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Faunistical records of Caddis flies (Trichoptera) from Østfold and Akershus, SE Norway

TROND ANDERSEN, KJELL ARNE JOHANSON, SVERRE KOBRO & SINDRE LIGAARD

Andersen, T., Johanson, K. A., Kobro, S. & Ligaard, S. 1993. Faunistical records of Caddis flies (Trichoptera) from Østfold and Akershus, SE Norway. *Fauna norv. Ser. B* 40: 1–12.

Records of a total of 116 Trichoptera species are given; 97 species are taken in Østfold and 104 species in Akershus. The number of species now recorded from these regions are 102 in Østfold and 112 in Akershus.

Erotis baltica McLachlan, 1877 is recorded for the first time in Norway, and *Cyrnus crenaticornis* (Kolenati, 1859) for the first time in South Norway. In addition, 16 of the species, *Rhyacophila fasciata* Hagen, 1859, *Agraylea sexmaculata* Curtis, 1834, *Hydroptila cornuta* Mosely, 1922, *H. pulchricornis* Pictet, 1834, *H. simulans* Mosely, 1920, *Orthotrichia costalis* (Curtis, 1834), *Chimarra marginata* (Linnaeus, 1767), *Cheumatopsyche lepida* (Pictet, 1834), *Hydropsyche contubernalis* McLachlan, 1865, *Isonychia dubia* (Stephens, 1837), *Limnephilus externus* Hagen, 1861, *L. fuscicornis* (Zetterstedt, 1840) *Beraeodes minutus* (Linnaeus, 1761), *Adicella reducta* (McLachlan, 1865), *Athripsodes albifrons* (Linnaeus, 1758) and *Setodes argentipunctellus* McLachlan, 1877, are considered as rare in Norway.

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INTRODUCTION

The regions bordering the Oslofjord are among the most densely populated areas in Norway, and human activities have influenced most freshwater habitats. Many of the larger river systems are strongly polluted due to industrial waste, housing sewer and seepage from farming land. Along the coast many of the small streams have been altered by canalization; lakes and ponds are strongly affected by eutrophication or they are used as dumping sites. During the last decade acid rain has also led to an increasing acidity in some of the freshwater systems, especially in Østfold.

Today, preservation of species diversity is considered to be one of the most important tasks in nature conservation. Throughout Europe freshwater localities are among the more threatened habitats, with local or widespread extinction of species as a result. In this context it is essential to get a better knowledge of the distribution and occurrence of

freshwater insects. Although Trichoptera is considered to be one of the better studied insect groups in Norway (Aagaard & Hågvær 1987), the Trichoptera fauna in many regions is still very superficially known. The regions bordering the Oslofjord have the richest insect fauna in Norway. Several caddis flies seem to have their northern border of distribution in these regions and in a Norwegian context the caddis fly communities in many of the freshwater habitats are probably rather unique. The present study aims to add to the knowledge of this fauna in Østfold and Akershus, but more comprehensive studies ought to be initiated before the deterioration of the freshwater systems has reached to far.

STUDY AREA, MATERIAL AND METHODS

The material comprises 2550 imagines from Østfold and 2675 from Akershus. In addition a few larvae have been identified. The mate-

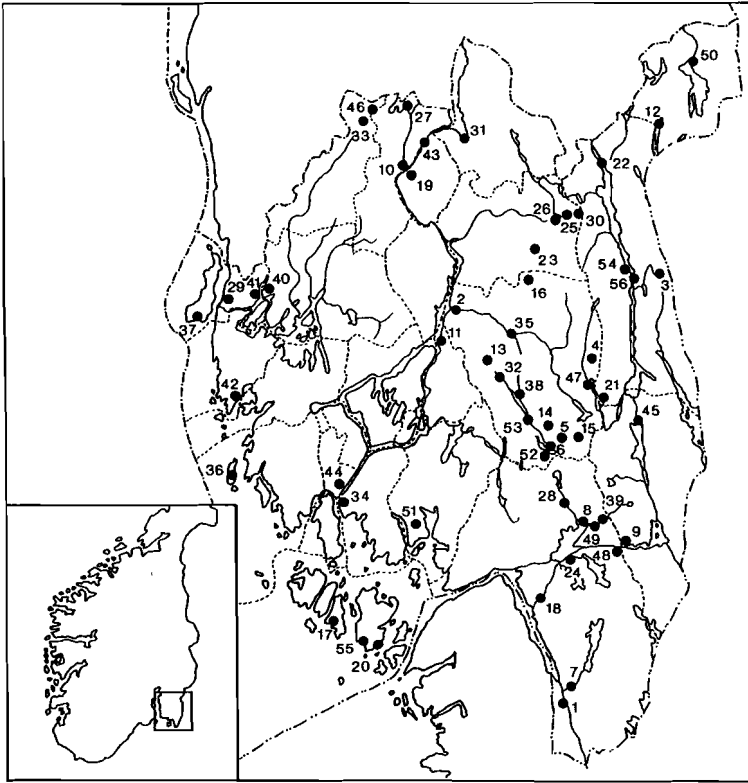


Fig. 1. Localities in Østfold; the numbers refer to the locality numbers in Table 1.

Lokaliteter i Østfold; numrene henviser til lokalitets numre i Tabell 1.

rial was collected between 1974 and 1990 in 56 localities in Østfold and 56 in Akershus, Figs. 1 & 2. The exact localities, with UTM- and EIS-references are listed in Table 1 & 2. The biogeographical provinces follow Strands' system as revised by Økland (1981).

In most of the localities caddis flies have been collected with sweepnet or have been searched for on stones and vegetation. Many of the imagines have also been taken in light traps or malaise traps. The larvae are mostly picked from stones and submerged vegetation in streams and rivers. Most of the material have been taken by the authors, but some specimens taken by Arild Fjeldså, Finn E. Klausen, Sidsel Krogtoft, Fred Midtgaard, Karen Swane and Leif Aarvik are also included. In addition, a few specimens collected by the VANDA project have been identified, as well as a few specimens deposited in the entomological collection at the Zoological Museum, University of Bergen.

Capture date and number of males and females caught are only given for species which are considered as rare.

THE SPECIES

Family Rhyacophilidae

Rhyacophila fasciata Hagen, 1859. Ø, Halden: Idd kirke 14 Aug. 1990 1 ♂; Rakkestad: Nerby 11 Aug. 1989 2 ♂♂. AK, Vestby: Sånner 24 Aug.—6 Sept. 1988 1 ♀; Nesodden: Fagerstrand 15 July 1988 1 ♂, 2 Sept. 1988 1 ♂, 30 Aug. 1990 1 ♀.

R. nubila (Zetterstedt, 1840). Ø, Halden: Berby, Engene, Mebø; Rømskog: Tørnby; Spydeberg: Fossum, Lysern; Rakkestad: Dammyra, Gautestad, Haugland, Nerby, Torp; Hobøl: Nesa. AK, Aurskog-Høland: Fosshim, Gulltjernmoen; Enebakk: Eikeberg; Nittedal: Strekan; Hurdal: Gjødingelva, Hurdalselva.

Family Glossosomatidae

Agapetus ochripes Curtis, 1834. Ø, Halden: Berby; Spydeberg: Fossum. AK, Hurdal: Gjødingelva, Hurdalselva.

Family Hydroptilidae

Agraylea cognatella McLachlan, 1880. Ø, Askim: Solbergfoss. AK, Fet: Bjanes.

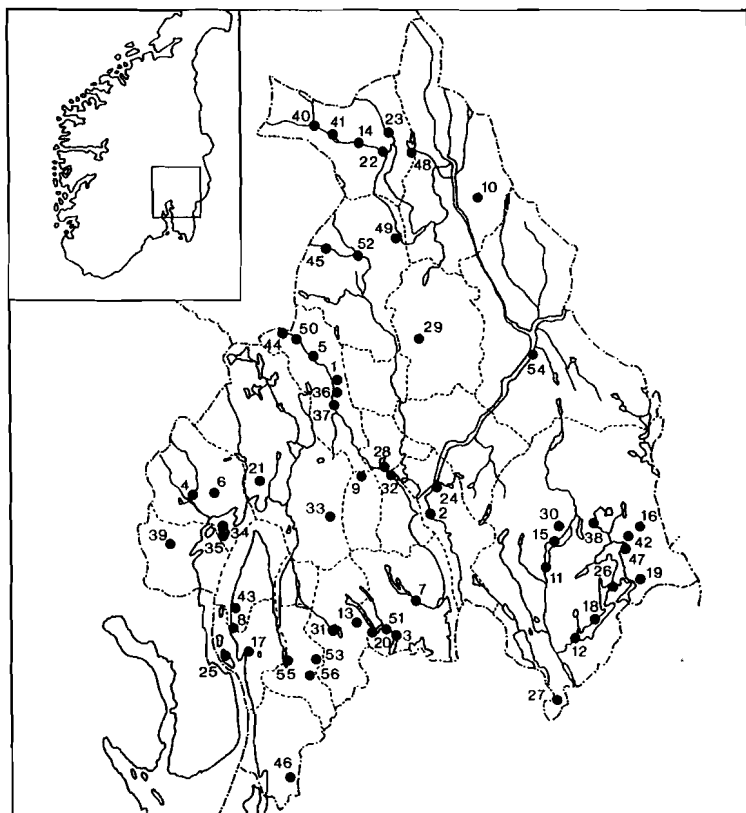


Fig. 2. Localities in Akershus; the numbers refer to the locality numbers in Table 2.

Lokaliteter i Akershus; numrene henviser til lokalitets numre i Tabell 2.

A. multipunctata Curtis, 1834. Ø, Askim: Solbergfoss.

A. sexmaculata Curtis, 1834. AK, Nesodden: Fagerstrand 30 July 1990 1 ♂.

Hydroptila cornuta Mosely, 1922. Ø, Aremark: Strømsfoss 8 July 1989 1 ♂; Marker: Ørje 8 July 1989 2 ♂♂ 1 ♀.

H. forcipata (Eaton, 1873). AK, Aurskog-Høland: Fossheim; Nittedal: Strekan.

H. pulchricornis Pictet, 1834. Ø, Rakkestad: Elnes 23 June 1990 7 ♂♂ 1 ♀. AK, Ski: Midsjøvann 6 July 1983 9 ♂♂; Aurskog-Høland: Gromsrud 9 July 1989 2 ♂♂, 25 June 1990 5 ♂♂ 2 ♀♀; Enebakk: Bjørke 19 Aug. 1990 14 ♂♂ 3 ♀♀.

H. simulans Mosely, 1920. Ø, Halden: Berby 14 Aug. 1990 1 ♀; Hobøl: Svikebøl 19 Aug. 1990 17 ♂♂ 7 ♀♀. AK, Vestby: Såner 21–28 July 1989 2 ♀♀; Aurskog-Høland: Fossheim 26 June 1990 3 ♂♂ 6 ♀♀; Enebakk: Holtopp 20 Aug. 1990 1 ♀; Nittedal: Strekan 21 July 1988 1 ♂.

H. tineoides Dalman, 1819. Ø, Varteig: Furuholmen; Marker: Ørje; Askim: Kjellås,

Solbergfoss; Hobøl: Svikebøl. AK, Aurskog-Høland: Halsnes; Nittedal: Strekan.

Ithytrichia lamellaris Eaton, 1873. Ø, Halden: Berby. AK, Vestby: Såner; Nittedal: Strekan; Hurdal: Gjødingelva.

Orthotrichia costalis (Curtis, 1834). Ø, Askim: Kjellås 10 July 1989 common (13 ♂♂ 21 ♀♀); Rakkestad: Elnes 23 June 1990 1 ♂ 4 ♀♀, Rolfseidet 24 June 1990 1 ♀. AK, Ski: Midsjøvann 6 July 1983 1 ♂.

Oxyethira distinctella McLachlan, 1880. AK, Hurdal: Skrukkelisjøen.

O. flavicornis (Pictet, 1834). Ø, Halden: Rød, Tue; Varteig: Furuholmen; Marker: Kolbjørnvik; Spydeberg: Lysern; Askim: Solbergfoss; Rakkestad: Gautestad. AK, Ski: Midsjøvann; Nesodden: Fagerstrand; Aurskog-Høland: Hauketjønn; Eidsvoll: Tisjøen; Hurdal: Skrukkelisjøen.

O. frici Klapálek, 1891. Ø, Halden: Berby. AK, Nittedal: Røtnes.

O. simplex Ris, 1897. AK, Aurskog-Høland: Sootbrua, Tangen.

No.	LOCALITY	REGION	MUNICIPALITY	UTM (32V)	EIS	No.	LOCALITY	REGION	MUNICIPALITY	UTM (32V)	EIS
1	Berby	Ø	Halden	PL4338	12	1	Berg	AK	Nittedal	PM054618	36
2	Brekke	Ø	Rakkestad	PL263912	20	2	Bjanes	AK	Fet	PM2141	29
3	Brutjern	Ø	Marker	PL544974	21	3	Bjørke	AK	Enebakk	PM158225	29
4	Dammyra	Ø	Rakkestad	PL455860	20	4	Bryn	AK	Bærum	NM8343	28
5	Djupfjern	Ø	Rakkestad	PL426754	20	5	Burås	AK	Nittedal	PM020664	36
6	Elnes	Ø	Rakkestad	PL403723	20	6	Dæilvann	AK	Bærum	NM8643	28
7	Engene	Ø	Halden	PL438399	12	7	Eikeberg	AK	Enebakk	PM191280	29
8	Fismedal	Ø	Halden	PL468625	20	8	Fagerstrand	AK	Nesodden	NM897246	28
9	Fjell	Ø	Aremark	PL507591	21	9	Fjellhamar	AK	Lørenskog	PM114472	29
10	Fossurn	Ø	Spydeberg	PM186094	29	10	Fløya	AK	Eidsvoll	PM2891	37
11	Furuholmen	Ø	Varteig	PL244867	20	11	Fosser	AK	Aurskog-Høland	PM400344	29
12	Galgebakken	Ø	Rømskog	PM536172	29	12	Fossheim	AK	Aurskog-Høland	PM450230	29
13	Gaustestad	Ø	Rakkestad	PL313849	20	13	Gjetsjøvann	AK	Ski	PM105237	29
14	Haugland	Ø	Rakkestad	PL394766	20	14	Gjødingelva	AK	Hurdal	PM088999	36
15	Holmetjern	Ø	Rakkestad	PL433757	20	15	Gromsrud	AK	Aurskog-Høland	PM408373	29
16	Honningen	Ø	Rakkestad	PL377954	20	16	Gulltjernmoen	AK	Aurskog-Høland	PM551397	29
17	Huser	Ø	Hvaler	PL1148	12	17	Hallangen	AK	Frogn	NM918215	28
18	Idd kirke	Ø	Halden	PL396525	20	18	Halsnes	AK	Aurskog-Høland	PM483255	29
19	Kjellås	Ø	Askim	PM187093	29	19	Hauketjønn	AK	Aurskog-Høland	PM546312	29
20	Kjerkøy	Ø	Hvaler	PL165439	12	20	Holtopp	AK	Enebakk	PM218228	29
21	Kolbjørnvik	Ø	Marker	PL466797	21	21	Hovseter	AK	Oslo	NM9246	37
22	Kroksund	Ø	Marker	PM462120	29	22	Hurdal	AK	Hurdal	PM131989	28
23	Krokvaun	Ø	Eidsberg	PL373988	20	23	Hurdalselva	AK	Hurdal	PN138016	46
24	Krusøtertjernet	Ø	Halden	PL4457	20	24	Hval	AK	Fet	PM218457	29
25	Lundebø	Ø	Eidsberg	PM410040	29	25	Håøya	AK	Bærum	NM8917	28
26	Lundebyvann	Ø	Eidsberg	PM403037	29	26	Kjersundet	AK	Aurskog-Høland	PM489274	29
27	Lysern	Ø	Spydeberg	PM193189	29	27	Kopperud	AK	Aurskog-Høland	PM415131	29
28	Møbe	Ø	Halden	PL426653	20	28	Lillestrøm	AK	Ski	PM135485	29
29	Molbøkkjernet	Ø	Moss	NL95992	19	29	Liergjettjern	AK	Lilensaker	PM187700	37
30	Moen	Ø	Eidsberg	PM421044	29	30	Maljeren	AK	Aurskog-Høland	PM3939	29
31	Monster bru	Ø	Tjøgstad	PM427145	29	31	Midsjøvann	AK	Ski	PM061228	28
32	Nerby	Ø	Rakkestad	PL329820	20	32	Nittedal	AK	Rælingen	PM1139479	29
33	Nesa	Ø	Hobøl	PM147177	29	33	Nøklevann	AK	Oslo	PM0439	28
34	Prestlandet	Ø	Fredrikstad	PL120651	20	34	Ostøya	AK	Bærum	NM887380	28
35	Rakkestad kirke	Ø	Rakkestad	PL346882	20	35	Oust	AK	Bærum	NM8837	28
36	Rauer	Ø	Onsøy	NL9667	19	36	Rus	AK	Nittedal	PM057608	36
37	Reier	Ø	Moss	NL9188	19	37	Røtnes	AK	Nittedal	PM049592	36
38	Rofsøidet	Ø	Rakkestad	PL358799	20	38	Røyfjern	AK	Aurskog-Høland	PM468406	29
39	Rød	Ø	Halden	PL451623	20	39	Sernsvannet	AK	Asker	NM7936	28
40	Rød	Ø	Våler	PL003931	20	40	Skrukelli	AK	Hurdal	NM994029	45
41	Rødsundet	Ø	Moss	PL001927	20	41	Skrukkeisjøen	AK	Hurdal	PM028012	45
42	Sildebåen	Ø	Rygge	NL975779	19	42	Sootbrua	AK	Aurskog-Høland	PM540388	29
43	Solbergfloss	Ø	Askim	PM218133	29	43	Spro	AK	Nesodden	NM8926	28
44	Stordammen	Ø	Fredrikstad	PL1169	20	44	Strakan	AK	Nittedal	NM9669	36
45	Strensloss	Ø	Aremark	PL516768	21	45	Stråtjern	AK	Nannestad	PM038840	36
46	Svikebøl	Ø	Hobøl	PM149184	29	46	Sånar	AK	Vestby	NM993002	28
47	Torp	Ø	Rakkestad	PL423828	20	47	Tangen	AK	Aurskog-Høland	PM524373	29
48	Trelløstjernet	Ø	Halden	PL505589	21	48	Tisjøen	AK	Eidsvoll	PM179983	37
49	Tue	Ø	Halden	PL457623	20	49	Tørnte	AK	Nannestad	PM1486	37
50	Tårnby	Ø	Rømskog	PM581264	29	50	Varpet	AK	Nittedal	NM991693	36
51	Ulleryø	Ø	Skjerveg	PL2262	20	51	Vestby	AK	Enebakk	PM149227	29
52	Vatnemellom	Ø	Rakkestad	RL397717	20	52	Vålangmoen	AK	Nannestad	PM087826	36
53	Vatvet	Ø	Rakkestad	PL374763	20	53	Østensjøvann	AK	Ås	PM0218	28
54	Ysterud	Ø	Marker	PL496977	20	54	Årnes	AK	Nes	PM3667	37
55	Østerli	Ø	Hvaler	PL1545	12	55	Årungen	AK	Ås	NM986187	28
56	Ørje	Ø	Marker	PL504972	21	56	Ås	AK	Ås	PM018167	28

Family Philopotamidae

Philopotamus montanus (Donovan, 1813).

AK, Eidsvoll: Tisjøen.

Wormaldia subnigra McLachlan, 1865. Ø, Hobøl: Nesa. AK, Aurskog-Høland: Sootbrua; Nittedal: Berg, Burås, Strekan; Nannestad: Vålangmoen.

Chimarra marginata (Linnaeus, 1767). Ø, Halden: Berby 14 Aug. 1990 common (22 ♂♂ 7 ♀♀). AK, Nittedal: Strekan 9 July 1989 very common (14 ♂♂ 9 ♀♀).

Family Psychomyiidae

Lype phaeopa (Stephens, 1836). Ø, Halden:

Rød; Varteig: Furuholmen; Marker: Ørje; Rakkestad: Haugland; Hobøl: Svikebøl. AK, Aurskog-Høland: Røyfjern.

Psychomyia pusilla (Fabricius, 1781). Ø, Aremark: Strømsfoss.

Tinodes waeneri (Linnaeus, 1758). Ø, Halden: Rød; Fredrikstad: Prestlandet; Varteig: Furuholmen; Marker: Kroksund, Ørje; Spydeberg: Lysern; Askim: Kjellås; Hobøl: Svikebøl. AK, Ski: Gjetsjøvann; Ås: Årungen; Nesodden: Fagerstrand; Aurskog-Høland: Fossheim, Halsnes, Kjersundet, Kopperud; Enebakk: Vestby.

Family Ecnomidae

Ecnomus tenellus (Rambur, 1842). Ø, Marker: Brutjern; Askim: Kjellås; Rakkestad: Elnes.

Family Polycentropodidae

Cyrnus crenaticornis (Kolenati, 1859). Ø, Halden: Rød 14 Aug. 1990 1 ♂.

C. flavidus McLachlan, 1864. Ø, Marker: Brutjern.
C. insolutus McLachlan, 1878. Ø, Marker: Kolbjørnvik; Askim: Kjellås. AK, Vestby: Såner.
C. trimaculatus (Curtis, 1834). Ø, Halden: Rød; Varteig: Furuholmen; Aremark: Strømsfoss; Marker: Kolbjørnvik, Kroksund; Askim: Kjellås; Rakkestad: Djuptjern, Elnes, Holmetjern, Rakkestad kirke, Torp, Vatvet; Hobøl: Svikebøl. AK, Vestby: Såner; Ski: Gjetsjøvann; Ås: Årungen; Aurskog-Høland: Fosser, Fossheim, Halsnes, Hauketjønn, Koppe-
rud, Røytjern; Enebakk: Bjørke, Holtopp, Vestby; Eidsvoll: Tisjøen; Hurdal: Hurdal.
Holocentropus dubius (Rambur, 1842). Ø, Fredrikstad: Stordammen; Marker: Kolbjørnvik; Rakkestad: Elnes, Holmetjern; Rygge: Sildebauen. AK, Oslo: Nøkle vann; Bærum: Dælivann; Aurskog-Høland: Halsnes, Hauketjønn; Ullensaker: Ljøgdttjern; Nannestad: Tømte.
H. picicornis (Stephens, 1836). Ø, Marker: Kolbjørnvik; Askim: Kjellås; Eidsberg: Moen. AK, Rælingen: Nitelva.
Neureclipsis bimaculata (Linnaeus, 1758). Ø, Halden: Berby; Varteig: Furuholmen; Aremark: Strømsfoss; Marker: Kroksund; Spydeberg: Fossum; Askim: Solbergfoss; Rakkestad: Gautestad, Rolfseidet, Vatvet; Hobøl: Svikebøl. AK, Vestby: Såner; Aurskog-Høland: Fosser, Fossheim, Sootbrua; Fet: Hval; Enebakk: Vestby; Nittedal: Strekan.
Plectrocnemia conspersa (Curtis, 1834). Ø, Marker: Kolbjørnvik; Spydeberg: Lysern; Rakkestad: Gautestad, Nerby. AK, Vestby: Såner; Ås: Årungen, Ås; Frogne: Hallangen; Nesodden: Fagerstrand; Bærum: Ostøya; Aurskog-Høland: Maltjern, Tangen; Nittedal: Berg, Rus; Eidsvoll: Tisjøen; Hurdal: Skrukkeli.
Polycentropus flavomaculatus (Pictet, 1834). Ø, Halden: Berby, Fismedal, Mebø, Rød; Varteig: Furuholmen; Aremark: Strømsfoss; Marker: Ørje, Ysterud; Rømskog: Tørnby; Spydeberg: Fossum, Lysern; Askim: Kjellås, Solbergfoss; Rakkestad: Brekke, Gautestad, Torp; Hobøl: Nesa, Svikebøl. AK, Vestby: Såner; Ås: Årungen, Ås; Asker: Semsvannet; Aurskog-Høland: Fosser, Fossheim, Gulltjernmoen, Kjersundet, Kopperud, Sootbrua; Enebakk: Eikeberg, Vestby; Nittedal: Røtnes, Strekan, Varpet; Hurdal: Gjødellingelva, Hurdal, Hurdalselva.
P. irroratus (Curtis, 1835). Ø, Aremark:

Strømsfoss; Marker: Kolbjørnvik, Ørje; Spydeberg: Lysern; Eidsberg: Lundeby; Rakkestad: Elnes, Rakkestad kirke, Vatnemellom; Hobøl: Svikebøl. AK, Vestby: Såner; Aurskog-Høland: Halsnes; Nittedal: Strekan; Hurdal: Skrukkeli.

Family Hydropsychidae

Cheumatopsyche lepida (Pictet, 1834). Ø, Halden: Berby 10 Sept. 1988 1 ♂, 14 Aug. 1990 3 ♂♂ 1 ♀. AK, Nittedal: Strekan 9 July 1989 14 ♂♂ 5 ♀♀.

Ceratopsyche nevae (Kolenati, 1858). Ø, Varteig: Furuholmen; Spydeberg: Fossum; Rakkestad: Gautestad.

Hydropsyche angustipennis (Curtis, 1834). Ø, Rakkestad: Nerby; Hobøl: Svikebøl. AK, Ås: Ås; Enebakk: Eikeberg.

H. contubernalis McLachlan, 1865. Ø, Varteig: Furuholmen 26 Aug. 1989 common (17 ♂♂ 15 ♀♀); Skjeberg: Ullerøy 26 July 1980 1 ♂; Rakkestad: Gautestad 11—26 Aug. 1989 2 ♂♂ 3 ♀♀. AK, Vestby: Såner 7—13 Aug. 1988 1 ♂.

H. pellucidula (Curtis, 1834). Ø, Hobøl: Nesa. AK, Enebakk: Eikeberg; Nittedal: Strekan.

H. siltalai Döhler, 1963. Ø, Rakkestad: Gautestad; Hobøl: Nesa. AK, Ås: Årungen; Bærum: Ostøya; Aurskog-Høland: Fosser, Fossheim; Enebakk: Eikeberg; Nittedal: Strekan.

Family Phryganeidae

Agrypnia obsoleta (Hagen, 1864). Ø, Halden: Rød, Trellnestjernet; Aremark: Fjell; Marker: Kolbjørnvik; Eidsberg: Lundebyvann. AK, Vestby: Såner; Nesodden: Fagerstrand.

A. pagetana Curtis, 1835. Ø, Rakkestad: Gautestad. AK, Bærum: Dælivann.

A. varia (Fabricius, 1793). Ø, Halden: Kru-sættertjernet; Marker: Kolbjørnvik; Askim: Kjellås; Eidsberg: Lundeby; Rakkestad: Gautestad. AK, Vestby: Såner; Ski: Midsjøvann; Ås: Årungen; Frogne: Hallangen; Nesodden: Fagerstrand, Spro; Bærum: Dælivann; Aurskog-Høland: Maltjern; Ullensaker: Ljøgdttjern.

Phryganea bipunctata Retzius, 1783. AK, Oslo: Nøkle vann; Aurskog-Høland: Halsnes, Hauketjønn; Ullensaker: Ljøgdttjern; Hurdal: Skrukkelisyen.

P. grandis Linnaeus, 1758. Ø, Halden: Kru-sættertjernet; Marker: Kolbjørnvik; Askim: Solbergfoss. AK, Oslo: Nøkle vann; Ås: Årungen; Nesodden: Fagerstrand; Bærum: Dæ-

livann; Ullensaker: Ljøgodtjern; Eidsvoll: Fløyta.

Trichostegia minor (Curtis, 1834). Ø, Eidsberg: Lundeby. AK, Frogn: Hallangen; Nesodden: Fagerstrand; Bærum: Oust.

Family Brachycentridae

Micrasema gelidum McLachlan, 1876. AK, Nannestad: Tømte.

M. setiferum (Pictet, 1834). AK, Nittedal: Strekan.

Family Lepidostomatidae

Lepidostoma hirtum (Fabricius, 1775). Ø, Varteig: Furuholmen. AK, Nittedal: Strekan.

Family Limnephilidae

Ironoquia dubia (Stephens, 1837). Ø, Rakkestad: Nerby 11—28 Aug. 1989 1 ♂. AK, Nesodden: Fagerstrand 11—20 Aug. 1987 1 ♂.

Chaetopteryx villosa (Fabricius, 1798). Ø, Rakkestad: Nerby. AK, Ås: Årungen; Nesodden: Fagerstrand; Nittedal: Strekan.

Anabolia nervosa (Curtis, 1834). Ø, Halden: Berby; Moss: Rødsundet; Spydeberg: Lysern; Askim: Kjellås; Rakkestad: Rakkestad kirke. AK, Ås: Årungen.

Colpotaulius incisus (Curtis, 1834). Ø, Eidsberg: Lundebyvann.

Glyphotaenius pellucidus (Retzius, 1783). Ø, Marker: Kolbjørnvik; Eidsberg: Lundeby; Rakkestad: Gautestad, Nerby; Høbøl: Svikebøl. AK, Vestby: Såner; Ås: Årungen, Ås; Frogn: Hallangen; Nesodden: Fagerstrand; Bærum: Dælivann, Håøya, Ostøya; Ullensaker: Ljøgodtjern.

Grammotaulius nigropunctatus (Retzius, 1783). Ø, Onsøy: Rauer. AK, Bærum: Ostøya.

Limnephilus affinis Curtis, 1834. Ø, Halden: Engene; Moss: Reier; Spydeberg: Lysern; Rakkestad: Gautestad. AK, Bærum: Ostøya, Oust.

L. auricula Curtis, 1834. Ø, Moss: Reier; Rakkestad: Gautestad. AK, Nesodden: Fagerstrand; Bærum: Ostøya.

L. binotatus Curtis, 1834. AK, Ås: Østensjøvann, Årungen.

L. borealis (Zetterstedt, 1840). Ø, Moss: Rødsundet; Marker: Kolbjørnvik; Spydeberg: Lysern; Askim: Kjellås; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årungen; Nesodden: Fagerstrand.

L. centralis Curtis, 1834. Ø, Halden: Engene; Marker: Kolbjørnvik; Spydeberg: Lysern;

Rakkestad: Gautestad, Nerby; Onsøy: Rauer. AK, Vestby: Såner; Ås: Årungen, Ås; Nesodden: Fagerstrand; Bærum: Håøya, Ostøya, Oust; Lørenskog: Fjellhamar; Nannestad: Tømte.

L. coenosus Curtis, 1834. Ø, Spydeberg: Lysern; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årungen, Ås; Nesodden: Fagerstrand.

L. decipiens (Kolenati, 1848). Ø, Spydeberg: Lysern; Eidsberg: Lundebyvann; Rakkestad: Gautestad. AK, Ski: Midsjøvann; Ås: Årungen; Enebakk: Bjørke, Vestby.

L. externus Hagen, 1861. Ø, Spydeberg: Lysern 5—30 Sept. 1989 1 ♂; Rakkestad: Gautestad 18 Sept.—1 Oct. 1989 2 ♂♂.

L. extricatus McLachlan, 1865. Ø, Marker: Kolbjørnvik; Rakkestad: Gautestad, Nerby. AK, Vestby: Såner; Ås: Årungen; Nesodden: Fagerstrand; Bærum: Ostøya.

L. flavicornis (Fabricius, 1787). Ø, Spydeberg: Lysern; Eidsberg: Lundeby, Lundebyvann; Rakkestad: Gautestad, Kolbjørnvik; Onsøy: Rauer. AK, Vestby: Såner; Ski: Midsjøvann; Ås: Østensjøvann, Årungen, Ås; Nesodden: Fagerstrand; Bærum: Ostøya; Aurskog-Høland: Kopperud; Eidsvoll: Fløyta.

L. fuscicornis Rambur, 1842. Ø, Rakkestad: Nerby, Vatvet. AK, Ås: Årungen.

L. fuscineris (Zetterstedt, 1840). Ø, Trøgstad: Mønster bru 22 July 1987 very common (4 ♂♂ 5 ♀♀); Askim: Kjellås 10 July 1989 1 ♂; Rakkestad: Gautestad 11 Aug. 1989 1 ♀. AK, Fet: Bjanen 22 July 1987 very common (3 ♂♂ 13 ♀♀); Rælingen: Nitelva 22 July 1987 2 ♂♂ 1 ♀; Skedsmo: Lillestrøm 6 Aug. 1990 1 ♂ 2 ♀♀; Nes: Årnes 30 July 1980 2 ♀♀.

L. germanus McLachlan, 1875. Ø, Rakkestad: Gautestad, Nerby, Rakkestad kirke. AK, Vestby: Såner; Nesodden: Fagerstrand.

L. griseus (Linnaeus, 1758). Ø, Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årungen; Nesodden: Fagerstrand.

L. ignavus McLachlan, 1865. Ø, Spydeberg: Lysern; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årungen; Nesodden: Fagerstrand; Bærum: Ostøya, Oust.

L. lunatus Curtis, 1834. Ø, Moss: Reier; Spydeberg: Lysern. AK, Ski: Midsjøvann.

L. luridus Curtis, 1834. Ø, Rakkestad: Gautestad; Rygge: Sildebauen; Onsøy: Rauer. AK, Nesodden: Fagerstrand; Bærum: Håøya, Ostøya, Oust.

L. marmoratus Curtis, 1834. Ø, Moss: Molbektjernet, Rødsundet; Spydeberg: Lysern;

Askim: Solbergfoss; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årunen.
L. nigriceps (Zetterstedt, 1840). Ø, Moss: Rødsundet; Spydeberg: Lysern. AK, Bærum: Dælivann; Ullensaker: Ljøgodttjern.
L. politus McLachlan, 1865. Ø, Moss: Rødsundet; Spydeberg: Lysern; Eidsberg: Lundebyvann; Rakkestad: Gautestad, Rakkestad kirke. AK, Vestby: Såner; Bærum: Dælivann.
L. rhombicus (Linnaeus, 1758). Ø, Spydeberg: Lysern; Eidsberg: Lundebyvann; Rakkestad: Gautestad, Nerby, Vatvet. AK, Vestby: Såner; Ås: Årunen; Nesodden: Fagerstrand; Bærum: Ostøya.
L. sericeus (Say, 1824). Ø, Spydeberg: Lysern; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årunen, Ås; Nesodden: Fagerstrand; Bærum: Ostøya, Oust; Aurskog-Høland: Kopperud.
L. sparsus Curtis, 1834. Ø, Moss: Reier; Spydeberg: Lysern; Rakkestad: Gautestad; Onsoy: Rauer. AK, Vestby: Såner; Ås: Årunen; Nesodden: Fagerstrand; Bærum: Håøya, Ostøya, Oust.
L. stigma Curtis, 1834. Ø, Rakkestad: Gautestad. AK, Vestby: Såner; Nesodden: Fagerstrand; Bærum: Ostøya.
L. subcentralis Brauer, 1857. Ø, Spydeberg: Lysern. AK, Vestby: Såner; Ås: Årunen; Nesodden: Fagerstrand.
L. vittatus (Fabricius, 1798). Ø, Hvaler: Kjørkøy. AK, Nesodden: Fagerstrand.
Nemotaulius punctatolineatus (Retzius, 1783). Ø, Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årunen; Nesodden: Fagerstrand.
Phacopteryx brevipennis (Curtis, 1834). AK, Vestby: Såner; Frog: Hallangen; Nesodden: Fagerstrand; Bærum: Håøya, Oust.
Rhadicoleptus alpestris (Kolenati, 1848). AK, Vestby: Såner; Nesodden: Fagerstrand.
Halesus radiatus (Curtis, 1834). Ø, Halden: Berby; Moss: Rødsundet; Spydeberg: Lysern; Rakkestad: Gautestad, Nerby. AK, Vestby: Såner; Ås: Årunen; Nesodden: Fagerstrand.
H. tessellatus (Rambur, 1842). Ø, Spydeberg: Lysern; Rakkestad: Gautestad. AK, Vestby: Såner; Ås: Årunen, Ås; Nesodden: Fagerstrand; Bærum: Bryn.
Micropterna lateralis (Stephens, 1837). Ø, Hvaler: Huser, Ørekilen. AK, Vestby: Såner; Ås: Ås; Nesodden: Fagerstrand; Bærum: Håøya, Oust; Nannestad: Tømte.
M. sequax McLachlan, 1875. Ø, Rakkestad: Gautestad, Nerby. AK, Vestby: Såner; Ås: Årunen, Ås; Nesodden: Fagerstrand; Bærum: Håøya, Oust.

Potamophylax cingulatus (Stephens, 1837). Ø, Spydeberg: Lysern; Rakkestad: Gautestad, Nerby. AK, Oslo: Hovseter; Vestby: Såner; Ås: Årunen; Frog: Hallangen; Nesodden: Fagerstrand.

P. latipennis (Curtis, 1834). Ø, Halden: Berby.

P. nigricornis (Pictet, 1834). AK, Nesodden: Fagerstrand.

Stenophylax permistus McLachlan, 1895. Ø, Moss: Reier. AK, Ås: Årunen; Bærum: Ostøya.

Family Goeridae

Goera pilosa (Fabricius, 1775). Ø, Marker: Ysterud, Ørje; Hobøl: Svikebøl. AK, Aurskog-Høland: Fossheim, Halsnes.

Silo pallipes (Fabricius, 1781). AK, Hurdal: Skrukkeli.

Family Beraeidae

Beraea pullata (Curtis, 1834). AK, Bærum: Oust.

Beraeodes minutus (Linnaeus, 1761). AK, Ås: Årunen 15 Apr.—12 June 1989 1 ♀.

Family Sericostomatidae

Sericostoma personatum (Spence in Kirby & Spence, 1826). AK, Nittedal: Berg.

Family Molannidae

Molanna angustata Curtis, 1834. Ø, Halden: Rød; Marker: Brutjern, Kolbjørnvik; Rømskog: Galgebakken; Askim: Kjellås; Eidsberg: Krok vann, Lundebyvann; Rakkestad: Djuptjern, Gautestad, Holmetjern; Hobøl: Svikebøl. AK, Oslo: Nøkle vann; Ski: Midstjøvann; Ås: Årunen; Frog: Hallangen; Nesodden: Fagerstrand; Aurskog-Høland: Halsnes, Maltjern; Enebakk: Bjørke, Holtopp; Skedsmo: Lillestrøm; Eidsvoll: Tisjøen.

Molannodes tinctus (Zetterstedt, 1840). Ø, Marker: Brutjern, Kolbjørnvik, Ørje; Eidsberg: Lundeby; Rakkestad: Dammyra, Elnes. AK, Aurskog-Høland: Hauketjønn, Røytjern; Nittedal: Burås.

Family Leptoceridae

Adicella reducta (McLachlan, 1865). AK, Aurskog-Høland: Tangen 29 June 1990 1 ♀.
Athripsodes albifrons (Linnaeus, 1758). Ø, Halden: Berby 14 Aug. 1990 1 ♀. AK, Vestby: Såner 7—13 Aug. 1989 1 ♀.

A. aterrimus (Stephens, 1836). Ø, Aremark: Strømsfoss; Rakkestad: Holmetjern. AK, Ås: Østensjøvann, Årunen; Aurskog-Høland:

Gromsrud, Halsnes, Kjersundet, Tangen; Hurdal: Skrukkelisjøen.
A. cinereus (Curtis, 1834). Ø, Halden: Berby, Rød; Marker: Kolbjørnvik, Kroksund, Ørje; Rakkestad: Rakkestad kirke. AK, Aurskog-Høland: Fosser, Fossheim, Halsnes, Kjersundet, Røytjern; Nittedal: Røtnes.
A. commutatus (Rostock, 1874). AK, Nittedal: Røtnes.
Ceraclea annulicornis (Stephens, 1836). Ø, Varteig: Furuholmen. AK, Aurskog-Høland: Fosser.
C. dissimilis (Stephens, 1836). Ø, Moss: Rødsundet; Varteig: Furuholmen; Marker: Ørje; Spydeberg: Lysern; Rakkestad: Rakkestad kirke; Hobøl: Svikebøl. AK, Aurskog-Høland: Fosser; Nittedal: Strekan.
C. nigronervosa (Retzius, 1783). Ø, Marker: Ysterud.
C. senilis (Burmeister, 1839). Ø, Marker: Brutjern; Askim: Kjellås; Eidsberg: Moen. AK, Aurskog-Høland: Fosser.
Erotesis baltica McLachlan, 1877. AK, Aurskog-Høland: Hauketjønn 29 June 1990 1 ♂.
Mystacides azurea (Linnaeus, 1761). Ø, Halden: Berby, Trellnestjernet; Varteig: Furuholmen; Aremark: Fjell, Strømsfoss; Marker: Brutjern, Kolbjørnvik, Kroksund, Ørje; Rømskog: Galgebakken; Spydeberg: Lysern; Askim: Kjellås; Eidsberg: Lundebyvann; Rakkestad: Djuptjern, Elnes, Holmetjern, Honningen, Vatnemellom; Hobøl: Nesa. AK, Ski: Gjestsjøvann; Asker: Semsvannet; Aurskog-Høland: Fossheim, Gromsrud, Halsnes, Hauketjønn, Kjersundet, Kopperud, Røytjern, Tangen; Enebakk: Bjørke, Holtopp, Vestby; Nittedal: Burås, Strekan; Eidsvoll: Tisjøen; Hurdal: Hurdal, Skrukkelisjøen.
M. longicornis (Linnaeus, 1758). Ø, Halden: Trellnestjernet; Askim: Kjellås; Rakkestad: Djuptjern. AK, Nannestad: Stråtjern; Hurdal: Skrukkelisjøen.
Oecetis lacustris (Pictet, 1834). Ø, Marker: Brutjern, Kolbjørnvik, Ørje; Askim: Kjellås; Eidsberg: Lundebyvann, Moen; Rakkestad: Gautestad; Hobøl: Svikebøl. AK, Vestby: Såner; Ski: Midsjøvann; Ås: Årungen; Nesodden: Fagerstrand; Aurskog-Høland: Fosser, Gromsrud, Kopperud; Fet: Bjaner; Enebakk: Bjørke, Holtopp; Skedsmo: Lillestrøm.
O. ochracea (Curtis, 1825). Ø, Rakkestad: Gautestad. AK, Aurskog-Høland: Fossheim, Halsnes; Fet: Bjaner; Skedsmo: Lillestrøm; Hurdal: Skrukkelisjøen.
O. testacea (Curtis, 1834). Ø, Halden: Rød;

Marker: Ørje. AK, Aurskog-Høland: Halsnes; Enebakk: Bjørke.

Setodes argentipunctellus McLachlan, 1877. Ø, Halden: Berby 14 Aug. 1990 2 ♀♀.

Triaenodes bicolor (Curtis, 1834). Ø, Halden: Trellnestjernet; Aremark: Fjell; Marker: Kolbjørnvik; Askim: Kjellås; Eidsberg: Krok-vann; Rakkestad: Djuptjern. AK, Ås: Østensjøvann; Hurdal: Skrukkelisjøen.

DISCUSSION

Brekke (1946) recorded 9 Trichoptera species from Østfold. Later, Solem (1970) added 7 species as new for Norway and Solem (1974) listed 38 species from five localities in Østfold, of which 29 were not previously recorded from the province. Of the species previously recorded from Østfold we failed to take *Orthotrichia angustella* (McLachlan, 1865), *Oxyethira tristella* Klapálek, 1895, *Phryganea bipunctata* Retzius, 1783, *Athripsodes commutatus* (Rostock, 1874) and *Oecetis notata* (Rambur, 1842). The present paper adds 57 species and the number of species now taken in this province is thus 102.

Brekke (1946) recorded 25 species from Akershus. He also recorded *Potamophylax stellatus* auct., a record which either referred to *P. cingulatus* (Stephens, 1837) or *P. latipennis* (Curtis, 1834). Sæther (1965) recorded three more species from lake Østensjøvannet. Later, Andersen (1976a) recorded *Limnephilus hirsutus* (Pictet, 1834) from Ostøya. In connection with studies on the fauna in various streams and rivers in Oslo 11 more species have been recorded (Brittain & Saltveit 1986, Bremnes & Saltveit 1988a, b). Of the species previously recorded from Akershus we failed to take *Agraylea multipunctata* Curtis, 1834, *Psychomyia pusilla* (Fabricius, 1781), *Cyrnus flavidus* McLachlan, 1864, *Ceratopsyche nevae* (Kolenati, 1858), *Agrypnia picta* Kolenati, 1848, *Oligotricha striata* (Linnaeus, 1758), *Semblis atrata* (Gmelin, 1790) and *Limnephilus hirsutus*. The present paper adds 72 species and the number of species now taken in this province is thus 112.

Erotesis baltica McLachlan, 1877 is recorded for the first time in Norway. The species is distributed in most parts of Central and North Europe, including Denmark, Sweden and Eastern Fennoscandia (Andersen & Wi-berg-Larsen 1987, Botosaneanu & Malicky

1978). In Sweden it is taken in most regions in south and central parts of the country north to Västerbotten and Lycksele Lappmark; it lacks, however, in western regions like Västergötland, Bohuslän, Dalsland and Värmland (Forsslund 1953, Forsslund & Tjeder 1942, Gullefors 1988). The species inhabits lakes and bogs (Botosaneanu & Malicky 1978). The present male was netted at small lake.

Cyrnus crenaticornis (Kolenati, 1859) is recorded for the first time in South Norway. The species has previously been taken in Sør Varanger in eastern Finnmark (see Andersen & Wiberg-Larsen 1987). In Sweden it is recorded from a few provinces north to Dalarna and Gästrikland (Forsslund & Tjeder 1942, Gullefors 1988). The species occur in standing or slowly running waters (Botosaneanu & Malicky 1978). The present male was netted near a rather large lake with mostly rocky and stony shores.

Sixteen of the species are considered as rare in Norway (Aagaard & Hågvar 1987). *Rhyacophila fasciata* Hagen, 1859 was recorded for the first time in Norway from Fagernes in Ramfjord in outer Troms (Forsslund 1932). The species has later been recorded from Vestfold and Telemark (Andersen 1975, Andersen, Ligaard et al. 1990), and has also been taken in southern Hedmark (see Aagaard & Hågvar 1987). According to Lepneva (1970) the species inhabits rapidly running brooks and rivulets. The present specimens were either caught in light traps or they were netted or taken in a malaise trap close to small streams.

Agraylea sexmaculata Curtis, 1834 has previously been recorded from Vestfold and outer Telemark (Andersen, Ligaard et al. 1990, Solem 1972). In Denmark the species inhabits lakes, ponds and slowly running streams (Wiberg-Larsen 1985). The present male was taken in a light trap situated not far from a pond with rich vegetation.

Hydroptila cornuta Mosely, 1922 was recorded for the first time in Norway from Mosvannet in Stavanger in outer Rogaland (Jensen 1942), and later from Enningdal in Halden in Østfold (Solem 1974). The species inhabits streams and rivers (Botosaneanu & Malicky 1978). The present specimens were all netted close to slowly running rivers.

Hydroptila pulchricornis Pictet, 1834 was recorded for the first time in Norway from Femsjøen near Halden in Østfold (Solem

1970). Later the species has been recorded from Vestfold, outer Telemark and outer Aust-Agder (Andersen 1975, Andersen, Hansen et al. 1990, Andersen, Ligaard et al. 1990). According to Marshall (1978) the species inhabits lakes, ponds, rivulets and brooks. The present specimens were all netted among vegetation on lake shores.

H. simulans Mosely, 1920 was recorded for the first time in Norway from Lillevann in Agdenes in outer Sør-Trøndelag (Solem 1966). Later the species has been recorded from various localities in outer Hordaland (Andersen 1976b, Andersen & Tysse 1985) and has also been taken in east Buskerud (see Aagaard & Hågvar 1987). The species inhabits streams and rivers (Botosaneanu & Malicky 1978). The present specimens were all netted close to rapidly running streams or rivers or taken in light traps.

Orthotrichia costalis (Curtis, 1834) was recorded as new to Norway from the lakes Borrevann and Åsrumvann in Vestfold (Andersen 1975). The species is later recorded from outer Telemark and outer Vest-Agder (Andersen, Ligaard et al. 1990, Johanson 1991). According to Marshall (1978) the species inhabits ponds and lakes and slowly flowing water. The present specimens were all netted among vegetation on lake shores.

Chimarra marginata (Linnaeus, 1767) was recorded for the first time in Norway from Skjeveland in Klepp in outer Rogaland (Jensen 1942). Later, the species has been recorded from Østfold and Akershus (Solem 1974, Brittain & Saltveit 1986). According to Lepneva (1970) it inhabits brooks with cool, clean water and rapid current. The present specimens were all netted swarming along small, rapid rivers.

Cheumatopsyche lepida (Pictet, 1834) is previously recorded from localities in outer and inner Rogaland and from Østfold (Jensen 1942, Solem 1974). The species inhabits streams and rivers (Botosaneanu & Malicky 1978). The present specimens were taken in the same localities as *C. marginata*.

Hydropsyche contubernalis McLachlan, 1865 was recorded for the first time in Norway from Hukstrøm bru in Lardal in Vestfold and has later also been taken on Langøya in Vestfold (Andersen 1975, Andersen & Hansen 1990). In Denmark the species inhabits large, slow flowing rivers (Wiberg-Larsen 1980). In England it is a typical inhabitant of the lower, slow flowing parts of the larger

river systems (e.g. Hildrew & Morgan 1974, Badcock 1976). The species was flying in high numbers along the River Glomma at Furuholmen at dusk, but it seems also to spread from the rivers as it was taken in light traps far from larger rivers.

Ironoquia dubia (Stephens, 1837) was recorded for the first time in Norway from two localities in Vestfold (Andersen 1975). Later the species has been taken in Porsgrunn in outer Telemark and on Langøya in Vestfold (Andersen & Hansen 1990, Andersen, Ligaard et al. 1990). In England the species inhabits small, shallow streams in deciduous woods (Wallace et al. 1990). The male from Østfold was taken in a malaise trap close to a small stream.

Limnephilus externus Hagen, 1861 was recorded for the first time in Norway from Lake Langvann in Vestfold (Andersen 1975). The species inhabits both standing and running waters (Botosaneanu & Malicky 1978). The present males were all taken in light traps.

Limnephilus fuscinervis (Zetterstedt, 1840) was recorded for the first time in Norway from east Buskerud (Brekke 1946). Later the species has been recorded from localities in Vestfold (Andersen 1975, Andersen & Hansen 1990). According to Wallace et al. (1990) the species inhabits lakes and pools, where the larvae can be found amongst plants or litter of *Carex* and *Phragmites*. At the localities along Lake Øyern the species was common, seemingly thriving in rather polluted water.

Beraeodes minutus (Linnaeus, 1761) was recorded for the first time in Norway from Seterstøa in southern Hedmark (Morton 1901). Later the species has been taken in outer Hordaland and outer Telemark (Andersen 1980, Andersen, Ligaard et al. 1990). In Denmark the species inhabits small streams in wooded areas, where the larvae prefers sandy bottom with some decaying plant material (Wiberg-Larsen 1979). The present female was taken in a light trap.

Adicella reducta (McLachlan, 1865) was recorded as new to Norway from outer Rogaland (Forsslund 1936); later a few more records from the same region were given by Jensen (1942). The species has also been recorded from outer Sogn og Fjordane and outer Vest-Agder (Andersen 1974, Andersen, Hansen et al. 1990). The species inhabits rivers, canals streams and flowing marshes (Wallace et al. 1990). The present female was

netted flying among alder (*Alnus glutinosa*) close to a small stream.

Athripsodes albifrons (Linnaeus, 1758) was recorded for the first time in Norway from Skjeveland in Klepp in outer Rogaland (Jensen 1942), and has later been taken in Buskerud and Vestfold (Andersen 1975, Andersen & Hansen 1990). The species lives on stony substratum in rivers; occasionally also on lake shores (Wallace et al. 1990). One of the present females was netted flying close to a small river, the other was taken in a light trap.

Setodes argentipunctellus McLachlan, 1877 was taken as new to Norway from Berby and Enningdalen in Halden in Østfold (Solem 1970). According to Botosaneanu & Malicky (1978) the species preferably inhabits streams and small rivers; in England the species is found on lake shores (Wallace et al. 1990). The present females were netted along a small, stony river.

With the present contribution the number of species recorded from both Østfold and Akershus is raised considerably. Akershus, with 112 species, is now the Norwegian region with the highest number of Trichoptera taken, outnumbering Vestfold with 108 species (see Andersen & Søli 1990). Several of the species are listed as rare in Norway (Aagaard & Hågvar 1987). Some of these, like *Rhyacophila fasciata*, *Hydroptila pulchricornis*, *Orthotrichia costalis*, *Hydropsyche contubernalis* and *Limnephilus fuscinervis* are seemingly widely distributed in SE Norway and thus ought to be deleted from the list. On the other hand, *Erotesis baltica* must be added to the list.

ACKNOWLEDGEMENT

Our thanks are due to Arild Fjeldså, Finn E. Klausen, Sidsel Krogtoft, Fred Midtgaard, Karen Swane and Leif Aarvik for supplying us with caddis flies. We are also indebted to Peter Larsson for allowing us to include material from the VANDA project and to Lita Greve Jensen for lending us material from the entomological collection at ZMB.

SAMMENDRAG

Funn av vårfluer (Trichoptera) i Østfold og Akershus

Funn av tilsammen 116 vårfluearter rapporteres; 97 arter ble tatt i Østfold og 104 arter i

Akershus. Totalt er det nå rapportert 102 arter fra Østfold og 112 arter fra Akershus.

Erotosis baltica McLachlan, 1877 er tidligere ikke funnet i Norge og *Cyrnus crenaticornis* (Kolenati, 1858) er ikke tidligere tatt i Sør-Norge. Videre ansees 16 av artene, *Rhyacophila fasciata* Hagen, 1859, *Agraylea sexmaculata* Curtis, 1834, *Hydropila cornuta* Mosely, 1922, *H. pulchricornis* Pictet, 1834, *H. simulans* Mosely, 1920, *Orthotrichia costalis* (Curtis, 1834), *Chimarra marginata* (Linnaeus, 1767), *Cheumatopsyche lepida* (Pictet, 1834), *Hydropsyche contubernalis* McLachlan, 1865, *Ironoquia dubia* (Stephens, 1837), *Limnephilus externus* Hagen, 1861, *L. fuscinervis* (Zetterstedt, 1840), *Beraeodes minutus* (Linnaeus, 1761), *Adicella reducta* (McLachlan, 1865), *Athripsodes albifrons* (Linnaeus, 1758) og *Setodes argentipunctellus* McLachlan, 1877, som sjeldne i Norge.

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Distribution of phytophagous beetles (Scolytidae, Cerambycidae, Curculionidae) living in the bark and wood of Scots pine (*Pinus sylvestris* L. in northern Norway

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Nilssen, Arne C. 1993. Distribution of phytophagous beetles (Scolytidae, Cerambycidae, Curculionidae) living in the bark and wood of Scots pine (*Pinus sylvestris* Linnaeus) in northern Norway. *Fauna norv. Ser. B* 40: 13—31.

The distribution of phytophagous beetles (Scolytidae, Cerambycidae, Curculionidae) on Scots pine (*Pinus sylvestris* Linnaeus) in Nordland, Troms and Finnmark is given in detailed maps. The field work was done 1974—83, and special effort was made to investigate scattered and isolated pine forests in coastal districts, including the northernmost pines in the world. The distribution and abundance of each species and the most interesting localities are briefly commented.

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INTRODUCTION

The bark and wood of trees constitute a potential resource utilized by a variety of phytophagous insect species. Although a few species may attack healthy trees, the majority can — due to resistance from the tree — only use dying or dead trees.

Some species attack only one tree species (*monophagous* species), other a few or many tree species (*oligophagous* and *polyphagous* species, respectively). Among the insects attacking bark and wood, Coleoptera constitutes the most species rich order, especially the families Scolytidae, Curculionidae and Cerambycidae.

Northern Norway forms the northwestern part of Fennoscandia and Europe. Many plant and animal species therefore have their northernmost distribution in this region. Among these species are Scots pine (*Pinus sylvestris* (Linnaeus)) and the specific fauna associated with it.

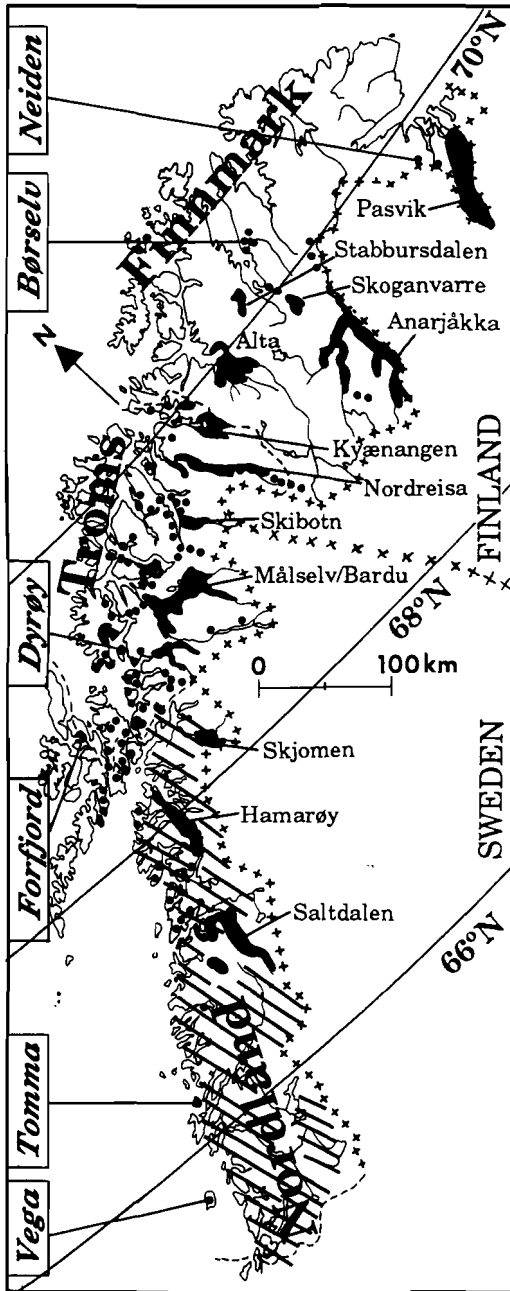
The detailed distribution of Scots pine in northern Norway has been mapped by Juul (1925) (counties of Finnmark and Troms), Benum (1958) (county of Troms). Rønning (1961) (north of 67° N). For southern Nordland there exists no detailed maps of the pine forests, but the coastal tree limits of pine are commented by Dahl (1912) and mapped by

Enquist (1933). The northern extension of Scots pine in Fennoscandia has been discussed by Hustich (1966).

Figure 1 gives a simplified map of the distribution of Scots pine in the counties of Nordland, Troms and Finnmark (= northern Norway). In the area north of Saltfjellet (66° 45'N). Scots pine is the only coniferous forest tree, and in most valleys in the mainland it forms real forests of varying sizes. Norway spruce (*Picea abies* (L.)) Karst. starts its natural distribution south of Saltfjellet, but has been planted north of its natural distribution, see Nilssen (1978).

Fossil records indicate that Scots pine formerly had a much wider distribution, especially in the outer districts (Juul 1925, Benum 1958, Hustich 1966). Thus, in many coastal areas and at higher altitudes there are now only persistent outposts of pine left, scattered as single trees or small stands. The pine forests are to different degrees isolated from each other. Some are interconnected by single trees over considerable distances, whereas others are completely isolated and have been called tree islands (see Hustich 1979).

The study area comprises the northernmost occurrences of Scots pine in the world. The northernmost pine forest is situated in Stab-



bursdalen ($70^{\circ}18'N$), but single trees are found as far north as Børselv ($70^{\circ}22'N$). The pine forests in the eastern parts of Finnmark are continuously connected to the Finnish pine forests (Hustich 1966).

The pine beetle fauna in northern Norway

Figure 1. Distribution of Scots pine *Pinus sylvestris* in northern Norway.

The map is based on Dahl (1912), Juul (1925), Enquist (1933), Benum (1958), Rønning (1961) and the author's own registrations. The dark areas show more or less closed pine forests, whereas the dots indicate isolated stands or single trees. The hatched areas in the south suggest the pine trees scattered among the dominating Norway spruce. The major pine forests and specific sites mentioned in the text are named (see also Table 2).

is partly known, and previous records of bark beetles (Scolytidae) are mapped in Lekander & al. (1977). Finds of other bark- and wood boring beetles (e.g. Curculionidae and Cerambycidae) are listed in Strand (1946, 1970, 1977), Lindroth (1960), and Nilssen and Andersen (1977). Distribution of the bark fauna (beetles) of the introduced spruce north of Saltfjellet has been published earlier (Nilssen 1978).

The purpose of this investigation has been to map the occurrences of the phytophagous bark- and wood-boring beetles on Scots pine towards the limits of the distribution of the host. What species will follow their host tree to its northern, climatic limits? An additional aim was to elucidate the host tree preferences of pine and spruce beetles. This question is basic in interpreting the colonization data of spruce beetles in northern Norway (Nilssen 1978) and the dispersal experiments carried out in northern Finland (Nilssen 1984).

All the largest pine forests in the study area were investigated. In addition, much field work was done in areas with scattered trees and isolated stands in the outer districts. The intention was to observe how the density and isolation of the host tree influence the abundance of the beetle populations and the species composition.

MATERIAL AND METHODS

The field work was carried out in the summers 1973 to 1983. The pine forests in the counties of Troms and Nordland (northern part) were investigated repeatedly. The following districts were visited once or a few times: The inner (eastern) parts of Finnmark in 1975 (Upper Anarjåkka) and 1977 (Skoganvarre), Pasvik in 1975 and 1983, Stabbursdalen in 1977 and 1979, Børselv 1979 and 1983, the outer parts of Nordland (Hel-

geland) in 1978, 1981 and 1982, the inner parts of southern Nordland in 1982, Tranøy. Senja (Troms) in 1974 and 1981. The investigation is therefore not equally thorough in all areas.

The material was collected by investigating the bark and wood of sick and dead pines found occasionally. A variety of kinds of breeding material (regarding e.g. size, thickness, degree of deterioration, exposure) was included. The deeper parts of the root systems were not investigated.

The species of Scolytidae and Curculionidae were mainly collected as imagines, Cerambycidae mostly as larvae. Some larvae, however, could not be identified. Sometimes larvae in their breeding material were brought to the laboratory for rearing and species identification. The nomenclature follows Silfverberg (1979) and (for Cerambycidae) Bily and Mehl (1989).

The investigation is qualitative, but notes on abundance will be commented in the discussion.

RESULTS

The finds of the most common species are given in distribution maps in Figure 2—18, whereas Table 1 summarizes the records of the more rare species.

Figure 2: *Tomicus piniperda* (Linnaeus) is common throughout all pine forests, but also in some of the outer districts with scattered pine trees. In such areas the breeding material was scarce, and the species often had to subsist on thin branches (diameter down to 3—4 cm), an unusual thin material for this species (Bakke 1968).

Figure 3: *Hylurgops palliatus* (Gyllenhal) is common throughout the range of the pine, but it was especially abundant in northern Nordland and in most of Troms. It seems scarce in the eastern parts of Finnmark. The species is the one that best has utilized the introduced spruce, see Nilssen (1978).

Figure 4: *Hylastes brunneus* Erichson follows its host tree well, to some extent also in the outer districts. It commonly breeds in the roots, but in this survey the species is mostly found on the undersides of logs placed directly on the ground.

Figure 5: *Pityophthorus lichtensteini* (Ratzeburg) only attacks well exposed thin broken twigs on standing trees. If not searched especially for, the species is easily overlooked. It therefore is probably occurring in all main forests. In Finnmark the species is very common, and it was even found in the northernmost pines in Stabbursdalen and Børselv.

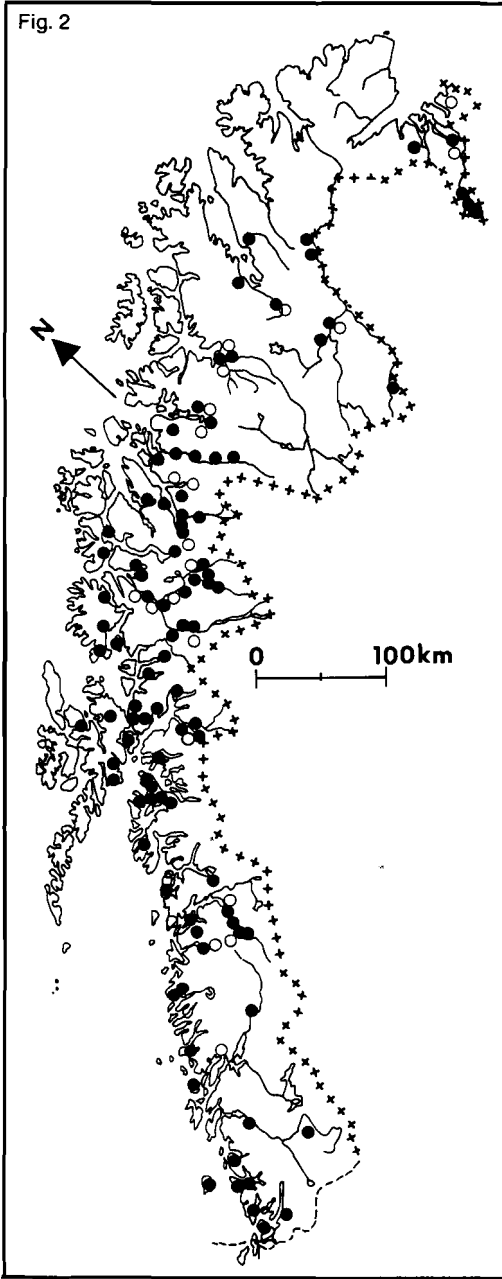
Figure 6: *Trypodendron lineatum* (Olivier) is found in most parts, but is missing in certain forests. Thus, it has never been found in Skjomen or other parts of northern Nordland despite being searched for repeatedly. It readily attacks spruce.

Figure 7: *Pityogenes quadridens* (Hartig) is widely distributed in northern Norway, even at the outermost occurrences of its host tree, e.g. the scattered pines of southwest Senja (area of Skrolsvik) and in Børselv.

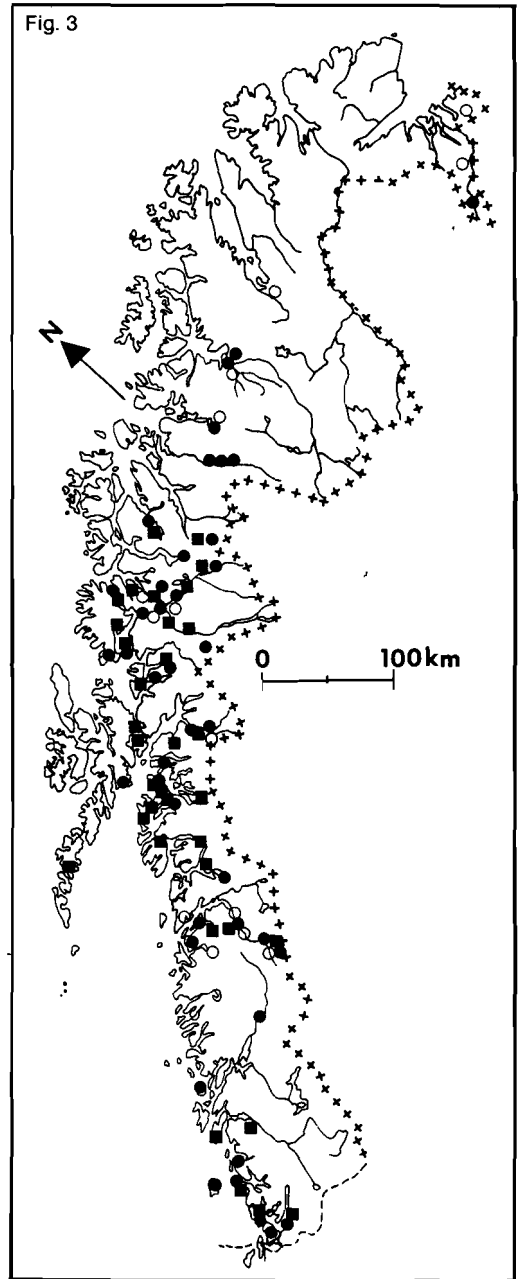
Figure 8: *Pityogenes bidentatus* (Herbst) has a distribution nearly identical with that of *P. quadridens*. These two species seem to coexist, perhaps also compete for the same limited resources in those districts where the pine trees are scattered.

Figure 9: *Ips acuminatus* (Gyllenhal) is common in Troms and Finnmark (including Stabbursdalen and Børselv). It seems normally confined to real forests, but was also occasionally found in the outer districts. In southern Nordland the species is scarce and has not yet been recorded from the coastal parts.

Figure 10: *Ips sexdentatus* (Börner) normally only attacks the thickest parts of pine timber, and the species is therefore often transported anthropochorously, e.g. to sawmills. The species is abundant in the Målselv/Bardu area, but seems scarce in the valleys of Nordreisa and Kvænangen. In Nordland the species was found only in Dunderlandsdalen and Saltdalen, both places at higher altitudes. This corresponds well to the suggestions of Bakke (1968) that its distribution is limited by a too warm climate. Thus, it has never been recorded further down in the substantial pine forests of Saltdalen. In Finnmark, the species was abundantly occurring in the Alta area and in Pasvik. In Stabbursdalen, only galleries were found. Because the supply of suitable breeding material is scarce due to



Tomicus piniperda (Linnaeus)

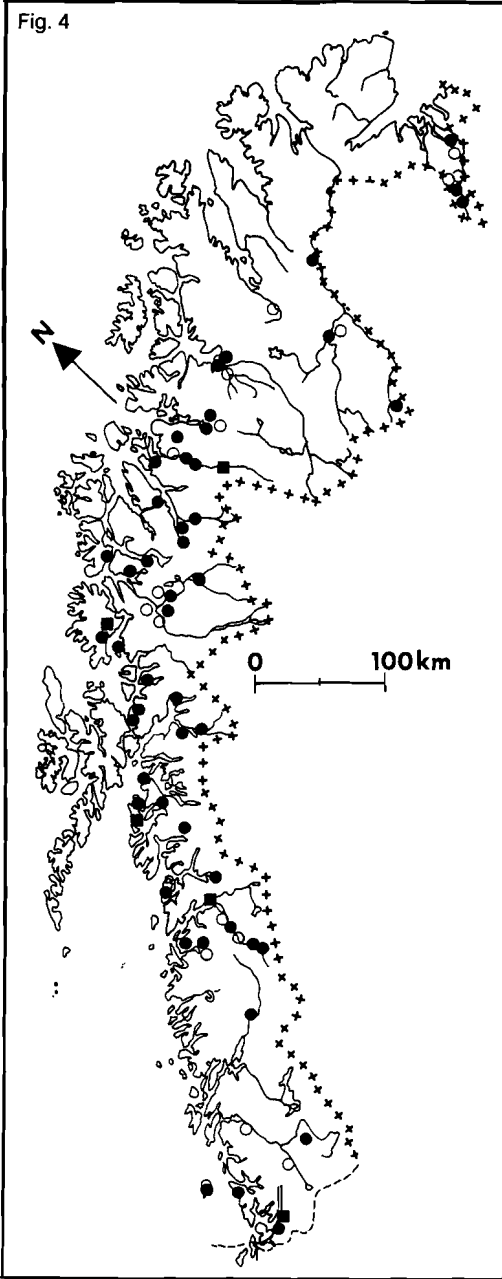


Hylurgops palliatus (Gyllenhal)

Figure 2—18. Distribution maps of the most common bark and wood beetles found on Scots pine. 2—11: Scolytidae; 12—13: Curculionidae; 14—17: Cerambycidae; 18: Pythidae). Previous registrations are mostly taken from Lekander & al. (1977) (Scolytidae) and Strand (1946, 1970) (Cerambycidae, Curculionidae and Pythidae). Finds on Norway spruce are mostly from Nilssen (1978).

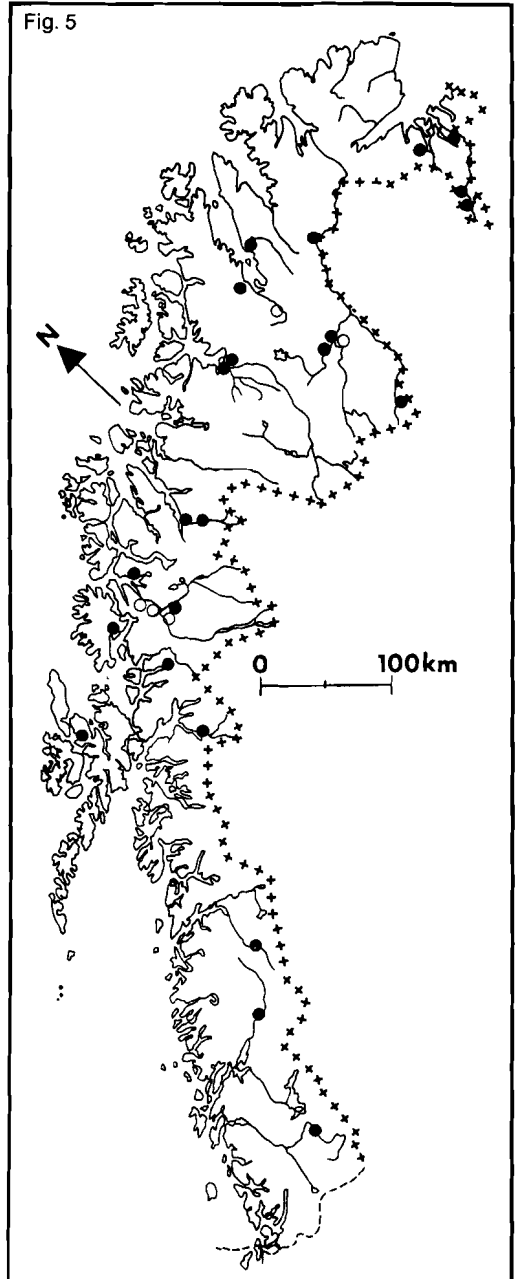
- collected on Scots pine
- collected on Norway spruce
- collected previously

Fig. 4



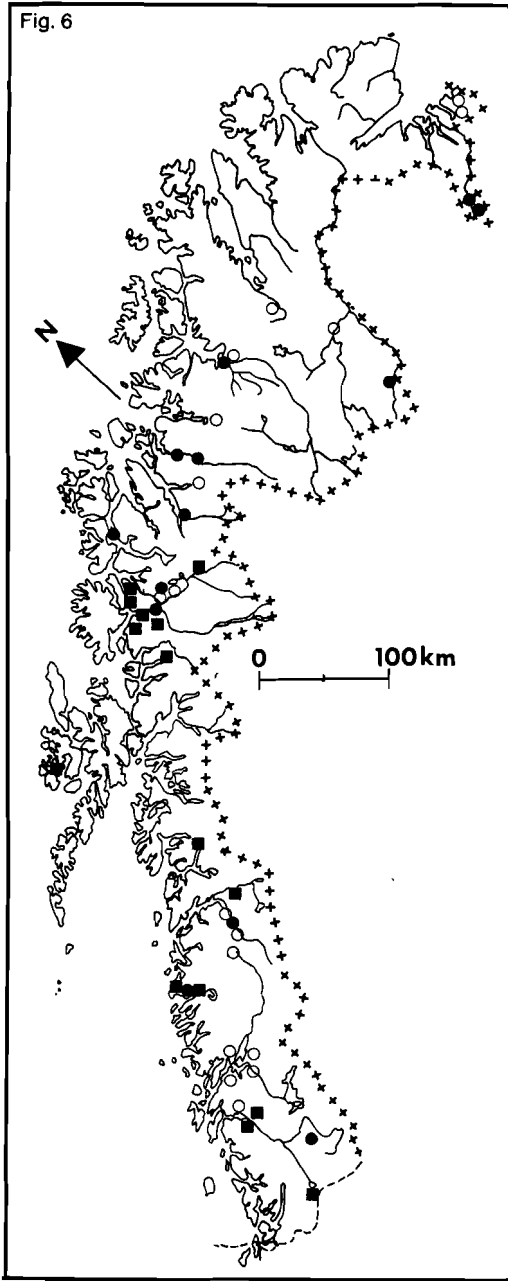
Hylastes brunneus Erichson

Fig. 5



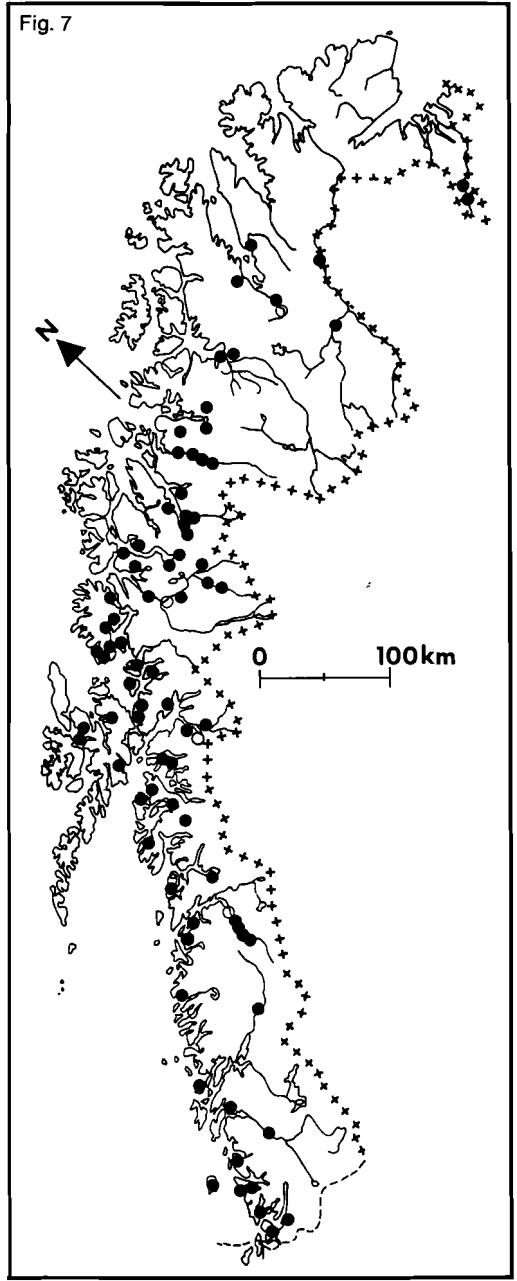
Pityophthorus lichtensteini (Ratzeburg)

Fig. 6

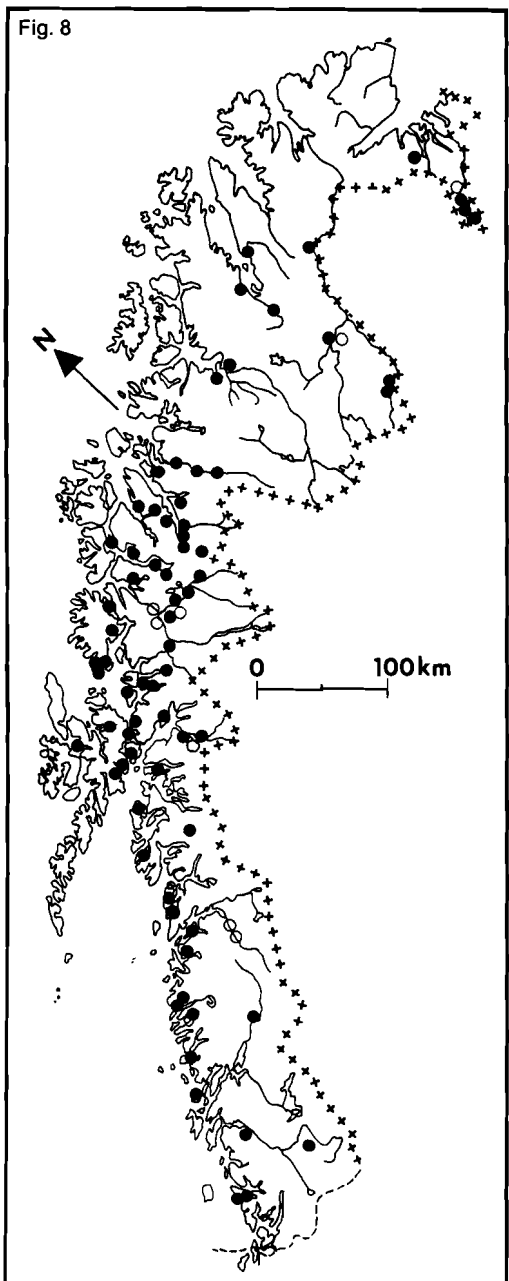


Trypodendron lineatum (Olivier)

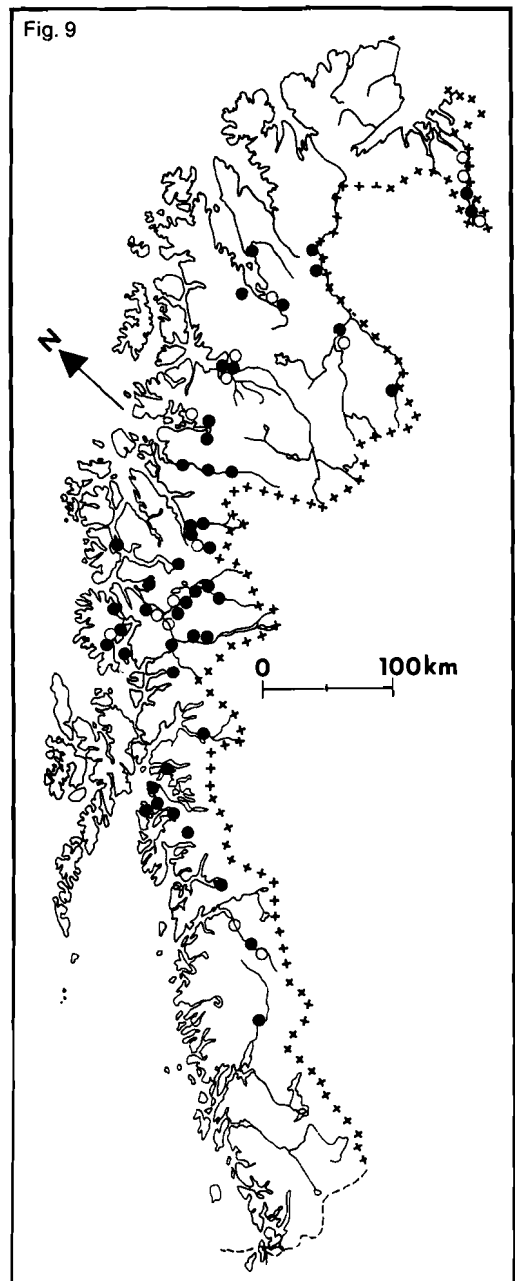
Fig. 7



Pityogenes quadridens (Hartig)

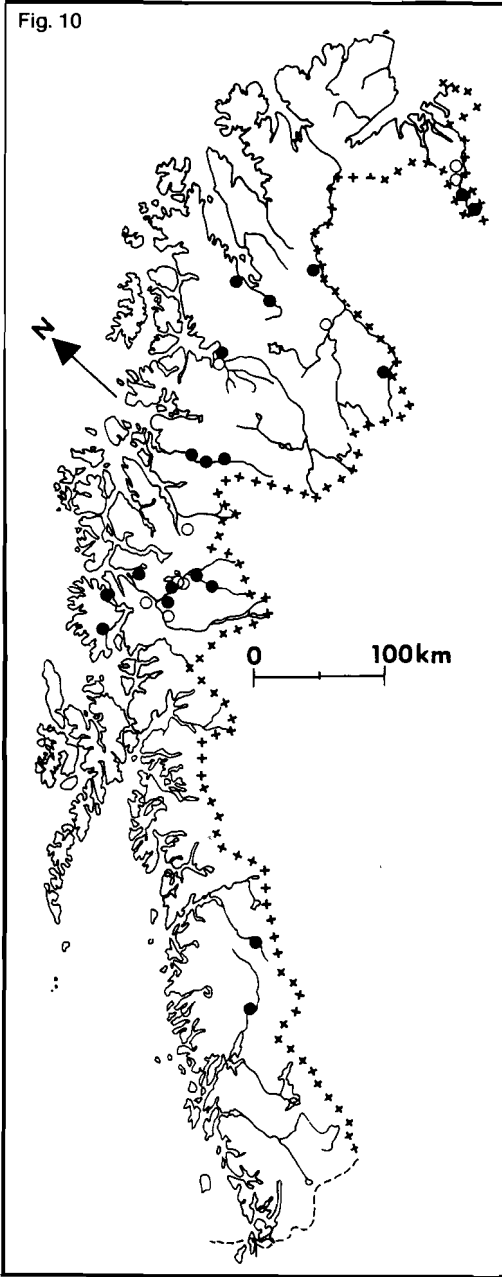


Pityogenes bidentatus (Herbst)



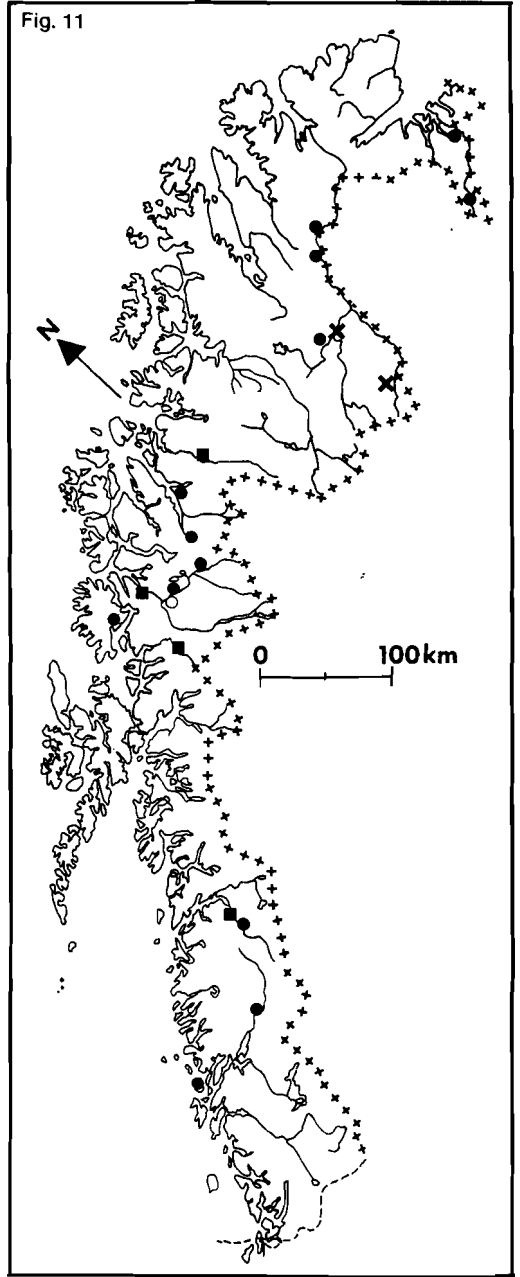
Ips acuminatus (Gyllenhal)

Fig. 10



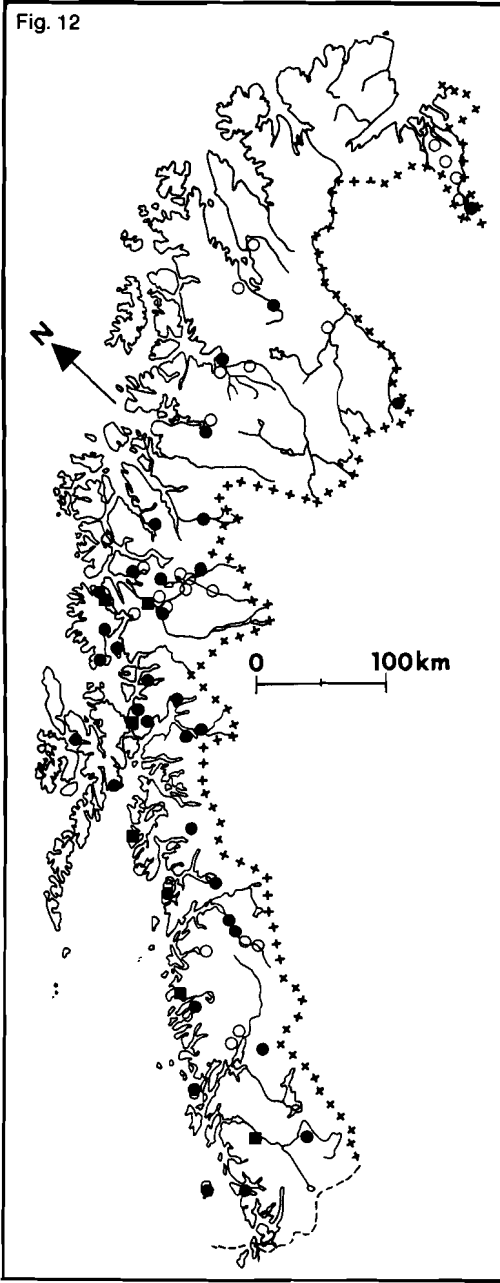
Ips sexdentatus (Börner)

Fig. 11



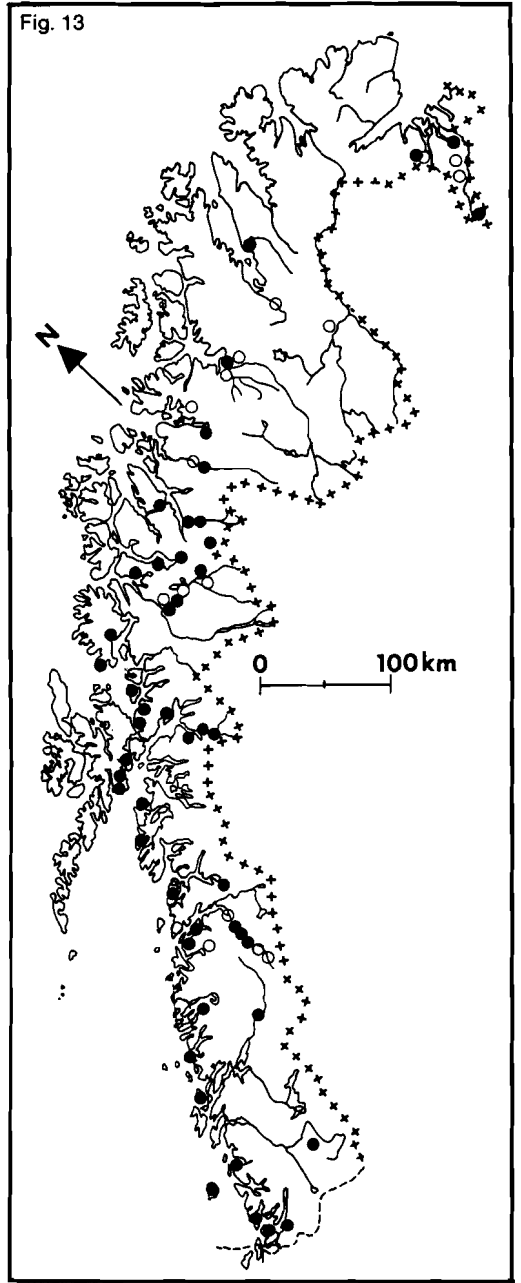
■, ● - *Orthotomicus suturalis* (Gyllenhal)
x - *Orthotomicus laricus* (Fabricius)

Fig. 12



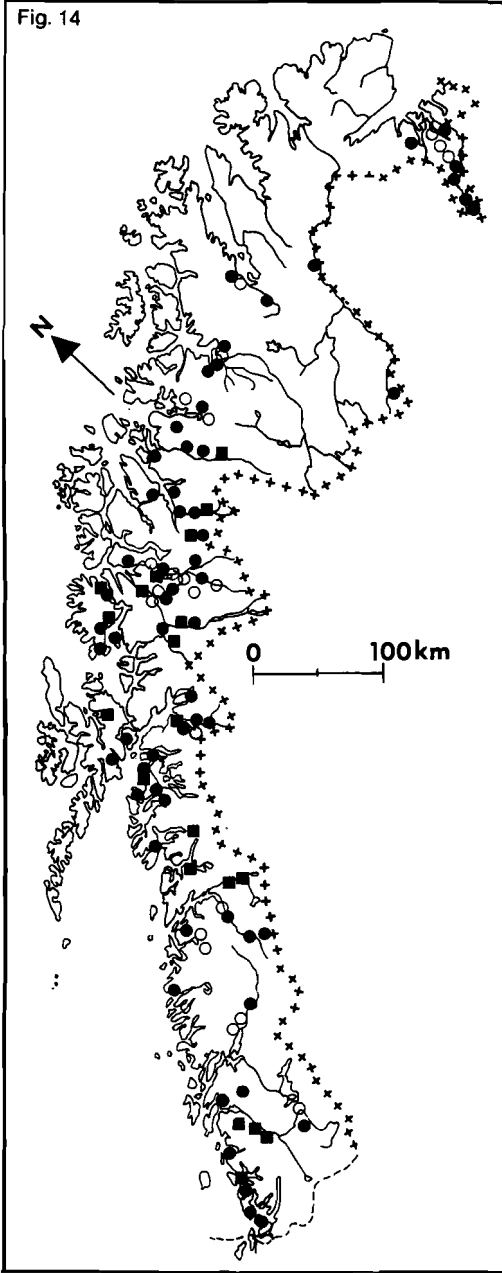
Hylobius abietis (Linnaeus)

Fig. 13



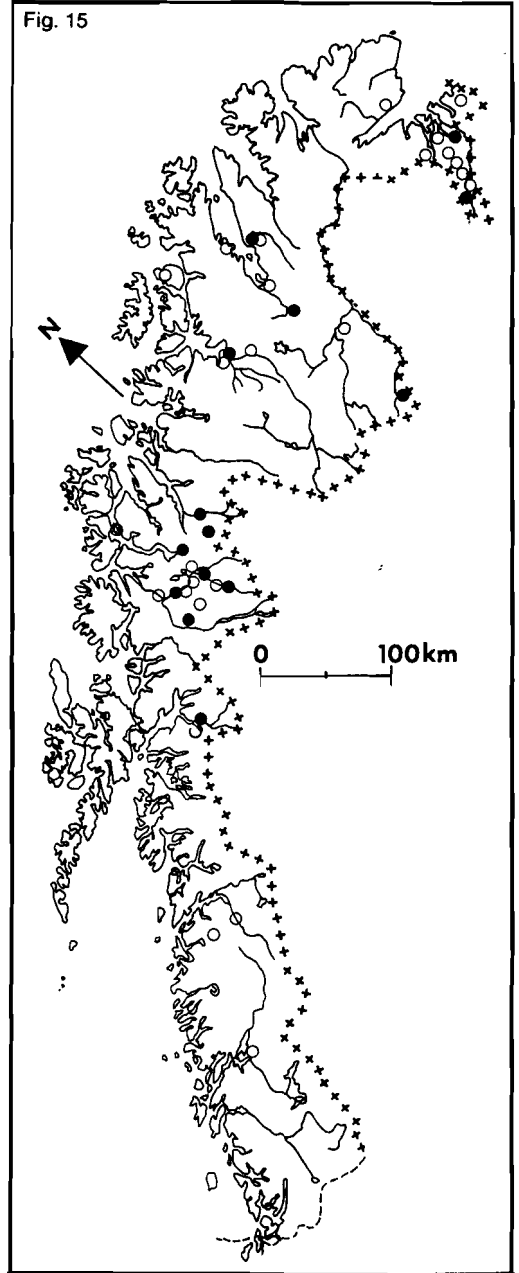
Pissodes pini (Linnaeus)

Fig. 14



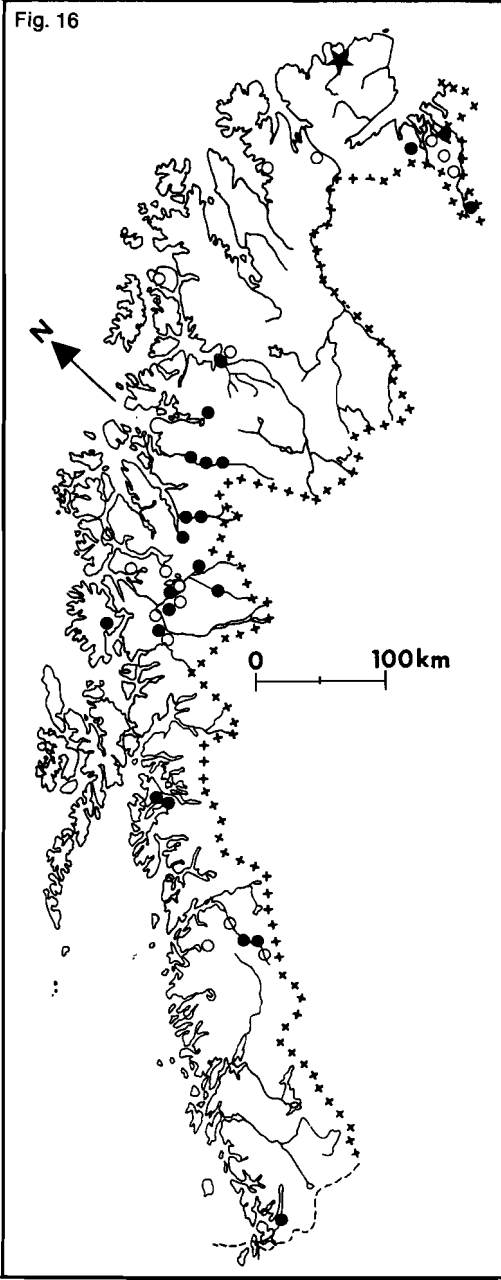
Rhagium inquisitor (Linnaeus)

Fig. 15



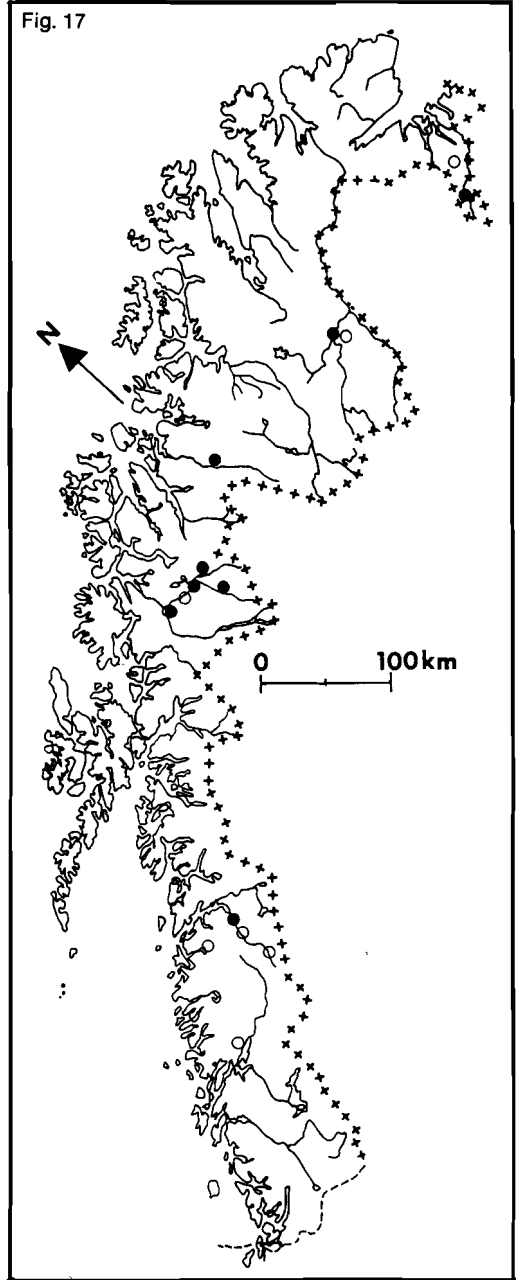
Asemum striatum (Linnaeus)

Fig. 16



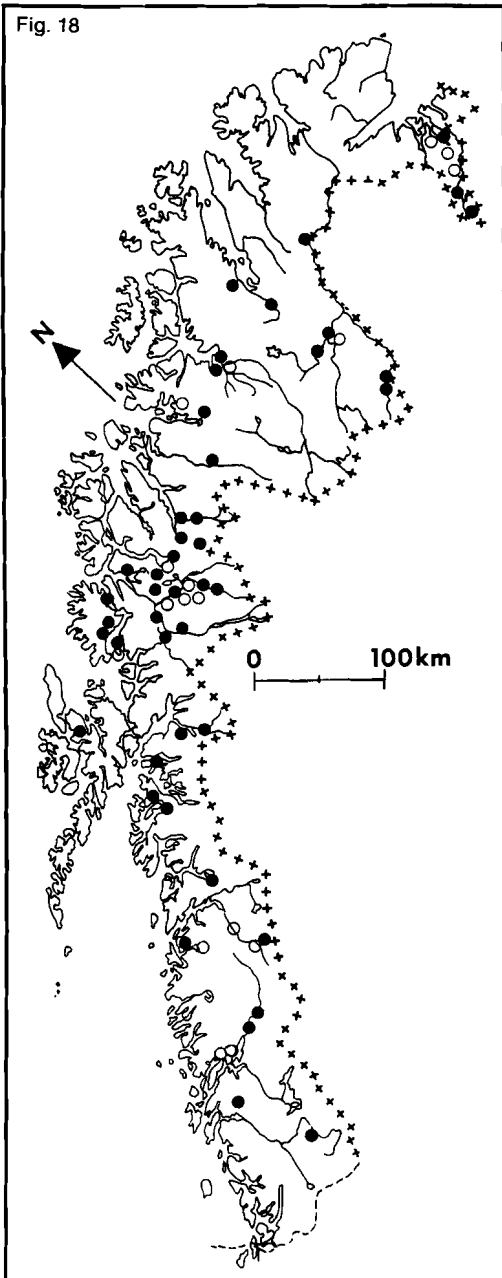
Acanthocinus aedilis (Linnaeus)

Fig. 17



Monochamus sutor (Linnaeus)

Fig. 18



Pytho depressus (Linnaeus)

little logging activity, the species may have problems to maintain the population there.

Figure 11. *Orthotomicus suturalis* (Gyllenhal) is quite rare and is only found in small numbers. It seems, however, more abundant in the eastern part of Finnmark. It is also found on spruce.

Figure 11: *Orthotomicus laricis* (Fabricius), not previously recorded from northern Norway, was found in Karasjok and in Upper Anarjåkka, East Finnmark. This is further north and west of the distribution limits suggested by Lekander & al. (1977: Map 4).

Figure 12: *Hylobius abietis* (Linnaeus) is widespread throughout the area, partly also in the outer districts. It is often found on spruce. The species most often breeds in underground roots, but such material has not been thoroughly examined in this survey. The species is therefore probably more widespread than the present map shows.

Figure 13: *Pissodes pini* (Linnaeus) is numerous and ubiquitous in pine forests. The species follows its host tree to most outposts. *P. pini* is a true pine beetle and is not found on spruce in the area.

Figure 14: *Rhagium inquisitor* (Linnaeus) is the most widespread cerambycid on pine. It occurs almost everywhere in pine timber exceeding certain sizes, some places in isolated pine forests. This beetle also utilizes spruce logs when present.

Figure 15: *Asemum striatum* (Linnaeus) is mostly found as imago, sometimes a long distances from pine trees. The species is possibly more common in the area than the map shows.

Figure 16: *Acanthocinus aedilis* (Linnaeus) is quite abundant in the largest pine forests. Also this species is occasionally found far beyond its host tree.

Figure 17: *Monochamus sutor* (Linnaeus) seems confined to the large pine forests in Målselv/Bardu and Nordreisa in Troms, Pasvik and Karasjok in Finnmark, and Saltdalen in Nordland. Occasionally, however, individuals are found far away from the pine districts, probably demonstrating anemochorous dispersal.

Table 1. Additional records of beetles from Scots pine (species not mapped in Figures 2—18).

Strand's revised system follows Økland (1981). EIS = European Invertebrate Survey-System (50 x 50 km squares) follows Økland (1976).

	Strand's revised system	EIS square

Anobiidae:		
<i>Enobius mollis</i> (Linnaeus):		
Skjomen, Narvik	NNØ	139
Skibotn, Storfjord	TRI	155
Svartnes, Ballsfjord	TRI	162
Furuflaten, Lyngen	TRI	163
Skogstad, Nordreisa	TRI	164
Cerambycidae:		
<i>Pityphilus (=Pogonocherus) fasciculatus</i> (DeGeer):		
Skomovik, Brønnøy	NSY	117
Skjomendalen, Narvik	NNØ	139
Straumsmo, Bardu	TRI	147
Skrolsvik, Tranøy	TRY	153
Rundhaug, Målselv	TRI	154
Holt, Målselv	TRI	154
Pasvik, Sør-Varanger	FØ	160
Furuflaten, Lyngen	TRI	163
<i>Callidium violaceum</i> (Linnaeus):		
Innhavet, Hamarøy	NNØ	138
Tømmeråsen, Hamarøy	NNØ	138
Skjomen, Narvik	NNØ	139
Nordvik, Harstad	TRY	145
Målselvfossen, Målselv	TRI	154
Suolovuopmi, Kautokeino	FI	165
<i>Anastrangalia (=Leptura) sanguinolenta</i> (Linnaeus)		
Tømmeråsen, Hamarøy	NNØ	138
Curculionidae:		
<i>Pissodes piniphilus</i> (Herbst):		
Skogstad, Nordreisa	TRI	164
<i>Hylobius piceus</i> (DeGeer)		
Skjomdalen, Narvik	NNØ	140
Pasvik, Sør-Varanger	FØ	160
Tverrelvdalen, Alta	FV	173
<i>Magdalis phlegmatica</i> (Herbst)		
Skibotn, Storfjord	TRI	155
Bostrichidae:		
<i>Stephanopachys substriatus</i> (Paykull):		
Upper Anarjåkka, Karasjok	FI	159
Scolytidae:		
<i>Hylastes cunicularius</i> Erichson		
<i>Hylurgops glabratus</i> (Zetterstedt)		
<i>Dryocoetes autographus</i> (Ratzeburg)		
<i>Dryocoetes hectographus</i> Reitter		
<i>Polygraphus punctifrons</i> Thomson		
Susendalen, Hattfjelldal	NSI	112

Figure 18: *Pytho depressus* (Linnaeus) often co-exists with *R. inquisitor*, and the distribution and abundance of these two species are similar. *P. depressus* is, however, more scarce in the coastal districts of Nordland.

Ernobius mollis and *Callidium violaceum* (Table 1) are able to utilize dry bark and wood of pine, by that being preadapted to live in houses if material with bark remnants are used. *Pityphilus fasciculatus* (Table 1) seems present all over the area, the larvae feeding in 2–5 cm thick branches. *Anastrangalia sanguinolenta* (Table 1) was found as adults in the pine forests in Hamarøy. The larvae were not found, but pine is regarded to be one of the principal host trees (Bily and Mehl 1989).

The scolytids listed in Table 1 from Hattfjelldal are spruce beetles found on pine in an area where Norway spruce is the predominating conifer.

DISCUSSION

The primary necessity for a bark insect species to exist is the presence of a proper host tree. Most species dealt with here are either monophagous on pine or oligophagous on Scots pine and Norway spruce. As spruce is an introduced tree and only occurring as separated plantations north of Saltfjellet (Nilssen 1978), pine is the only possible habitat most places, restricting the distribution of monophagous and oligophagous pine beetles to occurrences of pine, see Figure 1.

In Hattfjelldal, species with spruce as their principal host tree were found to attack pine occasionally, Table 1. In this area, Norway spruce is the predominant conifer with pine trees scattered and restricted to specific edaphic conditions. The population levels of spruce beetles are therefore high, obviously resulting in attacks on a secondary host tree. Nilssen (1978) reported a few cases of *Dryocoetes autographus*, *D. hectographus* and *Pityogenes chalcographus* attacking pine trees in places where only introduced spruce is present.

Theoretical studies of separated populations have shown that dispersal capacity is crucial for the survival of a population if the habitat is fragmented (Burkey 1989). The pine forests in northern Norway are highly fragmented, consisting of different areas, tree sizes, density and forestry practices. The pine

beetle populations will therefore also be fragmented.

Studies of insect diversity have shown a positive association between the number of species and the area or abundance of the host (Speight and Wainhouse 1989). This species-area relationship is to some extent comparable to the theories of island biogeography (MacArthur and Wilson 1967), because single trees or clusters of host plants may be visualized as islands in a «sea» of inhabitable vegetation (Janzen 1968), even if the analogy cannot be pushed too far (Southwood and Kennedy 1983). In analyzing the faunal list for British trees, Kennedy and Southwood (1984) found that the species-area relationship is the most important predictor of insect species richness. The following hypotheses have been advanced to describe the mechanisms involved (Strong & al. 1984): (i) The habitat-heterogeneity hypothesis (see also Wright 1983); (ii) the encounter-frequency hypothesis; and (iii) the equilibrium theory of island biogeography.

Applied on the pine beetle fauna in northern Norway, it is obvious that a large pine forest embrace a larger variety of habitats than a small one. Especially important is that a large forest has a higher probability of having dead trees of a proper size, which is a limiting factor for bark insects in small stands. A combination of the hypotheses (i) and (ii) above may therefore explain why large pine forests have a higher species richness than small ones.

The equilibrium theory (hypothesis (iii) above) presupposes both a colonizing rate and an extinction rate, with distance from the island to the pool of potential colonists as an important factor for colonizing, whereas the size of the island is important for the extinction rate. In the most isolated pine forests, e.g. those shown in Table 2, the situation is that the pine forests have become smaller the last hundreds of years, gradually increasing the probability of extinction of established species.

These isolated pine stands are a kind of «relicts» from a former, more extensive distribution. The question may be asked if the beetles here also are relicts in that they have survived as direct descendants from a previous period. The increased extinction risks may simply involve that one year with no wind broken trees (or other material) is enough for most species to «break the line». As

Table 2. Species found in «tree islands» of Scots pine, of which some are situated on real islands (Figure 1). Area: approximate total area covered by pine trees, but the trees are varying in size and density. Generally all pines in these sites are small (height < 3—4 m). Distance: nearest occurrence of other pine forests (single trees excluded). For the sites on small islands, the distance is over open sea. Børselv: the world's northernmost trees of Scots pine; Neiden: a small stand of trees well isolated from the pine forests in Pasvik, eastern Finnmark.

	VEGA	TOMMA	FORFJORD	DYRØY	BØRSELV	NEIDEN
	Small island	Small island	Big island	Small island	Northernmost pine	-
Investigated	1982	1981	1976;1981	1981	1979;1983	1983
Area (Sq km)	≈1.5	<0.5	≈1	≈0.5	<0.5	≈0.5
Distance (km)	≈25	≈10	≈40	≈15	≈30	≈35
Coordinates	65°37'N 11°50'E	66°17'N 12°50'E	68°47'N 15°45'E	69°10'N 17°33'E	70°22'N 25°35'E	69°40'N 29°20'E
<i>T. piniperda</i>	+	+	+	+	+	+
<i>H. palliatus</i>	+	+		+		
<i>H. brunneus</i>	+			+		
<i>P. lichtensteini</i>			+		+	+
<i>P. quadridens</i>	+	+	+	+	+	
<i>P. bidentatus</i>		+			+	+
<i>I. acuminatus</i>				+	+	
<i>O. suturalis</i>		+				
<i>H. abietis</i>	+	+	+	+		
<i>P. pini</i>	+	+			+	+
<i>R. inquisitor</i>				+		+
<i>A. striatum</i>					+	
<i>A. aedilis</i>						+
<i>P. depressus</i>			+	+		
Sum species	6	7	5	8	7	6

shown earlier (Nilssen 1978, 1984), bark beetles have a good capacity for aerial or anthropochorous dispersal, so it is a possibility that the present fauna reflects a continuous supply of individuals from other sub-populations.

There are, however, differences between species in their chances to survive in these marginal habitats. Generally, small species attacking branches and twigs are independent of whole dead trees. Species like *P. lichtensteini*, *P. bidentatus* and *P. quadridens* will nearly always find broken branches and twigs, which are the preferred breeding mate-

rial. Such material may be expected to be found frequently in all kinds of pine forests, including well isolated and scattered pine forests without organized logging. For those species requiring thick bark to breed, a broken branch or twig is not enough. Even so, *T. piniperda* was found all over the pine forests, including well isolated and small forests (Table 2). This species seems to have a flexibility in the habitat choice, as it was observed to attack unusual thin material. *Ips sexdentatus* and most cerambycids do not have this flexibility, a fact explaining their absence in the smallest pine forest.

Table 3. Latitudinal distribution of scolytid species with Scots pine as the principal host tree in the Nordic countries according to Lekander & al. (1977, Table 1). *H. palliatus* and *T. lineatum* are included even if they have an equal preference for Norway spruce and Scots pine. The table is based on the maps in Lekander & al. (1977) and the present investigation. x = present, xn = present in northern Norway.

Latitude (°N)	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Species																
<i>Tomicus minor</i>	x	x	x	x	x	x	x	x	x	x	x	xn	xn			
<i>Tomicus piniperda</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	xn
<i>Hylurgops palliatus</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	
<i>Hylurgus ligniperda</i>	x															
<i>Hylastes ater</i>	x	x														
<i>Hylastes brunneus</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	
<i>Hylastes opacus</i>	x	x	x	x	x	x	x	x	x	x						
<i>Carphoborus cholodkowskyi</i>								x			x	x	x			
<i>Carphoborus minimus</i>										x						
<i>Crypturgus cinereus</i>			x	x	x	x	x	x	x	x	x	x	x			
<i>Pityophthorus glabratus</i>	x	x	x		x	x										
<i>Pityophthorus lichtensteini</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	xn
<i>Pityophthorus pubescens</i>	x	x	x	x												
<i>Trypodendron lineatum</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	
<i>Pityogenes bidentatus</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	xn
<i>Pityogenes irkutensis</i>							x	x	x		x	x	x			
<i>Pityogenes quadridens</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	xn
<i>Pityogenes trepanatus</i>	x	x	x	x	x	x										
<i>Ips acuminatus</i>	x	x	x	x	x	x	x	x	x	x	xn	xn	xn	xn	xn	xn
<i>Ips sexdentatus</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	xn	xn	xn
<i>Orthotomicus laricis</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	xn
<i>Orthotomicus proximus</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
<i>Orthotomicus suturalis</i>	x	x	x	x	x	x	x	x	x	x	x	xn	x	xn	xn	
<i>Orthotomicus longicollis</i>	x	x		x	x	x										
Sum	20	21	18	18	18	19	17	16	16	17	16	16	15	12	11	6

Climate, especially the summer temperature, is another factor thought to influence the distribution of bark insects (Bakke 1968, Lekander & al. 1977, Halioövaara & al. 1991). The pine beetles absent in northern Norway (Table 3), are probably mainly limited by climatic factors, even if immigration history (Lekander 1963, Lekander & al. 1977) or condition of the forests may be co-factors. On the other hand, the species found in the present study do not seem to be limited by climate, even if the difference in climate along the latitude in northern Norway is substantial. Thus, the average number of days with daily mean temperature > 6°C has a

range from 150—110 days per year from south to north (Sveli 1987). When scrutinizing the distribution maps (Figures 2—18) it is evident that all species seem to survive in a climate satisfactory for the host, and no species seems to «leave off» at a certain latitude. This is, however, the case with *Tomicus minor*, not found in the present study, but previously registered in the southern part (Salt-dalen) (Lekander & al. 1977, see also Bakke 1968). Saarenma (1985) found that the temperature is crucial in timing of the emergence of *T. piniperda* in northern Finland, and that the species strongly relies on being reared on exposed parts of the logs. It is probably that

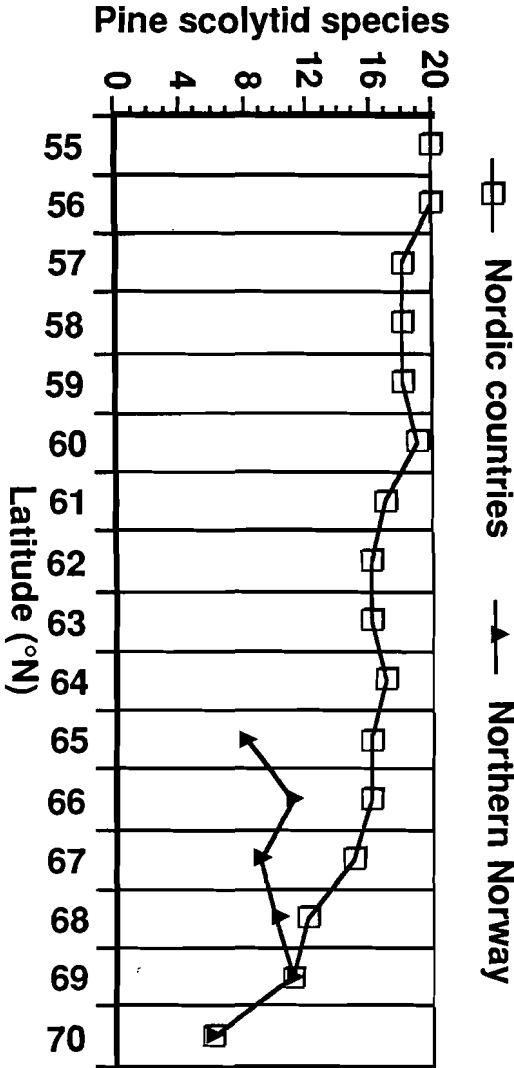


Figure 19. Latitudinal distribution of pine scolytid species in the Nordic countries. The figure is based on Table 3.

the impact of a cool summer climate is limiting the population growth, but not excluding the species completely. This may explain why damage by bark beetles are rare in the north even if they are present (Saarenma 1985).

The general statement that bark beetles associated with Scots pine have a northern boundary, but no southern one (Lekander & al. 1977, Heliövaara & al. 1991) is only true for a minority of the species. When Heliövaara & al. (1991) found that the number of

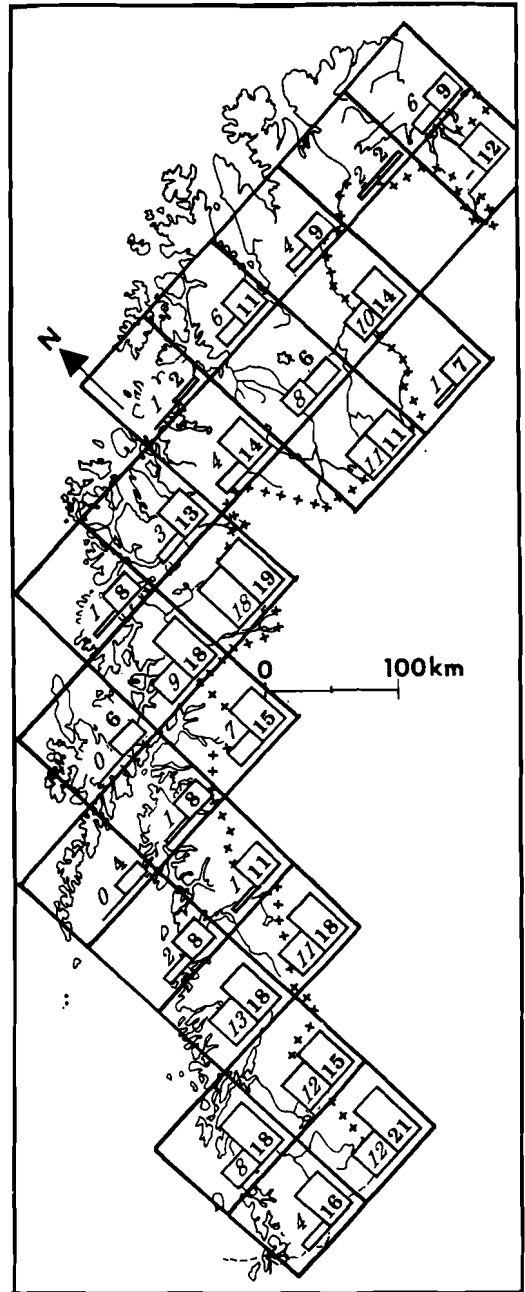


Figure 20. Number of scolytid species in northern Norway. The quadrats correspond to those used in Lekander & al. (1977) and Heliövaara & al. (1991). The **bold** numbers refer to records published in Lekander & al. (1977), Nilssen (1978), the present investigation and a few records from deciduous trees (unpublished). The numbers in *italics* are those used by Heliövaara & al. (1991).

Nordic scolytids decreased with the latitude, the primary reason is the decrease in number of host tree species. When controlling for this factor, i.e., looking at the species assemblage at one tree species, the «residual» may be explained equally between climate and degree of investigation.

Figure 19 shows the latitudinal distribution of pine scolytids in the Nordic countries, see also Table 3. There is a slight decrease in species richness up to 66° N, mainly caused by absence of certain southern species. *Hylastes ater*, *Hylastes opacus*, *Pityophthorus glabratus*, *Pityophthorus pubescens*, *Pityogenes trepanatus* and *Orthotomicus longicollis* all have southern distributions in the Nordic countries (Lekander & al. 1977), probably in part from climatic reasons. These species therefore cannot be expected to be found in northern Norway. Climate obviously also limits the distribution of *Tomicus minor* (see above).

Carphoborus cholodkovskyi is extremely rare and confined to two areas in northern Sweden, but may from climatic reasons be found in northern Norway. The two species most likely to be found here, are *Pityogenes irkutensis* and *Crypturgus cinereus* as both are found north of the Polar Circle in Sweden or Finland. The former species is regarded as «rare» and therefore difficult to detect and may have been overlooked in this survey. *C. cinereus*, on the other hand, has galleries formed in close association in those of *T. piniperda*, a common pine beetle in northern Norway (see Figure 1). It should be easily detected if present.

The variation in number of species may also represent degrees of sampling effort rather than actual number of species. Figure 19 shows that the number of pine scolytid species does not decrease northwards in northern Norway when the present survey is included (the number at 70° N excluded). The distribution maps in Lekander & al. (1977) are therefore probably greatly biased by the sampling effort, a general problem in faunistics not sufficiently considered in the analyses of Heliövaara & al. (1991). Figure 20 therefore gives a comparison of the numbers used by Heliövaara & al. (1991) and the corrected number in the part covered by the present investigation. More comprehensive surveys in other areas may give similar results.

ACKNOWLEDGEMENT

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SAMMENDRAG

Utbredelsen av barkbiller, trebukker og snutebiller (Scolytidae, Cerambycidae, Curculionidae) i bark og ved av furu (*Pinus sylvestris*) i Nord-Norge

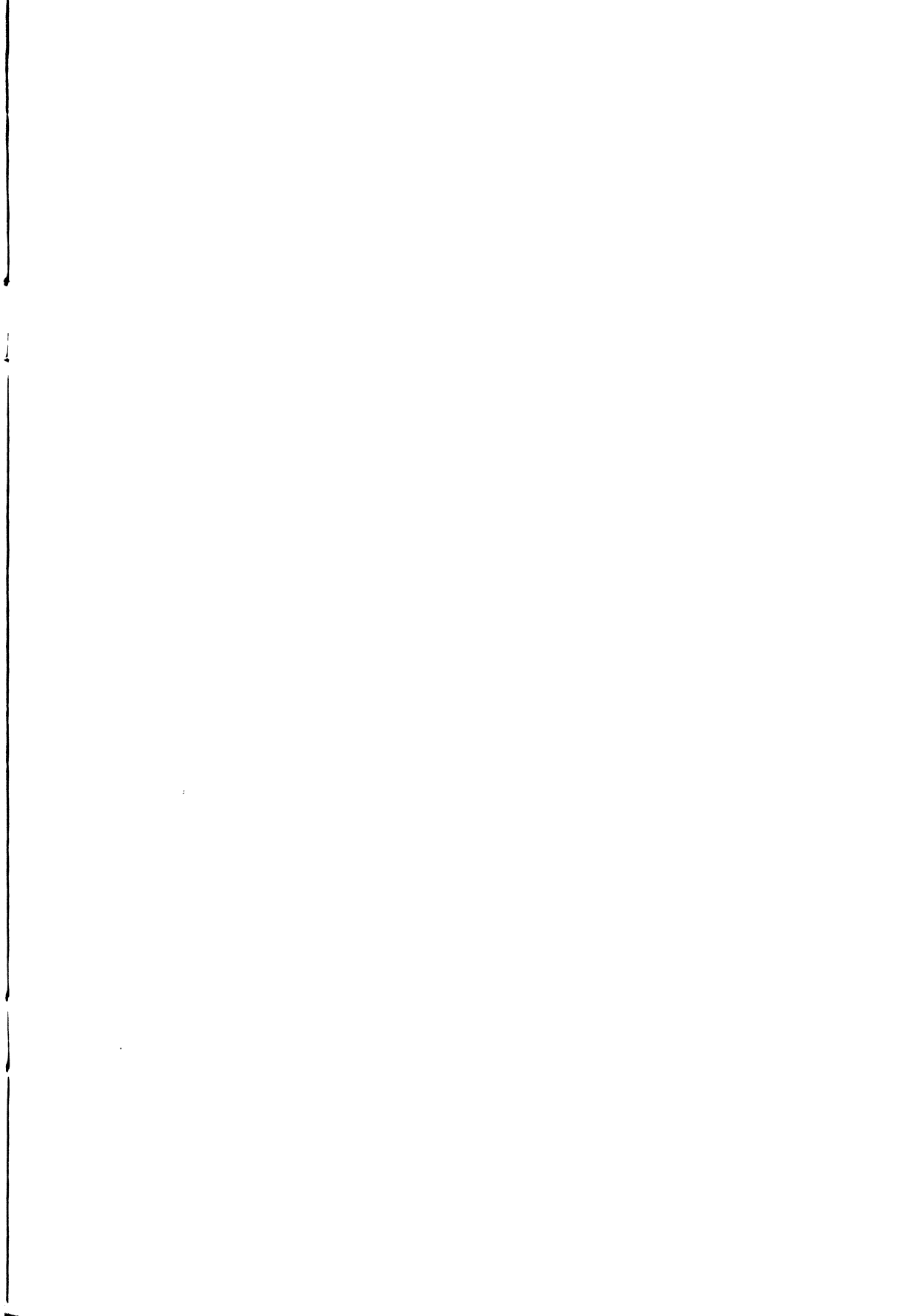
Utbredelse av barkbiller, trebukker og snutebiller funnet i bark og ved av furu i Nord-Norge blir presentert i prikk-kart. Feltarbeidet ble utført i 1974–83, og det ble særlig lagt vekt på å registrere faunaen i isolerte furuskoger i kystdistriktene, inkludert verdens nordligste furuforekomster. Utbredelsen og mengdene av hver art og de mest spesielle lokaliteter blir diskutert.

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Notes on Norwegian Coleoptera

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The following seven species of Coleoptera are reported new to Norway: *Dicheirotrichus rufithorax* (Sahlberg), (Carabidae), *Micropeple fulvus* Erichson, 1840 (Micropeplidae), *Geotrupes spiniger* (Marsham, 1802) (Scarabacidae), *Ebacus pedicularius* (L., 1758) (Malachiidae), *Monotoma spinicollis* Aubé, 1837 (Monotomidae), *Phalacrus caricis* Sturm, 1807 and *Olibrus corticalis* (Panzer, 1797) (Phalacridae). A second Norwegian record of *Baeocrara japonica* (Matthews, 1884) (Ptiliidae) is also reported. Notes on distribution and biology are briefly discussed for each species.

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INTRODUCTION

Even though Coleoptera is a relatively well-known group of insects in Norway, «new» species for this fauna are still encountered. Some of these species are immigrants which recently have established or are in an establishing phase, but most of them are species which previously have been overlooked by collectors. These are now encountered because of growing knowledge among the collectors and use of more sophisticated collecting methods than previously. This present work is some of the result of Coleoptera catches in SE Norway in the period 1984—1992.

THE RECORDS

The nomenclature follows Lundberg (1986) and the localities are cited in accordance with Økland (1981).

Carabidae

Dicheirotrichus rufithorax (Sahlberg, 1827) During an investigation of the pond Mile-tjern in Buskerud (BØ Nedre-Eiker: Mjøndalen, Mile-tjern, EIS 28) a specimen of this species appeared in a light-trap, primo august 1988 (leg. Devegg Ruud). The trap was situated a few meters from the pond and was during the time of capture almost hidden by bushes and taller herbs (e.g. *Artemisia vulgaris*, *Alnus incana*, *Salix* sp.). The pond is situated beside the garbage-dump for Nedre-

Eiker municipality, which has damaged the eastern part of the pond. The locality is more extensively described by Hansen & Bergsmark (1990).

Ptiliidae

Baeocrara japonica (Matthews, 1884)

A specimen was taken 2 January 1992 by sifting compost at Rollag, Buskerud (BV Rollag: Rollag, EIS 35) leg. Bjørn A. Sagvolden. The compost consists mainly of garden-litter as grass, leaves and branches. An ant-hill (*Formica* sp.) is also situated at the compost. The species is previously recorded from Røros, South Trøndelag (STI) in 1989 (Ødegaard 1992).

Micropeplidae

Micropeplus fulvus Erichson, 1840

3 males and 7 females of this striking species were taken by compost sifting in January and February 1992 at Hvittingfoss, Buskerud (BØ Kongsberg: Hvittingfoss, EIS 19), leg. Bjørn A. Sagvolden. The compost is quite huge and situated on a shady place surrounded by tall spruces and birches. Leaf- and grass-litter have been added annually for about 20 years, but some household-garbage is also present. The specimens were encountered among maple leaves and old clothes.

Scarabaeidae

Geotrupes spiniger (Marshall, 1802)

One specimen was found in connection with a cow dropping at Lista (VAY Farsund: Kviljo-odden, EIS 1) 3 October 1985, leg. S. Ludvigsen. 19 August 1991 another specimen was found under a cow dropping at Huseby (VAY Farsund: Huseby, EIS 1) not far from the first locality, leg. O. Hanssen. In May 1992 several specimens of *G. stercorarius* were found on this locality (leg. Hanssen & K. E. Zachariassen), but no specimens of *G. spiniger*. In contrast to this, a search on the locality in July revealed only specimens of *G. spiniger* (leg. F. Ødegaard & S. Ligaard).

Malachiidae

Ebacus pedicularius (L., 1758)

One specimen was taken by sweep-netting on flowers 29 June at Vinstra, Oppland (ON Nord-Fron: Vinstra, EIS 62), leg. Svein Svendsen.

Monotomidae

Monotoma spinicollis Aubé, 1837

One specimen was taken 31 July 1988 at Rollag in Buskerud (BV Rollag: Rollag, EIS 27*), leg. Stig E. Lanto; and 3 specimens 20 November 1991 also at Rollag (BV Rollag: Rollag, EIS 35*), leg. Bjørn A. Sagvolden (*Note: the border between EIS gride 27 and 35 runs through Rollag, which should explain why both grids are present at Rollag). The first specimen was encountered among straws which had been prepared with potash lye; the rest were found by sifting white-moulded grass from the compost where *B. japonica* was found.

M. spinicollis is also recorded from Kviteseid in Telemark: TEI Kviteseid: Kvitsund, 1 ex. 13 June 1984, 1 ex. 2 Sept. 1984, 1 ex. 23 Sept. 1984 and 1 ex. 17 Aug. 1985, all leg. Sindre Ligaard.

Phalacridae

Phalacrus caricis Sturm, 1807

Several males and females were taken 2 July 1985 at Jeløya in Østfold (Ø Moss: Jeløya, Ramberg, EIS 19), leg. Bjørn A. Sagvolden. The specimens were captured by sweeping the net slowly through the vegetation just

above the water-line of a pond with stagnant water. The species was also encountered at this locality in 1990. *P. caricis* has also been found on several localities in SE-Norway from 1982 and later leg. e.g. S. Ligaard, O. Hanssen. All sweep-netted on *Carex*.

Olibrus corticalis (Panzer, 1797)

During the Whitsun meeting of the Norwegian entomological society in 1992, a female of this species was taken by random sweep-netting 5 June at Sandøy in Vestfold (VE-Tjøme: Sandøy, EIS 19), leg. Bjørn A. Sagvolden. It was searched for in the end of July, but without any positive result (pers.com. Arne Fjellberg).

DISCUSSION

D. rutithorax is certainly an expanding species in the Scandinavian countries and has long been expected in Norway. Lindroth (1986) stresses that most Swedish records have been made after 1920, and the species seems to be better established at the east-coast than in the west, which may indicate an expansion towards the west. It is reported from Skåne (Sk) along the east-coast north to Upland (Up) and in the west more scattered north to Dalarna (Dr) (Lindroth 1986, Lundberg 1986). Furthermore it is reported from most regions in Finland, Karelia rossica, the Baltic countries and Germany through Central-Norway south to Austria and eastward to Central Siberia. No records seems to exist from Denmark and the British Isles. Since the species most probably is spreading westwards, the Norwegian record may indicate that the species is already established in the area of Buskerud (i.e. Østfold and Akershus).

The Norwegian record was made in an urban area at a garbage dump not far from the city of Drammen. This is in accordance with Lindroth (1986) which state that the species has a predominantly synanthropic way of life in the Scandinavian countries, mostly occurring in or in the vicinity of cities.

B. japonica is also a species which recently may have established in Norway. It develops in compost and other kinds of decaying matter (Palm 1948). The record from Rollag together with the Røros record (Ødegaard 1992) may indicate that this species probably has an extensive distribution in Norway. In Sweden it is found scattered from Småland

(Sm) in the south and north to Lycksele lappmark (Ly) and Norrbotten (Nb) (Lundberg 1986). Further more it has been reported from Finland, but not Denmark and Karelia rossica, nor the Baltic countries.

M. fulvus is, as the species above, found among compost, dead animals and other kind of decaying matter. This species is considered rare, like the other Scandinavian *Micropeplus* species, but can sometimes be found numerous (Palm 1948). In Sweden it is reported from 13 regions from Skåne (Sk) in the south, northwards to Dalarna (Dr) (Lundberg 1986). Furthermore it is reported from Finland and Denmark, but not Karelia rossica and the Baltic countries.

G. spiniger is certainly associated with open sandy areas, where it develops in feces from horse and cow (Landin 1957). Most Swedish records are done in coastal areas, but the species has sometimes been found abundant in inferior areas also. Landin (1957) stresses that *G. spiniger* is only occasionally found together with *Geotrupes stercorarius* (L., 1758). However, the Norwegian records indicate that these species may co-exist, but with different phenology.

Little is known about the biology of *E. pedicularius* in the Scandinavian countries. Hansen (1964) indicates that the species sometimes has been found in the entrance hole to nests of certain species of bees (i.e. Megachilidae). Hansen (1973) mentions that the imago has been taken on sandy places on thistle (e.g. *Carduus* sp.). The species is considered very rare, and in Sweden it is only reported from Småland (Sm), Västergötland (Vg), Västmanland (Vs), Dalarna (Dr) and Norrbotten (Nb) (Lundberg 1986). Furthermore it is reported from Finland, Denmark and the Baltic countries, but not Karelia rossica.

M. spinicollis is usually found among decaying vegetable matter and may be quite numerous in compost (Vogt 1967a). In Sweden it is scatterly distributed from Skåne (Sk) northwards to Norrbotten (Nb) (Lundberg 1986). It is also reported from Finland, Karelia rossica and the Baltic countries, but not Denmark. In Central-Europe it is widely distributed, but rare (Vogth 1967a).

P. caricis develops in flower-heads of *Carex* spp. attacked by certain rust fungi (Uredinales) (Vogt 1967b). In Sweden it is reported from 16 provinces from Skåne (Sk) in the south and north to Ångermanland (Ån)

(Lundberg 1986). It is also reported from Denmark, Finland, Karelia rossica and the Baltic countries.

O. corticalis is connected with *Senecio* spp. in which the larvae develop (Vogt 1967b). Several species of *Senecio* are present at the locality. *O. corticalis* is quite common in Central-Europe, but scarcer in the mountains and to the north. In Sweden it is only reported from the southernmost regions and the islands (i.e. Skåne (Sk), Blekinge (Bl), Halland (Ha), Öland (Öl) and Gotland (Go)) (Lundberg 1986). Furthermore it is reported from Denmark and the Baltic countries, but not Finland and Karelia rossica. Considered the distribution in the Scandinavian countries together with the fact that the Norwegian record is from an island, this species may be a southerly element which is established in Norway due to the climatic conditions at the islands in the Oslofjord.

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We are greatly indebted to Mikael Sörensson who identified *B. japonica* and to Sindre Ligaard for the identification of *D. rufithorax*. Also thanks to Anders Vik, Sindre Ligaard and Frode Ødegaard for the verification of some of the identifications, to Stig E. Lanto, Sindre Ligaard, Sebastian Ludvigsen, Devegge Ruud and Svein Svendsen who provided us material and to Oddvar Hanssen, Frode Ødegaard and Mikael Sörensson for comments on the manuscript.

SAMMENDRAG

Følgende syv billarter (Coleoptera) er rapportert nye for Norge: *Dicheirotichus rufithorax* (Sahlberg, 1827) (Carabidae), *Micropeplus fulvus* Erichson, 1840 (Micropeplidae), *Geotrupes spiniger* (Marsham, 1802) (Scarabaeidae), *Ebaeus pedicularius* (L. 1758) (Malachiidae), *Monotoma spinicollis* Aubé, 1837 (Monotomidae), *Phalacrus caricis* Sturm, 1807 and *Olibrus corticalis* (Panzer, 1797) (Phalacridae). Det andre norske funn av *Baeocrara japonica* (Matthews, 1884) (Philiidae) er også rapportert. Anmerkninger angående biologi og utbredelse er gitt for hver art.

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Family Pallopteridae (Diptera) in Norway

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The Dipteran family Pallopteridae is represented by 12 species in Norway. The distribution for each species in Norway is given. One species *Palloptera ambusta* (Meigen, 1826), however, has not been recorded in the last 150 years. *Palloptera ephippium* Zetterstedt, 1860, *P. formosa* Frey, 1930, *P. laetabilis* Loew, 1873 and *P. quinque maculata* (Macquart, 1835) have not previously been recorded from Norway. Remarks on the phenology and biology in Norway are given.

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INTRODUCTION

Many families of Norwegian Diptera have only been scantily studied in Norway. The family Pallopteridae is among those which are very superficially known. Confusion of both species and synonyms by earlier authors makes revisions of older material necessary.

Recent works on the family is Collin (1951) who published notes on some species, and a key to the British Palloptera. Then there is Morge's (1967, 1974) work on the family based mostly on material from Austria. Speight (1979) made a survey of the Irish Pallopteridae. In Scandinavia Andersson (1990) revised the Swedish material of this family. The Pallopteridae is grouped in the super-family Tephritoidea by McAlpine (1981). I refer to Andersson's article for the family Pallopteridae's position in the Dipteran systematic hierarchy and also to his key for determination of Norwegian material.

Flies belonging to the family Pallopteridae have with few exceptions characteristic, but varying, black wing patterns. The frons is broad and there is one upper orbital (ors). Body colours are varying. The male genitalia has a long, hairy, curled aedeagus and the females have a long, retractable ovipositor. Both these traits are found among other families of the Tephritoidea.

The sub.fam. Eurygnathomyiinae consists of one single European species *Eurygnathomyia bicolor* (Zetterstedt) with spines along the costa. The sternopleuron has four strong setae and there are 6 pairs of dorso-central

(dc) bristles. In the genus *Palloptera* belonging to the sub-fam. Pallopterinae the costa lacks spines, the number of setae on the sternopleuron is at most three and there are 4 pairs of dorsocentral bristles.

The biology of several species is not known in detail. The grown flies are often seen on flowers and the different species have different flying periods. While many are active in the day time, some are probably attracted to light and are active at dawn or dusk. There are usually one generation pr. year. The larvae of some species live in the stems of Umbelliferae, others in the flowering heads of Asteraceae. A few species have larvae which live as carnivores underneath the bark of different trees.

Zetterstedt (1838) described *Eurygnathomyia bicolor* from Sweden, and recorded *Palloptera ambusta* (Meigen, 1826) from Norway. Also an important paper is the one by Siebke (1877) who included the following species (in alphabetical order): *Palloptera ambusta* Meig., *P. arcuata* Fabr., *P. trimaculata* Meig., *P. umbellatarum* Fabr., *P. unicolor* Fabr., *P. usta* Meig. and *P. ustulata* Fall. Scattered records later are *P. umbellatarum* Fabr. mentioned by Storm (1896) from the Trondheim area and Strand (1903) mentions *P. saltuum* L. and *P. ambusta* Meig. from Røsvand, Nordland province. Neither Storm's nor Strand's material exists today.

Andersson (1990) reports *P. modesta* (Meigen, 1830) as new to Norway.

MATERIAL

The material included in this revision is a total of 578 specimens, 111 males and 464 females and 3 specimens with lost abdomen. Nearly all the material has been collected by insect nets, in Malaise traps or in light traps. The material is deposited in Zoological Museum, University of Oslo (ZMO), Vitenskapsmuseet, University of Trondheim, (Vitenskapsmuseet), Tromsø Museum, University of Tromsø (Tromsø Museum) and Zoological Museum, University of Bergen. The main bulk of the material is in Bergen and no reference to this museum is made in the record lists. The biogeographical provinces follow Strand's system as revised by Økland (1981).

The material:

Sub.fam. Eurygnathomyiinae

1. *Eurygnathomyia bicolor* (Zetterstedt, 1838)

Material: 1 ♀

HOY Bergen (Fana), Myravann EIS 30 17 June 1968 1 ♀ (det. W. Hackman)

Eurygnathomyia bicolor has been recorded from Finland, Sweden and Austria (Andersson 1990) and also from England (Cogan & Dear 1975). It is unknown from Ireland (Speight 1979). It seems everywhere to be a rare species. Myravann is a small lake in Bergen south, partly surrounded by a rich, deciduous forest, most of which today is strongly degraded.

Sub.fam. Pallopterinae

2. *Palloptera ambusta* (Meigen, 1826)

ON Dovre, Dovre 1 ♀ leg. Beheman. Not seen.

I have not seen any material of this species in Norwegian collections.

The species was not recorded from Sweden by Andersson (1990). It has been recorded from Finland, Great Britain and other countries in Europe and Asia (Soós 1984).

3. *Palloptera ephippium* Zetterstedt, 1860

Material: 2 ♂♂ 5 ♀♀

Revised material: ON Dovre, Dovre EIS 71 1 ♀ (ZMO 11472) (From *P. arcuata* Fabricius, misidentification). STI Oppdal, Kongsvoll EIS 79 6 Aug. 1867 1 ♂ (ZMO 11480) (From *P. trimaculata* Meigen, misidentification). Unpublished material: NSY: Bosø, Skålmoen EIS 130 6 Aug. 1982 1 ♀,

Øvre Falkflaug EIS 130 8 Aug. 1982 1 ♀. FN Porsanger, Fæstningsstuen EIS 174 1 Aug. 1924 1 ♂ 1 ♀, 2. Aug. 1924 1 ♀ (Tromsø Museum). *P. ephippium* is here reported new to Norway. The species has been recorded from Finland, Sweden, former USSR and Central-Europe (Andersson 1990).

4. *Palloptera formosa* Frey, 1930

Material: 1 ♀ Fig. 1.

AK Frogn, Håøya EIS 28 MF — A 27 July—18 Aug. 1984 1 ♀.

P. formosa is here reported new to Norway. *P. formosa* has been recorded from Finland, NW part of former USSR and from three localities in Sweden (Andersson, 1990). The Malaise trap at Håøya was opened from 14 April and closed 23 September.

5. *Palloptera laetabilis* Loew, 1873

Material: 1 ♂ 1 ♀ Fig. 1.

HES Eidskog, Bolfoss 32 VPM 595496 MF 26 June—16 Aug. 1990 1 ♀: BØ Røyken, Hyggen, Kinnartangen 11 July 1991 1 ♂.

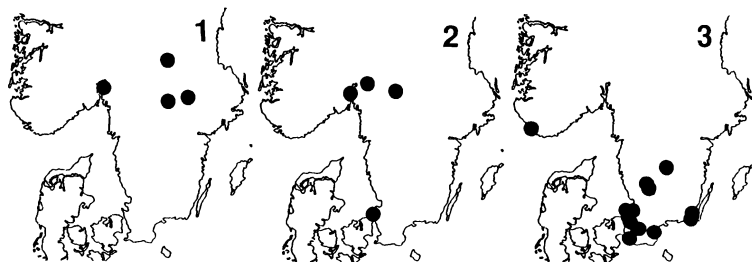
P. laetabilis is here reported new to Norway. *P. laetabilis* has been recorded from Finland and Sweden, and in Central-Europe from Great Britain to former SW USSR (Andersson 1990).

6. *Palloptera modesta* (Meigen, 1830)

Material: 15 ♂♂ 115 ♀♀ 1 specimen

Revised material: AK Oslo, Oslo EIS 28 1 ♂ (ZMO 11486), Tøyen 7. (= July) 45 (= 1845) 1 specimen (ZMO 11489), 1 ♂ 3 ♀♀ (ZMO 11484, 11485, 11488, 11490), 1. Aug. 51 (= 1851) 1 ♀ Tromsø Museum (From *P. umbellatarum* Fabricius, misidentification). Unpublished material: Ø Moss, Jeløy, Ahlbybukt EIS 19 17 July 1986 2 ♀♀. AK Bærum, Ostøya EIS 28 MF — A 30 May—10 June 1984 2 ♂♂, 10 June—1 July 1984 1 ♂ 2 ♀♀, 1—24 July 1984 2 ♂♂ 37 ♀♀, 24 July—12 Aug. 1984 1 ♂ 26 ♀♀, 12 Aug.—1 Sept. 1984 3 ♂♂ 12 ♀♀, MF — B 1—24 July 1984 1 ♂ 5 ♀♀, 24 July—12 Aug. 1984 3 ♀♀, 12 Aug.—1 Sept. 1991 2 ♀♀, MF — C 12 Aug.—1 Sept. 1984 1 ♂, Vestby, Sånner EIS 28 Lighttrap 24 Aug.—6 Sept. 1988 1 ♂. BØ Ringerike, Klekken EIS 36 7 July 1986 1 ♀, Hurum, Tofteholmen EIS 19 MF 31 July—1 Sept. 1991 3 ♀♀, 1 Sept.—26 Oct. 1991 1 ♀. VE Sande, Kommersøya EIS 19 MF 9 July—2 Aug. 1991 2 ♀♀, 2 Aug.—26 Oct. 1991 1 ♀, Våle, Langøya EIS 19 MF 8 July—2 Aug. 1991 4 ♀♀, 2 Aug.—1 Sept. 1991 1 ♀,

Fig. 1. Distribution of three species of *Paloptera* in Sweden and Norway; the Swedish records are based on Andersson (1990). Map. 1: *Paloptera formosa* Frey, 1930; Map. 2.: *P. laetabilis* Loew, 1873; Map. 3.: *P. quinquemaculata* (Macquart, 1835).



Tjøme, Mostrandra N EIS 19 14 July 1986 1 ♂. TEY Porsgrunn, Solvang, Sandøya EIS 11 MF 2—17 Aug. 1986 1 ♀, 27 July—2 Aug. 1989 1 ♀. VAY Lindesnes, Spangereid EIS 1 26 July 1984 1 ♀, 30 July 1984 2 ♀♀, Flekkefjord, Hidra, Kråkedal EIS 4 MF 4. Aug. 1981 1 ♀. HOY Austevoll, Møkster EIS 30 23—24 June 1985 1 ♀, Stord, Økland VLM 017355 21 July 1988 1 ♀. SFI Aurland, Vassbygdi EIS 42 17 Aug. 1941 1 ♀.

First record from Norway: NTI Thynes, Levanger EIS 98 Lund Museum in Andersson (1990). This is the northernmost record in Norway. *P. modesta* has been recorded from Finland and Sweden, and in Central-Europe from Great Britain to former SW USSR (Andersson 1990). Collection dates from 30 May—6 Sept.

7. *Paloptera quinquemaculata* (Macquart, 1835)

Material: 23 ♀♀ Fig. 1.

VAY Flekkefjord, Hidra, Osmundstø EIS 4 MF 21 June—3 July 1982 14 ♀♀, 3—5 July 1982 2 ♀♀, Hidra, Dragøy EIS 4 MF 3—5 July 1982 5 ♀♀, 21—25 July 1982 1 ♀, 30 July—3 Aug. 1982 1 ♀.

P. quinquemaculata is here reported for the first time from Norway. *P. quinquemaculata* has been recorded from Denmark, Sweden, in Central Europe from Great Britain across former Southern USSR to Mongolia (Andersson 1990). The larvae lives in grass sprouts.

8. *Paloptera saltuum* (Linnaeus, 1758)

Synonyms: *P. unicolor* (Fabr. 1805) and *P. marginella* Fallén, 1820

Material: 28 ♂♂ 84 ♀♀ 1 specimen

Published material: AK Oslo, Tøyen EIS 28 10 July 1851 1 ♀ (ZMO 11746), Eidsvoll, Eidsvoll EIS 37 1 specimen (ZMO 11479). Unpublished material: Ø Halden, Festningen

EIS 20 5 June 1967 1 ♂, Prestbakke EIS 12 MF 30 June—28 July 1986 1 ♀. Ås, Vollebakk EIS 28 29 July 1955 1 ♀. Published material: HEN Tyldal, Tyldal EIS 72 21 July 1848 1 ♀ (ZMO 11477). Unpublished material: HEN Åmot, Åmot EIS 55 1 ♀ (ZMO 11478). Os Øyer, Øyer EIS 54 14 July 1850 1 ♂ (ZMO 11475). BØ Nedre Eiker, Mjøndalen, Miletjern EIS 28 10 July 1988 1 ♀. BV Rollag, Rollag EIS 27 1 June 1983 1 ♀. VE Tjøme, Kjære EIS 19 15 July 1965 1 ♀, Tjølling, Malmøya EIS 19 14 June 1987 1 ♀, Brunlanes, Mørje (Tvedalen) EIS 11 27 June 1985 1 ♀. VAY Lyngdal, Nakkestad VMK 870380 9 July 1978 1 ♂, Flekkefjord, Gyland, EIS 4 MF 6—15 July 1982 MF 2 ♀♀, 15—22 July 1982 3 ♀♀, Hidra, Osmundstø EIS 4 MF 21 June—3 July 1982 3 ♀♀, Mar-nardal, Laudal, Sveindal gård EIS 4 MF 21 July—6 Aug. 1982 3 ♀♀. RY Sandnes Dale EIS 7 2 June 1967 1 ♀, Figgjo EIS 7 11 July 1965 1 ♀. RI Hjelmeland, Jøsneset, Fosså MF 13—20 June 1982 1 ♀. HOY Bergen (Fana), Nordås EIS 30 5 July 1981 1 ♂, (Åsane) Vollane EIS 39 24 June 1982 2 ♀♀, 27 July 1983 1 ♂, Eidsvåg EIS 39 18 June 1985 3 ♀♀, Samnanger, Ådland EIS 40 MF 29 May—5 June 1982 1 ♂ 2 ♀♀, 16 June—2 July 1982 6 ♂♂ 11 ♀♀, 2—17 July 1982 1 ♂ 2 ♀♀, Os, Hattvik EIS 31 3 June 1968 1 ♀, Askøy, Herdla EIS 39 4 July 1964 1 ♀, Øygarden, Alvsheim VKN 798262 21 June 1983 2 ♀♀. HOI Etne, Frette VLM 393245 27 June 1985 1 ♀, Kvinherad, Løfallstrand EIS 31 24 May 1985 1 ♂, Rosendal 31 MF 1—2 June 1982 1 ♀, Eidfjord, Hjørmo EIS 32 650 m a s 1 13 July 1967 2 ♂♂ 1 ♀, Hjørmodalen EIS 32 350 m a s 1 7 July 1967 1 ♂, Kvam, Bjerke EIS 41 MF 28 May—16 June 1982 1 ♀, Ljosnesvågen VLM 420850 15 June 1974 1 ♀. SFI Luster, Fåbergstøls-grandane EIS 60 550 m a s 1 MF 23—24 June 1988 3 ♂♂ 16 ♀♀, Aurland, south of Undre-

dal EIS 50 23 July 1981 1 ♀. STI Oppdal, Kongsvoll EIS 79 16 July 1992 2 ♂♂. NTI Stjørdal, Vikan 92 MF June—July 1988 1 ♀, 23 May—4 June 1990 7 ♂♂ 6 ♀♀, 28 July—14 July 1990 3 ♀♀. Høylandet, Tverrå MF 9 July 1986 1 ♀. NSY Gildeskål, Oterstranda EIS 120 9 July 1981 1 ♀, Bodø, Øvre Falkflaug EIS 130 8 Aug. 1982 1 ♀.

P. saltuum has been recorded from Sweden, Denmark, Finland and has a wide distribution in Europe and former USSR (Andersson 1990).

9. *Paloptera trimacula* (Meigen, 1826)

Synonyms: *P. trimaculata* (Meigen); *P. arcuata* (Fabricius).

Material: 26 ♂♂ 47 ♀♀.

Unpublished material: AK Oslo, Oslo EIS 28 1 ♂ (ZMO 11474); Bærum, Ostøya EIS 28 MF—A 1—25 Sept. 1984 1 ♀. BØ Hurum Tofte EIS 28 MF 1 June—1 Aug. 1985 2 ♂♂ 6 ♀♀. BV Gol, Herad EIS 44 8 Sept. 1980 1 ♀, Hemsedal, near Kårstad EIS 43 7 Aug. 1984 7 ♂♂ 8 ♀♀. VE Larvik, Brunlanes, Mølen EIS 19 14 July 1989 1 ♀. VAY Mandal, Marnarveien near Valand EIS 2 MF 27 July—6 Aug. 1982 1 ♂, 28 Aug.—19 Sept. 1982 1 ♂ 2 ♀♀. RY Karmøy, Slåttevattnet EIS 13 10 July 1982 1 ♀. HOY Bergen, Bellevue EIS 39 23 July 1934 1 ♂ 1 ♀, Ytre Midtun 9 Aug. 1987 1 ♀, Samnanger, Ådland EIS 40 MF 2—17 July 1982 1 ♀, 17 July—13 Aug. 1982 1 ♂, 17 July—13 Aug. 1982 1 ♂, 13 Aug.—4 Sept. 1982 1 ♀. HOI Eidfjord, Simadalen EIS 41 10 Aug. 1981 1 ♂ 1 ♀. MRY Hareid, near Kråkhølen EIS 75 2 Sept.—1 Oct. 1990 3 ♀♀. MRI Surnardal, Kårvatn 32 VMQ 938614 25 July 1980 1 ♀. NTI Stjørdal, Vikan EIS 92 MF June 14 July 1990 1 ♂, 20 Aug.—25 Sept. 1990 1 ♀. NSY Bodø, Skålmoen 6 Aug. 1982 5 ♂♂ 7 ♀♀, Urskar, Skuti 4 Aug. 1982 1 ♀, Øvre Falkflaug 8 Aug. 1982 1 ♂ 6 ♀♀. TRY Tromsø, Folkeparken EIS 162 MF 162 7—23 Oct. 1982 3 ♂♂.

P. trimacula was first recorded from Norway by Siebke (1877) from Kongsvoll, Oppdal STI collected 6 Aug. 1867. The only *Paloptera* specimen in Zoological Museum, University of Oslo from this locality and with this date is *Paloptera ephippium* Zetterstedt 1860. No other specimen belonging to *P. trimacula* is represented among the old material in the collection in Zoological Museum, University of Oslo. Thus, the records presented here are the first verified records from Nor-

way of this species. Judged from the records *P. trimacula* has a wide distribution in Norway. Outside Norway it is recorded from all Europe and from Iceland (Andersson 1990).

10. *Paloptera umbellatarum* (Fabricius, 1775)

Material: 17 ♂♂ 52 ♀♀

Unpublished material: Ø Halden, Prestbakke EIS 12 MF 30 June—28 July 1986 1 ♀, Tune, Råkil EIS 20 10 July 1990 1 ♂, 7 June 1991 1 ♂ T. J. Olsen private coll., Moss, Jeløy, Ahlbybukt EIS 19 17 July 1986 1 ♀. Published material: AK Oslo, Tøyen EIS 28 10 Aug. 1848 1 ♂ (ZMO 11487), 9 July 1851 1 ♀ (ZMO 11481), Tøyen 2 ♀♀ (ZMO 11482, 11483). Unpublished material: AK Frogn, Håøya EIS 28 MF A 10 June—1 July 1984 1 ♀, 1—24 July 1984 1 ♀, MF—B 10 June—1 July 1984 1 ♀, 24 July—12 Aug. 1984 1 ♀, MF—C 30 May—10 June 1984 1 ♂, 1—24 July 1984 1 ♂ 1 ♀. HES Ringsaker, Helgøya, Eiksåsen 32 VPQ 085353 July 1990 2 ♀♀, Eidskog, Bolfoss 32 VPM 595496 26 June—16 Aug. 1990 1 ♀. BØ Hurum, Mølen EIS 19 15 July 1989 1 ♀, 4 July 1990 1 ♂, Ramvikholmen EIS 19 12 Aug. 1990 1 ♂, Tofte EIS 28 17 July—8 Aug. 1985 1 ♂ 2 ♀♀. BV Rollag, Rollag EIS 27 26 June 1978 1 ♀. VE Sande, Kommersøya EIS 19 MF 28 May—9 July 1991 1 ♀, Tjøme, Mostrand N EIS 19 14 July 1986 1 ♀, Tjølling, Ula EIS 19 21 July 1984 1 ♀, Hedrum, Langåker EIS 19 4 Sept. 1988 1 ♀. TEI Kviteseid, Kviteseid EIS 17 Lighttrap 18—21 June 1988 1 ♀, 28—30 June 1988 1 ♀, 11—20 July 1988 1 ♀, 24—29 July 1988 2 ♂♂. AAY Landsvik, Skiftenes VMK 702747 29 June 1971 1 ♀. VAY Mandal, Malmø, Eskelandsmyra EIS 2 MF 11—28 Aug. 1982 1 ♀, Marnardal, Laudal, Sveindal gård EIS 5 MF 21 July—6 Aug. 1982 2 ♀♀. RY Stavanger, Sunde EIS 7 MF 12 Aug. 1981 1 ♀, Tysvær, Kårstø EIS 14 14 July 1981 1 ♂, Kårstø, Sandvikgårdene, EIS 14 14 July 1981 1 ♀. RI Hjelmeland, Jøsneset, Fosså EIS 14 MF 13—20 June 1982 1 ♀, 20 June—11 July 1982 2 ♀♀. HOY Bergen (Fana), St. Milde, Grønnevik EIS 30 14 July 1968 1 ♀, Bergen (Åsane), Vollane EIS 39 MF 21 June—10 July 1986 4 ♀♀, 22—31 July 1 ♀, 31 July—16 Aug. 1986 3 ♀♀, Stord, Rommetveit EIS 23 10 July 1969 1 ♀, Samnanger, Tysse EIS 40 Light trap 28 Sept.—5 Oct. 1980 1 ♂, Ådland EIS 40 MF 16 June—2 July 1982 1 ♂, 2—17 July 1982 1 ♀, 17 July—13 Aug. 1982 1 ♂. Os, Telle-

viki EIS 30 3 Aug. 1980 1 ♀. HOI Ullensvang, Djonno EIS 41 MF 5—26 June 1984 1 ♂, 11—31 Aug. 1984 1 ♀, Kvinnherad, Rosendal near Hattebergelva EIS 31 MF 25 May—6 June 1990 1 ♀, Ulvik, Hallanger EIS 41 200 m a s 1 MF 28 May—16 June 1982 1 ♂, Voss, Endeve VLN 6225 27 July 1987 1 ♀. SFY Høyanger, Bjordal EIS 49 Light trap 20—22 Aug. 1980 1 ♂. STI Trondheim, Rotvoll EIS 92 21 July 1987 1 ♀. NTI Stjørdal, Vikan EIS 92 MF 28 June—14 July 1990 3 ♀♀.

P. umbellatarum has been recorded from Sweden and Finland, and has a wide distribution in Europe (Soós 1984).

11. *Paloptera usta* (Meigen, 1820)

Material: 21 ♂♂ 125 ♀♀ 1 specimen

Unpublished material: Ø Tune, Råkil EIS 20 15 Oct. 1989 1 ♀. Published material: AK Oslo, Tøyen EIS 28 31 Aug. 49 (= 1849) 1 ♀ (ZMO 11468), 2 ♀♀ ÷ date (ZMO 11469, 11470), 1 ♀ Tromsø Museum, 1 Specimen (ZMO 11471). Unpublished material: AK Oslo, Munkerud EIS 28 13 Aug. 1982 1 ♂, Ås, Vollebekk EIS 28 20 July 1955 1 ♀, Bærum, Ostøya EIS 28 21 Aug. 1983 1 ♂, MF — A 24 July—12 Aug. 1984 1 ♀, 12 Aug.—1 Sept. 1984 3 ♀♀, 1—23 Sept. 1984 10 ♀♀, MF — B 12 Aug.—1 Sept. 1984 6 ♀♀, MF — C 24 July—12 Aug. 1984 1 ♀, 1—23 Sept. 1984 3 ♀♀. HES Eidskog, Bolfoss 32 VPM 595496 MF 25 June—19 Aug. 1990 2 ♀♀. BØ Hurum, Filtveit EIS 28 22 Aug. 1983 1 ♀, Tofte, 1 June—1 Aug. 1985 MF 3 ♂♂ 15 ♀♀, 17 July—8 Aug. 1985 2 ♀♀. BØ Røyken, Ryggen, Kinnartangen EIS 28 MF 8—24 Sept. 1991 4 ♀♀, Hurum, Tofteholmen EIS 19 MF 1 Sept.—26 Oct. 1991 4 ♂♂ 38 ♀♀. BV Gol, Engene EIS 44 MF 16—30 Aug. 1982 1 ♀, Herad EIS 44 8 Sept. 1980 1 ♀, Rollag, Rollag EIS 27 1 May 1983 1 ♀. VE Sande, Kommersøya EIS 19 MF 2 Aug.—26 Oct. 1991 2 ♀♀. TEI Kviteseid, Kviteseid EIS 17 24—29 July 1988 1 ♀. VAY Søgne, Søgne folkehøgskole EIS 2 Light trap 8—14 Aug. 1979 1 ♀. RY Høyland, Myrland EIS 7 16 July 1965 1 ♂. HOY Bergen (Bergen) Munkebotten EIS 39 4 Nov. 1984 1 ♀, Sædalen EIS 31 27 May 1968 1 ♂. HOY Os, Raudlien EIS 30 MF 6—28 June 1990 1 ♂, 12—26 July 1990 1 ♂ 1 ♀, Sælelid EIS 30 MF 8—15 Aug. 1991 1 ♀, 19—26 Sept. 1991 1 ♀, Stord, Sjoalemyr Nature Reserve EIS 23 29 Aug.—10 Oct. 1989 1 ♀, Iglatjødn Nature Reserve EIS 23 19 July—29 Aug. 1989 1 ♂,

Øygarden, Vardholmen EIS 39 MF 14 Aug.—30 Sept. 1983 1 ♀, Samnanger, Ådland MF 13 Aug.—4 Sept. 1982 1 ♀. HOI Voss, Mjølfjell, Solbakken 32 VLM 864317 670 m a s 1 MF 31 Aug.—29 Sept. 1991 1 ♀. MRV Hareid, Hareidlandet, near Kråkhølen EIS 75 MF 2 Sept.—1 Oct. 1990 2 ♂♂ 1 ♀. NTI Stjørdal, Vikan EIS 92 MF 20 Aug.—25 Sept. 1990 1 ♀, Høylandet, Skiftesås EIS 107 MF July, August 1986 3 ♀♀, Juli, August 1988 4 ♂♂ 7 ♀♀, Tverråa EIS 107 MF July, August 1986 1 ♂ 7 ♀♀.

Paloptera usta was first published from Oslo, Tøyen by Siebke (1877). Andersson (1990) also reports one record from BV Veggli.

P. usta is reported from all over Europe (Andersson 1990).

12. *Paloptera ustulata* Fallén 1820

Material: 1 ♂♂ 10 ♀♀

Published material: AK Oslo, Tøyen EIS 28 9 July 1851 1 ♀ (ZMO 11467), 15 July 1851 1 ♀ (ZMO 11466), 1 ♂ Tromsø Museum, Kastellet EIS 28 18 July 1871 1 ♀ (ZMO 11465). Unpublished material: AK Bærum, Ostøya EIS 28 MF — A 1—23 Sept. 1984 1 ♀, MF — B 24 July—12 Aug. 1984 1 ♀. VE Tjøme, Mostrand EIS 19 MF 1 Aug.—25 Sept. 1988 1 ♀, TEI Kviteseid, Kviteseid EIS 17 Light trap 24—29 July 1988 1 ♀. VAY Marnardal, Laudal EIS 5 MF 6—11 Aug. 1982 1 ♀. RY Klepp, Vik EIS 7 21 July 1962 1 ♀. HOI Ulvik, Ulvik EIS 41 30 Aug. 1984 1 ♀.

Paloptera ustulata was recorded from Oslo, Tøyen and Øyer, Øyer by Siebke (1877). *P. ustulata* belongs to a species complex not yet made clear — see Andersson (1990). The distribution of species/subspecies in this complex is probably wide in Europe.

Checklist for Norwegian Pallopteridae:

Sub.fam Eurygnathomyiinae

Eurygnathomyia bicolor (Zetterstedt, 1838)

Sub.fam Pallopterinae

Paloptera ambusta (Meigen, 1826)

P. ephippium Zetterstedt, 1860

P. formosa, Frey, 1930

P. laetabilis Loew, 1873

P. modesta (Meigen, 1830)

P. quinque maculata (Macquart, 1835)

P. saltuum (Linnaeus, 1758)

P. trimacula (Meigen, 1826)

P. umbellatarum (Fabricius, 1775)
P. usta (Meigen, 1826)
P. ustulata Fallén, 1820

RESULTS AND DISCUSSION

DISTRIBUTION

Six species *Eurygnathomyia bicolor*, *Pallop-tera ambusta*, *P. formosa*, *P. laetabilis*, *P. quinque-maculata* and *P. ustulata* are recorded from southern Norway only.

Three species *P. modesta*, *P. umbellatarum* and *P. usta* are recorded from both southern and central Norway, north to Nord-Trøndelag (NTI).

Three species *P. ephippium*, *P. saltuum* and *P. trimacula* are recorded from both southern, central and northern Norway.

The single new record of *Eurygnathomyia bicolor* is interesting since this obviously is a rare species in Norway. *E. bicolor* is distributed scattered in Sweden, rare in the southern parts (Andersson 1990). *E. bicolor* is also very rare in Great Britain and was recorded from these well surveyed islands as late as 1975 (Cogan & Dear 1975).

Pallop-tera ambusta has not been recorded from Sweden (Andersson 1990) and no specimen was found in the material recorded here. Thus it must be considered a very rare species indeed in Scandinavia. It is also a rare species in Europe even though the distribution covers large areas in the Palaeartic (Martinek 1977, Speight 1979).

The single record of *Pallop-tera formosa* is from a survey of Håøya (Greve & Midtgaard 1986) with Malaise traps. The trap was situated in an open, old, deciduous forest with rich ground vegetation. *P. formosa* is probably rare in Scandinavia since Andersson (1990) reports it from three localities only. Such new faunistic information could indicate that Håøya and Ostøya (Greve & Midtgaard 1992) could harbour a unique fauna.

Pallop-tera laetabilis was collected with a Malaise trap open from 26 June to 16 August near the Swedish border and a little south of Oslo with a sweep-net near the sea. *P. laetabilis* is a rare species also in Sweden (Andersson 1990). The species has been recorded scattered in Europe and the biology is virtually unknown (Martinek 1977).

Pallop-tera quinque-maculata was collected in Malaise traps from two localities situated in the same area at the extreme south of the

country. The distribution in Sweden is in the southern parts only and these records are the northernmost in Scandinavia. Further south in Europe *P. quinque-maculata* is a common species (Martinek 1977).

Pallop-tera ustulata has a fairly restricted distribution in southern Norway. Note should be taken of the fact that *P. ustulata* belongs to a species complex in which some forms lack the usual black markings on their wings (Andersson 1990). All specimens recorded here have wing-markings, although some are very weak. Stubbs (1969) refers to larvae of this complex living under poplar bark.

Pallop-tera modesta among the species which is widely distributed in southern Norway was in this survey only recorded from localities south of Dovre. Andersson (1990) who presented the first record from Norway also had material from Northern Trøndelag province. This is still the only record from central Norway.

P. umbellatarum is a fairly common species reaching Northern Trøndelag province. The recorded distribution in Sweden reach the same latitude (Andersson 1990).

Pallop-tera usta, another common species, has approximately the same distribution as *P. umbellatarum* in Norway. Andersson (1990), however, presented records of *P. usta* from further north in neighbouring Sweden.

Pallop-tera saltuum is a very common species in southern and central Norway. In northern Norway it is only represented with two records from Nordland province. Andersson (1990) presented records from localities further north in Sweden.

Pallop-tera trimacula is distributed north to Troms province. This is somewhat north of the distribution recorded for Sweden (Andersson 1990).

Pallop-tera ephippium is regarded by Ringdahl (1951) as an arctic high-boreal or perhaps a boreo-alpin(?) species, and Martinek (1977) regards the species as a possible glacial-relict in Central-Europe. *P. ephippium* is obviously a rare species, at least in the mountainous parts of southern Norway. The author has not managed to collect this species on many excursions to different mountainous areas in southern Norway. The localities given as Dovre and Kongsvoll can be considered at approximately 500—700 m a s l. The locality Fæstningstua is at 450 m a s l.

None of the species of this survey seem to occur regularly at subalpine or alpine altitu-

des. A rare exception for *P. saltuum* which has been collected at least once at approximately 900 m a s l, see also *P. ephippium*.

The most «common» species judged from both number of species and number of localities is *P. saltuum*. *P. modesta*, *P. trimacula*, *P. umbellatarum* and *P. usta* must also be considered fairly common in southern Norway. The same species with exception of *P. modesta* are also «common» in central Norway. No species of those mentioned here are frequently met in Northern Norway.

Biology

The larvae of the genus *Palloptera* are mostly carnivorous and live associated with different plants. The larvae of *P. saltuum* and *P. trimacula* both live in the stalks of Umbelliferae (Martinek 1977). The collection dates of adults *P. saltuum* is June and July with one exceptional date in August. For *P. trimacula* the collection dates of adults are from July until October, which indicate a somewhat later flying period than *P. saltuum*.

P. modesta and *P. umbellatarum* larvae both live in the flowerheads of the genera *Cirsium* and *Carlina* and are by some authors reckoned as members of a «Thistle» fauna (Redfern, 1983). Since *Carlina* has a restricted distribution in SE Norway *Cirsium* species must be the host at least in the parts of the country outside the distribution of *Carlina*. The collecting dates for adults of both species is from late May until early September.

The larvae of *Palloptera usta* live under the bark of different trees like spruce, pine, lark and birch (Martinek 1977). One male from Sædalen was actually hatched from a tree trunk. The adults flies are often caught in Malaise traps located in or near forests like the records from Bærum, Ostøya, Hurum, Tofte, Os, Raudlien and Sæleli, Stord Iglatjødn and Sjoalemyr and Høylandet Skiftesås and Tverråa. Collecting dates are from early May until November, most from July, August and September. Larvae of the *P. ustulata* might live in the same manner (Stubbs 1969).

The larvae of *P. quinque maculata* develop in species of *Aira* and *Arrhenatherum elatius* (L.) (Martinek 1977). The genus *Aira* is in Norway represented with *Aira praecox* (L.) distributed around the coast from Telemark province to Møre and Romsdal province, while *A. elatius* also has a coastal distribution from Østfold province north to Troms pro-

vince (Fægri 1960). Both plants are possible hosts. One of the two localities was a meadow with many flowering plants close to the sea, the other locality a bog 400 m from the sea. Only females were collected in the Malaise traps.

Adult *Palloptera* are usually collected one or few specimens at each time. Exceptions are two records of *P. modesta* from a Malaise trap at Ostøya where 2 males and 37 females of collected between 1—24 July, and 1 male and 26 females between 24 July and 12 August. *P. modesta* is represented in the survey with nearly as high number of specimens as *P. saltuum*, while the number of localities are 18 and 40 respectively. However, approximately 75% (11 ♂♂ and 87 ♀♀) of the material of *P. modesta* material was collected in the three Malaise traps at Ostøya. 9 ♂♂ 77 ♀♀ were collected in Malaise trap A situated in a flowering meadow with possible hostplants for the larvae, and relatively few in the two other traps. The flight period started in early June and continued until late August with maximum between 1 July and 12 August. The females outnumbered the males 1:8 in the material.

9 males and 30 females of *P. saltuum* were collected in a Malaise trap at Vikan, Stjørdal between 28 June and 14 July. On 7 August 1984 the author netted 7 males and 8 females of *P. trimacula* on *Heracleum* in a meadow near Kårstad, Hemsedal. Many more *Paloptera* specimens were seen on the flowerheads at the time, but were not collected. Probably only *P. trimacula* was present at the locality. 4 males and 38 females of *P. usta* were collected in a Malaisetrapp at Hurum, Tofteholmen between 1 Sept.—and 26 Oct. 1991. During earlier periods no specimens were recorded. The trap was opened in the middle of April. These are the occasions when more than 25 adult *Paloptera* were caught/observed at one locality.

Some authors like Martinek (1977) refer to the occurrence of *Paloptera* species in houses. A specimen of *P. saltuum* was collected in a window in Åsane.

The survey has shown that Malaise traps are very good collecting devices for flies belonging to this family. Parts of the material was also caught in light traps and this supports the notes in literature (Martinek 1977) which report *Paloptera* as active at low light intensities.

ACKNOWLEDGEMENTS

I wish to express my thanks to the following collectors of material: Trond Andersen, Bjørnar Borgersen, Asle Bruserud, Arne Fjellberg, Arild Fjeldså, Arne Foldvik, Jo-stein Korsnes, Sindre Ligaard, Fred Midtgaard, Tore Randulff Nielsen, Alf-Jacob Nil- sen, Thor J. Olsen, Bjørn A. Sagvolden & Geir E. E. Søli. I also want to thank Geir E. E. Søli for helpful criticism. The curators A. Fjellberg, Tromsø Museum, Univ. Tromsø, J. E. Raastad, Zoological Museum, Univ. Oslo, and J. O. Solem, Vitenskapsmuseet, Univ. i Trondheim have kindly lent me material in their care.

SAMMENDRAG

Fluefamilien Pallopteridae er representert med tolv arter i Norge. Artikkelen baserer seg på materialet i norske museer, endel private samlinger og noe materiale i utenlandske samlinger. Det er oversikter som dekker utbredelsen for hver art. For noen arter er det karter som viser den Skandinaviske utbredelsen. En art, *Palloptera ambusta* (Meigen, 1826), har ikke vært gjenfunnet de siste 150 årene. *Palloptera ephippium* Zetterstedt, 1860, *P. formosa* Frey, 1930, *P. laetabilis* Loew, 1873 og *P. quinque maculata* (Macquart, 1835) er ikke tidligere publisert fra Norge.

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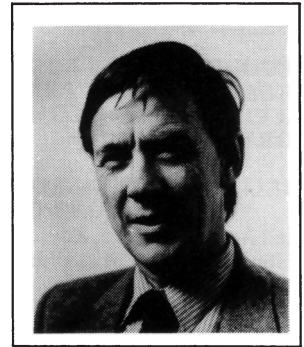
Albert Lillehammer — in memoriam

Vår kjære venn og kollega, førstekonservator dr. philos., Albert Lillehammer døde uventet den 9. oktober 1992. Med ham er en sentral skikkelse i norsk ferskvannsbiologisk fagmiljø gått bort.

Lillehammer ble født 24. oktober 1930 i Sauda. Etter en kort periode som smelteverksarbeider tok han realskolen og artium: begge på ett år som privatist. Han tok hovedfag i zoologi ved Universitetet i Oslo i 1964 på «Bunn- og drivfaunaen; deres betydning som føde for yngel av laks og ørret i Suldalslågen og Storelva.» Allerede året før ble han ansatt på Insektavdelingen ved Universitetets zoologiske museum som vitenskapelig assistent. I 1965 ble han ansatt som konservator samme sted, og fra 1975 og frem til i dag var han førstekonservator. Han ville ha fått personlig opprykk til professor i 1993.

Lillehammer var faglig svært dyktig. I 1975 tok han doktorgraden på insektgruppen steinfluer. Hans forskning hadde stor internasjonal anerkjennelse. De fleste av hans vel 100 publikasjoner var på steinfluer. I 1963 leverte han det som vel ble hans hovedverk: «The Plecoptera Fauna of Fennoscandia and Denmark». Etter dette dreiet interessen mer tilbake til der han startet: Suldalslågen, og hva man kan gjøre for å bedre oppvekstforholdene for laksyngel i denne vakre Rogalandselven. Gjennom sitt virke i flere år som fiskerisakkyndig vedrørende Suldalslågens reguleringer var han initiativtaker til opprettelsen av et forskningscenter for villaks i Suldal. I tillegg var han sterkt opptatt av å få til et vassdragsmuseum i Ryfylke.

Lillehammer engasjerte seg sterkt i internasjonale miljøer i forbindelse med sitt arbeide med vassdragsreguleringer. Han var med i en internasjonal komite som regelmessig arrangerte symposier om økologiske virkninger av vassdragsreguleringer, og han sto selv som arrangør av «The Second International Symposium on Stream Regulation» i Oslo i 1982. Gjennom iherdig innsats skaffet han flere viktige prosjekter til instituttet. Han hadde entusiastiske visjoner om å få bygget opp et sterkt fagmiljø i elveøkologi og lykkes i stor grad, særlig gjennom sin omfattende undervisning og veiledning av studenter.



*Lillehammer, Albert
Førstekonservator*

Selv om det først og fremst var forskningsresultatene som drev Lillehammer fremover, tok han seg tid til å lede utstillingsarbeidet ved Zoologisk museum da ombyggingen fant sted på slutten av 60-tallet. Han var i en årrekke museets visebestyrer og var bestyrer i 1985. I løpet av årene deltok han i en rekke komiteer og utvalg både innenfor og utenfor Universitetet.

Albert Lillehammer hadde et vinnende vesen. Han var en person som med vennlig interesse lyttet til sine kollegers synspunkter. Levende opptatt som han var av sitt fag hadde han stadig nye løsningsforslag til faglige problemstillinger. Gjennom en aktiv periode i Rotary ga han også uttrykk for sitt samfunnsmessige engasjement.

I det siste gledet han seg spesielt over at hans hjertebarn, elveøkologien, hadde vind i seilene. Han var en pådriver som med smittende entusiasme la faglige planer for mange år fremover i tiden. Albert Lillehammer døde på sin post; på vei hjem fra Sverige etter å ha gitt et etterspurt undervisningsbidrag ved Universitetet i Umeå. Han fylte en viktig posisjon på sin arbeidsplass. Vi føler alle den meningsløse tomheten etter ham.

Jan Emil Raastad

Short communications

RECORDS OF THE MIGRANT

RHODEMETRA SACRARIA (L., 1767) (LEPIDOPTERA: GEOMETRIDAE) IN NORWAY

KJELL ARNE JOHANSON

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Rhodometra sacraria (Linnaeus, 1767) is widely distributed in Africa, central and western Asia and southern Europe (Skou 1984). The species is a notorious migrant regularly reported from the British Isles, where it was first recorded in 1857 (Edelsten et al. 1980). In Denmark, *R. sacraria* was first taken in 1961 (Skou 1984) and in Sweden in 1983 (Petterson 1984). The species is so far not known from Finland.

In 1985 two specimens were taken on light in Vest-Agder, S Norway; VAY, Mandal: Holum (UTM: 32VMK129405, EIS 2), 5 Oct.; VAY, Kristiansand: Vågsbygd (UTM: 32VMK3842, EIS 2), 5 Oct.

In NW Europe the species occurs more irregular. On the night between October 5th and 6th in 1983 one specimen was taken near Förlösa in Småland in SE Sweden (Petterson 1984). In September and October the same year, 98 specimens were recorded from different localities in Denmark (Skou et al. 1984). In 1985, three specimens were recorded from S Sweden (Palmqvist 1986) and 33 specimens from Denmark (Skou et al. 1986); all records are from September or October. Both in 1983 and 1985 the weather situation during September and October in NW Europe was dominated by a strong westerly winds. The migration, thus, probably follows a westerly route via the British Isles to Denmark and Southern Scandinavia (Skule 1980).

SAMMENDRAG

Hovedutbredelsen til *Rhodometra sacraria* (Linnaeus, 1767) ligger i Sør-Europa, Nord-Afrika og Asia. Arten er kjent for å migrere fra Middelhavsområdet via Vest-Europa og de Britiske øyer nord til Danmark og Skandinavia. Arten ble tatt for første gang i Norge i Vest-Agder natten mellom 4. og 5. Oktober 1985. Lokalitetene ligger i Kristiansand og Mandal kommune. I nordvest Europa er arten tidligere kjent fra Sverige og Danmark. I Danmark ble arten første gang påvist i 1961, og kan enkelte år opptre i større antall. I Sør-Sverige er det tatt et fåtall eksemplarer i 1983 og 1985.

ACKNOWLEDGEMENT

I am indebted to Trond Andersen for commenting on the manuscript.

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HYPEROSCELIS EXIMIA (BOHEMAN, 1858) (DIPTERA, CANTHYLOSCELIDAE); NEW FAMILY AND SPECIES TO THE NORWEGIAN FAUNA

LITA GREVE

Hyperoscelis eximia (Boheman, 1858) (Dipt. Canthyloscelidae) is reported for the first time from Norway. One female was caught in a Malaise trap at BV, Gol Engene, EIS 44, between 18 June and 5 July 1982. This is the first species of the family Canthyloscelidae recorded from Norway.

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The family Canthyloscelidae (Syn.: Corynosceli-

dae Enderlein 1912, Hyperoscelidae Hardy & Nagatomi, 1960) was together with the family Synneuridae considered a part of the family Scatopsidae until 1951.

Hutson (1977) made a revision of the family in which he included two genera. The only Palaearctic genus *Hyperoscelis* includes two species only. *Hyperoscelis eximia* reported here was described as *Corynoscelis eximia* by Boheman, and is the first species described of this family.

During the summer 1982 a Malaise trap was run at the locality BV (Western Buskerud province), Gol, Engene EIS 44.

The locality is situated 200 m a s l.

One female *H. eximia* (Boheman 1958) was collected between 18 June and 5 July. The trap was emptied four more times, but no more specimens were found. The locality is a flowering meadow near the farm Engene or Engjan south of Gol, with many flowering *Lychnis viscaria*, *Ranunculus acris*, *Silene dioica*, *Viola tricolor* and *Geranium sylvaticum*.

Andersson (1982) in his survey of the family in Sweden only reported one locality which is the type locality Tärna, Laxfjället, in Lycksele Lappmark. Three specimens of the genus have been recorded from Finland (Hutson 1977) and elsewhere in the Palaearctic very few specimens are known. Thus the record of *H. eximia* from Norway is a very interesting record. Andersson (1982) gives the distribution as Finland, Czechoslovakia, the former USSR and Japan. Another species *H. veternosa* Mamaev & Krivosheina 1969 has been recorded from Finland, Roumania and Ukraina.

ACKNOWLEDGEMENTS

I am grateful to A. Bruserud, Brumunddal who emptied the trap in the summer 1982, and to A.-J. Nilsen, Hidrasund who initiated the use of a Malaise trap for insect collection.

SAMMENDRAG

En hunn av *Hyperoscelis eximia* (Boheman 1858) (Diptera, Canthyloscelidae) ble funnet for første gang i Norge i Malaisefellemateriale fra BV Gol, Engene i perioden 18 June til 5 July 1982. Det er bare kjent en palaearktisk slekt med to arter i denne familien og *H. eximia* er sjelden i Fennoskandia. I Sverige er arten bare kjent fra typelokaliteten, i Finland er det funnet tre individer. Den videre kjente utbredelsen er Tsjekkoslovakia, Forbundet av frie stater og Japan.

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BERKSHIRIA HUNGARICA (KERTÉSZ, 1921) FIRST RECORD FROM NORWAY

LITA GREVE & TERJE JONASSEN

Berkshiria hungarica (Kertész, 1921) (Diptera, Stratiomyidae) is recorded from Norway.

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The fly *Berkshiria hungarica* (Kertész, 1921) belongs to the subfamily Pachygasterinae in the family Stratiomyidae. The species of this subfamily are mainly tiny, max 4.5 mm., and dark, and the larvae are found mostly under the bark of dead and decaying trees. There are seven species belonging to six genera in Europe, and three species have hitherto been reported from Norway (Fjeldså, Greve and Nilsen, 1984; Greve, 1986). For descriptions of the species see Rozkošný (1983). One female *Berkshiria hungarica* was collected at Råkil, Tune i Østfold on 7 May 1989 by Thor Jan Olsen.

The genus *Berkshiria* includes two species, and *B. hungarica* has been recorded from Europe and western Siberia only. The other *B. albistylum* Johnson 1914 is known from North America. The two species were synonymized as *B. albistylum* in Rozkošný's (1983) work on Fennoscandian and Danish Stratiomyidae. *B. albistylum* Johnson, 1914 is today considered a separate species with Nearctic distribution (Rozkošný, 1983).

B. hungarica has according to the map in Rozkošný (1983) been recorded from four localities in Sweden, two in Finland, some in the former USSR and three in Romania. The record from Østfold is the westernmost in Europe.

Rozkošný (1983) reports adults from June and July, thus later than the specimen reported here.

The larvae of *B. hungarica* have been reported from under bark of *Populus tremula* L. logs and also under bark of other species of *Populus*. Thor Jan Olsen who collected the specimen, says that some *P. tremulus* is growing near by.

ACKNOWLEDGEMENTS

We would like to express our gratitude to Thor Jan Olsen, Sarpsborg who collected the specimen.

SAMMENDRAG

En hunn av våpenfluen *Berkshiria hungarica* (Kertész, 1921) ble funnet i Råkil, Tune i Østfold 7 Mai 1989 av Thor Jan Olsen. Dette er den første lokaliteten for arten i landet (Olsen 1992). *B. hungarica* er i Fennoskandia kjent fra fire steder i Sverige og to steder i Finland (Rozkošný, 1983). Arten er ikke rapportert fra Danmark. Det norske funnet er det vestligste i Europa.

Rozkošný (1973) omtalte arten under navnet *B. albistylum* Johnson 1914, men dette navnet er i dag forbeholdt en nær beslektet art i Nord-Amerika. Larvene til *B. hungarica* utvikler seg under bark av ospearter.

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XIPHYDRIA PROLONGATA (FOURCROY) (HYMENOPTERA, XIPHYDRIIDAE) NEW TO THE NORWEGIAN FAUNA

FRED MIDTGAARD & OVE SØRLIBRÅTEN

The woopwasp *Xiphydria prolongata* (Fourcroy) is recorded new to the Norwegian fauna. One female was found on an Umbilifer flower just outside an alder forest (*Alnus incana*) the 21st. of August 1991 at AK, EIS 37, Sørums: Lørenfallet (Egner), 20 km NE of Lillestrøm in south eastern Norway. The following summer 1 female was collected flying 20 June 1992, and 6 females and 3 males were found in a 10 cm thick alder log (*Alnus incanus*) 2 June 1992). Three specimens of the parasite *Aulacus striatus* Jurine (Aulacidae) were found at the same occasion in the log.

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Ove Sørlibråten, Egner, 1990 Sørums, Norway.

De norske løvtreveps (Xiphydriidae) har nylig blitt revidert (Midtgaard 1988b). Inntil da var bare en art, den vanlige kamelvepsen (*Xiphydria camelus* Latreille) kjent fra Norge. Vi fikk da rapportert en ny art for Norge som var ganske uventet: *Konowia megapolitana* Brauns. Funnet ble gjort i de varme liene i Vinstra ved Hesteskobakken (ON, Nord-Fron, EIS 62, leg. O. Hanssen). Seneste funn av denne arten i Nord-Europa var i Imatra i Sør-Østfinland i 1920. Blant de arter man kunne forvente hos oss var *Xiphydria prolongata* (Fourcroy). Arten er kjent fra alle våre naboland, men har ikke vært funnet i Norge tidligere. Mens *X. camelus* særlig utvikler seg i bjørk (*Betula*) og or (*Alnus*), skal *X. prolongata* særlig utvikle seg i selje og vier (*Salix* spp.) (Benson, 1951). Viitasaari (1984) nevner en lang rekke verter for begge artene.

Løvtrevepsen *Xiphydria prolongata* ble funnet flere ganger i 1991 og 1992 ved AK, EIS 37, Sørums: Lørenfallet (Egner), 20 km NE for Lillestrøm (leg. O. Sørlibråten). Først ble en hunn tatt på en skjermblomst (Umbilifera) like utenfor et gråorbstand (*Alnus incana*). Neste år ble 6 hunner og tre hanner funnet den 2. juni 1992 i puppekamre i en 10 cm tykk orekubbe. Treet hadde blitt hogd tre år før vepsene ble funnet. I puppekamre ble det også funnet tre individer av parasitten *Aulacus striatus* Jurine (Aulacidae). Parasitten har tidligere vært funnet i Norge (Midtgaard, 1992a). Den 20. juni samme år ble en *X. prolongata* hunn fanget flygende samme sted. Arten er lett å kjenne på den røde bakkroppen.

Flere andre arter av denne familien kan forventes i Norge: *Xiphydria longicollis* (Fourcroy), *X. picta* Konow og *Konowia betulae* (Enslin). Det finnes en nøkkel til alle arter i Nordeuropa i Viitasaaris (1984) arbeide over de finske artene. Han gir også omfattende informasjon om de enkelte artenes biologi og utbredelse, men dessverre på finsk.

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Content

Fauna norv. Ser. B 40. (1) 1993

Andersen, T., Johanson, K. A., Kobro, S. & Ligaard, S.: Faunistical records of Caddis flies (Trichoptera) from Østfold and Akershus, SE Norway	1
Nilssen, A. C.: Distribution of phytophagous beetles (Scolytidae, Cerambycidae, Curculionidae) living in the bark and wood of Scots pine (<i>Pinus sylvestris</i> L.) in northern Norway	13
Sagvolden, B. A. & Hansen, L. O.: Notes on Norwegian Coleoptera	33
Greve, L.: Family Pallopteridae (Diptera) in Norway	37
Albert Lillehammer — in memoriam	45

Short communications

Johanson, K. A.: Records of the migrant <i>Rhodometra sacraria</i> (L., 1767) (Lepidoptera: Geometridae) in Norway	46
Greve, L.: <i>Hyperoscelis eximia</i> (Boheman, 1858) (Diptera, Canthyloscelidae); new family and species to the Norwegian fauna	46
Greve, L. & Jonassen, T.: <i>Berkshiria hungarica</i> (Kertész, 1921), first record from Norway	47
Midtgaard, F. & Sørlibråten, O.: <i>Xiphidria prolongata</i> (Fourcroy) (Hymenoptera, Xiphidriidae) new to the Norwegian fauna	48