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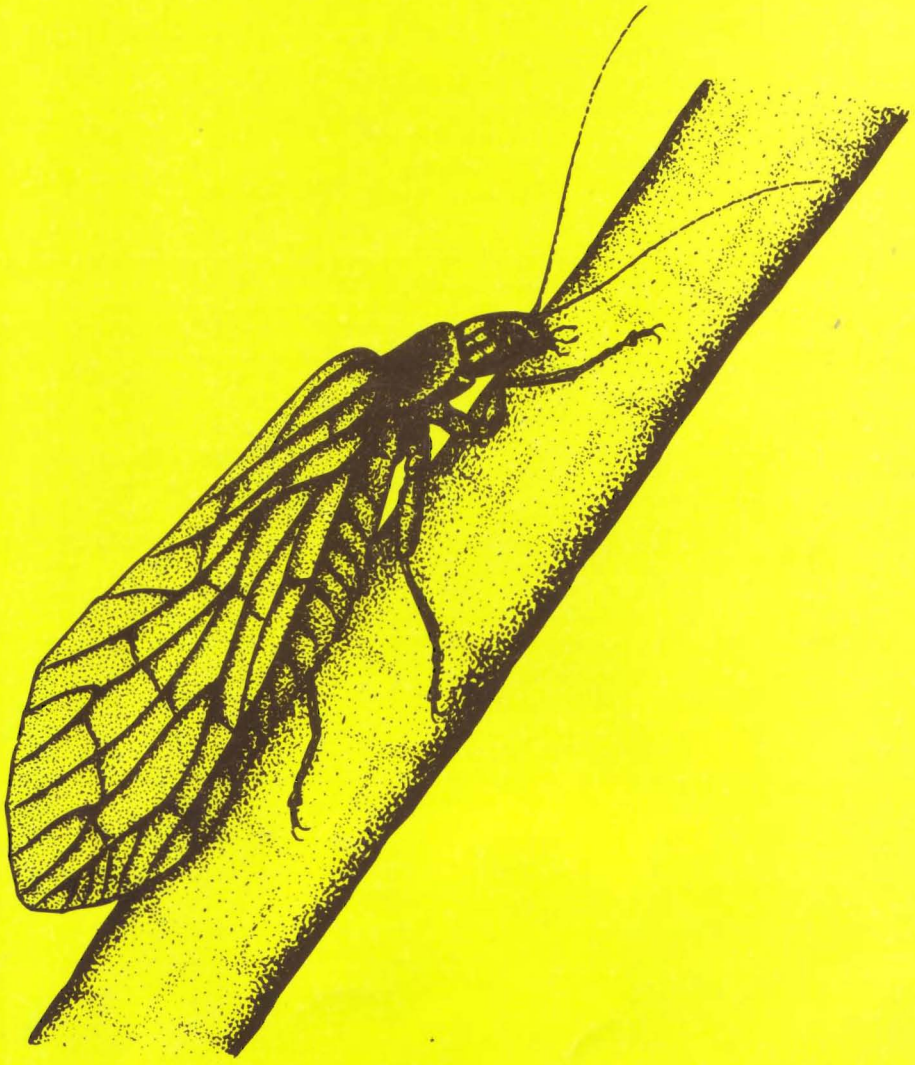

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Pitfall catches of spiders (Araneae) from proposed nature reserves on Tjøme, Vestfold, SE Norway

Trond Andersen & Erling Hauge

Andersen, T. & Hauge, E. 1995. Pitfall catches of spiders (Araneae) from proposed nature reserves on Tjøme, Vestfold, SE Norway. - Fauna norv. Ser. B 42: 1-10.

Coastal areas in Vestfold are exposed to considerable pressure from human activities. As a result, natural vegetation is worn down and destroyed. The areas have a very rich flora and fauna, and plans for management and conservation are most urgent. Spiders and other invertebrates have been collected to support proposals for establishing nature reserves. Pitfall trapping of spiders from 1984 to 1986 in 27 localities on the southern, coastal part of Tjøme yielded a total of 7186 specimens of 150 species in 17 families. *Haplodrassus minor* (O. P.-Cambridge, 1879) and *Enoplognatha thoracica* (Hahn, 1833) are new to Norway. In addition there are records of 25 species which must be considered as rare in Norway. Based on criteria of rare species the results encourage the proposal for establishing reserves.

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INTRODUCTION

There is a considerable pressure from human activities on the coastal areas of Vestfold. Today large areas are used for shore residences, camp grounds and beaches. As a result, the natural vegetation in most places is worn down and destroyed. Dry, open shores seem to be particularly vulnerable. From a biological point of view, these areas have very high qualities. A favourable climate, combined with rich marine sediments, forms the basis for a rich and diverse flora and fauna. If one wishes to secure this unique landscape for future generations, plans for management and conservation are most urgent.

The lepidopteran fauna in these coastal areas is very rich. No less than 1 280 species have been recorded from the southern parts of Tjøme, among which 58 species are considered as rare (Andersen & Fjeldså 1984, Andersen & Søli 1988). Andersen & Søli (1988) recommended the establishment of 3 nature reserves in the southern parts of Tjøme. To strengthen these proposals, studies on other invertebrates have been initiated. The present study is part of a survey on ground living invertebrates, granted by the Norwegian Ministry for the Environment (Miljøverndepartementet). The survey was mainly focused upon the fauna associated with dry, open grass and flower meadows, but sampling was also done in other habitats.

STUDY AREA

The sampling sites are situated in the southern, coastal parts of the two islands of Tjøme and Hvasser (**Figure 1**). The coastal regions of the municipality of Tjøme have a favourable climate with warm summers and relatively mild winters. Mean annual temperature is 7.5 °C (Meteorological station: Ferder fyr). February is the coldest month with -1.3 °C,

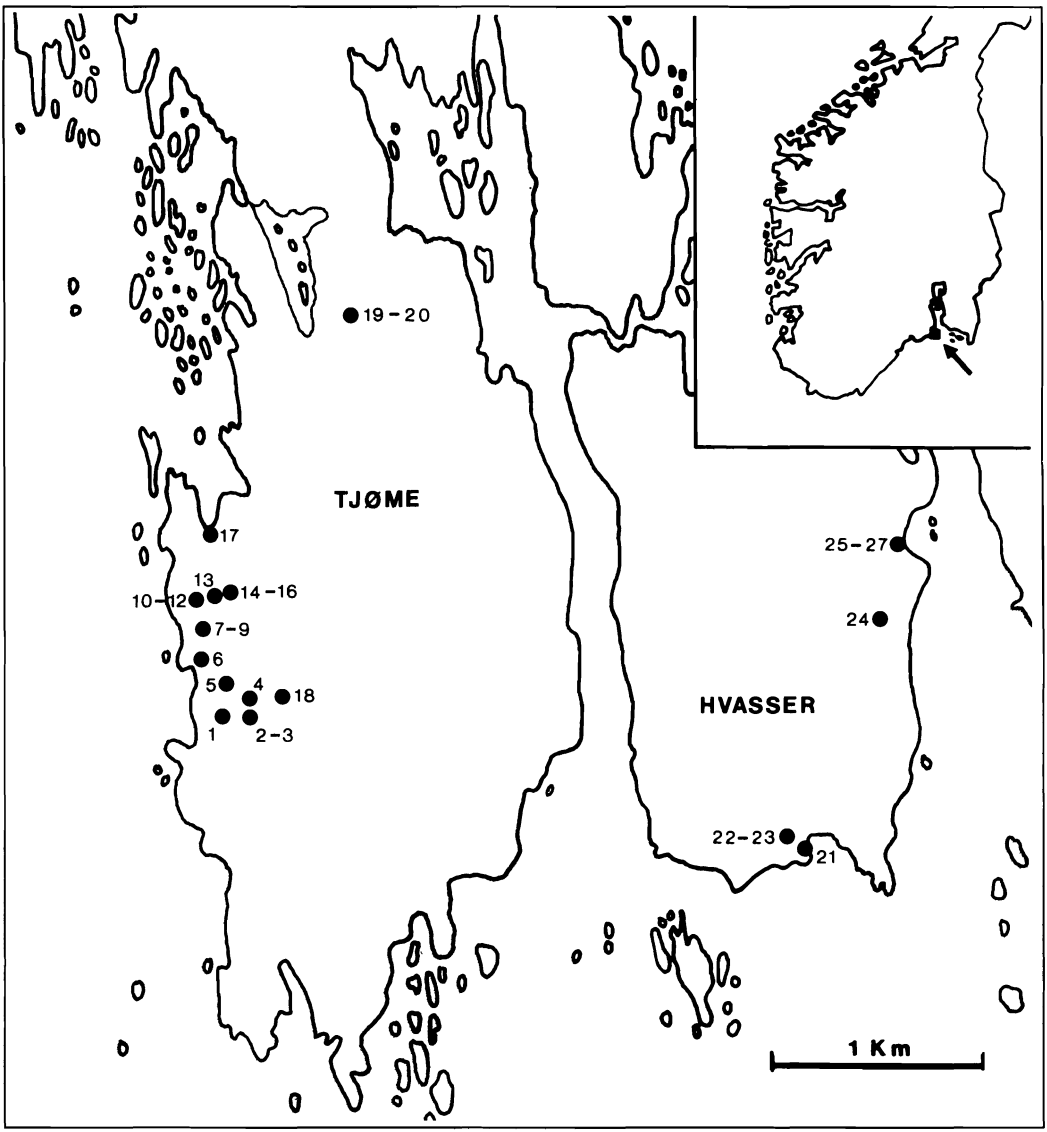

Figure 1
The southern parts of the islands of Tjøme and Hvasser, showing the position of the localities.

July the warmest with 17.2 °C (DNMI 1985). Mean annual precipitation is 775 mm. Highest precipitation falls in November (86 mm), lowest in March (39 mm) (DNMI 1987). The bedrock consists of plutonic rocks, mainly syenite, but the area is also rich in moraines with stones and boulders. The soil consists mainly of marine deposits, with a rich and varied vegetation. Within the area there are a high number of different habitats, ranging from sandy or stony beaches, rocky shores, wet and dry meadows to heath land, shrubs and wooded areas (see Andersen & Søli 1988).

METHODS AND MATERIAL

Pitfall traps were used in series of 5 at each of the 27 sampling sites (**Table 1**). The traps were glasses, 56 mm in diameter, and 117 mm deep, half filled with 4 % formaldehyde and soap added as a detergent, and provided with roofs. The sampling period at the different trapping sites varied (see **Table 1**). The traps were emptied at irregular intervals, usually

Table 1. *List of pitfall trap localities with UTM-references (32VNL-), trapping periods and short descriptions. Localities nos. 1 - 20 are situated on Tjøme, nos. 21 - 27 on Hvasser.*

No.	Locality	UTM	Trapping period	Description of the localities
1	Moutmarka	3802489	3.8 - 9.11 1986	Wet, tufted meadow, with grasses and *Ononis.*
2	Moutmarka	803490	3.8 - 9.11 1986	Damp area with *Sphagnum.*
3	Moutmarka	803490	3.8 - 9.11 1986	Damp meadow on morain with grasses, *Juniperus* and *Vaccinium uliginosum.*
4	Moutmarka	3803491	3.8 - 9.11 1986	Shrub with *Quercus, Corylus* and *Lonicera.*
5	Moutmarka	801493	3.8 - 9.11 1986	Pond shore with *Sphagnum* and *Phragmites.*
6	Moutmarka	800494	25.7 1984 - 2.8 1986	Exposed morain with grasses, *Juniperus* and *Thalictrum minus.*
7	Mostranda	800496	25.7 1984 - 2.8 1986	Wet area with bare sand and gravel, mosses, *Phragmites* and *Salix.*
8	Mostranda	800496	25.7 1984 - 2.8 1986	Dry, exposed, sandy slope with *Carex arenaria* and *Geranium sanguineum.*
9	Mostranda	800496	25.7 1984 - 2.8 1986	Dry, exposed meadow with short grass, *Carex* and *Euphrasia.*
10	Mostranda	799497	25.7 1984 - 2.8 1986	Dry meadow with grasses.
11	Mostranda	799497	25.7 1984 - 2.8 1986	Dry shrub *(Populus)* with grasses and herbs.
12	Mostranda	799497	25.7 1984 - 2.8 1986	Meadow with grasses and herbs.
13	Mostranda	801497	25.7 1984 - 2.8 1986	Damp shrub *(Populus)* with *Filipendula ulmaria.*
14	Mostranda	802497	25.7 1984 - 2.8 1986	Dense shrub *(Corylus),* ground layer with *Convallaria* and *Mercurialis perennis.*
15	Mostranda	802497	4.8 - 9.11 1986	Shielded meadow with grasses and herbs.
16	Mostranda	802497	25.7 1984 - 2.8 1986	Dry shrub *(Quercus)* with grasses and herbs.
17	Mostranda	801498	25.9 1984 - 2.8 1986	Sandy beach with *Artemisia* and *Atriplex.*
18	Mo	803492	25.7 1984 - 24.5 1985	Meadow with grasses and *Hieracium.*
19	Kolabekk	807509	4.8 - 9.11 1986	Mixed forest with *Pinus* and *Quercus,* ground lay er with grasses and *Melampyrum.*
20	Kolabekk	807509	4.8 - 9.11 1986	Pine forest, ground layer with short grass.
21	Sønstegård	828483	4.8 - 9.11 1986	Sandy beach with *Phragmites* and *Elymus.*
22	Sønstegård	828484	24.8 1985 - 9.11 1986	Shrub with *Prunus, Rosa* and *Centaurea.*
23	Sønstegård	828484	24.8 1985 - 9.11 1986	Dry, exposed meadow with *Centaurea* and *Artemisia campestris.*
24	Fyn	833496	4.8 - 9.11 1986	Damp forest with *Alnus, Acer* and *Fraxinus.*
25	Fyn	834499	25.9 1984 - 24.5 1985	Dry, exposed meadow with *Artemisia campestris.*
26	Fyn	834499	25.9 1984 - 24.5 1985	Beach with seaweed and herbs.
27	Fyn	834499	25.9 1984 - 24.5 1985	Beach with *seaweed and herbs.*

once or twice during the summer months, at longer intervals in winter. The material comprises 7186 specimens of 150 species in 17 families.

THE SPECIES

Family Dictynidae

Argenna subnigra (O. P.-Cambridge, 1861). Loc. no.: 7, 9, 10, 18. 21♂♂ 17♀♀.

Family Gnaphosidae

Callilepis nocturna (Linnaeus, 1758). Loc. no.: 6. 2♀♀.

Drassodes lapidosus (Walckenaer, 1802). Loc. no.: 6, 7, 8. 5♂♂ 15♀♀.

D. pubescens (Thorell, 1856). Loc. no.: 8, 9, 10, 22. 10♂♂ 5♀♀.

Drassyllus praeficus (L. Koch, 1866). Loc. no.: 8, 17. 3♂♂ 1♀♀.

D. pusillus (C.L. Koch, 1833). Loc. no.: 8, 9, 10, 18, 22, 23, 25. 14♂♂ 8♀♀.

Haplodrassus minor (O. P.-Cambridge, 1879). Loc. no.: 26, 27. 4♂♂.

H. moderatus (Kulczynski, 1897). Loc. no.: 14. 1♂.

H. signifer (C. L. Koch, 1839). Loc. no.: 8, 9, 10, 23, 26. 8♂♂ 1♀.

H. silvestris (Blackwall, 1833). Loc. no.: 14, 16. 1♂ 1♀.

Micaria fulgens (Walckenaer, 1802). Loc. no.: 6, 22, 23. 4♂♂ 1♀.

M. nivosa L. Koch, 1866. Loc. no.: 7, 19, 22. 5♀♀.

M. pulicaria (Sundevall, 1831). Loc. no.: 6, 7, 9, 10. 4♂♂ 2♀♀.

Zelotes latreillei (Simon, 1878). Loc. no.: 6, 7, 8, 9, 10, 15, 18, 20, 23. 12♂♂ 8♀♀.

Z. petrensis (C. L. Koch, 1839). Loc. no.: 8. 1♀.

Z. subterraneus (C. L. Koch, 1833). Loc. no.: 6, 16, 20, 22. 11♂♂ 7♀♀.

Family Clubionidae

Clubiona brevipes Blackwall, 1841. Loc. no.: 24. 1♂.

C. diversa O. P.-Cambridge, 1862. Loc. no.: 23. 1♀.

C. neglecta O. P.-Cambridge, 1862. Loc. no.: 9, 10, 18. 1♂ 3♀♀.

C. reclusa O. P.-Cambridge, 1863. Loc. no.: 17. 1♀.

C. terrestris Westring, 1862. Loc. no.: 11, 16. 2♀♀.

Family Liocranidae

Agroeca proxima (O. P.-Cambridge, 1871). Loc. no.: 1, 3, 6, 7, 8, 9, 10, 11, 12, 15, 16, 18, 20, 21, 22, 23. 59♂♂ 41♀♀.

Scotina gracilipes (Blackwall, 1859). Loc. no.: 8, 16. 2♂♂.

Family Zoridae

Zora spinimana (Sundevall, 1833). Loc. no.: 10, 11, 12, 13, 14, 19. 7♂♂ 4♀♀.

Family Thomisidae

Oxyptila atomaria (Panzer, 1810). Loc. no.: 6, 22. 3♂♂.

O. praticola (C. L. Koch, 1837). Loc. no.: 4, 14, 19. 12♂♂ 4♀♀.

O. trux (Blackwall, 1846). Loc. no.: 11, 12, 13, 14, 17, 24. 48♂♂ 7♀♀.

Xysticus bifasciatus C. L. Koch, 1837. Loc. no.: 10, 12. 7♂♂.

X. cristatus (Clerck, 1757). Loc. no.: 6, 7, 8, 9, 10, 12. 25♂♂ 8♀♀.

X. erraticus (Blackwall, 1834). Loc. no.: 6. 1♂ 1♀.

X. luctuosus (Blackwall, 1836). Loc. no.: 10. 1♀.

Family Philodromidae

Thanatus striatus C. L. Koch, 1845. Loc. no.: 7, 9, 17. 6♀♀.

Family Salticidae

Evarcha falcata (Clerck, 1757). Loc. no.: 20. 1♀.

Heliophanus cupreus (Walckenaer, 1802). Loc. no.: 9 . 1♀.

H. flavipes (Hahn, 1823). Loc. no.: 10. 1♀.

Phlegra fasciata (Hahn, 1826). Loc. no.: 9. 1♂.

Family Lycosidae

Alopecosa aculeata (Clerck, 1758). Loc. no.: 23. 1♂ 1♀.

A. cuneata (Clerck, 1757). Loc. no.: 6, 7, 8, 9, 18, 22, 25, 26, 27. 56♂♂ 35♀♀.

A. pulverulenta (Clerck, 1757). Loc. no.: 6, 7, 8, 9, 10, 12, 18, 23, 26. 32♂♂ 22♀♀.

Pardosa agricola (Thorell, 1856). Loc. no.: 27. 1♂ 1♀.

P. fulvipes (Collett, 1875). Loc. no.: 7, 9, 10, 11, 12, 14, 15, 17, 23. 42♂♂ 41♀♀.

P. lugubris (Walckenaer, 1802). Loc. no.: 2, 6, 11, 13, 14, 16, 19, 20. 52♂♂ 19♀♀.

P. nigriceps (Thorell, 1856). Loc. no.: 1, 6, 7, 8, 9, 10, 12, 17, 22, 23. 8♂♂ 22♀♀.

P. paludicola (Clerck, 1757). Loc. no.: 7, 17, 26, 27. 3♂♂ 14♀♀.

P. palustris (Linnaeus, 1758). Loc. no.: 6, 7, 8, 9. 5♂♂ 10♀♀.

P. prativaga (C. L. Koch, 1870). Loc. no.: 1, 5, 6, 7, 8, 9, 10, 12, 17. 157♂♂ 396♀♀.

P. pullata (Clerck, 1757). Loc. no.: 5, 7, 9, 10, 12, 17, 23. 11♂♂ 48♀♀.

Pirata hygrophilus Thorell, 1872. Loc. no.: 12. 1♂.

P. piraticus (Clerck, 1757). Loc. no.: 5, 7, 17. 3♂♂ 6♀♀.

P. uliginosus (Thorell, 1856). Loc. no.: 1, 2, 9, 10, 11. 3♂♂ 8♀♀.

Trochosa ŧuricola (Degeer, 1778). Loc. no.: 7, 8, 17, 21, 25, 26, 27. 120♂♂ 37♀♀.

T. spinipalpis (F. O. P.-Cambridge, 1895). Loc. no.: 6, 7, 11, 12, 14, 16, 17, 26. 31♂♂ 11♀♀.

T. terricola Thorell, 1856. Loc. no.: 1, 4, 5, 6, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26. 436♂♂ 223♀♀.

Xerolycosa nemoralis (Westring, 1861). Loc. no.: 8, 9. 172♂♂ 90♀♀.

Family Pisauridae

Pisaura mirabilis (Clerck, 1757). Loc. no.: 23. 1 juv.

Family Argyronetidae

Argyroneta aquatica (Clerck, 1757). Loc. no.: 5. 1♀.

Family Agelenidae

Agelena labyrinthica (Clerck, 1757). Loc. no.: 8, 9. 2♂♂ 1♀.

Textrix denticulata (Olivier, 1789). Loc. no.: 6, 23. 1♂ 1♀.

Family Hahniidae

Antistea elegans (Blackwall, 1841). Loc. no.: 1, 5, 7, 8, 17, 24. 96♂♂ 9♀♀.

Hahnia nava (Blackwall, 1841). Loc. no.: 6, 8, 9, 10, 23. 17♂♂ 1♀.

H. pusilla C. L. Koch, 1841. Loc. no.: 6, 18. 4♂♂.

Family Mimetidae

Ero furcata (Villers, 1789). Loc. no.: 9, 10, 14, 16, 20. 3♂♂ 3♀♀.

Family Tetragnathidae

Pachygnatha clercki Sundevall, 1823. Loc. no.: 5, 7, 17, 26, 27. 36♂♂ 46♀♀.

P. degeeri Sundevall, 1830. Loc. no.: 1, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18, 21, 22, 23, 26, 27. 246♂♂ 352♀♀.

Tetragnatha montana Simon, 1874. Loc. no.: 14. 1♀.

Family Theridiidae

Crustulina guttata (Wider, 1834). Loc. no.: 7, 8, 9, 19. 3♂♂ 2♀♀.

Enoplognatha thoracica (Hahn, 1833). Loc. no.: 9, 27. 1♂ 2♀♀.

Episinus angulatus (Blackwall, 1836). Loc. no.: 7, 16. 2♀♀.

Robertus arundineti (O. P.-Cambridge, 1871). Loc. no.: 5, 17. 11♂♂ 15♀♀.

R. lividus (Blackwall, 1836). Loc. no.: 3, 11, 12, 13, 17, 24. 11♂♂ 10♀♀.

Steatoda bipunctata (Linnaeus, 1758). Loc. no.: 14. 1♂.

Family Linyphiidae

Agyneta cauta (O. P.-Cambridge, 1902). Loc. no.: 1, 2, 10, 11, 12, 13. 5♂♂ 16♀♀.

A. conigera (O. P.-Cambridge, 1863). Loc. no.: 13. 1♂.

Allomengea scopigera (Grube, 1859). Loc. no.: 17. 1♂ 3♀♀.

Araeoncus crassiceps (Westring, 1861). Loc. no.: 21. 1♀.

Bathyphantes approximatus (O. P.-Cambridge, 1871). Loc. no.: 7, 10, 12, 13, 16. 24♂♂ 9♀♀.

B. gracilis (Blackwall, 1841). Loc. no.: 1, 5, 7, 26, 27. 25♂♂ 2♀♀.

B. nigrinus (Westring, 1851). Loc. no.: 12, 13. 4♂♂ 1♀.

B. parvulus (Westring, 1851). Loc. no.: 1, 7, 10, 12, 13, 14, 15, 17, 23. 71♂♂ 98♀♀.

B. setiger (F. O. P.-Cambridge, 1894). Loc. no.: 17, 25. 2♂♂.

Bolyphantes alticeps (Sundevall, 1832). Loc. no.: 8, 23, 24. 5♂♂ 1♀.

B. luteolus (Blackwall, 1833). Loc. no.: 5, 6, 7, 8, 9, 12, 17, 18, 21, 22, 23, 25, 26, 27. 39♂♂ 46♀♀.

Centromerita bicolor (Blackwall, 1833). Loc. no.: 1, 5, 6, 7, 8, 9, 10, 12, 15, 16, 17, 18, 21, 22, 23, 25, 26, 27. 771♂♂ 274♀♀.

C. concinna (Thorell, 1875). Loc. no.: 1, 2, 3, 6, 7, 8, 9, 17, 18, 22, 23. 259♂♂ 73♀♀.

Centromerus incilium (L. Koch, 1881). Loc. no.: 6, 23. 15♂♂ 5♀♀.

C. prudens (O. P.-Cambridge, 1873). Loc. no.: 8, 9, 18, 22. 5♂♂ 9♀♀.

C. sylvaticus (Blackwall, 1841). Loc. no.: 1, 3, 4, 6, 8, 10, 11, 12,13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25. 287♂♂ 54♀♀.

Ceratinella brevipes (Westring, 1851). Loc. no.: 7, 9, 12. 6♂♂ 8♀♀.

C. brevis (Wider, 1834). Loc. no.: 6, 7, 10, 11, 12, 14, 16, 17, 18. 70♂♂ 6♀♀.

C. scabrosa (O. P.-Cambridge, 1871). Loc. no.: 3, 11, 13, 16. 5♂♂ 2♀♀.

Cnephalocotes obscurus (Blackwall, 1834). Loc. no.: 10, 12, 18. 3♂♂ 2♀♀.

Dicymbium nigrum (Blackwall, 1834). Loc. no.: 17, 25, 26. 3♂♂.

Diplocephalus latifrons (O. P.-Cambridge, 1863). Loc. no.: 4, 13, 14, 16, 19. 84♂♂ 54♀♀.

D. picinus (Blackwall, 1841). Loc. no.: 9, 11, 13, 14, 15, 16, 17, 24. 159♂♂ 52♀♀.

Diplostyla concolor (Wider, 1834). Loc. no.: 6, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 23, 24, 27. 67♂♂ 35♀♀.

Drapetisca socialis (Sundevall, 1832). Loc. no.: 16. 1♂ 1♀.

Erigone arctica (White, 1852). Loc. no.: 21. 1♂ 3♀♀.

E. atra (Blackwall, 1841). Loc. no.: 7, 8. 1♂ 2♀♀.

E. dentipalpis (Wider, 1834). Loc. no.: 7, 25. 4♂♂.

Erigonella hiemalis (Blackwall, 1841). Loc. no.: 1, 18. 1♂ 2♀♀.

Evansia merens O. P.-Cambridge, 1900. Loc. no.: 9, 10. 1♂ 2♀♀.

Gnathonarium dentatum (Wider, 1834). Loc. no.: 5. 1♀.

Gonatium rubellum (Blackwall, 1841). Loc. no.: 10. 1♂.

G. rubens (Blackwall, 1833). Loc. no.: 3, 4, 5, 6, 9, 11, 12, 13, 19, 22. 8♂♂ 20♀♀.

Gongylidiellum murcidum Simon, 1884. Loc. no.: 7, 12, 17, 18, 26, 27. 12♂♂ 5♀♀.

Gongylidium rufipes (Sundevall, 1829). Loc. no.: 4, 14. 1♂ 4♀♀.

Leptothrix hardyi (Blackwall, 1850). Loc. no.: 8. 1♀.

Lepthyphantes angulipalpis (Westring, 1851). Loc. no.: 14, 15, 16, 19. 17♂♂ 9♀♀.

L. cristatus (Menge, 1866). Loc. no.: 3, 4, 15. 3♂♂ 3♀♀.

L. decolor (Westring, 1862). Loc. no.: 19, 20, 21. 2♂♂ 1♀.

L. ericaeus (Blackwall, 1853). Loc. no.: 1, 3, 18, 21. 10♂♂ 6♀♀.

L. flavipes (Blackwall, 1854). Loc. no.: 14, 17. 2♀♀.

L. mengei Kulczynski, 1887. Loc. no.: 1, 3, 5, 6, 8, 10, 11, 12,13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26. 108♂♂ 65♀♀.

L. minutus (Blackwall, 1833). Loc. no.: 24. 1♂.
L. tenebricola (Wider, 1834). Loc. no.: 24. 5♂♂ 3♀♀.
Linyphia triangularis (Clerck, 1857). Loc. no.: 15. 1♀.
Macrargus carpenteri (O. P.-Cambridge, 1894). Loc. no.: 8, 18, 23. 17♂♂ 4♀♀.
M. rufus (Wider, 1834). Loc. no.: 21. 1♂ 1♀.
Maro minutus O. P.-Cambridge, 1906. Loc. no.: 9. 1♂.
Meioneta beata (O. P.-Cambridge, 1906). Loc. no.: 6, 7, 10, 17. 9♂♂ 6♀♀.
Micrargus subaequalis (Westring, 1851). Loc. no.: 8, 14, 23. 3♂♂ 2♀♀.
Microneta varia (Blackwall, 1841). Loc. no.: 9, 11, 13, 14, 16. 53♂♂ 30♀♀.
Mioxena blanda (Simon, 1884). Loc. no.: 21. 1♀.
Neriene clathrata (Sundevall, 1829). Loc. no.: 14, 15, 16, 17, 23, 25, 26, 27. 2♂♂ 8♀♀.
Oedothorax apicatus (Blackwall, 1850). Loc. no.: 21, 26, 27. 39♂♂ 69♀♀.
O. retusus (Westring, 1851). Loc. no.: 17. 1♂.
Pelecopsis parallela (Wider, 1834). Loc. no.: 9. 5♂♂ 2♀♀.
Pocadicnemis pumila (Blackwall, 1841). Loc. no.: 2, 20. 3 ♀♀.
Porrhomma convexum (Westring, 1861). Loc. no.: 24. 1♂.
P. montanum Jackson, 1913. Loc. no.: 11. 1♂.
P. pygmaeum (Blackwall, 1834). Loc. no.: 17. 1♂ 1♀.
Saaristoa abnormis (Blackwall, 1841). Loc. no.: 6. 1♂.
Savignya frontata (Blackwall, 1833). Loc. no.: 17. 2♂♂ 10♀♀.
Silometopus reussi (Thorell, 1871). Loc. no.: 9, 17, 21, 26, 27. 110♂♂ 76♀♀.
Stemonyphantes lineatus (Linnaeus, 1758). Loc. no.: 6, 7, 8, 9, 23, 25. 16♂♂ 19♀♀.
Tallusia experta (O. P.-Cambridge, 1871). Loc. no.: 6, 17. 5♂♂.
Tapinocyba insecta (L. Koch, 1869). Loc. no.: 24. 1♀.
T. pallens (O. P.-Cambridge, 1872). Loc. no.: 11, 13, 16. 5♂♂.
Tapinocyboides pygmaeus (Menge, 1869). Loc. no.: 10, 12, 18. 15♂♂ 2♀♀.
Tapinopa longidens (Wider, 1834). Loc. no.: 1, 3, 4, 11, 14, 15, 16, 17,19, 20. 15♂♂ 5♀♀.
Thyreosthenius parasiticus (Westring, 1851). Loc. no.: 25. 4♂♂.
Troxochrus scabriculus (Westring, 1851). Loc. no.: 17, 21, 22, 25, 26, 27. 99♂♂ 30♀♀.
Typhocrestus digitatus (O. P.-Cambridge, 1872). Loc. no.: 8, 25, 26. 6♂♂ 13♀♀.
Walckenaeria acuminata Blackwall, 1833. Loc. no.: 3, 7, 8, 9, 10, 11, 14, 16, 17, 19, 23. 12♂♂ 3♀♀.
W. antica (Wider, 1834). Loc. no.: 3, 4, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 23, 24, 25, 26. 31♂♂ 35♀♀.
W. dysderoides (Wider, 1834). Loc. no.: 10, 12. 1♂ 2♀♀.
W. monoceros (Wider, 1834). Loc. no.: 8, 21. 2♂♂ 1♀.
W. nodosa O. P.-Cambridge, 1873. Loc. no.: 7, 8. 2♂♂.
W. nudipalpis (Westring, 1851). Loc. no.: 6, 17. 2♂♂.
W. vigilax (Blackwall, 1853). Loc. no.: 17, 27. 11♂♂ 1♀.

DISCUSSION

Several of the species taken during the present survey should be considered as rare. *Haplodrassus minor* is probably new to the Nordic countries, as it is not listed from Denmark (Brændegård 1966), Sweden (Tullgren 1946) or Finland (Palmgren 1977). The species is rare on the British Isles, so far found only on five shingle beaches on the southern coast of England (Locket & Millidge 1951, Locket et al. 1974). The present males were all trapped on sandy beaches. Also *Enoplognatha thoracica* seems to be new to the Nordic countries. In Britain this species is fairly common throughout the country (Locket & Millidge

1953). Our specimens were collected on a meadow with short grass, as well as on a sandy beach.

Further, a comparatively high number of the species taken on Tjøme has been recorded only once or twice in Norway. *Argenna subnigra* is in Norway previously only recorded from Moutmarka (Klausen 1974). *Drassyllus praeficus* has been found near Grimstad, outer Aust-Agder and in Varteig, Østfold (Hauge 1989). A single record of *D. pusillus* is from Hobøl, Østfold (Hauge 1989). *Haplodrassus moderatus* has been found near Arendal, outer Aust-Agder and near Hol, western Buskerud (Hauge 1989). *Clubiona brevipes* is previously recorded only from the island of Håøya, Akershus (Hauge & Midtgaard 1986). *C. diversa* is previously recorded only from Mostranda (Hauge 1987b). *C. neglecta* is recorded from Asker, Akershus only (Strand 1904), *Thanatus striatus* from Evje and Hornnes, inner Aust-Agder (Tveit & Hauge 1983), *Heliophanus flavipes* from "around Oslo" in Akershus (Collett 1875), *Phlegra fasciata* from Drammen, eastern Buskerud (Collett 1875). *Pirata uliginosus* is previously taken only on the Hvaler islands, Østfold (Hauge 1989), *Bathyphantes approximatus* once in Bærum, Akershus (Hauge 1989). *B. parvulus* is previously found in Østfold (Hauge 1989) and in Grenland, outer Telemark (Ellefsen & Hauge 1986). From Grenland there is also one previous record of *Ceratinella scabrosa* (Ellefsen & Hauge 1986). *Evansia merens* is recorded once from Bygland, inner Aust-Agder (Tveit & Hauge 1983), while a single record of *Gnathonarium dentatum* is from Klæbu, inner Sør-Trøndelag (Solem & Hauge 1973). *Maro minutus* is previously recorded from a few localities in western Norway only (Hauge 1989). *Oedothorax apicatus* has been found in cereal fields at Ås, Akershus (Andersen 1990), as well as in Troms (Jackson 1932). *Pelecopsis parallela* is previously recorded only once in Norway, near Risør, outer Aust-Agder (Hauge 1989). *Porrhomma montanum* is previously taken on the island of Stord, outer Hordaland (Hauge 1989) as well as in Flakstad, north-western Nordland (Ashmole & Planterose 1979). From Flakstad there is also a record of *Silometopus reussi,* also found on the island of Hisøy, outer Aust-Agder (Hauge 1989). *Tapinocyboides pygmaeus* is previously found only on the island of Hisøy, outer Aust-Agder (Hauge 1989). *Troxochrus scabricolus* is taken once in Ål, western Buskerud (Hauge 1989). *Walckenaeria monoceros* is previously recorded from Rendalen, northern Hedmark (Hauge & Kvamme 1983), as well as from Sveio, outer Hordaland (Hauge 1989). *W. vigilax* is previously represented by one record from Bærum, Akershus (Hauge 1989).

Four species caught by us have previously been recorded from Tjøme: *Argenna subnigra, Leptyphantes angulipalpis, Gongylidium rufipes* and *Clubiona diversa* (Hauge 1979, 1980, 1987b, Klausen 1974). In addition, there are 21 more species recorded from Tjøme. Hauge (1980) listed two species from Mostranda, *Maro lehtineti* Saaristo, 1971, for the first time in Norway. Hauge (1986) added 13 species considered as rare in Norway, *Philodromus poecilus* Thorell, 1872 was recorded for the first time in Norway. Hauge (1987a, 1987b) recorded *Trichoncus vasconicus* Denis, 1944, *Neoscona adianta* (Walckenaer, 1802), *Dictyna latens* (Fabricius, 1775), *Salticus zebraneus* (C. L. Koch, 1837) and *Araniella opistographa* (Kulczynski, 1905) from Tjøme, all species, except *S. zebraneus* recorded as new to Norway. Klausen & Andersen (1990) recorded the gnaphosid *Echemus angustifrons* (Westring, 1862) for the first time in Norway from Moutmarka.

When evaluating the conservation value of an area, various criteria can be used (see e.g. Usher 1986). When considering invertebrates

the two criteria most often stressed are species richness and the number of rare species. The number of species, 150, taken in the pitfall traps on the islands of Tjøme and Hvasser during the present survey, is rather high compared to the results of other pitfall studies of spiders in southern Norway (e.g. Ellefsen & Hauge 1986). Altogether 171 spider species have been recorded from Tjøme, comprising about 31 % of the Norwegian total (Hauge 1989). This percentage is rather low compared to the corresponding figure for Lepidoptera (60 %) from this area (Andersen & Søli 1988). Pitfall trapping is, however, a highly selective method, and studies applying other methods will undoubtedly add more spider species to the list from Tjøme.

Nevertheless, the number of rare species encountered in Tjøme is rather high. Two species have previously not been recorded from the Nordic countries. In addition 25 species recorded only once or twice in Norway, are also present in our material. Two of these are previously recorded for the first time in Norway from Tjøme. In addition 7 more species have previously been recorded for the first time in Norway from the island. The results thus indicating a rich and unique spider fauna, well worth protecting by establishing nature reserves in the southern, coastal parts of Tjøme as proposed by Andersen & Søli (1988).

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SAMMENDRAG

Fallfellefangst av edderkopper (Araneae) i foreslåtte naturreservater på Tjøme, Vestfold

Vestfolds kystsone spiller en vesentlig rolle som rekreasjonsområde for befolkningen i Østlandsområdet. En følge av dette er at naturlig vegetasjon slites ned og ødelegges. Disse kystområdene har en meget rik flora og fauna. Planer for bevaring og skjøtsel er derfor påkrevet. Andersen & Søli (1988) anbefalte å opprette 3 naturreservater i Tjøme kommune, basert på en undersøkelse av sommerfuglfaunen i Vestfolds kystområder.

For ytterligere å underbygge disse forslagene ble det i årene 1984 til 1986 foretatt innsamling av marklevende evertebrater med fallfeller på tilsammen 27 lokaliteter på Tjøme og Hvasser. I disse fellene ble det bl.a. tatt 7186 eksemplarer av edderkopper (Araneae) fordelt på 150 arter i 17 familier. *Haplodrassus minor* (O. P.-Cambridge, 1879) og *Enoplognatha thoracica* (Hahn, 1833) er tidligere ikke funnet i Norden. I tillegg ble det tatt 23 arter som må sies å være sjeldne i Norge. Det er også tidligere publisert en rekke "nye norske" arter fra Tjøme. Basert på kriterier om artsrikdom og stort innslag av sjeldne arter underbygger dette resultatet forslagene om opprettelse av naturreservater i området.

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Analysis and additions to the crane fly fauna of Finse, South Norway (Diptera: Tipulidea)

Fenja Brodo

Brodo, F. 1995. Analysis and additions to the crane fly fauna of Finse, South Norway (Diptera: Tipulidae). - Fauna norv. ser. B 42: 11-20.

Nineteen crane flies (s.l.) are now known from Finse. Eight of these are new to this region including the cylindrotomid *Phalacrocera replicata* (L.), the mating behaviour of which is described. Analysis of the species composition reveals only one, *Prionocera serricornis* Zetterstedt, with arctic affinities. The other 18 have very broad-ranging distributions and are more typical of alpine regions.

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INTRODUCTION

The Tipulidae and Limoniidae are species rich families which, as their distribution patterns become better known, could be effectively used to recognize important ecological sites as has been demonstrated for the British Isles (Stubbs 1992). The larvae of many of these species are aquatic or semi-aquatic and are sensitive to changes in water regimes such as the raising or lowering of water levels, changes in temperature, mineral contents and in pH (Stubbs 1992).

In 1974, Hofsvang reported on the crane flies of the high mountain region of Finse in Hordaland, at the alpine research station maintained by the Universities of Bergen and Oslo. Hofsvang had data on eight species and he noted that two more species from this region were represented in the collection at the Zoological Museum, University of Bergen. An additional species was reported by Tjeder (1965), deposited in Lund, making a total of eleven species for this field station. Hofsvang (1974) suggested then that a greater variety of traps may have attracted additional species.

The Finse research station is situated in the northwestern region of the mountain plateau Hardangervidda (60°36'N 7°30'E), at about 1200 m a.s.l. The Hardangervidda is the largest mountain plateau in Europe, covering approximately five thousand square kilometres (Hardangervidda s.str.) (Fjellberg 1972). It lies mostly between 1100 and 1300 m a.s.l., but includes a few peaks attaining 1800 to 1900 m and an active glacier, Hardangerjøkulen which is in the Finse area (Østbye et al. 1975). The plateau is dotted with many water bodies from tiny ponds to large lakes and small brooks to rushing rivers and it is rich in peatlands (ibid). The Finse region probably corresponds to the mid alpine region of Dovrefjell National Park (Hofsvang et al. 1987 & Mendl et al. 1987.)

The Hardangervidda was chosen as an IBP study site and information on the geology, meteorology, fauna and flora are found in Østybe et al. (1975) and Fjellberg (1972) and references therein. Several taxonomic groups have been studied and documented in a series of papers from the Hardangervidda, but among the Diptera only the Dolichopodidae

(Hedström, 1976) and the Tachydromiinae in the Empididae (Chvála, 1974) are so covered.

The Finse area has been the most extensively studied region on the plateau (Østybe et al. 1975). It is above tree line, and has a variety of habitats: glaciers, permanent snow beds, a lake, ponds, fens, seepage areas as well as relatively dry hillsides which are mainly granitic (Precambrian), but also include small regions of calcareous outcrop (John Birks, personal communication) as well as disturbed areas around dwellings and alongside the railroad track and roadway. The High Mountain Ecology Research Station at Finse is actively used by professors and students as well as by visiting scientists. It is, therefore, especially important to document the fauna and flora of this region.

The collecting season in 1992 had been delayed somewhat because of poor weather conditions. By July 17th, *Salix reticulata* was abundantly in bloom as were small patches of *Lychnis alpina* and *Trientalis europaea.* Collecting was done 17-19 July during which time there were several hours of sunshine as well as periods of rain and high winds.

METHODS

All collecting was done with a grey sweep net constructed from a design by Dr. Stephen Marshall, Guelph, Canada. The net terminates distally in a narrow, cylindrical extension wide enough to accommodate a collecting vial of 3 cm diameter (**Figure 1**). One or two rapid swings of the net will force netted insects into this extension. They can then be easily removed by knocking them into a vial inserted in this region. This net was designed to collect tiny Sphaeroceridae without having to use an aspirator, and this modification is equally effective for trapping the smaller crane flies into a collecting vial with almost no specimens escaping.

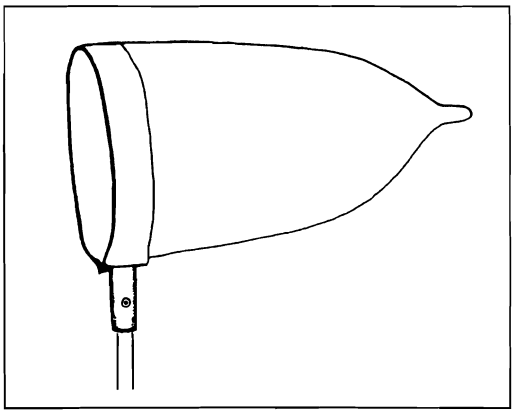

Figure 1
Modifiied net for collecting tiny insects.

Crane flies are easily disturbed when the substrate is trampled. They take wing, but relatively slowly, and so are easy to see and sweep into a net. This was especially so at Finse where the vegetation was not very dense and consisted mostly of herbaceous plants growing just a few centimetres high. The terrain around the field station was very carefully and slowly traversed on foot. It encompasses an altitude of about 1210 to 1370 m. All habitats mentioned above, except the glaciers and snow beds, were explored within a range of approximately 2 km.

Voucher specimens are deposited at the Zoological Museum, University of Bergen.

DISCUSSION

Fifteen species of crane flies were collected in 1992, eight of these are new records for Finse and are marked with an asterisk (*)(**Table 1**). Nineteen species belonging to the three families of Tipuloidea are now known from this area.

Nomenclature, listing of species, and comments on distributions, unless otherwise noted, are, for the Tipulidae, based on Oosterbroek & Theowald (1992), for the

Table 1. *Crane flies collected at Finse and compared with their occurrence at other alpine and arctic stations in northern Europe.*

	Finse[1]	Dovrefjell[2] sub/low/mid	Atna R.[3] BC/sub/alp	Abisko[4]	Inari[5]	Alps[6]	Arctic Tundra[7]
Tipulidae							
1. *Prionocera serricornis*	[++]			++	+		euarc
2. *Tipula (Savt.) alpium*	[+]			++		subAl	
3. *T. (Savt.) grisescens*	++	+/ - / -		+++	+	subAl	
4. *T. (Savt.) invenusta*	+++	+++/+++/ -		+++			sTun
5. *T. (Savt.) limbata*	[+]	+/ + / -		+++	+++	uMon	
6. *T. (Savt.) rufina*	[+]						
7. *T. (Savt.) subnodicornis*	+++	+++/ + / +		+++	+++	subAl	sTun
8. *T. (Vestiplex) excisa*	+++	+++/+++/++		+++	+++	Alp	sTun
Cylindrotomidae							
*9. *Phalacrocera replicata*	+++			+++	+		
Limoniidae							
*10. *Dicranota (D.) bimaculata*	+	+ / + / -	+ / + / -	+	+		
11. *D. (D.) guerini*	++	+ /++ /++	+ /+++/ +	+	+		sTun
*12. *D. (Rhaph.) exclusa*	++	+++/++ / -	+ /+++/ -	+	+		sTun
*13. *Pedicia (P.) rivosa*	+				+		
*14. *Tricyphona immaculata*	+	++/++ / -	++/ + / -	+	+		sTun
15. *Phyllolabis macroura*	[+]	+++/+++/ -	- /++ /+++	+	+		
16. *Euphylidorea meigenii*	+++				+		
*17. *Neolimnomyia nemoralis*	+	+++/ + / -	+++/++ / -				
*18. *Phylidorea (P.) squalens*	+	+ / + / -	+ / - / -		+		
*19. *Ormosia (0.) fascipennis*	+	++/++ / -	+/+++/++				sTun

* Indicates a new record for Finse.

[1] Relative abundance indicated by: + (< 5), ++ (5-10), +++ (> 11); [] = literature records.

[2] Dovrefjéll National Park, South Norway. Tipulidae: Hofsvang et al. 1987; Limoniidae: Mendl et al. 1987. Relative abundance noted as for Finse; sub = subalpine; low = low alpine; mid = mid alpine.

[3] Alpine and boreal zones along the Atna River, South Norway. Solem & Mendl 1989, Limoniidae only. BC = boreal-coniferous; sub = subalpine; alp = alpine.

[4] Abisko area, Torne Lappmark, Sweden. Tipulidae & Cylindrotomidae, Tjeder 1978; Limoniidae, Mendl 1979.

[5] Inari Lapland, Finland. Siitonen 1984.

[6] High altitude Tipulidae in Switzerland, Dufour 1992. Alp = alpine; subA = subalpine; uMon = upper montane.

[7] Eurasian tundra zone, Lantsov & Chernov 1987. euarc = predominantly of the arctic tundra; sTun = arcto-boreal, extending into the southern tundra.

Cylindrotomidae based on Soós & Oosterbroek (1992), and for the Limoniidae, based on Savchenko et al. (1992). Comparisons are made with Tipulidea (Hofsvang et al. 1987) and Limoniidae (Mendl et al. 1987) collected in Dovrefjell National Park, South Norway, situated north-east of the Hardangervidda and having a similar but richer alpine tundra region; with Limoniidae found along the Atna River, South Norway, a region which also includes an alpine component (Solem & Mendl 1989); with Tipulidae collected from various other Norwegian localities (Hofsvang et al. 1993); with Tipulidae and Limoniidae from Abisko, Swedish Lapland (Tjeder, 1978 & Mendl

1979, respectively); with Inari, Finnish Lapland (Siitonen 1984); with high altitude Tipulidae in Switzerland (Dufour 1992); and with Eurasian tundra species (Lantzov & Chernov 1987). See **Table 1**.

Tipulidae

Prionocera serricornis Zetterstedt, 1838
No adults were found in 1992, but a single 3rd or 4th instar *Prionocera* larva, probably belonging to this species, was collected from a clump of moss together with several *Phalacrocera replicata* larvae (see below). *Prionocera serricornis* is one of the earliest species on the wing; the specimens taken by Hofsvang (1974) were collected between 19 June and 5 July. It was not found at Dovrefjell nor along the Atna River, however, it might occur in other alpine fens in the mountains of Norway. It was collected at Abisko, Sweden and Inari, Finland but not in the Swiss Alps. This species seems to be more typical of a wet arctic tundra than alpine tundra (Brodo 1987) and is very abundant in the Eurasian true arctic tundra (Lantzov 1987).

Tipula (Savtshenkia) alpium Bergroth, 1888
The only records at Finse are from 6 September, 1964 (Tjeder 1965). It was not found at Dovrefjell. Hofsvang et al. (1993) collected it earlier in the season (28 May-3 July as well as 3-28 July) at lower elevations in spruce forest at Naustdal. Tjeder (1978) recorded it at Abisko, Sweden, 17 July, and I also collected this species at Abisko, in early September, in a wet subalpine area. The larvae live in terrestrial moss (Brindle 1950). It is very widespread in Europe, extending into the deciduous forest region of Germany (Brinkmann 1991) and considered to be primarily a subalpine species in Switzerland (Dufour 1992). It is probably rare in the higher alpine zone of Finse.

Tipula (Savshenkia) grisescens Zetterstedt, 1851
Four ♂♂ & 6 ♀♀ were collected in wet meadows in 1992. This species was not as common as *T. subnodicornis*. Hofsvang (1974) recorded it from 19 June to 27 July from Finse. At Dovrefjell only 2 ♂♂ were found in June, in the lower subalpine zone (Hofsvang et al. 1987). This species was collected at Naustdal (spruce woods) between 28 May and 3 July (Hofsvang et al., 1993), and at lower altitudes in the Bergen area in early to mid May (Tjeder 1965). *Tipula grisescens* has a boreoalpine disjunct distribution (Hofsvang et al. 1987). It is known from both Swedish (Tjeder 1978) and Finnish Lapland (Siitonen 1984) and extends east to the Altai and Krasnoyarskiy kray (Oosterbroek & Theowald 1992). Lantzov & Chernov (1987) consider this species to be primarily boreal although it does extend into the southern (arctic) tundra zone. It occurs as a subalpine disjunct in the Swiss Alps (Dufour 1992), associated with streams or wet habitats.

Tipula (Savtshenkia) invenusta Riedel, 1919
This is another late-flying species, not collected in 1992, but abundantly found by Hofsvang (1974) in Finse and at Dovrefjell (Hofsvang et al. 1987). I collected it at Abisko, Sweden, in late August and early September. It is not recorded from Inari, Finland and is not found in the Swiss Alps. This species has primarily a northern, boreoalpine distribution, extending from Scotland to Kamchatka (Oosterbroek & Theowald 1992), and just penetrates into the southern (arctic) tundra zone (Lantzov 1987).

Tipula (Savtshenkia) limbata Zetterstedt, 1838
The only record of this species occurring at Finse is a specimen in the Zoological Museum, University of Bergen (Hofsvang 1974). Tjeder (1965) reports it in Norway from On: Lom, 9 September 1960. It is probably the latest species on the wing at Finse; it was collected as late as October at Dovrefjell

(Hofsvang et al. 1987). This species was trapped in record numbers (164), from 31 August to 28 September in the spruce forest area at Nordmoen (Hofsvang et al. 1993). It is very common in both Abisko, Sweden (Tjeder, 1978) and Inari, Finland (Siitonen 1984), and is found primarily in the upper montane zone in the Alps (Dufour 1962). This is a boreoalpine species of the mountains of mid- Europe and extends across Russia to Kamchatka.

Tipula (Savtshenkia) rufina Meigen, 1818
A single specimen from Finse is in Bergen (Hofsvang 1974); it was not found at Dovrefjell. Tjeder (1965) recorded six specimens from western Norway. Finse is probably close to the northernmost limit of the distribution of *rufina*; according to Oosterbroek & Theowald (1992), this species does not extend into northern Fennoscandia. The larvae feed in terrestrial, semiaquatic and aquatic mosses (Brindle 1950).

Tipula (Savtshenkia) subnodicornis Zetterstedt, 1838
This was common in Finse in 1992; 20 ♂♂ & 2 ♀♀ were collected in wet meadows. According to Hofsvang (1974) this species is one of the first to fly after snow melt and can be found as early as mid May at lower altitudes (Tjeder 1965). It was found in Dovrefjell (Hofsvang et al. 1978) and at lower elevations in three localities in spruce woods from late May to early July (Hofsvang et al. 1993). It occurs in both Swedish (Tjeder 1978) and Finnish Lapland (Siitonen 1984), and is considered to be a subalpine species in the Swiss Alps where it is incapable of flight despite having full-sized wings (Dufour 1992). All the specimens at Finse were caught on the wing which would lead one to suspect that there is evidence of subspeciation here. This is a predominantly boreoalpine species but its distribution extends southward into the deciduous forests of the Ukraine and southern Russia (Oosterbroek & Theowald 1992) and northward into the southern (arctic) tundra zone (Lantzov & Chernov 1987). The larvae occur in semi-aquatic and aquatic mosses such as *Sphagnum* and *Hypnum* (Brindle 1950).

Tipula (Vestiplex) excisa Schummel, 1833
This is a common species at Finse, abundantly collected by both myself and Hofsvang (1974) in Finse, and at Dovrefjell (Hofsvang et al. 1987). In contrast to the other species collected at Finse, this species was more abundant in the drier habitats where the soil is moist but not water-logged. Hofsvang et al. (1993) collected single specimens at two spruce forest localities and at two pine forests localities, between late June and early August. This is a very widespread boreoalpine to deciduous forest species which is found across middle and northern Europe and extends north to Novaya Zemlya and east to the Kuril Islands (Oosterbroek & Theowald 1992). It occurs abundantly in Swedish and Finnish Lapland and is classified as an alpine species in Switzerland (Dufour 1992).

Cylindrotomidae

* *Phalacrocera replicata* (Linnaeus, 1758)
This represents a new species (and family) for the crane fly fauna of Finse. (An unidentified larva of this species, collected at Finse (23 Aug. 1969), was in the collection at Bergen.

Phalacrocera replicata was emerging in great numbers (17-19 July 1992) but apparently only from, and remaining very close to, one small shallow pond no more than 2 m across, near Lake Finsevatn. Several copulating pairs were seen on the water surface on July 17th. Most matings took place free from contact with either *Carex* stems or the moss clumps (mixtures of *Calliergon stramineum*, *Warnstorpia fluitans*, *Polytrichum*, and *Scapania* sp.) which sheltered and provided nourishment for the larvae. By July 18th and

19th there were many more copulating pairs and most of them were surrounded and jostled by as many as six, apparently competing, males. Very teneral females were usually found mating next to their pupal skins. It is likely that the females emit a potent pheromone attracting these males.

In copula, the sexes usually face opposite directions, both sexes with legs astride on the water surface, balancing themselves on their tarsal segments, but with the 5th tarsomeres and claws slightly raised. To get to this position, the male comes alongside the female, bends up his hypopygium about 180° and inserts it from below so that the female cerci remain above. The male then swings around on the horizontal plane, usually, but not always, until he is facing the opposite direction to the female, and in so doing his abdomen becomes longitudinally twisted 180°. This twist is evident as far as the third or fourth abdominal segment.

Lone females were observed walking on the water surface, stopping sporadically and dipping their ovipositors into the water, perhaps releasing eggs with each dip.

Numerous late instar larvae were collected from the moss clumps at the edge of this small pool. The larvae were dark, dull, olive green with long protuberances, blending perfectly with the moss. A berlese sample produced a single first instar larva indicating that hatching takes place rather quickly.

The pupa are also dull greenish coloured and have a characteristic pair of dorsal hooks distally with which they hang upside down on *Carex* stems or in moss clumps.

Phalacrocera replicata has a scattered distribution throughout most of Europe and eastern Russia (Soós & Oosterbroek 1992). It is also found in eastern North America where, just as in the Palaearctic, it is not a common species but can often be locally very abundant (Brodo 1967).

Limoniidae

Pediciinae. Only one species belonging to this subfamily had been recorded by Hofsvang (1974). All the species collected in 1992 are probably fully aquatic and predatory and therefore would not be found in as large numbers as the herbivorous species. Except for *Pedicia rivosa*, the following species were not distinguished in the field. They were all collected in the water soaked areas but not over open bodies of water.

* *Dicranota (D.) bimaculata* (Schummel) 1829
Two ♂♂ were collected at Finse. It was not very abundant in the sub and low alpine regions of Dovrefjell or along the Atna River where it was only found at lower altitudes, and it was also somewhat rare in the deciduous lowland of northern Germany (Brinkmann 1991). It has a broad distribution, however, extending across European Russia and south to North Africa, possibly Morocco.

Dicranota (D.) guerini Zetterstedt 1838
This was the only pediciine recorded by Hofsvang (1974) from Finse, in grassland habitats and among pioneer plant communities on glacial moraines. In 1992, 2 ♂♂ & 3 ♀♀ were collected in wetter habitats, among *Eriophorum* and *Carex*. At Dovrefjell *guerini* occurred in the mid and lower alpine and along the Atna River this species was common in the subalpine zone but also extended into the alpine and boreal-coniferous zones. This species shows primarily a boreoalpine distribution with populations in the Nordic countries, the Alps, European Russia and disjunct eastern populations in Chukotka, Kamchatka & Sakhalin and south in Mongolia. Lantzov & Chernov (1987) note that it extends into the southern (arctic) tundra zone.

* *Dicranota (Rhaphidolabis) exclusa* (Walker) 1848
Five ♂♂ & 2 ♀♀ were collected at Finse in the wetter areas among *Carex* and *Eriophorum*. It was more common in the subalpine zones at Dovrefjell and at Atna but was also found in the alpine and boreal-coniferous regions. This is a broad ranging species, extending from Ireland in the west to Kamchatka and the Kuril Islands to the east and northward into the southern (arctic) tundra (Lantzov & Chernov (1987).

* *Pedicia (P.) rivosa* (Linnaeus) 1758
Three males were collected in a terraced seepage area on hillside above the research station. One was teneral; apparently this species was just starting to emerge. Because of its large size and striking wing venation it is easy to see and net, however, like many tipuloids, is probably under represented in traps and therefore may have been missed at Dovrefjell and Atna. However, Jensen (personal communication) has caught this species in malaise traps set in boggy areas in southern Norway. This is a broad ranging species, found in northern Europe and extending into the Alps, Pyrenees and probably as far east as the Altai. It also occurs in the deciduous woods of northern Germany (Brinkman, 1991).

* *Tricyphona (T.) immaculata* (Meigen) 1804
Two specimens (♂ & ♀) were collected at Finse in 1992. This is another very broad-ranging species with a distribution that includes most of northern and central Europe (Brinkman (1991) recorded it from deciduous woods in northern Germany), and Russia, including Novaya Zemlya, and apparently a disjunction to Lebanon. This species is more characteristic of the sub and low alpine and boreal-coniferous regions although it does extend into the southern (arctic) tundra (Lantzov & Chernov 1987).

Hexatominae

Phyllolabis macroura (Siebke) 1863
Collected 9-10 August by Hofsvang (1974) but not collected in 1992, probably because of its later flight period. This is an autumnal, terrestrial species which is more common in the alpine zone. It has a boreoalpine disjunction, being found in Fennoscandia, the Alps and in northeastern Russia, but does not extend into central Europe.

Euphylidorea meigenii (Verrall) 1887
Listed as *Limnophila (Phylidorea) meigeni* Verrall (Hofsvang 1974). In 1992, 10 ♂♂ & 3 ♀♀ were collected in quite a variety of habitats varying from moist to quite wet areas. This is a carnivorous species, characteristic of peaty soils (Brindle 1958). Its distribution shows a boreoalpine disjunction, with populations in Great Britain and a few central European countries. It was not found at either Dovrefjell nor Atna.

* *Neolimnomyia (Brachylimnophila) nemoralis* (Meigen) 1818
A single ♂ was collected at Finse. At Dovrefjell and along the Atna River it was collected in the subalpine and boreal-coniferous region, and it was recorded in deciduous woodland in Germany (Brinkman 1991). This species is very widespread throughout most of Europe and Russia, extending east to the Kuril Islands and with an outlying population in Morocco.

* *Phylidorea (P.) squalens* (Zetterstedt) 1838
Three ♂♂ were caught at Finse. At Dovrefjell and Atna this was a relatively rare species, not extending higher than the low alpine. This species has a more restricted boreoalpine distribution with populations in the Nordic countries, the Alps and in western Russia and the Ukraine. Larvae live in marshy soils but need to migrate to drier soils prior to pupation (Brindle 1967).

Eriopterinae

* *Ormosia (O.) fascipennis* (Zetterstedt) 1838
Two ♂♂ a ♀ were collected in an inundated *Eriophorum*, *Carex*,
Sphagnum area. It was collected primarily in the subalpine zone along the Atna River and in the sub and low alpine at Dovrefjell. The larvae live in marsh soil (Brindle 1967). This is a widespread species, found across northern and central Europe and Russia, extending east to the Kuril Islands, south into North Korea and Japan and also occurs in North America.

ANALYSIS AND CONCLUSIONS

Specimens collected at Finse were strikingly darker than those in the collection in Helsinki with which they were compared. All of the latter were collected at much lower altitudes. High arctic crane flies are similarly darker than their more southern conspecifics (Brodo 1990) and darker specimens may also be characteristic of the high alpine. Dufour (1992), however, did not observe increased melanism in Swiss alpine species although he did note that alpine species in general tend to be dark brown or dark grey. Increased melanin allows for greater heat absorption and would allow darker insects to be physiologically more active at lower temperatures. Insects at high altitudes as well as high latitudes experience lower temperatures, greater wind chill and are generally more exposed because of meagre plant cover.

It is difficult to compare the various localities, listed on Table I, with that at Finse because of differences in size, altitude, variation in topography, moisture, bedrock, and other variables as well as differences in intensity of collecting. Also different criteria are used to designate the various subregions. The Finse region is probably comparable to the low and mid arctic regions of Dovrefjell and to the alpine regions as identified along the Atna River. These other regions are larger and more diverse and this partly explains the smaller number of crane flies collected at Finse. Yet some of the differences in distribution are hard to explain. *Tipula grisescens* is relatively common at Finse but at Dovrefjell was only found at lower altitudes in the subalpine zone. *Prionocera serricornis* and *Tipula alpium* were not collected at Dovrefjell but would be expected to occur there. The distribution of *Tipula salicetorum* and its well-documented absence from Finse (Hofsvang 1984), may be due to the lack of suitable muddy substrates in fast-flowing, shallow streams in the immediate neighbourhood of Finse, or may be the result of some barrier (possibly time) to migration.

The Atna River region with 48 Limoniidae (compared with 10 at Finse) is much larger, more variable and includes a greater altitudinal gradient than either Dovrefjell or Finse. One would expect a more varied fauna. The striking absence of *Pedicia rivosa* and *Euphylidorea meigenii*, the latter quite common at Finse, might be due to collecting methods. Having made extensive use of a wide variety of traps in the Canadian Arctic and elsewhere, I concur with Brinkmann (1991) that hand netting is still the most effective for inventorying crane flies.

The concentration of the subgenus *Savtshenkia* is striking, six out of eight. Presumably all these species live in aquatic and semiaquatic mosses, a particularly rich and varied habitat at Finse.

Also striking is the scarcity of typical arctic species. The only species with clear arctic affinities is *Prionocera serricornis*. The other four arctic *Prionocera's* do not occur here. The subgenus *Arctotipula* is completely lacking, as are typical arctic species such as *Tipula* (Pterelachisus) *carinifrons* Holmgren, *Tipula* (Vestiplex) *arctica* Curtis, and *Dactylolabis novaezemblae* Alexander.

The subfamily Limoniinae is entirely absent at Finse, and, incidentally, is also not repre-

sented in the Canadian Arctic Islands (Brodo 1990). This group may be more characteristic of lower altitudes and lower latitudes.

Two of the 19 species at Finse also occur in eastern North America, *Phalacrocera replicata* and *Ormosia fascipennis*. Their presence on both continents probably represents a Tertiary connection. The arctic species, *Prionocera serricornis*, has a very closely related sister species in North America (*P. ominosa* (Alexander)), probably the result of speciation in different refugia during the Pleistocene (Brodo 1990).

Except for *P. serricornis*, the other 18 crane flies of this high montane region have very widespread distributions in northern and middle Europe, extending into higher altitudes in the mountainous areas of Northern Europe and in the Alps. Rather than there being a distinctive high altitude or high latitude fauna at Finse, the species here seem to be a subset of ecologically tolerant and vagile species (those more able to move away from larval site and recolonize new areas). The Finse crane flies fall into two main groups: those with larvae in semi-aquatic or aquatic moss and those with carnivorous larvae but also found in aquatic or semi-aquatic habitats. The only terrestrial species are *Tipula vestiplex*, *Tipula alpium* and *Phyllolabis macroura*. The former lays its eggs relatively deeply into the ground thus protecting them and the larvae from desiccation. The latter two are rare at Finse. Some species (i.e., *Tricyphona immaculata* and *Dicranota bimaculata*), may have two generations further south (Brinkmann 1991) and only one at Finse, or may even take more than a year to complete a life cycle at Finse (Hofsvang 1972).

Perhaps there is also a stochastic factor which operates upon the distribution of species at Finse and at other high altitude regions in the mountains of Norway. Species extend and contract their ranges over time for many reasons. Local populations may become extinct temporarily and others, possibly for edaphic reasons or lessening of competition, may be able to extend their ranges.

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Insect fauna compared between six polypore species in a southern Norwegian spruce forest

Bjørn Økland

Økland, B. 1995. Insect fauna compared between six polypore species in a southern Norwegian spruce forest. - Fauna norv. Ser. B 42: 21-26.

Beetles and gall midges were reared from dead fruiting bodies of the polypore species *Phellinus tremulae*, *Piptoporus betulinus*, *Fomitopsis pinicola*, *Pycnoporus cinnabarinus*, *Fomes fomentarius* and *Inonotus radiatus*. The number of species differed significantly among the polypore species. The variation in species richness conformed well with the hypothesis that more insect species may utilize a fungi species with (1) increasing durational stability, and (2) increasing softness of the carpophores. Strong preferance for certain polypore species was indicated for most of the Cisidae species, and a few species in the other families of beetles and gall midges (Diptera). The host preferances of the Cisidae species were in good agreement with records from other parts of Scandinavia. The host records in two of the gall midge species are new. Many of the species were too low-frequent for an evaluation of host preferances.

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INTRODUCTION

A large number of mycetophagous insects utilize fruiting bodies of wood-rotting fungi as food and breeding sites (Gilberston 1984). The species breeding in Polyporaceae display varying degree of host specificity. Apparently, few species inhabit only one fungus species (Lawrence 1973). Several hypothesis have been suggested to explain the differences between fungi species in species richness and composition of inhabitants, e.g. differences in (1) the durational stability of the fruiting bodies (Hanski 1989), (2) the hyphal structure of the fruiting bodies (Paviour-Smith 1960), (3) the hardness of the fruiting bodies (Klopfenstein and Graves 1989), and (4) differences between the insect species in mouth morphology and feeding strategy (Lawrence 1989). In light of these hypothesis, the present study compares the fauna of beetles and gall midges reared from the fruiting bodies of six common Polyporaceae species: *Fomitopsis pinicola* (Fr.) Karst., *Fomes fomentarius* (Fr.) Kickx, *Piptoporus betulinus* (Fr.) Karst., *Phellinus tremulae* (Bond.) Bond.& Borisov, *Pycnoporus cinnabarinus* (Fr.) Karst. and *Inonotus radiatus* (Fr.) Karst. All six species form sporocarps of a bracket type, and are associated with different ranges of tree species (Ryvarden 1976). The study was restricted to dead sporocarps, in order to avoid the influence of the differences between the successional stages of the sporocarps. An earlier study of *Fomitopsis pinicola* within the same area showed a significant faunistic difference between the successional stages of the sporocarps and the richest fauna in dead sporocarps (Økland & Hågvar 1994).

Studies of polypore fauna have been conducted in Scandinavia in recent time. Thunes (1993) has reared insects from *Fomes fomentarius* and *Piptoporus betulinus* in the western part of Norway, including both beetles and gall midges. Midtgaard (1985) has reared moths of the families Tineidae and Oecophoridae from

most of the present polypore species. Outside Scandinavia, several authors have studied the insect fauna in the present six species of polypores (Benick 1952, Paviour-Smith 1960, Pielou 1966, Pielou & Verma 1968, Ackerman & Shenefelt 1973, Lawrence 1973, Nuss 1975, Klimaszewski & Peck 1987).

The main questions in the present study were: Does the species richness of beetles and gall midges differ significantly between the present polypore species, and what properties of the polypores may contribute to such differences? To what extent do single species show preferances for certain polypore species within the study area, and are the host preferances the same as found in other parts of Scandinavia?

STUDY AREA AND METHODS

The study was conducted in 1992 in the northern part of Østmarka Nature Reserve (12.5 km^2) east of Oslo in Norway (UTM: N 636100, E 148000). The reserve is dominated by old spruce forest (*Picea abies*) with scattered deciduous trees (mainly *Betula verrucosa*, *B. pubescens*, *Populus tremula*, *Salix caprea*, *Sorbus aucuparia*, *Alnus incana* and *Prunus padus*). The area has a generally high density of dead wood.

On 14 April 1992, 30 dead sporocarps were collected from each of the polypore species, except for *Pycnoporus cinnabarinus*, with only 13. Each sporocarp was placed in a plastic funnel closed with black textile on the top and a collecting vial with ethylene-glycol in the bottom. The rearing traps were placed in an outdoor cage house with a natural climate, and were operated until the beginning of September 1992. All adult beetles and gall midges were identified to species according to catalogs of Silfverberg (1979) and Skuhràva (1986). Kruskal Wallis non-parametric analysis of variance was applied to test the differences in species occurrences between the polypore species (Freund 1992).

RESULTS

Altogether, 30 species of beetles and 5 species of Cecidomyiidae were reared. The number of species varied significantly among the polypore species, and the largest number was found in *Piptoporus betulinus*, *Fomitopsis pinicola* and *Fomes fomentarius* (**Table 1**). The other polypore species harboured relatively few insect species.

Significant preferances for certain polypore species was indicated for most of the Cisidae species (**Table 1**). *Cis glabratus* was exlusively reared from *Fomitopsis pinicola*, and *Cis jacquemarti* from *Fomes fomentarius*. *Sulcacis affinis* showed preferance for *Pycnoporus cinnabarinus*, but was also reared from Piptoporus betulinus. *Cis quadridens* and *C. nitidus* were most common in *Piptoporus betulinus*, but these species were also found in *Fomitopsis pinicola* and *Fomes fomentarius*.

Species in the other beetle families were in most cases too low-numbered for evaluation of host preferances (**Table 1**). Exceptions were *Bolitophagus reticulatus* (Tenebrionidae) with a clear preferance for *Fomes fomentarius*, and *Leptusa fumida* (Staphylinidae) occuring most often in *Fomes fomentarius* and *Fomitopsis pinicola*.

Two species of Cecidomyiidae (Diptera) were frequent in the present study, and one of them, *Lestodiplosis polypori*, was significantly more numerous in *Fomitopsis pinicola*, *Fomes fomentarius* and *Piptoporus betulinus* (**Table 1**).

Table 1. *Number of insect adults reared from dead fruiting bodies of (A) Phellinus tremulae, (B) Fomitopsis pinicola, (C) Fomes fomentarius, (D) Piptoporus betulinus, (E) Pycnoporus cinnabarinus and (F) Inonotus radiatus. Difference between polypore species were tested with Kruskal-Wallis test (H) for all insect species exceeding a mean of four individuals pr. polypore species. Significance levels: *** p < 0.001, ** p < 0.01. * p < 0.05, and n.s. if p > 0.05.*

Polypore species:	A	B	C	D	E	F	H	sign.
name:	Ph.trem.	Fom.pin.	Fom.fom.	Pip.bet.	Pyc.cin.	In.rad.		
life cycle:	perennial	perennial	perennial	annual	annual	annual		
context:	very hard	hard	hard	soft	soft	soft		
Cisidae:								
Cis boleti	0	0	0	43	0	0	4,25	n.s.
Cis glabratus	0	219	0	0	0	0	113,86	***
Cis jacquemarti	0	0	283	0	0	0	133,69	***
Cis nitidus	0	3	5	119	0	0	15,42	***
Cis quadridens	0	12	0	86	0	0	22,09	***
Cis dentatus	0	0	1	0	0	0		
Enearthron cornutum	0	0	0	8	0	0		
Octotemnus glabriculus	0	0	0	2	0	0		
Sulcacis affinis	0	0	0	14	173	0	83,18	***
Staphylinidae:								
Agariochara latissima	0	0	0	1	0	0		
Amischa decipiens	0	0	0	1	0	0		
Amischa nigrofusca	0	0	0	1	0	0		
Dinaraea arcana	0	0	1	0	0	0		
Euplectus decipiens	0	0	1	0	0	0		
Ischnoglossa prolixa	0	0	3	0	0	0		
Leptusa fumida	4	9	15	1	0	0	17,68	**
Megarthrus sinuatocollis	0	0	0	1	0	0		
Pachygluta ruficollis	0	1	0	0	0	0		
Proteinus macropterus	0	0	0	1	0	0		
Quedius plagiatus	0	1	0	0	0	0		
Other beetle families:								
Abdera flexuosa	0	0	0	0	0	4		
Anaspis rufilabris	0	0	0	2	0	0		
Atomaria alpina	0	1	0	0	0	0		
Bolitophagus reticulatus	0	0	26	0	0	0	22,72	***
Cortinicara linearis	0	1	0	0	0	0		
Dinerella elongata	0	0	5	0	0	0		
Dorcatoma dresdensis	0	3	1	0	0	2		
Ips typographus	1	0	0	0	0	0		
Rhizophagus dispar	0	3	2	2	0	1		
Thymalus limbatus	0	0	0	1	0	0		
Cecidomyiidae:								
Winnertzia nigripennis	0	46	19	0	0	0	10,15	ns
Lestodiplosis polypori	0	30	44	19	1	0	26,22	***
Excrescentia mutuata	0	0	9	0	0	0		
Corinthomyia brevicornis	0	6	1	0	0	0		
Aprionus sp.	0	3	0	0	0	0		
Number of species	2	14	15	16	2	3	75,05	***

DISCUSSION

A combination of two hypothesis conforms well with the distribution of species richness recorded in the six polypore species: (1) Increasing durational stability makes the fruiting bodies suitable for more species, and (2) increasing softness implies that more species may utilize the fruiting bodies. The durational stability of the sporophores is of obvious significance to the insect fauna in fungi (Hanski 1989). The polypores have generally higher durational stability compared to the gilled mushrooms (Richardson 1970). The present study comprises both annual and perennial species of polypores. However, for the present fauna the duration of the fruiting bodies after death must be a more important factor than the duration of the living stage. The largest number of species was reared from an annual polypore species, *Piptoporus betulinus*, which has long been known to harbour a fairly rich insect fauna (Pielou 1966, Pielou & Verma 1968). The fruiting bodies of this species may be quite big. Even though this species is annual, the dead fruiting bodies may persist up to three years (Gilbertson 1984). In moist condition, these fruiting bodies are quite soft and comparable to Agaricales. The softness is supposed to increase the access and success of development for several insect species compared to harder polypore species (Klopfenstein & Graves 1989). At the same time, these fruiting bodies are more long-lasting than in Agaricales. The few species reared from the very hard fruiting bodies of *Phellinus tremulae* conforms well with the factor of hardness. However, few species were also reared from the soft fruiting bodies of *Pycnoporus cinnabarinus* and *Inonotus radiatus*. The durational stability of carpophores in these species appears to be shorter than in *P. betulinus*, since their carpophores are relatively small and may be eaten up within short time.

From England and North America the species of Cisidae have been described to occur in "host preferance groups", in which certain species of Cisidae are associated with certain polypore species (Paviour-Smith 1960, Lawrence 1973). The present results correspond well with such a model. Most Cisidae species showed strong preferances for certain polypore species. *Cis glabratus* and *Cis jacquemarti* occurred only in hard and perennial polypores, while most other species of Cisidae were more numerous in soft and annual polypore species. The host preferances of the three most numerous species, *Cis glabratus* , *Cis jacquemarti* and *Sulcacis affinis*, were the same as recorded in the western part of Norway (Thunes 1993) and in different parts of Sweden (Bengt Ehnström & Mats Jonsell pers. comm.). A closer examination of each insect species might reveal differences in mouth morphology and feeding strategy which are correlated with the hyphal structure and hardness of their host fungi species.

The model of "host preferance groups" may apply to other insects than Cisidae, like e.g. certain species in Cecidomyiidae and other families of Coleoptera. *Bolitophagus reticulatus* was numerous and exclusively found in *Piptoporus betulinus*, similar to what has been recorded by other researchers (Thunes 1993, Ehnström pers. comm.). *Leptusa fumida* was most numerous in *Fomes fomentarius* from Østmarka; however, this species was most numerous in *Piptoporus betulinus* in a study from western Norway (Thunes 1993). A final statement about such differences is avoided due to the low number of fruiting bodies applied in the present study.

For the low-frequent species, the present results are not sufficient for any conclusion about host preferences. The adults of many Staphylinidae species are known to be polyphagous and occur in a wide range of short-lived fungal habitats, while their larvae often show a more narrow host range (Newton 1984). Trapcaptures from *Fomitopsis pinicola*

indicated that a long list of Staphylinidae species may visit the fruiting bodies without breeding here (Økland & Hågvar 1994). Many of the species reared in low numbers are supposed to have their optima in some other habitats, while they may sporadically occur in the present polypore species. E.g. one individual of *Ips typographus* was reared from *Phellinus tremulae*, while it is well documented that *I. typographus* normally hibernates under the bark of dead spruces or in the forest litter (Biermann 1977). However, it cannot be excluded that many species possess clear preferances among the present species of polypores, even though they occurred in low numbers.

Gall midges of fungi are not well studied. *Excrescentia mutuata* Mamaev and Berest was described from the Carpathiens in 1991 (Mamaev & Berest 1991). From the present material the host and the female of this species are described for the first time (Økland 1995). The present host records are probably new for *Corinthomyia brevicornis* (Felt 1907), while the species *Winertzia nigripennis* Kieffer 1896 and *Lestodiplosis polypori* (Loew 1850) have already been recorded from various species of polypores.

From a management perspective, it should be noticed that the presence of dead deciduous trees is essential for five of the present polypore species: *F. fomentarius*, *P. betulinus*, *P. tremulae*, *P. cinnabarinus* and *I. radiatus*. Birch (*Betula* sp.) appears to be a "key species" (Hunter 1990) for the present fauna, since birch is the main host for three of the most species-rich polypore species: *F. fomentarius*, *P. betulinus*, *P. cinnabarinus*.

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SAMMENDRAG

Insektfauna sammenlignet mellom 6 kjukearter i en sørnorsk granskog

Biller og gallemygg ble klekket fra døde fruktlegemer av kjukeartene *Phellinus tremulae*, *Piptoporus betulinus*, *Fomitopsis pinicola*, *Pycnoporus cinnabarinus*, *Fomes fomentarius* and *Inonotus radiatus*. Det var signifikant variasjon i artsantall mellom kjukeartene. Variasjonen i artsantall samsvarte bra med hypotesene om at flere insektarter kan utnytte en soppart ved (1) økende varighet, og (2) økende mykhet av kjukefruktlegemene. Sterk verstspreferanse ble funnet hos de fleste Cisidae artene og hos visse arter blant de øvrige billene og gallemyggene. Vertspreferansen hos Cisidae artene samsvarer med registreringer fra andre steder i Skandinavia. For to av gallemyggartene er vertsbeskrivelsene nye. Mange av artene var for lavfrekvente for en vurdering av vertspreferanse.

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Description of the female and the breeding habitat of *Excrescentia mutuata* Mamaev and Berest (Diptera: Cecidomyiidae)

Bjørn Økland

Økland, B. 1995. Description of the female and the breeding habitat of *Excrescentia mutuata* Mamaev and Berest (Diptera: Cecidomyiidae). - Fauna norv. Ser. B 42: 27-30.

The female and the breeding habitat of *Excrescentia mutuata* is described for the first time, based on three females and six males reared from dead fruiting bodies of the fungus *Fomes fomentarius* on birches in Østmarka nature reserve, near Oslo in Norway. This genus and species was described by Mamaev and Berest in 1991, based on 4 males collected by netting in the Carpathiens.

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INTRODUCTION

The family gall midges (Cecidomyiidae) comprises different groups of insects, including species-rich groups which do not make galls, but develop in different types of fungi, dead wood, litter and soil. Many of these groups are poorly studied, and still much is unknown about their taxonomy and biology.

Excrescentia mutuata was described as a new genus and a new species for only few years ago (Mamaev & Berest 1991). The description was based on four males collected by netting in the Carpathiens (Ukraine). So far the biology of this species has been unknown. The genus *Excrescentia* Mamaev and Berest belongs to the tribe Micromyini, which was revised in North America by Pritchard (1947) and in Europe by Kleesattel (1979).

The present article gives a description of the female and the larval habitat of this species.

METHODS

Gall midges were reared from dead fruiting bodies of six common polypore species within Østmarka Nature Reserve (12.5 km^2) east of Oslo in Norway (UTM: N 636100, E 148000). The polypore species were *Fomitopsis pinicola* (Fr.) Karst., *Fomes fomentarius* (Fr.) Kickx, *Piptoporus betulinus* (Fr.) Karst., *Phellinus tremulae* (Bond.) Bond. & Borisov, *Pycnoporus cinnabarinus* (Fr.) Karst. and *Inonotus radiatus* (Fr.) Karst. On 14 April 1992, 30 dead sporocarps were collected from each of the polypore species, except for *Pycnoporus cinnabarinus*, with only 13. Each sporocarp was placed in a plastic funnel closed with black textile on the top and a collecting vial with ethylene-glycol in the bottom. The rearing traps were placed in an outdoor cage house with a natural climate, and were operated until the beginning of September 1992. Reared adults were prepared in canada balsam and identified under microscope.

RESULTS

Excrescentia mutuata was reared with 6 males and 3 females from dead fruiting bodies of only one of the polypore species, *Fomes fomentarius*.

The males corresponded well with the description given by Mamaev & Berest (1991). The following description is proposed for the female of *Excrescentia mutuata*:

Head: Rounded, with a well developed eye-bridge, 3-4 facets. Antennae with 2 + 12 segments; their length 0.52-0.58 mm. Basal segments globular and of about equal size (43 µm). The basal thickening of antennal segments oval, gradually narrowing into a short stem partly covered under the preceding segments (**Figure 1a**). First flagellar segment a bit longer and more oval than the preceding segments (basal thickening 73 µm and stem 7 µm). Length of flagellar segments decreasing towards the tip (basal thickening and stem of segment 2: 60/6 µm, 5: 58/5 µm, 8: 52/4 µm, 10: 42/2 µm, 11: 36/2 µm). The last antennal segment small and almost fused with the preceding segment. All antennal segments with a basal whorl of strong hairs with lenghts up to 90 µm. Strong hairs also found in the middle part, but not in a regular whorl. Most antennal segments with a well developed collar-shaped sensoria (**Figure 1a**). Both basal and distal margins of sensoria are not attached to the antennal segment. Sensorial pores scattered under the whole area of the sensoria, most densely in the basal half (may be difficult to see). Palps with four segments; their lenghts in preceding order 45 µm, 35-45 µm, 35-45 µm, and 55-65 µm. Palpal segment with 6-12 strong hairs, and some blunt and scale-like bristles.

Thorax: Light brown with dark brown mesonotum; slightly longer than high. Mesonotum convex with black bristles.

Wings: Lenght 1.9-2.1 mm and width 0.8-0.9 mm. All present veins relatively strong, except for a weak medial vein. Costa reaching far beyond the end of R5. M_{1+2} simple; gradually weaker and disappearing in the distal part of the wing. SubCosta ending free, slightly before Rs. M_{3+4} and Cu_1 forming a fork; M_{3+4} weaker in the distal part, but almost reaching the wing margin; Cu_1 ends long before the wing margin.

Legs: Long legs (reaching beyond the end of terminalia). Femur and tibia of equal length; hind femur slightly longer than tibia. The first tarsal segment about twice the length of the second segment; the preceding segments decreasing in length. Tarsal segments with hairs, but without scales. Tarsal clows forming wide bows, with 2-3 denticulations in the middle part of the tarsal claws; empodium small and thin (**Figure 1b**).

Abdomen: Length of abdomen more than two times the length of thorax. Ovipositor of telescopic type. Terminalia with three segments; with two sclerotized spermatechae of about equal size; ovipositor short; cerci bladelike and curved (**Figure 1c**). Body length (included the long terminalia) 2.1-2.3 mm.

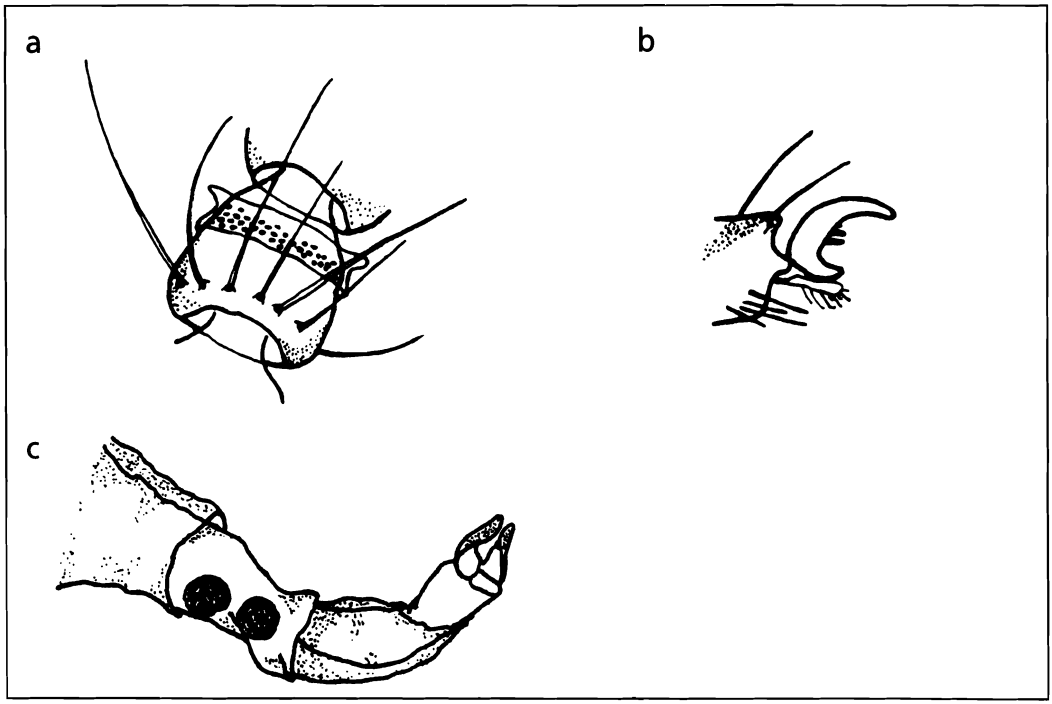

Figure 1
Excrescentia mututata *Mamaev and Berest; (A) flagellar segment of female; (B) tarsal claw of female; (C) terminalia of female.*

DISCUSSION

The characters of females and males in the present study are in good agreement with the descriptions of the males of *Excrescentia mutuata* from the Carpathiens. The genus may be clearly distinguished by the collar-shaped sensoria of female, with both basal and distal margins free from the antennal segment. Collar-shaped sensoria are also found in *Campylomyza* and *Micropteromyia* (Mamaev 1960), but these genera differ from *Excrescentia* in other characters. In *Campylomyza* the basal margin of the sensoria is attached to the antennal segment. *Micropteromyia* have antennae with only 2 + 8 segments and wingless females, while *Excrescentia* has 2 + 12 segments in the antennae and females with fully developed wings.

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SAMMENDRAG

Beskrivelse av hunn og klekkehabitat til *Excrescentia mutuata* Mamaev & Berest (Diptera: Cecidomyiidae)

Hunnen av *Excrescentia mutuata* og dens klekkehabitat er beskrevet for første gang, basert på tre hunner og tre hanner klekket fra døde fruktlegemer av knuskkjuke (*Fomes fomentarius*) på bjørk i Østmarka naturreservat, nær Oslo i Norge. Denne slekten og arten ble beskrevet av Mamaev og Berest i 1991,

basert på 4 hanner fanget med håv i Karpatene.

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Revisionary notes on Norwegian feather-wing beetles (Col. Ptiliidae)

Mikael Sörensson & Torstein Kvamme

Sörensson, M. & Kvamme, T. 1995. Revisionary notes on Norwegian feather-wing beetles (Col. Ptiliidae). - Fauna norv. Ser. B 42: 31-42.

Data are given on some new, rare, overlooked or in other ways noteable species of Norwegian Ptiliidae, including two species new to Norway, i.e. *Ptiliolum caledonicum* (Sharp) and *Acrotrichis henrici* (Matthews). All available material of Ptiliidae in museums and in private collections have been critically examined and identified. The result has been compared and correlated with old records in the literature, including "first mention" of individual species in Norway. New and revised distributional data within the country based on reexamined material are forwarded, as well as comments on habitat choice and conservancy.

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INTRODUCTION

The family Ptiliidae - Feather-wing beetles - are among the smallest known insects. The median length ranges between 0.5 and 1.0 mm. Their small size, the scarce literature on the group and the difficulties in many cases to identify them correctly have caused their relative unattractiveness among collectors. Thus, in most museums over the world, including the Norwegian ones, the family is rather poorly represented.

In Norway three coleopterists in particular have paid the ptilids attention. Thomas Munster collected them frequently during the early part of this century, and he was followed by Andreas Strand, who also described some new species, i.e. *Ptilium nanum* (= *Oligella nana*) (Strand 1946), *Pteryx splendens* (Strand 1960b), *Acrotrichis norvegica* (Strand 1941) and *A. nana* (= *A. dispar* (Matthews)) (Strand 1946).

From ca 1950 unto his death in 1987 Eivind Sundt dedicated much of his work on beetles to the Ptiliidae, especially the genus *Acrotrichis* Motsch. He had a keen and critical eye for the difficult systematics within the group, and his initial efforts were crowned by the publication of a revision of the Fenno-Scandian *Acrotrichis* species (Sundt, 1958). There he distinguished four *novae species* besides revising some of the old concepts of other species. The treatment of the genus *Acrotrichis* in "Die Käfer Mitteleuropas" (Sundt, 1971) contained much new information which was the result of many years of efforts trying to clear up the nomenclatural confusion within the group. There he also described *Acrotrichis rosskotheni* as a new species.

The latest information published on the distribution of Ptiliidae within Norway dates back to 1960 (Lindroth 1960). The nomenclature in this catalogue is partially out of date and hence difficult to interpret. Strand (1970, 1977) published some additions to the catalogue, and he also incorporated important nomenclatural changes (probably via Sundt *in litteris*) and range changes for different species within the country. Catalogues only recording presence of species of Ptiliidae in Norway have been published later (Silfverberg, 1979; Lundberg, 1986; Silfverberg, 1992). However, these tell nothing of the distribution within the country. Since the information of the status of many Norwegian ptilid species is scattered in the literature and much additional knowledge on the group has been gathered lately, the need for a new and comprehensive source of information has grown. The revision of the material will be published in another context, but we find it appropriate to make some preliminary comments on some rare or otherwise interesting species, in order to update current knowledge and thereby facilitate for entomologists interested in the group.

The largest collections of Ptiliidae in Norway are found in the Zoological museum in Bergen (ZMB), where Andreas Strand's large collection of Norwegian beetles is preserved. The collection of Eivind Sundt is preserved at NISK in Ås and contains a large amount of Norwegian ptilid material as well. At the Zoological museum at Tøien, Oslo (ZMO) there is much old ptilid material preserved, including the main part of Thomas Munster's collection. Minor ptilid collections are present in Stavanger (ZMS), Trondheim (ZMTH) and Tromsø (ZMTØ).

Comments on current knowledge of distribution, faunistic history within Norway and ecological demands are presented below for some new, rare, overlooked or otherwise interesting Norwegian ptilid species. The first publication of finds for each species in Norway is given and it is correlated with existing specimens in the museums. All known Norwegian finds are presented and ordered according to the biogeographic system of Økland (1981) and transformed into the UTM-EIS grid system (cfr. Økland 1976). We would like to stress that no faunistic data taken from the literature have been included in this investigation, unless the original material was reexamined and identified. All the relevant data processed during the present investigation have been included in the entomological databank at NISK.

NOTES ON INDIVIDUAL SPECIES

Ptenidium turgidum Thomson, 1855. This tree inhabiting species was first recorded from Norway by Munster (1927) who found it in numbers in a rotten trunk of spruce(!) at Ø:Onsøy, Engelsvika (EIS 19) in June 1926. There are eleven specimens in ZMO and three in ZMB from that occasion. However, he was actually not the first one to find it since A. Strand collected two specimens at Ø:Moss, Jeløya (EIS 19) 2 May 1926, now preserved in ZMB. In the collection of ZMTH there is also a specimen from TEy:Kragerø, Skåtøy (EIS 11) collected by Lysholm. Date unknown.

In an earlier paper Sörensson (1988) stressed the ecological value of this species. It is a good indicator of old forests where it mainly occurs under loosened bark, in rotten wood and in hollow trees. It prefers old deciduous trees like beech (*Fagus sylvatica*) and oak (*Quercus robur*) but it is occasionally found in other tree species as well. From a nature conservancy view it plays an important role as an indicator species of threatened forest habitats (**Figure 1**).

Oligella foveolata (Allibert, 1844). The first Norwegian records were reported by Munster (1901) from AK:Bygdøy (EIS 28) and

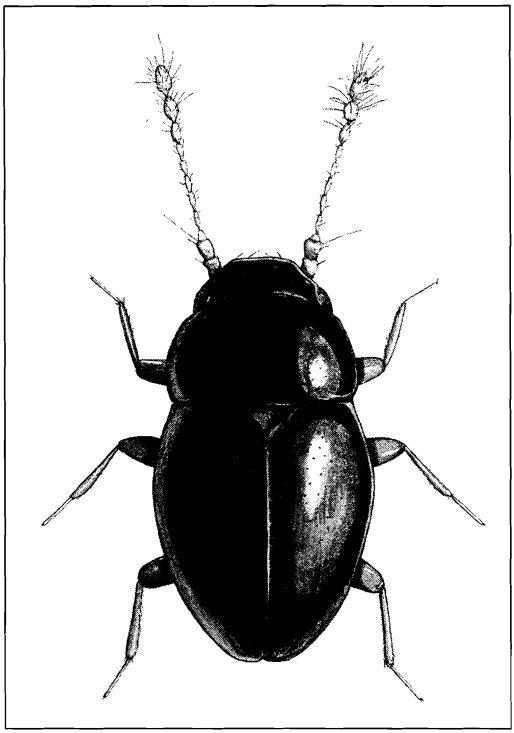

Figure 1
Ptenidium turgidum *Thomson, (Sweden: Halland). Length: 1 mm.*

AK:Nesodden (EIS 28) based on his own findings. In ZMO there are specimens representing these occasions besides a long row of specimens without labels collected by Munster, probably at Oslo. These are, however, not the oldest finds in Norway of *Oligella foveolata*.

It was actually first discovered by Moe who found it at AK:Oslo, Tøien (EIS 28) 29 July 1874. In ZMB there are 85 specimens preserved from this occasion. In the Strand-collection in ZMB there are specimens from AK:Asker, Brønnøya (EIS 28) 30 July 1948 leg. A. Strand (in flight) and AK:Oslo, Røa (EIS 28) taken in the early 50's by Strand. He also reported it from ON:Lom (EIS 70) (1960a) as taken by Sundt and himself in a compost heap 21 June 1958. In ZMB there are three specimens from this occasion. In ZMTH there are six specimens taken at Kristiania (= Oslo) (EIS 28) by Munster and in ZMS there are two specimens also labelled "Kristiania" and collected by Helliesen. In all 144 specimens were identified from AK 28 and ON 70.

Millidium minutissimum (Weber & Mohr, 1804). This easily recognized species was first reported from Norway by Munster (1901). He found it at BØ:Kongsberg (EIS 27; in ZMO & ZMTH) and at AK:Oslo, Bygdøy (EIS 28, in ZMO), and he also mentioned Lysholm's records from STI:Trondheim (EIS 92; in ZMTH).

However, the oldest record from Norway seems to be one specimen (in ZMB) taken by Moe at AK:Oslo, Tøien (EIS 28) though no date is given on the label. Strand (1970) reported specimens taken in TEY without specification of collecting site and date. He probably refered to one specimen in ZMB collected at TEY:Siljan (EIS 18) by A.Bakke.

In addition we now report one specimen in ZMS from RI:Ryfylke (EIS 14) leg. Helliesen (without date); one specimen in ZMO from AK:Oslo Bygdøy, Bukten, (EIS 28) leg. Munster 13 August 1931, and two specimens in ZMB from AK:Oslo, Røa (EIS 28) leg. A. Strand "in flight" (without date). In the collection of mr. F. Ødegaard there are five specimens from STI: Røros, Røros, Moan (EIS 81) 5 August 1989 leg. F. Ødegaard, "in grass heap" (cfr. *Baeocrara japonica* Matthews below).

M. minutissimum belongs to the mysterious group of dung-inhabiting insect species, which have declined all over its range in northern Europe during the last decades.

Ptilium horioni Rosskothen, 1934. The only reference in literature concerning Norwegian records of this species is by Strand (1937) who reported one specimen from AK:Asker, Brønnøya (EIS 28) leg. Strand 30 May 1935. It was correctly identified by the auctor.

Twenty additional specimens in coll. Strand (ZMB) are from AK:Asker, Brønnøya leg. A. Strand, collected during the period 1944–70. Almost all were found in hen droppings in June and August. Another five specimens from AK:Oslo, Røa (EIS 28) taken at different occasions by Strand during 1937-57 are present in ZMB. One of them was collected as early in the year as in May the 12th, "in flight".

In coll. Ødegaard there are three specimens from SFI:Luster, Nes (EIS 60) 11 August 1989 leg. F. Ødegaard, "in compost heap". *P. horioni* seems to be more restricted to woodland than is *Ptilium exaratum* (Allibert).

Ptilium modestum Wankowicz, 1869. Munster (1901) reported this species new to Scandinavia from three different collecting sites. It was found by him in ant hills of *Formica sp.* in company with *Ptilium myrmecophilum* (Allibert). Only two of these localities can be confirmed (Skoger and Gran). Since then nothing has been published about Norwegian records, and there are no recent records from Norway.

In ZMO there are five specimens from four specified localities in Norway, all lacking date: BØ:Kongsberg (EIS 27) leg. Munster (two specimens); BØ:Øvre Eiker, Nordre Eiker (EIS 27) leg. Munster (one sp.); BØ:Drammen, Skoger (EIS 28) leg. Munster (one sp.) and OS:Gran, Gran (EIS 36) leg. Munster (one sp.). In addition there are two specimens taken by Munster, both lacking date and locality. In ZMTH there is one specimen from BØ: Drammen (EIS 28) (leg. Munster?) as well.

A. Strand never succeeded in collecting this species himself, and all finds mentioned above were made during the last century, except for the Kongsberg-specimens. However, it is highly probable that directed collecting efforts in old hollow trees or in ant hills at suitable sites will reveal it as still being a member of the Norwegian fauna.

Euryptilium gillmeisteri (Flach, 1889). This species has only been reported once from Norway (Strand, 1937; as new to the country), and it is more than 30 years since it was last seen in Norway.

The Norwegian material is preserved in coll. A. Strand in ZMB and includes six specimens from AK:Asker Brønnøya (EIS 28) 5 May 1935 leg. A. Strand, "in rotten mushrooms" (cfr. Strand 1937); another eight specimens from the same site and collector, but without date; AK:Oslo, Bygdøy (EIS 28) 13 May 1959 leg. A. Strand (one specimen); AK:Oslo, Gaustad (EIS 28) 25 March 1934 leg. A.Strand (one sp.).

It is one of the rarest species of Ptiliidae in Europe. In Scandinavia it is otherwise known only from a few Danish sites. It seems to associate with old woodland of deciduous trees, where it may be found in rotting fungi and other kinds of decaying organic matter at tree bases.

Ptiliola brevicollis (Matthews, 1860). This is a rare species of large westpalearctic range. It seems to have been reported only twice from Norway (Strand 1970; Besuchet 1976), and without any details given.

In coll. A. Strand (ZMB) there is one specimen from AK:Oslo, Røa (EIS 28) 2 August 1960 leg A. Strand, "in window". This is probably the specimen Strand originally refered to, though without giving any details. Besuchet (1976), however, refers to *two* specimens collected at Røa by Strand. Thus, the second specimen may be deposited in a museum abroad.

In ZMB there are specimens from three additional collecting sites, the oldest being AK:Oslo, Tøien (EIS 28) where Moe found 16 specimens in 1890. Also Munster collected one specimen at AK:Oslo, Bygdøy (EIS 28), date unknown. The last record is from Ø:Halden, Fredrikshald 5 August 1907 leg. Tambs-Lyche (one specimen).

P. brevicollis especially occurs in decaying heaps of hay, in grass compost and in different kinds of manure.

Ptiliolum caledonicum (Sharp, 1871). This species is confined to old, rotting tree logs and stumps. In Scandinavia it is often found under aspen bark (*Populus tremula*), or by sifting mouldy aspen wood debris. Occasionally it is also found in other deciduous tree species, rarely in conifers. It is a good habitat indicator, currently included in threat category 4 in the Swedish Red List (Ehnström et al. 1993).

There are hitherto no official Norwegian records. We now report it from three different sites in Norway. The oldest record is one specimen in coll. Sundt (Ås) FØ:Sør-Varanger, Kirkenes (EIS 169) 13 August 1929 leg. A. Strand. The other two records are from Ø:Askim, Askim (EIS 29) 9 August 1984 leg. S. Ligaard (two specimens in coll. Ligaard) and MRI:Sunndal, Graven (EIS 79) 2-12 June 1986 leg. O. Hanssen, "window trap" (one specimen in coll. Hanssen).

Ptiliolum wuesthoffi Rosskothen, 1934. A. Strand (1967) reported the first Norwegian specimen from AK:Asker, Brønnøya (EIS 28) 25 June 1967 leg. A. Strand (coll. A. Strand ZMB), taken in pigeon manure. He considered it to be widely distributed and probably mixed up with *P. schwarzi* Flach. However, only one additional record is known to us, i.e. one specimen from BØ:Flesberg, Lyngdal BU (EIS 27) July 1923 leg. Munster (coll. ZMO).

It is a rather rare species, though widely distributed in northern and central Europe. Occasionally it can be found in numbers, but generally only single specimens are met with. It is not, like *P. schwarzi*, completely restricted to forests. It occurs in open habitats as well. A typical dung species, sometimes found in grass compost and alike too.

Ptiliolum spencei (Allibert, 1844). First reported by Munster (1901) from BØ:Kongsberg, Kongsberg (EIS 27; four specimens in ZMO without date and collector but evidently taken by Munster), and from AK:Oslo, Bygdøy (EIS 28; three specimens in ZMO without date and collector but also evidently taken by Munster). This is the only mention of this rather common European species in the Norwegian literature.

Two additional specimens from AK:Oslo, Røa (EIS 28) 19 July 1961 and 16 July 1964 leg. A.Strand are in ZMB. In ZMO there is also one unlabeled specimen (Munster leg.?). Recently mr. S. Ligaard found one specimen at TEI:Kviteseid, Kviteseid (EIS 17) 9 December 1984 (in coll. Ligaard), and mr. B. Sagvolden one specimen at BV:Nore & Uvdal, Bergstøl (EIS 35) 11 March 1993 (in coll. Sagvolden).

It is a cosmopolitan and a rather common member of the "compost-dung society" of beetles in Europe. Usually only single individuals are encountered, as opposed to other species of *Ptiliolum*, eg. *P. fuscum* (Er.). It is the only northern European *Ptiliolum* species which seems to prefer more open and exposed habitats.

Ptinella aptera (Guerin-Meneville, 1839). Noted from Norway by Lundberg (1986), but not by Silfverberg (1992)! Reported as new to Norway by Strand (1955) from specimens taken at AK:Oslo, Røa (EIS 28) leg. Strand. In coll. Strand (ZMB) there are 18 specimens caught between 1941 and 1961 at Røa, most of them "in flight". These are the only finds from Norway known to us. It should be sought for in hollow deciduous trees and under their bark.

Nephanes titan (Newman, 1834). There is only one recent record in Norway of this minute, cosmopolitan species. Eight specimens were taken in compost at OS:Vestre Toten, Vestumenga, Raufoss (EIS 45) 8 August 1989 leg. F. Ødegaard (in coll. Ødegaard).

It was first recorded from Norway (1901) by Munster. In ZMO there are many old specimens from BØ:Kongsberg, Kongsberg (EIS 27) and AK:Oslo Bukten, Bygdøy (EIS 28) and from AK:Oslo, Oslo (EIS 28). Altogether 79 specimens are present, many of which bear no labels, though obviously collected by Munster.

A. Strand also found some specimens at AK:Asker, Brønnøya (EIS 28), AK:Oslo, Røa (EIS 28) and at AK:Oslo, Ullern (EIS 28), all taken during 1935-53 (in coll. A. Strand, ZMB). Four additional old specimens taken at Kristiania (= Oslo), probably by Helliesen, are preserved in ZMS. It will surely prove to be more widely distributed in Norway, but due to its extremely small size it is easily overlooked.

Baeocrara japonica (Matthews, 1884). Recently reported as new to Norway by Ødegaard (1992) from STI:Røros, Røros (EIS 81) 5 August 1989 leg. Ødegaard in four specimens sifted from a compost heap together with inter alias *Millidium minutissimum*. Also reported by Sagvolden & Hansen (1993) in one specimen taken at BV:Rollag, Rollag (EIS 35) 2 Januar 1992 leg. Sagvolden in a compost heap.

In coll. Sagvolden there are two additional specimens taken at BØ:Kongsberg, Hvittingfoss (EIS 19) 10 Februar 1992 and 25 Februar 1992 leg. Sagvolden.

Acrotrichis chevrolatii (Allibert, 1844). The first mention in literature about Norwegian records of this species is by Munster (1901). He recorded it from three different localities in the Oslo fjord vicinity. However, only one of these can be confirmed by us, i.e. AK:Oslo Bygdøy, Bukten, (EIS 28) spring 1897 leg. Munster (three specimens in ZMO). Andreas Strand (1941) only mentioned this locality in his review of the Norwegian species of genus *Acrotrichis* Motsch. In ZMB there are three additional specimens taken at AK:Oslo, Røa (EIS 28) 7 May 1950 leg. A. Strand (in coll. Strand), "in flight".

Recently one specimen was taken at OS:Vestre Toten, Breiskallen (EIS 45) 21 July 1989 leg. F. Ødegaard (in coll. Ødegaard) in a grass compost. Sometimes it can be found in numbers, especially in mixtures of old, rotting, mouldy hay and horse manure around stables. It has also been found in horse manure in forests.

Acrotrichis norvegica Strand, 1941. The description was based on four specimens taken by Munster at AK:Bærum, Snarøy (EIS 28) 17 Novmber 1920 (in ZMB) and at AK:Oslo Bygdøy, Bukten, (EIS 28) 4 May 1929 and March 1930 (in ZMO). Sundt (1958) added a record from HES:Kongsvinger, Kongsvinger (EIS 38) 18 September 1957 leg. A Strand (in coll. A. Strand, ZMB).

However, the oldest specimens in Norway originate from AK:Oslo, Tøien (EIS 28) leg. Moe. Altogether five specimens collected at three different occasions in April 1891 were discovered in the collections of ZMB. In ZMO there is also one old specimen from BØ:Kongsberg, Kongsberg (EIS 27), probably taken by Munster.

This rare and local species always seems to occur in small numbers, contrary to many other ptilid species. It will probably prove to have a wider distribution within the country.

Acrotrichis volans Motschulsky, 1845. First noticed as a member of the Norwegian fauna by A. Strand (1941). Since then treated faunistically by a few authors (A. Strand 1970; Mysterud & Wiger 1976; Ødegaard 1992). For long it was confused with *A. parva* Rosskothen, and consequently, the true distribution in Norway has hitherto been unknown. In fact its Norwegian range quite resembles that of *A. parva*. However, it is a true boreal

species, which rarely occurs in habitats of "southern" types. It is usually encountered in conifer forests in all kinds of rotting organic matter. Though it is distributed all over the country it is more common towards the north.

A total of 93 specimens were identified and distributed as follows: AK (EIS 28, 36), OS (EIS 44), HEN (EIS 55, 65, 72, 73, 81), ON (EIS 71), STI (EIS 81), TRI (EIS 154, 164, 172), FI (EIS 167), FV (EIS 165, 173), FN (EIS 174, 175) and FØ (EIS 160, 168, 169). The earliest Norwegian record dates back to 23-VII-1901 (FØ:Sør-Varanger, Kirkenes leg Wessel; in coll. Sundt, Ås).

Acrotrichis parva Rosskothen, 1935. This species was initially confused with close relatives and therefore remained unrecognized for many years. It was described in 1935, but neither Strand (1941, 1970) nor Sundt (1958) accepted it as a good species. Not until rather recently (Sundt 1971, Strand 1977) it was recognized as a species distinctly separate from *A. silvatica* Rossk. and *A. volans* Motsch. (= *A. fennica* Renk.). Due to its variable external facies and its previous confusion with other species the true distribution within Norway has not been known adequately.

It is not an uncommon species in Norway, and is distributed over the whole country. Being a typical member of the mixed leaf forest fauna in all kinds of rotting and putrifying organic matter it is almost as common as *A. silvatica*.

The revision of all available material in museums as well as in private collections revealed it as a misinterpreted species. Also Strand and Sundt made some misidentifications, often as *A. silvatica*. In older literature members of the *A. silvatica* species group carried the name *A. suffocata* (Haliday), e.g. Munster (1901).

In all 72 specimens were identified and distributed as follows: Ø (EIS 20), AK (EIS 28, 36), ON (EIS 71), HES (EIS 37), HEN (EIS 55, 81), BØ (EIS 27), TEI (EIS 26), RY (EIS 7), NNV (EIS 137, 143), TRY (EIS 144, 162), TRI (EIS 154, 164), FI (EIS 167), FV (EIS 173), FØ (EIS 160, 168, 169).

The earliest records are the specimens from RY:Jæren (EIS 7) leg Helliesen (undated; probably ca 1890) and from FØ:Sør-Varanger, Kirkenes (EIS 169) 23-VII-1901 leg. Wessel (in coll. Sundt, Ås).

Acrotrichis suecica Sundt, 1958. Described by Sundt in 1958 based on Swedish material. Andreas Strand (1959) reported it as new to Norway from one specimen collected at AK:Oslo, Seteråsen Sørkedalen in Nordmarka (EIS 36) 18 July 1958 leg. Sundt and identified by Sundt (cfr. Strand (1959) regarding collector). The identification has been checked and is correct. Since then it has been briefly mentioned twice by Strand (1970, 1977).

Strand (1977) added HOY to the Norwegian distribution records, based on specimens collected at HOY:Askøy, Herdla (EIS 39) 9 May 1971 leg. A. Fjellberg and identified by Sundt (in coll. Sundt, Ås and in ZMB). A careful rechecking of these specimens revealed them all as misidentifications (= *A. silvatica* and *A. rugulosa* Rossk.). Consequently, HOY should be omitted from the list.

Acrotrichis sjobergi Sundt, 1958. Since its description by Sundt (1958) this boreal species has been reported four times from Norway. Andreas Strand (1960a) recorded it from HEN:Tolga, Tolga (EIS 81) where he and E. Sundt collected it 20 June 1958 (det. Sundt). Six specimens are in coll. Strand (ZMB), and they were correctly identified. Strand (1960a) also mentioned one specimen from FI:Karasjok (EIS 167) leg. Munster, det. E. Sundt. This is, however, a typical *Acrotrichis volans* Motsch., and the record from FI should consequently be dismissed.

Later Strand (1970) added a record from ON to the Norwegian distribution list without specification. In ZMB there are two specimens from ON:Dovre, Vålåsjø (EIS 71) 29 June 1940 leg. A. Strand and 11 July 1965 leg. A. Strand, both collected at birch sap (*Betula sp.*). A further record of *A. sjobergi* was mentioned by Strand (1975, 1977). One specimen was caught beneath a carcass of moose (*Alces alces*) at AK:Oslo, Sørkedalen (EIS 36) 8 September 1967 leg. A. Strand (coll. Strand, ZMB) and identified by Sundt. This is in fact a specimen of *A. cognata* (Matth.) without the typical blueish tinge on the elytra. Consequently, the district of AK should be omitted from the catalogues.

In addition to the above mentioned finds there are 22 specimens in ZMB, 19 of which were collected by A. Strand at HEN:Tynset, Tynset (EIS 80) 18 June 1958 and three specimens which Strand collected at HEN:Tolga, Tolga (EIS 81) 11 July 1965. In coll. Sundt (Ås) there are also three specimens from HEN:Tynset, Tynset (EIS 80) 20 June 1958 leg. Sundt. Summing up *A. sjobergi* is hitherto known only from ON and HEN.

Acrotrichis strandi Sundt, 1958. Described by Sundt in 1958 from a large number of specimens from the north of Norway and Sweden. Since then no other information has been given about *A. strandi* in Norway.

In the Norwegian museums there are altogether 80 specimens (incl. paratypes) collected at 25 different occasions at 11 localities. The oldest records are 12 specimens collected in 1904 by Munster (coll. ZMO) at FØ:Sør-Varanger, Vaggetem (EIS 160), TRY:Tromsø, Tromsø (EIS 162) and FØ:Sør-Varanger, Jarfjord (EIS 169). Many specimens were collected by A. Strand during his trips to arctic Norway during the 1930s and -50s (coll. Strand ZMB) and the species seems to be widely distributed and locally not uncommon in the northern parts of Norway. However, during the last forty years no records have been made. The last Norwegian record dates back to July 1956 (TRI:Nordreisa, Sappen (EIS 164) 4 July 1956 leg. A.Strand; four specimens in coll. Strand, ZMB).

Recently the senior author recieved a small collection of *Acrotrichis spp.* from mr. F. Ødegaard. Among them one female of *A. strandi* was present. It was collected in NTI:Frosta, Tautra (EIS 97) 7 Apr. 1993 leg F. Ødegaard (in coll. Ødegaard). Consequently the records hitherto known are from NTI (EIS 97, 101), TRY (EIS 162), TRI (EIS 154, 164), FN (EIS 174) and FØ (EIS 160, 169).

In Fennoscandia *A. strandi* belongs to the boreal fauna (no south Swedish records though recently found in Denmark), and it is confined to the middle and northern parts. It seems gradually to be replaced in the south by *A. fascicularis* which is not common in the north. It is a typical inhabitant of wet litter and debris along rivers and lakes. Hitherto overlooked, it is probably not uncommon, although it may be local in appearence. It will probably turn up in the southern parts of Norway as well.

Acrotrichis rosskotheni Sundt, 1971. Originally described by Sundt (1971) from a specimen collected by Helliesen at RY:Jæren (EIS 7), but already mentioned by Strand (1970) in his supplementary notes to the Norwegian Coleoptera catalogue. Later Strand (1977) added a record from MRY.

In Norwegian museums and private collections there is a large number of specimens, implying that this species is not uncommon and probably widely distributed in Norway, though with the main point in the south. In all 50 specimens taken at 37 occasions in 18 localities were identified. The oldest specimens originate from AAY:Grimstad, Grimstad (EIS 6) 1897 leg. H.K. Hanssen (in ZMB). Usually it seems to

have been met with singly in Norway. There is little information concerning the circumstances under which the specimens were taken. A few were taken in "mushrooms", "moose carcass" and "flood refuse", quite a lot "in flight".

Some specimens seen by Sundt were wrongly identified, often mixed up with *A. sitkaensis* Motsch. or *A. intermedia* (Gillm.). The known records in Norway are distributed as follows: Ø (EIS 29), AK (EIS 28, 36), HES (EIS 38), VE (EIS 19), AAY (EIS 6, 11), RY (EIS 7, 14), RI (EIS 15), HOI (EIS 31), MRY (EIS 85), and STI (EIS 92).

Acrotrichis henrici (Matth.). This species was for long known only from the north western states of the US. It surprisingly turned up in Great Britain in the mid-60's (Johnson, 1967). It is rare but known from several localities (Johnson, 1990). Recently it was also found in the Netherlands (Jansen & van Heijnsbergen, 1986) and its continued spreading reminds of *Acrotrichis insularis* (Mäklin), another North American immigrant. Only females have hitherto been recorded from Europe, and the combination of presumed parthenogenesis and spreading suggests a recent introduction. Johnson (1987), however, discovered some nineteenth century museum specimens from Britain. Thus the presumed introduction from North America seems to date further back. The reason for its sudden extension in range lately is unknown.

We can now report *A. henrici* for the first time from Scandinavia. Two specimens of this species were included in a small collection of Ptiliidae sent by mr. Frode Ødegaard and identified by MS. They were collected at VE:Tjøme, Mostranda (EIS 19) 7 June 1992 leg. F. Ødegaard (in coll. Ødegaard).

A. henrici has been dealt with in previous papers by Johnson (1967, 1987). Sundt (1971) also illustrated the female genitalia and gave a short diagnosis in the key to the middle European species of *Acrotrichis*.

In size and surface sculpture it comes close to *A. atomaria* (DeG.) (**Figure 2**), but it can easily be distinguished by its dark colour with pitchy black antennae besides the structure of the spermatheca (**Figure 3**). It is in general darker and smaller than *A. sitkaensis* Motsch., with less arcuate pronotal sidemargin viewed laterally. It also resembles *A. strandi* from which it externally may be separated by the surface being less microreticulated, though not as brilliantly shining as in *A. lucidula* Rosskothen. The latter species is broader, and it also possesses more arcuate pronotal sidemargins besides a different spermatheca.

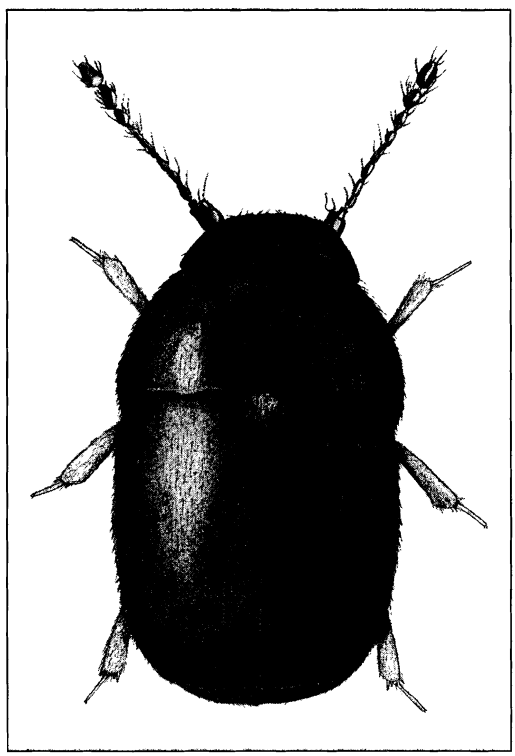

Figure 2
Acrotrichis henrici *(Matthews), female (USA: Oregon). Length: 1 mm.*

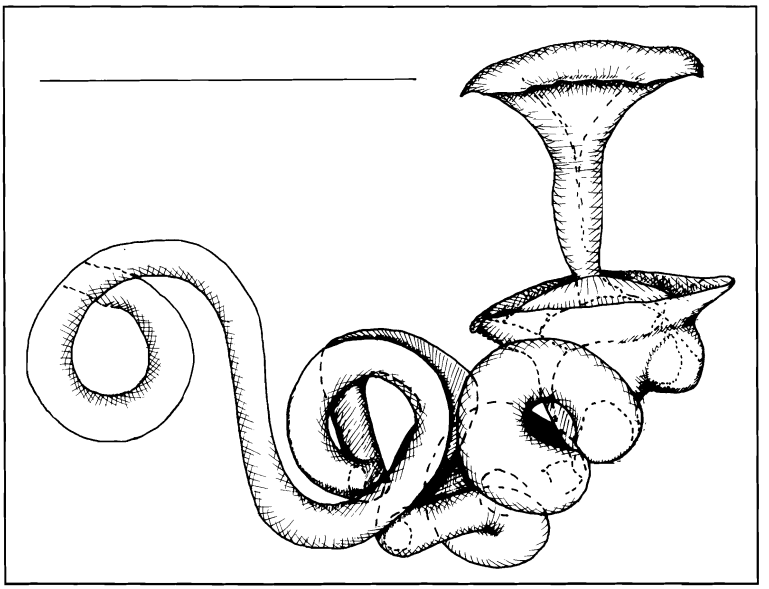

Figure 3
Acrotrichis henrici *(Matthews), female (USA:Oregon). Spermatheca. Scale bar = 0.1 mm.*

The female spermatheca is of characteristic shape and possesses a single, large basal loop below the "pump-apparatus" (**Figure 3**).

A. henrici is obviously slowly extending its European range eastwards, and it will probably turn up elsewhere in Scandinavia in a near future.

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We are also indebted to the staff at the zoological museums in Oslo, Bergen, Stavanger, Trondheim and Tromsø for their quick and efficient handling of our requests. Material from private collections were kindly put to our disposal by Mr. Lars Ove Hansen (Oslo), Mr. Oddvar Hanssen (Trondheim), Mr. Sindre Ligaard (Vestby), Mr. Bjørn Sagvolden (Rollag) and Mr. Frode Ødegaard (Trondheim).

Finally we would like to express our cordial thanks to Mrs. Katrin Sörensson-Persson who prepared the habitus drawings of *Ptenidium turgidum* and *Acrotrichis henrici*.

SAMMENDRAG

Revisjon av norske Ptiliidae (Col.)

Kjennskapet til den norske Ptiliidae er svært begrenset. Systematikken innen familien har gjennomgått store forandringer de siste tiårene. Det har derfor vært nødvendig å revidere det eksisterende materialet i henhold til den gjeldene oppfatning av artene. Deler av resultatene er sammenfattet i denne artikkelen. Alt tilgjengelig norsk materiale fra såvel offentlige som private samlinger er gjennomgått. Dette inkluderer samlingene til Thomas Munster, Andreas Strand samling og Eivind Sundt. Tilsammen utgjør dette det hovedmengden av det norske materialet.

Erfaringer fra gjennomgåelsen av materialet viser at ved siden av taksonomiske forandringer er det relativt mange rene feilbestemmelser innen vanskelige grupper. Opplysninger fra tidligere publikasjoner er derfor ikke akseptert hvis materialet ikke er bevart.

To arter presenteres for første gang fra Norge, *Ptiliolum caledonicum* (Sharp) og *Acrotrichis henrici* (Matthews). Den siste er også ny for Skandinavia.

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Aculeata of Norway. 1. Bethylidae (Hym., Apocrita)

Lars Ove Hansen

Hansen, L.O. 1995. Aculeata of Norway 1. Bethylidae (Hym., Apocrita). - Fauna norv. Ser. B 42: 43-48.

The present survey of this family in Norway gave 834 specimens. The following eleven species were recorded: *Anoxus boops* Thomson, 1862, *Bethylus cephalotes* (Förster, 1860), *B. dendrophilus* Richards, 1939, *B. fuscicornis* (Jurine, 1807), *B. nitidus* (Thomson, 1862), *Goniozus claripennis* (Förster, 1851), *Cephalonomia formiciformis* Westwood, 1833, *Epyris bilineatus* Thomson, 1862, *Laelius femoralis* (Förster, 1860), *Plastanoxus chittendenii* (Ashmead, 1893) and *Rhabdepyris myrmecophilus* Kieffer, 1904. Only *B. fuscicornis* has previously been reported from Norway. A total of 34 regional records are presented. Notes on biology and distribution are briefly given for each species.

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INTRODUCTION

The world fauna of Bethylidae consists of about 1850 described species (Gordh & Móczár 1990). Twenty of these are reported from Britain (Kloet & Hinks 1978), thirteen from Sweden (Hedqvist 1975) and eleven from Finland (Vikberg 1986). Surprisingly neither of the earlier Norwegian surveys on Hymenoptera have covered Bethylidae (i.e. Sparre Schneider 1880, Strand 1898). However, Kieffer (1912) reported *Bethylus fuscicornis* from Ranem, Overhalla (NTI), which seems to be the only bethylid hitherto recorded from Norway.

The bethylid larvae are external parasites, and larvae of Coleoptera and Lepidoptera are the preferred hosts (Richards 1939, Gauld & Bolton 1988). Even though some species are found in nests of certain species of ants, it is unclear if the hosts are the ants or certain beetles associated with the ants (Gauld & Bolton 1988). Some bethylids in Northern Europe are only synantrophic, having a parasitic association with typically imported species such as dermestids and grain-eating beetles. In Sweden only one synantrophic species has been found (Hedqvist 1975), while seven of the British species occur indoor (Kloet & Hinks 1978).

Bethylidae forms the superfamily Chrysidoidea (former Bethyloidea) together with Dryinidae, Embolemidae, Chrysididae and three tropical families (Kloet & Hinks 1978, Gauld & Bolton 1988). The present work is the first in a series of planned faunistic publications on aculeate Hymenoptera, a poorly known group in Norway.

MATERIAL AND METHODS

An initial study of Norwegian museum collections revealed eight specimens at the Zoological Museum of Oslo (ZMO). Of the specimens collected in the course of the pre-

sent study, nineteen were sweep-netted (SN), one specimen was found active indoor and two were hatched. However, sampling with malaise-traps (MT) in 1991-93 at the sites given in **Table 1** gave most of the specimens. In addition some malaise-trap samples were provided by other collectors from the following localities (see **Table 2**): Kirkejordet, May-September 1986 (leg. T. Hofsvang), Kjaglidalen May-August 1990 (leg. M. Falck), Bjelland, June 1992 (leg. A. Bakke) and Lisleherad April-October 1993 (leg. A. Bakke). The material from the present investigation is deposited at the Zoological Museum of Oslo and in the authors private collection.

Most of the specimens have been determined by means of the keys in Hedqvist (1975) and Perkins (1976), except for *Epyris* and *Plastanoxus* where respectively Nagy (1970) and Evans (1964) have been used.

THE RECORDS

The nomenclature in the list follows Gordh & Móczár (1990). The following abbreviations have been used: ZMO = ex coll. Zoological Museum of Oslo, SN = sweep netted, MT = malaise-trap and spm. = specimen(s). Further data about the localities and the collectors are given in **Table 2**. Regional abbreviations are given in accordance with Økland (1981).

Bethylinae

Anoxus boops Thomson, 1862
ON: Vinstra, 1 spm. 6 August-16 September 1992 (MT). **BØ:** Underlia. 1 spm. July 1993 (MT). **VE:** Kommersøya, 2 spm. 9 July-26 October 1991 (MT). **TEI**: Lisleherad 3 spm. 30 April-6 August 1993 (MT).

Bethylus cephalotes (Förster, 1860)
BØ: Labru, 1 spm. 14 June 1993 (SN); Klaustad, 1 spm. 7 June 1993 (SN). **AAY:** Arendal, 1 spm. (ZMO); Bjelland, 1 spm. 18 July 1953 (ZMO). **VAY:** Gimle 1 spm. 23 July 1977.

B. dendrophilus Richards, 1939
ON: Vinstra, 1 spm. 30 June-6 August 1992 (MT). **VE:** Kommersøya, 1 spm. 9 July-2 August 1991 (MT).

Table 1. *Localities investigated with malaise-traps in the present study. Number of traps (Σtraps), collected specimens (Σspm.) and species (Σspp.) on each locality are given. See Table 2 for further information about the localities.*

Locality	Period	Σ traps	Σ spm.	Σ spp.
Ekeby	19 May—16 October 1992	2	1	1
Kinnartangen	14 April—24 October 1991	1	160	3
Kinnartangen	1 May—1 September 1993	1	9	2
Kommersøya	2 May—26 October 1991	1	9	5
Langøya	2 May—26 October 1991	2	46	2
Tofteholmen	1 May—26 October 1991	2	190	2
Underlia	1 May—31 October 1992	1	261	3
Underlia	1 May—30 September 1993	1	30	4
Vinstra	1 May—19 October 1992	1	82	3
Vårviken	1 May—31 October 1992	1	3	3

Table 2. Localities with EIS- and UTM (ED-50)-references where bethylids have been collected in Norway.

Locality	Region	EIS	Municipality	UTM 32V-	Leg.: (ex coll.)
Arendal	AAY	6	Arendal	MK8680	Anonymous (ZMO)
Bagn	OS	44	Sør-Aurdal	NN2943	L.O. Hansen
Bjelland	AAY	6	Tromøy	MK9380	A. Bakke
Egner	AK	37	Sørum	PM2561	O. Sørlibråten
Einarsneset	VAY	1	Farsund	LK6937	B.A. Sagvolden
Ekeby	Ø	19	Rygge	NL9484	L.O.Hansen & G.Walberg
Gimle	VAY	2	Kristiansand	MK4147	K. Berggren
Hvalpåsen, Nes	BØ	36	Hole	NM7153	L.O. Hansen
Kinnartangen	BØ	28	Røyken	NM7520	L.O. Hansen
Kirkejordet, Ås	AK	28	Ås	NM9917	T. Hofsvang
Kjaglidalen	AK	28	Bærum	NM7947	M. Falck
Klaustad	BØ	27	Kongsberg	NM3807	B.A. Sagvolden
Kommersøya	VE	19	Sande	NL7499	L.O. Hansen
Labru	BØ	27	Kongsberg	NM3709	B.A. Sagvolden
Langøya	VE	19	Våle	NL7896	L.O. Hansen
Lierbyen	BØ	28	Lier	NM6927	B.A. Rukke
Lisleherad	TEI	27	Notodden	NM1507	A. Bakke
Lysakermyren	AK	28	Bærum	NM9042	T. Münster (ZMO)
Mølen	BØ	19	Hurum	NL8595	L.O. Hansen
Nærstad	BØ	36	Ringerike	NM7074	N. Seip (ZMO)
Ramvikholmen	BØ	19	Hurum	NL8799	L.O. Hansen
Sandodden, N.	HEN	64	Rendalen	PP1740	L.R. Natvig (ZMO)
Sjausel	TEI	17	Tokke	ML5686	L.O. Hansen
Solbakken	HEN	64	Rendalen	PP1642	L.R. Natvig (ZMO)
Sørem	ON	71	Vågå	NP0760	T. Münster (ZMO)
Tofteholmen	BØ	19	Hurum	NL8898	L.O. Hansen
Tråen saga	BV	35	Rollag	NM1554	B.A. Sagvolden
Tøyen	AK	28	Oslo	NM9944	J.H.S. Siebke (ZMO)
Underlia	BØ	28	Drammen	NM6624	L.O. Hansen
Vinstra	ON	62	Nord-Fron	NP4328	K. Myhr & L.O. Hansen
Vårviken	BV	35	Rollag	NM1553	B.A. Sagvolden

B. fuscicornis (Jurine, 1807)
AK: Tøyen, 1 spm. 12 August 1853 (ZMO); Kjaglidalen, 1 spm. 11-22 June 1990 (MT); Lysakermyren, 1 spm. 24 September 1923 (ZMO); Egner, 1 spm. 10 August 1993 (SN). **HEN**: Sandodden, 1 spm. 11 August 1956 (ZMO); Solbakken, 1 spm. 17 July 1951 (ZMO). **ON:** Sørem, 1 spm. 1922 (ZMO). **BØ**: Nærstad, 1 spm. (ZMO); Underlia, 1 spm. May 1993 (MT), Kinnartangen, 8 spm. June-August 1993 (MT); Ramvikholmen, 2 spm. 12 August 1990 (SN); Tofteholmen, 2 spm. 28 May-1 September 1991 (MT); Mølen, 1 spm. 8 July 1991 (SN). **VE:** Langøya, 28 spm. 28 May-26 October 1991 (MT); Kommersøya, 2 spm. 28 May - 9 July 1991 (MT). **TEI**: Lisleherad 1 spm. 28 June-6 August 1993 (MT). **AAY:** Bjelland 1 spm. June 1992 (MT). **VAY:** Einarsneset, 1 spm. 31 July 1993 (SN). Previously published spm.: **NTI:** Ranum, leg. E. Strand (Kieffer 1912). This record could not be verified.

B. nitidus (Thomson, 1862)
BØ: Hvalpåsen, 1 spm. 31 July 1992 on *Solidago virgaurea* (SN); Underlia, 1 spm. July 1992 (MT). **AAY:** Bjelland, 1 spm. June 1992 (MT).

Goniozus claripennis (Förster, 1851)
OS: Bagn, 4 spm. 1 August 1992 (SN). **ON:** Vinstra, 80 spm. 1 May-16 September 1992 (MT). **BØ:** Hvalpåsen, 4 spm. 31 July 1992 on *Solidago virgaurea* (SN); Mølen, 1 spm. 8 July 1991 (SN); Underlia, 253 spm. 1 June-31 August 1992 (MT), 22 spm. 1 May-30 September 1993 (MT); Kinnartangen, 158 spm. 14 April-8 September 1991 (MT), 1 spm. June 1993 (MT); Tofteholmen, 188 spm. 28 May - 26 October 1991 (MT). **BV:** Vårviken, 1 spm. August 1992 (MT); Tråen saga, 1 spm. 1 August 1993 (SN).**VE:** Langøya, 18 spm. 28 May-1 September 1991 (MT); Kommersøya, 1 spm. 2 August-26 October 1991 (MT). **TEI:** Sjausel, 1 spm. 16 July 1992 (SN); Lisleherad, 1 spm. 27 May-22 June 1993 (MT). **AAY:** Bjelland, 1 spm. June 1992 (MT).

Epyrinae

Cephalonomia formiciformis Westwood, 1833
Ø: Ekeby, 1 spm. 24 August-16 October 1992 (MT); **BØ:** Lierbyen, 1 spm. hatched July-December 1993 from fruit bodies of the wood fungi *Fomes fomentarius* infested by *Cis* sp. (Col. Cisidae); **BV:** Vårviken, 1 spm. June 1992 (MT); 1 spm. hatched from fruit bodies of wood fungi (indet.) infested by *Cis* sp. April- May1994.

Epyris bilineatus Thomson, 1862
VE: Kommersøya, 3 spm. 28 May-2 August 1991 (MT).

Laelius femoralis (Förster, 1860)
AK: Kirkejordet, 3 spm. 26 June-3 July 1986 (MT). **BØ**: Underlia, 1 spm. 17 September 1991 (indoor), 7 spm. July 1992 (MT), 6 spm. June-September 1993 (MT); Kinnartangen, 1 spm. 4 August -8 September 1991 (MT).

Plastanoxus chittendenii (Ashmead, 1893)
BV: Vårviken, 1 spm. August 1992 (MT).

Rhabdepyris myrmecophilus Kieffer, 1904
BØ: Kinnartangen, 1 spm. 8 September - 24 October 1991 (MT).

DISCUSSION

Distribution

All together 834 specimens were examined, and 96.3 % of these were taken in malaise-traps, thus, this method seems to be an efficient sampling method for this family.

G. claripennis was certainly the most abundant species in the material, but lacked completely in some of the samples (i.e. Kirkejordet, Ekeby). The many records indicate that the species is common and may be distributed in most areas of SE Norway. Hedqvist (1975) stressed that the species may occur throughout the Palaearctic region. Gordh & Móczár (1990) reported only West-Europe, while Triapicyn (1978) added Caucasus and Siberia.

B. cephalotes was the only species not recorded in malaise-traps in the present study. It is previously reported from western and northern Europe including several Swedish regions (Hedqvist 1975, Gordh & Móczár 1990). The three recorded specimens of *B. nitidus* may indicate that this is a rare species as proposed by Hedqvist (1975). Records exist only from Sweden and Finland (Gordh & Móczár 1990). *B. dendrophilus* is reported from Britain, France and Finland (Richards 1939, Vikberg 1986) and the few recorded idividuals in this study may indicate that this is also a rare species. On the other hand *B. fuscicornis* seems to be quite common and may be distributed through most parts of SE Norway, or perhaps most of Norway. It is recorded from North-Africa and several parts of Europe

including Iceland (Petersen 1956, Triapicyn 1978, Gordh & Móczár 1990).

A. boops is previously recorded from Sweden, Central-Europe and Madeira, *L. femoralis* from Sweden, Finland and Germany, and *E. bilineatus* from Sweden, Romania and Britain; while *R. myrmecophilus* is clearly a rare species, and records exist only from Sweden (Gotland) and Germany (Hellén 1953, Hedqvist 1975, Kloet & Hincks 1978, Vikberg 1986, Gordh & Móczár 1990). *C. formiciformis* seems to be quite widespread in Europe and it is recorded borth from Sweden and Finland (Hedqvst 1975, Vikberg 1986). *P. chittendeni* is clearly rare and only reported from England and North-America and is therefore new to northern Europe (Evans 1964, Kloet & Hinks 1978).

Biology

Little is known about the biology of bethylids, but several species are known to prey on larvae of Coleoptera and Lepidoptera, although few observations have been made. Both *Goniozius* spp. and *Bethylus* spp. seem to prey on lepidopterous larvae, and *G. claripennis* has been reared from larvae of Choreutidae, Gelechiidae, Oecophoridae and Tortricidae, *B. cephalotes* from Agonoxenidae, Tortricidae and Zygaenidae, *B. dendrophilus* from Cosmopterigidae and *B. fuscicornis* from Coleophoridae and Gelechiidae (Gordh & Móczár 1990).

The host of *L. femoralis* seems to be unknown, but some other *Laelius* spp. have been reared from different coleopterous larvae (i.e. Dermestidae, Scolytidae and Bruchidae) (Gordh & Móczár 1990). The female of *R. myrmecophilus* has been found in the nest of *Tetramorium caespitum* (Hym., Formicidae), but it is unclear if the hosts are the ants or certain species of Coleoptera associated with the ants (Hedqvist 1975).

Both *C. formiciformis* and *P. chittendeni* have been reared from fungi infested by *Cis* spp. (Col. Cisidae) (Gordh & Móczár 1990), which seem to be in accordance with the observations made on *C. formiciformis* in the present study.

It should be mentioned that bethylids are often introduced by trade and odd species are regularly reported from e.g. warehouses and stores. However, due to the collecting methods presently used, it is likely that all the species found in this investigation are outdoor species.

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SAMMENDRAG

Norges Aculeata 1. Bethylidae (Hym., Apocrita).

Denne undersøkelsen av familien Bethylidae i Norge gav 834 individer. Følgende arter ble funnet: *Anoxus boops* Thomson, 1862, *Bethylus cephalotes* (Förster, 1860), *B. dendrophilus* Richards, 1939, *B. fuscicornis* (Jurine, 1807), *B. nitidus* (Thomson, 1862),

Goniozus claripennis (Förster, 1851), *Cephalonomia formiciformis* Westwood, 1833, *Epyris bilineatus* Thomson, 1862, *Laelius femoralis* (Förster, 1860), *Plastanoxus chittendenii* (Ashmead, 1893) and *Rhabdepyris myrmecophilus* Kieffer, 1904. Kun *B. fuscicornis* er tidligere rapportert fra Norge. Totalt angis 34 regionsfunn. Biologi og utbredelse er kort angitt for hver art.

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Norwegian Psocoptera I — A national species list, with preliminary comments on distribution and abundance

Johannes E. Anonby

Anonby, J. E. 1995. Norwegian Psocoptera I – A national species list, with preliminary comments on distribution and abundance. - Fauna norv. Ser. B 42: 49-58.

Fifty-three (53) species of Psocoptera are reported from Norway, of which only 21 have been entered into publications before. Now, however, more than 10 000 specimens, belonging to 49 species, have been identified by the author. Numbers of catches with individual species in various biogeographic regions serve as preliminary indications of abundance or rarity, and apparent distribution patterns are discussed. Species composition and distribution of the Norwegian fauna is compared to existing knowledge on the fauna of other Northern European countries, and altitudinal distribution in the Alps. Species numbers decrease markedly with altitude, and only a few species reach the timberline. The greatest diversity of Norwegian Psocoptera seems to exist in the Oslofjord area of SE-Norway, with an apparent concentration of rare species. Sampling has been very patchy, and more effort should be directed towards soil, litter and low vegetation, and to areas with warmer summer climates, where additional species could be expected.

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INTRODUCTION

The insect order Psocoptera has been neglected by most Norwegian entomologists, and no attempt has so far been done to present a comprehensive list of the species occurring in Norway. Enderlein (1910) reports 11 species from Norway: *Trichadenotecnum majus* (Kolbe), *Amphigerontia bifasciata* (Latreille), *Stenopsocus lachlani* Kolbe, *S. immaculatus* (Stephens), *Caecilius flavidus* (Stephens), *Enderleinella obsoleta* (Stephens), *Mesopsocus unipunctatus* (Müller), *Elipsocus abdominalis* Reuter, *E. hyalinus* (Stephens), *Philotarsus picicornis* (Fabricius) and *Liposcelis silvarum* (Kolbe). Of the Norwegian finds reported by Arndt (1931), *Trichadenotecnum sexpunctatum* (L.) is new to the list. Meinander (1974a) reports the following species (collected within a limited geographical range): *Lepinotus patruelis* Pearman, *Psyllipsocus ramburii* Sélys-Longchamps, *Liposcelis silvarum*, *Caecilius burmeisteri* Brauer, *Stenopsocus lachlani*, *Reuterella helvimacula* (Enderlein), *Mesopsocus unipunctatus*, *Metylophorus nebulosus* (Stephens), *Loensia fasciata* (Fabricius), *L. variegata* (Latreille) and *Trichadenotecnum sexpunctatum*, thus adding 7 species to the previous 12. Greve & Hauge (1989) report 2 additional species: *Amphigerontia contaminata* Stephens and *Kolbia quisquiliarum* (Bertkau); the total number of species reported from Norway before this present paper was 21.

MATERIAL STUDIED

For some years, I have been collecting Psocoptera in Norway. In addition, a great number of specimens have been made available for me to identify, both from contemporary field samplings done by other entomolo-

gists, and older museum materials. Altogether, I have examined and identified more than 10000 individual specimens of Norwegian Psocoptera, belonging to 49 species. Numbers of examined finds are listed in **Table 1** for each species, with distribution among the biogeographic regions of Norway (K.A. Økland 1981).

Nomenclature follows Günther (1974), for *Liposcelis* Lienhard (1990), and for *Elipsocus* Mockford (1993). For attribution to families, see Günther (1974).

Geographically, the country is very incompletely covered, as many biogeographic regions have not been investigated at all (see **Table 1**). The high numbers of finds from SFI and SFY are mainly due to the author's activity. A great part of the material is obtained from tree branches and twigs, using a beating tray. Also malaise traps, light traps and window traps have contributed substantially, being of particular interest as they tend to catch some species not readily found by beating. Picking by sight from various substrates, and sampling from the ground level, have not been carried out to the extent necessary to get that part of the potential Psocoptera fauna sufficiently represented. Regarding the Psocoptera found in human dwellings, I suppose the material I have seen may be only a minor part of what has actually been submitted to various health authorities and laboratories. It is my hope that this paper will challenge other entomologists to help complete the knowledge on species occurrence and distribution patterns of Norwegian Psocoptera.

RESULTS

In **Table 2**, the numbers of specimens examined by the author are presented, together with maximum altitude of encounter for each species, and remarks on the region in which this altitudinal record is done.

Additionally, 4 species which I have not seen myself have been found in Norway (Lita Greve, pers. comm.), and have been identified by Dr. Martin Meinander, Helsinki. They are: *Cerobasis annulata* (Hagen) (2 samples from houses, received by Museum of Zoology, Bergen, 1959 and 1964, apparently from Bergen), *Lepinotus inquilinus* Heyden (1 sample, domicolous, apparently from Bergen, received 1973), *Psyllipsocus ramburii* (12 samples, including Meinander 1974a), and *Epipsocus lucifugus* (Rambur) (2 samples from a single locality in region HOI).

As a total, 53 Psocoptera species are thus known from Norway.

DISCUSSION

Comments on particular species

Cerobasis guestfalica (Kolbe) has been referred to as "a very widely distributed domestic species" (New 1974). Except for its frequent occurrence on weathered lignum of old wooden buildings, my samples do not give any indications of domestic occurrence in Norway. Its apparent absence in the most continental parts of Southern Norway, together with its abundance in humid areas of West Norway, may indicate preference for a coastal climate. In North America, it is found along the Pacific coast and on the eastern coastal plain (Mockford 1993). In continental countries like Switzerland (Lienhard 1977) and Hungary (Lienhard 1986), it seems to be a rather uncommon free-living species, and it is apparently absent from the Moscow and Ryazan regions of Russia (Vishnyakova 1959).

Caecilius flavidus has traditionally been regarded a strictly parthenogenetic species, but bisexual populations are found in North America and Switzerland (Lienhard 1977), Greece (Lienhard 1980) and Madeira (Lienhard 1983). Norwegian samples containing males tend to be most frequently taken in upland situations, typically in the range 300-800 m a.s.l. This tendency is particularly interesting as most of the malaise and light traps (methods generally causing overrepresentation of males) have been operated near sea level, giving only females of the species. One single *C. flavidus* male, however, resulted from a large trapping project in the lowlands of region SFI using suspended window traps (total catch of Psocoptera being 1965 specimens, which is almost one fifth of the Psocoptera samples reported here). Altogether, when including a find with last instar nymphs, the Norwegian material studied by the author contains 12 *C. flavidus* finds with males, consisting of 30 males and 57 females. Except for altitude, the bisexual populations do not show any clear distribution pattern.

Graphopsocus cruciatus (L.). This species has not been found higher than 150 m a.s.l., and its abundance in the Oslo area contrasts with a more infrequent occurrence in West Norway. Moreover, most, if not all, of the 15 adult females (3 finds) from West Norway (HOI, HOY and SFY) were brachypterous, and brachypterous nymphs were seen in another sample from HOY. West Norwegian males were all normal. Brachyptery has so far not been detected by me among *G. cruciatus* in East Norway, even if it is well known from other countries. The West Norwegian specimens may represent local, and more genetically isolated, populations at the edge of the distribution range.

Peripsocus didymus Roesler seems to be less frequent in West Norway than in East Norway. All the West Norwegian finds have taken place in, or close to, dense plantations of Norway spruce *Picea abies*, a tree species not indigenous to the West Norwegian districts in question.

Peripsocus subfasciatus (Rambur) is not found in West Norway. In the Oslo area it seems to be particularly numerous in dense spruce forests, and its absence in West Norway could possibly be an effect of its preferred habitat lacking until rather recent times, cf. *P. didymus*.

Elipsocus pumilis (Hagen) (= *E. westwoodii* McLachlan) and *E. moebiusi* Tetens are strongly underrepresented, because more than half of the total samples were identified without discriminating between these species, so that it could not be included in the figures.

For similar reasons, *Philotarsus picicornis* and *P. parviceps* Roesler are also underrepresented, with only 55 percent of the total finds being properly identified and included in the tables. *P. picicornis* has traditionally been regarded as the only — and very common — *Philotarsus* species found in the Nordic countries. Comparing Lienhard (1977, figures 79-80 and text), it is quite clear, however, that both species are present in Norway, *P. parviceps* being by far the more common. The species were easily separated by both pigmentation pattern of head and abdomen, and the distinctness of the wing pigmentations. *P. parviceps* seems to be more or less parthenogenetic, while the sparse *P. picicornis* material may suggest an even sex ratio.

Mesopsocus laticeps (Kolbe) has not been found in West Norway, and the finds suggest a southeastern distribution in Norway. The species is rare in Britain (New 1974) but rather common in southern Finland (Meinander 1974b). The Norwegian distribution, as it appears from my finds, fits well into this pattern along an east-west gradient.

Table 1. *Numbers of finds of Norwegian Psocoptera examined by the author, with distribution among the Norwegian biogeographic regions. - A "find" consists of conspecific individuals from a certain site and time.*

Species	Ø	AK	HES	HEN	OS	ON	BØ	BV	VE	TEY	TEI	AAY	AAI	VAY	VAI	RY
Lepinotus patruelis		2														
Trogium pulsatorium		1														
Cerobasis guestfalica		16					2		3							
Liposcelis bostrychophila		1														
Liposcelis brunnea																
Liposcelis silvarum	1	1														
Badonnelia titei		2														
Caecilius atricornis	1															
Caecilius burmeisteri	2	59	3	1	2	9	12		5					2		
Caecilius despaxi	1	13	1				6							4		
Caecilius flavidus	3	28	3	3	1	6	8	1	7			1		10		
Caecilius fuscopterus						1										
Caecilius gynapterus	1	7				3	2		6					2		
Caecilius piceus		6				2	2		5							
Enderleinella obsoleta	1	11							1							
Graphopsocus cruciatus	4	38	1				6		12		1			2		
Stenopsocus immaculatus	1	5	1				2		1							
Stenopsocus lachlani	1	14	2		1	8	8	1								
Kolbia quisquiliarum						1		2	1					2		
Lachesilla pedicularia	1					1			5					5		
Lachesilla quercus		10				4	1									
Ectopsocus briggsi							3									
Peripsocus alboguttatus	1								3					1		
Peripsocus didymus	1	24					1							1		
Peripsocus phaeopterus		26					6		2					1		
Peripsocus subfasciatus	2	14	1						1							
Cuneopalpus cyanops		13					2							2		
Elipsocus abdominalis		15				1	2		2							
Elipsocus hyalinus	1	9				1	5		5					2		
Elipsocus moebiusi	4	1	2				7		5							1
Elipsocus pumilis	2	3												4		
Pseudopsocus fusciceps	1															
Reuterella helvimacula	2	18				3	2		1							
Philotarsus parviceps	3	9					6		4					6		1
Philotarsus picicornis		3				1	1		1							1
Mesopsocus immunis	5	5					4		4	1						
Mesopsocus laticeps		14					2					1				
Mesopsocus unipunctatus	2	48		2	2	15	20	2	7							
Amphigerontia bifasciata		11		1		2	1									
Amphigerontia contaminata		14				1	1									
Blaste conspurcata									1							
Psococerastis gibbosa	1	7					2					1		1		
Metylophorus nebulosus	4	68	1				11		6			2		1		2
Psocus bipunctatus									1							
Loensia fasciata	5	14				1	5							1		
Loensia pearmani		3					1									
Loensia variegata	4	19					2		1			1		3		
Trichadenotecnum majus	4	13	1		1		2	1	2					2		
Trichadenotecnum sexpunctatum	1	3												2		
Sum	60	568	16	7	7	60	135	7	92	1	1	6	0	54	0	5

Table 1. *forts.*

RI	HOY	HOI	SFY	SFI	MRY	MRI	STY	STI	NTY	NTI	NSY	NSI	NNØ	NNV	TRY	TRI	FV	FI	FN	FØ	SUM
	8		2	2																	14
																					1
			21	14	1																57
	2	1																			4
				4																	4
																					2
	3		2	1																	8
																					1
	9		18	13	1					1						1					138
	9	1	4	6	4																49
	20	3	11	16	3			1													125
			1			2															4
				1																1	23
			2	1	1																19
			3	6	1																23
1	4	1	1																		71
	1		3	8	4																26
	10		9	13	2																69
	1																				7
			3	1																	16
				1																	16
			1																		4
																					5
			3	3																	33
	1		13	1	1																51
																					18
	9		6	6				1													39
	1		3	10				1													35
	3		4	7																	37
	1		4	3								1									29
	2		2	7	3																23
																					1
			5	10																	41
	5		7	15	3																59
	2			1																	10
			2	2																	23
																					17
	7	1	25	21	1			3			2	1			1						160
	1	1	1	4				1				1									24
	2		3	3																	24
																					1
	1			7																	20
	3		12	13																	123
																					1
	2	1	12	11				2			1										55
																					4
		1	5	10						1											47
				5																	31
	3		15	12	3																39
1	110	10	203	238	28	2	0	9	0	2	3	3	0	0	1	1	0	0	0	1	1631

Table 2. *Numbers of Psocoptera specimens examined by the author, together with maximum altitude (in meters) for free-living species with more than 10 registered finds. - Biogeographic region of the altitudinal record is added. Domicolous species are marked "d".*

Species	Males	Females	Nymphs	TOTAL	Max. altitude
Lepinotus patruelis	34	58	104	196	d
Trogium pulsatorium		2		2	d
Cerobasis guestfalica		435	534	969	400 SFI, SFY
Liposcelis bostrychophila		14		14	d
Liposcelis brunnea	2	8	3	13	d
Liposcelis silvarum		19		19	
Badonnelia titei	2	13	8	23	d
Caecilius atricornis		1		1	
Caecilius burmeisteri	264	552	366	1182	1120 ON
Caecilius despaxi	44	59	78	181	700 BØ
Caecilius flavidus	24	417	59	500	1120 ON
Caecilius fuscopterus	8	2		10	
Caecilius gynapterus	27	3	1	31	800 ON
Caecilius piceus	36	36	9	81	620 ON
Enderleinella obsoleta	30	55	10	95	380 SFY
Graphopsocus cruciatus	67	105	66	238	150 AK, BØ
Stenopsocus immaculatus	29	49	13	91	550 SFI
Stenopsocus lachlani	120	145	230	495	800 ON
Kolbia quisquiliarum	9			9	
Lachesilla pedicularia	9	21		30	450 ON
Lachesilla quercus	23	48	14	85	700 ON
Ectopsocus briggsi	3	1		4	
Peripsocus alboguttatus	8	1		9	
Peripsocus didymus	39	54	4	97	350 AK
Peripsocus phaeopterus	64	61	81	206	210 SFY
Peripsocus subfasciatus		297	60	357	100 AK
Cuneopalpus cyanops	42	85	5	132	600 SFI
Elipsocus abdominalis	120	102	26	248	640 ON
Elipsocus hyalinus		101	25	126	300 ON
Elipsocus moebiusi	14	58	4	76	550 SFI
Elipsocus pumilis	31	48	8	87	600 SFI
Pseudopsocus fusciceps	2			2	
Reuterella helvimacula	90	183	77	350	780 ON
Philotarsus parviceps	7	276	299	582	300 SFY
Philotarsus picicornis	3	7	1	11	400 ON
Mesopsocus immunis	109	12		121	70
Mesopsocus laticeps	8	20	48	76	200 AK
Mesopsocus unipunctatus	362	251	598	1211	1120 ON
Amphigerontia bifasciata	55	44	79	178	840 HEN (text)
Amphigerontia contaminata	24	15	36	75	450 ON
Blaste conspurcata	1			1	
Psococerastis gibbosa	46	17	45	108	350 AK
Metylophorus nebulosus	293	111	201	605	350 AK
Psocus bipunctatus		2		2	
Loensia fasciata	150	281	43	474	640 ON
Loensia pearmani	5	4		9	
Loensia variegata	361	490	21	872	350 AK
Trichadenotecnum majus	2	46	7	55	250 SFI
Trichadenotecnum sexpunctatum	137	143	24	304	550 SFI
				10643	

Amphigerontia bifasciata has been found drifting on water 1 200 m a.s.l. in HOI, far above the timberline. I have never found Psocoptera any higher in Norwegian mountains, even though Meinander (1974a) reports several species from the alpine zone. In **Table 2**, however, the find on water is omitted as an altitudinal record because of its supposedly accidental character, as wind-transported Psocoptera may be found far outside their living habitats, in environments unable to support the species in question.

Comparing the two species of *Trichadenotecnum*, *T. sexpunctatum* seems to be more common in West Norway, while *T. majus* seems to dominate in East Norway. The coastal climate in West Norway, with its effects both on summer temperature and possibly the microepiphyte communities, is suspected to be the reason for such a difference.

General comments and conclusions

As expected, the Norwegian Psocoptera fauna does not differ very much from the faunas of other North European countries, like Great Britain (New 1974), Sweden (Nyholm 1953, Hedström' 1983 and 1989) and Finland (Meinander 1984). So far, however, the species number from Norway is somewhat lower. The altitudinal limits, as they appear from my samples, can be compared to the altitudinal distributions of free-living species found in the Swiss Alps by Lienhard (1977). The species reaching the highest altitudes in my study, *Mesopsocus unipunctatus*, *Caecilius burmeisteri*, *C. flavidus* and *Amphigerontia bifasciata*, are all found in the upper subalpine zone of the Swiss National Park, too, where *M.unipunctatus* is one of three species reaching the upper limit of the zone (i.e. the timberline at 2300 m). *Mesopsocus unipunctatus* is also the species found farthest to the north, reported by Arndt (1931) from Bossekop in Finnmark county in North Norway, about 70° n.lat., region FV. Of the 31 species found in the subalpine zone (1500 - 2300 m) in the Swiss National Park, 23 are also recorded in Norway. For the species restricted to the lower (montane) zone in the S.N.P., these figures are 24 and 12 respectively. With some exceptions and deviations, the altitudinal distribution patterns seem to be rather parallel in Norway and the Swiss Alps. Several species that seem to be rare or local in Norway, like *Loensia pearmani*, *Blaste conspurcata* (Rambur) and *Psocus bipunctatus* (L.), are in the Swiss study restricted to the montane zone.

These preliminary Norwegian data on distributions and altitudinal limits conform well to the general notion of Psocoptera being a thermophilous group, with species numbers decreasing with latitude and altitude. Many species are found near sea level only. The Norwegian forests, and vegetation zones in general, reach their highest altitudes in central (continental) parts of South Norway (particularly region ON), and disproportionately many altitudinal records of Psocoptera are found in this same region (**Table 2**). Forests extend to about 1 000 m (coniferous) and 1200 m (birch) in ON, but local variations are substantial. In sunny, south-facing hillsides in ON, *Caecilius piceus* Kolbe and *Lachesilla quercus* (Kolbe) have been found at 620 m and 700 m respectively, whereas none of them has been found higher than 100 m in other regions of the country. The peculiar climate of the dry and sunny rain shadow valleys of northern Gudbrandsdal in ON is known to produce habitats both for semiarid climate lichens, and for rare, thermophilous beetles (Andersen & Hanssen 1989). Several Psocoptera species should be expected at extreme altitudes in south-facing mountain sides in this region, and additional, rare species may be found.

Considering the underscoring of the bottom and field layer fauna in my field samplings, it

is likely that species like *Reuterella helvimacula* and *Liposcelis silvarum* may extend far into the subalpine (and even alpine) zone, in Norway like in Switzerland, cf. Meinander (1974a). The mentioned sampling bias may also be the reason for the apparent rarity of low-vegetation dwellers like *Kolbia quisquiliarum* and others.

Sex ratios (cf. **Table 2**) are expected to be substantially distorted by sampling methods selecting winged males in species with flightless females, like *Mesopsocus unipunctatus*, *M. immunis* (Stephens) and *Caecilius gynapterus* Tetens. In species readily caught by traps, the higher activitity of the males may produce similar results, like in *Metylophorus nebulosus* and possibly several others.

Among the free-living species, the apparently rare ones, like *Caecilius atricornis* McLachlan, *Pseudopsocus fusciceps* (Reuter), *Blaste conspurcata* and *Psocus bipunctatus*, show a conspicuous concentration in the Oslofjord area, i.e. coastal parts of the Southeast-Norwegian regions Ø, VE, AK and BØ, where also the species number seems to reach its maximum. A concentration of rare species in this area is not surprising, knowing that the climate is generally considered the most favourable in Norway. In Great Britain (New 1974) *C. atricornis* is a "rare, perhaps local, species", *P. fusciceps* has been recorded only once, *P. bipunctatus* has not been found since 1837, while *B. conspurcata* is not known at all. New (1971) considers the British non-domestic Psocoptera fauna "a slightly impoverished island fauna". Similarly, a peninsular effect could be expected in Norway, with mountain ranges making the northern and western valleys and fiord areas increasingly like islands as far as a warmth-demanding group like Psocoptera is concerned. In order to separate possible effects of isolation from the effects of climate, more sampling efforts should be directed towards various sites with a particularly warm summer climate, which seems to be important to Psocoptera, like continental valleys in region ON, and to the scattered areas with thermophilous vegetation in the inner fiords of West Norway. Investigation of warm and sunny locations in the Oslofjord area should be intensified. Also, more sampling from the bottom and field layers, and various odd habitats, may be necessary in order to separate the really rare species from the ones that may be widespread but overlooked. Increased sampling activity in poorly investigated habitats and in areas with a particularly favourable climate may well reveal additional species.

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SAMMENDRAG

Norske støvlus (Psocoptera) I — en nasjonal artsliste, med foreløpige kommentarer til utbredelse og alminnelighet

I alt 53 arter av støvlus rapporteres fra Norge, hvorav bare 21 er publisert tidligere. Forfatteren har selv identifisert et materiale på over 10 000 dyr, fordelt på 49 arter. Antall funn av de enkelte artene i de forskjellige regionene tjener som foreløpige indikasjoner på alminnelighet eller sjeldenhet, og tilsynelatende utbredelsesmønstre blir diskutert. Artssammensetning og utbredelse av den norske faunaen sammenlignes med hva man kjenner

fra andre nordeuropeiske land, og høydeutbredelsen i Alpene. Artsantallet avtar raskt med høyden, og bare få arter synes å nå skoggrensen. Det største artsmangfoldet later til å finnes i Oslofjordområdet, med flere tilsynelatende sjeldne arter. Innsamlingene har likevel vært dårlig fordelt geografisk, og har vært konsentrert om trær og busker. Økt fangstinnsats i bl.a. mer bakkenære sjikt, og på steder med særlig varmt sommerklima, vil være viktig for å kunne skille virkelig sjeldne arter fra dem som bare er oversett. Nye arter bør også kunne finnes på den måten.

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Description of *Syntemna haagvari*, a new species of Mycetophilidae (Diptera) from Norway

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Økland, B. 1995. Description of *Syntemna haagvari*, a new species of Mycetophilidae (Diptera) from Norway. - Fauna norv. Ser. B 42: 59-62.

In this article seven species of *Syntemna* are reported from southeastern Norway. One of the species, *Syntemna haagvari*, is described for the first time.

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Syntemna Winnertz 1863 is considered to be a strongly boreal genus with many Holarctic species. The genus was revised by Hutson in 1979, and since that time new species have been added by Plassmann (1978, 1990), Vockeroth (1980, Nearctic species) and Zaitzev (1994). Adults of this genus seem to be relatively uncommon in collections and samples. Little is known about biology beyond that two of the species have been reared or collected from saproxylic habitats (Hutson 1979).

In the period 1991-93 fungus gnats have been collected by malaise traps and trunk-window traps on polypore fungi (Kaila 1993) from a large number of localities with old spruce-dominated forest in different parts of south-eastern Norway. The material contained seven species of *Syntemna*: *Syntemna hungarica* (Lundström 1912), *Syntemna nitidula* Edwards 1925, *Syntemna setigera* (Lundström 1914), *Syntemna stylata* Hutson 1979, *Syntemna relicta* (Lundström 1912), *Syntemna penicilla* Hutson 1979, and a new species *Syntemna haagvari* described below.

***Syntemna haagvari* sp.n.**

Syntemna haagvari seems to be closely related to *Syntemna setigera* (Lundstr.). The macrotrichia are mainly restricted to the apical half of the wing beyond the base of Median fork, and none are found in or close to the Basal cell. An apical brush of pale hairs curved distally is found at the apex of tarsal sement 1, but not at the apex of tarsal segment 2 of the fore leg. However, the new species is distinguished by principle differences in the morphology of the male genitalia. Parameres are lacking in *S. haagvari* (**Figure 1**), but are present in *S. setigera* (Lundstr.) and other related species (**Figure 2**, and Hutson 1979). The gonostyle of *S. haagvari* differs from *S. setigera* and *S. penicilla* in its shape and the absence of a very stout bristle on the inner surface surrounded at base of a membranous ring or a socket (**Figure 1** and **2**, and Hutson 1979). The median process of tergite 9 is broader and shorter in *S. haagvari* compared to the related species (**Figure 1**, **2** and Hutson 1979). Differences were also found in other parts of the body, but are considered as supporting characters because body characters may be less consistent in *Syntemna* (Hutson 1979).

Description: Body length 3.9 mm. **Head**: head dark brown with light brown mouthparts; maxilar palps pale and 4-segmented; both segment 3 and 4 long, each about twice as long as segment 2; segment 4 much thinner than the

Figure 1
Male gentalia of
Syntemna haagvari
sp.n.

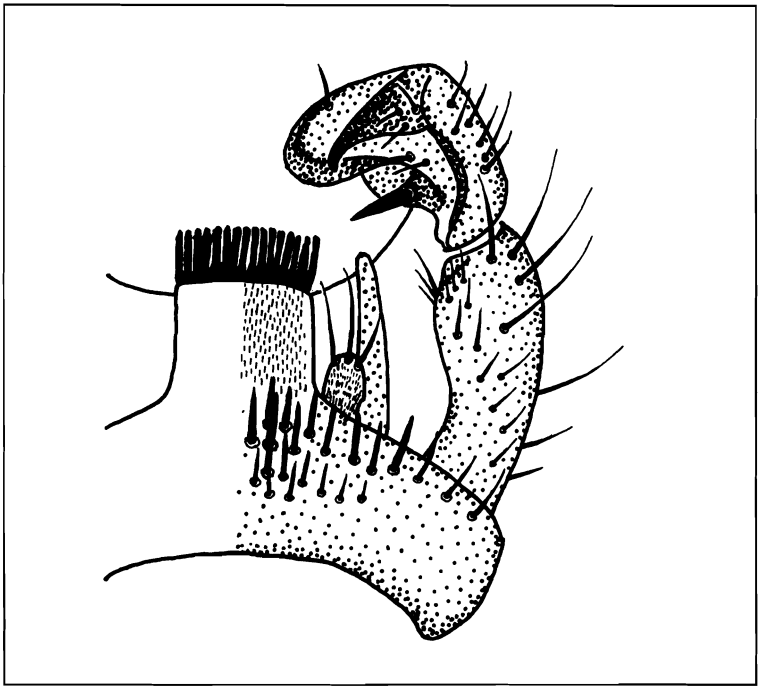

Figure 2
Male gentalia of
Syntemna setigera
(Lundström 1914)

other palp segments; oval spot on innerside of segment 2; Vertex covered with short pale hairs and with well-developed greyish ocelli, the lateral ocelli about 2 ocelli diameters from the eye margin; antenna clearly longer than head and thorax together, length 1.9 mm; Mid flagellar segments with length 2.0-2.5 X the width; all antennal segments densely covered with pale hairs shorter than the segment width; scape dark brown; pedicel and 1st flagellar segment pale; other flagellar segments brown. **Thorax**: Mesonotum, scutellum and mediotergite dark brown; sideplates of thorax and lateral parts of mesonotum and mediotergite brown; light brown shoulder spot; mesonotum with long pale bristles covering lateral and frontal parts and forming three longitudinal stripes in the center of the discal plate; 6 major scutellar bristles placed to either side of scutellum; mediotergite and sideplates of thorax bare, except for a group of long pale bristles on pleurotergite and 2-4 bristles at each of the propleuron and the forepart of pronotum; halters pale. **Wings**: Clear, length 3.7 mm; microtrichia in the whole wing; macrotrichia mainly restricted to the apical part beyond the base of Median fork, with none in or close to the basal cell; most veins with macrotrichia except for bare Medial stem, R-M, and stem of hind fork; Anal vein bare or with a few macrotrichia at its tip; R4 present, forming a small cell with Rs; length of Medial stem about twice the length of RM; Sc ending in R1 about the level of R4; C reaching well beyond the end of R5; the veins C, R1, R4, R5 and Rs brown, other veins light brown or pale; distinct black spots at the base of the wing. **Legs**: Coxae and femura yellow, more pale in fore leg; trochanters and the base of coxae brown; tibiae and tarsal segments pale, but increasing density of darker hairs towards apex gives the tarsal segments a darker impression; all tibia with yellow apical spurs, fore tibia with a single spur, and tibia 2 and 3 with 2 spurs, one of the spurs about 1/5 shorter than the other; length of tibia about 1.2 X the length of basitarsus in foreleg; apical brush of pale hairs curved distally present at the apex of tarsal sement 1, but absent at the apex of tarsal segment 2 of the fore leg; fore basitarsus slightly swelling apically; all legs with wide tarsal claws with a well-developed denticulation; bristles of mid tibia: 3a, 2pd, 3p, 6pv, 3av, and hind tibia: 6a, 9pd, 6p, 3pv. **Abdomen**: Segments 1-3 brown, and all segments behind dark brown; abdominal plates covered with long pale hairs. *Genitalia* (male): Parameres absent; hind margin of tergite 9 convex with a broad and short median process bearing a comb of 18 dark fingerlike fringes; anterior of the median process is a row of smaller bristles, and anterior of this a row of 8-10 stout dark bristles, continuing laterally into a row of bristles along the hind margin of tergite 9; internal flaps at apex of gonocoxites well-developed; gonostyle with some strongly sclerotized processes on the inner side, but none of them are bristles surrounded at base of membranous ring or socket.

Holotype male: NORWAY, Oppland, Gausdal, Ormetjernkampen, June 1993. The type is preserved in the Zoological museum of Oslo. Later on, two male individuals have been identified by Dr. A. Zaitzev. One of these was sufficient for being included as paratype.

Paratype male: Oppland, Gausdal, Tjuruverket, vii 1993. The paratype is preserved at A.N. Severtzov Institute of Ecology and Evolution, Moscow.

ACKNOWLEDGEMENTS

I am thankful to Dr. A.I. Zaitzev for all help in the present work. The study was a part of the research programme "Forest ecology and Multiple use", financially supported by the Norwegian Research Council.

SAMMENDRAG

Beskrivelse av *Syntemna haagvari*, en ny art av Mycetophilidae (Diptera) fra Norge.

I denne artikkelen rapporteres syv *Syntemna* arter fra sørøst Norge. Blant disse er en art, *Syntemna haagvari*, beskrevet for første gang.

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Short communication

A species of Tipulidae (Diptera) new to Norway

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A male of *Prionocera chosenicola* Alexander 1945 (= *Prionocera tjederi* Mannheims, 1948) collected at Grenseneset, FØ: Sør-Varanger, 19/7/1969, leg. Tore Nielsen, was found in the alcoholic collection in Bergen. This represents the first record for this species in Norway. As *Prionocera tjederi* it is known from northern Sweden, Finland, Russia and The Czech Republic, as well as from North America (Brodo 1987), and therefore its presence in Norway is not unexpected. According to the recent check list of Norwegian Tipulidae (Hofsvang 1992) this brings the Tipulidae total to 94 species, and 5 species of *Prionocera* are now known to occur in Norway.

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Leptocerus tineiformis Curtis, 1834 (Trich., Leptoceridae), a new caddis fly for Norway

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In early August 1993 one male of *Leptocerus tineiformis* Curtis, 1834 was netted flying close to the outlet of the river draining Lake Borrevann in Vestfold (VE, Borre: Falkenstein, UTM: 32VNL812903, 2 August 1993); several more specimens probably belonging to the same species, were observed. A visit to the river on 4 August 1994 gave no further specimens. The river is approximately 5 m wide, shallow and slow flowing. It runs through a park and the river bed has been modified. There are a few small weirs and the banks are laid with stones; upstream both banks and bottom are cemented. A dam is situated further upstream, where the river is forming a small lake with heavily grown shores.

L. tineiformis is distributed in most parts of Europe north up to Denmark, Sweden and Finland (Botosaneanu & Malicky 1978, Andersen & Wiber-Larsen 1987). In Sweden it is taken in Södermanland and Uppland (Forsslund 1953). In Finland the species is recorded from Helsingfors by Nybom (1980), who suggested that the specimens, 6 females, were accidental immigrants from the Baltic.

According to Tobias & Tobias (1981) *L. tineiformis* inhabits standing or slow flowing waters with rich vegetation.

SAMMENDRAG

Leptocerus tineiformis Curtis, 1834 (Trich., Leptoceridae), ny for Norge

Leptocerus tineiformis Curtis, 1834 er ikke tidligere rapportert fra Norge. I 1993 ble én hann fanget med håv nær utløpet av elven som drenerer Borrevann i Vestfold. Arten er utbredt over det meste av Europa, nærmeste lokaliteter ligger i øst Sverige og i Danmark.

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Three gold wasps new to Norway: *Hedychridium ardens* (Coquebert, 1801), *Pseudospinolia neglecta* (Shuckard, 1836) and *Chrysis rutiliventris* Abeille, 1879 (Hymenoptera, Chrysididae)

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One specimen of *Hedychridium ardens* (Coquebert, 1801) was collected at VE Tjøme: Hvasser, Nessletta (EIS 19) on the 7 June 1993, leg. Øistein Berg. It was flying in a small sandy depression with little vegetation. The species is known from Europe, North Africa and the Middle East (Kimsey & Bohart 1990). In Sweden the species is recorded from several provinces north to Norbotten (Erlandsson 1971). Most chrysidids are parasitoids on other aculeate larvae: The two sphecid wasps *Tachysphex pompiliformis* (Panzer, 1805) and *T. nitidus* (Spinola, 1805) are recorded as hosts for *H. ardens* by Else (1973) and Mocsáry (1889) respectively. *T. pompiliformis* was collected on the island of Hvasser on the 6 June 1992, and both *Tachysphex* species have been taken on the neighbouring island of Sandø (Fjellberg 1993).

A male of *Pseudospinolia neglecta* (Shuckard, 1836) was netted at the roadside at HES Eidskog: Leirsjøen (EIS 38) on the 3 July 1991, leg. Øistein Berg. This is a Holarctic species found in Europe, northern China, Mongolia and northern North America (Kimsey & Bohart 1990). In Sweden the species is recorded from several provinces north to Gästrikland (Erlandsson 1971). Kimsey & Bohart (1990) record the mason wasps *Odynerus spinipes* (L., 1758) and *O. reniformis* (Gmelin, 1790) (Eumenidae) as hosts for *P. neglecta.* A male of *O. spinipes* was collec-

ted at Leirsjøen on the 20 June 1989. Morgan (1984) refers to Maneval (1932) who mentions a mason bee — *Osmia villosa* Schenck (Megachilidae) — as a host. This species is not found in Norway, but there are several other Norwegian species in that genus.

A male of *Chrysis rutiliventris* Abeille, 1879 was netted at VE Våle: Langøya (northern part) (EIS 19) on the 28 May 1991, leg. Øistein Berg. Another specimen was collected on the same day by the same collector at VE Sande: Kommersøya (EIS 19). A female was taken at BØ Ringerike: Tyristrand (EIS 28) on the 30 June 1991, leg. Anders Dahl. These specimens of *C. rutiliventris* are closer to the ssp. *vanlithi* Linsenmaier, 1959 than to the nominotypical form. The species is widely distributed in the Palearctic region (Kimsey & Bohart 1990), in Sweden it is recorded from four provinces from Scania to Bohuslän (Erlandsson 1971). Species of the mason wasp genus *Ancistrocerus* Wesmael (Eumenidae) are mentioned as hosts in England by Morgan (1984), this is the most numerous and common eumenid genus in Norway so it may very well include the host species here as well.

ACKNOWLEDGEMENTS

Thanks to Anders Dahl for gift of material and to Lars Ove Hansen for providing transport.

SAMMENDRAG

Tre gullveps nye for Norge: *Hedychridium ardens* (Coquebert, 1801), *Pseudospinolia neglecta* (Shuckard, 1836) *Chrysis rutiliventris* Abeille, 1879 (Hymenoptera, chrysididae)

Tre nye arter av gullveps meldes for første gang fra Norge: *Hedychridium ardens* ble fanget på Hvasser i Tjøme kommune i Vestfold. *Pseudospinolia neglecta* ble tatt ved Leirsjøen ved Magnor i Hedmark. *Chrysis rutiliventris* ble fanget på Langøya utenfor Holmestrand, på Kommersøya i Sandebukta i Vestfold og ved Tyristrand på Ringerike i Buskerud.

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Opilio parietinus (De Geer, 1778) (Arachnida, Opiliones) does belong to the Norwegian fauna

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INTRODUCTION

The Norwegian harvestman fauna is up till now believed to comprise 15 species, with the latest new species reported in 1982. These are all well treated in Stol (1982), with the exception of the 15th, *Trogulus tricarinatus* (L., 1767), which was delivered for publication shortly afterwards (Solhøy 1982). *T. tricarinatus* was collected in Arendal which is in EIS 6, not in EIS 11 as the paper of Solhøy indicates.

Opilio parietinus has also been reported once from Norway (Strand 1900), but when Stol revised the Norwegian material in 1982, he decided to remove it from the list as all museum material proved to be juveniles of *Mitopus morio* (Fabricius, 1779) (Stol 1982). Strand (op. cit.) reported one specimen from a dwelling house in Oslo on 30 September 1899, but this specimen has not been examined by Stol, and is probably not present in any museum (I. Stol in litt.). When including the present records, this is the only species belonging to the genus *Opilio* hitherto to be recorded in Norway, and it can be distinguished from the other Norwegian harvestmen by the following combination of characteristics: distinct ocularium; palp with claw: palpal claw smooth; no distinct trident; patella and tibia of palp without apophysis; underside not white; no tubercles below the front edge of cephalothorax (Sankey & Savory 1974).

O. parietinus and *O. saxatilis* C.L. Koch, 1839 are both known from Denmark and southern Sweden, and the former also from southern Finland (Meinertz 1964, Martens 1978, Stol 1993). In Denmark and southern Sweden, a third species *O. canestrinii* (Thorell, 1876), is known. This was first recorded in 1985 (Gruber 1988), and in 1987 registered as the most abundant Danish harvestman, based on samples from walls, fences etc. (Enghoff 1987, 1988). There is good reason to look out for this species in Norway.

THE NEW NORWEGIAN MATERIAL

O. parietinus was handpicked on two occasions. Both times only one individual was collected from buildings, about 1 m above the ground. The first specimen, an adult male, was taken at Kringsjå, Oslo (EIS 28) on 17 September 1993. The second specimen, also an adult male, was collected from a brick wall in Hokksund, Buskerud county (EIS 28) on 29 September 1993. The distance between the two localities is about 45 km.

ACKNOWLEDGEMENTS

Thanks to Ingvar Stol for commenting upon the manuscript, and to Arvid Bach for correcting my English.

SAMMENDRAG

Opilio parietinus (De Geer, 1778) (Arachnida, Opiliones) tilhører den norske fauna

Langbeinarten *Opilio parietinus* (De Geer, 1778) kan på grunnlag av to funn av voksne hanner i 1993 gjeninnføres på den norske faunalisten. Strand (1900) angir arten fra et boligh us i Oslo i 1899, men ved revisjon har alt museumsmateriale vist seg å være unge

Mitopus morio (Fabricius, 1779) (Stol 1982). Strands eksemplar har ikke vært å finne i noe museum, og Stol besluttet derfor å stryke arten fra den norske listen. Det bør i tillegg holdes skarpt utkikk etter *O. canestrinii* (Thorell, 1976), som nylig har vist seg å være meget vanlig i Danmark (Enghoff 1988), og som også har dukket opp i Sør-Sverige.

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Cordioniscus stebbingi (Patience, 1907) and *Trichorhina tomentosa* (Budde-Lund, 1893), two greenhouse woodlice (Isopoda, Oniscidea) new to Norway

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INTRODUCTION

Several of the woodlice reported from Norway and the other Nordic countries are totally or predominantly confined to indoor localities. According to Enckell (1980), *Androniscus dentiger* Verhoeff, 1908 and *Trichoniscus pygmaeus* (G.O. Sars, 1898) are confined to greenhouses in Norway, but also these species have been found outdoor in the Oslo area by the author.

C. stebbingi is described from Glasgow, Scotland, where Patience (1907) found specimens both outdoor and in greenhouses in 1906. It is indigenous in South America and known from several European countries including Denmark, Finland and southern Sweden (Gruner 1966, Lindroth 1957). The species is also reported from the USA (Van Name 1936). The two subspecies described from Continental European specimens are not approved by Gruner (1966).

T. tomentosa is described from Venezuela and has apparently been found only once in the Nordic countries, namely 145 females in a greenhouse in the Botanical Garden in Copenhagen, Denmark, in 1930 (Meinertz 1934). These specimens made the basis for the description of the synonym *T. monocellata* Meinertz, 1934. The species is indigenous and widely distributed in Central America, and brought by man to Europe, where it exclusively is found in greenhouses. No male specimens are known.

Keys and illustrations can be found in Edney (1954), Gruner (1966) and Enckell (1980).

THE TWO SPECIES IN NORWAY

The greenhouses (one large, modern and two smaller, older) near the Botanical Garden at Tøyen, Oslo (EIS 28) were inspected on 28 October 1993.

Three adult females of *C. stebbingi* were found underneath flower pots in the large greenhouse. The floor in this house is made of concrete and the temperature in the actual compartment is 18 °C. The animals are moving quite rapidly, especially when they are aware of a danger, and their reddish brown colour gives a rather good camouflage against the substrate.

In one of the smaller greenhouses there is bare soil on the floor and the temperature is about 10 °C. Underneath flower pots placed on a cloth-covered table five specimens (three adult females, one with marsupium, and two juveniles) of *T. tomentosa* were collected. These are slow-moving and easy to catch, besides being much easier to see as they are unicoloured white.

ACKNOWLEDGEMENTS

I express my gratitude to Bjarne Meidell who checked the specimens as well as carefully read the manuscript and gave valuable corrections. Arvid Bach, Christian Steel and Kari Rigstad also commented on the manuscript.

SAMMENDRAG

Cordioniscus stebbingi (Patience, 1907) og *Trichorhina tomentosa* (Budde-Lund, 1893), to veksthusskrukketroll (Isopoda, Oniscidea) ny for Norge

De to veksthusskrukketrollene *Cordioniscus stebbingi* (Patience, 1907) og *Trichorhina tomentosa* (Budde-Lund, 1893) er funnet som nye for Norge i veksthuskomplekset ved Botanisk Hage på Tøyen i Oslo. *T. tomentosa* er funnet én gang i Danmark og *C. stebbingi* er tidligere rapportert fra Danmark, Finland og Sør-Sverige.

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Nanogona polydesmoides (Leach, 1815) (Diplopoda, Chordeumatida) from two new localities in Norway

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INTRODUCTION

N. polydesmoides was first reported from Norway by Meidell (1975), who published a record made in Bergen in 1956 (leg. A. Storesund). Two females were found in a garden. Since then, no observations have been reported from Norway. The next report from Scandinavia is that of Gärdenfors (1991), mentioning four adult specimens (1♀, 3♂♂) from the district of Hälsingborg, Sweden, in 1989, and later (1991) another mature male.

The species is widely distributed in Great Britain and Ireland (Kime 1990), where it liven under stones, fallen logs and bark (Blower 1985). It is preferably found on calcareous localities in or near woodland, but also in more open land, arable fields usually not included. In Britain, this is the species most frequently recorded from caves. The species is also rather common in southern France and otherwise only in scattered localities in the rest of France and southern Belgium. An isolated subspecies (*N.p. italicus* Manfredi, 1931) occurs in the Lombardi area of the Italian Alps, although this is not indicated in Kime (1990). The species is known to be winter active (Blower 1985).

NEW LOCALITIES IN NORWAY

Unsystematical sampling of millipedes has been carried out by the author in the surroundings of Arendal in Aust-Agder County and in the Oslo area. In both areas the species has been found, and both localities are more or less influenced by man. In Arendal (EIS 6), two females were found underneath a birch log in Naturparken, Blødekjærheia, on 27 March 1993. The ground was rather frozen and ice crystals were present on the lower surface of stones and logs. The park is encircled by roads and buildings, and Arendal railway station is situated at the bottom end of the rather steeply sloping deciduous forest (mostly oak *Quercus* spp.). Another female was caught in a Barber pitfall at the same site between 5 September and 7 November 1993.

In Oslo (EIS 8), two females and one juvenile male were found under two large stones in a mound of clay in the compost heap area of the Botanical Garden at Tøyen, on 27 August 1993. This locality is undoubtedly heavily influenced by man, and introduction from abroad cannot be excluded. Plants are regularly imported to the Botanical Garden and its greenhouses (R. Elven pers. comm.). It is not very likely that the species can spread to new areas by itself from here. One adult male was also discovered in one of the greenhouses at the same locality on 21 October 1993. The temperature inside was 10 °C.

IS THE SPECIES INDIGENOUS OR INTRODUCED TO SCANDINAVIA?

Gärdenfors (1991) discusses whether *N. polydesmoides* is introduced to Sweden or not. As

the locality near Hälsingborg resembles its natural habitats in Great Britain and Ireland, there is a possibility that it is of ancient, but post-glacial, origin in Sweden. The localities in Norway (including Bergen) are all more obviously synanthropic, and nothing points to an indigenous origin here.

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SAMMENDRAG

Nanogona polydesmoides (Leach, 1815) (Diplopoda, Chordeumatida) fra to nye lokaliteter i Norge

Nanogona polydesmoides (Leach, 1815) har hittil bare blitt funnet to steder i Skandinavia; i Bergen i 1956 og i nærheten av Helsingborg, Sverige, i 1989 og 1991. Arten rapporteres her fra to nye funnsteder i Norge: Naturparken, Arendal, Aust-Agder og området ved komposthaugen til Botanisk Hage og Museum, Tøyen, Oslo. Begge funn er fra 1993.

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Fauna norv. Ser. B 42 (1) 1995

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