EIS 7 2 July 1981 1♂, leg. ROG, Sandnes: Stokka EIS 7 17 June 1972 2♂♂ and 7 June 1973 1♂; Klepp: Kleppe EIS 7 23 July 1972 2♀♀. Alvevatn EIS 7 29 June 1972 1♂, Øksnevadtjern EIS 7 10 June-17 July 1972-1984 18♂♂,5♀♀; Sola: Gimra EIS 7 30 July 1973 1♀, Harvalandsvatn EIS 7 20 June 1972 1♂,1♀; Strand: Tau EIS 14 9 June 1979 1♂, leg. GRE; Finnøy: Sevheim EIS 14 26 June 1995 1♂, 1♀ leg. JSK; Karmøy: Eide near Kopervik EIS 13 27 June 1974 2♂♂.

Distribution and ecology: scattered localities in coastal areas and in the valleys of south Norway: found most abundantly at the borders of eutrophic lakes, otherwise on bogs with flowering *Potentilla palustris.*

Flowers visited: *Potentilla palustris.*
Flight period: early June - end July.

P. versicolor (Fabricius, 1794). Map 13.
Previous records: Lake Østensjøvann, Oslo (Nielsen, 1972c)

New records: AK, Oslo: Stabekk EIS 28 24 June 1873 1♀, leg. SIE, in coll. ZMO. VE, Stokke: Robergsmyra EIS 19 6 July 1969 1♀, leg FJB. AAY, Tromøy EIS 6 7 July 1982 1♂, leg. IST. VAY, Kristiansand: Bjørnestad EIS 2 14 July 1972 1♀.

Distribution and ecology: scattered lowland localities in South-east Norway, on borders of eutrophic lakes and swamps.
Flowers visited: *Typha latifolia.*
Flight period: late June - July.

Genus ***SERICOMYIA*** Meigen, 1803.
Key: Table 2.

S. arctica Schirmer, 1913. Figure 4e-g, and i, 6d. Map 14.
FØ, Sør-Varanger: Gjøkåsen EIS 160 20 June 1990 2♂♂, Fiskevann EIS 160 14 July 1969 4♂♂ (1♂ in coll. ZMB), 17 July 1969 1♂, on both dates the specimens were observed flying around small ponds polluted with horse manure. *Sweden*, Abisko 17 July 1918 1♂, leg. O. Ringdahl.

Distribution and ecology: a subarctic and arctic species found in open, humid pine forests and on moors and bogs (Finnmark and northern Sweden).
Flowers visited: *Rubus chamaemorus, Achillea millefolium.*
Flight period: mid June-July.

Remarks: Schirmers collections and types are kept in Zoological Museum, University of Bergen. I have examined the male holotype of *arctica* and figured its genitalia.

S. jakutica (Stackelberg, 1927) Figure 4h and j, 6e. Map 15.
New to Scandinavia. *Norway*, FN, Porsanger: Kistrand EIS 181 1♂, leg. SCH, in coll. ZMO. *Sweden*, Abisko 1♂ 2 July 1922 leg. O. Ringdahl in coll. ZIL and 22 June 1972 1♂, leg. FJB, in coll. TRN.

Stackelberg (1927) described this species on basis of a single male from northern Yakutia, east Siberia. Violovitsh (1983) also reports it from this area.

S. jakutica is very similar to *arctica*. In his description Stackelberg (op.cit.) claims that it can be separated from *arctica* by its black hind tibia and tarsi (reddish in *arctica*), and Violovitsh gives additional characters. In the material at my disposal (one male from Yakutia, det. Violovitsh and the two Scandinavian males), I have found these characters variable, but there are good differences in the male genitalia. I have not been able to separate the females.

S. lappona (Linnaeus, 1758). Figure 5b, 6b. Map 16.
syn. *Bulboscrobia undulans* Gaunitz, 1937: 91
Previous records: Siebke 1877, Nielsen 1972a, 1972b.
New records: from all parts of the country.

Distribution and ecology: common and widespread, in forests (deciduous and coniferous), on meadows, bogs and moors. Frequent also in high mountain areas, found up till 1050 m a.s.l.
Flowers visited: *Ranunculus acris, Rubus ideaus, Potentilla erecta, Vaccinium myrtillus, V. uliginosum, Vaccinium vitis-idaea.*
Flight period: end May - mid August.

Remarks: As known from Torp (1984) *Bulboscrobia undulans* was a name used by Gaunitz (1937) for two aberrant females of *S. lappona.* I have examined both types. The holotype is labeled «Typus», «Sm. Korsberga Holm «Kärret» 15.7.1927, D. Gaunitz» and «Bulboscrobia undulans Gaun.». It diverges from normal *lappona* specimens in having a dented, quite black and rather dull abdomen (Figure 5b.). The paratype has a similar appearence, but it is partially eaten by insects.

S. nigra Portschinsky, 1873. Figure 6c. Map 17.
syn. *intermedia* Ringdahl, 1922 (as *Cinxia*): 179.

AK, Oslo: Rustadsaga EIS 28 4 Aug. 1981 1♀ and 1 Aug. 1993 1♀; Rustad EIS 28 20 July 1985 1♂, 1♀; Lutdalen EIS 28 24 July 1985 9♂♂, all leg. and in coll. MFA. Ø, Askim: Øyerud EIS 29 6 July 1976 1♀. HES, Åsnes: Flisa EIS 47 30 June 1975 1♀; Elverum: Grundset EIS 55 1♀, leg. SIE, in coll. ZMO and Kynneberget EIS 55 21 July 1981 1♀, leg. and in coll. MFA. BV, Rollag: Rollag boligfelt EIS 35 1 Aug. 1984 1♀, leg. BSA. TEI, Seljord: Ulvenes EIS 17, 25 July 1979 1♀, leg. ROG; Kviteseid: Lauve, Vråvatn EIS 17 5 July 1980 1♀, leg. ROG. HOY, Bergen: Sandviksfjellet EIS 39 19 July 1981 1♀, leg. ESP. STI, Orkdal: Songli EIS 91 13 June 1988 1♂, leg. and coll. VBI. NSI. Rana: Mo i Rana EIS 123 2 July 1983 1♀. NNØ, Narvik: Narvik EIS 139 3 July 1980 1♀, leg. and coll. LUC. TRI, Målselv: Frihetsli EIS 147 27 July 1922 1♀, leg. SRY, in coll. TRM. FØ, Sør-Varanger: Hestefoss, Øvre Pasvik EIS 160 9 July 1974 1♂ leg. FJB.

Distribution and ecology: a rare species often taken in single specimens only, in open forests and on meadows in as well South as North Norway.
Flowers visited: *Valeriana sambucifolia*.
Flight period: June - early August.

Remarks: In 1922 O. Ringdahl described *Cinxia intermedia* from Abisko, northern Sweden. Later (1931) he concluded that his specimens should be males of *nigra* Stackelberg, which was described on basis of a female. I have selected one of the three *intermedia* males, dated «Abisko 11.7.-22» as lectotype and the other two as paralectotype and labeled them accordingly, hereby designated. I have not been able to examine the *nigra* type, but the *intermedia* males and their genitalia, are identical with those of *nigra*.

S. silentis (Harris, 1776). Figures 5a, 6a. Map 18.
Previous records: Siebke (1877) and Nielsen (1969, 1972a).

New records: from all parts of the country, except for Finnmark.

Distribution and ecology: common and widespread in South Norway, less frequent in North Norway. Most abundant in lowland districts, in open forests, on meadows, bogs, moors, river banks and along ditches. Sometimes also (probably wind-spread) in alpine areas and on mountain tops.
Flowers visited: *Rubus idaeus, R. nessensis, Potentilla palustris, P. erecta, Calluna vulgaris, Succisa pratensis, Valeriana sambucifolia, Taraxacum* sp., *Hieracium* sp.
Flight period: mid May - end September.

Remarks: In 1816 Fallén described this species under the name *Syrphus borealis* from Östergötland («Ostrogothiae»), Sweden. I have designated a male from the Dipt. Scand. collection and with Falléns handwriting «S. borealis ♂. Ostrog.» as lectotype and labeled it accordingly. It is kept in ZM, Lund. Paralectotypes in Naturhist. Riksmus., Stockholm: male labeled with Falléns handwriting "S. borealis ♂ lappona OG.", female "S. borealis ♀ " and male "Uppsala", hereby designated.

Figure 1
Helophilus hybridus, female in *Valeriana* flower.

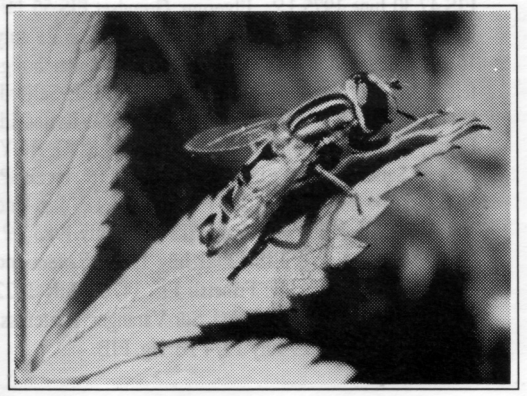


Figure 2
Helophilus trivittatus, male sunbathing.

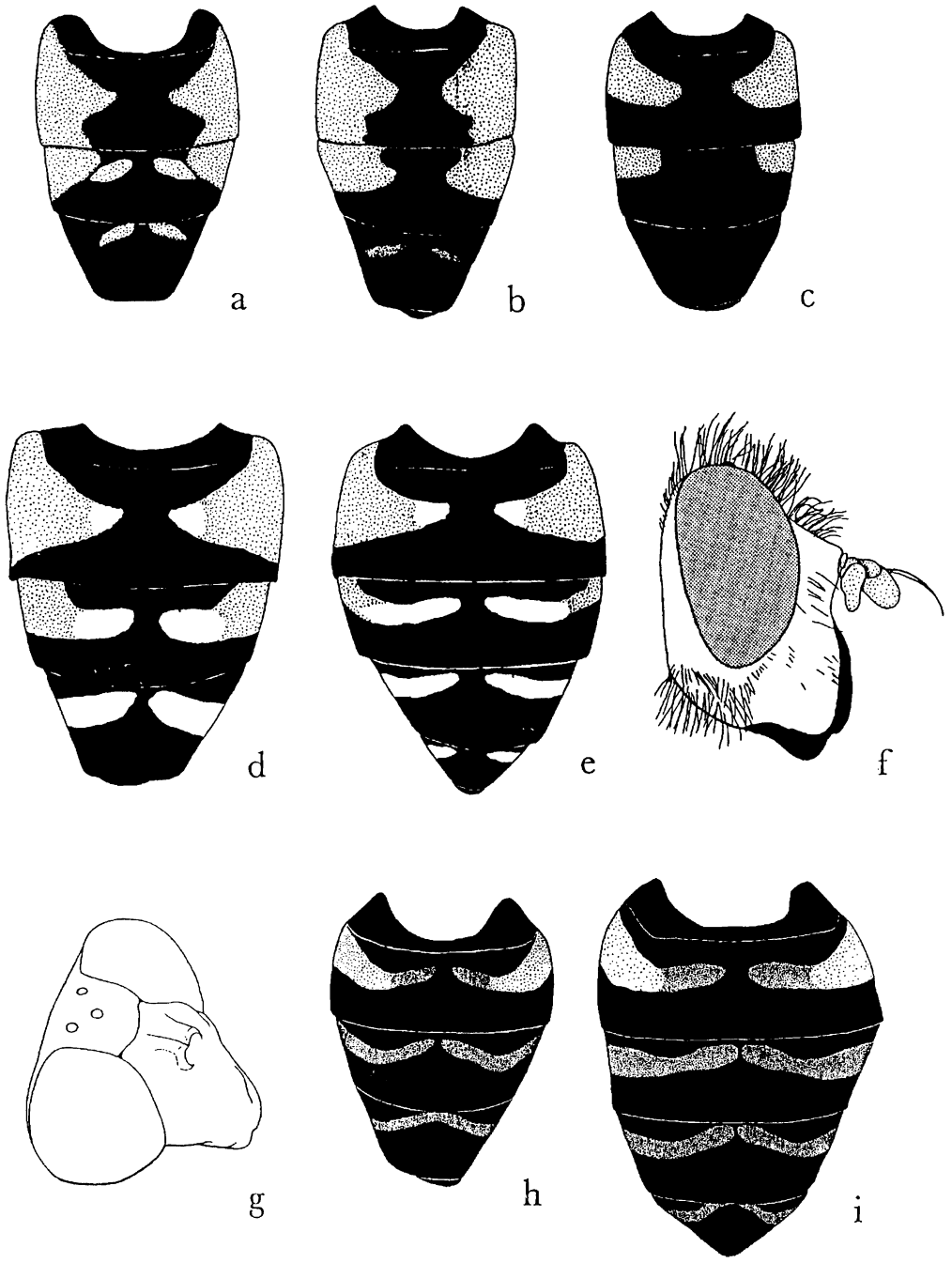


Figure 3
a-c: *Helophilus lapponicus*, male abdomen. d-e: *H. groenlandicus*, d: male abdomen, e: female abdomen. f-i: *H. bottnicus* (Yakutia), f: male head in profile, g: female head (dorsolateral view), h: male abdomen, i: female abdomen.

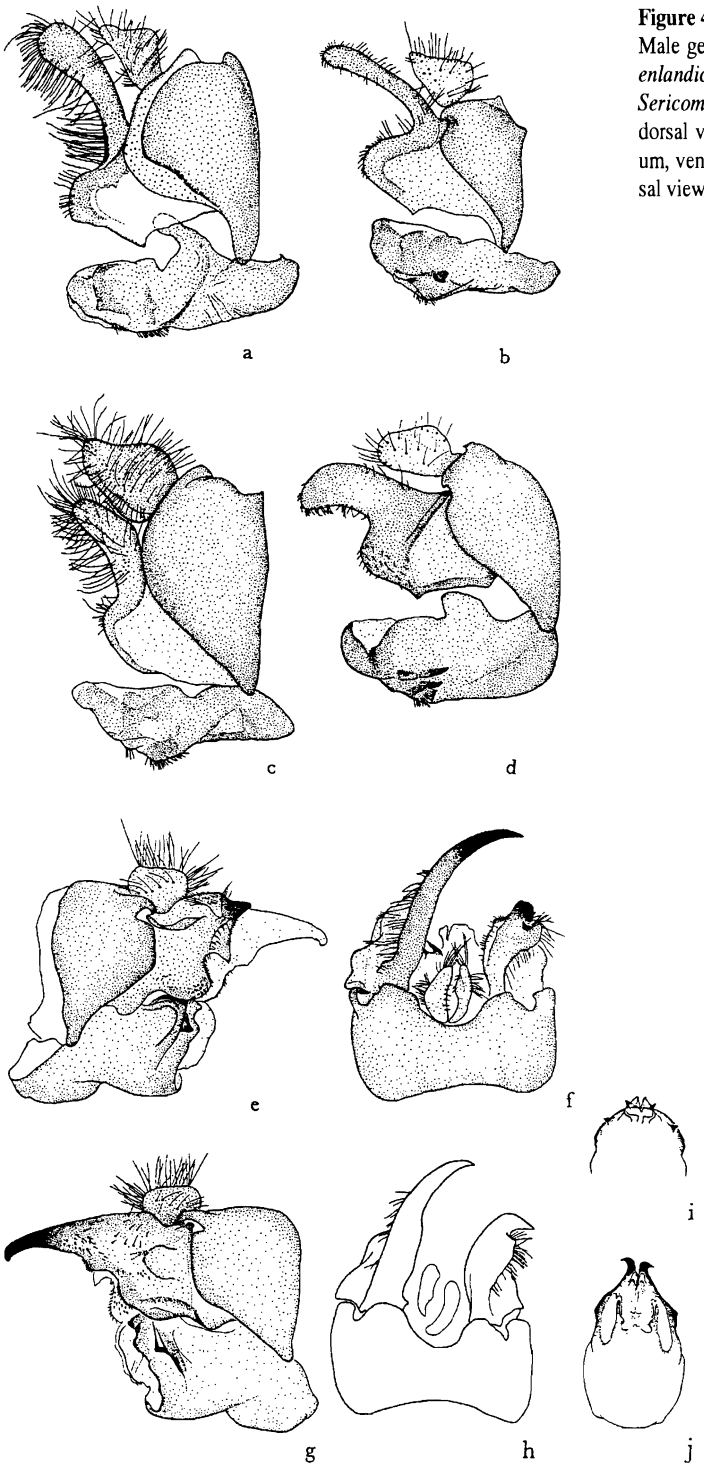
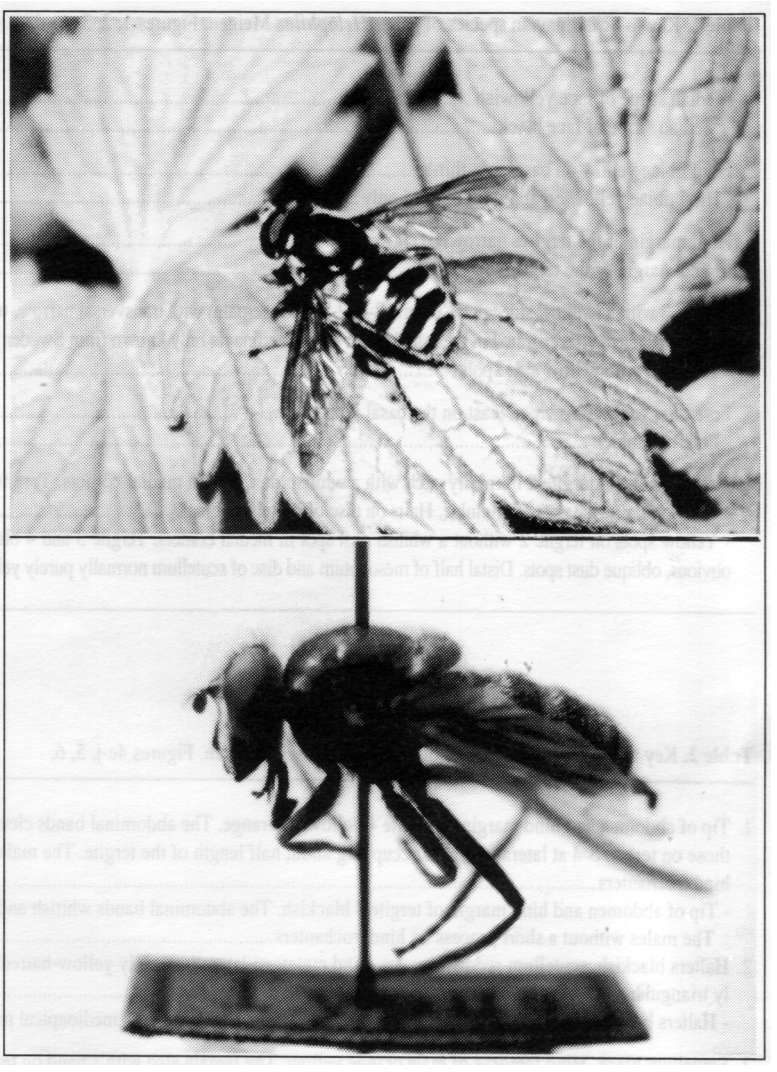


Figure 4
Male genitalia. a: *Helophilus affinis*, b: *H. groenlandicus*, c: *H. lapponicus*, d: *H. bottnicus*, e: *Sericomyia arctica* holotype right side, f: do. dorsal view, g: do. left side, i: tip of hypandrium, ventral view. h: *S. jakutica*, epandrium dorsal view. j: hypandrium, ventral view.

Figure 5
a) *Sericomyia silentis*, male. b) *Bulboscrobia undulans* Gaunitz, holotype.



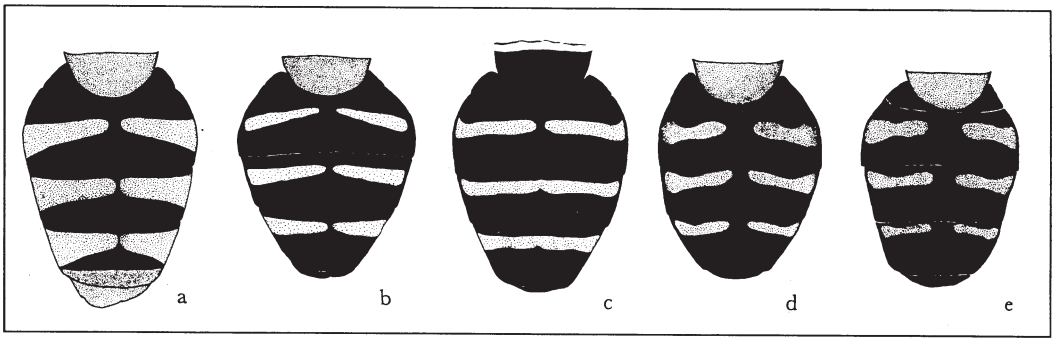


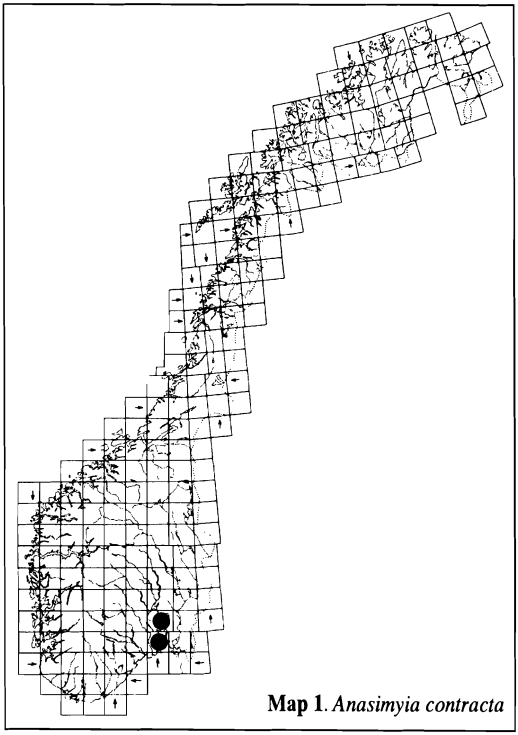
Figure 6
Sericomyia male abdomens. a: *silentis*, b: *lappona*, c: *nigra*, d: *arctica*. e. *jakutica*.

Table 1. Key to Scandinavian species of genus ***Helophilus*** Meigen. Figures 1, 2, 3, 4a-d.

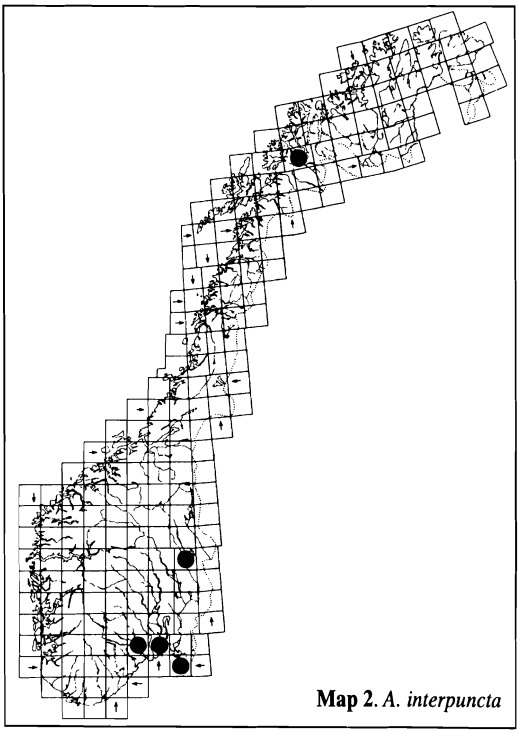
1. Median stripe of face yellowish ..... ***trivittatus*** (Fabricius)
   - Median stripe of face black **2**
2. Hind tibiae yellow on basal two-thirds ..... ***pendulus*** (Linnaeus)
   - Hind tibiae yellow on about basal third only **3**
3. Hind margin of the tergites narrowly yellow ..... ***hybridus*** (Loew)
   - Hind margin of the tergites black **4**
4. Tergite 3 without yellow side spots. Tergite 2-4 (2-5 in the female) with transversal narrow, undulating greyish bands of dusting, sometimes narrowly separated in the middle (In Fennoscandinavia only known from Sweden). Figs. 3f-i, 4d.... ***bottnicus*** Wahlberg
   - Tergite 3 with yellow side spots **5**
5. Fore tarsi yellow-brown, at least on the basal joints ..... ***affinis*** Wahlberg
   - Fore tarsi black **6**
6. Yellow spots on tergite 2 normally each with a whitish dust spot in medial corners. Tergite 3-4 (in female also tergite 5) with strong, greyish spots or lunulae. Hairs on disc of scutellum black ..... ***groenlandicus*** (Fabricius)
   - Yellow spots on tergite 2 without a whitish dust spot in medial corners. Tergite 3 and 4 black, sometimes with two more or less obvious, oblique dust spots. Distal half of mesonotum and disc of scutellum normally purely yellowhaired ..... ***lapponicus*** Wahlberg

Table 2. Key to Scandinavian species of genus ***Sericomyia*** Meigen. Figures 4e-j, 5, 6.

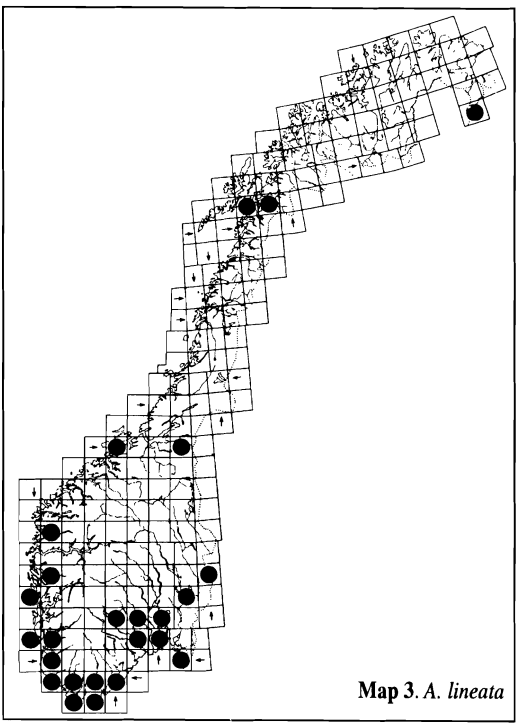
1. Tip of abdomen and hind margin of tergite 4 yellowish orange. The abdominal bands clearly yellow and rather broad, those on tergite 3-4 at lateral margins occupying about half length of the tergite. The male with a short process on hind trochanters ..... ***silentis*** (Harris)
   - Tip of abdomen and hind margin of tergite 4 blackish. The abdominal bands whitish and rather narrow. The males without a short process on hind trochanters **2**
2. Halters blackish, scutellum reddish-brown. Hind metatarsi laterally mainly yellow-haired. The abdominal bands very narrowly triangular. The hairs on medioapical part of tergite 4 yellow ..... ***lappona*** (L.)
   - Halters brown, hind metatarsi laterally mainly black-haired. The hairs on medioapical parts of tergite 4 mainly black **3**
3. Scutellum black. Hind femorae of male orange yellow. The female also with a band on tergite 5 ..... ***nigra*** (Portschinsky)
   - Scutellum dark reddish-brown. Hind femorae (except extreme tip) of male mainly blackish-brown. The abdominal bands slightly lunulate and widening more or less abruptly near lateral margins of the tergites **4**
4. Males: Tip of hypandrium rounded (Fig. 4i) ..... ***arctica*** Schirmer
   - Tip of hypandrium more pointed and hooked (Fig. 4j) ..... ***jakutica*** (Stackelberg)
   Females: ..... ***arctica*** Schirmer and ***jakutica*** (Stackelberg)



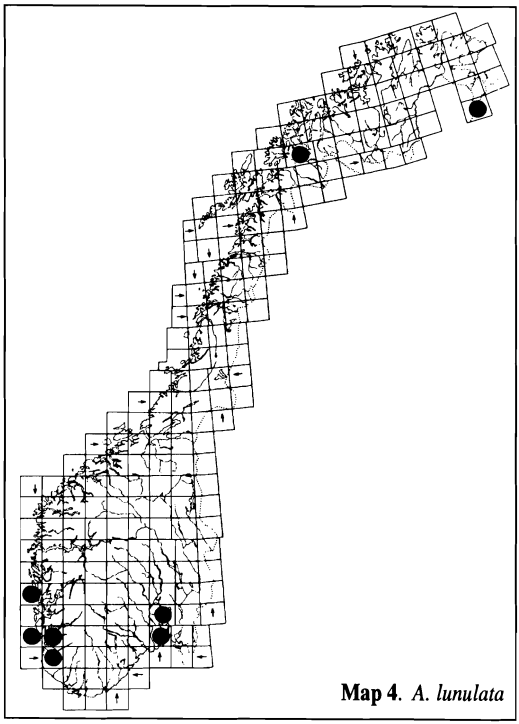
Map 1. *Anasimyia contracta*



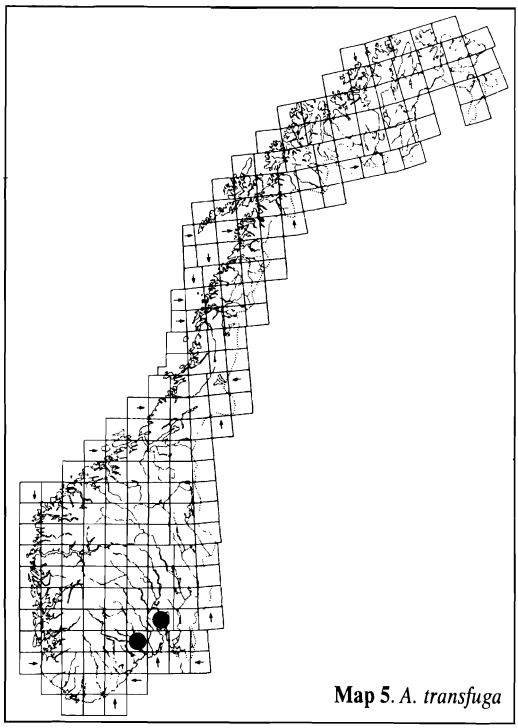
Map 2. *A. interpuncta*



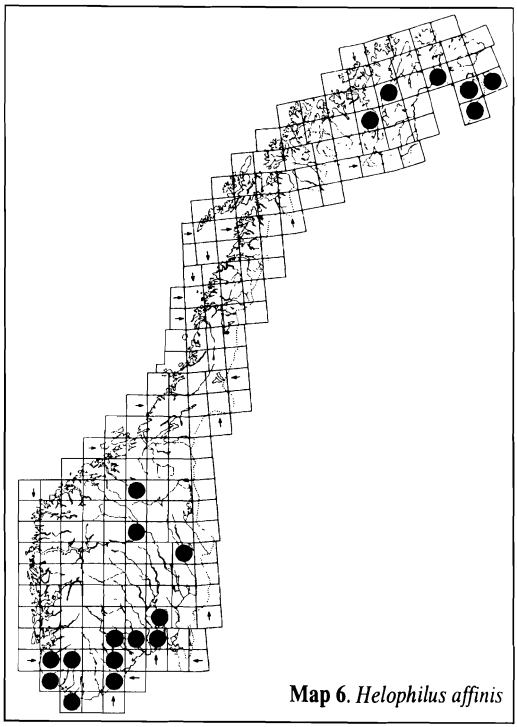
Map 3. *A. lineata*



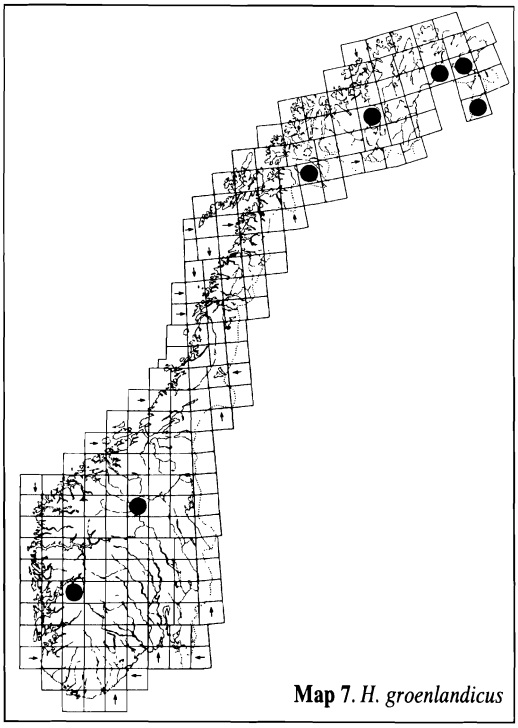
Map 4. *A. lunulata*



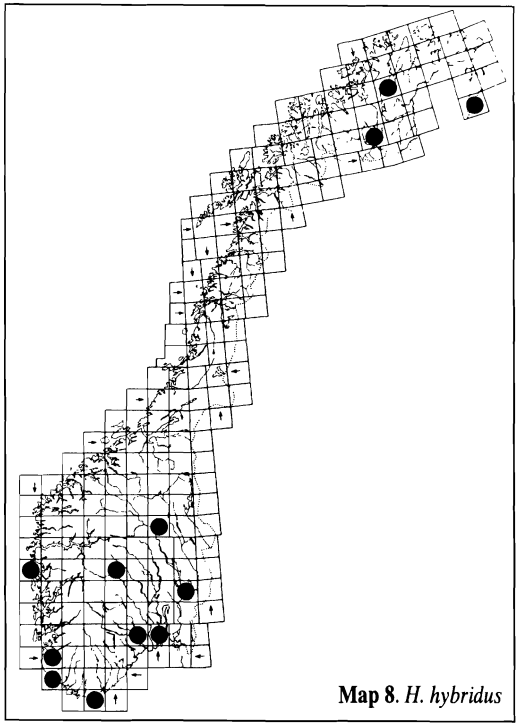
Map 5. *A. transfuga*



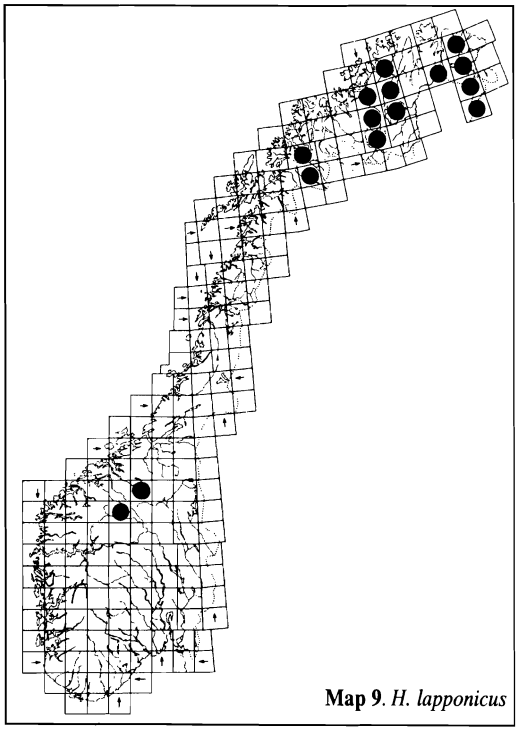
Map 6. *Helophilus affinis*



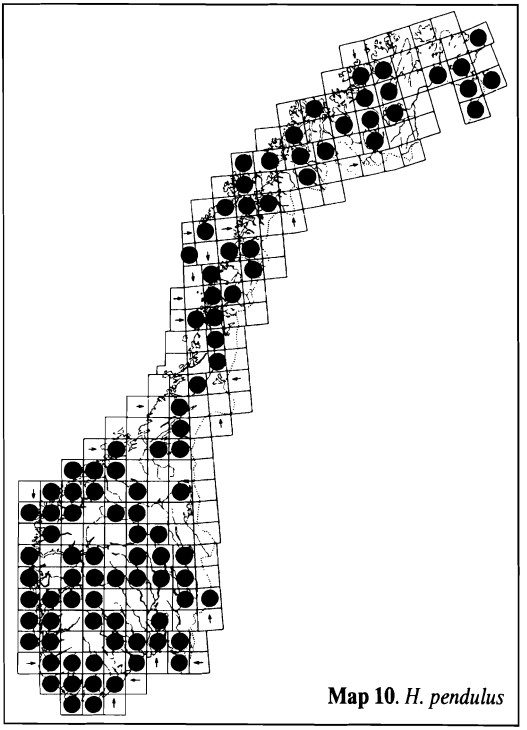
Map 7. *H. groenlandicus*



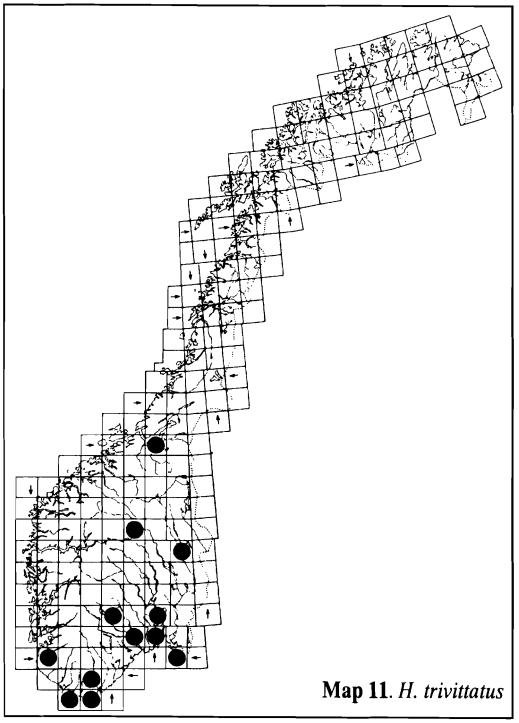
Map 8. *H. hybridus*



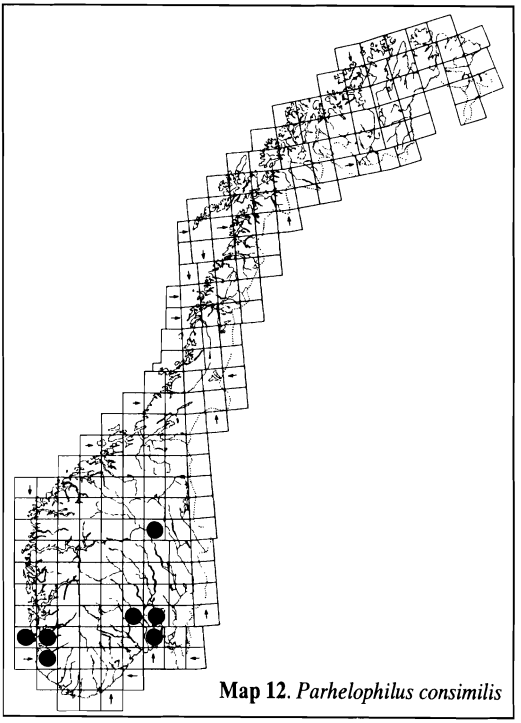
Map 9. *H. lapponicus*



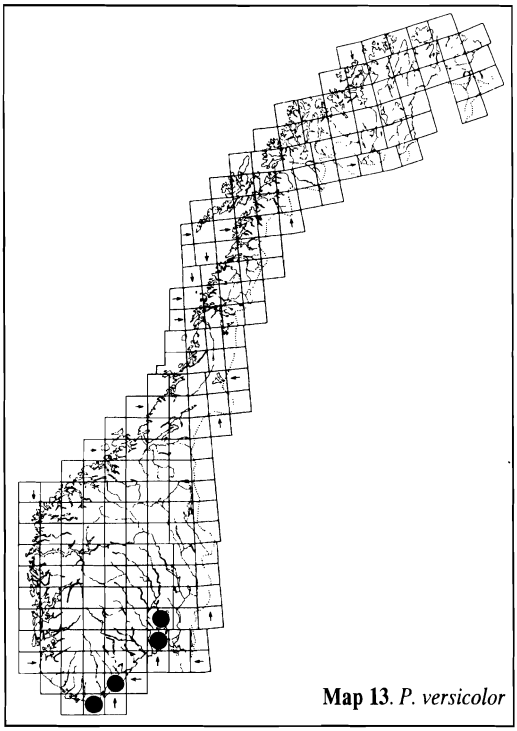
Map 10. *H. pendulus*



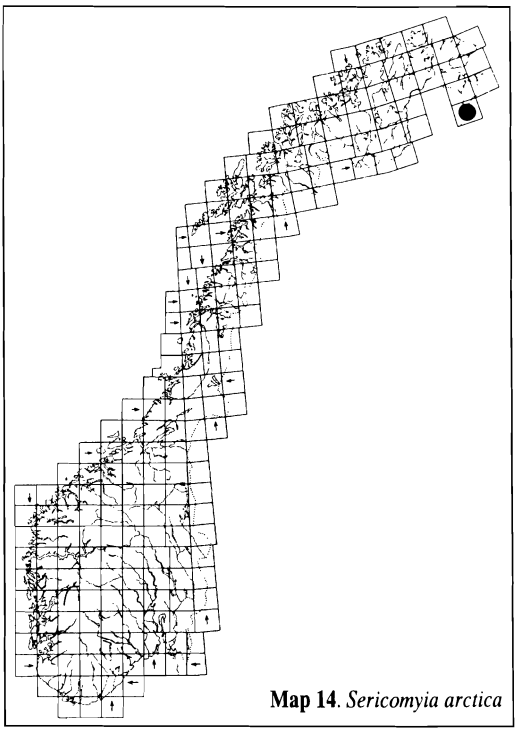
Map 11. *H. trivittatus*



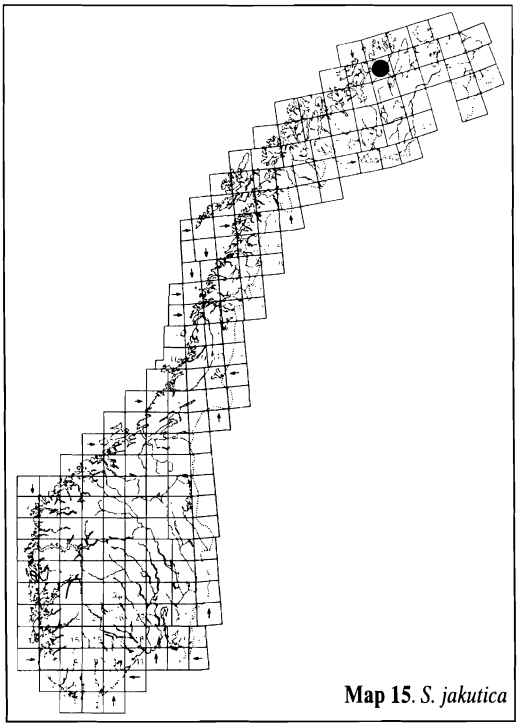
Map 12. *Parhelophilus consimilis*



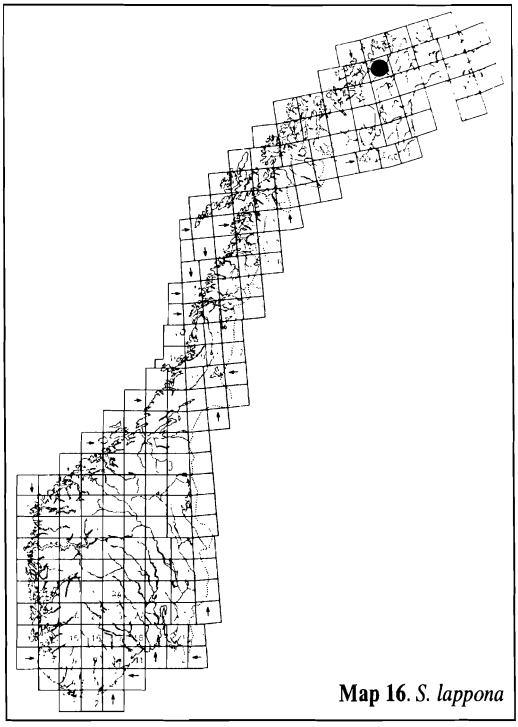
Map 13. *P. versicolor*



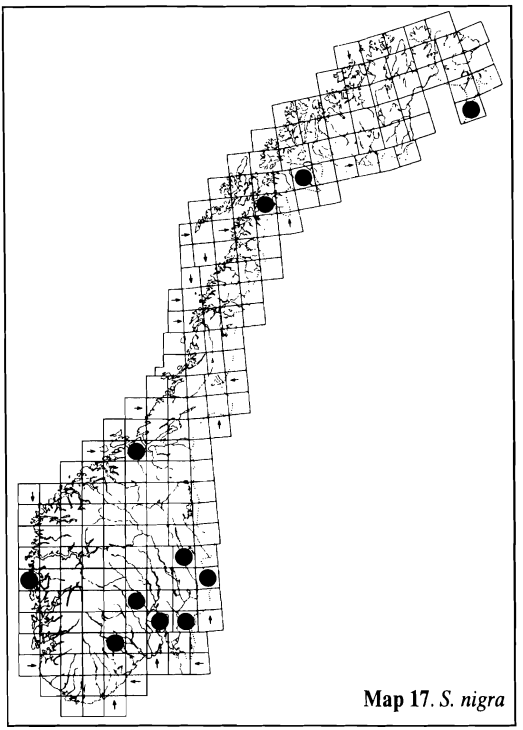
Map 14. *Sericomyia arctica*



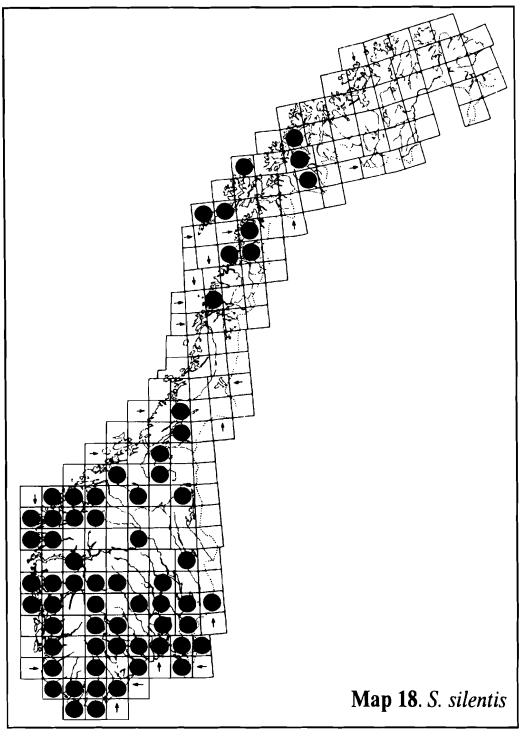
Map 15. *S. jakutica*



Map 16. *S. lappona*



Map 17. *S. nigra*



Map 18. *S. silentis*

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SAMMENDRAG

Blomsterslektene *Anasimyia* Schiner, *Helophilus* Meigen, *Parhelophilus* Girschner and *Sericomyia* Meigen i Norge (Diptera, Syrphidae)

Artene av slektene *Anasimyia, Helophilus* og *Parhelophilus* er mellomstore til store blomsterfluer med grågule, langsgående striper på oversiden av brystet, og ellers med gule, grågule og svarte tegninger på bakkroppen. *Sericomyia*-artene er store og kraftige, svarte med gule eller hvite skråstriper på bakkroppen.

I Norge er det funnet fem *Anasimyia*-, seks *Helophilus*–, to *Parhelophilus*- og fem *Sericomyia*-arter. *Sericomyia jakutica* (Stackelberg), tidligere bare kjent fra Øst-Sibir, er nå også funnet i Finnmark og Nord-Sverige. *Helophilus borealis* Siebke, 1864 er synonym med *H. affinis* Wahlberg, 1844.

Egg og larver av ovennevnte slekter utvikler seg i stillestående vann med organisk avfall. Noen av *Anasimyia*- og *Parhelophilus*-artene ser ut til å forekomme bare

ved næringsrike (eutrofe) vann, og har i Norge en begrenset forekomst på Østlandet. Med tanke på drenering og én stadig gjenvekst i slik våtmark, må disse artenes eksistens ses på som truet i vår fauna.

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Fennoscandian records of Lestremiinae (Diptera: Cecidomyiidae)

Bjørn Økland & Boris M. Mamaev

Økland, B. & Mamaev, B.M. 1997. Fennoscandian records of Lestremiinae (Diptera: Cecidomyiidae). Fauna norv. Ser. B 44: 123-128.

The subfamily ground midges (Lestremiinae) has been poorly studied in Fennoscandia. Until quite recently (1986) only eight species of this group was known from this area. However, the number of species recorded has increased considerably the few last years. This article surveys new and old records of ground midge from Fennoscandia. The survey is based on a new material collected in 49 localities in various parts of Fennoscandia, and on records in previous publications. A list of altogether 73 species of ground midges is presented, including 25 species which are new to Finland, Norway or Sweden.

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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 Cataloque of Palaearctic Diptera published in 1986 contained only eight species from this area (Skuhravá 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 balasam 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 = Eropean Invertebrate Survey-system, leg. = name of collector, collection = collection for preservation of the material.

no.	site	municipality	reg.	EIS	date	leg.	method	collection
1	Prestbakke	Halden	Ø	12	IX 86	F. Midtgaard	malaise	B. Økland
2	Bysætermosan	Enebakk	AK	29	VIII 91	B.Økland	malaise	B. Økland
3	Danemark	Ås	AK	28	VI-IX 94	B. Økland	malaise	B. Økland
4	Ekeberg skog	Enebakk	AK	29	VI,VIII 91	B. Økland	malaise (8)	B. Økland
5	Fagerstrand	Nesodden	AK	28	VI,VIII-X 89-90	S. Kobro	light trap	B. Økland
6	Fjellsjøkampen	Hurdal	AK	45	VII 93	B. Økland	malaise	B. Økland
7	Håøya	Frogn	AK	28	VII,VIII 93	B. Økland	malaise	B. Økland
8	Losby	Lørenskog	AK	29	VIII 91	B. Økland	malaise (2)	B. Økland
9	Rundkollen	Nittedal	AK	36	VII,VIII 93	B. Økland	malaise	B. Økland
10	Smihagen	Ås	AK	28	VII-VIII 94	B. Økland	malaise	B. Økland
11	Styggvann	Lørenskog	AK	29	VI,VIII 91	B. Økland	malaise	B. Økland
12	Tappenberg	Rælingen	AK	29	V-VI,VIII 91	B. Økland	malaise (3)	B. Økland
13	Tofte	Hurum	AK	28	VI 85	F. Midtgaard	malaise	B. Økland
14	Vangen	Enebakk	AK	29	VIII 91	B. Økland	malaise	B. Økland
15	Skvaldra	Ringsaker	HES	54	VIII 93	B. Økland	malaise	B. Økland
16	Tronkeberget	Stor-Elvdal	HEN	64	VII,VIII 93	B. Økland	malaise	B. Økland
17	Finntjern	Jevnaker	OS	36	VIII 93	B. Økland	malaise	B. Økland
18	Hesteskotjern	Jevnaker	OS	36	VIII 93	B. Økland	malaise	B. Økland
19	Hirkjølen	Ringebu	OS	63	VII 93	B. Økland	malaise	B. Økland
20	Håkåseter	Sør-Fron	OS	62	VIII 93	B. Økland	malaise	B. Økland
21	Imsdalen	Ringebu	OS	63	VII-VIII 93	B. Økland	malaise	B. Økland
22	Ormtjernkampen	Gausdal	OS	53	VIII 93	B. Økland	malaise	B. Økland
23	Skarsmoen	Øyer	OS	54	VIII 92	A. Bakke	malaise	B. Økland
24	Skotjernfjell	Lunner	OS	36	VII-VIII 93	B. Økland	malaise	B. Økland
25	Tjuruverket	Gausdal	OS	53	VII-VIII 93	B. Økland	malaise	B. Økland
26	Totenåsen	Østre Toten	OS	45	VII-VIII 93	B. Økland	malaise	B. Økland
27	Fagernes	Nord-Aurdal	ON	53	VI 87	F. Midtgaard	malaise	B. Økland
28	Lortholkollen	Ringerike	BØ	36	VII-VIII 93	B. Økland	malaise	B. Økland
29	Langtjern, Gulsvik	Flå	BV	35	"VIII 86; VI 87"	F. Midtgaard	malaise	B. Økland
30	Skultrevassåsen	Drangedal	TEY	11	V 93	A. Bakke	malaise	B. Økland
31	Elferdalen	Notodden	TEI	18	VIII 93	B. Økland	malaise	B. Økland
32	Lisleherad	Notodden	TEI	27	VII 92-94	A. Bakke	malaise (2)	B. Økland
33	Naustdal	Naustdal	SFY	58	IX 86	F. Midtgaard	malaise	B. Økland
34	Leirbakk	Lierne	NTI	108	VIII 94	A. Winsents	malaise	B. Økland
35	Granhei	Rana	NSI	123	VIII 86	F. Midtgaard	malaise	B. Økland
36	Tromsdalen	Tromsø	TRY	162	VIII 87	H. Barstad	malaise	B. Økland
37	Sletta, Dividalen	Målselv	TRI	154	VI-IX 93-94	F. Midtgaard	malaise	B. Økland
38	Mellesmo, Svanvik	Sør-Varanger	FØ	169	VIII-IX 86	F. Midtgaard	malaise	B. Økland
39	Svanhovd, Svanvik	Sør-Varanger	FØ	169	IX 86	F. Midtgaard	malaise	B. Økland
40	Häckeberga	Genarp	Sk.	-	23 V 93	B.M. Mamaev	netting	B.M. Mamaev
41	Alsike	Uppsala	Upl.	-	9 VI 93	B.M. Mamaev	netting	B.M. Mamaev
42	Lunsen	Uppsala	Upl.	-	9 VI 93	B.M. Mamaev	netting	B.M. Mamaev
43	Knutby, Herrgården	Uppsala	Upl.	-	16 VII 93	B.M. Mamaev	netting	B.M. Mamaev
44	Uppsala	Uppsala	Upl.	-	22-26 VII 93	B.M. Mamaev	netting	B.M. Mamaev
45	Nås, Gräsberget	Vansbro	Dlr.	-	29 V, 26 VI 93	B.M. Mamaev	various	B.M. Mamaev
46	Garpenberg	Hedemora	Dlr.	-	14-16 VI 93	B.M. Mamaev	netting	B.M. Mamaev
47	Granlandet	Gällivare	Lu. Lpm.	-	VIII-IX 94	R. Petterson	various	B. Økland
48	Suorke reserve	Jokkmokk	Lu. Lpm.	-	VI-IX 93	B. Wiklund	malaise	B. Økland
49	Vohdensaari	Uusikaupunki	Ab	-	VI-X 94	P. Kejo	malaise	B. Økland
Former published records:								
50	Swedish sites in Mamaev (1996)					B.M. Mamev	various	B.M. Mamaev
51	Norwegian records in Økland (1995a,b)					B. Økland	rearing	B. Økland
52	Eight sites in Lapland, Jaschhof (1996)					M. Jaschhof	various	M. Jaschhof
53	Species included in Catalogue of Palaearctic Diptera, Skuhravá (1986)							

Fauna Ent. Scand. (see f.ex. Chvála 1994). For Norway, the revised code of Økland (1981) was used instead.

The nomenclature of the species presentation follows the Cataloque of Palaearctic Diptera (Skuhravá 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, VIII, 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., Lu.Lpm., 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.

Anaretella 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, VIII, 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., Lu.Lpm.; 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., Lu.Lpm., 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, X.

Lestremia leucophaea (Meigen, 1818); 10 ind.; country: N, S; region: AK, OS, TEY, FØ, Upl., Lu.Lpm.; 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 bispinosus 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 flavidus (Winnertz, 1870); 2 ind.; country: S; region: Dlr.; site: 50; period: VI.

Aprionus flaviventris (Winnertz, 1870); 1 ind.; country: N; region: TEI; site: 32; period: V.

Aprionus giganteus Berest, 1991; 3 ind.; country: N; region: TEI; 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.

table 2 cont.

Aprionus lapponicus Jaschhof et Mamaev in lit.; 11 ind.; country: N, S; region: FØ, Dlr., T. Lpm.; site: 45, 46, 52; period: VI, VII.

Aprionus longicollis Mamaev, 1963; 1 ind.; country: N; region: FN; site: 52; period: VII.

Aprionus miki Kieffer, 1895; 1 ind.; country: N; region: FN; site: 52; period: VII.

Aprionus paludosus Jaschhof et Mamaev in lit.; 14 ind.; country: N, S; region: FØ, Upl., Dlr.; site: 41, 45, 46, 52; period: VI, VII.

Aprionus spiniger (Kieffer, 1894); 12 ind.; country: N, S; region: FØ, Upl., Dlr.; site: 50, 52; period: VI, VII.

Aprionus svecicus Jaschhof, 1996; 13 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Monardia stirpium Kieffer, 1895; 27 ind.; country: S; region: Dlr.; site: 50; period: VII.

Mycopriona abnormis (Mamaev, 1963); 1 ind.; country: S; region: Sk.; site: 40; period: V.

Trichopteromyia modesta Williston, 1896; 1 ind.; country: S; region: Upl.; site: 44; period: VII.

Xylopriona monotheca (Edwards, 1938); 23 ind.; country: N, S; region: OS, Dlr.; site: 24, 50; period: VI, VII.

Bryomyia apsectra Edwards, 1938; 26 ind.; country: F, N, S; region: AK, OS, Sk., SM, Upl., Dlr., Ab; site: 4, 7, 8, 11, 12, 23, 24, 26, 49, 50; period: V, VI, VII, VIII.

Bryomyia bergrothi Kieffer, 1895; 41 ind.; country: N, S; region: Ø, FN, FØ, Upl., Dlr., Lu.Lpm.; site: 1, 47, 50, 52; period: VI, VII, IX.

Bryomyia gibbosa (Felt, 1907); 33 ind.; country: N, S; region: AK, OS, FN, FØ, Dlr., T. Lpm.; site: 4, 8, 12, 18, 24, 50, 52; period: VI, VII, VIII.

Bryomyia incisa Mamaev, 1963; 12 ind.; country: S; region: Sk.; site: 50; period: V.

Bryomyia producta (Felt, 1908); 76 ind.; country: N, S; region: TRY, FN, FØ, Sk., Dlr., Lu.Lpm., T. Lpm.; site: 36, 48, 50, 52; period: V, VI, VII.

Heterogenella hybrida Mamaev, 1963; 180 ind.; country: N, S; region: FN, FØ, Dlr., T. Lpm.; site: 50, 52; period: VII.

Campylomyza alpina (Siebke, 1864); 7 ind.; country: N, S; region: STI, TRI, FØ, Dlr., Lu.Lpm; site: 37, 47, 50, 52, 53; period: VII, VIII.

Campylomyza bicolor Meigen, 1818; 2 ind.; country: N; region: OS, FØ; site: 23, 38; period: VIII.

Campylomyza dilatata Felt, 1907; 3 ind.; country: N; region: Ø, FN, T. Lpm.; site: 1, 52; period: VI, VII, IX.

Campylomyza flavipes Meigen, 1818; 55 ind.; country: N, S; region: OS, FN, SM, Upl., T. Lpm.; site: 20, 50, 52; period: V, VI, VII, VIII.

Campylomyza fusca Winnertz, 1870; 21 ind.; country: N; region: TEI, NTI, FØ; site: 31, 34, 52; period: VII, VIII.

Campylomyza monilicornis (Zetterstedt, 1838); region: ON; country: N; site: 53.

Campylomyza pallipes (Zetterstedt, 1850); country: F, S; site: 53.

Campylomyza pumila Winnertz, 1870; 1 ind.; country: S; region: Lu.Lpm.; site: 47; period: VIII, IX.

Polyardis delicata Mamaev, 1993; 3 ind.; country: N; region: AK, TEI; site: 12, 13, 31; period: V, VI, VIII.

Neurolyga bilobata (Mamaev et Rozhnova, 1982); 2 ind.; country: N; region: TRY; site: 36; period: VIII.

Neurolyga ovata Jaschhof, 1996; 1 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Corinthomyia brevicornis (Felt, 1907); 15 ind.; country: N, S; region: AK, FØ, SM; site: 50, 51, 52; period: V, VII.

Excrescentia mutuata Mamaev et Berest, 1991; 11 ind.; country: N, S; region: AK, SM; site: 50, 51; period: V.

Peromyia bicolor (Edwards, 1938); 3 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Peromyia caricis (Kleffer, 1901); 11 ind.; country: N, S; region: FN, FØ, T. Lpm.; site: 52; period: VII.

Peromyia diadema Mamaev, 1963; 2 ind.; country: S; region: Upl.; site: 50; period: VII.

Peromyia fungicola (Kieffer, 1898); 19 ind.; country: N, S; region: AK, OS, TRY, FØ, T. Lpm.; site: 4, 25, 36, 38, 39, 52; period: VII, VIII, IX.

Peromyia monilis Mamaev *in* Mamaev and Krivosheina, 1965 [*Peromyia alni* Kleesattel, 1979 is a synonym of *Peromyia monilis* Mamaev (Mamaev 1996b)]; 1 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Peromyia nemorum (Edwards, 1938); 1 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Peromyia palustris (Kieffer, 1895); country: S; site: 53.

Peromyia perpusilla (Winnertz, 1870); 1 ind.; country: S; region: Dlr.; site: 50; period: VII.

Peromyia photophila (Felt, 1907); 10 ind.; country: N, S; region: FØ, Upl., T. Lpm.; site: 43, 52; period: VII.

Peromyia syltenfjordensis Jaschhof, 1996; 29 ind.; country: N, S; region: FN, T. Lpm.; site: 52; period: VII.

Peromyia tschirnhausi Jaschhof, 1996; 5 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Peromyia tundrae Jaschhof, 1996; 1 ind.; country: S; region: T. Lpm.; site: 52; period: VII.

Acoenonia europaea Mamaev, 1964; 5 ind.; country: S; region: SM, Upl.; site: 50; period: VI.

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 Norwegian regions is found in Økland (1981), and other Fennoscandian regions in Chvála (1994).

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

the table are found in regions in the north and east of Scandinavia (Torne Lappmark, Dalarne 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 Cataloque 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, *Campolymyza 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 apsectra* 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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Families Otitidae and Ulidiidae (Diptera) in Norway

Lita Greve

Greve, L 1997. Families Otitidae and Ulidiidae (Diptera) in Norway. - Fauna norv. Ser. B 44: 129-142.

Eleven species of Otitidae and Ulidiidae (Diptera) are recorded from Norway: Family Otitidae, *Ceroxys urticae* (L., 1758), *Herina frondescentiae* (L., 1758), *Melieria crassipennis* (Fabricius, 1794), *M. omissa* (Meigen, 1826), *Pseudotephritis corticalis* (Loew, 1873), *Seioptera vibrans* (L., 1758), *Systata rivularis* (Fabricius, 1805) and *Tetanops myopina* (Fallèn, 1820); family Ulidiidae, *Homalocephala angustata* (Wahlberg, 1838), *H. biumbrata* (Wahlberg, 1838) and *H.apicalis* (Wahlberg, 1838). *H. biumbrata* is a new record for Norway. Keys for the identification of the genera and species are given. The Norwegian distribution and the biology of most of the species are commented on. Three species of Otitidae are widely distributed, while the two *Melieria* species are only recorded from SE Norway. *Pseudotephritis corticalis*, *Systata rivularis* and *Tetanops myopina* have all been recorded only once from Norway. Due to their rarity these three species must be considered vunerable. The three *Homalocephala* - Ulidiidae - species must all be considered rare species.

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INTRODUCTION

The present paper is a survey of the families Otitidae and Ulidiidae in Norway. The two families are represented by ten genera in Fennoscandia and Denmark and have not been subjected to survey in Norway since the time of Siebke (1877). The number of genera represented in all of Europe is twenty (Soós 1984).

The Otitidae and Ulidiidae have few species in NW Europe. Hackman (1980) lists fourteen species from Finland, Lyneborg (1964) lists nine from Denmark, and Wahlgren (1919) twelve from Sweden. Hugo Andersson, Lund, Sweden (pers.comm.) lists the number of species he knows from Sweden today as sixteen.

Little attention has, up to the last years, been offered these families in Norway despite the fact that the bars and spots on the wings of many species make them quite eye-striking and it is possible to observe such species even in the field.

The first, and hitherto only, survey of Norwegian species was made by Siebke (1877). Siebke lists three species placed in the family Ortalides Zetterstedt: *Ortalis crassipennis* Fabricius (=*Melieria crassipennis* (Fabr., 1794)); *Ortalis vibrans* Linnè (=*Seioptera vibrans* (L. 1758)) and *Ortalis cerasi* Linnè (=*Herina frondescentiae* L., 1758). He names one species belonging to the family Platystomatidae. The families Otitidae and Ulidiidae have, since the time of Siebke, very rarely been mentioned in Norwegian entomological literature except for single species included in faunistical lists (see under each species below).

Articles and short notes on some genera have appeared in the later years such as Greve (1988) and Borgersen & Greve (1989). Records of single species has been mentioned in Greve & Hauge (1989) and Hansen & Bergsmark (1990). A poster on the distribution of Norwegian Otitidae was presented at the 2nd International Congress of Dipterology, Bratislava, Czechoslovakia with an abstract (Greve 1990).

Hennig (1939, 1940) in his treatment of the Palaearctic Diptera considered Ulidiidae and Otitidae as two separate families, and this view was still held by Hennig in 1973. Soòs (1984) followed Hennig, (1939, 1940 and

1973), and considered the Otitidae a separate family from the Ulidiidae based on characters of the male aedeagus. The stem of the adaegus in the Otitidae is either partly bristly or hairy or with teeth or bristles along the whole stem, the tip is simple; in the Ulidiidae the aedeagus is bare and the end parts are sometimes specialized.

The upper, dorsal part of vein R_1 is usually, (but not always), setose in the Otitidae while in the Ulidiidae the vein is usually bare. Steyskal (1987), recognizing the difference in the aedeagus, still considers both families as subfamilies of the family Otitidae. This survey follows Soòs (1984) and considers Otitidae and Ulidiidae as separate families.

Recent taxonomic work by Kameneva and Korneyev (1994) supports the view of Steyskal (1987) considering both Otitidae Westwood, 1840 and Ulidiidae Macquart, 1838 as one family. In contrast to earlier workers, however, Kameneva and Korneyev give the name Ulidiidae priority as name of the family, not Otitidae. They also have errected a new tribus Seiopterini, including the genera *Seioptera* Kirby and *Pseudoseioptera* Stackelberg (from family Otitidae as in this survey) and the genus *Homalocephala* Zetterstedt (from family Ulidiidae in this survey). If the view of Kameneva and Korneyev wins support the names of the families and sub-families may change in the not too distant future.

The names of the species distributed in NW Europe are all listed in Soòs (1984), and his work also lists other synonyms than those included below.

The Otitidae can be described as small to medium-sized flies, most often with wings marked with bars or spots. The head can be of various shape with inner and outer vertical bristles and ocellar bristles. The postocular bristles are usually divergent and one or two orbital bristles are present. The face of the species in many genera is with a prominent carina and striking antennal groves. The thorax is usually longer than broad, chaetotaxy may be varying. Cell cup (posterior cubital cell) varying in outline, usually with a short extenstion making the vein cup looking slightly like a "s". In some genera the extension can be long.

The "s" form of the cup vein is a character used in most keys to key out these families among other Diptera. However, in some species the "s" is not very distinct. The wings are usually with bars, bands or dots. In some species the wings are nearly without any marks.

The long aedeagus of the males is wound like a clock spring and not hidden by the genitalia. The females have an oviscape, somewhat triangular and an ovipositor which often is long. For more details, see Lyneborg (1964).

The larvae look like the common type found among the acalyptrate Dipterans, very similar to larvae from the families Tephritidae, Platystomatidae and Lonchaeidae. The larvae and other immature stages are only described for some genera and species, and many of the immature stages are still unknown.

The larvae live like saphrophages, a few species have phytophagous larvae, among these some of the Nearctic species are considered plant pests. Most species of these flies occur in northern temperate areas.

This survey records eleven species from Norway and they are listed in alphabetic order in the check-list below.

The present survey includes all Norwegian material of Otitidae and Ulidiidae kept in Norwegian university collections, material in several private Norwegian entomological collections, and material from some Scandinavian and European Museum and University collections.

Key to the genera of the families Otitidae and Ulidiidae:

This key is only for the species hitherto recorded from Fennoscandia and Denmark.

1. Vein R_1 bare (Figure 1B). Aedagus at most pubescent or short spinolose in its median parts **2**
   Vein R_1 setulose. Aedagus strongly and long spinolose **4**
2. Veins R_{4+5} and M (Figure 1B) very close together at wing tip ..... ***Physiphora*** Fallèn
   1 species recorded from Fennoscandia and Denmark
   Veins R_{4+5} and M not close together at wing tip **3**
3. Face wider than high. Eyes longer or as long as high. Cell cup (Figure 1B) without extension ..... ***Homalocephala*** Zetterstedt

5 species recorded from Fennoscandia and Denmark

Face higher than wide. Eyes higher than long. Cell cup with extension ..... ***Seioptera*** Kirby

1 species recorded from Fennoscandia and Denmark

4. Antennal groves (Figure 1A) and fascial carina absent. Wings with many dots and marks. ***Pseudotephritis*** Johnson

1 species recorded from Fennoscandia and Denmark

Antennal groves and fascial carina present. Wings not so ... **5**

5. Crossveins rm and dm (Figure 1B) very close together. Blackish flies. Wings with two cross bars and black line along wing tip..... ***Systata*** Loew

1 species recorded from Fennoscandia and Denmark

The length from rm to dm is at least the length of crossvein dm. The body colour and wing marks varying **6**

6. Frons and gena narrow, gena at most 0.25 as high as eye. Often blackish flies..... **7**

Frons and gena at least 0.33 as high as eye. Often greyish-yellow/brownish flies **8**

7. R_{4+5} + M apically converging. First flagellomere dorsally concave with more or less pointed apex. Approximately 6 mm..... ***Ceroxys*** Macquart

1 species recorded from Fennoscandia and Denmark

R_{4+5} + M parallel apically. First flagellomere dorsally straight, round or pointed apically. Small species less than 5 mm..... ***Herina*** Robineau-Desvoidy

4 (5 ?) species recorded from Fennoscandia and Denmark

8. First flagellomere dorsally concave and pointed apically..... ***Melieria*** Robineau-Desvoidy

3 (4 ?) species recorded from Fennoscandia and Denmark

First flagellomere dorsally straight, apically rounded..... **9**

9. Gena fairly narrow, less than 1/2 more than 0.33 high of eye. Head somewhat protruding in profile..... ***Otites*** Latreille

1 species recorded from Fennoscandia and Denmark

Gena very broad at least 1/2 hight of eye. Head in profile nearly triangular..... ***Tetanops*** Fallén

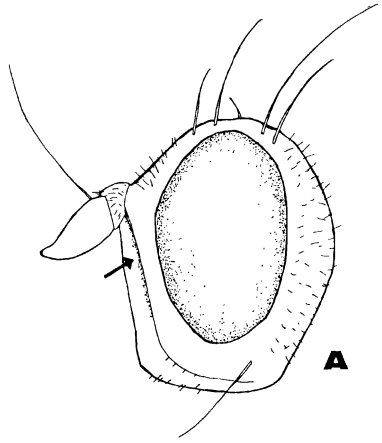
2 species recorded from Fennoscandia and Denmark

Material

Total material examined and listed below: 1007 Otitidae and 22 Ulidiidae.

Most of the material upon which this study is based is deposited in the collections of the Zoological Museum, University of Bergen (=ZMB), and not specificly mentioned in the lists below. A few specimens are in The Zoological Museum of Lund's University (=Lund. Univ.). The oldest material is in the Zoological Museum, University of Oslo (=ZMO). Some specimens are in the private collections of Terje Jonassen (=TJ), Tore Randulff Nielsen (=TRN), Thor J. Olsen (=TJO) and in the Tromsø museum, University of Tromsø (=TSZ).

MT=Malaise trap, LT=Light trap. The geographic provinces follow the revised Strand system (Økland 1981). EIS square numbers are used in Figures and UTM numbers (grid zone 32) are noted when available.



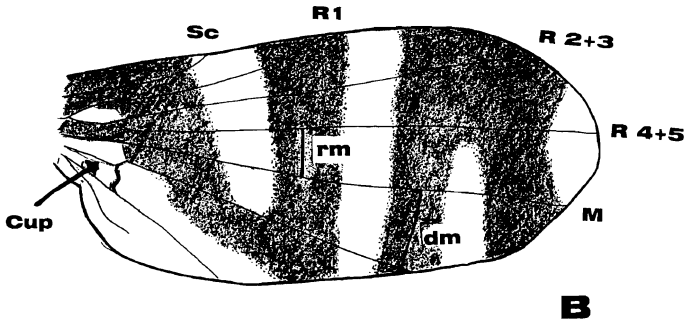


Figure 1
A. Head of *Ceroxys urticae*, seen in profile. The arrow points at antennal grove. B. Wing of *Herina frondescentiae*. Veins rm, dm and cup are especially outlined.

Genus ***Ceroxys*** Macquart,1835
One species recorded from Northern Europe.

1. ***Ceroxys urticae*** (L., 1758)
Fig. 2. Material: 70♂♂ 60♀♀

New records: Ø Fredrikstad: Øra 24 June 1979 2♂♂ 6♀♀, 25 July 1984 1♀; Moss: Jeløy, Albybukt 5 July 1983 1♂ 1♀, 17 July 1986 2♂♂ 2♀♀, Alby 15 Aug.1995 1♂ (TJO). Published records?: AK Oslo: Oslo (Kristiania) 2♂♂ (ZMO 7282, 7283), Oslo 1♂ (ZMO 7401). New records: AK Oslo: Frognerkilen 29 Aug. 1982 1♂, Sandsnåsen 6 July 1983 3♂♂. HES Ringsaker: Furnes, Sandvold MT 21-31 May 1993 1♀, 31 May-24 June 1993 1♀, LT 12-15 July 1993 1♀; Stange: Tangen 5 June 1984 1♂; Våler: Eid 2♂♂ 3♀♀. OS Nordre Land: Dokka 27 June 1983 1♀. Published record?: ON Dovre: Dovre 1♀ (ZMO). New records: Lom: Lom 1♂ (ZMO); Nord-Fron: Kvam 10 June 1981 1♂. Published records: BØ Nedre Eiker: Mjøndalen, Miletjern 20 May 1988 1♂, 10 June 1988 1♂, Ultimo June 1988 1 ♀, 28 Aug. 1988 1♂ (Hansen & Bergsmark 1990). New records: Hurum: Filtvedt 4 June 1982 1♂, Tofteholmen MT 28 May-7 July 1991 1♂, Østnestangen 26 May-8 July 1995 MT 1 ♂. BV Gol: Gol 9 July 1970 1♀ (TRN). VE Horten: Karljohansvern 9 July 1985 19♂♂ 13♀♀; Sandefjord: Vesterøya, Sørpynten 22 June 1984 1♀, Sørbyøya 22 June 1984 1♀; Stavern: Stavern 25 May 1988 1♂; Sem: Valløy 20 July 1982 6 ♂♂ 2♀♀, 28 Sept. 1984 2♂♂; Tjøme: Fynstranda 3 July 1983 1♂ 3♀♀, Hvasser, Fyn 19 July 1988 1♂, Kjære, in window 18 July 1965 1♂, Mostranda 22 July 1982 1♂, Moutmarka, on *Archangelica archangelica* L. 23 June 1995 1♂ 1♀, Sandøy 24 July 1984 1♂ 2♀♀, 5 June 1992 1♀, Sønstegård 9 July 1983 1♂, 6 June 1992 2♀♀, Verdens ende 28 June 1984 1♂ 3♀♀; Brunlanes: Mølen 23 June 1982 1♀. TEY Porsgrunn: Skjelvik, Kohtøya 31 July 1983 1♀; Bamble: Langesund 11 July 1986 1♂. AAY Risør: Risør 1 June 1905♂ (ZMO). RY Hå: Brusand, Strandvegen 12 June 1985 1♂, Ogna 21 May 1988 1♂; Klepp: Horpestad, near Orrevann 12 July 1987 1♂. NSI Saltdal: Rognan 19-22 June 1981 1♂, 23 July 1988 2♂♂. FI Alta: Gargia 30 June 1989 1♂, Stengelsen 5 July 1986 2♂♂ 2♀♀, 6 July 1986 1♀, 11 July 1986 1♂, 14 July 1986 1♀, 16 July 1986 1♀, 24 July 1986 1♀, 28 July 1986 1♂, 29 July 1986 1 ♀ (TSZ). FN Tana: Seida, at Tana bridge 24 July 1989 1♀. FØ Sør-Varanger: Øvre Pasvik, Noatun MF 23 July-7 Aug. 1989 1♂.

Ceroxys urticae is the only species of the genus *Ceroxys* in NW Europe. *C. urticae* is a dark species with face, frons and genae reddish-brown. Along the eye-margin there is a silver tomentose lining only seen in dry material. The body is otherwise shining black. The wings have three broad blackish bars and one large spot at the wing tip. In some specimens the bars are divided, in others the bar two and three are joined towards the posterior part of the wing, and likewise bar three and the wing spot can be joined along the anterior edge of the wing.

C. urticae is widespread, but not very common in Norway. Siebke (1877) did not report this species in his lists although some material in the Zoological museum in Oslo dates from around 1850-60, and are partly collected by Siebke. Such records are marked as «Published records?» in the lists above.

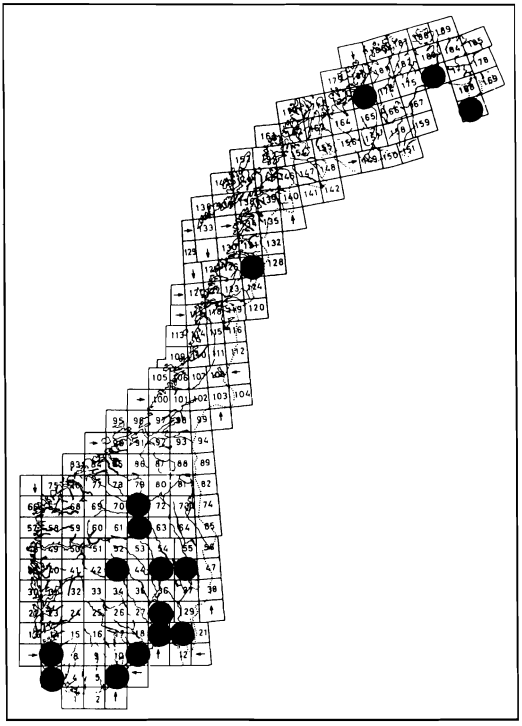


Figure 2
The distribution of *Ceroxys urticae* in Norway.

Genus ***Herina*** Robineau-Desvoidy, 1830

Key to the species of the genus Herina in Fennoscandia and Denmark:

1. Wings with four broad, black bars crossing the wings from front to hind margin (Figure 1B). The two basal bars run together at the hind wing margin, the two distal bars run together at the front margin. Wing tip clear. Reddish brown face and frons.....***H. frondescentiae*** (L., 1758)
   The only species hitherto recorded from Norway.
   Wings with much less markings, mainly at front wing margin, wing tip and along cross veins.....**2**
2. Lower parts of face shining black.....**3**
   Lower parts of face reddish brown **5**
3. Frons between eyes black, not shining. 1. flagellomere long, 4/5 x width at base, rounded not pointed, mostly black. Wings with weak brownish colour at front margin in cells Cu and SC, a slight brownish colouring of the crossveins and a spot at wing tip,
   3-4 mm long .....***H. paludum*** (Fallèn, 1820)
   Frons between eyes reddish-brown. 1. flagellomere shorter than above, 3x width at base.....**4**
4. 1. flagellomere rounded, not pointed. Wings very narrow. Faint colouring at cells C and SC, not colouring of crossveins and a weak spot at wing tip.
   2-3.5 mm long.....***H. oscillans*** (Meigen, 1826)
5. 1. flagellomere pointed. Wings not very narrow. Colouring only very weakly at cell SC and very weak colouring at the end of R 2+3. 3-4 mm. .....***H. palustris*** (Meigen, 1826)
   (Two additional *Herina* spp., *H. germinationis* (Rossi, 1790) and *H. lugubris* (Meigen,1826) have been recorded from both Germany and the British Isles. They have both wing marks weaker than *H. frondescentiae*, and stronger than *H. paludum*, *H. oscillans* and *H. palustris*.)

2. *Herina frondescentiae* (L., 1758)
Syn. *Ortalis cerasi* Siebke, 1877
Ortalis uliginosa (Fallèn, 1820)
Figure 3. Material: 301♂♂ 238♀♀ 8 specimens

New records: Ø Hvaler: Akerøy 6 June 1992 3♂♂ 1♀, 2♂♂ (TJO). Published records: AK Oslo: Oslo 4♂ 6♀♀ (ZMO), 1♂ (TSZ), Bekkelaget 8 June 1846 2♂♂ (ZMO). New records: ON Lom: Nordseter 12 July 1953 1♀ (ZMO 11459). HES Kongsvinger: Kongsvinger 1♂ (ZMO). Published records: HES Grue: Grue 1♀ (ZMO). New records: OS Nord-Aurdal: Aurdal, Oppheimsbekken 2 specimens 20 June 1960 750 m a.s.l., (Museet København), Nord-Aurdal: Fagernes 1♀ (ZMO 11460). ON Lom: Nordseter 12 July 1953 1♂ (TSZ). Published records: ON Dovre: Dovre 2♂♂ 2♀♀ (ZMO). BØ Krødsherad: Krødsherad 1♂ 1♀ (ZMO). New records: BØ Kongsberg: Krekling 21 July 1986 1♀; Øvre Eiker: Dokka 32 VNM 399 163 31 July 1990 1♀; Flesberg: Torskje 5 July 1983 1♂ 2♀♀. VE Våle: Langøya 16 May 1990 2♂♂ 4♀♀, 4 July 1990 1♀, MT 28 May-8 July 1991 1♀; Tjøme: Helgerød 28 June 1985 95♂♂ 42♀♀, Mo 24 July 1982 1♂ 2♀♀, Mostranda 22 July 1982 1♀, 20 July 1983 1♂ 2♀♀, Moutmarka 20 July 1982 11♂♂ 1♀, 24 July 1982 8♂♂ 19♀♀, 4 July 1983 11♂♂ 12♀♀ , 8 July 1983 18♂♂ 24♀♀, 30 June 1985 1♀; Brunlanes: Mølen 14 July 1989 1♂ 2♀♀. TEY Bamble: Langesund, Krokshavn 11 July 1986 1♂. TEI Kviteseid: Morgedal 27 June 1975 1♂; Vinje: Haukelidsæter 18 July 1984 UTM 32 V MM 010031 subalpine zone - low in alpine zone 960-990 m a.s.l. 1♂ 2♀♀. VAY Flekkefjord: Hidra, Ysthus 14 July 1982 1♀. RY Sandnes: Brattebø 28 June 1963 2♂♂, Gimra 5 July 1965 1♂ (TRN), 1♀ (ZMB), Stokka 14 June 63 1♀; Klepp: Orre 20 June 1979 1♀ , 28 July 1979 1♂ 1♀, 16 Juli 1995 2♂♂ 4♀♀ (TRN); Strand: near Prekestolen UTM 32 VLL 366427 20 June 1981 420 m a.s.l. 1♂; Finnøy: Kyrkøy 12 July 1986 1♂ 2♀♀, 4 June 1987

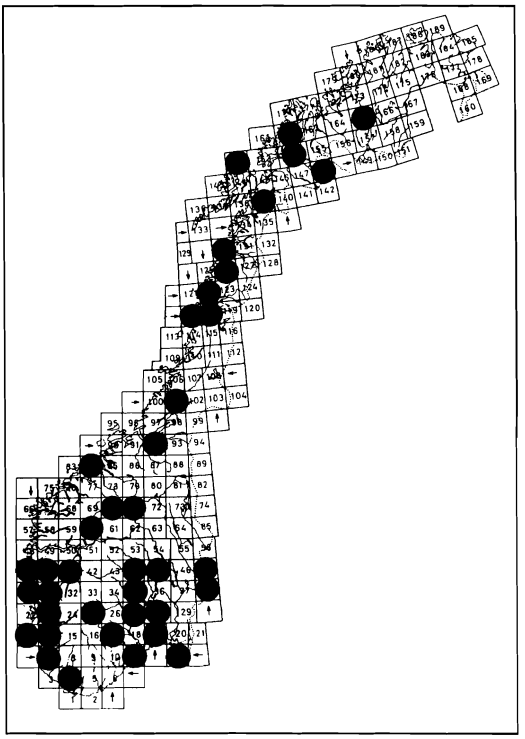


Figure 3
The distribution of *Herina frondescentiae* in Norway.

2♂♂. Published record: HOY Bergen: Bergen 5 June 1871 1♂ (ZMO). New records: HOY Bømlo: near Bømlo church 2 June 1966 2♂♂ 1♀. Published record: Stord: Iglatjødn Nature reserve MT 28 June-19 July 1989 2♀♀ (Greve & Hauge 1989). New records: Stord: Gullberget 29 June 1976 2♂♂ 1♀, Tveitavann 25 June 1976 3♂♂ 3♀♀; Tysnes: Vetlebøletjørna VLM 152596 1 July 1992 5♂♂ 5♀♀, Vevatn VLM 136626 1 July 1992 5♂♂ 4♀♀; Samnanger: Ådland MT 16 June-2 July 1982 4♀♀, 2-17 July 1982 3♀♀; Austevoll: Møkster 23-24 June 1975 2♂♂ 1♀; Askøy: Herdla June 1936 3♂♂ 2♀♀, Hesteneset 6 June 1984 20♂♂ 7♀♀; Osterøy: Skiftå MT 28 May-13 June 1982 1♂ 1♀. HOI Eidfjord: Måbødalen EIS 33 or 42 - not mapped, 450 m a.s.l. 24 July 1967 1♀ ; Ulvik: Hallanger MT 220 m a.s.l. 28 May-16 June 1982 1♂ 2♀♀E. SFI Luster: Kolstad seter 9 Aug. 1945 1♂. Published record: MRY Møre, Osmarka. New records: STI Trondheim: Leirbru July 1987 4♂♂. NTI Steinkjer: Vassaune 24 July 1975 1 specimen. Published material: NTI Verdal, Thynes 2 specimens (Lunds Universitet). New records: NSY Bodø: Bodø 17-18 June 1981 1♀ TRN Falkflaugvann, Falkflaug 6 July 1980 2♀♀, 15 July 1980 1♂, 23 July 1980 2♂♂ 1♀, Falkflaugvann, Urskar Storlia 8 July 1982 1♂, Falkflaugvann, Urskar, Skuti 4 Aug. 1982 1♂ 3♀♀, Falkflaug, Snokki 16 July 1980 1♂, Hammersbakken 8 July 1980 12♂♂ 19♀♀; Straumøya, Skivik 24 July 1980 1♂, Valnes 9 July 1980 1♀, Valnes, Sjågand 6 July 1981 27♂♂ 20♀♀, Skålmoen 6 July 1981 2♂♂ 1♀, Valnesvann, Frostmo 8 July 1980 4♂♂ 3♀♀, Valnesvann, Ørnlia 26 July 1981 3♂♂; Nesna: Dilleren VP 0247 19 June 1980 1♀ (Rana Museum). NSI Rana: Børresteinslia VP 3249 27 June 1985 4♂♂ 1♀, Nordsjona VP 3360 9 July 1985 3♂♂ 1♀, Straumen VNP 4553 6 July 1973 1 specimen (Rana Museum); Beiarn: Kvål 19 July 1981 1♂ 1♀, Moljord 20 July 1981 1♂ 1♀. Published record: NNØ Narvik: Bjerkvik 1 specimen (Lunds Universitet). New records: NNØ Evenes: Evenes near airport 22 June 1984 2♂♂ 1♀, 29 June 1984 2♂♂. NNV Andøy: Andenes 22 July 1941 1♂ (TSZ). TRY Tromsø: Ramfjord July 1921 1♀ (TSZ). TRI Målselv: Dividalen, L.Jerta 24 June 1986 1♂ (TSZ), Balsfjord: Lille Rundvann 19 July 1943 1 specimen (TSZ). FV Alta: Gargia, Grønnåsen 27 June 1984 1♂ (TRN), 30 June 1989 1♂ 1♀. FN Magerøya EIS 186 or 187- not mapped. 7-10 Aug. 1947 1 specimen (Lunds Universitet).

Zetterstedt (1845) published the first records of *Herina frondescentiae* from NTI Verdal: Garnes and Tynes (Thynes). The Zetterstedt collection in the Lund University still contains specimens from Tynes (Northern Trøndelag province) and Bjerkvik (Nordland province) (Dr. Roy Danielsson, Lund, pers. comm.). I have not seen these specimens. Neither have I seen the material from MRY mentioned by Krogerus (1960). There are records in literature from STY Rissa: Stadsbygd and STI Malvik: Mostadmarken (Storm 1896 og 1907), and Nordland province: Hatfjelddal and Lødingen in Nordland (Strand 1903) and Nordland: Klovimoen by Frey in Strand (1913), but no material exists from these localities today. Bidenkap (190l) records only from literature.

H. frondescentiae can be acknowledged even in the field on account of the characteristic wings with four bars. The two basal bars run together at the hind margin, the two distal bar at the front margin of the wing. The wing tip is clear.

Genus ***Melieria*** Robineau-Desvoidy, 1830
For key to species see Greve (1988).

3. *Melieria crassipennis* (Fabricius, 1794)
Figure 4. Material 21♂♂ 17♀♀ l specimen.

The genus *Melieria* has been surveyed by Greve (1988). For list of material see Greve (1988). Only records based on material made available to the author after 1988 are listed separately here while the total material includes material in Greve (1988).

New material: Ø Borge: Borge Varde 13 July 1992 2♂♂ 1♀, 21 Aug. 1992 1♂ 2♀♀ (TJO). HES Våler: Eid 1 Aug. 1994 5♂♂ 4 ♀♀ , Elverum, island in Glomma W of Kvernbekken VPN 353617 14 June 1996 1♂. BV Rollag: Rollag 12 July 1984 3♂♂, 11 Sept. 1984 1♂. VE Larvik: Gjønnes 27 May 1989 2♂♂.

Melieria crassipennis is hitherto recorded from areas in SE Norway only, see Figure 4. There are records from both coastal and inland localities as far north as northern Hedmark province. There is one reference to *M.* (=*Ortalis*) *crassipennis* from Southern Trøndelag by Storm (1898). No material of *M. crassipennis* exists in what remains of Storm's collections today, and therefore no locality is mapped .

4. ***Melieria omissa*** (Meigen, 1826)
Figure 5. Material: 40♂♂ 74♀♀.
For list of material surveyed earlier see Greve (1988).

New records: Ø Skjeberg: Grimsøy 17 June 1991 1♂ 3♀♀ T.J. Olsen pers. coll., 23 June 1991 1♀, Tune: Råkil 2 Aug. 1991 1♀, Moss: Jeløy, Alby 15 Aug. 1995 1♀. TEY Bamble: Langøya 6-31 July 1995 MT 1♀ at seashore.

Total material includes material listed by Greve (1988).

Melieria omissa is recorded from coastal areas in SE Norway only, see Greve (1988). *M. omissa* looks rather similar to *M. crassipennis*. The wings. however, are spotted with no definite bars. For other characters, see also the key.

Genus ***Pseudotephritis*** Johnson, 1902.

5. ***Pseudotephritis corticalis*** (Loew, 1873)
Figure 5. Material 1♀.

Distribution: VE 0926 Brunlanes: Klova, near Pauler 5 July 1987 1♀.

P. corticalis differs from all other Norwegian Otitidae in the body colouring with dark and light brown dots and the very spotted wings. Especially the wing marks look like some Platystomidae or Tephritidae flies. *P. corticalis* was reported new to Norway by Borgersen and Greve (1989). The single female collected at Pauler is still the only specimen known from Fennoscandia and Denmark.

Outside Norway the nearest record is from the vicinity of Leningrad (Stackelberg 1945).

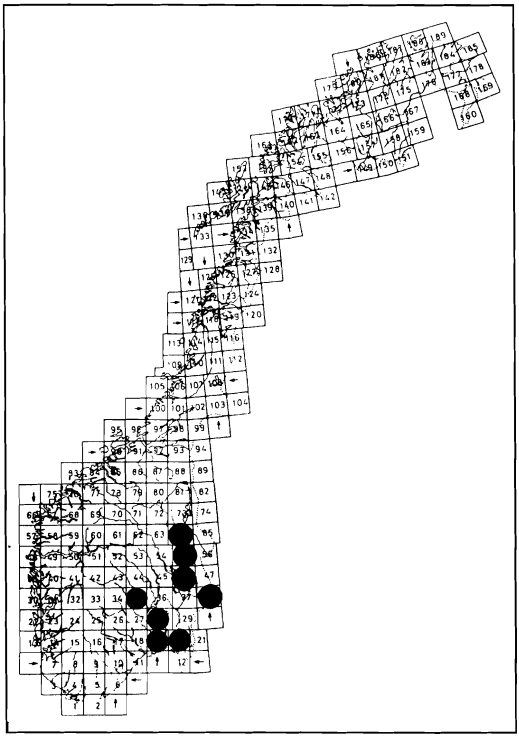


Figure 4
The distribution of *Melieria crassipennis* in Norway.

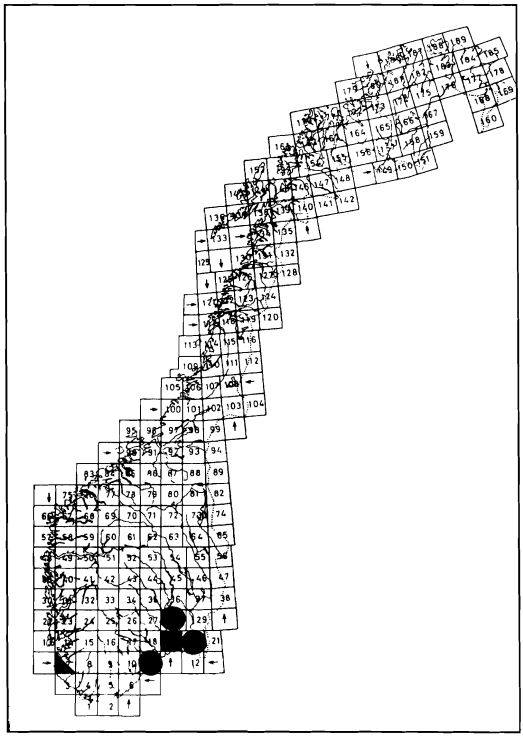


Figure 5
The distribution of *Melieria omissa* (=closed circles + square), *Pseudotephritis corticalis* (square) and *Tetanops myopina* (triangle).

Genus ***Seioptera*** Kirby, 1817

6. *Seioptera vibrans* (L., 1758)
Syn.: *Ortalis vibrans* (L., 1758)
Figure 6. Material: 84♂♂ 86♀♀ 4 specimens

New records: Ø Fredrikstad: Øra 24 June 1979 1♂; Moss: Jeløy, Albybukt 17 July 1986 1♀; Tune: Råkil 12 June 1990 1♂, 18 June 1992 1♂ (TJO). Published material: AK Oslo: Oslo 1♂ 3♀♀ leg. Esmark (ZMO 7299-7302), Rosenberggaten 18 July 1845 1♀ (ZMO 7303), Tøyen 2♂♂ 2♀♀ 1 specimen leg. Siebke (ZMO 7305-7309); Enebakk: Enebakk 1♂ (ZMO 7298) (Siebke 1877). Revised material: Oslo: Oslo 1♂ leg. Siebke (ZMO 7363) from *Homalocephala albitarsis*. New records: AK Oslo: Bogstadmyra 17 July 1989 1♂, Sandsnåsen 26 June 1979 1♀, Sognsvannet 31 July 1935 1♂ (TSZ), Tøyen 26 June 1979 1♀, Tåsen 1 Aug. 1935 1♂ (TSZ). HES Ringssaker, Furnes, Sandvold 10 July 1991 1♀, 23 July 1992 1♀. HEN Åmot: Ygle July 1933 1♀ , Rena, South 17 July 1987 4♂♂ 9♀♀. OS Sør Fron: East of Hundorp 15 July 1982 1♀, Gausdal: Follebu 12 Aug.1995 1♀. ON Lom: Vågaines 11 July 1953 1♂ (ZMO), West of Lom 30 July 1978 1♀. Published records: BØ Nedre Eiker: Mjøndalen, Miletjern LT Primo June 1989 7♂♂ 11♀♀, Ultimo June 8♂♂ 4♀♀ 1989 (Hansen & Bergsmark 1990). New records: BØ Hurum: Tofte MF Rich deciduous forest 2-17 June 1985 3♂♂, 17 June-17 July 1985 16♂♂ 4 10♀♀, 17 July-8 Aug. 1985 1♂; Drammen: Underlia MT June 1992 2♀♀. BV Gol: Engane MT 200 m a.s.l. 18 June-5 July 1982 1♂, 5-21 July 1982 2♂♂, 2-16 Aug. 1982 1♀; Rollag: Rollag 16 July 1979 1♂, 16 June 1984 1♂ 4♀♀, 29 July 1989 1♀, 20 June 1992 1♂, 29 June 1995 1♂ 2♀♀. VE Våle: Langøya MF June 1990 3♂♂ 1♀, 3 July 1990 1♂ 1♂, MT Calcarous meadow at sea shore 2 Aug.-1 Sept. 1991 1♂; Tjøme: Hvasser 6 June 1992 1♂, Mågerø 23 June 1969 1♀ , Tjøme 26 June 1965 1♀. TEY Porsgrunn: Sandøy 10 July 1986 1♂. TEI Kviteseid: Kviteseid LT 15-17 June 1988 1♀; Tokke: Dalen 30 June 1980 1♀. AAY Tromøy: Tromøya 8 July 1981 1♀. VAY Kristiansand: Oddernes 24 June 1967 1♂; Mandal: Kvisla 8 July 1935 1♂ (TSZ), Mandal 6 July 3♂♂ 2♀♀, 13 July 1♂ (TSZ). RY Sandnes: Hommeland 18 June 1978 1♀; Stavanger: Tjensvoll 30 June 1977 3♂♂; Sola: Sola May 1930 1♂, April 1931 1♂ hatched from pupae; Finnøy, Hauskjevann MT 7-17 June 1992 1♂, Kirkøy EIS 14 29 June 1987 1♀, Sevheim MT C 8 July-5 Aug. 1995 1♀, Sevheimsvatn MF 17-24 June 1992 1♂, 24 June-4 July 1992 1♀. RI Forsand: Helmikstøl 5 July 1981 1♀ (TJ); Hjelmeland: Jøsneset, Fosså MT 13-20 June 1982 1♂. Published record: HOY Bergen: Bergen 11 June 1871 1♂ (ZMO 7304). New records: HOY Bergen (Fana): Steinsvik 15 June 1958 1♀, (Åsane): Vollane 3 July 1980 1♀. HOI Kvinherad: Rosendal 8 June 1990 1♀. SFI Leikanger: Gjerde 11 Aug. 1982 4♂♂, Hermannsverk, Njøs forskningsgård 22 May 1990 5♂♂ 4♀♀, Sanden 7 June 1990 1♂. STI Trondheim: Lade 25 July 1968 1♀, Leirbru July 1987 1♂. Published records: NTI Verdal: Thynes 1 specimen (Lunds Universitet). NSI Saltdal: Rognan 27 July 1988 1♀. NSI Rana: Mo 25 June 1956 2 specimens (Lunds Universitet). TRI Målselv: Kirkedalen, Kjosvoll 70 m a.s.l. MF 25 July-10 Aug. 1992 2♀♀.

In addition to the material listed above Siebke (1866 and 1877) also records *S. vibrans* from Sarpsborg, Bekkelaget, Vang i Valdres, Land, near Lillehammer, Fokstua and Flatmark i Romsdalen. Material from these localities does not exists in ZMO today. Zetterstedt (1845) in his first record of *S. vibrans* from Norway, reported *S. vibrans* from Tynes (Thynes) in Verdal and this material exists in Lund today (Dr. R. Danielsson. pers. comm.).

Storm (1907) mentioned it from the Trondheim area, but Storm`s material do not exist today. There are

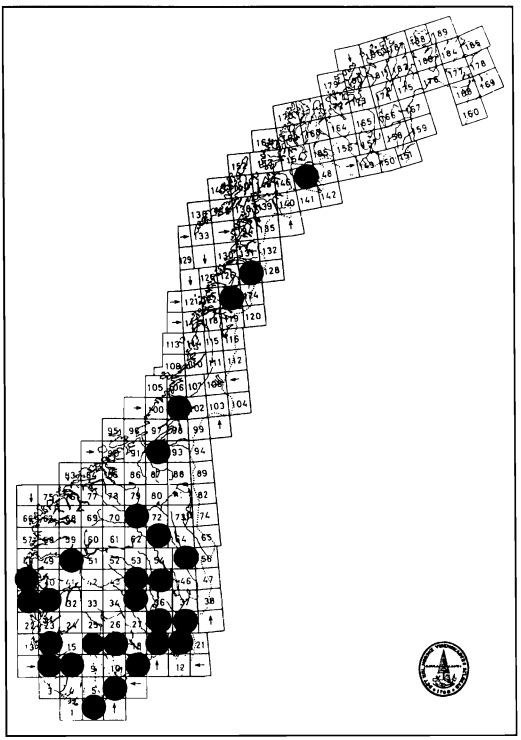


Figure 6
The distribution of *Seioptera vibrans* in Norway .

records in the list of material from some localities in the Trondheim area.

The head is reddish brown, yellowish brown in front, the postcranium is black as the rest of the body. The eyes are with a silver tomentose lining. The wing tip has a black spot and the outer part of the costal is black also. This wing pattern is similar to the pattern found in some species of the genus *Homalocephala.*

Genus ***Systata***

7. *Systata rivularis* (Fabricius, 1805)
Not mapped, see below.

One male, labelled «Norwegen» - no exact locality given - exists today in the collection of the Natural History Museum in Vienna. There is also some additional letters on the label written with indian ink, but they are not possible to decipher. Determinator is F. Hendel. The specimen has been examined by the author and there is no doubt about the identification. The specimen is newly hatched with the ptinial pouch still not withdrawn.

The record is included by both Hennig (1939) and Soòs (1984) as from Norway. Hennig considers the main distribution area of *S. rivularis* to be in Central Europe. The southernmost record, however, is from Sicily.

S. rivularis is a shining blackish fly with a similar colouring to *S. vibrans* (se above). The crossveins of the wings are very close together and this is a good character for separating *S. rivularis* from the other Otitidae mentioned here. The wings are basally with a black mark, they have two black bars of which the innermost and broadest crosses the wing completely, the outermost stops a little way before the hind wing margin. A black stripe also follows along the most of the wing tip.

Genus ***Tetanops***

8. *Tetanops myopina* Fallén, 1820
Figure 5. Material: 1 ♂

RY 1619 Hå: Ogna EIS 3 8 July 1986 1♂

Tetanops myopina was reported new to Norway by Greve (1988). The female collected at Ogna is hitherto the only specimen recorded from Norway. According to Lyneborg (1964) *T. myopina* is usually found connected with sandy shores and beaches.

The head of *T. myopina* is yellow with grey dusting and the grey dusting is also on thorax and abdomen. The abdomen is black, however, parts of the abdomen might be clear of dust varying from individual to individual. The legs are yellow. The wings is nearly clear with a faint brown line along the cross veins and some faint brown markings where R 2+3 and R4+5 meet the wing margin.

Fam. Ulidiidae

Genus ***Homalocephala***
Syn. *Psairoptera* Wahlberg, 1838

Key to the species of Homalocephala in Norway:

1. Halteres black, third antennal segment distinctly longer than broad. Legs predominantly black ..... ***H. apicalis*** (Wahlberg, 1838)
   Halteres white, third antennal segment rounded about as long as broad..... **2**
2. Face and jowls dark. Frons narrow.Abdomen with few, short bristles..... ***H. angustata*** (Wahlberg, 1838)
   Face and jowls in front white. Frons broad. Abdomen stouter then the preceeding species and with numerous, distinct bristles. ..... ***H. biumbrata*** (Wahlberg, 1838)

NB! For complete key to species occurring in Fennoscandia and Denmark see Andersson (1991).

Genus ***Homalocephala***

1. *Homalocephala angustata* (Wahlberg, 1838)
Figure 7. Material: 2♂♂ 3♀♀

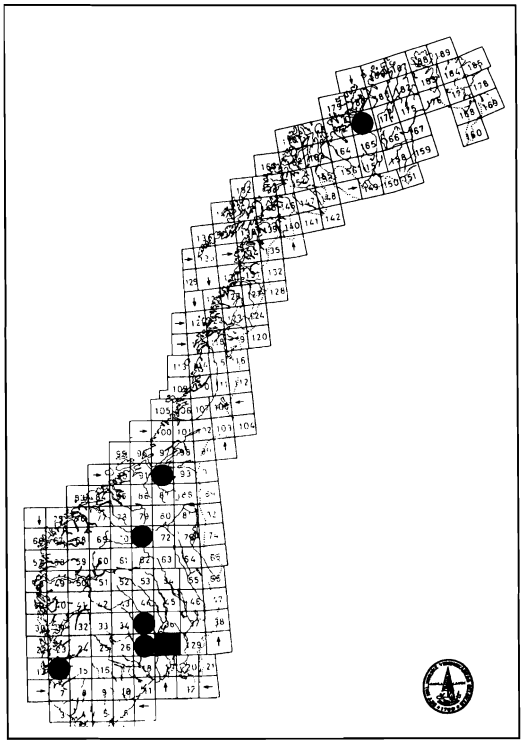
Published material: AK Oslo: Bekkelaget 19 June 1850 1♂ (ZMO 7365) 26 June 1850 2♀♀ (ZMO 7362, 7364), Oslo: Oslo (Kr.ania) 1♀ (TSZ). New material: AK Frogn: Håøya 27 June-22 July 1984 MT B 1♂.

Homalocephala angustata is a small, blackish fly with a fairly distinct wing pattern, a small black dot at base of humeral vein, the subcostal cell black and a narrow, black wingspot reaching vein Cul.

H. angustata has not been mentioned in Norwegian literature since the time of Siebke (1877). Siebke also mentioned a record from VE Sarpsborg, but no material from this locality exists today. The specimen collected at Håøya is verified by H. Andersson, Lund. Andersson (1991) mentions only a single locality from Sweden where many (a total of 30♂♂ 14♀♀) specimens have been collected from the type locality Gusum in Østergötland. Hedström (1995) reports 1♂ and 3♀♀ from another locality, Huddinge in Södermanland also Sweden. Both records are from east of Sweden. *H. angustata* is recorded from Finland and NW central European territory of the former USSR.

2. *Homalocephala biumbrata* (Wahlberg, 1838)
Figure 7. Material: 3♂♂ 9♀♀

New and revised material: AK Frogn: Håøya MT A 22 July-18 August 1984 1♂. On Dovre: Toftemo(en) 6 Aug. 1873 1♀ (ZMO 7297). BØ Krødsherad: «Krødsherad» 12.7.1869 1♂ (ZMO 12770); Nedre Eiker: Mjøndalen, Hagetjern, Ryggsetra July 1994 MT 1♀. BV Rollag: Rollag, Tråen saga 1 Aug. 1993 2♀♀, 9 Aug. 1994 3♀♀. RY Finnøy: Kyrkøy MT 1-11 June 1992 1♀. NTI Stjørdal: Vikan MT 23 May-4 June 1990 1♀. FV Alta: Kåfjord, Møllenes 3 July-8 Aug.1995 MT 1♀.



The following females also probably belong here, but can not be determined with certainty: VE Tønsberg: Tønsberg 1♀ (ZMO 12769); TEY Porsgrunn: Sandøya, Solvang MT 27 July-2 Aug. 1985 1♀; VAY Marnardal: Laudal, Sveindal gård MT July-6 Aug. 1982 1♀; SFY Gaular: Vikan 27 June 1942 1♀. *H. biumbrata* is here recorded as new to Norway. This species has earlier been confused with *H. apicalis* Zetterstedt, 1838. Siebke (1877) mentioned, under the name *Psairoptera bipunctata* Loew p. 150 Var. b., a specimen collected by him from «Fyldpaa» near Tønsberg 27 Juli 1865. *P. bipunctata* Loew, 1854 is today considered a synonym for *H. albitarsis* Zett., 1838. One female in ZMO is from Tønsberg (ZMO 12769). I have examined this female which has two pairs of scutellar bristles, the one remaining halter must be considered «white», the legs are all dark, the frons is broad and the face and jowls in front are white. This leads to either *H. albitarsis* Zett., 1838 or *H. biumbrata* (Wahlberg, 1838). Both wings have been broken off, thus the wing drawings can not be controlled. I tentatively place this specimen as *H. biumbrata* (Wahlberg, 1838). Thus no material of the *H. albitarsis* do exist in Norwegian collections today.

It is noteworthy that there is no material from Norway today in coll. Boheman. *H. albitarsis* was described, both sexes from Dovre, Norway and from Sweden, Torne lappmark, Jukkasjärvi, but only the Swedish material still exists, see also Andersson (1991)

3. *Homalocephala apicalis* (Wahlberg, 1838)
Material: 1♂

Andersson (1991) mentions one male collected by Ringdahl in July 1913 in Norway. This specimen has no locality data. Thus *H. apicalis* is recorded in Norway, but the exact locality is unknown. I have not seen this specimen.

Figure 7
The distribution of *Homolocephala angustata* (square) and *Homalocephala biumbrata* (closed circles and square) in Norway.

Check-list of Norwegian Otitidae and Ulidiidae:
Fam Otitidae
Genus *Ceroxys*
1. *Ceroxys urticae* Macquart, 1835
Genus *Herina*
2. *Herina frondescentiae* (L., 1758)
Genus *Melieria*
3. *Melieria crassipennis* (Fabricius, 1794)
4. *M. omissa* (Meigen, 1826)
Genus *Pseudotephritis*
5. *Pseudotephritis corticalis* (Loew, 1873)
Genus *Seioptera*
6. *Seioptera vibrans* (L., 1758)
Genus *Systata*
7. *Systata rivularis* (Fabricius, 1805)
Genus *Tetanops*
8. *Tetanops myopina* (Fallén, 1820)
Fam. Ulidiidae
Genus *Homalocephala*

1. *Homalocephala angustata* (Wahlberg, 1838)
2. *H.apicalis* (Wahlberg, 1838)
3. *H.biumbrata* (Wahlberg, 1838)

DISCUSSION

Wahlgren (1919) reported 7 species of Otitidae and 4 species of Ulidiidae from Sweden. In his revision of the genus *Homalocephala* Andersson (1991) recorded 5 species from Sweden making the total number 6 of Ulididae from Sweden. The list of Finnish Diptera of Hackman (1980) has 7 species of Otitidae and 7 species of Uliididae .

The Norwegian list recorded above has 8 species of Otitidae and 3 species of Uliididae.

Of the Otitidae, only the three species *Ceroxys urticae*, *Herina frondescentiae* and *Seioptera vibrans* can be said to be fairly common in at least part of the country. They are all recorded from southern, central and northern Norway. The remaining species all have southern distribution .

Ceroxys urticae has been found scattered over large parts of Norway, but there are no records from western Norway, except from the southern parts of Rogaland province. There is also a gap in Western Agder province despite considerable collecting in this area in the latest years. Neither is there material from central Norway south of Rognan in Nordland.

The main bulk of both localities and specimens have been collected in SE Norway. No localities are situated in sub-alpine or alpine areas. *C. urticae* is widely distributed in Middle-Europe (Merz 1996b).

Locally there are areas where *C. urticae* has fairly "large" populations even in the very north of Norway like the locality Stengelsen in Alta where 4 ♂♂ and 7 ♀♀ where collected on 8 days throughout the month of July. There is little additional information on the various localities, although several are near the coast or from beaches.

C. urticae is considered very common in all parts of Denmark (Lyneborg 1964), but in Norway it must be considered moderately rare.

Herina frondescentiae is the only species of the genus *Herina* in Norway. Three additional *Herina* species occur in Fennoscandia and Denmark; *H. paludum* (Fallèn, 1820) and *H. palustris* (Meigen, 1826) from Sweden and Denmark and *H. oscillans* (Meigen, 1826) from Sweden, but none of them have been recorded from Norway. All three have only partly spotted wings without the broad bars which make *H. frondescentiae* easy to recognize even in the field. Drawings of the terminalia of male and female *Herina* are given in Merz (1996a).

Altogether 547 specimens of *H. frondescentiae* have been recorded from approximately 70 localities, and it is thus the most widespread and common species of Otitidae in Norway. There are records from all over Norway except the eastern part of Finmark province. Nearly all localities are below the tree-borderline. There is only one record from the sub-alpine zone, the one from TEI Vinje, Haukelidsæter 960-980 m a.s.l. from south facing slope.

Krogerus (1960) mentions *H. frondescentiae* in his surveys of Scandinavian moors. Some records from the Nature Reserve Iglatjødn, Stord - a moor-bog reserve - (Greve & Hauge 1989) and collections from other localities show that *H. frondescentiae* is often found on

moors. On the otherhand there are also localities at beaches (Mostranda and Langøya VE) thus *H. frondescentiae* is probably fairly euryoc. It is common and widely distributed in Europe (Merz 1996a).

S. vibrans is the third of the three common species of Otitidae in Norway distributed from southern Norway north to Troms province. The main bulk of the material is southern Norway, however, and the few records from Central and Northern Norway are scattered.

S. vibrans is also mentioned by Storm (1896) from the area near Trondheim, but no material exists today.

The flight period judged from the Malaise trap catches runs through the summer season from early June to early August.

S. vibrans is usually collected individually or a few specimens each time. A light trap at Miletjern (BØ: Nedre Eiker) collected 7 males and 11 females in early June, while a Malaise trap at Tofte (BØ: Hurum) 16 males and 10 females between 17 June and 17 July. After 17 July only one male was caught. The localities are varied: Meadows, bogs, beaches , near lakes etc. All localities are situated in the lowlands. It is fairly common in Northern and Middle Europe.

The genus *Melieria* is represented in Norway by two species, *M. crassipennis* and *M. omissa*, surveyed by Greve (1988). New records support the view that both species have restricted distributional areas in SE Norway. There is, however, the old record of *M. crassipennis* from literature (Storm 1898) from an area close to Trondheim, but no material exists today. *M. crassipennis* is found in a much wider area than *M. omissa* which is restricted to sandy shores and dunes. The number of localities for both species are about the same, the number of specimens for *M. omissa* is much higher than for *M. crassipennis*.

Three species of Otitidae have been reported, once each, from Norway. *Tetanops myopina* is still represented by a single female in Norway from RY Hå: Ogna (Greve 1988). A survey of this area during the summer 1996 yielded no specimens. *T. myopina* occurs only on sandy shores and in sand dunes. Although *T. myopina* is common in Denmark (Lyneborg 1964) and occurs in Southern Sweden (Ardø 1957), it has not been found in SE Norway. The locality in RY is very isolated and probably the northernmost for this species in NW Europe. *T. myopina* occurs in UK (Kloet & Hincks 1976). Another species, *T. sintenisi* Becker is recorded from Finland (Hackman 1980). *T. myopina* also looks similar to the genus *Otitis* with one species *O. centralis* Fabricius, 1805 in Scandinavia, reported from Gotland und Öland, but not from the Swedish mainland (Lyneborg 1964).

Pseudotephritis corticalis has been recorded only once from Norway from VE Brunlanes, Klova near Pauler (Borgersen & Greve 1989). The next nearest record is from the St.Petersburg area. *P. corticalis* is, however, considered very rare in all parts of its distribution in the Palaearctic and most records are single specimens only. Thus the single record from Norway is not surprising. Hedström (1995) does not include *P. corticalis* or *S. rivularis* in his material of Otitidae from Sweden.

The third and last of the «single record» species *Systata rivularis* has not been recorded from other localities in Northern Europe at all. There is not doubt that «Norwegen» is written on the label of the specimen in the Vienna museum. *S. rivularis* is a characteristic fly, unlikely to be overlooked and not at all uncommon in the distributional area in Central Europe. This single Norwegian record is very unexpected, clearly way outside the expected distributional area. The record is fairly old, published as early as Hennig (1939). The Scandinavian fly fauna has been much better surveyed during the last decades, but there have been no new records. An open question is a possibly mislabelling as the occurrence of *S. rivularis* in Norway can not be explained satisfactorily.

The genus *Homalocephala* is the only genus of the Ulidiidae represented in Norway. The three species *H. angustata*, *H. biumbrata* and *H. apicalis* must all be considered rare flies. All Scandinavian *Homalocephala* species have wing marks and thus these flies should not easily be overlooked.

H. angustata is a very rare fly collected from 2(3) localities in Norway. The locality «Oslo» carries no information, Bekkelaget is an urban area, and, of the original nature very little is left today. No material exists from the Sarpsborg locality mentioned by Siebke (1877). Only Håøya, an island in the Oslofjord, is today

a bonafide locality for this species. *H. biumbrata* must also be considered a rare species, however, it has been collected from at least seven localities in southern, middle and Northern Norway. Andersson (1991) reports *H. biumbrata* from several localities in Sweden, north to the innermost part of the Bothnian Bay. This species must be considered the most common of the genus *Homalocephala* in Norway, albeit it is rare.

The third species *H. apicalis* has no certain locality for Norway and is also very rare in Sweden.

Hedström (1995) has some new records for *H. angustata* and *H. biumbrata* from Sweden, all, however, listed as « intressantare arter» viz. as species worth mentioning especially.

More species of *Homalocephala* species are surely present in Norway. *H. albitarsis* Zetterstedt, 1838 is, judged from the Swedish distribution, the most likely species. Hedström (1995) states that they are connected with dead trees, otherwise very little is known of the biology of these flies.

No species among the Norwegian Otitidae seem to have strong populations in the country. Mass occurence is very rare, mostly single specimens or a few individuals have been collected. 32 specimens of *Ceroxys urticae* were collected from Karljohansvern, Horten in early July. 137 specimens of *Herina frondescentiae* were collected at Helgerød, Tjøme in July, and another Tjøme area, Mo, also yielded many specimens. At Tofte, Hurum, 26 specimens of *Seioptera vibrans* were collected in a Malaise trap between 17 June and 17 July. More specimens were collected in the trap in the periods before and after.

Note should be made of the fact that very little of the material included here has been collected quantitatively and it is therefore not possible to compare samples for number of species, etc.

The flight period in Norway for *S. vibrans* is from late May untill last part of August. At Tofte, Hurum, specimens were caught from early June until early August.

Based on the lists of species presented above the family Otitidae have several species which should be presented in the Norwegian Red List (Størkersen 1992). Of the Otitidae *Pseudotephritis corticalis* (Loew, 1873) and *Tetanops myopina* Fallén, 1820 are clear candidates. The same goes for *Systata rivularis* (Fabricius, 1805) though one might mark the occurrence of this species in Norway with a question mark. *P. corticalis* has a scattered distribution in all parts of it's hitherto known distributional area both in Europe and North America. The locality of *T. myopina* in Rogaland fits well with a northern distributional area of this species.

The three *Homalocephala* species all qualify for the Norwegian Red List. *H. angustata* and *H. apicalis* are both also very rare in Sweden. Species of *Homocephala* are also considered very rare on the Britsh Isles (Cogan & Dear 1975). The species most "common" of the three *H. biumbrata*, still qualifies as rare.

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SAMMENDRAG

Familien Otitidae og Ulidiidae (Diptera) i Norge

Artikkelen er en revisjon av det norske materialet av de to fluefamiliene Otitidae og Ulidiidae (Diptera). Artikkelen omtaler den kjente utbredelsen, og dels flyvetiden hos de norske artene. Ingen av disse familiene har noen norske navn. Det blir presentert nøkler til slekter og arter. Åtte arter Otitidae er oppgitt fra Norge. Arten *Systata rivularis* kan en kanskje sette et spørsmål ved. *Ceroxys urticae*, *Herina frondescentiae* og *Seioptera vibrans* er utbredt over største delen av landet, *Melieria crassipennis* og *M. omissa* er bare kjent fra sørøst Norge. *Pseudotephritis cor-*

ticalis er funnet en gang i Vestfold og *Tetanops myopina* en gang i Rogaland. Et eksemplar korrekt bestemt til *Systata rivularis* og med lokalitets-etiketten "Norwegen" (=Norge) finnes i Wiens Naturhistoriske Museum. *Systata rivularis* er ellers bare kjent fra Mellom- og Sør-Europa.

Tre arter Ulidiidae, *Homalocephala angustata*, *H. apicalis* og *H. biumbrata* er påvist i Norge. Alle disse tre artene må regnes som sjeldne.

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The family Coniopterygidae (Neuroptera) in Norway

Lita Greve

Greve L. 1997. The family Coniopterygidae (Neuroptera) in Norway. - Fauna norv. Ser. B 44: 143-157.

The article presents a survey over the family Coniopterygidae (Neuroptera) in Norway based on a total of 2178 specimens. A check-list of the nine species of Coniopterygidae recorded from Norway and the distribution of each species is given. Remarks on the phenology and biology are given.

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INTRODUCTION

The family Coniopterygidae comprises the smallest species within the order Neuroptera. The recent check-list lists 423 recent and 11 fossil species in the family (Meinander 1990). The number of species is steadily increasing, and has nearly been doubled since the last world revision by Meinander (1972).

Coniopterygidae have head and parts of thorax strongly chitinized in contrast to the abdomen. The male genitalia of some species are much better chitinized than the genitalia in the females.

The fore- and hind-wings in most species are nearly equal in size, length of forewings varies between 2 mm to 5 mm. Some species have partly or totally reduced hindwings. The wing venation is much reduced and lacks several characters found in the other Neuroptera. The small forks situated along parts of the wing margin in species of the other families are totally lacking in the Coniopterygidae.

The Coniopterygidae have hypodermal wax glands which lie evenly distributed on the whole body surface. They produce a waxy substance giving both living and dried, dead specimens a chalky white appearance. The wax disappears entirely from alcohol fixated material.

Larvae and adults are carnivores on aphids, mites and some other small, inactive creatures and often associated with certain types of vegetation or even single species of bushes or trees which might indicate preference of certain species of prey.

Meinander (1972) discussed the phylogeny and the classification of the family. He considers Coniopterygidae as a primitive sideline of the Neuroptera together with the family Ithonidae .

The Coniopterygidae were long considered rare and not often mentioned by older Norwegian entomologists. Nevertheless Schøyen (1887), reported one species, *C. tineiformis* Curtis - see below, as common and widespread both in southern and northern Norway. However, Tjeder (1943) revised Schøyens material and could not find any specimens of Coniopterygidae at all. Tjeder reported two Norwegian specimens of *C. tineiformis* from Zetterstedts collection in Lund, see below. Tjeder (1945) in his catalogue of Norwegian Neuroptera listed three species, *Coniopteryx borealis* Tjeder, *C. tineiformis* Curtis and *Helicoconis lutea* (Wallengren), based on three specimens only.

Since 1966 several Norwegian records have been published Aagaard & Solem (1972), Greve (1966, 1967, 1969, 1971, 1974, 1976, 1987 (with keys to the Norwegian fauna), 1990), Greve et al. (1987) and Solem & Aagaard (1973).

Aspöck et al. (1980) presented a survey of the European Neuropteroidea, partly based on literature. Meinan-

der (1990) presented a check-list with new distributional records for many species.

MATERIAL AND METHODS

This survey includes material in the major insect collections in Norway Zoological Museum , University of Bergen; Zoological Museum, University of Oslo (ZMO); Vitenskapsmuséet, University of Trondheim (VMT); The Norwegian Agricultural University, Ås (NLH) and Tromsø Museum, University of Tromsø (TRM). Material from some museums outside Norway is also included.

The survey is based on 2178 specimens, 717♂♂, 1264 ♀♀, 3 specimens, 193 larvae and 1 pupa. The material has been obtained by sweep-netting, from Malaise traps (MT), collision traps (CT), window traps (WT) and light traps (LT).

The geographic divisions follow the revised Strand system (Økland 1981). The map follow the EIS system.

Check list for Norwegian Coniopterygidae (in alphabetical order):
Coniopteryx
1. *C. borealis* Tjeder, 1930
2. *C. esbenpeterseni* Tjeder, 1930
3. *C. pygmaea* Enderlein,nec auctt.
4. *C. tineiformis* (Curtis, 1834)

Conwentzia
5. *C. pineticola* Enderlein, 1905
6. *C. psociformis* Curtis, 1834

Helicoconis
7. *H. lutea* (Wallengren, 1871)

Parasemidalis
8. *P. fuscipennis* (Reuter, 1894)

Semidalis
9. *S. aleyrodiformis* (Stephens, 1836)

Other Coniopterygidae species that might possibly turn up in Norway are: *Aleuropteryx loewii* Klapalek, 1894 recorded from Southern Sweden (Tjeder 1953); *A. juniperi* Ohm, 1968 recorded from The British Isles (Plant 1992); *C. haematica* McLachlan, 1866 recorded from Sweden (Meinander 1972); *H. hirtinervis* Tjeder, 1960 recorded from Denmark (Tjeder 1960); and *Semidalis pseudouncinata* Meinander, 1963 recorded from The British Isles (Plant 1992).

A key for identification of the adult males of the species listed above is found in Aspöck et al. (1980). As for adult females, see below for each species. Only for some species larval instars and the pupae are known. When nothing else is mentioned the material is deposited in Zoological Museum, University of Bergen.

1. *Coniopteryx borealis* Tjeder, 1930
Material: 5♂♂. Figure 1, Map 1.

AK Bærum: Ostøya 10 June-1 July 1984 MT B 1 ♂. BØ Røyken: Hyggen, Kinnartangen MT 4 Aug.-8 Sept. 1991 1 ♂. TEI Kviteseid: Kviteseid, LT 11 June 1988 2♂♂. HOI Granvin: Seim June 1936 1 ♂.

C. borealis was first recorded from Norway from Granvin by Tjeder (1944). It is here reported new to AK, BØ and TEI.

Only five males are listed here since females of *C. borealis* can not be distinguished from the females of *C. esbenpeterseni* or *C. tineiformis*, see below for *C. tineiformis*.

Aspöck et al. (1980) map a distribution in Scandinavia to about 60°N, and one record more northernly in Finland. Outside Scandinavia *C. borealis* is distributed in Europe west of 30°E and has also been recorded from Marocco (Aspöck et al. 1980) and Tunesia (Monserrat & Reviejo 1980). According to Aspöck et al. (1980) *C. borealis* prefers warm, but not dry habitats and develops on deciduous trees. The four localities in Norway are all in areas with high summer temperatures. The locality at Ostøya (Greve & Midtgaard 1986), was near an old dead oak in decidous forest with *Tilia cordata*, *Ulmus glabra* and *Quercus robur* as the dominating species. At Triset *C. borealis* was collected together with *C. esbenpeterseni*, see below.

2. *Coniopteryx esbenpeterseni* Tjeder, 1930
Material: 41♂♂ (7♀♀). Figure 1, Map 2.

AK Nesodden: Fagerstrand LT 10-11 June 1992 1♂; Bærum: Ostøya 31 May 1984 1♂, 2 June 1984 1♂ (1♀), MT A + B 30 May-10 June 1984 8♂♂(1♀), MT B 10 June-1 July 1984 1♂, Asker: Sem 5 June 1973 1♂ NLH. VE Sandefjord: Nes 8 July 1970 1♂; Tønsberg: Frodåsen 9 June 1975 1♂; Nøtterøy: Herstad south 15 May 1974 1♂, Mellom Bolærne 10 June 1975 2♂♂ (1♀), Tjøme: Kolabekkilen 12 August 1972 1♂. TEI Lårdal: Triset 2 July 1975 1♂; Kviteseid: Kviteseid LT 8-11 June 1988 1♂, 10-20 July 1988 1♂ (1♀). AAY Risør: Øysang 7 July 1976 1♂. VAY Mandal: Mandal, Skriverparken 9 July 1978 3♂♂ (1♀), Skjernøy 6 July 1978 1♂ (1♀), Flekkefjord: Lavoll 4 July 1978 1♂. SFI Leikanger: Leikanger 16 June 1974 1♂, 9 July 1975 1♂; Leikanger, Hamre 7 June 1990 2♂♂ (1 ♀), Sogndal: Sogndal 12 June 1973 1♂, 27 May 1974 1♂, 5 June 1975 1♂, 16 June 1975 4♂♂, 7 July 1975 3♂♂.

Only males are listed here since females can not be distinguished from the females of *C. borealis* and *C. tineiformis*.

Coniopteryx esbenpeterseni was first recorded from Sandefjord: Nes in Norway Greve (1971). The species is here reported new to AK, AAY, VAY and SFI. *C. esbenpeterseni* has been found in two areas, in southeast Norway and in inner Sogn and Fjordane. The restricted area in Sogn & Fjordane is the northernmost locality in Europe according to Aspöck et al. (1980), see also Greve (1990). *C. esbenpeterseni* has not yet been recorded from Finland, Meinander (1972, 1990). Outside Fennoscandinavia *C. esbenpeterseni* has been recorded from Europe and near Asia, Aspöck et al. (1980). Recently it was recorded from The British Isles (Hynd & Plant 1991).

C. esbenpeterseni has been collected from deciduous trees with preference for *Quercus, Crataegus,* and *Carpinus*, often fairly dry localities (Aspöcket al. 1980). Several of the Norwegian specimens were netted on *Quercus*. For description of the habitat at Ostøya see Greve & Midtgaard (1986). Note should be made that most of the material from Sogn and one male from Asker were collected on fruit-trees like plum, apple and pear. Two males from Sogn, Leikanger was collected from shrubs in a *Corylus* forest. Some localities must be considered dry, others were not. Thus, in Norway this species shows a preference for rich deciduous forest and fruit gardens, often with mono-cultural fruit-trees.

At Triset *C. esbenpeterseni* was collected together with the rare *C. borealis,* see above. *C. esbenpeterseni* was nowhere collected in great numbers.

The flight period for adults is from medio May, with one early appearance on 15 May, to early July. One late appearance was a male collected on 12 August. The earliest and the latest records are from Vestfold.

3. *Coniopteryx pygmaea* Enderlein, nec auctt.
Synonym: *Coniopteryx parthenia* (Navás & Marcet, 1910)
Material: 105♂♂ 287♀♀ 2 specimens. Figure 1, Map 3.

Ø Halden: Strupe 5 June 1967 31♂♂ 51♀♀. AK Oslo: Ekeberg 28 July 1987 1♀; Ås: Ås 4 June 1972 1 ♀; Nesodden: Fagerstrand LT 30-31 May 1990 1♀, 25-26 June 1991 2♀♀, 25-26 June 1992 2♀♀; Bærum: Ostøya 31 May 1984 2♀♀; Rælingen: Losby WT 24 May-24 June 1991 1♀; Enebakk: Ekeberg WT 25 May-25 June 1991 1♂ 2♀♀, Vangen WT 25 May-25 June 1991 2♂♂; Lørenskog: Aamodtdammen WT 19 May-19 June 1991 1♀. HES Eidskog: Helgesjøen 11 July 1974 2♀♀; Os Gjøvik: Os 15 June 1975 1♂ 1♀. BØ Kongsberg: Kongsberg, Hamremoen kro 4 July 1980 4♀♀; Ringerike: Krokskogen, Smeddalen 25 July 1987 1♀; Modum: Hovlandsfjell 16 June 1990 1♀; Hurum: Mølen 2-4 July 1990 1♀, Tofteholmen 28 May-7 July 1991 2♂♂; Røyken: Hyggen, Kinnartangen Primo July 1989 1♀, MT 2-28 May 1991 3♂♂ 1♀. VE Tønsberg: Frodåsen 9 June 1975 4♀♀, Stemmelia 1985 1♂; Stavern: Stavern VNL 593397 5 July 1980 6♀♀; Våle: Langøya MT 2-28 May 1991 1♂ 4♀♀; Borre: Bastøy 9 June 1974 1♀; Nøtterøy: Magnhildås 12 June 1974 5♂♂ 5♀♀, Mellom Bolærne 10 June 1975 8♂♂ 29♀♀, Strengdalsvann 18 June 1974 2♀♀; Tjøme: Eidene 2 June 1967 5♂♂ 1♀, Hulebakk 10 July 1975 1♀, Kjære 31 May 1965 2♂♂, 6 June 1965 2♂♂, 31 May 1967 1♂ 1 specimen, 2 June 1967 4♂♂ 3♀♀, 27 June 1968 3♀♀, 21 June 1969 14♀♀ 1 specimen, Kjæreskogen 10 August 1974 8♂♂ 5♀♀, 8 June 1975 8♂♂ 27♀♀, Tjøme 3 June 1967 9♂♂ 3♀♀. TEY Kragerø: Portør 7 July 1976 1♀. TEI Seljord: Sandsdalen 1 July 1975 1♀, Seljord 3 July 1975 5♀♀; Kviteseid: Kviteseid 30 June 1975 1♂ 5♀♀, Morgedal, Brekke 28 June 1975

1♀, Morgedal, Bygland 27 June 1975 6♀♀, Morgedal, Donstad 3 July 1975 5♀♀, Vråliosen 30 June 1975 9♀♀. AAY Risør: Barmen VNL 0911 11 July 1976 2♀♀, Bossviktjern 9 July 1976 3♀♀, Bossvik south 8 July 1976 1♀, Granli 6 July 1976 2♀♀, Laget 10 July 1976 1♀, Risøya 11 July 1976 2♀♀; Grimstad: Feviktjern VMK 805710 15 July 1977 2♀♀, 17 July 1977 3♀♀, Vik 13 July 1977 2♀♀; Moland: Reddal kanal 14 July 1977 4♀♀; Froland: Blakstad VMK 7985 16 July 1977 1♀; Birkenes: Senumstad MT 23 June-6 August 1986 1♀. VAY Kristiansand: Drangsholt 18 July 1977 1♀; Mandal: N.Brinsdal VMK 138431 5 July 1978 4♀♀, Sjøsanden 10 July 1978 3♀♀, Skjernøy VMK 130298 6 July 1978 1♀, Smeland VMK 138450 5 July 1978 2♀♀; Farsund: Øyvoll VLK 682427 9 July 1978 1♀; Flekkefjord: Djupvik VLK 653628 11 July 1978 2♀♀; Sogndalen: Stokkeland VMK 295523 7 July 1978 3♀♀. VAI Sirdal: Tonstad 15 June 1974 1♂. RY Sandnes: Melsheia 13 June 1976 1♂. HOY Bergen: Nygårdsparken 23 June 1969 1♀, (Fana): Fantoft 13 June 1969 1♂ 3♀♀, Nordvikvann 15 June 1973 1♂; Stord: Storsøy 18 June 1966 1♀; Os: Røttingen 16 June 1976 1♀; Vaksdal: Eidslandet 15 June 1968 4♀♀, 28 June 1969 4♀♀, 1 July 1969 3♀♀, Eksingedalen, Flatekvål 29 June 1969 2♂ 2♀♀. HOI Kvinnherad: Ænesdalen 5 June 1990 1♂; Granvin: Granvin MT 28 May-16 June 1982 2♀♀; Kvam: Berg VLM 436898 10 July 1974 1♀, Fosse VLM 372846 9 July 1974 1♀, Strandebarm, Vikingnes 15 June 1980 2♀♀. SFY Gloppen: Vereide 29 June 1989 2♀♀. SFI Aurland: Tero 25 July 1981 2♀♀. NTI Høylandet: Tverråa MT 24 June-1 July 1986 1♀ VMT. NSI Rana: Granhei MT June 1986 1♂. FI Alta: Gargia 34 WEC 962 465 1 July 1979 1♂.

Coniopteryx pygmaea was reported from Ø, VE and HOY (Greve, 1967, 1969). It is here reported new to AK, HES, OS, BØ, TEY, TEI, AAY, VAY, VAI, RY, HOI, SFY, SFI, NTI, NSI and FI. *C. pygmaea* seems to be fairly common in southern Norway. It is rare in central and northern Norway. The European distribution is all Europe and the species is also found in Asia and North Africa. Meinander (1962) mapped the Finnish distribution. According to this, the record from inner Finmark is the northernmost in Europe.

C. pygmaea has mostly been found associated with conifers, both *Picea abies* and *Pinus silvestris*. It is also found on planted conifers, various *Picea* and *Pinus* spp. Monserrat (1988) says it prefers *Pinus* species in Spain. The Norwegian material is often from *P. silvestris*, but also often from *Picea abies*. Aspöck et al. (1980) regard it as euryoc. *C. pygmaea* is frequently collected at the same localities as *S. aleyrodiformis*, but then netted at conifers while *S. aleyrodiformis* (see below) prefers deciduous trees. There are no specimens from *Juniperus* or *Larix* in the material.

C. pygmaea was at Krokskogen, Smeddalen taken at 600 m a.s.l. It might follow the conifers up to the tree border, but no specimens have been caught in subalpine areas.

C. pygmaea is known to occur in dense populations further south in Europe. More than eighty specimens were netted at Strupe, Halden which suggests dense populations also in Norway. In addition several records consists of more than 10 specimens.

4. *Coniopteryx tineiformis* Curtis 1834

Material: 399♂♂ 321♀♀ 5 larvae Figure 1, Map 4.

Ø Halden: Fredriksten 5 June 1967 1♂; Rygge: Telemarkslunden MT 19 May-17 June 1992 1♂ 2♀♀ . AK Ås: Kaja 15 June 1973 1♂ 2♀♀, 29 June 1973 1♂, 13 July 1973 1♀ NLH; Bærum: Ostøya MT A 30 May-10 June 1984 1♂ ,MT C 10 June-1 July 1984 1♂; Asker: Sem 26 May 1973 1♂, 5 June 1973 4♂♂ 4♀♀, 4 July 1973 3♀♀, 2 Oct. 1973 1♀, 30 April 1974 1♂, 10 May 1974 2♂♂, 20 May 1974 2♂♂ 3♀♀, 4 June 1974 1♂ 3♀♀, 19 June 1974 6♀♀, 6 July 1974 2♂♂ 4♀♀, 18 Aug. 1974 1♀ 2 larvae, 2 Oct. 1974 3 larvae, 21 May 1975 1♀, 2 June 1975 1♂, 10 June 1975 1♀, 9 July 1975 1♀, 29 July 1975 1♀ NLH. BØ Hurum: Tofteholmen 1-28 May 1991 4♂ 4♀♀; Røyken: Hyggen, Kinnartangen MT 28 May-6 July 1991 1♂ 1♀, 4 Aug.-8 Sept. 1991 1♂. VE Tønsberg: Frodåsen 11 May 1974 1♂, 18 May 1974 1♂, 15 June 1975 2♂♂ 1♀; Våle: Kommersøya MT 2-28 May 1991 1♂ 2♀♀, 28 May-9 July 1991 3♂♂ 2♀♀, Langøya MT 8 July-2 Aug. 1991 3♂♂; Nøtterøy: Herstad 15 May 1874 1♂, Mellom Bolærne 10 June 1975 2♂♂; Tjøme: Tjøme 4 June 1965 1♂, 18 July 1965 1♂ 6♀♀, 3 July 1966 2♂ 40♀♀, 8 Aug. 1974 1♂ 2♀♀, Kolabekkilen 4 July 1985 2♂♂, Mostranda 2 July 1982 1♂. TEI Kviteseid: Morgedal, Brekke 28 June 1975 6♂♂ 6♀♀; Seljord: Seljord 3 July 1975 1♂ 2♀♀. VAY Mandal: Mandal, Huse 32 VMK 082326 10 July 1978 1♂; Sogndalen: Brunvann 32 VMK 197423 7 July 1978 1♂; Lyngdal: 1.5 km West of Lyngdal 19 July 1977 1♂ 3♀♀. RY Sandnes: Bråstein 22 May 1981 1♂, Lutsi 11 June 1976 2♂♂, Melsheia 13 June 1976 7♂♂; Tysvær: Kårstø 13 July 1981 1♂ 1♀, 14

July 1981 1♂ 10♀♀. RI Forsand: Forsand MT 8 May-13 June 1982 1♂ 1♀; Hjelmeland: Jøsneset, Fosså MT 8 May-13 June 1982 1♂ 1♀. HOY Bergen: Bergen 16 June 1966 7♂♂ 8♀♀, Hellenesset 15 June 1980 2♂♂ 4♀♀, Isdalen 9 June 1966 2♂♂ 1♀, 7 June 1969 12♂♂ 9♀♀, 20 May 1972 1♂, Munkebotten 8 June 1978 10♂♂ 12♀♀, 28 June 1978 2♂♂ 1♀, Ole Irgensvei 31 May 1975 1♂, Sandviken 10 June 1975 4♂♂ 3♀♀, 7 Aug. 1980 1♂ 2♀♀, 24 May 1981 19♂♂ 11♀♀, Skansen 21 June 1981 4♂♂ 1♀, Øvre Sollien 3 June 1969 1♂, (Fana), Dyngelandsvann 5 June 1968 2♂♂, Fantoft 11 June 1969 16♂ 13♀♀, 13 June 1969 10♂♂ 3♀♀, 17 June 1969 22♂♂ 16♀♀, Kristianborgvann 8 June 1986 1♂, Mjølkevika 9 May 1975 1♂ 3♀♀, Myravann 6 June 1969 13♂♂ 5♀♀, Nesttun 18 June 1966 1♂ 3♀♀, Paradis 11 June 1968 3♂♂ 2♀♀, (Åsane), Åsane 26 June 1966 11♂♂ 30♀♀, Eidsvåg, Vollane 12 June 1968 1♂ 4♀♀, 1-9 June 1978 CT 3♂♂, 20-28 June CT 1978 1♂, Steinestø 10 June 1966 1 ♂ 2♀♀, Åstveit 25 May 1966 6♂♂ 1♀, 1 Aug. 1966 21♂♂ 32♀♀; Bømlo: Erlandsvåg 27 June 1♂ 1♀; Stord: Gullberget 29 June 1976 1♂, Rommetveit 27 June 1976 1♂ 4♀♀, Sandvikvåg 18 June 1975 3♂♂ 1♀; Samnanger: Holdhus 27 May 1985 3 ♂♂ 1 ♀; Os: Drange MT 5-14 June 1988 1♂, Halgjem 28 June 1975 1♂, Mobergviki 13 June 1982 1♂; Austevoll: Møgster 23-24 June 1975 1♂ 3♀♀; Vaksdal: Eidslandet 3 July 1966 1♂ 2♀♀; Osterøy: Fitjarhellen 2 June 1975 5♂♂ 3♀♀, Herland 32 VLN 105216 LT 16-21 June 1972 1♂, Kleppe 16 June 1986 3♂♂ 2♀♀. HOI Kvinnherad: Løfallstrand 6 June 1966 3♂♂ 3♀♀, Uskedal 2 June 1966 3♂♂ 1♀; Ullensvang: Djønno MT 22 May-5 June 1984 1♂, Kinsarvik 28 May 1982 2♂♂, Lofthus 26 June 1975 3♂♂ 10♀♀, Utne 4 July 1975 2♂♂ 6♀♀; Ulvik: Hallanger 28 May-16 June 1982 MT 1♂; Granvin: Granvin 28 May-16 June 1982 MT 1♂ 1 ♀; Kvam: Berge 27 May 1985 1♂, Fyksesund, Bjerke MT 28 May-16 June 1982 2♂♂, Tørvikbygd 21 July 1971 1♂. SFI Sogndal: Sogndal 17♂♂ late May, June and primo July 1972; Leikanger: Grinde CT late June-primo July 1991 21♂♂ 4♀♀, 27 May-11 June 1992 1♂ 1♀, Husebø 7 July 1982 11♂, Leikanger late May, June and primo July 1992 46♂♂. NTY Namsos: Namsos 15 June 19 (1919?) 1♂ TRM. NTI Steinkjer: Steinkjer 28 June 1983 4♂♂ 1♀; Stjørdal: Vikan 14 July-20 Aug. 1990 MT 3♂♂ 3♀♀. NSY Bodø: Sjågand, Valnes 6 July 1981 1♂ 2♀♀.

C. tineiformis was first recorded from Norway by Zetterstedt (1840). Tjeder (1943) revised the material of Neuroptera recorded by Schøyen (1887). No Coniopterygidae existed in the collection, but Tjeder refers to two specimens of *C. tineiformis* from NTI Verdal: Garnes and Levanger: Tyness which both are in Zetterstedt's collection in Lund. I have not seen this material, but I trust Tjeder's identification and I have included the records in the map presented here. *C. tineiformis* is here reported new to AK, TEI, RY, RI, SFI and NSY. Tjeder also refers Zetterstedt's record from TRY Skjervøy, but as no specimens are present in Zetterstedt's collection from neither Nordland, Troms or Finland the Skjervøy record is not included here. Further records are given by Greve (1967,1969) and Andersen & Greve (1975).

The bulk of indetermined *Coniopteryx* females probably belongs to *C. tineiformis* since this is by far the most common species viz. the main bulk of determined *Coniopteryx* males. There are females from localities in OS, BØ, TEY, AAI, SFY and NSI representing areas where *C. tineiformis* has not been recorded. Neither *C. borealis* nor *C. esbenpeterseni* have been recorded from areas north of Sogn & Fjordane and probably all the *Coniopteryx* females from NTI, NSY and NSI are *C. tineiformis*. The record of a male from Sjågand somewhat north of 67°N represents the northernmost record, and since it is further north than Meinander's (1962) record from Finland shortly north of 64°N, it is the northernmost for Europe.

C. tineiformis has a Holarctic distribution, recorded from northern Spain, Corsica, northern Greece and east into Asia and further in North America (Aspöck et al. 1980).

C. tineiformis has not been found in the subalpine or alpine regions in Norway, lacking both in the survey at Hardangervidda (Greve 1976) and at Dovre (Greve et al. 1987). Collections by the author in other mountainous area of Norway have not yielded material of *C. tineiformis* either. The highest altitudes in southern Norway for this species are approximately 400-500 m a.s.l.

C. tineiformis prefers deciduous or mixed forest. The few nettings from coniferous trees like pine (*Pinus silvestris*) are always in mixed forests. Forest edges with shrubs are preferred biotops, but not very low vegetation. A list of deciduous trees where *C. tineiformis* has been found comprises: *Quercus* sp., *Tilia cordata*, *Ulmus glabra*, *Fraxinus excelsior*, *Sorbus aucuparia*, *Salix* sp., *Acer platanoides*, *Betula* sp., *Fagus silvatica*,

Corylus avellana and *Alnus* spp. These species are the common Norwegian deciduous trees. There are also many records from fruit gardens with apple-, pear- and plum-trees. Some material is from gardens.

In southern Norway adult specimens of *C. tineiformis* have been collected from very late April untill early October. A long activity period can mean two generations pr. year in some localities. A light trap emptied regularly at Sem, Asker collected specimens continously from 30 April untill 18 August (1973) and 26 May-2 Oct (1974). The total number of specimens was low, however. From Northern Trøndelag and further north 11 records, are from late June to early August. This number also include records of *Coniopteryx* females.

C. tineiformis has been found associated with other Coniopterygidae as *C.esbenpeterseni* and *Semidalis aleyrodiformis*, see below.

Mass occurence was observed on some localities. More than 25 specimens have been collected occasionally in some areas of southern Norway. Otherwise few specimens have been collected from each locality.

5. *Conwentzia pineticola* Enderlein, 1905
Material: 33♂♂ 17♀♀. Figure 2, Map 6.

AK Ås: Ås 7 Sept. 1973 1♂ NLH; Nesodden: Fagerstrand LT 8-9 Sept. 1991 1♂; Bærum: Ostøya, Ringerikshaugene 2 June 1984 1♀. ON Skjåk: Marlo 21 August 1978 1♀. BØ Hurum, Tofteholmen MT 7-31 July 1991 1♂. BV Uvdal: Øvre Hein 1130 m a.s.l. 21 Aug.1969 1♀. VE Sandefjord: Årø 27 July 1969 1♀, 29 July 1969 1♂; Borre: Bastøy 9 June 1974 1♂; Sem: Gullkronen 4 May 1974 1♂; Nøtterøy: Herstad LT 31 May 1971 1♂, 2 June 1971 1♂, 1 July 1971 1♂, 2 July 1971 1♂, 4 July 1971 1♂, 6 July 1971 1♂, 8 July 1971 2♂♂, 9 July 1971 1♂, 27 Sept. 1971 1♂, 3 Okt.1971 1♂, Vestfjorden, LT 2-8 July 1973 2♂♂. TEY Kragerø: Portør 7 July 1976 1♀. TEI Kviteseid: Vråliosen 30 June 1975 1♀. AAY Risør: Bossviktjern 9 July 1976 1 ♂ 1♀, Granli 6 July 1976 1♂, Laget 10 July 1976 1♂; Grimstad: Feviktjern VMK 805710 15 July 1977 1♂, 17 July 1977 2♂♂ 1♀, Vik 13 July 1977 1♂; Froland: Blakstad VMK 7985 16 July 1977 2♂♂ 1♀; Birkenes: Hereforsfjord, Stien VMK 6284 16 July 1977 1♀; Lillesand: Moland 18 July 1977 1♀. RY Øksnevad: Klepp 4 June 1977 1♀. HOY Bergen: Muséhagen 9 May 1969 1♂, (Fana), Myravann 5 June 1969 1♀; Osterøy: Herland VLN 105216 4-15 Okt.1972 1♂; Vaksdal: Eksingedalen, Flatekvål 29 June 1969 2♀♀. HOI Ullensvang: Espe 28 Sept.1982 1♂. NTI Stjørdal: Svesjøen, Skånvikholm East 9 August 1982 1♂ 1♀. TRY Tromsø: Ramfjordnes MT Sept. 1991 1♀. FI Alta: Gargia 34 WEC 965468 2 July 1979 1♂.

C. pineticola was first recorded from HOY, Greve (1969), see also Andersen & Greve (1975). *Conwentzia pineticola* is here reported new to AK, ON, BØ, TEI, TEY, AAY, RY, HOI, NTI, TRY and FI.

C. pineticola End., 1905 and the closely related *C. psociformis* (Curtis, 1834) are the only two *Conwentzia* species hitherto recorded from Europe. The males are determined by characteristics of the genitalia, while the females are distinguished in the difference of the number of antennal segments only. Zeleny (1961a,b) reports variation in number in Czech females from 31 to 33, Meinander (1972) in Finnish material from 30 to 35. The variation in the Norwegian *C . pineticola* females was from 31 to 34, one specimen only with 34. The males in the Norwegian material had from 31 to 38 antennal segments compared to from 32 to 36 segments reported by Meinander (1972).

C. pineticola has wide distribution in Norway. Only two records are from the Northern Norway. In Fennoscandia it has been recorded from both Northern Sweden and Northern Finland Meinander (1972). *C. pineticola* has a wide distribution in the Holarctic region Aspöck et al. (1980).

Most of the records are from the lowlands, only one from the alpine region at 1130 m a.s.l. at eastern Hardangervidda Greve (1976).

Most of the material has been netted from conifers, both *Pinus silvestris* and *Picea abies*. There are also records from planted spruce in western Norway. Some records are from deciduous trees, one from a fruit garden. The habitat at Hardangervidda was far away from any conifers and above upper borderline for conifers in the areas around the Hardangervidda plateau. The specimen was netted in shrubs of *Betula nana*. Several records represent light traps. *C. pineticola* has also

been reported from light traps in HOY, Andersen & Greve(1975). Eleven males and no females were caught at light at Herstad.

Imagines have been caught flying from May to October.

6. ***Conwentzia psociformis*** (Curtis, 1834)
Material: 32♂♂ 47♀♀. Figure 1, Map 7.

Ø Rygge: Ekeby, Telemarkslunden MT 21 July-24 Aug. 1992 1♂. AK Nesodden: Fagerstrand LT 7-8 Aug. 1989 1♂, 5-6 Sept.1989 2♂♂, 28-29 July 1990 1♀, 18-19 Aug. 1991 1♂. BØ Røyken: Hyggen, Kinnartangen MT 4 Aug.-8 Sept. 1991 2♂♂. VE Horten: Løvøya 19 May 1975 1♂; Tønsberg: Frodåsen 18 May 1974 1♀, 9 June 1975 1♂ 1♀; Sandefjord: Nes 8 July 1970 5♀♀, 6 Aug. 1974 6♂♂ 11♀♀; Nøtterøy: Herstad LT 9 Aug. 1970 1♂, 2 June 1971 1♂, Mellom Bolærne 10 June 1975 2♀♀; Tjøme: Berstad 8 Aug.1974 1♂ 13♀♀, Kjære 8 Aug. 1974 1♂ 3♀♀, Moutmarka 16 June 1974 1♂. AAY Risør: Stamsøykilen 32 VNL 078124 3 Aug. 1980 1♂. HOY Bergen: Sandviken 10 June 1975 1♀. HOI Etne: Molnes 32 VLM 237245 28 June 1985 1♀; Kvinnherad: Varaldsøy 25 Aug. 1976 1♂. SFI Vik: Tveit 5 Aug.1974 10♂♂ 8♀♀.

Conwentzia psociformis was first recorded from Vestfold province in Norway by Greve (1971). It is here reported new to AK, BØ, AAY, HOY, HOI and SFI. The distribution according to Aspöck et al. (1980) covers all Europe and northern Africa, Asia, North America and New Zealand. They leave the question open, however, whether more than one species may be involved. The number of antennal joints of males in the Norwegian material is from 38-42, in females from 36-42 which correspond well with Meinander (1972).

The Norwegian distribution is restricted to coastal areas in southern Norway, or in along the fjords of western Norway. The record from Sogn & Fjordane province is the northernmost hitherto recorded from Europe.

Aspöck et al. (1980) recorded *C. psociformis* from deciduous trees, and note a strong preference for *Quercus* sp. All records in the Norwegian material is either from oak or when no trees have been specified, deciduous forests with some oaks. AK Nesodden: Fagerstrand represents light trap, for details of this locality see Kobro (1991).

Imagines have been caught from middle of May until late August. Three records from VE Sandefjord: Nes, Tjøme: Berstad and Vik: Tveit represent more than 15 specimens each and thus indicate fairly dense populations. 79 specimens represent 14 localities only, for *C. pineticola* 47 specimens represent 27 localities.

7. ***Helicoconis lutea*** (Wallengren, 1871)
Material 35♂♂ 18♀♀ 183 larvae 1 pupa. Figure 2, Map 8.

Ø Halden: Prestbakke MT Primo June-30 June 1986 1♀; Rygge: Ekeby, Telemarkslunden MT 21 July-24 Aug. 1992 1♀. AK Bærum: Ostøya MT B 30 May-10 June 1984 1♂. OS Gjøvik: Gjøvik 15 June 1975 1♂. ON Skjåk: Staurust, approximately 800 m a.s.l. 15 June 1978 2♂♂. BØ Modum: Hovlandsfjellet 16 June 1990 1♂; Røyken: Hyggen, Kinnartangen MT 2-28 May 1991 2♀♀, LT July 1991 1♀, Hurum: Tofte MT 17 June-17 July 1985 MT 1♀. VE Sande: Kommersøya MT 9 July-2 Aug. 1991 1♀; Nøtterøy: Herstad 2 June 1971 1♂, 4 July 1971 1 ♂; Tjøme: Kjære 27 June 1968 1♀, Tjøme 3 July 1966 1♂. TEI Kviteseid: Morgedal, Brekke 28 June 1975 1♀, Morgedal, Bygland 28 June 1975 1♂; Tokke: Dalen 30 June 1975 1♂. AAY Risør: Barmen 11 July 1976 3♀♀, Granli 6 July 1976 1♀, Laget 10 July 1976 2♂♂ 2♀♀, Risøya 11 July 1976 1♀; Grimstad: Feviktjern 17 July 1977 1♂; Lillesand: Vestre Moland VMK 6258 18 July 1977 1♀. HOY Osterøy: Kleppe June 1972 1♂. HOI Ulvik: Finse 25 June 1992 1♂; Eidfjord: Vøringsfoss 23 June 1969 1♂, Stigstuv 2-24 July 1971 3♂♂ 3♀♀, Stigstuv Loc.I, Loc. II and Loc. III 1971/1972 182 larvae, 1 pupa, 1♂, North of Bjoreidalshytta 20 July 1975 1♀, 2.2 km South east of Stigstuv 12 June 1970 1 larvae; Voss: Solbakken VLN 864317 MT 8 June-13 July 1985 1♂. STI Oppdal: Kongsvoll: Blesbekken, CT 23-30 July 1985 1♀, Kongsvoll, Gåvålibekken MT 26 June-3 July 1982 1♂, Lønset MT 1-12 June 1992 1♂, 24 June-17 July 1993 1♂; NTI Stjørdal: Svesjøen, Steinviksholm East 9 August 1982 1♂. FV Måsøy: Gunnarsnes 14 July 1991 1♂. FN Tana: Tana 10 July 1985 9♂♂; Vardø: Båtsfjord 22 July 1962 1♂. FØ SørVaranger: Øvre Pasvik, Svartbrysttjern 3 July 1974 1♂.

Helicoconis lutea (Wallengren, 1871) was first recorded from Norway by Tjeder (1943) from TRY Skjervøy: Skjervøy "Raschtind", see Greve (1986).

The material is in Zetterstedt's collection in Lund, Sweden. Further records are reported by Greve (1967,

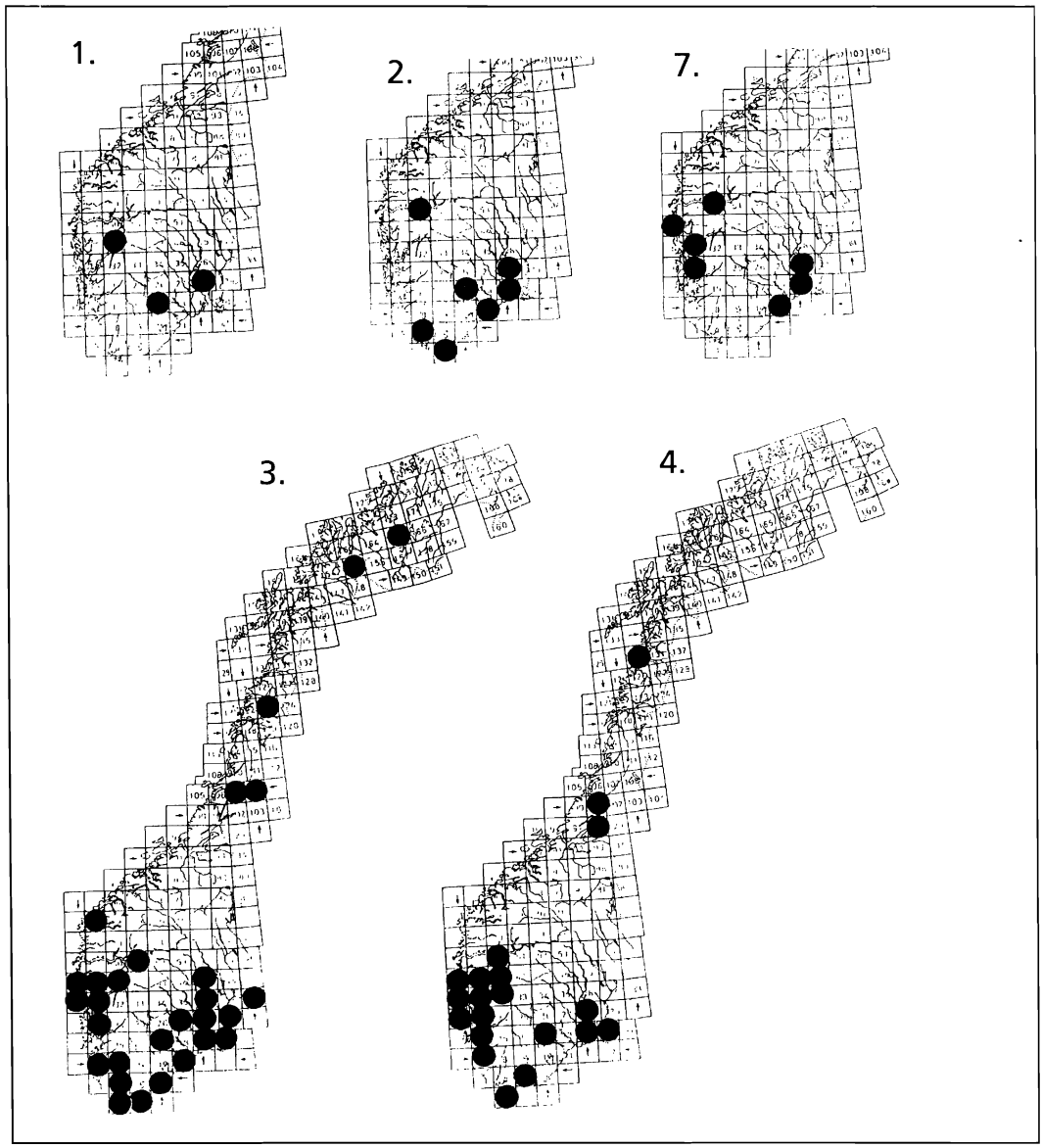

Figure 1
Maps 1, 2, 3, 4 & 7. Distribution of Coniopterygidae species in Norway mapped in EIS squares: 1. *Coniopteryx borealis* Tjeder. - 2. *C. esbenpeterseni* Tjeder. - 3. *C. pygmaea* Enderlein. - 4. *C. tineiformis* Curtis. - 7. *Conwentzia psociformis* (Curtis).

1969), Greve et al. (1987). *H .lutea* is here reported new to Ø, AK, OS, ON, BØ, TEI, AAY, HOY, NTI , FV, FN and FØ.

The distribution of *H. lutea* after Aspöck et al. (1980) is mainly north of 45°N and West of the Greenwich meridian. There are also records from Northern Italy Monserrat (1980). *H. lutea* is also recorded from northern Asia and parts of Canada and USA Meinander (1990).

H. lutea is recorded from several localities in alpine areas like Stigstuv at 1275, 1230, 1225 m a.s.l. (Greve 1974), Blesbekken at 1200 m a.s.l. and Gåvalibekken at 930 m a.s.l. Greveet al. (1987).

In the lowlands imagines have been collected from deciduous trees as well as conifers, however, most material on conifers. At higher altitudes at HOI Voss: Solbakken in open forests of birch and pine. I have also seen specimens from birch forest or just above the birch border line collected in Abisko, Northern Sweden, not too far from the Norwegian border. The highest records are, however, from areas without forests and habitats like lichen heath, dry meadows etc. see Greve (1974).

The flight period is from late June to early August. *H. lutea* specimens have been collected in Malaise traps, light traps, as well as in sweep netting, and larvae has been collected in suction traps (Greve 1974).

Arne Fjellberg (pers. comm.) have on two occasions observed massswarming. One observation was from the mountain above Staurust, Skjåk at approximately 800 m a.s.l. at 06.30 in the morning, a warm day with no wind and the habitat was a dry hillside with heather. The adults flew low above the ground, and two males were collected. The second observation was from Tana on a dry heather hillside in the evening on 10 July 1985 a warm day with no wind. The specimens were crawling in the heather and flew in short intervals only. Nine males were collected,

8. *Parasemidalis fuscipennis* (Reuter, 1894)
Material: 3♂♂ 3♀♀ Figure 2, Map 9.

BØ Røyken: Hyggen, Kinnartangen LT 15-30 June 1986 1♀. VE Sande: Kommersøya MT 28 May-9 July 1991 1♀; Hedrum: Osestad 32 VNL 540746 LT 6-15 July 1974 1♀. STI Klæbu: Målsjøen LT 18-22 June 1971 1♂ , 1-5 July 1971 1♂, 16-20 June 1972 1♂.

P. fuscipennis was reported new to Norway from STI by Aagaard & Solem (1972). Two more specimens were later recorded (Solem & Aagaard 1973) from the same locality. I have only seen one of these specimens. *P. fuscipennis* is here reported new to Bø and VE. The distribution according to Aspöck et al. Hölzel (1980) is wide, but scattered in Europe. The locality in STI Klæbu: Målsjøen is the northernmost record in Europe. Outside Europe the distribution is holarctic Mongolia, USA and Mexico(Meinander 1990).

P. fuscipennis is found associated with conifers, especially *Pinus* or *Juniperus.* The locality at Målsjøen is in conifer forest. The locality at Osestad was near spruce forest at the foot of a mountain wall with pine *Pinus silvestris* and some *Juniperus communis.*

Five of six specimens collected have been taken in light traps. The flight period in Norway is June and early July. This is remarkable since for many other insects light traps are ineffective in this period.

Aspöck et al. (1980) report the species to occur in small populations.

9. *Semidalis aleyrodiformis* (Stephens, 1836)
Material: 65♂♂ 167♀♀ 1 specimen 1 larva. Figure 2, Map 10.

AK Frogn: Håøya 1 June 1990 1♂; Nesodden: Fagerstrand LT 3-4 July 1990 1♀, 25-26 June 1991 1♂, 1-2 July 1991 1♀, 8-9 June 1992 1♀, 6-7 July 1992 1♀, 7-8 July 1992 1♀; Bærum: Ostøya, Ringerikshaugene 31 May 1984 5♂♂, 2 June 1984 1♂,MT A & B 12-30 May 1984 3♂♂,MT B 30 May-10 June 1984 3♂♂ 2♀♀; Asker: 19 June 1974 1♀, 6 July 1974 2♀♀, 18 August 1973 1 larva, 2 Oct. 1973 1 larva; Lørenskog: Losby WT 28 May-28 June 1991 1♂. HES Eidskog: Helgesjøen 11 July 1974 1♀. BØ Røyken: Hyggen, Kinnartangen LT July 1991 2♀♀

Hurum: Mølen 17 June 1978 1♂ 1♀. VE Holmestrand: Holmestrand 18 June 1978 1♀; Tønsberg: Frodåsen 18 May 1974 3♂♂, 26 May 1974 1♂ 2♀♀, 13 June 1974 1♀, Ultimo August 1♀, 9 June 1975 4♂♂ 8♀♀; Sandefjord: Nes 5 July 1970 3♀♀, 8 July 1970 1♂ 4♀♀, Årø 27 July 1969 1♀, 29 July 1969 1♀; Sande: Kommersøya MT 28 May-9 July 1991 3♂♂ 1♀; Stavern: Stavern VNL 596397 5 July 1980 1♀, 6 July 1980 1♀; Våle: Langøya MT 25 May-8 July 1991 1♀; Nøtterøy: Herstad 28 July 1971 1♀, 21 May 1974 1♂, Mellom Bolærne 10 June 1975 1♂; Tjøme: Kolabekkilen East 4 July 1985 3♀♀, Kjære 21 June 1969 11♂♂, 8 August 1974 1♀, Kjærelia 8 June 1975 1♀, Mo 11 August 1968 1♀, Moutmarka 28 June 1985 1♂ , Tjøme 28 June 1965 1♀. TEY Kragerø: Kragerø 32 VNL 2127 9 July 1976 2♀♀; Levang: Portør 7 July 1976 1♀. TEI Seljord: Sandsdalen East 1 July 1975 1♀, Seljord, Seljord 3 July 1975 1♂ 9♀♀; Kviteseid: Kviteseid 30 June 1975 2♀♀, Haugland 4 July 1970 1♂. AAY Risør: Barmen 32 VNL 0911 11 July 1976 2♀♀, Bossviktjern South 8 July 1976 1♂ 2♀♀, Garte 9 July 1976 1♀, Granli 6 July 1976 1♂ 3♀♀, Risøya 6 July 1976 1♂ 2♀♀, Øysang 7 July 1976 8♀♀; Grimstad: Bringsvær, Fjære 13 July 1977 7♀♀, Eid, Søndle VMK 7274 14 July 1977, Fjære, Engene 7 July 1975 1♀, Grøsle VMK 6173 16 July 1977 2♀♀, Fevik: Fevik 16 July 1977 1♀, Vik 13 July 1977 6♀♀, Vik VMK 7870 17 July 1977 2♀♀; Moland: Landvik 7 July 1975 2♂♂ 1♀, Landvik, Skiftenes 32 VMK 702747 30 June 1971 1♀; Froland: Blakstad VMK 7985 16 July 1977 2♀♀; Øyestad: Øyestad VMK 7975 13 July 1977 7♀♀; Birkenes: Hereforsfjord, Stien VMK 6284 16 July 1977 3♀♀. VAY Kristiansand: Drangsholt 18 July 1977 1♂ 2♀♀ 1 specimen, Oddernes, Gimlemoen 19 August 1967 1♂; Mandal: Nordre Brinsdal VMK 138431 5 July 1978 5♀♀, Holmefoss bro 12 July 1977 2♀♀, Homsevik VMK 122312 6 July 1978 1♀, Huse VMK 082326 10 July 1978 1♀, Sauland VMK 063313 6 July 1978 2♀♀, Skjernøy VMK 130298 6 July 1978 1♀, Smeland VMK 138 450 5 July 1978 1♀, Tregde VMK 155307 6 July 1978 2♀♀; Flekkefjord: Lavoll VLK 622706 4 July 1978 2♀♀; Sogndal: Brunvatn VMK 197427 7 July 1978 4♀♀, Stokkeland near Vehus VMK 295523 7 July 1978 1♂ 4♀♀; Marnardal: North of Koland VMK 123555 5 July 1978 4♂♂ 2♀♀; Lyngdal: Nakkestad VLK 870380 9 July 1978 1♀. HOI Etne: Molnes VLM 237245 28 June 1985 2♂♂ 7♀♀. HOI Kvam: Berge 27 May 1985 1♂, Ljonesvåg VLM 420850 15 June 1974 2♂♂ 10♀♀, 9 July 1974 4♂♂ 5♀♀, 1 km West of Ålvik 20 July 1975 1♀. MRI Norddal: Tafjord, Fjøra 32 VMQ 156065 MT 1 23 June-18 July 1993 1♀.

Semidalis aleyrodiformis was first recorded new to Norway from VE (Greve 1966). Further records are reported by Greve (1969). *S. aleyrodiformis* is here recorded new to AK, HES, BØ, TEY, TEI, AAY, HOI and MRI. The main distributional area is SE Norway. *S. aleyrodiformis* is also recorded from parts of Hordaland province. One isolated locality is in MRI. The distribution according to Aspöck et al. (1980) is all Europe including England and Scotland and parts of Asia. The northernmost record in western Fennoscandia is a little north of 62°N, in the eastern part one record from Finland is north of the Bothnian Bay. The locality Fjøra is a steep southern exposed deciduous forest with several xerotherme plants.

S. aleyrodiformis have been netted from many different trees and shrubs in Norway: *Quercus* spp. *Ulmus glabra*, *Corylus avellana*, *Alnus* spp., *Sorbus* spp. *Pinus silvestris* and *Picea abies*. Most often specimens have been netted from mixed deciduous forest or shrubs along forest edges, more rarely on coniferous trees. In fruit gardens it has been netted from plums, apples and pear trees. Aspöck et al. (1980) note *S. aleyrodiformis* as eurytopic and the Norwegian material supports this view.

S. aleyrodiformis is also often noted as occurring in large populations in Europe (Aspöck et al. 1980). There are no observations of mass occurrence from Norway although more than ten specimens have been netted on some localities. *S. aleyrodiformis* has been collected together with other Coniopterygidae like *Coniopteryx esbenpeterseni*, *Conwentzia psociformis* and *Coniopteryx parthenia* on some localities. In some provinces like VE, AAY and VAY *S. aleyrodiformis* is a common species.

The flight period is from late May untill August. The bulk of the material have been collected in late June and the first three weeks of July.

Relatively few specimens have been collected in Malaise traps and light traps compared to those netted. The light trap at Fagerstrand collected specimens in late June and early July.

More females than males have been collected, 59 males compared to 159 females. This material does not allow any conclusion about ratios, however.

Plant (1992) who recently recorded *S. pseudouncinata* from the British Isles refers to a character in the venati-

on of the wings of *S. aleyrodiformis* which he considers constant for British specimens. In the wings the radial crossvein joins R distal to the fork of R and Rs and R 1+2. According to Plant this character could therefore be used to separate *S. aleyrodiformis* from *S. pseudouncinata*. The character is not constant in the Norwegian material where in several specimens the crossvein join R basal to the fork, or at the fork itself.

Additional material

This is a material of 401 *Coniopteryx* sp., indetermined females and larvae, listed below. Figure 2, Map 5.

Coniopteryx spp.females & larvae
Material : 397♀♀ 4 larvae.

AK Nesodden: Fagerstrand LT 15-16 Aug.1989 1♀, 3-4 July 1990 1♀; Ås: Ås 21 July 1986 1♀; Bærum: Ostøya MT B 24 July-12 Aug.1984 1♀, 5 Sept. 1987 1♀. HES Ringsaker: Brumunddal, Dæli 28 June 1991 1♀, Helgøya, Eiksåsen 32 VPN 085353 1990 1♀. OS Gjøvik: Gjøvik 15 June 1975 1♀; Gausdal: Follebu, Bjørkne 26 July 1973 2♀♀. BØ Røyken: Hyggen, Kinnartangen Primo July 1989 1♀, MT 6 July-4 Aug. 1991 2♀♀; Hurum: Mølen 12-14 July 1989 2♀♀, 2-4 July 1990 1♀, Tofte MT 8 Aug.-1 Sept. 1985, 1♀, Tofteholmen MT 3-31 July 1991 1♀. VE Tønsberg: Frodåsen 13 June 1984 1♀; Sandefjord: Nes 8 July 1969 1♀, 5 July 1970 1♀, Årø 27 July 1969 1♀; Sande: Kommersøya MT 9 July-2 Aug. 1991 5♀♀; Våle: Langøya MT 2 Aug.-1 Sept. 19911♀, 1 Sept.-26. Oct. 1991 1♀; Nøtterøy: Magnhildsåsen 12 June 1974 3♀♀, Mellom Bolærne 10 June 1975 2♀♀; Tjøme: Berstad 8 Aug. 1974 1♀, Kjære 18 June 1965 1♀, 15 July 1966 1♀; Andebu: Bølevann UTM 32 VNL 581771 15 July 1974 1♀; Stavern: Stavern 32 VNL 593397 5 July 1980 1♀. TEY Kragerø: Kragerø 32 VNL 21 27 9 July 1976 1♀. TEI Kviteseid: Kviteseid 30 June 1975 1♀, Kviteseid LT 24-29 July 1988 1♀; Tokke: Dalen 30 June 1975 1♀. AAY Risør: Garte 9 July 1976 1♀, Risøya 6 July 1976 3♀♀, 9 July 1976 2♀♀, Øysang 7 July 1976 2♀♀; Birkenes: Stien 16 July 1972 2♀♀; Lillesand: Håvåg 21 July 1966 4♀♀. AAI Valle: Rygnestad 12 July 1976 1♀. VAY Kristiandsand: Oddernes, Gimlemoen 19 Aug. 1967 1♀; Flekkefjord: Hidra, Dragøy MT 3-11 July 1982 1♀, 30 July-3 Aug. 1982 1♀, Råga MT 21-25 July 1982 1♀, Ysthus 14 July 1982 1♀; Lindesnes: Lenefjord 2 km from Lene 12 July 1977 2♀♀, Ramstad 32 VLK 881348 8 July 1978 1♀; Lyngdal: Nakkestad 32 VLK 870380 9 July 1978 2♀♀. RY Sandnes: Dale 29 June 1969 1♀; Finnøy: Kvitevik 8 June 1992 1♀, Sevheim MT 4-9 June 1992 1♀, 1 Aug. 1992 2♀♀; Karmøy: South of Sundfør 11 July 1977 4♀♀; Vindafjord: Sandeid 20 July 1977 1♀. HOY Bergen: Hegrenesset 13 June 1980 1♀, Hellenesset 28 July 1980 1♀, 11 Aug. 1980 1♀ 2 larvae, Muséhagen 7 July 1969 3♀♀, 12 July 1969 2♀♀, Nygårdparken 22 June 1969 1♀, 23 June 1969 1♀, Sandviken 7 Aug. 1980 1♀, Skansemyren 10 June 1972 2♀♀; (Fana) Fantoft 22 June 1973 1♀, St.Milde 9 July 1975 5♀♀, 6 July 1977 2♀♀, 8 July 1977 6♀♀, St.Milde, Naustdalen 6 July 1977 1♀, Myravann 8 June 1969 1♀, Straume 28 July 1975 1♀, Hellenesset 13 June 1980 1♀, 28 July 1980 1♀, 11 Aug. 1980 1♀ 2 larvae, (Åsane) Eidsvågsnesset, Furubotten 8 July 1969 1♀, Eidsvåg, Vollane 8 June 1969 1♀, 10 July 1972 3♀♀, 23 June 1973 2♀♀, CL 20-28 May 1978 1♀, Åstveit 19 July 1972 1♀; Bømlo: Sakseid 27 June 1966 1♀; Osterøy: Lono 32 VLN 093135 LT 20-29 June 1973 1♀; Stord: Gullberget 29 June 1976 1♀, Rommetveit 10 July 1969 2♀♀; Os: Osøyri 3 Aug. 1980 1♀, Telleviki 3 Aug.1980 1♀; Fjell: Vindenes 22 June 1978 1♀; Askøy: Siglingevann 22 June 1982 1♀; Samnanger: Holdhus, Ådland 3 June 1968 1♀; Meland: Brakstad 8 July 1966 2♀♀, 31 July 1977 1♀, Brakstad, Brakstadvann 25 June 1966 4♀♀; Vaksdal: Eidslandet 2 Aug. 1968 2♀♀, 27 June 1966 1♀. HOI Kvinnherad: Leirvikvann 12 July 1978 1♀, Rosendal, Hattebergelvi 4 June 1990 1♀, Rosendal, Sandquarry 23 May 1975 1♀; Odda: Solfonn hotel 13 July 1976 1 ♀; Ulvik: Hjeltnes 5 Aug. 1977 1♀; Kvam: Fosse 32 VLM 372846 15 June 1974 2♀♀, Ljonesvågen 32 VLM 420850 15 June 1974 1♀, 9 July 1974 2♀♀, Tordalsvann 1 July 1970 1♀. SFY Gulen: Eide LT 27 June-29 July 1973 2♀♀, 29 July-19 Aug. 1973 1♀, Grinde 26 June 1973 1♀; Gloppen: Vereide 6 Aug. 1984 1♀, 5 July 1986 1♀, 8 July 1986 1♀. SFI Fortun: Fortun 14 July 1938 1♀; Aurland: Vassbygdvann, Låvi LT 1968 1♀; Leikanger: Leikanger 1971-75 141♀♀; Sogndal: Sogndal 1971-75 81♀♀. NTI Stjørdal: Svesjøen, Steinvikholm East 9 Aug. 1982 3♀♀; Grong: Grong 8 Aug. 1982 1♀; Høylandet: Skiftesåa MT 18-25 June 1988 1♀, 25 June-2 July 1988 1♀. NSY Bodø: Bratten 4 July 1980 1♀, Skålmoen 6 July 1981 2♀♀. NSI Beiarn: Moljord 21 July 1981 1♀, Kvæl 19 July 1981 3♀♀, Soløy 21 July 1981 1♀; Rognan: Saltdal 20 June 1981 2♀♀.

Coniopteryx females listed above have been collected alone or with males of more than one species, and therefore can not be determined with certainty.

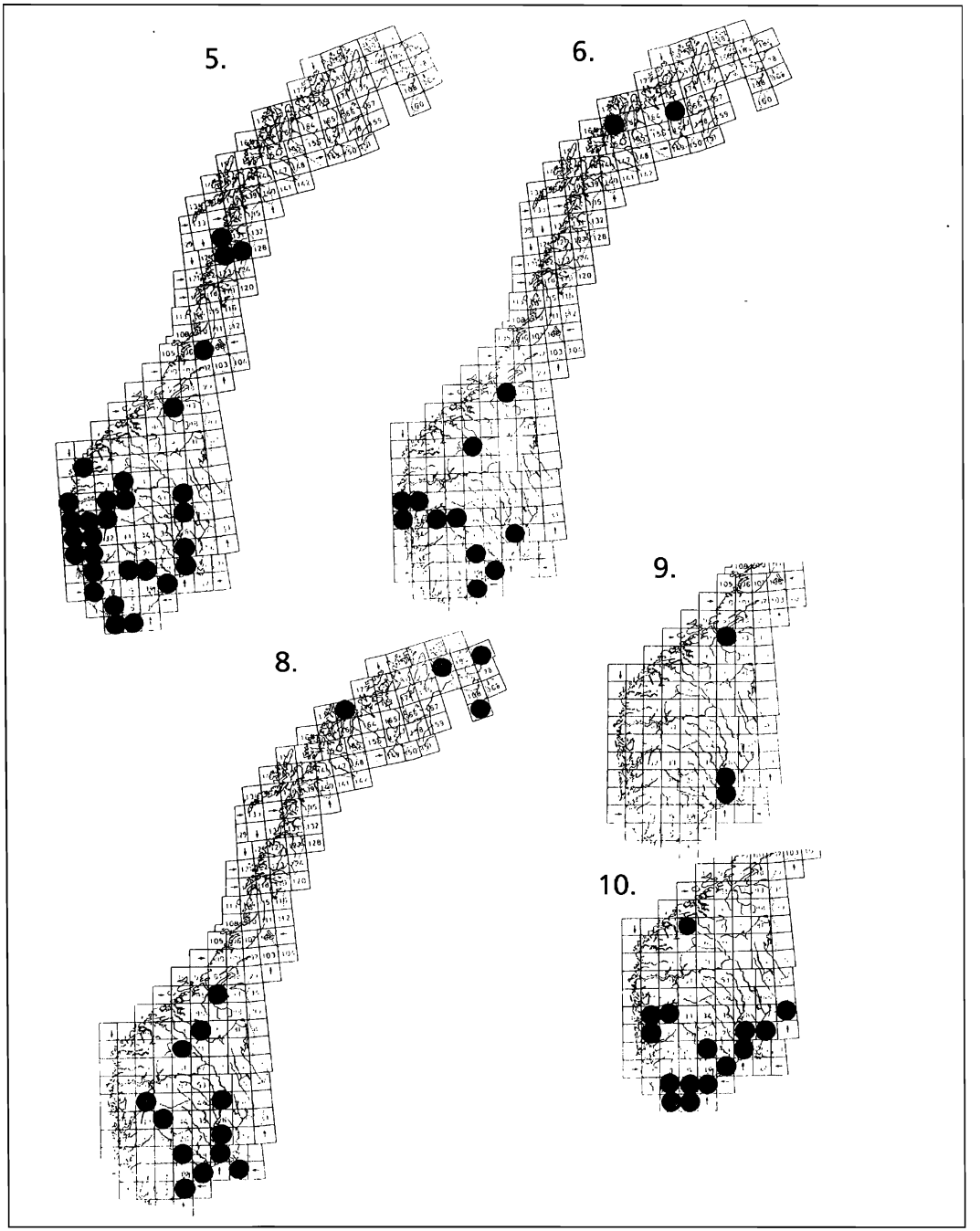

Figure 2
Maps 5, 6, 8, 9 & 10. Distribution of Coniopterygidae species in Norway mapped in EIS squares: 5. *Coniopteryx* sp. ♀♀. - 6. *Conwentzia pineticola* Enderlein. - 8. *Helicoconis lutea* (Wallengren). - 9. *Parasemidalis fuscipennis* (Reuter). - 10. *Semidalis aleyrodiformis* (Stephens).

DISCUSSION

Aspöck (1992) lists 47 species of Coniopterygidae from Europe. The fauna of Coniopterygidae in northwestern Europe is well known as far as number of species is concerned, but the distribution of the species, however, is insufficiently known (Aspöck 1992).

Of the Norwegian species *Coniopteryx tineiformis*, *C. pygmaea*, *Conwentzia pineticola* and *Helicoconis lutea* is distributed in southern, central and northern Norway. *C.tineiformis* is recorded as far north as Nordland county, while the three others have been recorded north to Finnmark county. The northern records are scattered and these species must be considered rare in the northern provinces. This type of distribution is the same as recorded from Finland by Meinander (1962).

One of the remaining species, *Parasemidalis fuscipennis,* is recorded from central Norway. *P. fuscipennis* has a wide distribution in the Holarctic (Meinander 1990), but it is scarce wherever it occurs (Meinander 1972). Only six specimens have been collected in Norway.

The remaining four species *Coniopteryx borealis*, *C. esbenpeterseni*, *Conwentzia psociformis* and *Semidalis aleyrodiformis* all have their distribution in southern Norway only. *C. borealis* is a very rare species in Norway, represented with only five males from four localities. The total area of distribution area outside Norway is fairly large. *C. borealis* is also considered a rare species elsewhere in Fennoscandia (Meinander 1962).

Of the four species restricted to southern Norway, all are recorded from the eastern as well as the western parts. Thus, none have their distribution restricted to the Oslofjord area as many insect species in Norway (see Greve & Midtgaard 1992). For three species, *Coniopteryx esbenpeterseni*, *Conwentzia psociformis* and *Semidalis aleyrodiformis*, there seems to be two areas of distribution, one larger area in southeast Norway and some smaller in western Norway. This is a distributional pattern also found in other insect groups. *C. psociformis* has only been collected in coastal areas and might prefer mild winters as well as high summer temperatures. Carnivorous Coniopterygidae, as adults or larvae, are closely associated with the host plants of the small phytophagous arthropods which constitute their normal diet (Monserrat & Marin 1992). Thus, the association with the plants are indirect. The plant species of the Norwegian material are mostly the same as recorded elsewhere in Europe. Important exceptions are for *Conwentzia pineticola* and *Helicoconis lutea* which in subalpine and alpine areas might live on bushes and herbs, and not on conifers which is preferred in the lowlands. This was also suggested by Meinander (1972). He recorded similar habitats from the Kilpisjärvi area in Northern Finland. *C. pygmaea* is often collected on spruce which is the dominating coniferous tree in parts of Norway, rarely on *Juniperus communis* which usually grows like a shrub and which is common in the whole area both in the lowlands and mountainous areas.

C. pineticola and *H. lutea*, two species of three with a distribution in northern Norway, are also recorded from the highest altitudes. *C. pygamea*, the third species in Northern Norway, has hitherto only been recorded in the lowlands.

C. tineiformis is the most common species of Coniopterygidae in Norway. The number of specimens caught of this species, 717 plus most of the 401 unidentified females, is nearly the double of the secondmost common species *C. pygmaea* represented with 392 specimens in the material.

The more rare *C. esbenpeterseni* has two areas of distribution. It has been collected from a restricted area in inner Sogn and Fjordane county and here nearly only from fruit-gardens. An anthropochor spreading of the species to this area is likely. The new record of *C. esbenpeterseni* from the very well surveyed southern part of The British Isles (Hynd & Plant 1991) supports the view of a rare and scattered species in northern Europe.

Semidalis aleyrodiformis has three areas of distribution. The records from Hordaland county are far apart, and *S. aleyrodiformis* is more scarce here than in SE Norway.

C. esbenpeterseni, *C. pygmaea* and *H. lutea* have mostly been collected in June and first half of July with some records in May and one in August. *Semidalis*

aleyrodiformis has a similar flight period, however, there are more records in August and even one as late as October for this species. Most of the specimens of these species fly in June/July. Most *C. tineiformis* specimens have been caught in June and early July. However, the earliest record are from last part of April and the last from last part of October. The long flight period suggests possible bivoltine populations in Southern Norway.

The flight periods of the *Conwentzia* species are from May until October. Most specimens of *C. pineticola* have been collected in July, most specimens of *C. psociformis* in August. Further south in Europe (in the lowlands) there are probably more than one generation each year (Aspöck et al. 1980).

The material of the rare *C. borealis* and *P. fuscipennis* is to small to be considered here.

Mass swarming indicating populations with a high number of specimens has occasionally been observed and this is noted under each species. According to Aspöck, et al. (1980), dense populations can locally occur in southern Europe for most of the species mentioned in this article, exceptions are *C. borealis* and *P. fuscipennis.* As a rule, the single specimens in the field are seldom seen flying. When disturbed, however, they may leave the vegetation, but quickly settle again.

The observed swarming on days without wind in some populations of *H. lutea* in alpine areas is perhaps an adjustment to an open and harsh environment where wind could easily disperse the population.

There seems to be more females collected than males for those species where the material is substantial.

ACKNOWLEDGEMENTS

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SAMMENDRAG

Nettvingefamilien Coniopterygidae i Norge

Familien Coniopterygidae (Neuroptera) har ni arter fordelt på fem slekter i Norge. Artikkelen har med en liste over artene og omtaler av hver art i tillegg til utbredelseskart med EIS-rutenett for Norge.

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Short communications

Buprestis novemmaculata L. (Coleoptera, Buprestidae) found in Norway

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The buprestid beetle *Buprestis novemmaculata* L. is reported found at two different sites in Drangedal, Telemark county in Southern Norway. Several specimens were collected on pine timber at two different sites in July and August 1997.

In Fennoscandia the buprestid beetle *Buprestis novemmaculata* is known from several districts of Sweden and Finland. There is also an old record from Denmark. From Norway there is only an old uncertain observation from Buskerud county (Lindroth 1960). The species is otherwise distributed from Southern and Central Europe to Siberia (Bily 1982).

On 16 July 1997 the author found three specimens of *B. novemmaculata* near Vefald in Drangedal, Telemark county. On the same day another specimen was found near Neslandsvatn, Drangedal. This site is situated about 15 kilometers from the first location. On both sites the specimens were flying in sunshine on piles of pine timber logs. Several more specimens were found on the first location on 19 July and on 11 August. On the latter day the animals were laying eggs on the timber logs. The eggs were deposited individually on the sun-exposed bark surface and in crevices in the bark.

The body length of the animals ranged from 16-19 mm, and they were of both genders. The orange spots on the elytra were very variable, ranging from one pair of small spots to eight large spots, of which one pair in the middle were exceptionally large in one specimen. The beetles can be seen in the author's collection.

The two sites where the beetles were found are so far apart that the beetles are likely to originate from different locations. This indicates that the species is well established in the area. The species is likely to have existed in the district for many years and been overlooked by collectors. Hence, further collection in Telemark county is likely to bring up more rare species of beetles and other insects.

SAMMENDRAG

Buprestis novemmaculata L. (Coleoptera, Buprestidae) funnet i Norge

Praktbillen *Buprestis novemmaculata* L. rapporteres funnet i Norge. Flere eksemplarer ble funnet svermende på furutømmer på to forskjellige lokaliteter i Drangedal i Telemark i juli og august 1997.

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The dung fly genus *Hydromyza* (Diptera: Scathophagidae, Scathophaginae) recorded in Norway

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The dung fly *Hydromyza livens* (Fabricius, 1794) is recorded for the first time in Norway. The specimens were all sampled from the Yellow Water Lily flower, *Nuphar lutea* (L.) in Marnardal and Mandal Municipality, Vest-Agder, South Norway.

MATERIAL

The records are:

VAY: Mandal, Kigevannet, EIS 2, UTM: 32VMK125312, 14 July 1992 (12:40-01:30 p.m.), 2 males, leg. F. Ervik (net); VAY: Marnardal, Høyevannet, EIS 2, UTM: 32VMK185524, 15 July 1992 (12:20 p.m.), 1 female, leg. F. Ervik (net).

All specimens were sitting in the female stage of the Yellow Water Lily flower *Nuphar lutea* (L.).

SYSTEMATICS AND CHARACTERISTICS

About 250 species of Scathophagidae have been described (Vockeroth 1987). In Europe about 125 species are presently known. *Hydromyza livens* is included in subfamily Scathophaginae which altogether includes 164 Palearctic species within 30 genera (Gorodkov, 1986). The species was initially described as a *Musca*, but in 1823, Fallén (1823) erected the genus *Hydromy-*

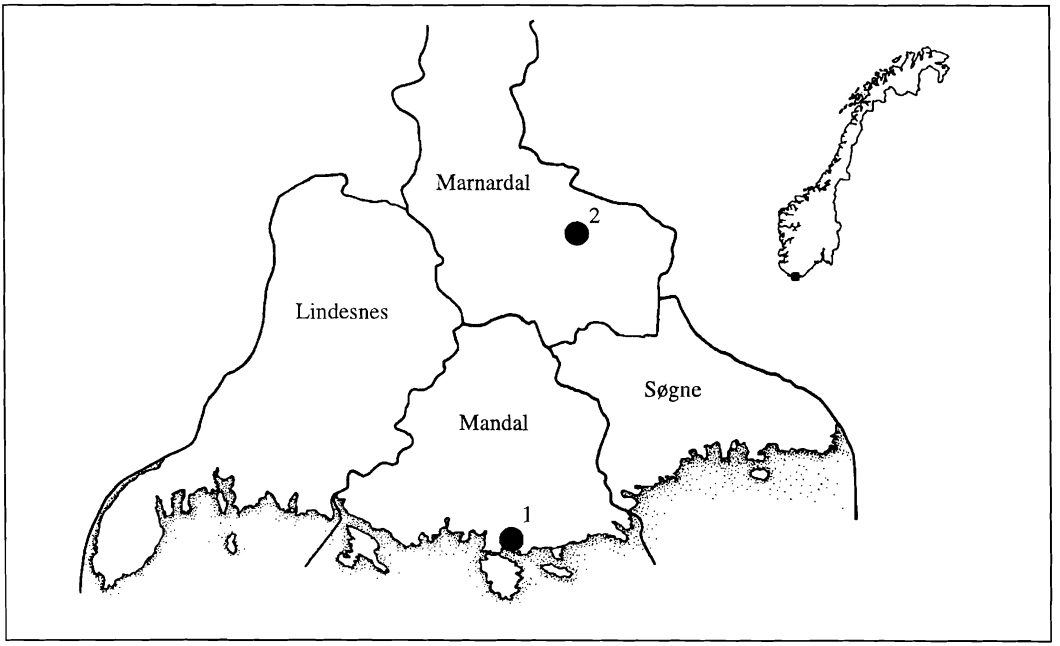

Figure 1
The recorded distribution of *Hydromyza livens* (Fabricius, 1794) in Norway. Locality 1 refers to Kigevannet. Locality 2 refers to Høyevannet.

za to recieve the single species *H. livens*. *Hydromyza rivularis* (Robineau-Desvoidy, 1930) [= *Nupharia* Robineau-Desvoidy, 1930] is considered as synonym of *H. livens* (Gorodkov 1986). Only two species of *Hydromyza* are described: *H. livens* which is known from the Palearctic Region, and *H. confluens* Loew which is known from the Nearctic Region (Vockeroth 1987).

Hydromyza livens can be separated from other Norwegian scathophagids in that the antenna have a rather short arista; the head have short proclinate, inner and outer vertical setae - the proclinate setae are shorter than the diameter of the ocelli (Figure 2 and 3). The wings lack crossvein bm-cu? and A1 ends before wing margin (Figure 4).

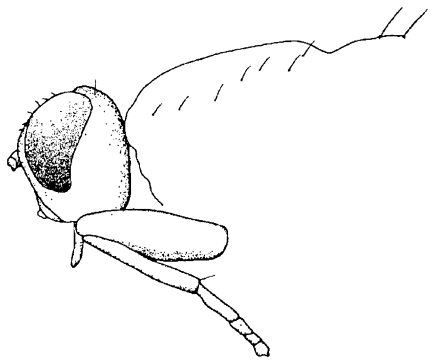

Figure 2
Hydromyza livens (Fabricius, 1794) female, head and anterior part of thorax, lateral view.

BIOLOGY

The biology of *H. livens* is poorly known. The larvae have been reported to mine petioles and leaves of the Yellow Water Lily (Brook & Velde 1983, Colyer & Hammon 1968, Smith 1989, Mike Nelson pers. comm.), and the adults are reported to fly over water surface and visit aquatic plants (Hackman 1956). The larvae of the scathophagids *Acanthocnema glaucescens* (Lw), *Acanthocnema latipennia* Beck., *Acanthocnema nigrimana* Zett. and *Spaziphora hydromyzina* (Fall.) have also aquatic larvae, but are all free living (Vockeroth 1978). *H. livens* is the only European aquatic scathophagid having endoparasitic behaviour.

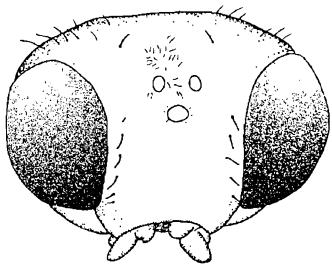

Figure 3
Hydromyza livens (Fabricius, 1794) female, head, frontal view.

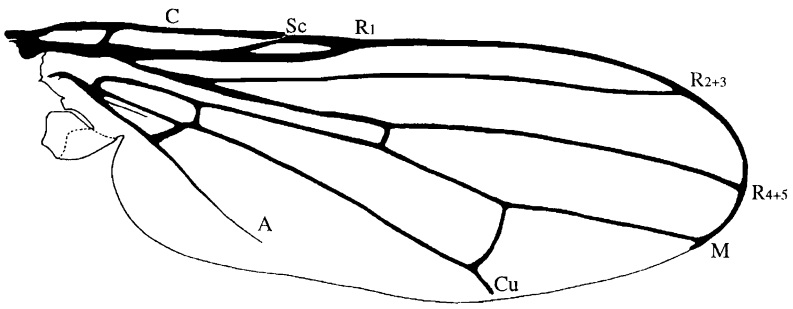

Figure 4
Hydromyza livens (Fabricius, 1794) female, right wing venation.

DISCUSSION

The species is widely distributed in Sweden from Skåne in the south to Lappland in the north (Ringdahl 1936, Hackman 1956), and in Finland from Åbo in the south, to Österbotten in the north (Hackman 1956). It has also been recorded from eastern Russia and south - central Europe. The species was thus expected to occour also in Norway. Lack of records may very well be due to sampling errors because the species is strongly associated to the rather inaccessible *Nuphar* vegetation. *H. livens* probably has a larger distributional pattern than indicated in this report. However, further documentations of the presence in Norway are needed to conclude the status of the species.

ACKNOWLEDGEMENTS

We would like to thank Lita Greve Jensen, Museum of Zoology, University of Bergen and Mike Nelson, Midlothian, Scotland for their valuable help during the identification of the species.

SAMMENDRAG

Gjødselfluer av slekten *Hydromyza* (Diptera: Scathophagidae, Scathophaginae) er tatt for første gang i Norge

En hann og to hunner av *H. livens* (Fabricius, 1794) er for første gang tatt i Norge. De ble funnet sittende på hunn-stadiet av gul nøkkerose, *Nuphar lutea* (L.), i to innsjøer i kommunene Mandal og Marnardal, VAY.

Arten er vanskelig å fange på grunn av tilknytningen til akvatiske habitater, og den er vidt utbredt i alle av våre naboland.

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Choerades (Laphria) *ignea* (Meigen, 1820) (Diptera, Asilidae) new to Norway

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The asilid fly *Choerades* (*Laphria*) *ignea* (Meigen, 1820) is recorded for the first time from Norway. One male and one female were netted at Øksenholt, in Vestfold county, near the northern end of lake Farris, Larvik on 1 Sept. 1996.

Choerades ignea (Meigen, 1820) is closely resembling *C. gilva* (L., 1758), an asilid found scattered in southern Norway to Nordland county. Earlier both species were placed in the genus *Laphria* Meigen, 1803. Both species have golden hairs dorsally on abdomen, in *C. gilva* the colour is reddish yellow, in *C. ignea* the colour is more yellowish golden, the golden parts are larger and the hairs are more adpressed than in *C. gilva*. The beard or mystax is mostly white with some black bristles in *C. ignea* and the marginal bristles of the scutellum are light coloured. In *C. gilva* the mystax is mostly black and the marginal bristles of the scutellum mostly dark or dark reddish. Both species are big, impressive flies not easily overlooked, and some specimens reach body lenght of more than 2 cm (Engel 1930, Rikhter in Bei-Bienko 1988). The genitalia of *C. ignea* are figured in Weinberg & Bächli (1995).

According to Lehr (1988) *C. ignea* is known from Sweden, Finland and Denmark. Melin (1923) reports *C. ignea* from Öl., Gotl. and Ög., Hedström (1986) also notes *C. ignea* from the the Stockholm area. From Hedström's lists *C. gilva* is a far more common and widespread species in Sweden compared to *C. ignea* .

The Norwegian entomologist Tron Soot-Ryen made outlines for a survey of the Norwegian Asilidae, but his work was unfortunately not printed. His manuscript holds also keys to genera and species. The manuscript is deposited in the Zoological Museum, University of Bergen. Soot-Ryen included all material in the Norwegian university museums deposited up to 1960-70, and he has no notice of specimens of *C. ignea* , although the species is included in his keys. Soot-Ryen's northernmost record of *C. gilva* is from NSI Saltdal.

SAMMENDRAG

Choerades (Laphria) ignea (Meigen, 1820) (Diptera, Asilidae) ny rovflueart for Norge.

En hann og en hunn av rovfluen *Choerades ignea* (Meigen, 1820) ble fanget med insekthåv ved Øksenholt som ligger nær nordenden av Farrisvannet i Larvik kommune i Vestfold. Fluene fløy i en glissen, vindeksponert furuskog som vokser på en sørvestvendt åsside ca. 240 moh (UTM 32 VLN 507634). I skogen er mange døde trær, tildels liggende tørrved-stammer med praktbilleangrep. Rovfluearten *C. ignea* er svært lik *C. gilva* (L., 1758). Den skiller seg på "barten" som er nesten helt lys med få mørke børster, bakkroppens overside som har tiltrykte gylne hår og kanten av scutellum som har lyse børster. Motsatt har *C. gilva* svart "bart", mørke børster langs scutellum og mer reverød farge på bakkroppen. Disse røde hårene er heller ikke tiltrykte, og dekker totalt mindre partier enn hos *C. ignea*.

C. ignea er kjent fra våre naboland, men er i Sverige bare funnet i de østligste provinser. *C. gilva* er videre utbredt (nord til Nordland), men er heller ingen vanlig art i Norge.

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