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Tipula (s.str.) oleracea Linnaeus, 1758, in Norway, with a key to the Norwegian *Tipula (s.str.)* (Diptera, Tipulidae)

John Skartveit

Skartveit, J. 2006. *Tipula (s.str.) oleracea* Linnaeus, 1758, new to Norway, with a key to the Norwegian *Tipula (s.str.)* (Diptera, Tipulidae). Norw. J. Entomol. 53, 1-4.

The Common cranefly, *Tipula (s.str.) oleracea* Linnaeus, 1758, is recorded for the first time from Norway. A female specimen was collected at RY, Finnøy, Sevheim on 8 June 2005. A key to the Norwegian *Tipula (s.str.)* is given. The potential spreading and pest status of *T. oleracea* is commented upon.

Key words: cranefly, *Tipula oleracea,* agricultural pests

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INTRODUCTION

The Marsh cranefly *Tipula paludosa* Meigen, 1830 is a well-known pest species (Darvas *et al.* 2000), occasionally doing extensive damage to leys and other grassy fields in northern Europe. However, the subgenus *Tipula (s.str.)* includes two further species in Northern Europe. While working at Finnøy, SW Norway in early June 2005 I noticed that a species rather similar to *T. paludosa* was flying. Noting that this was very early for *T. paludosa,* I collected a specimen, which on closer examination turned out to be the Common cranefly, *Tipula oleracea* Linnaeus, 1758. This species has not previously been recorded from Norway (Hofsvang 1981, 1992).

The species of *Tipula (s.str.)* are greyish crane-flies, with wing lengths 13-28 mm (Coe 1950). The wings are pale brownish with the costal cell brown, which give the wings a conspicuous brown fore margin. The wings have no other obvious colour patterns. All three *Tipula (s.str.)* which occur in northern Europe have been noted as agricultural pests (Darvas et al. 2000). *T. oleracea* is the predominant pest species in Central Europe, while *T. paludosa* causes problems mainly in areas with an Atlantic climate. The somewhat

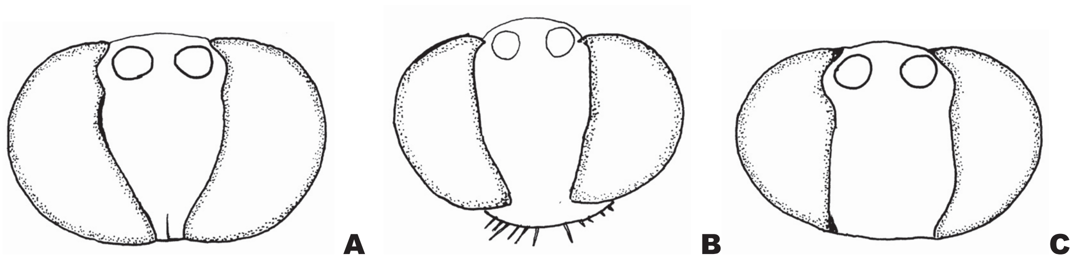
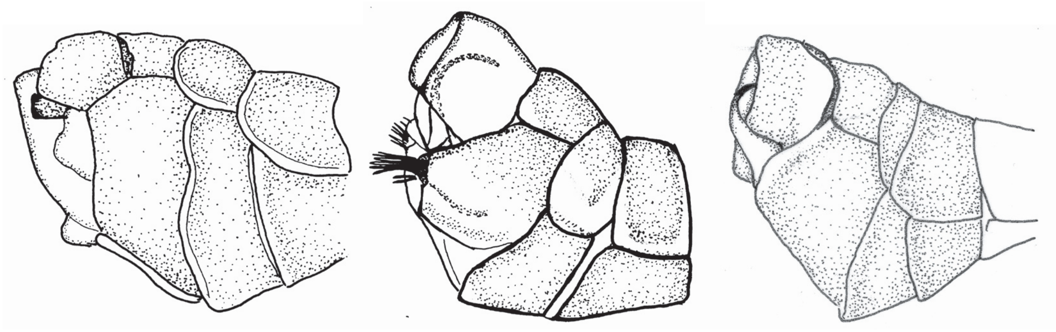


Figure 1. Heads, frontal/ ventral view, mouthparts and antennae omitted. A. *T. oleracea.* B. *T. paludosa.* C. *T. subcuntans.*



A B C

Figure 2. Male terminalia, lateral view. A. *T. oleracea* (Drawn from a specimen from Ayrshire, Scotland). B. *T. paludosa.* C. *T. subcuntans.*

less common Autumn cranefly, *Tipula subcuntans* Alexander, 1921 is considered a minor pest in Central and Southern Europe *(*Darvas *et al.* 2000). Hofsvang (1981) reviewed the distributions of T. *paludosa and T. subcuntans* (as *T. czizeki* de Jong) in Norway.

Since *T. oleracea* was not included in the key given by Hofsvang (1986), a new key to the Norwegian species of *Tipula (s.str.)* is provided, with short comments to each species. Terminology follows Alexander & Byers (1981).

KEY TO THE NORWEGIAN *Tipula (s.str.)*

1. Distance between eyes below short, considerably less than half the distance at level with the antennal sockets (Figure 1A). Antenna 13-segmented. Male terminalia as in Figure 2A ....*Tipula oleracea* L., 1758

- Distance between eyes below longer, at least approximately half as long as distance at level with antennal sockets. Antenna 13- or 14-segmented. Male terminalia different.................................... 2

2. Antenna 14-segmented. Distance between eyes below approximately half as long as distance at level with antennal sockets (Figure 1B). Male terminalia as in Figure 2B, outer lobe of gonostylus very large, leafy and transparent, curved spine on inner gonostylus lobe very long and slender. Inner gonostylus lobe with a conspicuous tuft of yellow hairs.....................*Tipula paludosa* Meigen, 1830

- Antenna 13-segmented. Distance between eyes below considerably more than half as long as distance at level with antennal sockets (Figure 1C). Male terminalia as in Figure 2C, outer lobe of gonostylus smaller, not transparent, curved spine on inner gonostylus lobe shorter and more robust. Inner lobe of gonostylus without conspicuous hair tuft................*Tipula subcuntans* Alexander, 1921

****Tipula oleracea* Linnaeus, 1758**

Material: Norway, **RY:** Finnøy (EIS 14), Sevheim, 8 June 2005, J. Skartveit leg., 1 □

The species has not been previously recorded from Norway, but has been found as far north as southern Sweden (Darvas et al. 2000). It has neither been recorded from Finland nor Estonia (Brodo 1994). The species is bivoltine, with a spring and an autumn generation (Darvas et al. 2000). Although its flight period lasts between April and October, its peak abundance is in spring, unlike the two following species (Coe 1950). Any adult *Tipula* (s.str.) found before July should be checked for this species, as *T. paludosa* appears not to have been collected earlier than10 July in Norway (Hofsvang 1981). The species was not present in a large Diptera material collected using yellow water traps at the same locality between April- September in 1995. This may suggest that it is a newcomer to the area. *T. olerace*a is habitually very similar to the familiar *T. paludosa,* and for this reason it is likely the species has been overlooked in Norway, though Hofsvang (1981) did not find it among the material of *Tipula* (s.str.) in Norwegian museums.

Tipula paludosa Meigen, 1830

This is the predominant species in northern and western Europe (Hofsvang 1981, Darvas et al. 2000). It appears to be present over most of the lowland areas in Norway with the possible exception of Troms and Finnmark counties (Hofsvang 1981).

Tipula subcuntans Alexander, 1921

Syn *Tipula czizeki* de Jong, 1925

Material: Norway, **HOY:** Lindås (EIS 39), Mongstad oil refinery, Malaise trap, 10. August-24. November 2005, J. Skartveit leg., 1 □.

Less frequently recorded than *T. paludosa,* but this is possibly due to its late flight period (Hofsvang 1981). *T. subcuntans* flies in late September and early October in SE Norway (Hofsvang 1981). The species appears to occur further north than *T. paludosa,* reaching as far as Tromsø in Norway (Hofsvang 1986).

DISCUSSION

Tipula oleracea is a potential agricultural pest species and its presence in Norway is notable for this reason. Damages due to the three North European *Tipula* (s.str.) are considered similar (Darvas et al. 2000), though the larva of *T. subcuntans* appears to be undescribed (Darvas et al. 2000). It should be possible to distinguish the species at least partially through their phenology. Any full-grown tipulid larvae damaging fields in late winter and early spring are likely to be *T. oleracea.* The Norwegian *Tipula* (s.str.) include one widespread, univoltine species (*T. paludosa*), one univoltine species with a late flight period (*T. subcuntans*) and one apparently newly-established species, bivoltine in Central Europe. This situation has an interesting parallel in the bibionid genus *Dilophus,* which also has three Norwegian species (Skartveit 1996). *Dilophus femoratus* is widespread and univoltine, *D. borealis* is an univoltine species with a late flight period and boreoalpine distribution, and *D. febrilis* is bivoltine, with a southern distribution, and apparently a newcomer in the fauna. The latter species is currently spreading in Norway and has already been noted as an occasional pest (Skartveit 2004). A warming climate is likely to facilitate the establishment and spreading of such species in Norway, and thus lead to increased insect pest problems.

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Norsk samandrag. Kålstankelbein, *Tipula oleracea,* vart funnen på Finnøy, Rogaland i 2005. Dette er fyrste norske funn av arten. Eg gjev ein revidert nøkkel til norske artar i underslekta *Tipula,* som ved sida av kålstankelbein omfattar myrstankelbein *(Tipula paludosa)* og haust-stankelbein *(Tipula subcuntans)*. Alle tre artane kan gjera skade på eng og avlingar. *T. oleracea* mangla i eit stort tovengjemateriale samla på den same lokaliteten i 1995, og det synest rimeleg at arten er nyetablert. Ei klimaendring som fører til varmare klima aukar truleg sjansen for at artar som *T. oleracea* skal etablera seg, spreia seg og gjera skade i Noreg.

REFERENCES

Alexander, C.P. & Byers, G.W. 1981. Tipulidae. Pp. 153-190 in McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (eds.), Manual of Nearctic Diptera, Vol. 1. Research Branch, Agriculture Canada Monograph No. 27.

Brodo, F. 1994. The subgenus *Tipula (Tipula)* in Finland and Estonia. Entomol. Fenn. 5, 49-52.

Coe, R.L. 1950. Family Tipulidae. Pp. 1-66 in Coe, R.L., Freeman, P. & Mattingly, P.F., Diptera 2. Nematocera: families Tipulidae to Chironomidae. Handbk. Ident. Br. Insects, 9:2.

Darvas, B., Skuhravá, M. & Andersen, A. 2000. Agricultural dipteran pests of the Palaearctic region. Pp. 565-649 in Papp, L. & Darvas, B. (eds.), Contributions to a Manual of Palaearctic Diptera, Volume 1, General and Applied Dipterology. Science Herald, Budapest.

Hofsvang, T. 1981. The species of the subgenus *Tipula* L. (Dipt., Tipulidae) in Norway. Fauna norv. Ser. B 28, 93-95.

Hofsvang, T. 1986. Stankelbein (Diptera, Tipulidae). Norske Insekttabeller 10. 84 pp. Norsk Entomologisk Forening, Ås.

Hofsvang, T. 1992. A check list of Norwegian Tipulidae (Diptera). Fauna norv. Ser. B 39, 77-79

Skartveit, J. 1996. Distribution and flight periods of Norwegian *Dilophus* Meigen, 1803 (Diptera, Bibionidae), with a key to species. Fauna norv. Ser. B 43, 35-46.

Skartveit, J. 2004. Nordiske hårmygg (Bibionidae). Larver og imagines. Norske Insekttabeller 17. 26 pp. Norsk Entomologisk Forening, Oslo.

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The overwintering of *Gonioctena pallida* L. (Coleoptera, Chrysomelidae) in the alpine zone at Finse, Norway.

Ole J. Lønnve, Jostein-André Nordmoen & Lauritz Sømme

Lønnve, O.J., Nordmoen, J.A. & Sømme, L. 2006. The overwintering of *Gonioctena pallida* L. (Coleoptera, Chrysomelidae) in the alpine zone at Finse, Norway. Norw. J. Entomol. 53, 5-9.

In the low alpine zone at Finse, Norway, *Gonioctena pallida* overwinters as adult in soil and litter underneath shrubs of *Salix* spp. Larvae are present on *Salix* during the summer, and pupate in the litter in the autumn. Due to a thick cover of snow, winter temperatures at the overwintering sites rarely drops more than 1 or 2 °C below zero. In the laboratory, adult beetles survived 314 days at 2 °C, and another 420 days at this temperature following a short period of feeding. The adults also survived more than 8 months at –3 °C and more than six months at –6 °C. In contrast, all pupae died after two months at 0 °C. Mean supercooling points of adult beetles stored at 0 °C remained close to –10 °C during the winter. It is concluded that *G. pallida* is sufficiently cold hardy to survive alpine winter conditions in the adult stage. Apparently, the species has a one-year life cycle.

Key words: *Gonioctena pallida,* Coleoptera, Chrysomelidae, overwintering, supercooling points

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INTRODUCTION

The chrysomelid beetle *Gonioctena pallida* L. inhabits the lower alpine zone of the Scandinavian mountain chain but is also widely distributed in the lowlands of Fennoscandia, Siberia and Central Europe (Silferberg 1989, 2004). Species of the genus *Gonioctena* are specialist herbivores. Both larva and adult feed on the same host plants, which include *Salix, Corylus* and *Quercus* (Hansen 1927). *G. pallida* is facultative vivipar (Bontems 1988) and the life cycle is completed in one year (Axelsson et al. 1974a,b). In the lowland, the fully developed 4. instar larvae leave their host plants and pupate in the ground. The pupae hatch in the autumn and following a period of feeding, the adults overwinter in soil and litter. Like chrysomelids in general, their power of dispersal appears to be limited. Adults are rarely seen flying, although capable of doing so (Richards & Waloff 1961, Mason & Lawson 1982). More recently, phylogeographical studies of a regional population of *G. pallida* in Central Europe showed that the presence of several effective barriers prevents recurrent gene flow within the studied area (Mardulyn 2001).

In the low alpine zone at Hardangervidda, Norway, *G. pallida* feeds on several *Salix* spp., in particular on *Salix lanata* and to a lesser extent on *Salix glauca* and *Salix lapponum* (Nordmoen & Lønnve 1996).

The overwintering strategy of *G. pallida* under alpine conditions has not previously been investigated. The purpose of the present study was to study the cold hardiness of the species in relation to its overwintering at Finse, Norway.

MATERIAL AND METHODS

Description of habitat

Specimens of *G. pallida* for the present study were collected from the low alpine zone at Finse (60°36'N, 7°30'E) in the northern area of the Hardangervidda mountain plateau. The habitat was situated at 1300 m a.s.l. in the south-facing slope of Kvannjolsnut, characterized by dense patches of Salix spp. and otherwise relatively lush vegetation.

Temperatures in soil and litter underneath shrubs of *Salix* spp. were recorded with a Grant Squirrel 1200 data logger from 17 August to 28 October 1992. The thermocouples were situated 2, 5 and 8 cm below the surface. Another thermocouple was used to measure air temperatures 8 cm above the ground.

Sampling and treatments

Beetles for studies of cold hardiness were collected on several occasions. Following a period of feeding for two weeks at 22 °C in the laboratory, adult beetles sampled in June 1993 were placed at 2 °C in a temperature controlled cabinet. Beetles surviving 314 d at this temperature were allowed to feed on leaves of *Salix lanata* for four weeks under laboratory conditions, and subsequently exposed to 2 °C for a period of 420 d.

Adult beetles collected in August 1992 were acclimated two weeks at 5 °C and four weeks at 0 °C and subsequently placed at –3 or –6 °C.

Following exposure at the different temperatures, adult beetles were transferred directly to room conditions in the laboratory. They were considered to be alive when able to walk, but not if only movements of legs or antenna were observed.

Pupae of *G. pallida* collected from litter underneath *Salix* spp. in August 1992 were acclimated at 5 °C for 2 weeks before exposure to 0 °C for 57 d.

Supercooling

Supercooling points (SCPs) were measured with copper-constantan thermocouples, connected to a recording potentiometer. To slow the rate of cooling, each thermocouple was placed inside two glass tubes before being lowered into the cooling bath of a cryostat. Under these conditions the beetles were cooled at a rate of 1-2 °C min^{-1}.

SCPs of larvae were recorded shortly after collection in the field. Similarly, adult beetles collected in June were brought directly to the laboratory and tested. Beetles collected in August were acclimated for two weeks at 5 °C and subsequently stored at 0 °C. Samples for measurements of SCPs were removed at intervals from October to April. To record their ability to survive freezing, following the rebound the beetles were cooled for a second time to the temperature of their SCP.

RESULTS

Field observations

According to observation in the field, adult beetles appeared shortly after snow-melt in May, and were present until the middle of July. Larvae feeding on *Salix* were most numerous in June and July, and 4. instar larvae pupated in the litter below the shrubs. Adult beetles reappeared in the middle of August and could be collected from the litter in September. In this way, observations in the field strongly suggest that *G. pallida* has a one-year life cycle even under alpine conditions. As in the lowlands, overwintering apparently takes place in the adult stage.

Microclimate

From the middle of August till the middle of October no significant differences in temperatures were measured at 5 and 8 cm below the surface. In the litter layer 2 cm below the surface, the temperatures were more fluctuating, but fell slightly below 0 °C only once in a cold period just before the snow appeared. Air temperatures at 8 cm above the surface frequently dropped below 0 °C from the end of September and down to -15 °C in the end of October. When the snow appeared in the middle of October, temperatures below the surface became stabilized at approximately 0 °C. The lowest measured temperature during the winter was -0.7 °C. From the middle of October, only minor differences were recorded by the three thermocouples below the surface.

Cold hardiness

Long term survival

The beetles appeared to be highly chill tolerant. Among adults exposed to 2 °C for 314 d, 58 % survived (Table 1). Following feeding for four weeks in the laboratory, 91 % of the remaining beetles survived another exposure to 2 °C for 420 days. At –3 °C, more than 75 % of adult *G. pallida* survived for 239 d (Table 1). Two-thirds of the beetles survived for 191 d at –6 °C., while in a sample of 12 specimens all were killed after 218 days at this temperature.

In contrast, the pupae were more susceptible to long term exposure at low temperatures, and all of them died during 57 d at 0 °C (Table 1).

Supercooling

The supercooling points of adult beetles collected during the autumn and stored at 0 °C in the laboratory, did not change significantly from October to February (Table 2). In April the SCPs were slightly lower than in December. An ANOVA test did not show any significant differences between the measurements from October to February. Adults collected in their reproductive phase in early June had a mean SCP similar to those of the overwintering beetles. All beetles were killed by freezing at temperatures corresponding to their SCP.

The SCPs of 2. instar larvae collected from the shrubs in July had a mean SCP within the same range.

Table 1. Survival of adults and pupae of *Gonioctena pallida* during long term exposure to low temperatures.

Temp. °C	n	Days	Percent mortality
Adults			
2	46	314	42.3
	23[1]	420	91.3
-3	30	239	23.0
-6	12	127	0
	12	191	33.3
	12	218	100
Pupae			
0	129	57	100

[1] Following feeding 4 weeks in the laboratory

Table 2. Mean supercooling points of adults and larvae of *Gonioctena pallida* collected during the summer and stored at 0 °C in the laboratory.

Stage	Date	n	SCP±SD
Adult			
	June[1]	12	-10.3±1.1
	Oct	20	-9.7±3.2
	Dec	15	-10.2±2.8
	Feb	12	-9.3±3.9
	Apr	11	-8.0±3.4
Larvae			
	July	7	-9.7±1.9

[1]Tested shortly after collection

DISCUSSION

At Finse, the winter normally has a duration of approximately eight months. The snow usually arrives in early October, and at the overwintering sites of *G. pallida* a layer of at least 1 m is built up during the winter.

Temperature recorded in the ground 2. 5 and 8 cm below the surface at the overwintering sites of the beetles dropped to approximately 0 °C in the middle of October. At the end of the month, air temperatures 8 cm above the ground fell close to –15 °C. In general, the snow cover protects the ground from fluctuating and freezing temperatures (Wielgolaski 1997). When the snow cover is sufficiently thick, temperatures rarely drops more than one or two °C below zero. In this way the beetles are protected from low freezing temperatures. As pointed out by Nordmoen & Lønnve (1996), *G. pallida* apparently prefer areas of dense snow cover, and may be absent from *Salix* at other sites.

In the laboratory, adult *G. pallida* survived exposure at 0 and –3°C for periods corresponding to the duration of the winter, or longer. At –6 °C most specimens survived for more than six months, but this temperature is rarely encountered in the field. The supercooling capacity of the adult beetles is more than required to survive the temperatures they are likely to be exposed to during the winter. Their high degree of chill tolerance makes it possible for the beetles to survive long periods of exposure at temperatures above the supercooling points.

In contrast to the freeze susceptible *G. pallida,* two other chrysomelid beetles from the alpine zone in Norway are freeze tolerant. *Phyllodecta laticollis* may survive freezing down to –42 °C (van der Laak 1982) and *Melasoma (Chrysomela) collaris* tolerates temperatures down to –35 °C (Sømme & Conradi-Larsen 1979). Both species overwinter in unprotected sites and are exposed to low air temperatures.

Recently, several papers on chrysomelid beetles with similar life cycles and overwintering strategies as *G. pallida* have been published. At the Kola Peninsula, NW Russia the leaf beetle Chrysomela lapponica feeds on *Salix borealis* (Zvereva 2002). Adult beetles overwinter in the soil where they are protected from low temperatures. Food quality in the pre-overwintering period has strong impact on survival. In Tsukuba, Japan, the univoltine chrysomelid beetle *Aulacophora nigripennis* overwinters as adult in cracks and crevices (Watanabe & Tanaka 1998). More than 90 % of the beetles survived for five months at outdoor conditions. Their chill tolerance increased during the autumn, while mean SCPs did not fall below –11 °C. Similarly, Lam & Pedigo (2000) found that the bean leaf beetle *Cerotoma trifurcata* avoids extreme temperatures during overwintering in leaf litter of woodlands in Iowa, USA.

In conclusion, adults of *G. pallida* are sufficiently cold hardy to survive the alpine winter conditions at Finse. Their overwintering sites in litter and below a deep snow cover are protected from extreme low temperatures, but the beetles survive very long periods at temperatures close to 0 °C. Their overwintering strategy is similar to a pattern that has also been found in some other chrysomelid beetles.

REFERENCES

Axelsson, B., Bosetta, E., Lohm, U., Persson, T. & Tenow, O. 1974a. Energy flow through a larval population of *Phytodecta pallidus* L. (Col., Chrysomelidae) on *Coryllus avellana* L. I. Individual energy budget. Zoon 2. 49-50.

Axelsson, B., Lohm, U., Persson, T. & Tenow, O. 1974b. Energy flow through a larval population of *Phytodecta pallidus* L. (Col., Chrysomelidae) on *Coryllus avellana* L. II. Population energy budget. Zoon 2. 153-160.

Bontems, C. 1988. Localization of spermatozoa inside viviparous and oviparous female of Chrysomelidae. Pp. 299-315 in Jolivet, P., Petipierre, E. & Hsio, T. H. (eds). Biology of Chrysomelidae. Kluwer Academic Publishers. Dordrecht.

Hansen, V. 1927. Biller VII. Bladbiller og bønnebiller. Danm. Fauna, 31. 1-401.

Lam, W.-K. F. & Pedigo, L.P. 2000. Cold tolerance of overwintering bean leaf beetles (Coleoptera: Chrysomelidae). Environ. Entomol. 29, 157-163.

Nordmoen, J.-A. & Lønnve, O. J. 1996. Undersøkelser av biologien til en lavalpin populasjon av *Gonioctena pallida* L. (Col., Chrysomelidae). 95pp. Cand. scient. thesis in zoology. Department of Biology, University of Oslo.

Mason, M. L. & Lawson, F. A. 1982. Biology of the American aspen beetle (Coleoptera: Chrysomelidae: *Gonioctena americana* Schaeffer) in the Medicine Bow National Forest, Wyoming. J. Kans. Entomol. Soc. 55. 779-788.

Mardulyn, P. 2001. Phylogeograph of the Vosges mountains populations of *Gonioctena pallida* (Coleoptera: Chrysomelidae): a nested clade analysis of mitochondrial DNA haplotypes. Molec. Ecol. 10, 1751-1763.

Richards, O. W. & Waloff, N. 1961. A study of a natural population of *Phytodecta olivacea* (Forster) (Col., Chrysomelidae). Phil. Trans. Brit. 244, 205-257.

Silfverberg, H. 1989. The problem of arctic Chrysomelids (Coleoptera). Fauna norv. Ser. B. 36. 53-55.

Silfverberg, H. 2004. Enumeratio nova Coleopterorum Fennoscandiae, Daniae et Baltiae. Sahlbergia 9. 1-111.

Sømme, L. & Conradi-Larsen, E.M. 1979. Frost resistance in alpine, adult *Melasoma collaris* (Coleoptera). Oikos 33, 80-84.

Van der Laak, S. 1982. Physiological adaptations to low temperature in freezing tolerant *Phyllodecta laticollis* beetles. Comp. Biochem. Physiol. 73A, 613-620.

Watanabe, M. & Tanaka, K. 1998. Diapause and cold hardiness in *Aulacophora nigripennis* (Coleoptera: Chrysomelidae). J. Insect Physiol. 44, 1103-1110.

Wielgolaski, F.E. 1997. Fennoscandian Tundra. Pp. 27-83 in Wielgolaski, F.E. (ed.), Polar and alpine Tundra. Ecosystems of the World 3. Elsevier, Amsterdam

Zvererva, E. 2002. Effects of host plant quality on overwintering success of the leaf beetle *Chrysomela lapponica* (Coleoptera: Chrysomelidae). Eur. J. Entomol. 99, 189-195.

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Contribution to the knowledge of Coleoptera from Western Norway

Per Kristian Solevåg

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New data are given for the distribution of 45 species of Coleoptera in Norway, 13 species being new to Western Norway. Some ecological aspects are briefly discussed. The beetle fauna of Western Norway is poorly investigated, and the importance of faunistic surveys on all levels of beetle taxonomy seems clear. Most of the species presented are common and widely distributed in Norway, other species have a more restricted distribution, and some should even be reckoned as relicts from the postglacial warm period. One species group shows a clear preference for oceanic climate: *Quedius picipes* (Mannerheim, 1830), *Bolitobius inclinans* (Gravenhorst, 1806) and *Grynobius planus* (Fabricius, 1787). Another group has a more south-eastern distribution: *Calosoma inquisitor* (L, 1758), Badister *lacertosus* (Sturm, 1815), *Falagrioma thoracica* (Stephens, 1832), *Rhizophagus cribratus* Gyllenhal, 1827, *Xyletinus ater* (Creutzer, 1796) and *Cerylon fagi* Brisout de Barneville, 1867. Also hollow oaks in the area revealed interesting species: Dienerella elongata (Curtis, 1830), *Hapalaraea melanocephala* (Fabricius, 1787) and *Batrisodes venustus* (Reichenbach, 1816).

Key words: Coleoptera, Western Norway.

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INTRODUCTION

The topography and its east-western situation have probably led to the high diversity of forest communities along the 200 km long Sognefjord, Western Norway. On its northern side, the steep south-facing mountain slopes have a rather warm microclimate for the latitude. The inner parts of the fjord have high annual temperatures, and should probably be compared with some eastern areas in southern Norway (Aune 1993); favouring species of thermophilous insects. Hence, the northern side of the Sognefjord at sea level is mostly situated in the boreonemoral and southboreal vegetation zones (Moen 1999).

In the present paper some interesting species of beetles and species new for the area, collected during a larger survey along the Sognefjord in 2001 are presented. Pitfall traps were used, and the material is deposited at Bergen Museum. The nomenclature follows Lundberg (1995). The specimens are collected by P.K. Solevåg and Tom Alvestad. Survey grids (EIS) are given in accordance with Økland (1981).

THE SPECIES

Carabidae

Calosoma inquisitor (L, 1758)
SFI Balestrand: Tjugum (EIS 50) 15 May-7 August 2001. One specimen in a mixed deciduous forest. The first record from western Norway, previously known from **MRI, Ø, AK, AAY** and **VAY** (Figure 1) (Vik 1991, Gärdenfors et al. 2002).

Badister lacertosus (Sturm, 1815)
SFI Balestrand: Tjugum (EIS 50) 15 May-7 August 2001, Sogndal: Stedjeberget (EIS 50) 14

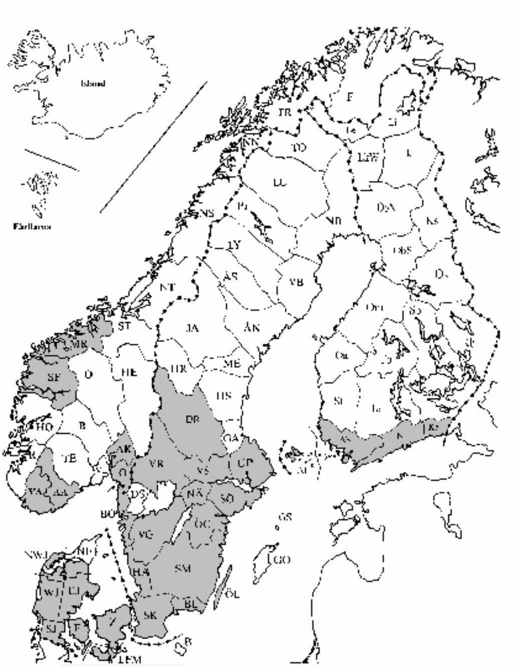

Figure 1. The distribution of *Calosoma inquisitor* in the Nordic countries.

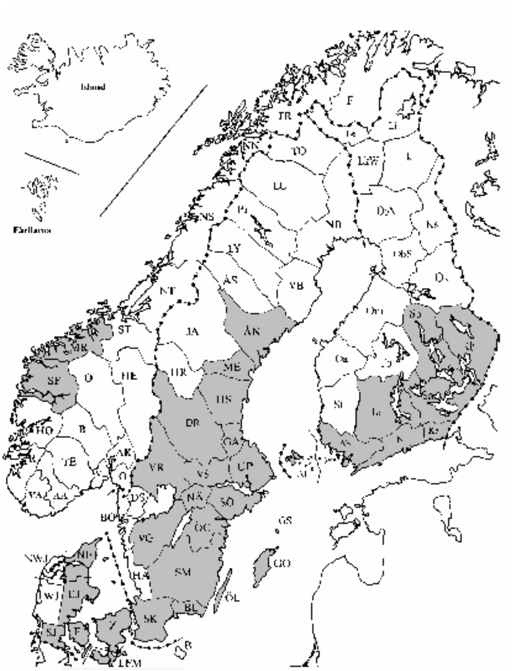

Figure 2. The distribution of *Badister lacertosus* in the Nordic countries.

May-6 August 2001; Luster: Luster (EIS 60) 15 May-6 August 2001; Leikanger: Leikanger (EIS 50) 15 May-7 August 2001.

All the sites were more or less dry deciduous forests. Also previously recorded from the area (Figure 2) (Løken 1965, Lindroth 1986, Refseth 1987).

Staphylinidae

Quedius picipes (Mannerheim, 1830)
SFY Solund: Engvika (EIS 48) 3 April-4 November 2001, two specimens in an open pine forest; Høyanger: Værholm (EIS 49) 16 May-7 August 2001, four specimens in an alder forest; Hyllestad: Staurdalen (EIS 49) 16 May-7 August 2001, two specimens in a open pine forest; Balestrand: Kvamsøy (EIS 50) 15 May-7 August 2001, Balestrand: Saurdalen (EIS 50) 15 May-7 August 2001, three specimens in an old pine forest situated 500 m.a.s.l.; Leikanger: Grinde (EIS 50) 15 May-7 August 2001, one specimen in a hazel thicket; Sogndal: Stedjeberget (EIS 50) 14 May-6 August 2001, one specimen in a dry warm south-faced *Tilia cordata* forest. Previously recorded in coastal areas from **AAY** to **HOY**, some isolated records from **BØ, STI** and **NTI** (Vik 1991, Tømmerås & Breistein 1995).

Hapalaraea melanocephala (Fabricius, 1787)
SFI Luster: Luster (EIS 60) 6 August-3 November 2001, nine specimens in a hollow oak. First record from Western Norway, scattered in eastern parts of the country, most common in the south (Vik 1991).

Bolitobius inclinans (Gravenhorst, 1806)
SFY Solund: Engvika (EIS 48) 3 April-4 November 2001, two specimens in an open pine forest; Hyllestad: Rønset (EIS 48) 16 May-7 August 2001, one specimen; Høyanger: Værholm (EIS 49) 16 May-7 August 2001, one specimen. **SFI** Balestrand: Sæle (EIS 50) 5 May-7 August 2001, one specimen, Kvamsøy (EIS 50) 15 May-7 August 2001, one specimen, Tjugum (EIS 50) 15 May-7 August 2001, one specimen; Sogndal: Vesterland (EIS 51) 14 May-6 August 2001, one specimen; Luster: Bargarden (EIS 60) 14 May-6

August 2001, one specimen; Årdal: Seimsdal (EIS 51) 14 May-6 August 2001, three specimens in a dense deciduous forest. Previously recorded from **TEY, AAY, HOY** and **HOI** (Vik 1991, Birkemoe 1993, Skartveit et. al 2004). A stenotopic species restricted to moist woods (Palm 1966, Horion 1967, Koch 1989a). The present and the study by Skartveit et al. (2004) show that the species is probably more eurytopic, found in both dense sites as well as open sun exposed ones.

Falagrioma thoracica (Stephens, 1832)
SFI Balestrand: Nessane (EIS 50) 15 May-7 August 2001, 116 specimens.

Previously recorded only once in Norway, **TEI** (Ødegaard & Ligaard 2000). Eurytopic (Horion 1967, Koch 1989a), also in seaweed communities and sandy soil. A relict species, probably more common in Norway during the post-glacial warm period (Ødegaard & Ligaard 2000).

Aleochara inconspicua Aube, 1850
SFI Leikanger: Leikanger (EIS 50) 15 May-7 August 2001, 24 spesimens. Probably rare in Norway, recorded along the southern coast north to **AAY**, some isolated records also from **HOI** and **STI** (Vik 1991 Andersen et al. 1992). Described as eurytopic (Horion 1967, Koch 1989a).

Aleochara fumata (Gravenhorst, 1802)
SFI Balestrand: Nessane (EIS 50) 15 May-7 August 2001, one specimen. Previously known from **Ø, AK, HES, BØ, TEY** and **RY** (Vik 1991), most common in forests (Horion 1967).

Atheta paracrassicornis Brundin, 1954
SFI Årdal: Seimsdal (EIS 51) 14 May-6 August 2001, one specimen, Kammen (EIS 51) 14 May-6 August 2001, one specimen. First records from western Norway, previously only around the Oslo fjord (Vik 1991) and one isolated record from **TRY** (Andersen & Olberg 2003). The species apparently prefers decaying organic material, fungi, tree sap and animal droppings (Palm 1970).

Batrisodes venustus (Reichenbach, 1816)
SFI Leikanger: Hella (EIS 50) 4.April-7.August 2001, two specimens in a hollow oak. First record from Western Norway, seems totally dependent on this substrate for its survival (Hansen 1968).

Leiodidae

Triarthron maerkelii Märkel, 1840
SFI Luster: Fortun (EIS 60) 15 May-6 August 2001, one specimen. Previously recorded only from **BV** and **AAY**. Resembles *Liodes* sp. in behavior (Reitter 1909, Hansen 1968, Baranowski 1993).

Agathidium varians Beck, 1817
SFI Balestrand: Målsnes (EIS 50) 15 May-7 August 2001, one specimen; Leikanger: Hella (EIS 50) 15 May-7 August 2001, one specimen, Leikanger (EIS 50) 15 May-7 August 2001, one specimen; Årdal: Seimsdal (EIS 51) 14 May-6 August 2001, one specimen. Probably rare in Norway, previous recorded around the Oslo-fjord and in the northwestern areas, **MRI, STI** and **NTI** (Vik 1991, Tømmerås & Breistein 1995).

Colon angulare Erichson, 1837
SFI Luster: Luster (EIS 60) 15 May-6 August 2001, two specimens. First records from western Norway; previously found in **AK** and **VE** (Vik 1991).

Colon serripes (Sahlberg, 1822)
SFY Hyllestad: Risnes (EIS 48) 16 May-7 August 2001, 14 specimens in a hazel thicket. First record from western Norway, previously recorded from **Ø, HE, ON, BØ**, and from **STI** to **FN** (Vik 1991, Tømmerås & Breistein 1995).

Anobiidae

Xyletinus ater (Creutzer, 1796)
SFI Lærdal: Tjønum (EIS 51) 1 June 2003, two specimens in a mixed deciduous forest. Previous scattered records from southeastern Norway. Most likely connected to dead and decaying branches of deciduous trees (Hansen 1951).

Grynobius planus (Fabricius, 1787)
SFI Balestrand: Målsnes (EIS 50) 15 May-7 August 2001, one specimen. Restricted to the south-western parts of Norway north to **NT**

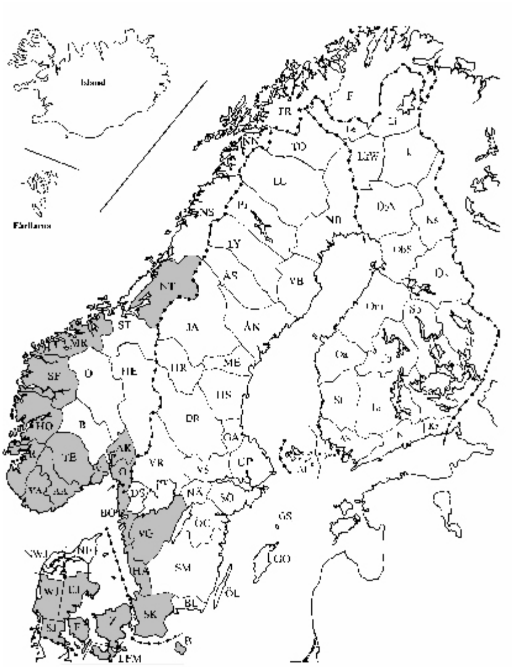

Figure 3. The distribution of *Grynobius planus* in the Nordic countries.

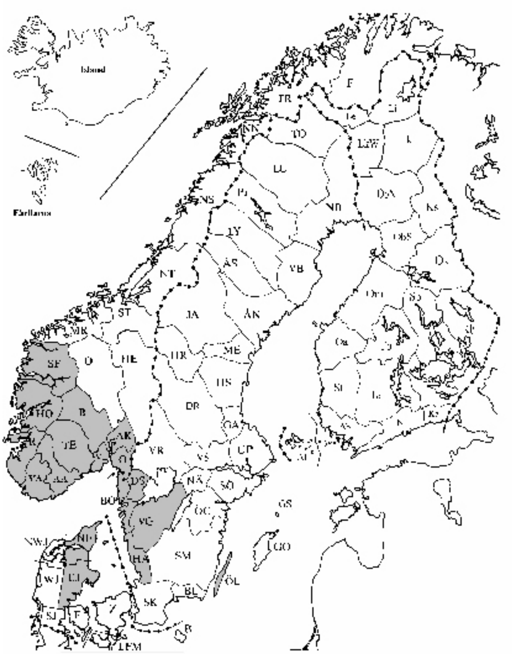

Figure 4. The distribution of *Acalles ptiniodes* in the Nordic countries.

(Vik 1991) (Figure 3). Found on dry branches of various deciduous trees like hazel, oak, beech and cherry (Hansen 1951), stenotopic to deciduous forest, dependent on decaying wood of any kind (Koch 1989b, Hansen & Ligaard 1992).

Trogossitidae

Thymalus limbatus (Fabricius, 1787)
SFI Balestrand: Sæle (EIS 50) 5 May-7 August 2001, one specimen. Scattered distribution in Norway, recorded from the areas around the Oslofjord and in **TEI, TEY, AAI** and **RI** (Vik 1991). Mostly found under bark of decaying and fungi infested trees and branches, also visiting tree fungi (Hågvar 1999, Økland 2002).

Monotomidae

Rhizophagus cribratus Gyllenhal, 1827
SFI Balestrand: Saurdalen (EIS 50) 15 May-7 August 2001, two specimens in a dense pine stand. The species should be considered as rare in Norway. There are scattered records in southern areas, and some records from **HOY** to **NSI** (Vik 1991, Skartveit et. al 2004). According to Koch (1989b), this is a stenotopic deciduous forest species, but as in the study by Skartveit et al (2004), the species was found far from any deciduous forest.

Cryptophagidae

Atomaria impressa Erichson, 1836
SFY Hyllestad: Rønset (EIS 48), 16 May-7 August 2001, one specimen. **SFI** Balestrand: Skardet (EIS 50) 15 May-7 August 2001, one specimen; Sogndal: Stedjeberget (EIS 50) 14 May-6 August 2001, one specimen. First records from western Norway, previously recorded from areas around the Oslo fjord, **STI** and **NTI** (Vik 1991). Stenotopic (Koch 1989b), found in moist habitats.

Caenoscelis ferruginea (Sahlberg, 1820)
SFI Balestrand: Sæle (EIS 50) 5 May-7 August 2001, 16 specimens, Saurdalen (EIS 50) 15 May-7 August 2001, one specimen; Sogndal: Vesterland (EIS 51) 14 May-6 August 2001, two specimens; Lærdal: Husum (EIS 51) 14 May-6 August 2001, five specimens. The species has a

Table 1. Further species recorded new for **SFI** and **SFY** during the study.
Spc./loc = Number of specimens / number of localities.

Species	Habitat	Spc./Loc
Carabidae		
Amara aenea (Degeer, 1774)	Decidious	20/4
Staphylinidae		
Xantholinus laevigatus Jacobsen, 1847	Eurytopic	16/5
Othius punctulatus (Goeze, 1777)	Decidious	78/16
Anthobium melanuoephalum (Illiger, 1794)	Coniferous	2/2
Acidota cruentata Mannerheim, 1830	Eurytopic	8/7
Lordithon exolethus (Erichson, 1839)	Eurytopic	25/9
Mycetoporus rufescens (Stephens, 1832)		3/3
Autalia longicornis Scheerpeltz, 1947	Eurytopic	7/4
Zyras cognatus (Märkel, 1842)	Decidious	
Atheta brunneipennis (Thomson, 1832)	Eurytopic	5/3
Leiodidae		
Agathidium nigrinum Sturm, 1807	Decidious	1/1
Agathidium seminulum (L, 1758)	Decidious	1/1
Catopidae		
Choleva fagniezi Jeannel, 1922	Eurytopic	6/5
Scydmaenidae		
Nevraphes coronatus Sahlberg, 1881	Eurytopic	3/3
Nitidulidae		
Epuraea angustula Sturm, 1844	Coniferous	1/1
Cryptophagidae		
Spavius glaber (Gyllenhal, 1808)	Coniferous	6/3
Melandryidae		
Orchesia minor Walker, 1837	Decidious	3/3
Oedemeridae		
Chrysanthia nigricornis (Westhoff, 1881)	Coniferous	1/1
Chrysomelidae		
Crepidodera nitidula (L, 1758)	Decidious	1/1
Nemonychidae		
Cimberis attelaboides (Fabricius, 1787)	Coniferous	1/1
Curculionidae		
Leisoma deflexum (Panzer, 1795)	Decidious	1/1

bisected distribution in Norway; most common in the southeastern areas, scattered from **STI** and northwards (Vik 1991). Also found in **HOY** (Skartveit et.al 2004), occurring only in the most productive parts of the deciduous forests. More eurytopic in the present study, found both in *Calluna* pine forest and elm/lime forest, more in co ordinance with (Koch 1989b).

Cerylonidae

Cerylon fagi Brisout de Barneville, 1867
SFI Balestrand: Målsnes (EIS 50) 15 May-7 August 2001, two specimens, Tjugum (EIS 50) 15 May-7 August 2001, one specimen. First records from western Norway, previously recorded from areas around the Oslo fjord and along the southern coast from **AAY** to **RY** (Vik 1991). Under bark (Koch 1989b), prefers beech, oak, poplar and elm, according to Hansen (1951).

Latriidae

Dienerella elongata (Curtis, 1830)
SFI Balestrand: Målsnes (EIS 50) 7.August-3 November 2001, four specimens; Leikanger: Hella (EIS 50) 4 April-3 November 2001, nine specimens; Luster: Luster (EIS 60) 15 May-6 August 2001, five specimens. The first record from western Norway, previously recorded from **Ø, AK, VE, AAY** and **STY**, but due to the wider distribution in Sweden (Lundberg 1995), and the small size of the beetle, it may have a wider distribution in Norway. Found in rotten and decaying vegetation of different kind (Hansen 1951), eurytopic and synanthropic (Koch 1989b); also found in connection with tree fungi (Økland & Hågvar 1994) and in pine forest (Hansen and Ligaard 1992).

Ciidae

Orthocis vestitus (Mellié, 1848)
SFI Årdal: Seimsdal (EIS 51) 14 May-6 August 2001, two specimens. First records from western Norway, previously known from **AK** and **VE** (Vik 1991). Found in deciduous and mixed forests (Koch 1989b), foraging on different kinds of fungi (Hansen 1951).

Chrysomelidae

Acalles ptinoides (Marsham, 1802)
SFY Høyanger: Torvund (EIS 49) 16 May-7 August 2001, one specimen in an open Calluna type pine stand. Recorded along the coast from **VE** to **SFY** (Figure 4) (Vik 1991).

More species new to SFI and SFY.

Table 1 gives a list of the other species recorded in the present study new for this part of Norway.

DISCUSSION

Most ecological or faunistic studies on beetles in Norway have been carried out in southeastern, middle and northern parts of Norway (Andersen et al. 1992, Andersen & Olberg 2003, Birkemoe 1993, Fossli & Andersen 1998, Hansen & Ligaard 1992, Hågvar 1999, Thingstad 1987, Ødegaard & Ligaard 2000, Økland & Hågvar 1994), although some literature on the species` distribution and ecology in western Norway is available (Andersen & Fjellberg 1975, Hanssen & Olsvik 1982, Key 1981, Kålås 1985, Pedersen 1986, Refseth 1979, 1987, Thunes 1993). Despite these studies the beetle fauna of western Norway is poorly known (Refseth 1987, Andersen et al. 1992), particularly among the staphylinids.

The majority of the species presented in the present paper should be reckoned as common and widely distributed in southern Norway, although previously not known from Western Norway; most likely due to little collecting here. However, the distribution of some species is discussed in the present paper.

Several species have a coastal distribution in the Nordic countries, indicating their preferences for oceanic climate. This applies to the staphylinids *Quedius picipes, Bolitobius inclinans* and the anobiidae *Grynobius planus*. Especially *Grynobius planus* is restricted to the western coast of both Norway and Sweden (Figure 3) (Vik 1991, Lundberg 1995), depending on decaying wood in the warm boreo-nemoral deciduous forest (Hansen & Ligaard 1992). *Acalles ptinoides* has a similar distribution pattern (Figure 4), but is more connected to coniferous forest, foraging on *Calluna vulgaris* (Hansen 1965). Only *Q. picipes* is found in the southern parts of Finland, indicating a preference for more continental climate.

Other species have their northern distribution limits in Western Norway, being more distributed in the eastern parts of Europe. Among these, at least *Calosoma inquisitor* (Figure 1), *Xyletinus ater, Cerylon fagi* and *Rhizophagus cribratus* seem to be dependent on the warm deciduous forest found scattered along the western coast. However, this study and a study by Skartveit et al. (2004) indicate that R. *cribratus* is more eurytopic than previously thought, found in both deciduous and coniferous forest. In the present study, it was recorded from a pine stand more than 250 m a.s.l, far from any deciduous forest. In the case of C. *inquisitor*, it is restricted by the distribution of oak; the latter distributed north to **MRY** (Lid 1994).

The Anobiidae *X. ater* is also dependent on dead oak branches (Hansen 1951) and should be regarded as a relict species in Western Norway, being more widely distributed in the postglacial warm period. Another relict species is the rove beetle *Falagrioma thoracica* (Ødegaard & Ligaard 2000), found numerous in a warm deciduous forest in the middle parts of the Sognefjord, the second record from Norway. The species ecology seems poorly investigated, and it has probably a wider distribution in western Norway.

The carabid *Badister lacertosus* is only recorded from western Norway, and seems connected to deciduous forest. This is most likely also a relict species from the post glacial warm period (Andersen & Hanssen 1992). Its preference for continental climate in the Nordic countries (Figure 2) seems to support this.

Eight hollow oaks along the Sognefjord were investigated with pitfall traps, and the small and slender species *Dienerella elongata* was abundant in all of them, the first records from Western Norway. Its wide distribution in Sweden (north to **Ån**) (Lundberg 1995) may indicate a wider distribution in Norway, but due to the species small size and often hidden way of living in rotten and decaying wood of various kinds (Hansen 1951), the species may be difficult to record.

Other interesting species from oaks were the rove beetles *Batrisoides venustus* and *Hapalaraea melanocephala,* both recorded from Western Norway for the first time. The prior seems totally dependent on hollow oaks for its survival (Hansen 1968), and might be rare in Norway, previously recorded from **Ø, VE, TEY** and **RI** (Vik 1991). *Hapalaraea melanocephala* has a wider distribution, recorded along the coast north to **AAI**, and some scattered records from **NTI** and northwards (Vik 1991). The almost total absence from western Norway shown by this species, there might be some environmental factors along the western coast not favouring *H. mealonocephala;* underreporting seems unlikely.

The beetle fauna of Western Norway seems to be poorly investigated. As more surveys are being carried out, the total number of species will probably rise to a level only slightly lower than the number of species in eastern parts of the country.

According to Refseth (1987) faunistic data are important for many reasons: such as studies on immigration routes, patterns of dispersal, courses of adaptation, and the fact that they are important in recognizing valuable areas for protection. Therefore, more faunistic surveys are needed in order to protect the remaining and vulnerable forests in Western Norway.

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REFERENCES

Andersen, A., Ligaard, S., Ødegaard, F. & Hanssen, O. 1992. New records of Carabidae and Staphylinidae (Col.) from several districts in southern and central Norway. Fauna norv. Ser. B 39, 33-37.

Andersen, J. & Hanssen, O. 1992. Løpebiller med isolert forekomst i Norge. Insekt-Nytt 17(2), 5-16.

Andersen, J. & Fjellberg, A. 1975. Some Coleoptera from the outer part of Sogn and Fjordane, western Norway. Norw. J. Entomol. 22, 87-88.

Andersen, J. & S. Olberg. 2003. New records of Coleoptera from Northern Norway. Norw. J. Entomol. 50, 57-67.

Aune, B. 1993. Temperaturnormaler normalperiode 1961-1990. Det norske meteorologiske institutt. Rapport Klima 02-93, 1-63..

Baranowski, R. 1993. Revision of the genus *Leiodes* Latreille of North and Central America (Coleoptera: Leiodidae). Ent. scand. Suppl. 41, 149 pp.

Birkemoe, T. 1993. Distribution of ground dwelling beetles along the main vegetation gradient in an old growth boreal forest. Cand. scient. thesis, University of Oslo.

Gärdenfors, U., Aagaard, K., Biström, O. (red.) & Holmer, M. (ill.). 2002. Hundraelva nordiske evertebrater. Handledning för övervakning av rödlistade småkryp. 288 pp.

Hansen, L. O. & Ligaard, S. 1992. Coleoptera from six small islands in the middle Oslofjord, SE Norway. Fauna norv. Ser. B 39, 23-31.

Hansen, V. 1951. Biller XIV. Clavicornia 2.del og Bostrychoidea. Danmarks Fauna 56, 253 pp.

Hansen, V. 1965. Biller XXI. Snudebiller. Danmarks Fauna 69, 524 pp.

Hansen, V. 1968. Biller XXV. Ådselbiller, Stumpbiller m.m. Danmarks Fauna 77, 353 pp.

Hanssen, O. & Olsvik, H. 1982. Nye funn av Coleoptera fra Møre og Romsdal. Fauna norv. Ser. B 29, 74-77.

Horion, A. D. 1967. Faunistik der Mitteleuropäischen Käfer. Staphylinidae. Habrocerinae bis Aleocharinae. XI(3).

Hågvar, S. 1999. Saproxylic beetles visiting living sporocarps of *Fomitopsis pinicola* and *Fomes fomentarius*. Norw. J. Entomol. 46, 25-32.

Key, R. S. 1981. Cluster analysis of dung inhabiting beetle communities from different altitudes in Jostedalen, South-West Norway. Fauna norv. Ser. B 29, 24-33.

Koch, K. 1989a. Die Käfer Mitteleuropas. Ökologie 1. 440 pp.Goecke & Evers Verlag, Krefeld.

Koch, K. 1989b. Die Käfer Mitteleuropas. Ökologie 2. 440 pp. Goecke & Evers Verlag, Krefeld.

Koch, K. 1992. Die Käfer Mitteleuropas. Ökologie 3. 389 pp. Goecke & Evers Verlag, Krefeld.

Kålås, J. A. 1985. Species composition and seasonal activity patterns of Carabidae (Col.) in a small deciduous forest in western Norway. Fauna norv. Ser. B 32, 28-32.

Lid, J. L. & Lid, D.T. 1994. Norsk Flora. 1014 pp.

Lindroth, C. H. 1986. The Carabidae (Coleoptera) of Fennoscandia and Denmark. Fauna Ent. Scand. 15 (2), 233-497.

Lundberg, S. (1995). Catalogus Coeloptetorum Sueciae, Stockholm.
http://www.nrm.se/en/lists/CATCOLS.txt 1nt

Løken, A. 1965. Ekskursjonsberetning. Insekter og arachnoider samlet under det 13. Nordiske Entomologmøtes ekskursjon til Flåm (SFi: Aurland) 13. -16. sugust 1965. Norsk ent. Tidsskr. 13, 371-386.

Moen, A. 1999. Nasjonalatlas for Norge: Vegetasjon. 220 pp. Statens kartverk, Hønefoss.

Ødegaard, F. & Ligaard, S. 2000. Contribution to the knowledge of Norwegian Coleoptera. Norw. J. Entomol. 47, 7-19.

Økland, K.A. 1981. Inndeling av Norge til bruk ved biogeografiske oppgaver-et revidert Strand-system. Fauna (Oslo) 34, 167-178.

Økland, B. & Hågvar, S. 1994. The insect fauna associated with carpophores of the fungus *Fomitopsis pinicola* (Fr.) Karst in a southern Norwegian spruce forest. Fauna norv. Ser. B 41, 29-42.

Økland, B. 2002. Canopy cover favours sporocarp-visiting beetles in spruce forest. Norw J. Entomol. 49, 29-39.

Palm, T. 1966. Skalbaggar. Coleoptera. Kortvingar: Fam. Staphylinidae. Underfam. Habrocerinae, Trichophyinae, Tachyporinae. Svensk Insektfauna 4, 91 pp.

Palm, T. 1970. Skalbaggar. Coleoptera, Kortvingar: Fam. Staphylinidae. Underfam. Alocharinae (Atheta). Svensk Insektfauna 6, 117-296.

Palm, T. 1972. Skalbaggar. Coleoptera. Kortvingar: Fam. Staphylinidae. Underfam. Aleocharinae (Aleuonota Tinotus). Svensk Insektfauna 7, 300-467.

Pedersen, T. 1986. Et økologisk studium av carabider (Coleoptera) på kulturmark i Øygarden, Hordaland. Fenologi, livssyklus, habitattilknytning og habitatbruk. Cand. Scient. Thesis, Zoologisk ecology, University of Bergen.

Refseth, D. 1979. Noen funn av Coleoptera fra

Trøndelag og Møre. Fauna norv. Ser. B 26, 8-9.
Refseth, D. 1987. New records of Coleoptera in Norway, with notes on the significanse of faunistic surveys. Fauna norv. Ser. B 34, 117-119.
Reitter, E. (1909). Die Käfer des Deutschen Reiches. II. Band. Fauna Germanica XXIV, 392 pp.
Skartveit, J., Pommeresche, R. & Solhøy, T. 2004. Notes on uncommon beetles (Coleoptera) collected during a survey in Hardanger, Western Norway. Norw. J. Entomol. 51, 151-158.
Thingstad, P. G. 1987. Pitfall trapping of the carabid fauna in alpine and subalpine habitats at Saltfjellet, North Norway. Fauna norv. Ser. B 34, 105-116.
Thunes, K. H. 1993. Polypore Fungi and Their Associated Arthropod Communities In Selected West Norwegian Forests. The Rationale and Applications Of Numerical Methods. Cand. Scient. Thesis, University of Bergen.
Tømmerås, B. Å. & Breistein, J.1995. Fragmenteringsforsøk i granskog. Problemstillinger og metoder samt resultater fra feltsesongen 1994. NINA oppdragsmelding, 342 pp.
Vik, A. 1991. Catalogus Coleopterum Norvegica. 157 pp. Stig Otto Hansen, Larvik.

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Clitellaria ephippium (Fabricius, 1775) (Diptera, Stratiomyidae) rediscovered in Norway

Øivind Gammelmo & Ole J. Lønnve

Gammelmo, Ø. & Lønnve, O. J. 2006. *Clitellaria ephippium* (Fabricius, 1775) (Diptera, Stratiomyidae) rediscovered in Norway. Norw. J. Entomol. 53, 21-22.

The stratiomyid fly *Clitellaria ephippium* (Fabricius, 1775) is recorded from Norway for the first time since 1844. A single male was captured at Skoklefall in Nesodden municipality (AK) in 2005. The species is previously recorded once in Norway, from AK Oslo: Fjeldstuen.

Key words: *Clitellaria ephippium*, Diptera, Stratiomyidae, Norway

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The genus *Clitellaria* is characterized by a pair of strong lateral spines on the thorax in front of the wing-base (Rozkošný 1973) (Figs 1-2). The genus is represented in Europe with one species only; *Clitellaria ephippium* (Fabricius, 1775). The larva of *C. ephippium* is found in nests of the ant *Lasius fuliginosus* (Latreille, 1798) which occurs in hollow trees. The species is listed as VU (according to the IUCN criteria) in Sweden (Gärdenfors 2005), and is only known from a few localities. *C. ephippium* is distributed throughout Europe, but rare in the north. In addition to Norway and Sweden the species are reported from Austria, Belgium, Bulgaria, Croatia, Czech Republic, French mainland, Germany, Hungary, Italian mainland, Lithuania, Poland, Romania, central and south Russia, Slovakia, Slovenia, Spanish mainland, Switzerland, The Netherlands, and Ukraine (Pape 2006, Rozkošný 1983). According to Verrall (1909) the species is reported from Great Britain, but no specimens are available (Rozkošný 1983).

C. ephippium has only been recorded once from Norway; **AK** Oslo: Fjeldstuen (EIS 18), 1 □, 1844, leg. Esmark (Siebke 1877, Rozkošný 1973, Falck & Greve 1990). The specimen is deposited in the entomological collection, Natural History Museum, University of Oslo. The species was considered extinct from Norway by Falck & Greve (1990).

A single male (Figs 1-2) was captured in a yellow bucket-trap at **AK** Nesodden: Skoklefall (EIS 28, UTM_{WGS84}32VNM935359) on 11 July 2005, leg. Ole J. Lønnve. The trap was situated in a moist bush-dominated ditch in a residential area at the edge of a pine forest. The specimen is deposited in the entomological collection, Natural History Museum, University of Oslo.

REFERENCES

Falck, M. & Greve, L. 1990. Records of Stratiomyidae (Diptera) from South-Eastern Norway, with some notes on the specimens. Fauna norv. Ser. B. 37, 101-104

Gärdenfors, U. (ed.) 2005. Rödlistade arter i Sverige 2005 – The 2005 red list of Swedish Species. 496 pp. ArtDatabanken, SLU, Uppsala.

Pape, Thomas. 2006. Fauna Europaea: Stratiomyidae.

Figure 1: Habitus of *Clitellaria ephippium* (Fabricius, 1775) (male), dorsal view.

Figure 2: Habitus of *Clitellaria ephippium* (Fabricius, 1775) (male), lateral view.

Fauna Europaea version 1.5, http://www.faunaeur.org

Rozkošný, R. 1973. The Stratiomyioidea (Diptera) of Fennoskandia and Denmark. Fauna ent. Scand. 1, 140 pp.

Rozkošný, R. 1983. A biosystematic study of the European Stratiomyidae (Diptera) 2. 431 pp. Dr. W. Junk. Publ. The Hauge, Boston, London.

Siebke, J.H.S. 1877. Enumeration Insectorum Norvegicum. Fasc. IV. Catalogum Dipterorum Continentem. 255 pp. A.W.Brøgger, Christiania.

Verrall, G.H. 1909. Stratiomyiidae etc. In British Flies, Vol. 5, 51-229.

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Centipedes (Chilopoda) and millipedes (Diplopoda) in North Norway

Robert Bergersen, Kjell Magne Olsen, Per Djursvoll & Arne C. Nilssen

Bergersen, R., Olsen, K. M., Djursvoll, P. & Nilssen, A. C. 2006. Centipedes (Chilopoda) and millipedes (Diplopoda) in North Norway. Norw. J. Entomol. 53, 23-38.

Based on 486 specimens collected over the last 70 years, the Chilopoda and Diplopoda in North Norway were found to consist of four genera and eight species in the former, and seven genera each of one species in the latter. All but two species, *Pachyiulus varius* (S European) and *Oxidus gracilis* (anthropochorous), could be regarded as native. Four species (*Lithobius melanops, L. tenebrosus, Strigamia maritima and Nemasoma varicorne*) were new to the area. From S to N, Nordland hosted 12 species, Troms 6 and Finnmark 5. Among the Chilopoda, numbers were 7, 5 and 5; in Diplopoda, 5, 1 and 0, respectively. Seven species were viewed as being common: *Lithobius forficatus, L. erythrocephalus, Proteroiulus fuscus* and *Polydesmus denticulatus* in Nordland, *Lamyctes emarginatus* and *Geophilus proximus* in Nordland and Troms, and *Lithobius curtipes* in Finnmark. These are the world's northernmost finds (65°04'N-70°52'N), except for *curtipes*, which also occurs in N Russia. In Nordland, *Polyxenus lagurus* and *Cylindroiulus latestriatus* may be more common than this study shows. Almost half the material was collected by schoolchildren in one year (2005). The children proved to be useful collectors.

Key-words: Chilopoda, Diplopoda, Myriapoda, geographical distribution, North Norway.

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INTRODUCTION

The Norwegian myriapod fauna is only partly known, and published works from Norway are mainly those by Ellingsen (1892, 1897, 1903, 1910), Meidell (1967, 1968, 1969, 1970, 1975, 1977, 1979), Simonsen (1981), Olsen (1995a, 1998a, 2000) and scattered notes (e. g. Porat 1887, Storm 1898, Meidell & Simonsen 1985, Olsen 1995b, 1995c, 1996, 1998b). In North Norway, the first myriapod reported appears to be *Lithobius curtipes* from eastern Finnmark (Palmberg 1866). In 1866, probably also in Finnmark („Finmarken"), Lauritz Esmark collected two more species, *Lithobius forficatus* and *Geophilus proximus* (cf. Porat 1887), so that three species were known from North Norway by the end of the 19th century (Ellingsen 1897). In 1900, Sparre Schneider and Embrik Strand collected three species, *Lithobius erythrocephalus, Henicops fulvicornis* (= *Lithobius emarginatus*) and *Julus luscus* (= *Cylindroiulus latestriatus*) in Nordland (Schneider 1905, p. 178), so that six species were known by Ellingsen (1910).

The history repeated itself when in 1966, *Lithobius curtipes* was again collected in eastern Finnmark by the Norwegian ZMO Expedition (unpubl.). During the next three decades, some more myriapods were found (Meidell 1969,

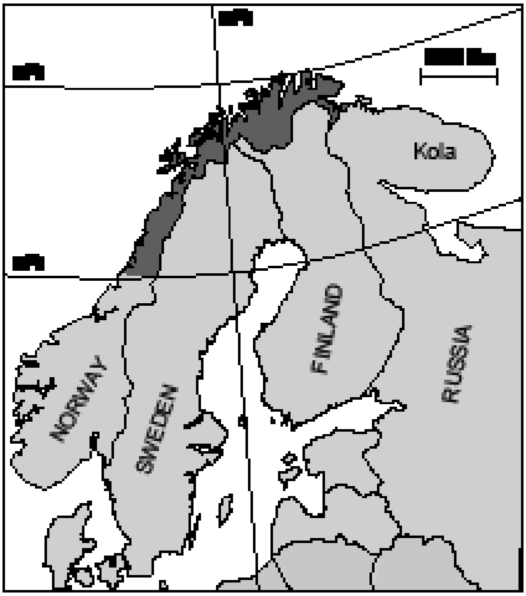


Figure 1. Map of the study area: North Norway (dark grey).

Table 1. Specimens of North Norwegian Chilopoda and Diplopoda (incl. juveniles): present depositions.

	Chilopoda	Diplopoda
Tromsø University Museum	220	96
Zoological Museum, Bergen	51	31
Natural History Museum, Oslo	33	18
Rana Museum, Mo i Rana	30	5
Zoological Museum, Copenhagen		2
SUM	334	152

1978, Vader 1979, unpubl. material collected by J. Fjeldså, H. W. Waldén, P. Straumfors, A. Fjellberg, A. C. Nilssen), including *Proteroiulus fuscus, Polydesmus denticulatus* and *Polyxenus lagurus* in Nordland (Olsen 1998c, Kime & Golovatch 2000), increasing the known number of species to nine.

Apart from the *Lithobius forficatus* and *Geophilus proximus* from „Finmarken“ (which could be anywhere in Finnmark or Troms) collected 1866, the oldest preserved specimens known to us are from 1937 (*Cylindroiulus latestriatus* in Nordland) and 1966 (*Lithobius curtipes* in Finnmark). The Nordland 1900 material was examined by Edvard Ellingsen (Schneider 1905) and possibly returned to Schneider, whereas Ellingsen's private myriapod collection was finally donated to the Zoological Museum in Oslo (Sømme 2004, p. 240). Apart from the information in Meidell (1978, 1979) and Andersson et al. (2005), no overview of the North Norwegian myriapod fauna exists, and the knowledge of the distribution in Norway cannot be said to be „good“ (Kime 2000, p. 284).

In the present paper we examine newly-collected material from Nordland, Troms and Finnmark (65^{o}N-71^{o}N) (Figure 1). Most of this material was made available for the myriapod volume of the Encyclopedia of Swedish Flora and Fauna (Andersson et al. 2005).

MATERIAL & METHODS

The material consists of 486 specimens deposited in Tromsø University Museum, University of Tromsø, Zoological Museum, University of Bergen, Natural History Museum, University of Oslo, Rana Museum, Mo i Rana, and Zoological Museum, University of Copenhagen (Table 1). No specimens were found in other museums (our requests indicated that there are no such specimens, but there may be some in private collections).

About half the specimens (~ 46%) were collected by schoolchildren in 2004 and especially in 2005, following an appeal (by RB and ACN) distributed to 522 North Norwegian primary and secondary schools (264 in Nordland, 156 in Troms, 102 in Finnmark). The rest (~ 54%) had been collected by about 20 persons, mainly in recent years (Table 2).

As the basic taxonomic literature, we used amongst others, Eason (1982) and Blower (1985). The nomenclature and sequence of taxa follows Andersson (2001) and Enghoff (2002). The Tromsø museum material was examined by RB, the Rana and Oslo museum material by RB and KMO, and the Bergen museum material by PD. ACN instigated the study. The distribution of each species was plotted on maps, and details of the finds and zoogeographical remarks are given in the text.

LIST OF SPECIES

Centipedes (Chilopoda)

Lithobius forficatus (Linnaeus, 1758)

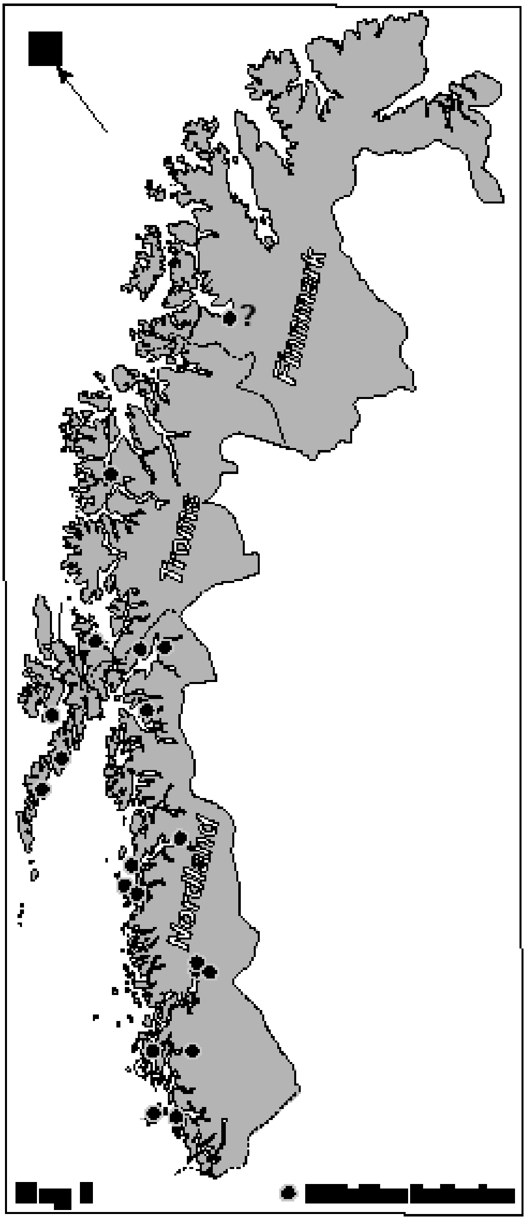
Map 1

TRY Tromsø: Tromsø (EIS 162) 10 Oct. 1995 1 □ (indoor in house), Tromsø 31 Aug. 1998 1 □ leg. G. Graff, Tromsø 18 Oct. 1999 1 □ leg. B. Møller, Hvilhaug Sykehjem (EIS 162) 8 March 2004 1 □; **TRY** Harstad: Harstad (EIS 145) 3 Sept. 1968 1 □ leg. R. Mehl; **NNV** Hadsel: Stokmarknes (EIS 143) 1 June 2005 1 □ leg. A.-K. Sandvin, Stokmarknes 19 June 2005 1 □ leg. I. G. Jensen; **NNV** Vågan: Storvågan (EIS 137) 16 June 2005 17 □□18 □□ leg. Kabelvåg school; **NNV** Vestvågøy: Stamsund (EIS 137) 5 April 2005 2 □□ 2 □□ leg. Svarholt school; **NNØ** Evenes: Bogen (EIS 145) 23 Sept. 2001 2 □□ 5 □□ leg. P. Jordan; Bergviknes (EIS 145) 8 June 2005 3 □□ leg. Bogen school; **NNØ** Narvik: Narvik (EIS 139) 18 April 2005 1 □ leg. L. B. Steffensen (in house "every spring"); **NNØ** Tysfjord: Kjøpsvik (EIS 139) 13 June 2005 1 □ leg. Kjøpsvik school; NSI Fauske: Klungset (EIS 131) 1 Oct. 2005 2 □□ 2 □□ leg. A. Forså (in barrow with sawdust); **NSI** Rana: Grubhei (EIS 123) 3 May 1990 1 □ leg. A. Ødholt, Ytteren (EIS 123) 1 May 1998 2 □□ leg. K. M. Olsen, Grubhei (EIS 123) 10 Aug. 2004 1 □ leg. T. A. Varem, Mo i Rana (EIS 123) 25 May 2005 1 □ 2 □□ leg. 3AC Lyngheim school, Stenneset bygdetun (EIS 123) 26 May 2005 2 □□ leg. Båsmo school; **NSI** Vefsn: Mosjøen (EIS 118) 18 April 2005 2 □□ leg. David (Olderskog school); **NSY** Bodø: Vågønes (EIS 130) 8 April 2005 1 □ leg. P. Tegnander (in barn), Bodø (EIS 130) 13-15 April 2005 5 □□ 3 □□ leg. 4A/6A Grønnåsen school; NSY Gildeskål: Sørarnøy (EIS 125) 18 April 2005 1

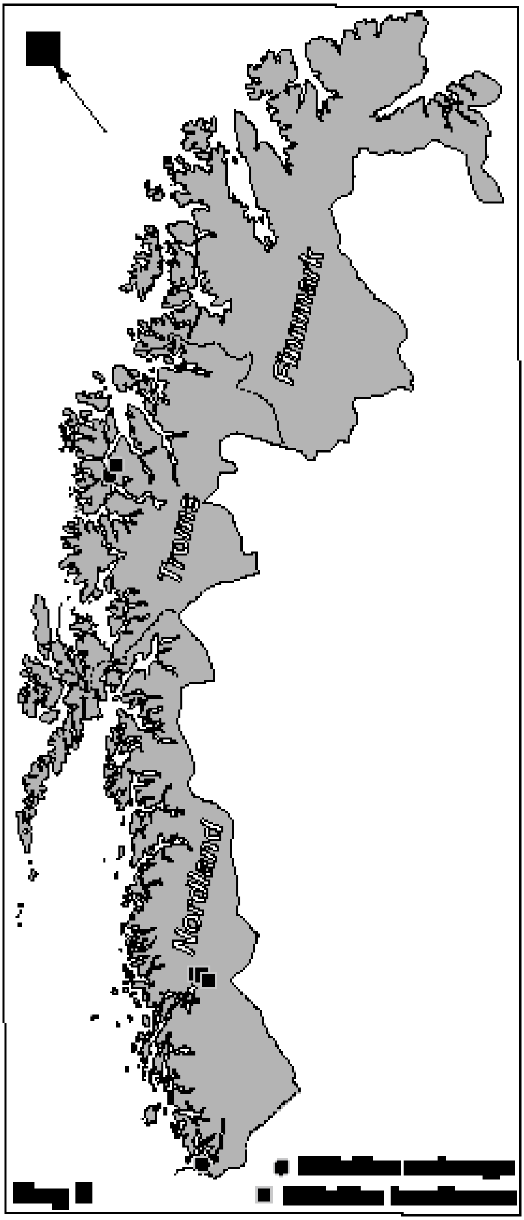
Table 2. Collectors of North Norwegian Chilopoda and Diplopoda and the years of their activity.

	Chilopoda	Diplopoda
Schoolchildren* (2004-2005)	164	59
Robert Bergersen (2004-2005)	34	10
Arne C. Nilssen (1975-2005)	24	29
Per Straumfors (1975-1984)	24	2
Kjell M. Olsen (1993, 1998)	20	13
H. W. Waldén (1971, 1974, 1987)	20	3
Petter Jordan (1995, 2001)	15	3
Jon Fjeldså (1967)	8	
Lauritz Martin Esmark (1866)	6	
Arne Fjellberg (1974, 1984)	3	1
Zool. Mus. Oslo Exp. (1966)	3	
Wim Vader (1977)	3	
C. d'Udekem d'Acoz (2005)	2	
Tore R. Nielsen (2002)	2	
Olav Myhre (1983)	1	
Erling Hauge (1995, 2003)		22
Hans Tambs-Lyche (1937)		6
Arild Fjeldså (1971)		2
Hans Jakob Sparre Schneider	≥4#	≥1#
Embrik Strand (1900)	≥1#	
Others (delivery to museums)	5	2

*named as individuals or by school in List of Species. Most of the material (~ 90%) was collected in 2005 (mainly in spring)
#probably lost material



Map 1. Distribution of *Lithobius forficatus* in North Norway. The question mark denotes “Finmarken” (the specimens collected by Lauritz Esmark in 1866); the open circle is from Schneider (1905).



Map 2. Distribution of *Lithobius melanops* and *L. tenebrosus* in North Norway.

□ leg. Sørarnøy school, Inndyr (EIS 126) 3 June 2005 1 □ leg. Inndyr school (under asphalt slab); **NSY** Dønna: Lauvøya (EIS 117) 4 June 1978 2 □□ leg. P. Straumfors; **NSY** Herøy: Sør-Herøy (EIS 117) May 1900 leg. J. S. Schneider (in lit., det. Ellingsen); **NSY** Vega: Åsen (EIS 113) 27 June 2005 1 □ leg. Vega school; **NSY** Brønnøy: Salhus (EIS 114) 17 Aug. 1971 2 □□ 1 □ leg. H. W. Waldén (in greenhouse). In addition 4□□ 1 □ labelled „Finmarken Esmark", collected in 1866 by Lauritz Esmark (Map 1).

The species is not found in Lappland, N Sweden (Andersson et al. 2005). The North Norwegian records are well north of the northernmost Swedish ones. As in Sweden, it occurs with decreasing frequency from south to north, with no new records from Finnmark (Map 1). Depicted in E Finnmark in Meidell (1978) and Andersson et al. (2005). Found several times in S Iceland (Eason 1970), but only once in Greenland (Jensen & Christensen 2003). Rare (Palmén 1949) or absent (Andersson et al. 2005) in N Finland. The species is more common in N Nordland (Map 1) than depicted in Andersson et al. (2005).

Lithobius melanops Newport, 1845

Lithobius glabratus C. L. Koch, 1847
Map 2
TRY Tromsø: Folkeparken (EIS 162) 5 July 2004 1 □ leg. R. Bergersen (under beam at Tromsø Museum), Kroken (EIS 162) 11 & 28 June 2005 2 □□ leg. C. d'Udekem d'Acoz (fallen from roof of city block balcony into tray of water); **NSY** Bindal: Osen (EIS 110) 7 April 2004 3 □□ 1 □ leg. R. Bergersen (under stones near house) (Map 2).

New to North Norway. Found indoors in N Sweden (Andersson 1985). In the British Isles, this is one of two species of *Lithobius* (the other is L. *forficatus*) which is often found in houses (Eason 1964). As most *Lithobius* species, it is probably nocturnal. Quite common in Iceland (Eason 1970). The schoolchildren did not find this relatively conspicuous species.

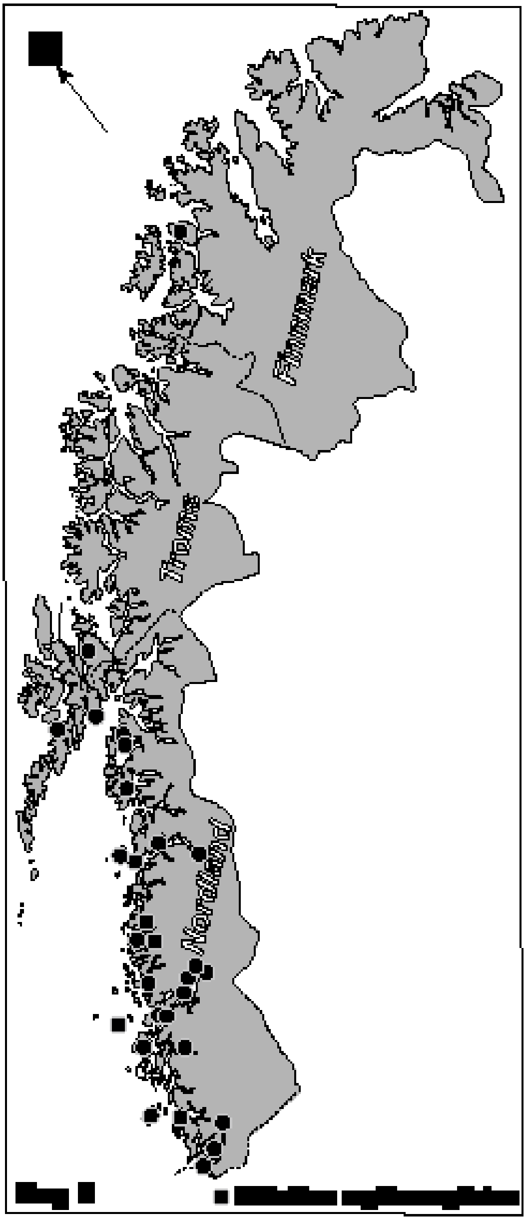
Lithobius tenebrosus Meinert, 1872

Lithobius nigrifrons Latzel & Haase, 1880
Map 2
NSI Rana: Selforslia (EIS 123) 22 March 1976 2 juv. □□ leg. P. Straumfors (under bark of dead alder Alnus incana), Åenglia (EIS 123) 1 Oct. 1979 1 □ leg. P. Straumfors (under bark of dead spruce *Picea abies*), Stenneset bygdetun (EIS 123) 26 May 2005 3 □□ 2 □□ leg. Båsmo school (Map 2).

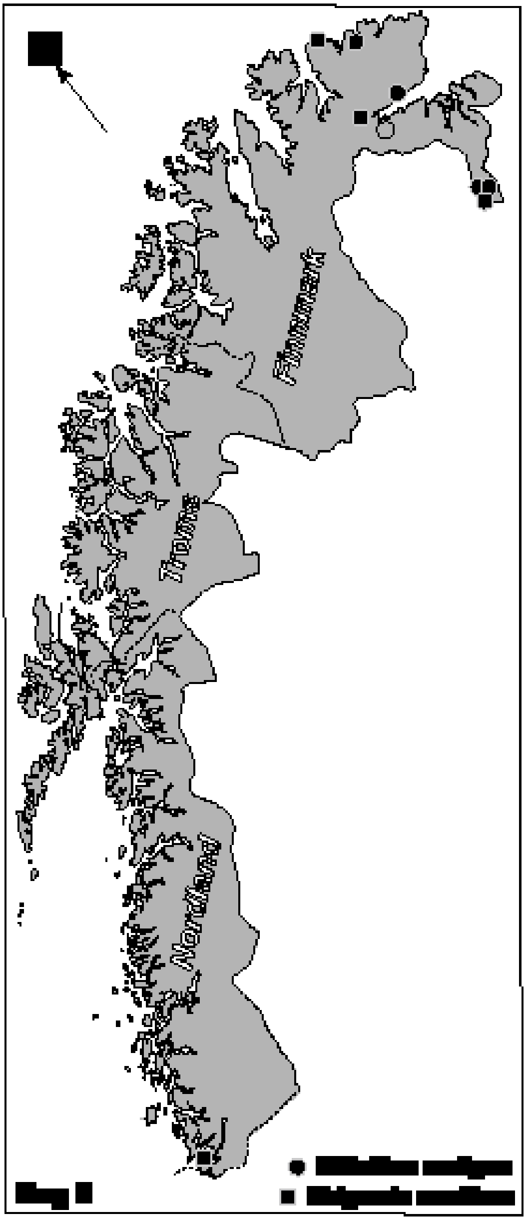
New to North Norway. The above records, quite far north of the general distribution area, are included in Andersson et al. (2005).

Lithobius erythrocephalus C. L. Koch, 1847

Map 3
FV Hammerfest: Rypefjord (EIS 180) 10 June 2005 1 □ 2 □□ leg. Fjordtun school (under stones); **TRY** Kvæfjord: Rasmus Torheim feltet (EIS 144) 15 Aug. 1975 1 □ leg. A. C. Nilssen; **NNV** Hadsel: Strønstad (EIS 137) 4 April 2005 1 □ leg. E.-T. Johansen; **NNV** Lødingen: Vågehamn (EIS 138) 22 April 2005 4 □□ 2 □□ leg. Vestbygd school; **NNØ** Steigen: Leinesfjord (EIS 134) 30 July 1987 1 □ leg. H. W. Waldén; **NNØ** Hamarøy: Oppeid (EIS 138) 17 June 1976 1 □ leg. A. C. Nilssen, Tømmeråsen (EIS 138) 29 July 2004 2 □□, 25 July 2005 1 □ 5 □□ and 1 Aug. 2005 4 □□ 6 □□ leg. A. C. Nilssen (under bark); **NSI** Saltdal: Langset (EIS 127) 27 July 1987 5 □□ leg. H. W. Waldén; **NSI** Rana: Straumen (EIS 122) 31 March 1975 1 □ leg. P. Straumfors, Røbergeng (EIS 123) 19 May 1977 1 □ leg. P. Straumfors, Ytteren (EIS 123) 14 Sept. 1979 1 □ leg. P. Straumfors, Ytteren 1 May 1998 5 □□ leg. K. M. Olsen, Stenneset bygdetun (EIS 123) 26 May 2005 2 □□ leg. Båsmo school, Stibergan (EIS 123) 31 May 2005 1 □ leg. Alteren school; **NSI** Vefsn: Utnes (EIS 118) 17 Aug. 1974 2 □□ leg. H. W. Waldén; **NSY** Bodø: Vågan W (EIS 130) 26 July 1993 1 □ leg. K. M. Olsen, Bodømarka (EIS 130) 7 April 2005 4 □□ 5 □□ leg. 5C Grønnåsen school; Bodø (EIS 130) 13-15 April 2005 2 □□ 4 □□ leg. 4A/6A Grønnåsen school, Landegode (EIS 130) 16 April 2005 2 □□ leg. H. Steinsrud (under moss on stone); **NSY** Meløy: Aspflaten (EIS 125) 21 July 1978 1 □ leg. A. C. Nilssen, Grønnøya (EIS 125) 1 April 2005 1 □ leg. T. Hansen & A. Meløysund,



Map 3. Distribution of *Lithobius erythrocephalus* in North Norway. The open circle is from Schneider (1905).



Map 4. Distribution of *Lithobius curtipes* and *Strigamia maritima* in North Norway. The open circle denotes “Varanger” in Palmberg (1866).

Neverdalen (EIS 125) 4 May 2005 1 □ 4 □□ leg. Neverdal school; **NSY** Rødøy: Kilboghamn (EIS 122) 28 July 1981 2 □□ leg. A. C. Nilssen; **NSY** Lurøy: Lovund (EIS 121) 28 June 1979 1 □ leg. P. Straumfors; **NSY** Nesna: Dillern (EIS 117) 19 June 1980 2 □□ leg. P. Straumfors, Hammarøy (EIS 118) 21 Aug. 1980 4 □□ leg. P. Straumfors; NSY Dønna: Solfjell (EIS 117) 7 Sept. 1995 4 □□ 1 □ leg. Midtbygda school; NSY Herøy: Sør-Herøy (EIS 117) May 1900 leg. J. S. Schneider (in lit., det. Ellingsen); **NSY** Vega: Vega (EIS 113) 26 April 2005 2 □□ 1 □ leg. Vega school; **NSY** Brønnøy: Tosen (near Mårvika) (EIS 110) 16 Aug. 1971 5 □□ & Brønnøysund (EIS 114) 17 Aug. 1971 1 □ leg. H. W. Waldén; **NSY** Bindal: Reppen (EIS 110) 8 Aug. 1984 1 □ leg. P. Straumfors & S. Lundmo, Osen (EIS 110) 7 April 2004 2 □□ 3 □□ & 5 July 2005 2 □□ leg. R. Bergersen (Map 3).

Very common species in Nordland; probably not so in Troms. Rare in Finnmark (Map 3). The distribution seems to be restricted to fjords and coastal areas.

Lithobius curtipes C. L. Koch, 1847

Map 4

FØ Sør-Varanger: Varangerfjord 1857 (probably) 1 ? leg. T. M. Fries (in lit., det. Palmberg), Strømsvann (EIS 160) 19 June 1966 1 □ leg. A. Lillehammer; Ellenvann (EIS 160) 2 July 1966 2 □□ leg. ZMO (Zool. Museum Oslo) Pasvik Expedition; Roudaguorra (EIS 160) 13 June 1974 1 F, Sortbrysttjern (EIS 160) 27 June 1974 1 □ & Stabburtjern (EIS 160) 29 June 1974 2 □□ leg. A. Fjellberg; **FØ** Tana: 400 □ down Tana Bridge (EIS 176) 26 June 2002 4 □□ 1 □ leg. T. R. Nielsen; **FN** Vadsø: Vestre Jakobselv (EIS 177) 4 Aug. 1993 2 □□ leg. K. M. Olsen; **FN** Berlevåg: Berlevåg (at 70°52‘N) (EIS 189) 29 June 2002 1 □ leg. T. R. Nielsen; **FN** Båtsfjord: Nordskogen (EIS 184) 10 June 2005 5 □□ 6 □□ leg. Nordskogen school (Map 4).

Whereas common throughout Sweden and Finland (Palmén 1949, Tobias 1975), Vaigatsch, N Russia (Stuxberg 1876, as *L. crassipes*) and on the Kola peninsula, NW Russia (Palmén 1949, Zalesskaja 1978), the distribution in Norway is eastern (Finnmark, Oslo area and a few records elsewhere). Not found in Iceland (Andersson et al. 2005).

Lamyctes emarginatus (Newport, 1844)

Lamyctes fulvicornis Meinert, 1868

Map 5

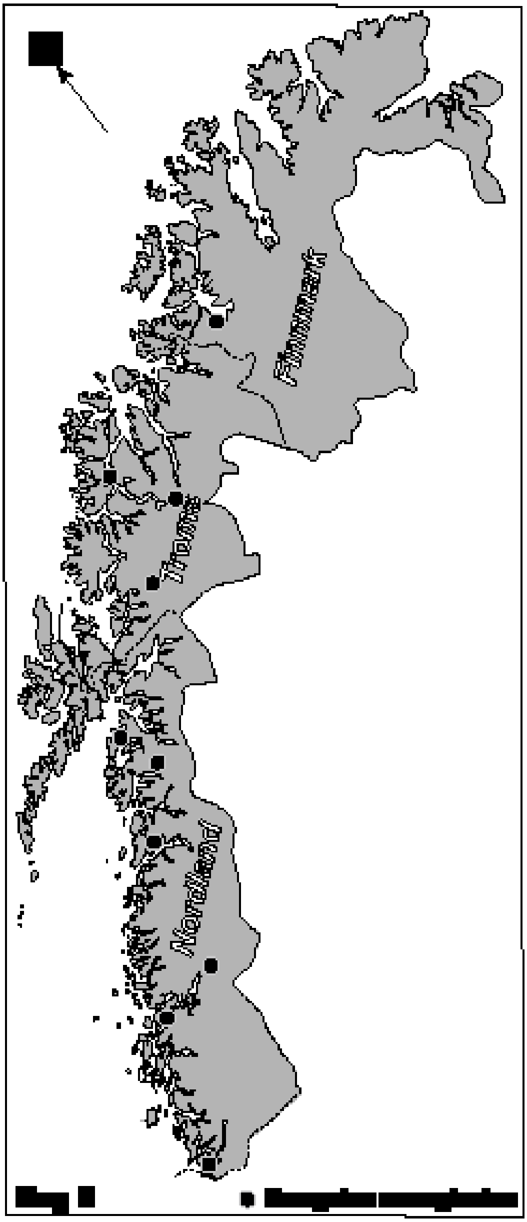
FV Alta: Vassbotn (EIS 173) 29 July 1993 1 □ leg. K. M. Olsen, **TRY** Tromsø: Tromsø (EIS 162) 29 July 2004 1 □ leg. R. Bergersen; **TRI** Balsfjord: Nordkjosbotn (EIS 154) 7 Aug. 1993 1 □ leg. K. M. Olsen; **TRI** Bardu: Setermoen (EIS 146) 21 Sept. 2004 1 □ leg. J. M. Myrland; **NNØ** Hamarøy: Femtvasslia (EIS 134) 27 July 1993 1 □ leg. K. M. Olsen, Tømmeråsen (EIS 138) 25 July 2005 1 □ leg. A. C. Nilssen; **NSI** Rana: Mo i Rana Lufthavn (EIS 123) 8 Aug. 1993 2 □□ leg. K. M. Olsen; **NSY** Bodø: Vågan W (EIS 130) 26 July 1993 1 □ leg. K. M. Olsen; NSY Nesna: Hammarøya (EIS 118) 21 Aug. 1980 5 □□ leg. P. Straumfors; **NSY** Alstahaug: Alsta („Alstenø“) (EIS 117) 1900 leg. E. Strand (in lit., *Henicops fulvicornis* Meinert det. Ellingsen); **NSY** Bindal: Osen (EIS 110) 10 Aug. 2004 1 □. leg. R. Bergersen (under stone near house) (Map 5).

No males were found. In this globally widespread species, males are known from the Azores, Canary Islands, and the Australasian area. In contrast to most centipedes, the species prefers fairly dry and exposed biotopes with low vegetation (J. Böcher, pers. comm.), which may explain its presence in Greenland (Böcher & Enghoff 1984, cf. Jensen & Christensen 2003). Although not clearly seen from Map 5, the species was found further from the sea than other species, i.e. in areas where winter temperatures are generally lower.

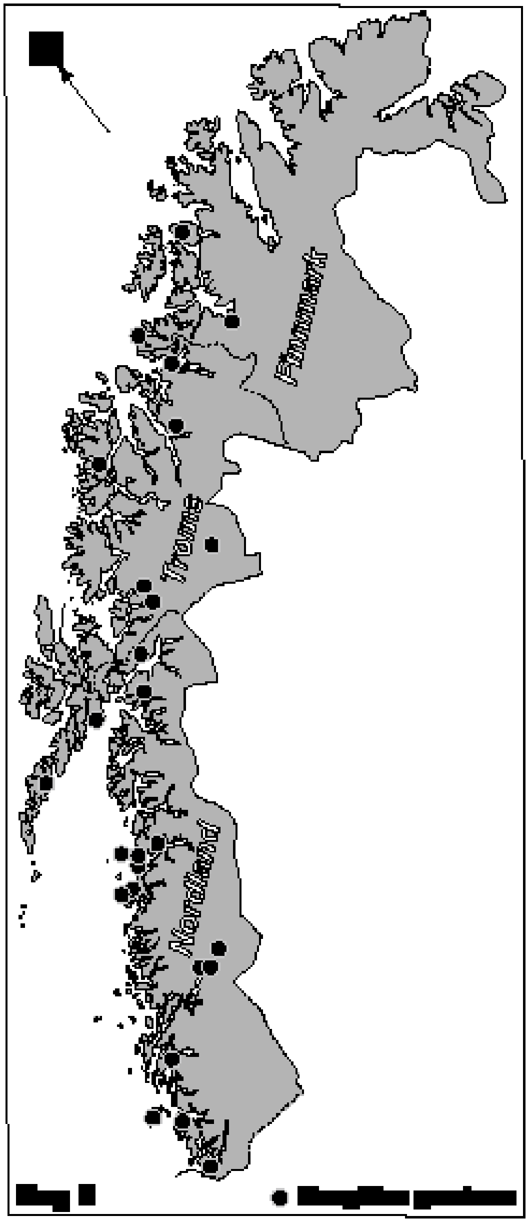
Geophilus proximus C. L. Koch, 1847

Map 6

FV Hammerfest: Rypefjord (EIS 180) 15 April 2005 1 □ leg. J. Mortensen (in supralittoral), Rypefjord 10 June 2005 2 □□ leg. Fjordtun school; FV Loppa: Mønes (EIS 172) 19 June 1977 3 □□ leg. W. Vader; **FV** Alta: Komsa (EIS 173) 1 June 2005 1 □ leg. 1B Komsa school; **TRY** Tromsø: Rakkfjord (EIS 162) 29 April 1984 1 □ leg. A. Fjellberg; **TRI** Kvænangen: Spildra (EIS 172) 31



Map 5. Distribution of *Lamyctes emarginatus* in North Norway. The open circle is from Schneider (1905).



Map 6. Distribution of *Geophilus proximus* in North Norway.

May 2005 3 □□ leg. Spildra school; **TRI** Kåfjord: Olderdalen (EIS 163) 19 April 2005 1 □ leg. P. M. Blindheim; **TRI** Salangen: Melen (EIS 146) 25 April 2005 5 □□ leg. V. Sagerup (in compost); **TRI** Lavangen: Tennevoll (EIS 146) 24 Aug. 2004 3 □□ leg. Lavangen school; **TRI** Målselv: Dividalen (EIS 148) 1 July 1982 1 ? photo A. C. Nilssen; **NNV** Vestvågøy: Hermannsvika (EIS 137) 21 April 2005 2 □□ leg. Svarholt school; **NNV** Lødingen: Vågehamn (EIS 138) 22 April 2005 1 □ leg. Vestbygd school; **NNØ** Evenes: Bogen (EIS 145) 2 Sept. 2001 8 □□ leg. P. Jordan; **NNØ** Ballangen: Vårset (EIS 139) 27 July 1993 1 ? leg. K. M. Olsen; **NSI** Rana: Røbergeng (EIS 123) 19 May 1977 2 □□ leg. P. Straumfors, Svartvasshei (EIS 123) 23 May 1983 1 □ leg. O. Myhre, Ytteren (EIS 123) 1 May 1998 2 □□ leg. K. M. Olsen; **NSY** Bodø: Vågøya (EIS 130) 30 June 1967 8 □□ leg. J. Fjeldså, Vågan W (EIS 130) 26 July 1993 1 ? leg. K. M. Olsen; Bodø (EIS 130) 15 April 2005 1 □ leg. 6A Grønnåsen school, Landegode (EIS 130) 28 May 2005 1 □ leg. A. Steinsrud; **NSY** Gildeskål: 3 km N Breivik (EIS 126) 28 July 1987 1 □ leg. H. W. Waldén, Sørarnøy (EIS 125) 18 April 2005 2 □□ leg. Sørarnøy school; **NSY** Leirfjord: Lille Leirvika (EIS 117) 4 July 1979 1 □ leg. P. Straumfors; **NSY** Vega: Vega (EIS 113) 26 April 2005 1 □ leg. Vega school; **NSY** Brønnøy: Brønnøysund (EIS 114) 17 Aug. 1971 2 □□ leg. H. W. Waldén; **NSY** Bindal: Osen (EIS 110) 7 April 2004 12 □□ (probably) and Osen 10 Aug. 2004 3 □□ leg. R. Bergersen (Map 6).

In addition 1 □ labelled „Finmarken Esmark“ (depicted in eastern Finnmark in Meidell (1978) and Andersson et al. (2005)), collected in 1866 by Lauritz Esmark, and unverified „some places along the coast north to Tromsø“ (Schneider 1905, p. 178). Common throughout Sweden and S Finland, and slightly more common in Troms than depicted in Andersson et al. (2005). Occurs also on the south coast of the Kola peninsula, N Russia (Palmén 1949).

Strigamia maritima (Leach, 1817)

Map 4

NSY Bindal: Osen (EIS 110) 7 April 2004 2 □□ 1 □ leg. R. Bergersen (under stones in the supralittoral among isopods *Porcellio scaber*) (Map 4).

New to North Norway. Included in Andersson et al. (2005). Listed in European Register of Marine Species (ERMS). The species has been searched for on some occasions in Nordland and Troms, but never been found (W. Vader, pers. com.). Further south it may occur in large numbers (Horneland & Meidell 1986). The species has been used in studies of segmentation (Arthur & Chipman 2005).

Millipedes (Diplopoda)

Polyxenus lagurus (Linnaeus, 1758)

Map 7

NSY Bodø: Straumøya (EIS 130) 20 June 1971 2 □□ leg. A. Fjeldså (under stone, calcareous meadow) (Map 7). Deposited in Zoological Museum, Copenhagen.

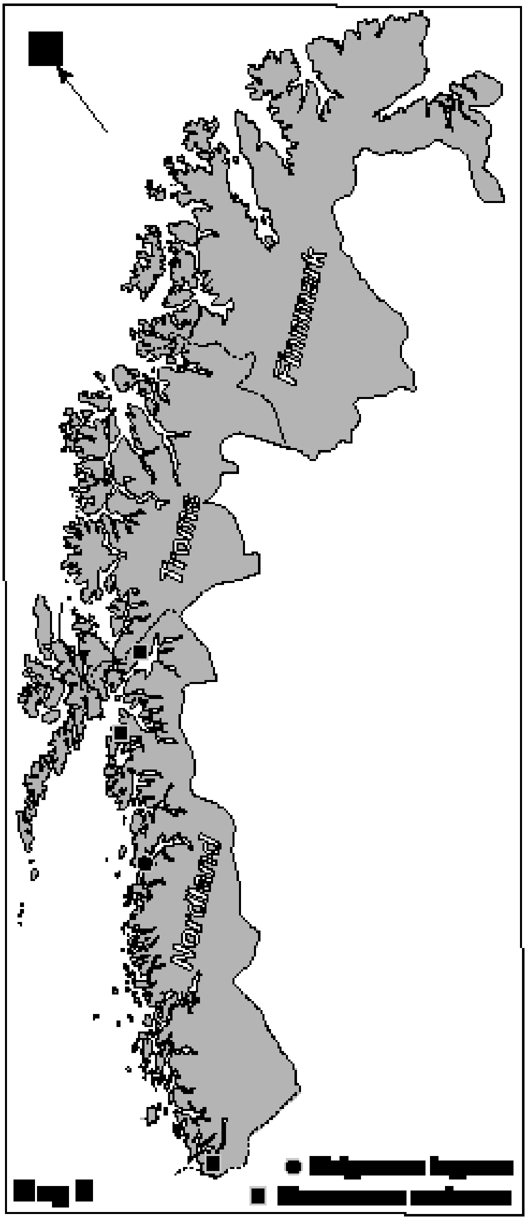
The above find, briefly mentioned in Kime & Golovatch (2000, p. 343), adds to the records in Meidell (1970). This conspicuous but very small (2-3 □□ long) species is common under bark of living pine (Meidell 1970) and also in birds‘ nests (Tajovský et al. 2001). Previously found at Rørvik (Ellingsen 1910) just south of the study area.

Nemasoma varicorne C. L. Koch, 1847

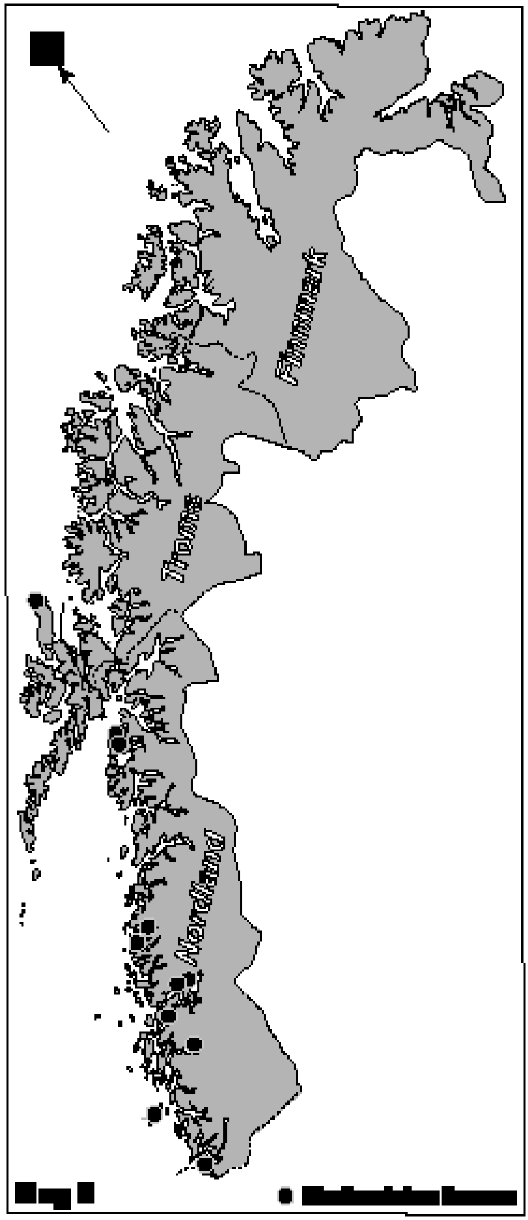
Map 7

NNØ Evenes: Bogen (EIS 145) July 1995 2 □□ leg. P. Jordan, Bogen 2 Sept. 2001 1 □ leg. P. Jordan; **NNØ** Hamarøy: Tømmeråsen (EIS 138) 29 July 2004 4 □□ leg. A. C. Nilssen; **NSY** Bindal: Osen (EIS 110) 23 March 2005 1 □ leg. R. Bergersen (sun-exposed hill, under bark of fallen birch *Betula pubescens*) (Map 7).

New to North Norway. The records from N Nordland ($68^{o}30$‘N) are included in Andersson et al. (2005) but not the one from S Nordland (65^{o}N). The northernmost find in South Norway is at 62^{o}N; in Sweden and Finland at 61^{o}N (Andersson et al. 2005).



Map 7. Distribution of *Polyxenus lagurus* (two females in ZMUC, Copenhagen) and *Nemasoma varicorne* in North Norway.



Map 8. Distribution of *Proteroiulus fuscus* in North Norway.

Proteroiulus fuscus (Am Stein, 1857)

Map 8

NNV Andøy: Bleiksøya (69°17‘N, EIS 152) 3 Aug. 1984 1 □ leg. A. Fjellberg (in nest of kittiwake *Rissa tridactyla*); **NNØ** Hamarøy: Liland (EIS 138) 30 July 1987 1 □ leg. H. W. Waldén, Tømmeråsen (EIS 138) 27 Sept. 1996 1 □, 2 Aug. 2002 1 □, 22 July 2003 6 □□, 25 July 2005 15 □□ and 1 Aug. 2005 1 □ leg. A. C. Nilssen (under bark of Scots Pine *Pinus sylvestris*); **NSI** Rana: Straumen (EIS 122) 4 May 1975 2 □□ leg. P. Straumfors, Storstrand (EIS 122) 2 May 1998 4 □□ leg. K. M. Olsen; **NSI** Vefsn: Utnes (EIS 118) 17 Aug. 1974 1 □ leg. H. W. Waldén; **NSY** Meløy: Grønnøya (EIS 125) 1 April 2005 1 □ leg. T. Hansen & A. Meløysund, Neverdalen (EIS 125) 4 May 2005 1 □ leg. Neverdal school; **NSY** Nesna: Sandnes (EIS 118) 18 Aug. 1974 1 juv. leg. H. W. Waldén; **NSY** Vega: Åsen (EIS 113) 14 Aug. 1982 1 □ leg. A. C. Nilssen; **NSY** Bindal: Osen (EIS 110) 23 March 2005 2 □□ leg. R. Bergersen (under bark of fallen birch) (Map 8).

The northernmost record from Andøy is not included in Andersson et al. (2005). First reported from North Norway by Meidell (1978) and Olsen (1998c). Mapped in Kime (1990) as the only diplopod in N Norway. Common in birds‘ nests (Tajovský et al. 2001).

Cylindroiulus latestriatus (Curtis, 1845)

Julus luscus Meinert, 1868

Map 9

NSY Røst: Sandøya (EIS 129) 3 July 1937 4 □□ 2 □□ leg. H. Tambs-Lyche (det. C. Jeekel 1963); **NSY** Herøy: Sør-Herøy (EIS 117) May 1900 leg. J. S. Schneider (in lit., *Julus luscus* Meinert det. Ellingsen); **NSY** Alstahaug: Sandnessjøen (EIS 117) 10 July – 2 August 1995 1 juvenile leg. E. Hauge (Barber trap); **NSY** Bindal: Osen (EIS 110) 7 April 2004 1 □ leg. R. Bergersen (under stone in supralittoral) (Map 9).

This is a cosmopolitan and halophilic species (Andersson et al. 2005). It may be common in Nordland, although the schoolchildren did not find it. Most classes went to the woods, rather than sea shores.

Pachyiulus varius (Fabricius, 1781)

Pachyiulus flavipes (C. L. Koch, 1847)

Map 9

NSI Rana: Plurdalen (EIS 123) 30 Nov. 1989 1 □ leg. Grundstrøm (“in kitchen counter, possibly transported with grapes”) (Map 9).

Being a common species in S Europe but absent from N Europe (Fauna Europaea 2005), this specimen was probably introduced accidentally.

Oxidus gracilis (C. L. Koch, 1847)

Map 9

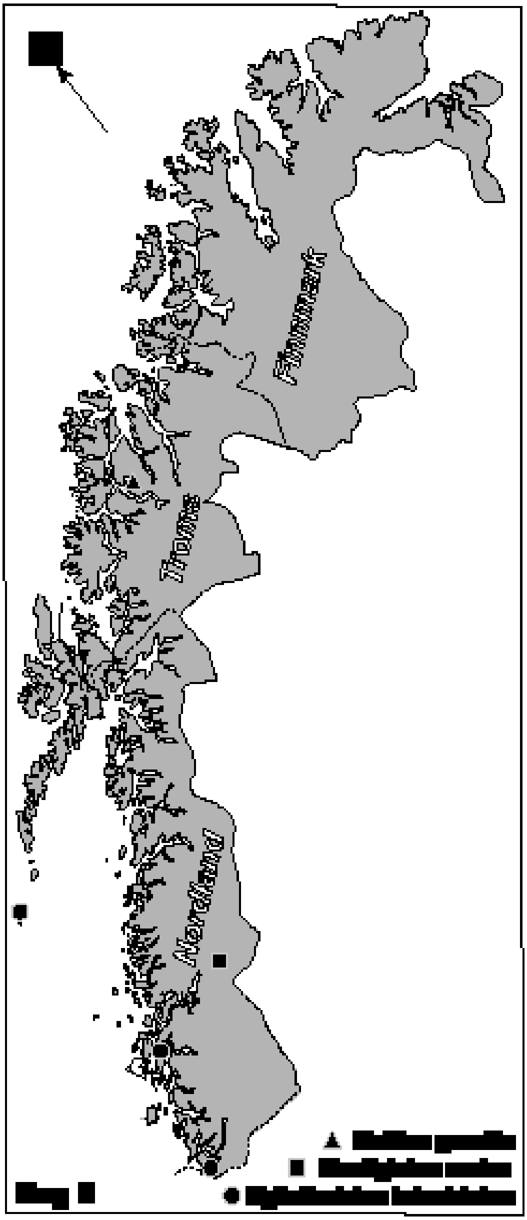
TRY Tromsø: Andersdalen (EIS 162) Sept. 1987 1 □ leg. A. Jensen (Map 9).

The specimen was found outdoors on the ground while the finder was cutting birch wood (Arne Jensen pers. medd. 2004). A “greenhouse species” in the Nordic countries (Andersson et al. 2005), and probably introduced.

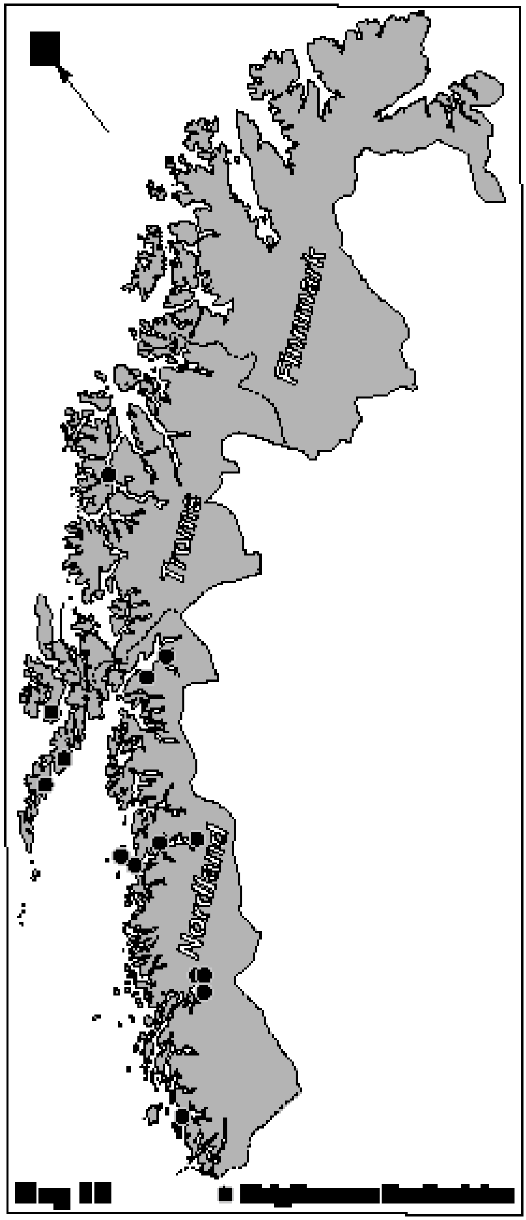
Polydesmus denticulatus C. L. Koch, 1847

Map 10

TRY Tromsø: Tromsø (69°38’N, EIS 162) 15 Oct. 2004 1 □ and 26 May 2005 2 □□ 2 □□ leg. R. Bergersen (under stones near compost); **NNV** Hadsel: Stokmarknes (EIS 143) 9 June 2005 1 □ leg. 2AB Stokmarknes school; **NNV** Vågan: Storvågan (EIS 137) 16 June 2005 19 □□ 10 □□ leg. Kabelvåg school; **NNV** Vestvågøy: Stamsund (EIS 137) 19 April 2005 6 □□ leg. Svarholt school (under stones, abandoned potato field); **NNØ** Narvik: Håkvikskogen (EIS 139) 3 May 2005 1 □ leg. M. Liljebakk; **NNØ** Ballangen: Ballangen (EIS 139) 25 April 2005 2 □□ leg. Ballangen school; **NSI** Saltdal: Setså (EIS 127) 4 July 2005 1 □ leg. R. Bergersen (under stones near decaying heap of rubbish); **NSI** Rana: Tverråga (EIS 123) 21 & 30 June 1989 2 □□ leg. K. A. Meyer & S. Lundmo (Barber trap), Ytteren (EIS 123) 1 May



Map 9. Distribution of *Cylindroiulus latestriatus, Pachyiulus flavipes* and *Oxidus gracilis* in North Norway. The open circle is from Schneider (1905).



Map 10. Distribution of *Polydesmus denticulatus* in North Norway.

1998 9 □□ leg. K. M. Olsen, Stenneset bygdetun (EIS 123) 26 May 2005 4 □□ 4 □□ leg. Båsmo school; **NSY** Bodø: Vågan (EIS 130) 4 June – 21 July 2003 6 □□ 11 □□ leg. E. Hauge (Barber trap), Bodø 13-15 April 2005 5 □□ 1 □ leg. Grønnåsen school, Landegode (EIS 130) 28 May 2005 2 □□ leg. A. Steinsrud; **NSY** Brønnøy: Mosaksla (EIS 114) May-July 2003 1 □ 3 □□ leg. E. Hauge (Map 10).

Previously known to occur in the Trondheim area (Storm 1898), the species was first reported from North Norway (NSI Rana) by Olsen (1998c). The distribution area has now been proven north to Troms (Map 10).

DISCUSSION

For the overall distribution pattern we have little to add to Andersson et al. (2005). Hence, we will discuss the distribution in North Norway. In this part of the country seven species can be regarded as common: *Lithobius forficatus, L. erythrocephalus, Proteroiulus fuscus* and *Polydesmus denticulatus* in Nordland, *Lamyctes emarginatus* and *Geophilus proximus* in Nordland and Troms, and Lithobius curtipes in Finnmark. For Nordland, *Polyxenus lagurus* and *Cylindroiulus latestriatus* may eventually be added to this list. It became clear that the area had been poorly investigated, as the schoolchildren found almost half the total material in one year (Table 2).

Centipedes (Chilopoda)

Three centipedes (*Lithobius melanops, L. tenebrosus,* and *Strigamia maritima*) were new to the area. None of them were found by the schoolchildren. The two former may be rare, as they occur in places where the children looked (houses and cellars, in debris, under stones, moss and bark). The latter was scarcely searched for and may be common in S Nordland. It lives in sea shore habitats, including rotten seaweed.

Lamyctes emarginatus was only found once by the schoolchildren (Troms in 2004). This globally widespread species is parthenogenetic in northern regions and has been considered ripicolous, occurring along lakes and rivers (Adis & Junk 2002) and in open disturbed areas (Andersson 2005). In Greenland, it is most often found in dry and exposed biotopes with low vegetation (J. Böcher, pers. comm.), and it is regularly found in flooded grassland (Plum 2005). In Nordland it was found under a stone on a sun-exposed hill. Probably being univoltine (Andersson 2005), it is usually found in late summer and autumn (most school classes searched in spring). Clearly an adaptive species that can turn up anywhere.

Lithobius forficatus was common in houses in Nordland, and *L. erythrocephalus* was common in the woods there. *Geophilus proximus* was common in Nordland and Troms - maybe even in W Finnmark. The schoolchildren found many new localities for these species, and we believe their distribution (Maps 1, 3, 6) is now more truly presented. The same applies to *L. curtipes*, which the children did *not* find in Nordland and Troms.

Lithobius curtipes was first found by the lichenologist Theodor M. Fries in "Warangerfjord", Finnmark, in 1857 or 1864 (see Jørgensen 2001). The specimen was published by Palmberg (1866). In 1875, the Nordenskiöld Expedition collected the species in Vaigatsch, N Russia (Stuxberg 1876). By now, when the differences between *L. curtipes* and *L. crassipes* are evident (Zalesskaja 1978, Andersson 1983), it is clear that *curtipes* is *the* northern centipede species. No other *Lithobius* species has been found in Finnmark (Maps 1-6), except the doubtful 4 □□ 1 □ *Lithobius forficatus* labelled "Finmarken Esmark" (collected in 1866 by Lauritz Esmark on his travels in North Norway).

Millipedes (Diplopoda)

The occurrence of millipedes at 70^{o}N was anticipated by Golovatch (1997, Fig. 2). However, Mikhaljova (2004) has 67^{o}30'N (*Proteroiulus fuscus*) and 67^{o}40'N (*Angarozonium amurense*) as the northernmost Holarctic records. They are now found at 69^{o}17'N (*P. fuscus*, in kittiwake nest) (Map 8) and 69^{o}38'N (*Polydesmus denticulatus*) (Map 10).

Except *Pachyiulus varius* (S European) and the anthropochorous *Oxidus garacilis*, only one millipede, *Nemasoma varicorne*, was new to the area and found in three places in Nordland (Map 7). Searching under dead bark (as many reportedly did), the schoolchildren should have found it if it was very common. However, as the northernmost find in S Norway is at about 62°N (Andersson et al. 2005), it is probably not.

Polyxenus lagurus and *Cylindroiulus latestriatus* may be more common than the study shows. Although conspicuous in appearance, the former is small and easily overlooked because of its dull colouring (Meidell 1970). The latter is thalassophilic and occurs in all parts of the world, apparently in similar habitats as the centipede *Strigamia maritima* (on 7 April 2004 these two species were found on the same stoney beach). However, both species occur in several kinds of habitat (Andersson et al. 2005).

Proteroiulus fuscus seemed to be common in Nordland (Map 8), where it occurred under the bark of decaying trees. This is its usual habitat (Andersson et al. 2005). One may therefore wonder what it was doing in a kittiwake nest on the treeless Bleiksøya (at 69°17'N). In Slovakia, the most frequent millipede species in nests were *Polyxenus lagurus* and *Proteroiulus fuscus* (Tajovský et al. 2001). Both are amphi-Atlantic species, with sometimes sexual, sometimes asexual mode of reproduction (in the present study only females were found). Are they spread by birds?

Polydesmus denticulatus was on several occasions found near decaying organic matter (grass, leaves, potatoes). RB found it in crevices on the underside of stones, and not on the ground. It can be overlooked, and may be commoner than shown in Map 10.

Myriapoda

Of the four Myriapoda classes (including Pauropoda and Symphyla), only Chilopoda and Diplopoda were found in North Norway. However, four species of pauropods and three species of symphylans have been found in Trøndelag (Andersson et al. 2005), just south of the study area. Their smaller size makes them easy to overlook, and we think they also occur in Nordland.

The coastal climate of North Norway is influenced by a warm current, causing relatively mild winters. Farther inland, however, winter temperatures are lower. It was therefore no surprise that the distribution area of myriapods stretched along the Norwegian coast, where few biologists study the terrestrial invertebrate diversity.

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REFERENCES

Adis, J. & Junk, W. J. 2002. Terrestrial invertebrates inhabiting lowland river floodplains of Central Amazonia and Central Europe: a review. Freshw. Biol. 47, 711-731.

Andersson, G. 1983. Post-embryonic development of *Lithobius curtipes* C. L. Koch (Chilopoda: Lithobiidae). Ent. Scand. 14, 387-394.

Andersson, G. 1985. The distribution and ecology of centipedes in Norrland, Sweden (Chilopoda). Bijdr. Dierk. 55, 5-15.

Andersson, G. 2001. A check-list of the Centipedes of the Nordic countries (Denmark, Sweden, Norway, Finland and Iceland. http://www.gnm.se/gnm/clecom/clecom/chilopod.htm

Andersson, G. 2005. Habitat preferences an seasonal distribution of developmental stadia in *Lamyctes* *emarginatus* (Newport, 1844) (*L. fulvicornis* Meinert, 1868) and comparisons with some *Lithobius* species (Chilopoda, Lithobiomorpha). In: 13th International Congress of Myriapodology, Bergen, Norway, Abstracts of lectures and posters: 5.

Andersson, G., Meidell, B. A., Scheller, U., Winqvist, J.-Å., Osterkamp Madsen, M., Djursvoll, P., Budd, G. & Gärdenfors, U. 2005. Nationalnyckeln till Sveriges flora och fauna [Encyclopedia of Swedish Flora and Fauna]. Mångfotingar. Myriapoda. 351 pp. ArtDatabanken, Uppsala.

Arthur, W. & Chipman, A. D. 2005. The centipede *Strigamia maritima*: what it can tell us about the development and evolution of segmentation. BioEssays 27, 653-660.

Blower, J. G. 1985. Millipedes. Synopsis of the British Fauna (New Series) 35, 1-242.

Böcher, J. & Enghoff, H. 1984. A centipede in Greenland: *Lamyctes fulvicornis* Meinert, 1868 (Chilopoda, Lithobiomorpha, Henicopidae). Ent. Meddr 52, 49-50.

Eason, E. H. 1964. Centipedes of the British Isles. 294 pp. Frederick Warne, London.

Eason, E. H. 1970. The Chilopoda and Diplopoda of Iceland. Ent. Scand. 1, 47-54.

Eason, E. H. 1982. A review of the north-west European species of Lithobiomorpha with a revised key to their identification. Zool. J. Linn. Soc. 74, 9-33.

Ellingsen, E. 1892. Bidrag til Kundskaben om de norske Myriopoders Udbredelse. Christiania Vid. Selsk. Forh. 1891(10), 3-12.

Ellingsen, E. 1897. Mere om norske Myriopoder. Christiania Vid. Selsk. Forh. 1896(4), 3-12.

Ellingsen, E. 1903. Mere om norske Myriopoder. II. Christiania Vid. Selsk. Forh. 1903(6), 3-11.

Ellingsen, E. 1910. IV. Myriopoda und Pseudoscorpiones. Pp. 344-348 in Strand, E. (ed.), Neue Beiträge zur Arthropoden-Fauna Norwegens nebst gelegentlichen Bemerkungen über deutsche Arten. I-V. Nyt Mag. Naturv. 48, 307-352.

Enghoff, H. 2002. Millipedes, Diplopoda. http://www.zmuc.dk/EntoWeb/collections-databaser/diplo.html

Fauna Europaea 2005. http://www.faunaeur.org/full_results.php?id=150279 (pages updated by Henrik Enghoff)

Golovatch, S. I. 1997. On the main traits of millipede distribution and faunogenesis in Eurasia (Diplopoda). Ent. Scand. Suppl. 51, 199-208.

Horneland, E. O. & Meidell, B. 1986. The epimorphosis of *Strigamia maritima* (Leach, 1817) (Chilopoda: Geophilidae). Ent. Scand. 17, 127-129.

Jensen, D. B. & Christensen, K. D. (eds.) 2003. The Biodiversity of Greenland - a country study. 165 pp. Greenland Institute of Natural Resources, Nuuk.

Jørgensen, P. M. 2001. Th. M. Fries (1832–1913), A Grand Scandinavian Lichenologist. The Bryologist 104, 537-542.

Kime, R. D. 1990. A provisional atlas of European myriapods. Part 1. Fauna Europaea Evertebrata 1, 1-109.

Kime, R. D. 2000. Present knowledge of the distribution of European millipedes (Diplopoda). Fragm. Faun. Suppl. 43, 281-294.

Kime, R. D. & Golovatch, S. I. 2000. Trends in the ecological strategies and evolution of millipedes (Diplopoda). Biol. J. Linn. Soc. 69, 333-349.

Meidell, B. A. 1967. *Polydesmus angustus* Latzel 1884, (Diplopoda), new to Norway. Norsk Ent. Tidsskr. 14, 103-105.

Meidell, B. A. 1968. *Microchordeuma gallicum* (Latzel 1884), (Diplopoda) new to Scandinavia. Norsk Ent. Tidsskr. 15, 41-46.

Meidell, B. A. 1969. *Geophilus insculptus* Attems 1895 and *Geophilus proximus* C. L. Koch 1847 (Chilopoda) in Norway. Norsk Ent. Tidsskr. 16, 9-12.

Meidell, B. A. 1970. On the distribution, sex ratio, and development of *Polyxenus lagurus* (L.) (Diplopoda) in Norway. Norsk Ent. Tidsskr. 17, 147-152.

Meidell, B. A. 1975. Four diplopods new to Norway. Norw. J. Entomol. 22, 121-122.

Meidell, B. A. 1977. Myriapoda. Fauna of the Hardangervidda 12, 3-8.

Meidell, B. A. 1978. The distribution of Norwegian myriapods as known 1972, with a list of published papers devoted to the same subject (revised Sept. 1978). 7 pp. Unpubl. MS, Univ. of Bergen.

Meidell, B. A. 1979. Norwegian myriapods: some zoogeographical remarks. Pp. 195-201 in Camatini, M. (ed.), Myriapod Biology. Academic Press, London.

Meidell, B. & Simonsen, Å. 1985. A mass occurrence of *Cylindroiulus londinensis* (Leach, 1815) in Norway. Fauna norv. Ser. B 32, 47-48.

Mikhaljova, E. V. 2004. The millipedes (Diplopoda) of the Asian part of Russia. 292 pp. Pensoft Publishers, Sofia-Moscow (Series Faunistica 39).

Olsen, K. M. 1995a. *Nanogona polydesmoides* (Leach, 1815) (Diplopoda, Chordeumatida) from two new localities in Norway. Fauna norv. Ser. B 42, 69-70.

Olsen, K. M. 1995b. Tusenbeinet *Kryphioiulus occultus* (C. L. Koch, 1877), "grisehaletusenbein". Insekt-Nytt 20(4), 13.

Olsen, K. M. 1995c. Jordskolopenderen *Haplophilus* *subterraneus* (Shaw, 1789), “kjempeskolopender”. Insekt-Nytt 20(4), 14.

Olsen, K. M. 1996. Skolopenderen *Lithobius lapidicola* Meinert, 1872, “veksthussteinkryper”. Insekt-Nytt 21(4), 5.

Olsen, K. M. 1998a. Flattusenbeinet *Polydesmus angustus* Latzel, 1884 funnet i Østfold. Fauna (Oslo) 51, 164-167.

Olsen, K. M. 1998b. Tusenbeinet *Macrosternodesmus palicola* Brolemann, 1908, “hvittusenbein”. Insekt-Nytt 23(4), 17-18.

Olsen, K. M. 1998c. Noen spredte funn av småkryp i og nær Mo i Rana. Ranas Dyreliv 20, 34-35.

Olsen, K. M. 2000. *Haplophilus subterraneus* (Shaw, 1789), a centipede (Chilopoda, Geophilomorpha) new to Norway. Norw. J. Entomol. 47, 63-64.

Palmberg, J. G. W. (1866). Bidrag till kännedom om Sveriges Myriapoder. Ordningen Chilopoda. 29 pp. Acad. thesis, Stockholm.

Palmén, E. (1949). The Chilopoda of Eastern Fennoscandia. Ann. Zool. Soc. Zool. Bot. Fenn. Vanamo 13(4), 1-45.

Plum, N. 2005. Terrestrial invertebrates in flooded grassland: a literature review. Wetlands 25, 721-727.

Porat, C. O. von 1887. Om norska myriapoder. Ent. Tidskr. 8, 39-40.

Schneider, J. S. 1905. Sydherø. Et lidet bidrag til kundskaben om den arktiske skjærgaards malakologiske og entomologiske fauna. Tromsø Museums Aarshefter 27, 170-205.

Simonsen, Å. 1981. Faunistisk rapport over norske Diplopoda. 93 pp. Acad. thesis, University of Bergen.

Storm, V. 1898. Myriopoda & Oniscoida ved Throndhjem. Det. Kgl. Norske Vid. Selsk. Skr. 1898(8), 3-6.

Stuxberg, A. 1876. On the Myriapoda, from Siberia and Waigatsch Island, collected during the Expedition of Prof. Nordenskiöld, 1875. Ann. Mag. Nat. Hist. 17, 306-318.

Sømme, L. 2004. Entomologiens historie i Norge. 326 pp. Norsk Entomologisk Forening, Oslo.

Tajovský, K., Mock, A. & Krumpál, M. 2001. Millipedes (Diplopoda) in birds’ nests. Eur. J. Soil Biol. 37, 321-323.

Tobias, D. 1975. Zur Kenntnis von *Lithobius curtipes* C. L. Koch (Chilopoda: Lithobiomorpha) in Nordschweden. Ent. Tidskr. 96, 24-26.

Vader, W. 1979. En landisopode *Trichoniscus pusillus* på 70°N. Fauna (Oslo) 32, 121.

Zalesskaja, N. T. 1978. [Identification book of the lithobiomorph centipedes of USSR (Chilopoda, Lithobiomorpha)]. 212 pp. Nauka, Moskva. (In Russian.)

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Uleiota planata (L. 1761) (Coleoptera, Silvanidae) new to Norway

Arne Endre Laugsand

Laugsand, A. E. 2006. *Uleiota planata* (L. 1761) (Coleoptera, Silvanidae) new to Norway. Norw. J. Entomol. 53, 39-41.

Uleiota planata (L. 1761) (Coleoptera, Silvanidae) is here reported new to Norway. The records and the locality are described. In Sweden the beetle probably became extinct and all the records after 1930 are connected to import of timber. The species might have been displaced through competition from the close relative *Dendrophagus crenatus* (Paykull, 1799). Observations on the locality also exclude the possibility of direct import of the specimens on timber, but one possibility is a secondary settlement in the natural habitat after import on foreign timber. However, it is possible that *U. planata* has been present continuously in fragments of virgin forest. The locality deserves further attention.

Keywords: *Uleiota planata, Dendrophagus crenatus,* Silvanidae, Norway, *Carabus cancellatus,* Coleoptera

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INTRODUCTION

The members of the family Silvanidae are predatory beetles that both as larvae and imago prey under bark of trees. According to Silfverberg (2004), eight species of this family are earlier recorded in Norway. *Uleiota planata* (L. 1761) is common in central and southern Europe. In northern parts of Europe it is known from Finland, Sweden, Denmark, Latvia, Lithuania, Russian Karelia (Silfverberg 2004) and Britain (Allen 1992). The beetle probably became extinct in Sweden during the last century, but during the last decade there have been several records in Sweden, but all specimens are interpreted to be connected to import of timber. It is listed in The 2005 red list of Swedish species in the category DD (data deficient) (Gärdenfors 2005). In this paper the first Norwegian specimens are presented and the locality is described. Further, it is discussed how to interpret and place these records in context to the distribution of the species in Europe.

MATERIAL

Records

Five specimens of *U. planata* were found beneath thick bark on logs of *Betula pendula* at **AK** Bærum: Isi (EIS 28). Four ex (1 □, 3 □□) on 7.V.2005, leg. Arne Endre Laugsand, and one ex (□) on 15.V.2005, leg. Christer Reiråskag.

How to recognize the species

U. planata could be confused with the common and widely distributed *Dendrophagus crenatus* (Paykull, 1799). However, the two species can be separated on the shape of the pronotum which in *U. planata* has spiny sharp edges whereas *D. crenatus* has rounded corners (Figure 1). It is easy to distinguish the sexes of *U. planata*, because only the males has sickle-shaped horns arising from the basal parts of the mandibles (Allen 1996). In Figure 1 this secondary sexual character is visible between the first antennal segments (scapi) and should not be confused with the smaller mandibles.

Observations on the locality

The beetles were found on a log of *Betulae pendula* Roth lying in a southern aspect hill near Isielva, a small river lined by mostly deciduous mixed forest in cultural landscape. The surrounding topography gives a warm local climate and the geology of the area is of Cambro-Silurian origin. The log was cut in pieces ranging from 0.3 to 1m in length and with a diameter of about 0.6m. The beetles were found under thick and loose bark. The wood was hard, dry and exposed to the sun. A stump nearby indicates that the log has been cut on the location, and rules out the possibility that the beetles have been imported directly with timber. Horizontal growth direction and age of the fruitbodies of the polypore fungi on the logs indicate that the tree was cut some years ago and then attacked by the fungi. The fungus belongs to the genus *Trametes* (Olberg pers. com). Among other beetle species found on the same logs were *Platysoma minus* (Rossi, 1792), *Bitoma crenata* (Fabricius, 1775) and larvae of *Pyrochroa coccinea* (L. 1761). A nest of small ants (Formicidae) was also found in the log.

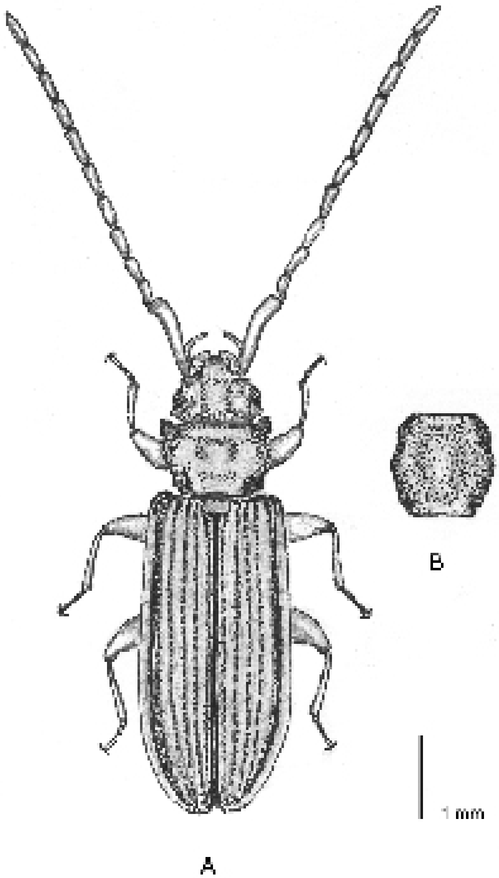

Figure 1. A) Sketch of *Uleiota planata* (L. 1761) male found in Norway. Note the sharp corners of the spiny pronotum. B) The more rounded pronotum of *Dendrophagus crenatus* (Paykull, 1799) is provided for comparison. (Drawings by the author)

DISCUSSION

The faunistic history of *U. planata* in Scandinavia is uncertain. The species was common in southern Sweden around 1850 and the close relative *Dendrophagus crenatus* (Paykull, 1799) was rare. By 1930 the situation was the reversed. *U. planata* had disappeared completely and *D. crenatus* had become common. Around 1970 *U. planata* was rediscovered in Halland, Sweden (Ødegaard pers. com). There are now several records from Sweden, but most specimens are connected to import of timber mainly from Germany, Spain and France (Gillerfors 1988; Lundberg 1997). The extensive import of timber from Russia could probably also constitute a source of specimens. The forest of Russian Karelia has a different management history and *U. planata* was among the rare insects that seems to be more common on the Russian side of the Karelia than on the Finnish side (Siitonen & Martikainen 1994).

An explanation of the records in Norway could probably be a secondary settlement in the natural habitat after import on foreign timber. The sawmill Fossum bruk is situated approximately 10 kilometers from the locality. It is suggested that *U. planata* might have been displaced by *D. crenatus* in Sweden (Ødegaard pers. com). One hypothesis may be that these species have conflicting fundamental niches sensu Hutchinson (1957). Around 1930 *U. planata* was maybe then totally out competed and had become extinct. However, it is possible that *U. planata* has been present continuously in fragments of virgin forest after the decline a century ago. It is worth noting that Allen (1992) describes exactly the same mystical disappearance and rediscovery pattern in southern Britain as the one in southern Sweden. Allen also suggested that the species may have been overlooked for over a century in Britain. In the study by Gillerfors (1988), only *U. planata* and not *D. crenatus* appears together with three other members of the family Silvanidae and other species from the superfamily Cucujoidea. Neither on the locality in Norway was *D. crenatus* observed. This suits the suggested allopatric distribution pattern of the species.

Both sexes of *U. planata* were recorded and it is possible that there exists a small viable native population in the area. Preliminary examination of suitable microhabitats in the area surrounding the log did not result in observations of *U. planata*. However, one specimen was collected on the same log on the 15th of May 2005. This, held together with the fact that there have been collectors surveying the area and also with traps of different kinds, supports the pattern of general rarity of *U. planata* in Fennoscandia.

Another species found at the same locality that invite to further investigations in the area is *Carabus cancellatus* (Illiger, 1798). This large beautiful ground beetle (Carabidae) seems to be disappearing from earlier known localities in Scandinavia and in Norway there are only a few records after 1985 (Ødegaard pers. com).

Acknowledgements. I thank Stefan Olberg for helping me a lot with this text. Christer Reiråskag and Frode Ødegaard identified the species. Frode Ødegaard also provided valuable information about the species and commented on the manuscript. Karl Erik Zachariassen commented on the manuscript. Oddvar Hanssen gave me hint on how to draw beetles.

REFERENCES

Allen, A. 1992. *Uleiota planata* (L.) (Col.: Cucujidae) recaptured near Blackheath, S.E. London after more than a century. Entomol. Rec. J. Var. 104(9-10), 230.

Allen, A. 1996. A striking male character of *Uleiota planata* (L.) (Col.: Cucujidae) overlooked in British works. Entomol. Rec. J. Var.108(1-2).

Gillerfors, G. 1988. Coleoptera from pulp-wood imported to South Sweden from France and Spain. Ent. Tidskr. 109, 42-45.

Gärdenfors, U. e. 2005. Rödlistade arter i Sverige 2005 – The 2005 Red List of Swedish Species. ArtDatabanken, SLU, Uppsala.

Hutchinson, G. T. 1957. Population studies - Animal ecology and demography - Concluding remarks. Cold Spring Harbor Symp. Quant. Biol. 22, 415-427.

Lundberg, S. 1997. Beetles which have not been recorded in Sweden for a long time - a follow-up of an article from 1978. Ent. Tidskr. 118(2-3), 119-123.

Siitonen, J. & Martikainen, P. 1994. Occurrence of rare and threatened insects living on decaying Populus tremula: A comparison between Finnish and Russian Karelia. Scand. J. Forest Res. 9(2), 185-191.

Silfverberg, H. H. 2004. Enumeratio nova Coleopterorum Fennoscandiae, Daniae et Baltiae. Sahlbergia 9(1), 1-111.

Norw. J. Entomol. 53, 43-46, 22 May 2006

Notes on Norwegian sawflies (Hymenoptera: Symphyta) I

Ole J. Lønnve

Lønnve, O. J. 2006. Notes on Norwegian sawflies (Hymenoptera: Symphyta) I. Norw.J.Entomol. 53, 43-46.

The sawflies *Pamphiliius festivus* Pesarini & Pesarini, 1984, *Selandria wuestneii* (Konow, 1885) and *Eutomostethus gagathinus* (Klug, 1816) are recorded from Norway for the first time. Remarks on their biology and distribution are given.

Key words: Hymenoptera, Symphyta, Pamphiliidae, Tenthredinidae,Norway.

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INTRODUCTION

In the present paper, three sawflies new to Norway are recorded. The records result from the present revision of the Symphyta collection in the Natural History Museum, Oslo (NHMO), and also from recent field work. The material is deposited in the collection of the NHMO. The nomenclature is according to Taeger & Blank (1998).

MATERIAL

Pamphiliidae

Pamphilius festivus Pesarini & Pesarini, 1984
Figure 1

During examination of the material of Pamphiliids at the NHMO, 2 □□ specimens of *P. festivus* were identified. The records are **AK** Enebakk (EIS 29), probably about 1870 (leg. J. H. S. Siebke) and **BØ** Hole, Sundvollen (EIS 36) 1 June 1906 (leg. T. H. Schøyen).

P. festivus highly resembles *P. betulae* (Linnaeus, 1758), and has until recently been confused with this species (Pesarini & Pesarini 1984, Viitasaari 2002). *P. festivus* is a beautifully colored and spectacular insect. The biology is poorly known, but probably resembles that of *P. betulae* (Viitasaari 2002). *Populus tremulae* is reported as host plant (Taeger et al. 1998). The distribution of *P. festivus* in Norway is unknown, but as *P. betulae,* it is probably rather rare, and distributed in southern Norway (Midtgaard 1987).

Tenthredinidae

Selandria wuestneii (Konow, 1885)
Figure 2

The genus *Selandria* is a small genus with only four European species. *S. serva* (Fabricius, 1793) is common in southern Norway. Recently a second species, *S. flavens* (Klug, 1816), was published new to Norway (Nuorteva et. al. 2005).

One single □ of *S. wuestneii* was captured at **AK** Sørum: Dammyra (EIS 37, UTM (WGS84) 32V PM 213 549) 21 June 2005 (leg. O. Sørlibråten).

S. wuestneii is a black sawfly (6-7 mm) with yellowish abdomen. The species within Selandria feed on different grasses and sedges. Both *S. flavens* and *S. wuestneii* inhabit bogs and wet places. According to Taeger et al. (1998), *S. wuestneii* feeds on *Carex lasiocarpa*, which is common throughout Norway (Lid 1987). For this

Fig. 1. *Pamphilius festivus* □.

reason *S. wuestneii* and *S. flavens*, are probably distributed over a greater part of Norway. *S. wuestneii* is known from North- and Central Europe and North America (Canada and Alaska) (Viitasaari & Vikberg 1985, Lacourt 1999).

Tenthredinidae

Eutomostethus gagathinus (Klug, 1816)
Figure 3

One □ was captured in a meadow at **AK** Oslo: Lindøya (EIS 28, UTM (WGS 84) 32V NM 961 405) 1 July 2005 (leg. L. Aarvik).

E. gagathinus is a black and shining sawfly (5–7 mm.) with yellow legs and smoky wings. *E. gagathinus* is widely distributed all over Europe, including Denmark and Finland (Viitasaari & Vikberg 1985, Benson 1952, Nielsen & Henriksen 1915). The distribution in Norway is uncertain, but the species is probably not common. The host plant is unknown, but other species in the genus feed on different species of *Poa, Juncus* and *Carex* (Taeger et al. 1998) which might be host plants for *E. gagathinus* as well.

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Fig. 2. *Selandria wuestneii* □.

Fig. 3. *Eutomostethus gagathinus* □.

REFERENCES

Benson, R. B. 1952. Hymenoptera, Symphyta. Handbk. Ident. Brit. Ins., London 6 (2b), 51–137.

Lacourt, J. 1999. Répertoire des Tenthredinidae oust-paléarctiques (Hymenoptera, Symphyta). Mémoires de la SEF, Vol. 3, 432 pp

Lid, J. 1987. Norsk, Svensk, Finsk Flora.837 pp. Det Norske Samlaget, Oslo.

Midtgaard, F. 1987. The Norwegian Xyelidae and Pamphilidae (Hymenoptera). Fauna norv. Ser. B 34, 125–130.

Nielsen, J. C. & Henriksen, K. 1915. Træ- og Bladhvepse. Danmarks fauna. Dansk naturhistorisk forening. 232 pp. G. E. C. Gads, København.

Nuorteva, M., Nuorteva, J. & Olsen, T. J. 2005. Records of sawflies (Hymenoptera: Symphyta) from Østfold, Southern Norway. Sahlbergia 10, 68–79.

Pesarini, C. & Pesarini, F. 1984. Pamphilius festivus n. sp. Di Pamphiliidae dell'Italia settentrionale. Atti Soc. ital Sci. nat. Museo civ. Stor. Nat. Milano 125, 94–100.

Taeger, A. & Blank, S. M. 1998. Pflanzenwespen Deutschlands (Hymenoptera, Symphyta). 364 pp., 8 plates.Verlag Goecke & Evers, Keltern.

Taeger, A., Altenhofer, E., Blank, S. M., Jansen, E., Kraus, M., Pschorn-Walcher, H. & Ritzau, C. 1998. Kommentare zur Biologie, Verbreitung und Gefährdung der Pflanzenwespen Deutschlands (Hymenoptera, Symphyta). Pp. 49– 36 in Taeger, A. & Blank. S. M. (Eds): Pflanzenwespen Deutschlands (Hymenoptera, Symphyta). Kommentierte Bestandsaufnahme. Verlag Goecke & Evers, Keltern.

Viitasaari, M. 2002. The Northern European taxa of Pamphilidae. Pp. 235–358. In: Viitasaari, M. (Ed.), Sawflies (Hymenoptera, Symphyta). A review of the suborder, the Western Palearctic taxa of Xyeloidae and Pamphilioidae. Tremex Press, Helsinki

Viitasaari. M. & Vikberg, V. 1985. A checklist of the sawflies (Hymenoptera, Symphyta) of Finland. Notulae Entomol. 65, 1–17.

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On the family Ditomyiidae (Diptera, Sciaroidea) in Norway

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Gammelmo, Ø. & Rindal, E. 2006. On the family Ditomyiidae (Diptera, Sciaroidea) in Norway. Norw. J. Entomol. 53, 47-49.

The distribution of the two species of the genus *Symmerus* (Ditomyiidae) in Norway is discussed. *Symmerus nobilis* Lackschewitz, 1937 has hitherto not been recorded from Norway.

Key words: Diptera, Sciaroidea, Ditomyiidae, *Symmerus*, Norway.

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INTRODUCTION

The family Ditomyiidae consists worldwide of about 80 species belonging to 9 genera, mainly occurring in the Southern hemisphere. In Europe the family is represented with 4 species in 2 genera (*Symmerus* Walker, 1848 *Ditomyia* Winnertz, 1846). Of these, *Ditomyia* has a Central European distribution, while *Symmerus* has a more northerly distribution. According to Munroe (1974) *Symmerus* is endemic to the Palaearctic region, and *Symmerus sensu stricto* has not been recorded outside Europe so far.

Ditomyiidae is considered as a relatively new family of Diptera. The oldest fossil record known is from the Eocene period (36.6 – 52 mya) from Australia (Evenhuis 1994), which is much younger than the other large families of Sciaroidea. Mycetophilidae and Keroplatidae, reported from Jurassic and Cretaceous, respectively.

Symmerus annulatus (Meigen, 1830) is relatively common in Europe compared with *Symmerus nobilis* Lackschewitz, 1937. *S. nobilis* is mentioned as rare in Britain by Falk & Chandler (2005). *S. annulatus* was first recorded from Scandinavia by Zetterstedt (1851) from Esperöd, Sweden, as *"Ceroplatus flavus"* Zetterstedt, 1851.

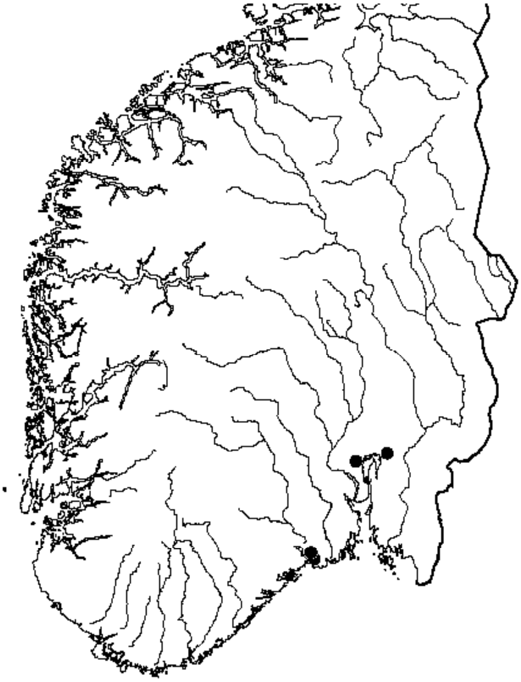
Little is known about the biology and ecology of these species, but larvae of *S. annulatus* have been reported reared from decaying elm wood.

At present the species can only be identified with certainty on characters in the male genitalia. European Ditomyiidae species can be identified with Zaitzev (1978) or Landrock (1940). Munroe (1974) gives a world revision of the genera *Symmerus* (Palaearctic) and *Australosymmerus* Freeman, 1954 (Latin-America, Australia and New Zealand).

Contributions to this family in Norway have been scarce. In estimates of of the number of each insect family occurring in Norway, Ottesen (1993) suggested that Ditomyiidae most probably has one species in Norway. The family was first recorded from Norway from the lake Østensjøvannet in Oslo municipality (Hansen & Falck 2000). Two males of *Symmerus annulatus* were reported, from the northern and western part of this area.

The present study deals with the genus *Symmerus* and is based on 19 specimens from 5 localities. The material is kept in the insect collection at

Figure 1: Habitus of *Symmerus annulatus* (Meigen, 1830), lateral view. Photo: K. Sund.



Map 1: Distrubution of *Symmerus annulatus* (Meigen, 1830) in Norway.

the Natural History Museum, University of Oslo (NHMO). Munroe (1974) was used for identification (see this publication for figures).

THE SPECIES

Symmerus annulatus (Meigen, 1830)

(Map 1, Figure 1)
Total material: 12 □□ 4□□.
AK Oslo: Østensjøvannet (EIS 28) 6□□1□, July 1996, leg. M. Falck, coll. NHMO; Asker: Semsvik (EIS 28), 14 – 18 June 2004, 2 □□, leg. Ø. Gammelmo, coll. NHMO; Semsvik (EIS 28), 18 – 25 June 2004, 2 □□, leg. Ø. Gammelmo, coll. NHMO; Semsvik (EIS 28), 9 – 14 June 2004, 1 □, leg. Ø. Gammelmo, coll. NHMO; Semsvik (EIS 28), 24 June – 3 August 2005, leg. Ø. Gammelmo, coll. NHMO; Semsvik (EIS 28), 1 □, 18 – 25 June 2005, leg. Ø. Gammelmo, coll. NHMO. **TEY** Porsgrunn: Gravastranda (EIS 18), 13 June – 12 July 1988, 1 □, leg. G. Søli, coll. NHM; Hitterødbekken (EIS 18), 13 June – 11 July 1988, 2 □□, leg. G. Søli, coll. NHMO;

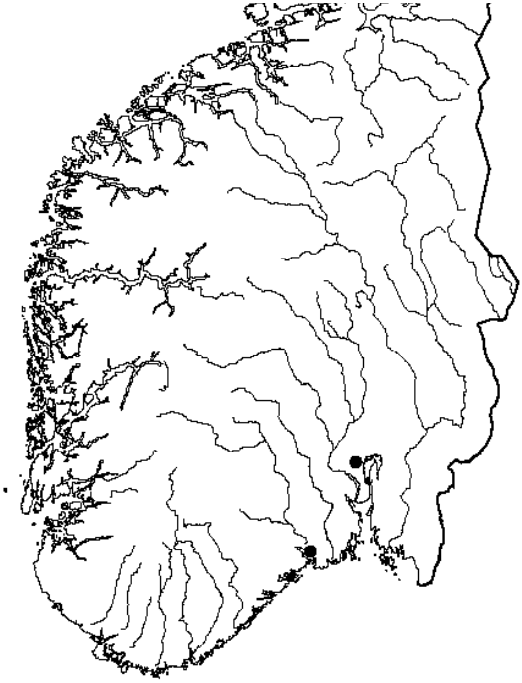
Note: One specimen, caught 18 – 25 June 2004, showed some differentiation in size and color, being significantly smaller and paler. However, the genitalia were similar to the other males.

Symmerus nobilis Lackschewitz, 1937

(Map 2, Figure 2)
Total material: 2 □□.
AK Asker: Semsvik (EIS 28), 24 June -3 August 2005, 1□, leg. Ø. Gammelmo, coll. NHMO. TEY Porsgrunn: Dammane (EIS 11), 27 June – 12 July 1998, 1□, leg. G. Søli, coll. NHMO;

CONCLUDING REMARKS

This family is rare and relatively unknown in Norway. The *Symmerus* species seems to have



Map 2: Distribution of *Symmerus nobilis* Lackschewitz, 1937 in Norway.

Figure 2: Habitus of *Symmerus nobilis* Lackschewitz, 1937, lateral view. Photo: K. Sund.

a preference for south facing warm broadleaved forests. According to their limited distribution and habitat requirements should be considered for the Norwegian Red List.

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REFERENCES

Evenhuis, N.L. 1994. Catalogue of the fossil flies of the world (Insecta: Diptera). 600 pp. Backhuys Publishers, Leiden.

Falk, S.J. & Chandler, P.J. 2005 A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza not dealt with by Falk (1991). Species Status 2, 1 – 189. Joint Nature Conservation Committee, Peterborough.

Hansen, L.O. & Falck, M. 2000. Insektfaunaen ved Østensjøvannet. Oslo: Østensjøvannets venner. 1 – 34.

Landrock, K. 1940. Pilztmücken oder Fungivoridae (Mycetophilidae). Pp. 1-166 in: Dahl, F. (ed.), Die Tierwelt Deutschlands. 38/6, G. Fischer, Jena.

Munroe, D.D. 1974. The systematics, phylogeny, and zoogeography of *Symmerus* Walker and *Australosymmerus* Freeman (Diptera: Mycetophilidae: Ditomyiinae). Mem. entomol. soc. Can. 92. 1 – 183. Ottawa.

Ottesen, P. (red).1993. Norske insektfamilier og deres artsantall. NINA Utredning 55,1-40.

Zaitzev A.I. 1978. Flies of the family Ditomyiidae (Diptera) from the USSR. Entomolo. Obozr. 57 (3), 668-676.

Zetterstedt, J.V. 1851. Diptera Scandinaviae, disposita et descripta. Vol. 10. Lund.

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Gonodera luperus (Herbst, 1783) (Col., Tenebrionidae) and *Anthocomus rufus* (Herbst, 1784) (Col., Melyridae) new to Norway

Stefan Olberg

Olberg, S. 2006. *Gonodera luperus* (Herbst, 1783) (Col., Tenebrionidae) and *Anthocomus rufus* (Herbst, 1784) (Col., Melyridae) new to Norway. Norw. J. Entomol. 53, 51-53.

One specimen of *Gonodera luperus* (Herbst, 1783) (Family Tenebrionidae) was collected in a window-trap at Kolsås, Bærum (EIS 28) in Akershus (AK). Several specimens of *Anthocomus rufus* (Herbst, 1784) (Family Melyridae) have been found at four different localities in south-eastern Norway during 2003 to 2005. These are the first records of the two species in Norway.

Key words: *Gonodera luperus, Anthocomus rufus*, Tenebrionidae, Melyridae, Norway

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THE SPECIES

Gonodera luperus (Herbst, 1783)

One specimen of *Gonodera luperus* (Figure 1) (family Tenebrionidae) was caught in a window-trap at **AK** Bærum: Kolsås (EIS 28) 15 June – 7 July 2005, leg. and coll. S. Olberg. The fairly large (7-9 mm) darkling beetle *G. luperus,* belonging to the subfamily Alleculinae, is previously known from Sweden, Denmark and Estonia in Northern Europe (Silfverberg 2004). In Sweden it is recorded in several of the southern districts (Sk, Bl, Sm, Öl, Go, Ög, Sö, Up, Vs) (Lundberg 1995). *G. luperus* is widespread but not common in both Sweden and Denmark (Hansen 1938). It is therefore not surprising that the species also appears in south-eastern parts of Norway. Despite the relatively large size of *G. luperus*, it has so far not been detected in Norway and must be regarded as rare. The larva develops in rotten wood of various deciduous trees while imago visits flowers. It is unlikely that this is a newly invaded species, but its rarity and probable restricted distribution in Norway, most likely explain why this species has been undetected in the Norwegian fauna.

Anthocomus rufus (Herbst, 1784)

The first specimens of *Anthocomus rufus* (Figure 2) (family Melyridae) were found in Norway at **AK** Bærum: Oksenøya (EIS 28) Aug. 2003, leg. J. Pedersen, coll. NHM and S. Olberg. Three specimens were sweep-netted on *Phragmites communis*. Two additional specimens were sweep-netted at the same locality in Sept. 2005, leg. L.O. Hansen, coll. NHM. **AK** Oslo: Heggholmen (EIS 28) 1 Sept. 2005. 1 specimen leg. and coll. S. Olberg. Sweep-netted on a meadow. **Ø** Hvaler: Kirkøy (EIS 12) 12 Sept. 2003. 1 specimen leg. and coll. S. Ligaard. **TEY** Skien: Børsesjø (EIS 18) 19 Aug. – 10 Sept. 2004. 7 specimens in malaise-trap, leg. K.M. Olsen, coll. NHM and S. Olberg.

A. rufus is a widespread species in southern parts of Sweden (Lundberg 1995) and there are reports of an expansion or at least an increase in the Swedish populations during the last couple of years. Such an expansion in our neighbouring country could have lead to an invasion in south-eastern Norway. An invasion or at least an expansion in Norway is supported by the fact that *A. rufus* was found at three localities situated far from each other within

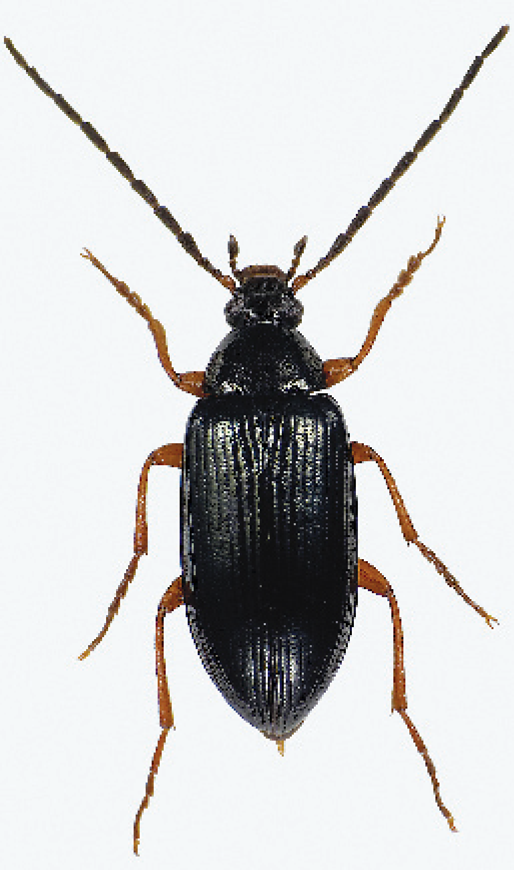

Figure 1. *Gonodera luperus.*
Photo: Karsten Sund.

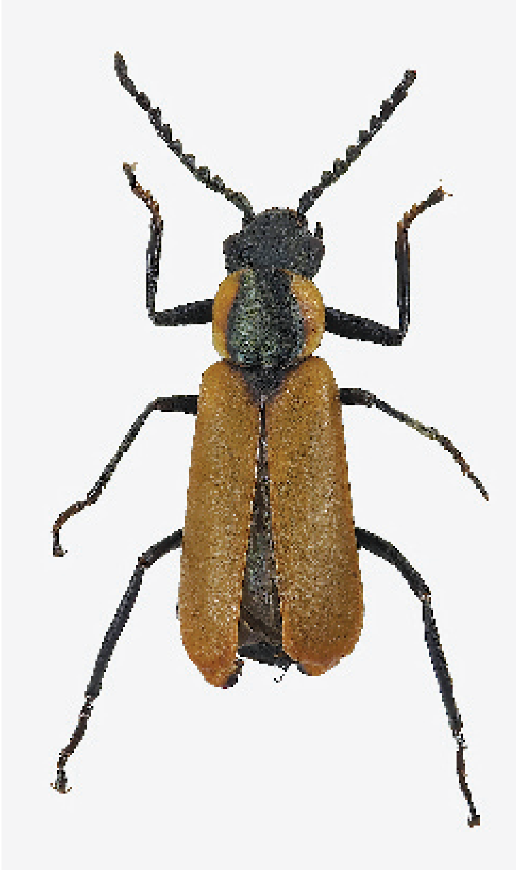

Figure 2. *Anthocomus rufus.*
Photo: Karsten Sund.

a short time period. If this species has been present in Norway over a long period of time, there must have been small populations restricted to a few areas where they were able to exist undetected by entomologists. *A. rufus* is connected to *Phragmites communis* and imago is usually found in late autumn. There are no populations of *P. communis* on Heggholmen, and for this reason *A. rufus* probably does not have a viable population on this island. Heggholmen is on the other hand close to other suitable habitats and only about 6 km from the population on Oksenøya. The four other records of *A. rufus* in Norway where made on *P. communis* or (Børsesjø) in traps placed in close connection to this plant. Searching for *A. rufus* in potential habitats elsewhere along the Norwegian south-eastern coast will probably reveal new populations and it would be interesting to see if this species continue its expansion in the coming years.

Acknowledgements. I would like to thank Karsten Sund, Nasjonalt senter for insektkartlegging, who photographed the specimens figured in the present article. Lauritz Sømme and Arne Laugsand provided constructive comments to the manuscript and Lars Ove Hansen, Sindre Ligaard and Kjell Magne Olsen contributed with material as well as valuable information about *Anthocomus rufus*.

REFERENCES

Hansen, V. 1938. Danmarks Fauna 44. Biller. Blødvinger, klannere m.m. 320 pp. G.E.C. Gads Forlag , København.

Lundberg, S. 1995. Catalogus Coleopterorum Sueciae. 224pp. Naturhistoriska riksmuseet & Entomologiska Föreningen i Stockholm, Stockholm.

Silfverberg, H. 2004. Enumeratio nova Coleopterorum Fennoscandiae, Daniae et Baltiae. Sahlbergia 9(1), 1-111.

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Book review

Almquist, S. 2005. Swedish Araneae. Part 1 – families Atypidae to Hahniidae (Linyphiidae excluded).

Insect Systematics & Evolution Supplements 62. 284 pp. USD 50. Soft cover. Distributed by Scandinavian Entomology Ltd., Västervång 28, S-247 34S, Sandby, Sweden.

A printed checklist of Swedish spiders has been missing (although an internet version has been available since 2001: http://www2.nrm.se/en/spindlar.html). Fortunately that is now changing. Not only has a complete up-to-date checklist been published, but every species has been meticulously illustrated and described!

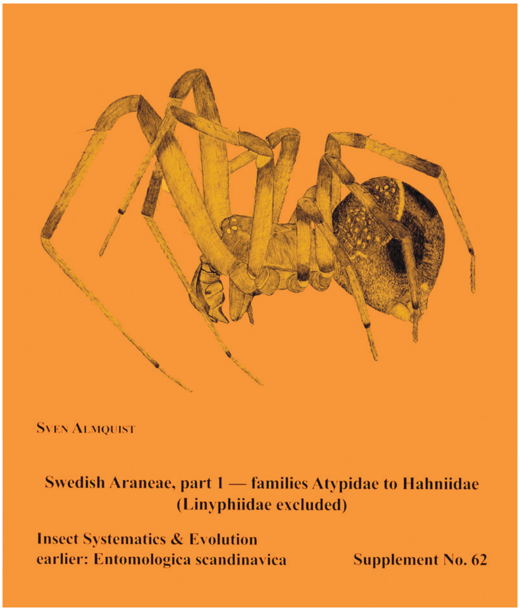
The present volume is the first in a planned three-volume instalment on Swedish spiders. Part 1 includes the families Atypidae, Pholcidae, Segestriidae, Dysderidae, Mimetidae, Eresidae, Uloboridae, Nesticidae, Theridiidae, Theridisomatidae, Tetragnathidae, Araneidae, Lycosidae, Pisauridae, Oxyopidae, Agelenidae, Cybaeidae and Hahniidae (in that order). The remaining families with the exception of Linyphiidae will be treated in Part 2 (to be published in 2006) while Part 3 (to be published in 2007) will be entirely devoted to the Linyphiidae . In the first volume (Part 1) 18 families with 199 species are treated. The text is richly illustrated with about 1300 drawings by the author!

This volume starts with a checklist of all genera and species recorded from Sweden, followed by several pages describing the general morphology of spiders in detail. A dichotomous key to all families is provided, with all salient features mentioned in the key being illustrated. In short this is one of the best family keys I have seen. A couple of pages with a map of the faunal provinces of Sweden and a list of abbreviations follow.

All families and genera are diagnosed and both sexes of each species are given a thorough separate description. Brief information on distribution, accompanied by a map, is also provided, followed by notes on the biology of each species including information on web building behaviour, prey capture, reproduction and phenology. Some of this information, however, is not presented for all species. Keys for each genus and species are provided where necessary.

The book has a nice lay-out,and is easy to use for determination work. The illustrations are very clear and all relevant structures of the genitalia are pointed out and named. When necessary the palpal organ and epigyne are shown from different angles, sometimes even part of the palpal organ is shown separately (very helpful for some of the more similar species of *Pardosa*). Vulval structures are also illustrated for the vast majority of species. One of the best features of this book is the inclusion of small, yet very clear habitus drawings, many of them having been drawn from live specimens. Only those drawings made from specimens preserved in alcohol have been illustrated without legs (with four exceptions), a fact which makes it easy to determine the state of the specimens on which the drawings are based.

Even a cursory glance at this book reveals the immense dedication and efforts that has gone into it. The present and forthcoming volumes will no doubt be standard reference and determination works for future araneologists in Northern Europe. In fact, the release of these volumes will make it much easier to work on Norwegian spiders as accurate and detailed drawings are finally available for virtually all Norwegian species in a single series of publications. Now it will not be necessary to go through all the old publications by Palmgren, Holm, Tullgren and others (although they are important) to find that elusive drawing! It is also nice to have an up-to-date and accurate taxonomic list of our Scandinavian spiders.



On the critical side I would have liked to see more accurate distributional data on the species in Sweden. For each species only the provinces have been listed along with a small map where the relevant provinces have been filled in black. Of course, it is a daunting and perhaps overwhelming task to compile all distributional data for a nation with as long an araneological history as Sweden, but the omission of such data means that the book is not ideal for use in faunistical surveys, although the maps do provide a general indication of the distribution of the species. Perhaps the weakest part of the book has to do with the habitat descriptions. These are very brief and often only based on a single source (references for these are frequently not provided) and are of little use for ecological purposes. The book clearly does not emphasise the ecology of these fascinating animals. With such data included this would have been a perfect book for the spider enthusiast. I would also have liked to see a small chapter on the history of araneology in Sweden.

There are also a few minor inconsequential errors or omissions in the book. In the introduction the number of known spiders species is given as 34.000, which clearly shows that the author has been working on this series for a long time! As of January 2005 the number of described spider species in the world are 39.112! Furthermore, the male palpal organ of *Aculepeira lapponica* is not illustrated, presumably because a male has not been collected in Sweden. On the other hand, while no Swedish male of *Argiope bruennichi* is known either, a specimen from Germany has been used as basis for an illustration of its palpal organ. It is a pity that no male *A. lapponica* could be obtained, although the male has been described from Finland. This applies to a few other species as well.

These comments, however, are minor points only which in no way diminishes the fact that this is a stunning work and an excellent book.

Norwegian fungus gnats of the family Mycetophilidae (Diptera, Nematocera)

Øivind Gammelmo & Geir Søli

Gammelmo, Ø. & Søli, G. 2006. Norwegian fungus gnats of the family Mycetophilidae (Diptera, Nematocera). Norw. J. Entomol. 53, 57-69.

Our knowledge about the Norwegian fauna of fungus gnats has improved considerably during the last 15 years. With the present addition of 61 new species, 473 species belonging to the family Mycetophilidae have been recorded from Norway. A complete check list for Norway is presented together with detailed information for the new species. To enable comparison with previous lists from Europe, references to literature for most species recorded or published after 1940 are added.

Key words: Diptera, Nematocera, Mycetophilidae, Norway, check-list.

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INTRODUCTION

Fungus gnats of the family Mycetophilidae are small to medium sized, slender to moderately robust gnats, with simple antennae and humped thorax. Adults are easily recognized on their distinctly elongated coxae. Fungus gnats are most abundant in humid areas, especially moist woodland. Larvae of most species lives on fungi, sporophores or on hyphae penetrating decaying wood and other plant material.

Together with Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae, Lygistorrhinidae, Rangomaramidae and Sciaridae, Mycetophilidae make up the superfamily Sciaroidea. The family Mycetophilidae is commonly divided in subfamilies and tribes, but their phylogeny is still insufficiently known and the ranking of taxa varies between authors (see e.g. Søli et al. 2000).

The first studies dealing with Norwegian fungus gnats, are those by Siebke (1853, 1863, 1866, 1872, 1877). In his most extensive list (Siebke 1877), he included 53 species today referable to Mycetophilidae. Until recently, little attention has been paid to the Norwegian fauna of fungus gnats, and new records were only occasionally published. For a review up to 1940, see Soot-Ryen (1943). The first European check list of Mycetophilidae was published in 1988 (Soós & Papp 1988), and included 47 species recorded from Norway. Between 1940 and 1988 the only contributions to the Norwegian fauna, were those of Hackman (1970, 1971), Gagné (1981) and Väisänen (1984). A few more records were added after 1988 (Kjærandsen 1993, Søli 1993), until 1994 when 211 species were published from Jostedalen, West Norway (Søli 1994), thus extending the list of Norwegian species considerably. More studies followed within the next 10 years (Zaitzev & Økland 1994, Økland 1995, Økland & Zaitzev 1997, Søli 1997, Hansen & Falck 2000, Kurina 2003, Kjærandsen & Kurina 2004). According to our data, 413 species have been published from Norway up to present. Not all of these records, however, were included in the Fauna Europaea project, listing 374 species of Mycetophilidae from the Norwegian mainland, and 5 from Svalbard and Jan Mayen (Chandler 2004).

MATERIAL AND METHODS

The present study includes records based on both material studied by the authors, and records taken from the literature. Possible misidentifications can thus not be entirely excluded. The studied material is kept in the Natural History museum, University of Oslo (NHMO). This is by far the largest collection of mycetophilids in Norway. In 1996, a substantial material of fungus gnats was transferred to NHMO from the Zoological museum (Bergen museum), University of Bergen, including previously published material from Jostedalen (Søli 1994).

To enable comparison with previous fauna lists, references to earlier records were added to the list. As records up to 1940 are well treated by Soot-Ryen (1943), only references published after 1940 were included in the final list. One exception is Siebke (1877), being the first Norwegian list of Mycetophilidae. Information on whether or not a certain species is recorded as Norwegian in the Catalogue of Palaearctic Diptera (Soós & Papp 1988) and the Fauna Europaea project (Chandler 2004) were also included.

THE CHECK LIST

References used in the list: 1 - Siebke (1877), 2 - Hackman (1970), 3 - Hackman (1971), 4 - Gagné (1981), 5 - Väisänen (1984), 6 - Søli (1993), 7 - Kjærandsen (1993), 8 - Søli (1994), 9 - Zaitzev & Økland (1994), 10 - Økland (1995), 11 - Økland & Zaitzev (1997), 12 - Søli (1997), 13 - Hansen & Falck (2000), 14 - Kjærandsen & Kurina (2004), 15 – Kurina (2003), 16 - Økland (1996), FaEu – Registered as from Norway in Fauna Europaea (Chandler 2004), CpD – Registered as from Norway in Catalogue of Palaearctic Diptera (Soós & Papp, 1988), NHMO – Material represented in the collection of NHMO.

Species not previously recorded from Norway are marked with an asterix (*), and are commented on below. A few species in the check list are included in the Fauna Europaea database (Chandler 2004), but as far as known to the authors, records for these species have never been published. These species are marked with a diamond sign (◊).

***Acnemia* Winnertz, 1863**
Acnemia falcata Zaitzev, 1982 8, 11, 16, FaEu
* *Acnemia longipes* Winnertz, 1863 NHMO
Acnemia nitidicollis (Meigen, 1818) NHMO, 8, 11, 13, 16, FaEu

***Acomoptera* Vockeroth, 1980**
Acomoptera difficilis (Dziedzicki, 1885) NHMO, 11, 13, 16, FaEu

***Allocotocera* Mik, 1886**
Allocotocera pulchella (Curtis, 1837) NHMO, 8, 11, 16, FaEu

***Allodia* Winnertz, 1863**
Allodia (Allodia) anglofennica Edwards, 1921 NHMO, 8, 11, 16, FaEu
* *Allodia (Allodia) embla* Hackman, 1971 NHMO
Allodia (Allodia) lugens (Wiedemann, 1817) NHMO, 8, 11, 16, FaEu
Allodia (Allodia) lundstroemi Edwards, 1921 NHMO, 8, 11, 16, FaEu
Allodia (Allodia) ornaticollis (Meigen, 1818) NHMO, 1
nigricollis Zetterstedt, 1852 (*Mycetophila*)
Allodia (Allodia) pyxidiiformis Zaitzev, 1982 NHMO, 8, 11, FaEu
Allodia (Allodia) septentrionalis Hackman, 1971 NHMO, 3, 8, 11, 16, CpD, FaEu
Allodia (Allodia) simplex Zaitzev, 1982 11, FaEu
Allodia (Allodia) truncata Edwards, 1921 NHMO, 8, 11, FaEu
Allodia (Allodia) tuomikoskii Hackman, 1971 3, 11, 16, CpD, FaEu
◊ *Allodia (Allodia) zaitzevi* Kurina, 1998 FaEu
Allodia (Brachycampta) alternans (Zetterstedt, 1838) NHMO, 1
Allodia (Brachycampta) barbata (Lundström, 1909) NHMO, 8, FaEu
Allodia (Brachycampta) czernyi (Landrock, 1912) 11, FaEu
* *Allodia (Brachycampta) foliifera* (Strobl, 1910)

Allodiopsis Tuomikoski, 1966
Allodiopsis (Allodiopsis) domestica (Meigen, 1830) NHMO, 8, FaEu
* *Allodiopsis (Allodiopsis) rustica* (Edwards, 1941)

Anaclileia Meunier, 1904
Anaclileia dispar (Winnertz, 1863) NHMO, 11, 16, FaEu

Anatella Winnertz, 1863
Anatella ankeli Plassmann, 1987 NHMO, 7, FaEu
Anatella aquila Zaitzev, 1989 NHMO, 8, FaEu
Anatella ciliata Winnertz, 1863 NHMO, 8, 11, 16, FaEu
Anatella flavomaculata Edwards, 1925 NHMO, 8, 11, FaEu
Anatella fungia Plassmann, 1984 NHMO, 8, FaEu
Anatella gibba Winnertz, 1863 11, FaEu
Anatella laffooni Plassmann, 1977 NHMO, 8
Anatella lenis Dziedzicki, 1923 NHMO, 8, 11, 16, FaEu
Anatella longisetosa Dziedzicki, 1923 NHMO, 8, FaEu
Anatella minuta (Stæger, 1840) NHMO, 8, FaEu
Anatella setigera Edwards, 1921 NHMO, 8, FaEu
Anatella simpatica Dziedzicki, 1923 NHMO, 8, FaEu

Anatella turi Dziedzicki, 1923 NHMO, 8, FaEu
Anatella unguigera Edwards, 1921 NHMO, 8, FaEu

***Apolephthisia* Grzegorzek, 1885**
Apolephthisia subincana (Curtis, 1837) NHMO, 8, 11, 13, 16, FaEu

***Azana* Walker, 1856**
Azana (Azana) anomala (Stæger, 1840) NHMO, 11, 16, FaEu

***Boletina* Stæger, 1840**
Boletina basalis (Meigen, 1818) NHMO, 1, 8, 11, 13, 16, CpD, FaEu
nigra Zetterstedt, 1838 (Leia)
Boletina borealis Zetterstedt, 1852 NHMO, 1, 8, 11, 16, FaEu
Boletina brevicornis Zetterstedt,1852 NHMO, 1, 8, 11, 16, CpD, FaEu
Boletina cincticornis (Walker, 1848) NHMO, 1, 8, 11, 16, CpD, FaEu
consobrina Zetterstedt, 1852 (*Boletina*)
Boletina conformis Siebke, 1864 NHMO, 1, CpD, FaEu
Boletina cornuta Zaitzev, 1994 11, 16, FaEu
* *Boletina digitata* Lundström, 1914 NHMO
Boletina dispecta Dziedzicki, 1885 11, FaEu
* *Boletina dissipata* Plassmann, 1986 NHMO
Boletina dubia (Meigen, 1804) NHMO, 1, 8, FaEu
analis Meigen, 1818 (*Boletina*)
Boletina edwardsi Chandler, 1992 NHMO, 8
Boletina erythropyga Holmgren, 1883 NHMO, 11, 16, FaEu
◊ *Boletina falcata* Polevoi & Hedmark, 2004 FaEu
Boletina gripha Dziedzicki, 1885 NHMO, 8, 11, 13, 16, FaEu
Boletina griphoides Edwards, 1925 NHMO, 11, 13, 16, FaEu
Boletina groenlandica Stæger, 1845 NHMO, 8, 11, 16, FaEu
Boletina jamalensis Zaitzev, 1994 11, 16, FaEu
* *Boletina kowarzi* Stackelberg, 1943 NHMO
* *Boletina kurilensis* Zaitzev, 1994 NHMO
* *Boletina landrocki* Edwards, 1924 NHMO
Boletina lundbecki Lundström, 1912 11, 16, FaEu
Boletina lundstroemi Landrock, 1912 NHMO, 8, 11, 13, 16, FaEu
Boletina maculata Holmgren, 1870 NHMO, 8, 11, 16, CpD, FaEu
* *Boletina minuta* Polevoi, 1995 NHMO
Boletina moravica Landrock, 1912 NHMO, 8, 13, FaEu
Boletina nasuta (Haliday, 1839) NHMO, 8, FaEu
Boletina nigricans Dziedzicki, 1885 NHMO, 8, 11, 16, FaEu
Boletina nigricoxa Stæger, 1840 1, CpD, FaEu
Boletina nigrofusca Dziedzicki, 1885 NHMO, 8, 11, 16, FaEu
Boletina nitida Grzegorzek, 1885 NHMO, 13
Boletina pectinunguis Edwards, 1932 NHMO, 8, 11, 16, FaEu
Boletina plana (Walker, 1856) NHMO, 8, 11, 16, FaEu
Boletina polaris Lundström, 1915 NHMO, 11, FaEu
* *Boletina populina* Polevoi, 1995 NHMO
* *Boletina rejecta* Edwards, 1941 NHMO
Boletina sciarina Stæger, 1840 NHMO, 1, 8, 11, 16, CpD, FaEu
obscurella Zetterstedt, 1838 (*Mycetophila*)
Boletina silvatica Dziedzicki, 1885 NHMO, 11, 16, FaEu
* *Boletina takagii* Sasakawa & Kimura, 1974 NHMO
* *Boletina triangularis* Polevoi, 1995 NHMO
* *Boletina tirolensis* Plassmann, 1980 NHMO
* *Boletina trispinosa* Edwards, 1913 NHMO
Boletina trivittata (Meigen, 1818) NHMO, 1, 8, 11, 13, 16, FaEu
* *Boletina verticillata* Stackelberg, 1943 NHMO
Boletina villosa Landrock, 1912 NHMO, 11, 16, FaEu

***Brachypeza* Winnertz, 1863**
Brachypeza (Brachypeza) bisignata Winnertz, 1863 NHMO, 11, 16, FaEu
* *Brachypeza (Brachypeza) radiata* Jenkinson, 1908 NHMO

***Brevicornu* Marshall, 1896**
Brevicornu affine Zaitzev, 1988 NHMO, FaEu
Brevicornu arcticum (Lundström, 1913) 11, 16, FaEu
Brevicornu bipartitum Lastovka & Matile, 1974 NHMO, 8, 11, 16, FaEu
Brevicornu boreale (Lundström, 1914) NHMO, 8, 11, 16, FaEu
Brevicornu disjunctum Zaitzev, 1988 11, FaEu
Brevicornu fennicum (Landrock, 1927) 11, FaEu
Brevicornu foliatum (Edwards, 1925) NHMO, 8, 11, 16, FaEu
Brevicornu fuscipenne (Stæger, 1840) 11, 16, FaEu
Brevicornu griseicolle (Stæger, 1840) NHMO, 8, 11, 16, FaEu
Brevicornu griseolum (Zetterstedt, 1852) NHMO, 8, 11, 16, FaEu
Brevicornu kingi (Edwards, 1925) NHMO, 8, 11, 16, FaEu
Brevicornu occidentale Zaitzev, 1988 11, 16, FaEu
Brevicornu ruficorne (Meigen, 1838) NHMO, 8, 11, 16, FaEu
* *Brevicornu serenum* (Winnertz, 1863)
Brevicornu sericoma (Meigen, 1830) NHMO, 8, 11, 16, FaEu

***Coelophthinia* Edwards, 1941**
Coelophthinia thoracica (Winnertz, 1863) 11, 16, FaEu

***Coelosia* Winnertz, 1863**
Coelosia flava (Stæger, 1840) NHMO, 1, 11, 12, 16, FaEu
Coelosia fusca Bezzi, 1892 NHMO, 11, 12, 13, 16, FaEu
silvatica Landrock, 1918 (*Coelosia*)
Coelosia limpida Plassmann, 1980 NHMO, 12, FaEu
Coelosia tenella (Zetterstedt, 1852) NHMO, 8, 11, 12, 13, 16, FaEu
Coelosia truncata Lundström, 1909 NHMO, 11, 12, 13, 16, FaEu

***Cordyla* Meigen, 1803**
Cordyla bomloensis Kjærandsen & Kurina, 2004 14
Cordyla brevicornis (Stæger, 1840) NHMO, 8, 11, 13, 16, FaEu
Cordyla crassicornis Meigen, 1818 NHMO, 1, 11, 16, FaEu
cinereus Zetterstedt, 1852 (*Pachypalpus*)
Cordyla fasciata Meigen, 1830 NHMO, FaEu
Cordyla fissa Edwards, 1925 NHMO, 8, 11, FaEu
Cordyla flaviceps (Stæger, 1840) NHMO, 11, 16, FaEu
Cordyla fusca Meigen, 1804 NHMO, 8, 11, 13, 16, FaEu
Cordyla murina Winnertz, 1863 NHMO, 11, 13, 16, FaEu
Cordyla nitens Winnertz, 1863 NHMO, 11, 16, FaEu
◊ *Cordyla nitidula* Edwards, 1925 FaEu
Cordyla parvipalpis Edwards, 1925 NHMO, 11, 16, FaEu
Cordyla pusilla Edwards, 1925 NHMO, 8, 11, 13, 16, FaEu
sixi Barendrecht, 1938 (*Cordyla*)
Cordyla semiflava (Stæger, 1840) NHMO, 8, 11, 16, FaEu

***Docosia* Winnertz, 1863**
Docosia fumosa Edwards, 1925 11, FaEu
* *Docosia fuscipes* (von Roser, 1840)
Docosia gilvipes (Haliday, 1856) NHMO, 8, 11, 13, FaEu
* *Docosia pallipes* Edwards, 1941 NHMO

***Drepanocercus* Vockeroth, 1980**
Drepanocercus spinistylus Söli, 1993 6, 8, 11, 16, FaEu

***Dynatosoma* Winnertz, 1863**
Dynatosoma cochleare Strobl, 1895 11, FaEu
Dynatosoma fuscicorne (Meigen, 1818) NHMO, 8, 11, 13, 16, FaEu
Dynatosoma nigromaculatum Lundström, 1913 11, 16, FaEu
Dynatosoma norwegiense Zaitzev & Økland, 1994 9, 16, FaEu
Dynatosoma reciprocum (Walker, 1848) NHMO, 8, 11, 16, FaEu
Dynatosoma rufescens (Zetterstedt, 1838) 1, 11, 16, CpD, FaEu
lutescens Zetterstedt, 1852 (*Mycetophila*)
Dynatosoma thoracicum (Zetterstedt, 1838) NHMO, 8, 11, 16, FaEu

***Dziedzickia* Johannsen, 1909**
Dziedzickia marginata (Dziedzicki, 1885) NHMO, 8, 11, 16, FaEu

***Ectrepesthoneura* Enderlein, 1911**
Ectrepesthoneura bucera Plassmann, 1980 11, 16, FaEu
Ectrepesthonerua colyeri Chandler, 1980 NHMO, 11, 13, 16, FaEu
Ectrepesthoneura hirta (Winnertz, 1846) NHMO, 8, 11, 13, 16, FaEu
Ectrepesthoneura nigra Zaitzev, 1984 11, 16, FaEu
Ectrepesthoneura pubescens (Zetterstedt, 1860) NHMO, 11, 16, FaEu
Ectrepesthoneura referta Plassmann, 1976 NHMO, 11, 16, FaEu
Ectrepesthoneura tori Zaitzev & Økland, 1994 9, 16, FaEu

***Epicypta* Winnertz, 1863**
Epicypta aterrima (Zetterstedt, 1852) NHMO, 8, 11, 13
Epicypta limnophila Chandler, 1981 NHMO, 13

***Exechia* Winnertz, 1863**
Exechia cincta Winnertz, 1863 8, FaEu
Exechia confinis Winnertz, 1863 NHMO, 7, 8, 11, FaEu
Exechia contaminata Winnertz, 1863 7, 8, 11, FaEu
Exechia cornuta Lundström, 1914 7, 8, FaEu
Exechia dizona Edwards, 1924 7, 11, 16, FaEu
Exechia dorsalis (Stæger, 1840) NHMO, 1, 11, 13, FaEu
Exechia exigua Lundström, 1909 NHMO, 7, 8, 11, 16, CpD, FaEu
Exechia festiva Winnertz, 1863 7, 8, FaEu
Exechia frigida (Boheman, 1865) NHMO, 7, 8, 11, 16, CpD, FaEu
Exechia fusca (Meigen, 1804) NHMO, 1, 7, 8, 11, 16, FaEu
guttiventris Meigen, 1830 (*Mycetophila*)
Exechia lucidula (Zetterstedt, 1838) 11, FaEu
Exechia lundstroemi Landrock, 1923 11, 16, FaEu
Exechia macula Chandler, 2001 8, FaEu
Exechia nigra Edwards, 1925 NHMO, 8, 11, 16, FaEu
◊ *Exechia nigrofusca* Lundström, 1909 FaEu
Exechia nigroscutellata Landrock, 1912 11, FaEu
Exechia parva Lundström, 1909 11, FaEu
Exechia parvula (Zetterstedt, 1852) 8, 11, FaEu
Exechia pseudocincta Strobl, 1910 8, 11, FaEu
Exechia repanda Johannsen, 1912 NHMO, 11, FaEu
Exechia separata Lundström, 1912 NHMO, 11, 16, FaEu
Exechia seriata (Meigen, 1830) 1
ochracea Zetterstedt, 1852 (*Mycetophila*)
Exechia spinuligera Lundström, 1912 8, FaEu
Exechia subfrigida Lastovka & Matile, 1974 8, FaEu
Exechia unimaculata (Zetterstedt, 1860) NHMO, 1, 8, 11, CpD, FaEu

***Exechiopsis* Tuomikoski, 1966**
Exechiopsis (Exechiopsis) aemula Plassmann, 1984 15
Exechiopsis (Exechiopsis) clypeata (Lundström, 1911) 7, 8, 11, 16, FaEu
Exechiopsis (Exechiopsis) distendens (Lackschewitz, 1937) 7, 8, FaEu
Exechiopsis (Exechiopsis) dryaspagensis Chandler, 1977 7, 8, FaEu
Exechiopsis (Exechiopsis) fimbriata (Lundström, 1909) 7, 8, FaEu
Exechiopsis (Exechiopsis) forcipata (Lackschewitz, 1937) 11, FaEu
Exechiopsis (Exechiopsis) furcata (Lundström, 1911) 8, FaEu
Exechiopsis (Exechiopsis) grassatura (Plassmann, 1978) NHMO, 8, FaEu
Exechiopsis (Exechiopsis) hammi (Edwards, 1925) NHMO, 7, FaEu
Exechiopsis (Exechiopsis) indecisa (Walker, 1856) NHMO, 7, 8, 11, 16, FaEu
Exechiopsis (Exechiopsis) intersecta (Meigen, 1818) NHMO, 7, 8, 11, FaEu
Exechiopsis (Exechiopsis) januarii (Lundström, 1913) 7, FaEu
Exechiopsis (Exechiopsis) lackschewitziana (Stackelberg, 1948) NHMO, 7, 11, FaEu
Exechiopsis (Exechiopsis) landrocki (Lundström, 1912) 7
Exechiopsis (Exechiopsis) ligulata (Lundström, 1913) NHMO, 7, 8, FaEu
Exechiopsis (Exechiopsis) magnicauda (Lundström, 1911) NHMO, 8, FaEu
Exechiopsis (Exechiopsis) pseudoindecisa Lastovka & Matile, 1974 NHMO, 7, 8, 11, FaEu
Exechiopsis (Exechiopsis) pseudopulchella (Lundström, 1912) 7, 8, 11, FaEu
Exechiopsis (Exechiopsis) pulchella (Winnertz, 1863) NHMO, 8, 11, 16, FaEu
Exechiopsis (Exechiopsis) sagittata Lastovka & Matile, 1974 NHMO, 11, FaEu
Exechiopsis (Exechiopsis) subulata (Winnertz, 1863) NHMO, 7, 8, 11, 16, FaEu
Exechiopsis (Xenexechia) crucigera (Lundström, 1909) 8, FaEu
Exechiopsis (Xenexechia) leptura (Meigen, 1830) 1, 11, FaEu
Exechiopsis (Xenexechia) membranacea (Lundström, 1912) 8
Exechiopsis (Xenexechia) pollicata (Edwards, 1925) NHMO, 7, 8, FaEu

***Gnoriste* Meigen, 1818**
Gnoriste apicalis Meigen, 1818 NHMO, 1
Gnoriste bilineata Zetterstedt, 1852 NHMO, 1, 8, 11, 13, 16, CpD, FaEu
trilineata Zetterstedt, 1852 (*Gnoriste*)
Gnoriste harcyniae von Röder, 1887 NHMO, 8, FaEu
Gnoriste longirostris Siebke, 1863 NHMO, 11, 16, CpD, FaEu

***Greenomyia* Brunetti, 1912**
* *Greenomyia baikalica* Zaitzev, 1994 NHMO

***Grzegorzekia* Edwards, 1941**
Grzegorzekia collaris (Meigen, 1818) NHMO, 8, 11, 13, 16, FaEu

***Hadroneura* Lundström, 1906**
Hadroneura palmeni Lundström, 1906 11, FaEu

***Leia* Meigen, 1818**
* *Leia bilineata* (Winnertz, 1863) NHMO
Leia bimaculata (Meigen, 1804) 11
Leia crucigera Zetterstedt, 1838 CpD, FaEu
Leia cylindrica (Winnertz, 1863) NHMO, 13
Leia fascipennis Meigen, 1818 NHMO, 1, 13
Leia longiseta Barendrecht, 1938 13
* *Leia picta* Meigen, 1830 NHMO
Leia subfasciata (Meigen, 1818) NHMO, 1, 8, 11, 13, 16, CpD, FaEu
marklini Zetterstedt, 1838 (*Leia*)
Leia winthemii Lehmann, 1822 NHMO, 1, 11, 13, 16, FaEu

***Leptomorphus* Curtis, 1831**
Leptomorphus (Leptomorphus) forcipatus Landrock, 1918 16, FaEu
quadrimaculatus (Matsumura, 1916) (*Leptomorphus*)
* *Leptomorphus (Leptomorphus) walkeri* Curtis, 1831 NHMO

***Macrobrachius* Dziedzicki, 1889**
* *Macrobrachius kowarzii* Dziedzicki, 1889 NHMO

***Manota* Williston, 1896**
* *Manota unifurcat*a Lundström, 1913 NHMO

***Megalopelma* Enderlein, 1911**
Megalopelma nigroclavatum (Strobl, 1910) NHMO, 11, 13, FaEu

***Megophthalmidia* Dziedzicki, 1889**
Megophthalmidia crassicornis (Curtis, 1837) NHMO, 13

***Monoclona* Mik, 1886**
Monoclona furcata Johannsen, 1910 11, 13, 16, FaEu
Monoclona rufilatera (Walker, 1837) NHMO, 8, 11, 13, 16, FaEu

***Mycetophila* Meigen, 1803**
Mycetophila abbreviata Landrock, 1914 NHMO, 8, FaEu
Mycetophila abiecta (Lastovka, 1963) 11, FaEu
Mycetophila adumbrata Mik, 1884 11, FaEu
* *Myctophila alea* Laffoon, 1965
Mycetophila attonsa (Laffoon, 1957) 11, 16
Mycetophila autumnalis Lundström, 1909 11
Mycetophila bialorussica Dziedzicki, 1884 NHMO, 8, FaEu
◊ *Mycetophila biusta* Meigen, 1818 FaEu
Mycetophila bohemica (Lastovka, 1963) 11, 16, FaEu
Mycetophila brevitarsata (Lastovka, 1963) 11, 16, FaEu
Mycetophila caudata Stæger, 1840 NHMO, 11, 16, FaEu
Mycetophila confluens Dziedzicki, 1884 NHMO, 8, 11, 16, FaEu
* *Mycetophila confusa* Dziedzicki, 1884 NHMO
Mycetophila curviseta Lundström, 1911 7, 11, 16, FaEu
Mycetophila czizeckii Landrock, 1911 NHMO, 8, FaEu
Mycetophila dentata Lundström, 1913 11, 16, FaEu
Mycetophila dziedzickii Chandler, 1977 11, 16, FaEu
* *Mycetophila edwardsi* Lundström, 1913
Mycetophila evanida Lastovka, 1972 NHMO, 7, 8, FaEu
Mycetophila finlandica Edwards, 1913 11, 16, FaEu
* *Mycetophila formosa* Lundström, 1911
Mycetophila fungorum (De Geer, 1776) NHMO, 1, 8, 11, 13, 16, FaEu
    cunctans Meigen, 1818 (*Mycetophila*)
    punctata Meigen, 1804 (*Mycetophila*)
Mycetophila gibbula Edwards, 1925 13
Mycetophila hetschkoi Landrock, 1918 11, 16, FaEu
Mycetophila ichneumonea Say, 1823 NHMO, 8, 11, 16, FaEu
Mycetophila immaculata (Dziedzicki, 1884) 11, 16, FaEu
Mycetophila laeta Walker, 1848 11, 16, FaEu
Mycetophila lapponica Lundström, 1906 11, 16, FaEu
* *Mycetophila lastovkai* Caspers, 1984
Mycetophila lumbomirskii Dziedzicki, 1884 11, 16, FaEu
Mycetophila luctuosa Meigen, 1830 NHMO, 11, 16, FaEu
Mycetophila lunata Meigen, 1804 NHMO, 1
Mycetophila marginata Winnertz, 1863 NHMO, 8, 11, 16, FaEu
* *Mycetophila mitis* (Johannsen, 1912) NHMO
Mycetophila mohilivensis Dziedzicki, 1882 NHMO, 8, FaEu
Mycetophila ocellus Walker, 1848 NHMO, 1, 7, 8, 11, 16, CpD, FaEu
    cinerea Zetterstedt, 1852 (*Mycetophila*)
Mycetophila ornata Stephens, 1829 NHMO, 7, 8, FaEu
Mycetophila pictula Meigen, 1830 NHMO, CpD, FaEu
    arcuata Zetterstedt, 1838 (*Mycetophila*)
Mycetophila pumila Winnertz, 1863 NHMO, 8, FaEu
* *Mycetophila pyrenaica* Matile, 1967
Mycetophila ruficollis Meigen, 1818
Mycetophila schnablii (Dziedzicki, 1884) NHMO, 8, 11, 16, FaEu
* *Mycetophila signata* Meigen, 1830 NHMO
Mycetophila signatoides Dziedzicki, 1884 NHMO, 7, 8, 11, 16, FaEu
    assimilis Matile, 1967 (*Mycetophila*)
Mycetophila sordida van der Wulp, 1874 NHMO, 7, 11, FaEu
* *Mycetophila spectabilis* Winnertz, 1863 NHMO
Mycetophila strigata Stæger, 1840 13
Mycetophila strigatoides (Landrock, 1927) NHMO, 8, 11, 13, 16, FaEu
Mycetophila stylata (Dziedzicki, 1884) 11, 16, FaEu
Mycetophila sumavica (Lastovka, 1963) NHMO, 8, FaEu
Mycetophila unguiculata Lundström, 1913 11, 16, FaEu
Mycetophila uninotata Zetterstedt, 1852 NHMO, 1, 13, CpD, FaEu
Mycetophila unipunctata Meigen, 1818 NHMO, 7, FaEu
Mycetophila vittipes Zetterstedt, 1852 NHMO, 1, 8, FaEu
Mycetophila xanthopyga Winnertz, 1863 11, 16, FaEu

***Mycomya* Rondani, 1856**
Mycomya (Calcomycomya) pulchella (Dziedzicki, 1885) NHMO, 11, 16, FaEu
* *Mycomya (Cymomya) circumdata* (Stæger, 1840) NHMO
◊ *Mycomya (Lycomya) pectinifera* Edwards, 1924 FaEu
Mycomya (Mycomya) annulata (Meigen, 1818) NHMO, 1, 8, 11, 16, CpD, FaEu
    incisurata Zetterstedt, 1838 (*Sciophila*)
* *Mycomya (Mycomya) bialorussica* Landrock, 1925 NHMO
Mycomya (Mycomya) bicolor (Dziedzicki, 1885) NHMO, 5, 8, 11, 16, FaEu
Mycomya (Mycomya) britteni (Kidd, 1955) 13
Mycomya (Mycomya) brunnea (Dziedzicki, 1885) 11, 16, FaEu
Mycomya (Mycomya) cinerascens (MacQuart, 1826) NHMO, 1, 8, 11, 13, 16, CpD, FaEu
    hyalinata Meigen, 1830 (*Sciophila*)
Mycomya (Mycomya) denmax Väisänen, 1979 NHMO, 8, 13, FaEu
Mycomya (Mycomya) disa Väisänen, 1984 NHMO, 5, 8, FaEu
Mycomya (Mycomya) dziedzickii Väisänen, 1981 11, 16, FaEu
Mycomya (Mycomya) egregia (Dziedzicki, 1885) 8, 11, 13, 16, FaEu
Mycomya (Mycomya) festivalis Väisänen, 1984 11, 13, 16, FaEu
* *Mycomya (Mycomya) flavicollis* (Zetterstedt, 1852) NHMO
Mycomya (Mycomya) griseovittata (Zetterstedt, 1852) NHMO, 1, 5, 8, 11, 16, CpD, FaEu
    fasciata Zetterstedt, 1838 (*Sciophila*)
Mycomya (Mycomya) hackmani Väisänen, 1984 NHMO, 5, 8, 11, 16, FaEu
* *Mycomya (Mycomya) hiisi* Väisänen, 1979 NHMO
Mycomya (Mycomya) humida Garrett, 1924 11, 16, FaEu
Mycomya (Mycomya) islandica Väisänen, 1984 FaEu (Svalbard)
Mycomya (Mycomya) lambi Edwards, 1941 NHMO, 8, 13, FaEu
* *Mycomya (Mycomya) levis* (Dziedzicki, 1885) NHMO
Mycomya (Mycomya) maculata (Meigen, 1804) NHMO, 1, 8, 11, 16, CpD, FaEu
Mycomya (Mycomya) marginata (Meigen, 1818) NHMO, 1, 11, 16, CpD, FaEu
Mycomya (Mycomya) mituda Väisänen, 1980 11, 16, FaEu
Mycomya (Mycomya) neohyalinata Väisänen, 1984 NHMO, 8, 13, FaEu
Mycomya (Mycomya) nigricornis (Zetterstedt, 1852) NHMO, 8, 11, 16, FaEu
Mycomya (Mycomya) nitida (Zetterstedt, 1852) NHMO, 1, 5, 8, 11, 16, CpD, FaEu
Mycomya (Mycomya) norna Väisänen, 1984 11, 16, FaEu
Mycomya (Mycomya) ornata (Meigen, 1818) NHMO, 13, FaEu
Mycomya (Mycomya) prominens (Lundström, 1913) 11, FaEu
Mycomya (Mycomya) pseudoapicalis (Landrock, 1925) 11, 16, FaEu

Mycomya (Mycomya) punctata (Meigen, 1804) 5, FaEu
Mycomya (Mycomya) ruficollis (Zetterstedt, 1852) NHMO, 1, 11, 13, 16, CpD, FaEu
Mycomya (Mycomya) shermani Garrett, 1924 NHMO, 5, 8, 11, 13, 16, CpD, FaEu
    kingi Edwards, 1941 (*Mycomya*)
* *Mycomya (Mycomya) siebecki* (Landrock, 1912) NHMO
Mycomya (Mycomya) sigma Johannsen, 1910 NHMO, 11, 13, 16, FaEu
Mycomya (Mycomya) simulans Väisänen, 1984 NHMO, 8, FaEu
* *Mycomya (Mycomya) subarctica* Väisänen, 1979 NHMO
Mycomya (Mycomya) tenuis (Walker, 1856) NHMO, 5, 11, FaEu
* *Mycomya (Mycomya) tridens* (Lundström, 1911)
Mycomya (Mycomya) trivittata (Zetterstedt,1838) NHMO, 1, 8, 11, 16, CpD, FaEu
Mycomya (Mycomya) tumida (Winnertz, 1863) NHMO, 5, 8, 11, 16, FaEu
Mycomya (Mycomya) vittiventris (Zetterstedt, 1852) NHMO, 1, 5, 8, 11, 16, CpD, FaEu
Mycomya (Mycomya) wankowiczii (Dziedzicki, 1885) NHMO, 1, 8, CpD, FaEu
    notabilis Stæger, 1840 (*Sciophila*)
Mycomya (Mycomya) winnertzi (Dziedzicki, 1885) 8, 13, FaEu
* *Mycomya (Mycomyopsis) affinis* (Stæger, 1840) NHMO
Mycomya (Mycomyopsis) confusa Väisänen, 1977 NHMO, 11, 16, FaEu
* *Mycomya (Mycomyopsis) neolittoralis* Väisänen, 1984 NHMO
Mycomya (Mycomyopsis) penicillata (Dziedzicki, 1885) 11, 16, FaEu
* *Mycomya (Mycomyopsis) permixta* Väisänen, 1984 NHMO
Mycomya (Mycomyopsis) trilineata (Zetterstedt, 1838) NHMO, CpD, FaEu
Mycomya (Neomycomya) fimbriata (Meigen, 1818) NHMO, 11, 13, 16, FaEu

***Myrosia* Tuomikoski, 1966**
Myrosia maculosa (Meigen,1818) NHMO, 1

***Neoempheria* Osten Sacken, 1878**
Neoempheria pictipennis (Haliday, 1833) NHMO, 8, 11, 16, FaEu
Neoempheria striata (Meigen, 1818) 13

***Neuratelia* Rondani, 1856**
Neuratelia nemoralis (Meigen, 1818) NHMO, 8, 11, 16, FaEu
* *Neuratelia nigricornis* Edwards, 1941 NHMO

***Notolopha* Tuomikoski, 1966**
Notolopha cristata (Stæger, 1840) NHMO, 1, 8, 11, 16, FaEu
    brachycera Zetterstedt, 1852 (*Mycetophila*)

***Palaeodocosia* Meunier, 1904**
* *Palaeodocosia alpicola* (Strobl, 1895) NHMO
Palaeodocosia vittata (Coquillett, 1901) NHMO, 8, 11, 16, FaEu
    janickii (Dziedzicki, 1923) (*Palaeodocosia*)

***Paratinia* Mik, 1874**
Paratinia sciarina Mik, 1874 NHMO, 8, 11, 16, FaEu

***Phronia* Winnertz, 1863**
Phronia aviculata Lundström, 1914 NHMO, 8, FaEu
Phronia biarcuata (Becker, 1908) 8, 11, 16, FaEu
Phronia bicolor Dziedzicki, 1889 NHMO, 7, 11, 16, FaEu
    fusciventris van Duzee, 1928 (*Phronia*)
    ?tarsata Stæger, 1840 (*Mycetophila*)
Phronia braueri Dziedzicki, 1889 NHMO, 8, 11, FaEu
Phronia caliginosa Dziedzicki, 1889 NHMO, 8, 11, 16, FaEu
Phronia cinerascens Winnertz, 1863 NHMO, 8, 11, 16, FaEu
* *Phronia conformis* (Walker, 1856) NHMO
Phronia cordata Lundström, 1914
Phronia digitata Hackman, 1970 11, 16, FaEu
Phronia disgrega Dziedzicki, 1889 NHMO, 11, FaEu
Phronia dziedzickii Lundström, 1906 11, 16, FaEu
Phronia egregia Dziedzicki, 1889 8, CpD, FaEu
Phronia elegans Dziedzicki, 1889 11, 16, FaEu
Phronia exigua (Zetterstedt, 1852) NHMO, 1, 8, CpD, FaEu
Phronia flavipes Winnertz, 1863 8, FaEu
Phronia forcipata Winnertz, 1863 NHMO, 8, 11, 13, 16, FaEu
Phronia humeralis Winnertz, 1863 NHMO, 8, FaEu
Phronia interstincta Dziedzicki, 1889 NHMO, 8, FaEu
Phronia longaelamellata Strobl, 1898 8
Phronia lutescens Hackman, 1970 8, FaEu
Phronia mutabilis Dziedzicki, 1889 8, 11, 13, FaEu
Phronia nigricornis (Zetterstedt, 1852) NHMO, 1, 8, 11, 16, FaEu
Phronia nigripalpis Lundström, 1909 NHMO, 11, 13, 16, FaEu
* *Phronia nitidiventris* (van der Wulp, 1852) NHMO
Phronia notata Dziedzicki, 1889 NHMO, 8, FaEu
Phronia obscura Dziedzicki, 1889 8, FaEu
Phronia obtusa Winnertz, 1863 11, 13, FaEu
Phronia peculiaris Dziedzicki, 1889 NHMO, 11, 16, FaEu
Phronia persimilis Hackman, 1970 NHMO, 2, 11, 16, CpD, FaEu
Phronia petulans Dziedzicki, 1889 11, 16, FaEu
Phronia porschinskyi Dziedzicki, 1889 13, CpD, FaEu
Phronia siebeckii Dziedzicki, 1889 NHMO, 11, FaEu
Phronia signata Winnertz, 1863 NHMO, 8, FaEu
    austriaca Winnertz, 1863 (*Phronia*)
Phronia strenua Winnertz, 1863 8, 11, 13, 16, FaEu
    flavicollis Winnertz, 1863 (*Phronia*)
Phronia tenuis Winnertz, 1863 NHMO, 11, 16, FaEu
* *Phronia tieffii* Dziedzicki, 1889 NHMO
* *Phronia unica* Dziedzicki, 1889 NHMO
◊ *Phronia vitrea* Plassmann, 1999 FaEu
Phronia willistoni Dziedzicki, 1889 11, 16, FaEu

***Phthinia* Winnertz, 1863**
Phthinia humilis Winnertz, 1863 NHMO, 8, 11, 16, FaEu
Phthinia mira Ostroverkhova, 1979 11, 16, FaEu
Phthinia setosa Zaitzev, 1994 11, 16, FaEu
* *Phthinia winnertzi* Mik, 1869 NHMO

***Platurocypta* Enderlein, 1910**
Platurocypta punctum (Stannuis, 1831) NHMO, 1
    obsoleta Zetterstedt, 1852 (*Mycetophila*)
Platurocypta testata (Edwards, 1925) NHMO, 11, 13, FaEu
    fumipennis Bukowski, 1934 (*Platurocypta*)

***Polylepta* Winnertz, 1863**
Polylepta borealis Lundström, 1912 NHMO, 8, 11, 16, FaEu
Polylepta guttiventris (Zetterstedt, 1852) NHMO, 8, 11, 13, 16, FaEu

***Pseudobrachypeza* Tuomikoski, 1966**
Pseudobrachypeza helvetica (Walker, 1856) NHMO, 8, FaEu

***Pseudoexechia* Tuomikoski, 1966**
Pseudoexechia aurivernica Chandler, 1978 NHMO, 7, FaEu
Pseudoexechia trisignata (Edwards, 1913) NHMO, 7, 8, FaEu

Pseudoexechia trivittata (Stæger, 1840)

***Pseudorymosia* Tuomikoski, 1966**
Pseudorymosia foeva (Dziedzicki, 1910) NHMO, 8, FaEu
***Rondaniella* Johannsen, 1909**
Rondaniella dimidiata (Meigen, 1804) NHMO, 1, 11, 13, 16, CpD, FaEu
apicalis Zetterstedt, 1852 (*Leia*)
Rymosia Winnertz, 1863
Rymosia affinis Winnertz, 1863 7, FaEu
Rymosia bifida Edwards, 1925 NHMO, 8, FaEu
Rymosia fasciata (Meigen, 1804) NHMO, 7, 8, 11, 16, FaEu
Rymosia guttata Lundström, 1912 8, FaEu
Rymosia placida Winnertz, 1863 NHMO, 7, 8, 11, FaEu
Rymosia signatipes (van der Wulp, 1859) NHMO, 7, 8, 11, FaEu

***Saigusaia* Vockeroth, 1980**
Saigusaia flaviventris (Strobl, 1894) NHMO, 11, 16, FaEu

***Sceptonia* Winnertz, 1863**
Sceptonia concolor Winnertz, 1863 NHMO, 11, 16, FaEu
Sceptonia costata (van der Wulp, 1858) NHMO, FaEu
Sceptonia fumipes Edwards, 1925 NHMO, 8, 11, 13, 16, FaEu
Sceptonia fuscipalpis Edwards, 1925 NHMO, 8, 11, 16, FaEu
Sceptonia nigra (Meigen, 1804) NHMO, 1, 8, 11, FaEu
Sceptonia regni Chandler, 1991 11, 16, FaEu
Sceptonia tenuis Edwards, 1925 11, 16, FaEu

***Sciophila* Meigen, 1818**
Sciophila adamsi Edwards, 1925 11, 16, FaEu
Sciophila balderi Zaitzev & Økland, 1994 9, 16, FaEu
Sciophila bicuspidata Zaitzev, 1982 11, 16, FaEu
Sciophila buxtoni Freeman, 1956 11, FaEu
Sciophila distincta Garrett, 1925 11, FaEu
Sciophila exserta Zaitzev, 1982 11, 16, FaEu
Sciophila fenestella Curtis, 1837 NHMO, 8, 11, 13, 16, FaEu
Sciophila fridolini Stackelberg, 1943 NHMO, 13
Sciophila geniculata Zetterstedt, 1838 NHMO, 1, 11, 16, CpD, FaEu
Sciophila hirta Meigen, 1818 NHMO, 1, 11, 13, 16, FaEu
Sciophila inerrupta (Winnertz, 1863) NHMO, 13
Sciophila limbatella Zetterstedt, 1852 NHMO, 13
Sciophila lutea Macquart, 1826 NHMO, 11, 16, FaEu
Sciophila nigronitida Landrock, 1925 NHMO, 8, 13, FaEu
Sciophila nonnisilva Hutson, 1979 11, 16, FaEu
* *Sciophila quadriterga* Hutson, 1979 NHMO
Sciophila rufa Meigen, 1830 11, FaEu
Sciophila salassea Matile, 1983 11, 16, FaEu
Sciophila spinifera Zaitzev, 1982 NHMO, 11, 16, FaEu
Sciophila subbiscupidata Zaitzev & Økland, 1994 9, 16, FaEu
Sciophila thoracica Stæger, 1840 NHMO, 1

***Speolepta* Edwards, 1925**
Speolepta leptogaster (Winnertz, 1863) NHMO, 7, 11, 16, FaEu

***Stigmatomeria* Tuomikoski, 1966**
Stigmatomeria crassicornis (Stannuis, 1831) NHMO, 1, 11
bicolor Macquart, 1834 (*Mycetophila*)

***Synapha* Meigen, 1818**
* *Synapha fasciata* Meigen, 1818 NHMO
Synapha vitripennis (Meigen, 1818) NHMO, 8, 11, 13, 16, FaEu

***Syntemna* Winnertz, 1863**
* *Syntemna daisetzuzana* Okada, 1938 NHMO
◊ *Syntemna elegantia* Plassmann, 1978 FaEu
Syntemna hungarica (Lundström, 1912) NHMO, 8, 11, 13, 16, FaEu
Syntemna nitidula Edwards, 1925 NHMO, 8, 11, 16, FaEu
Syntemna penicilla Hutson, 1979 11, 16, FaEu
Syntemna relicta (Lundström, 1912) NHMO, 8, 11, 13, 16, CpD, FaEu
Syntemna setigera (Lundström, 1914) 9, 10, 11, 13, 16, FaEu
haagvari Økland, 1995 (*Syntemna*)
Syntemna stylata Hutson, 1979 NHMO, 11, 16, FaEu

***Tarnania* Tuomikoski, 1966**
Tarnania dziedzickii (Edwards, 1941) NHMO, 7, FaEu
Tarnania fenestralis (Meigen, 1818) NHMO, 7, 8, FaEu
* *Tarnania nemoralis* (Edwards, 1941)
Tarnania tarnanii (Dziedzicki, 1910) NHMO, 8, 11, 16, FaEu

***Tetragoneura* Winnertz, 1846**
Tetragoneura sylvatica (Curtis, 1837) NHMO, 11, 16, FaEu

***Trichonta* Winnertz, 1863**
Trichonta aberrans Lundström, 1911 11, FaEu
Trichonta atricauda (Zetterstedt, 1852) NHMO, 1, 4, 8, 11, 13, 16, CpD, FaEu
* *Trichonta beata* Gagné, 1979 NHMO
Trichonta bicolor Landrock, 1912 8, FaEu
Trichonta bifida Lundström, 1909 4, CpD, FaEu
Trichonta brevicauda Lundström, 1906 4, CpD, FaEu
Trichonta comica Gagné, 1981 NHMO, 11, 16, FaEu
Trichonta comis Gagné, 1981 8, 11, FaEu
Trichonta delicata Gagné, 1981 11, 16, FaEu
Trichonta facilis Gagné, 1981 NHMO, 4, 8, 11, 16, CpD, FaEu
Trichonta falcata Lundström, 1911 4, FaEu
Trichonta fissicauda (Zetterstedt, 1852) NHMO, 8, 11, 16, FaEu
Trichonta flavicauda Lundström, 1914 11, 16, FaEu
Trichonta fragilis Gagné, 1981 NHMO, 11, FaEu
Trichonta generosa Gagné, 1981 8, 11, 16, FaEu
Trichonta hamata Mik, 1880 NHMO, 4, 8, 11, 16, FaEu
* *Trichonta lyrica* Gagné, 1981 NHMO
Trichonta melanura (Stæger, 1840) NHMO, 1, 4, 8, 11, 16, CpD, FaEu
melanopyga Zetterstedt, 1852 (*Mycetophila*)
* *Trichonta patens* Johannsen, 1912 NHMO
Trichonta subfusca Lundström, 1909 NHMO, 4, 11, 16, CpD, FaEu
Trichonta submaculata (Stæger, 1840) NHMO, 8, 11, 13, 16, FaEu
Trichonta terminalis (Walker, 1856) NHMO, 4, 8, 11, 16, CpDFaEu
Trichonta trivittata Lundström, 1916 NHMO, 8, FaEu
Trichonta venosa (Stæger, 1840) NHMO, 4, 11, 16, FaEu
Trichonta vitta (Meigen, 1830) 4, 11, 16, FaEu
Trichonta vulcani (Dziedzicki, 1889) NHMO, 4, 8, CpD, FaEu
Trichonta vulgaris Loew, 1869 11, 16, FaEu

***Zygomyia* Winnertz, 1863**
Zygomyia humeralis (Wiedemann, 1817) 11, 16, FaEu
Zygomyia kiddi Chandler, 1991 11, 16, FaEu

Zygomyia notata (Stannuis, 1831)[NHMO, 8, 11, FaEu]
paludosa (Stæger, 1840) (*Mycetophila*)
Zygomyia pictipennis (Stæger, 1840) [11, 16, FaEu]
Zygomyia pseudohumeralis Caspers, 1980 [8, 11, 16, FaEu]
Zygomyia semifusca (Meigen, 1818) [NHMO, 8, 11, 16, FaEu]
Zygomyia valida Winnertz, 1863 [11, 16, FaEu]
Zygomyia vara (Stæger, 1840) [1, 11, 16, FaEu]
Zygomyia zaitzevi Chandler, 1991 [11, FaEu]

SPECIES NEW TO NORWAY

Acnemia longipes Winnertz, 1863
HOY: Askøy: Åsbø (EIS 39), 15 September 1990, 1 □, leg. J. Kjærandsen, coll. NHMO.

Allodia (Allodia) embla Hackman, 1971
HOY: Stord: Iglatjørn (EIS 23), 23 May - 28 June 1989, 1 □, leg. L. Greve Jensen, coll. NHMO.

Allodia (Brachycampta) foliifera (Strobl, 1910)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 2 □□, leg. O. Kurina & J. Kjærandsen.

Allodiopsis (Allodiopsis) rustica (Edwards, 1941)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 3 □□, leg. O. Kurina; Larvik: Jordstøyp (EIS 19), 20 May 2005, 10 □□, leg. O. Kurina; Larvik: Vemannsåsen (EIS 19), 21 May 2005, 3 □□, leg. O. Kurina.

Boletina digitata Lundström, 1914
TEY: Porsgrunn: Gravastranda (EIS 18), 13 June - 12 July 1988, 1 □, leg. G. Søli, coll. NHMO. **SFI:** Luster: Gaupne (EIS 60), 22 June 1988, 1□, leg. G. Søli, coll. NHMO; **FV**: Alta: Buolamalia, Detsika (EIS 173), 11 June - 3 July 1995, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Eiby, Valsetmoen (EIS 173), 6 July - 8 August 1995, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Møllenes, Kåfjord (EIS 173), 3 July - 8 August 1995, 2 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina dissipata Plassmann, 1986
FV: Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 14 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Eiby, Valsetmoen (EIS 173), 6 July - 8 August 1995, 27 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina kowarzi Stackelberg, 1943
TEY: Porsgrunn: Gravastranda (EIS 18), 13 June - 12 July 1988, 3 □□, leg. G. Søli, coll. NHMO; **VE:** Horten: Veggefjellet, Falkenstein (EIS 19), July 1997, 1 □, leg. L. O. Hansen, coll. NHMO.

Boletina kurilensis Zaitzev, 1994
FV: Alta: Mattisdalen S. (EIS 165), 4 August - 26 September 1996, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 2 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina landrocki Edwards, 1924
TRY: Tromsø: Skittenelvdal (EIS 162), 13 September 1987, 1 □, leg. G. Søli, coll. NHMO; **FV:** Måsøy: Gunnarnes, Rolvsøy (EIS 186), September 1992, 1 □, leg. P. Tangen, coll. NHMO.

Boletina minuta Polevoi in Zaitzev & Polevoi, 1995
SFI: Luster: Øyastrondi, Jostedalen (EIS 60), 20 August - 11 September 1988, 1 □, leg. G. Søli, coll. NHMO; **FV:** Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 19 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina populina Polevoi in Zaitzev & Polevoi, 1995
TEY: Drangedal: Skultrevassåsen (EIS 11), 16 May - 13 June 1995, 1 □, leg. A. Bakke, coll. NHMO; **FV**: Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 46 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Eiby, Valsetmoen (EIS 173), 6 July - 10 September 1995, 58 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Møllenes, Kåfjord (EIS 173), 8 August - 10 September 1995, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina rejecta Edwards, 1941
FV: Alta: Buolamalia, Detsika (EIS 173), 11

June - 3 July 1995, 18 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 5 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina takagii Sasakawa & Kimura, 1974
FV: Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 70 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Eiby, Valsetmoen (EIS 173), 6 July - 10 September 1995, 13 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina tirolensis Plassmann, 1980
FV: Alta: Mattisdalen S (165), 4 August - 26 September 1996, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina triangularis Polevoi in Zaitzev & Polevoi, 1995
AK: Nesodden: Fagerstrand (EIS 28), August – September 1980, 1 □, leg. S. Kobro, coll. NHMO; **FV:** Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 51 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO; Alta: Eiby, Valsetmoen (EIS 173), 8 August - 10 September 1995, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Boletina trispinosa Edwards, 1913
TRY: Tromsø: Folkeparken (EIS 162), 5 September 1987, 3 □□, leg. G. Søli, coll. NHMO.

Boletina vertcillata Stackelberg, 1943
TRY: Tromsø: Litlemoen, Breivikeidet (EIS 163), 1 September 1987, 1 □, leg. G. Søli, coll. NHMO.

Brachypeza radiata Jenkinson, 1908
AAI: Bygland: Heddevika (EIS 9), 29 July - 27 August 1988, 1 □, leg. K. Berggren, coll. NHMO.

Brevicornu serenum (Winnertz, 1863)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 1 □, leg. O. Kurina.

Docosia fuscipes (von Roser, 1840)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 2 □□, leg. O. Kurina.

Docosia pallipes Edwards, 1941
VE: Horten: Veggefjellet, Falkenstein (EIS 19), July 1997, 6 □□, leg. L. O. Hansen, coll. NHMO.

Greenomyia baikalica Zaitzev, 1994
NTI: Lierne: Østborg (EIS 103), 14 - 20 August 1996, 1 □, leg. A. Bakke, coll. NHMO.

Leia bilineata (Winnertz, 1863)
TEY: Porsgrunn: Oksum (EIS 18), 17 July - 5 August 1991, 1 □, leg. S.K. Hansen, coll. NHMO.

Leia picta Meigen, 1830
TEY: Drangedal: Skultrevassåsen (EIS 11), 10 July - 8 August 1995, 2 □□, leg. A. Bakke, coll. NHMO; Porsgrunn: Sandøya (EIS 11), 17 September – 3 October 1986, 1 □, leg. G. Søli, coll. NHMO; **TEI:** Kviteseid: Flatland, Vrådal (EIS 17), 9 July 1983, 1 □, leg. G. Søli, coll. NHMO; **AK:** Oslo: Østensjøvannet (EIS 28), July 1996, 2 □□, leg. M. Falck, coll. NHMO.

Leptomorphus (Leptomorphus) walkeri Curtis, 1831
TEY: Drangedal: Skultrevassåsen (EIS 11), 10 July - 8 August 1995, 1 □, leg. A. Bakke, coll. NHMO; Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 2 □□, leg. G. Søli, coll. NHMO; **TEI:** Tinn: Rjukan (EIS 26), August 1995, 1 □, leg. B. A. Sagvolden, coll. NHMO.

Macrobrachius kowartzii Dziedzicki, 1889
TEY: Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 1 □, leg. G. Søli, coll. NHMO.

Manota unifurcata Lundström, 1913
TEY: Porsgrunn: Brevik, Dammane (EIS 11), 27 June - 12 July 1988, 1 □, leg. G. Søli, coll. NHMO **AK:** Ås: Årungen, Syverud (EIS 28), 14 August – 13 September 2003, 1 □, leg. E. Rindal & L. Aarvik, coll. NHMO.

Mycetophila alea Laffoon, 1965
VE: Larvik: Jordstøyp (EIS 19), 1 □, 20 May 2005, leg. J. Kjærandsen.

Mycetophila confusa Dziedzicki, 1884
AK: Nesodden: Fagerstrand (EIS 28), August - October 1980, 1 □, leg. S. Kobro, coll. NHMO.

Mycetophila edwardsi Lundström, 1913
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 1 □, leg. O. Kurina.

Mycetophila formosa Lundström, 1911
VE: Larvik: S Tinvik (EIS 19), 22 May 2005, 2 □□, leg. J. Kjærandsen.

Mycetophila lastovkai Caspers, 1984
VE: Larvik: Vemannsåsen (EIS 19), 21 May 2005, 1 □, leg. O. Kurina.

Mycetophila mitis (Johannsen, 1912)
FV: Alta: Buolamalia, Detsika (EIS 173), 11 June - 3 July 1995, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Mycetophila pyrenaica Matile, 1967
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 1 □, leg. O. Kurina.

Mycetophila signata Meigen, 1830
AAY: Iveland: Tolleklev (EIS 5), 20 May 1991, 4 □□, leg. G. Søli, coll. NHMO.

Mycetophila spectabilis Winnertz, 1863
RY: Finnøy: Sevheim (EIS 14), 28 August - 17 October 1992, 2 □□ 1 □, leg. J. Skartveit, coll. NHMO.

Mycomya (Cymomya) circumdata (Staeger, 1840)
TEY: Porsgrunn: Gravastranda (EIS 18), 13 June - 12 July 1988, 2 □□, leg. G. Søli, coll. NHMO.

Mycomya (Mycomya) bialorussica Landrock, 1925
FV: Alta: Mattisdalen S. (EIS 165), 23 June - 4 August 1996, 1 □, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Mycomya (Mycomya) flavicollis (Zetterstedt, 1852)
TEY: Drangedal: Skultrevassåsen (EIS 11), 10 July - 8 August 1995, 9 □□, leg. A. Bakke, coll. NHMO; Porsgrunn: Brevik, Dammane (EIS 11), 26 June - 12 July 1988, 7 □□ 1 □, leg. G. Søli, coll. NHMO; **VE:** Horten: Veggefjellet, Falkenstein (EIS 19), July 1997, 2 □□, leg. L. O. Hansen, coll. NHMO.

Mycomya (Mycomya) hiisi Väisänen, 1979
BV: Rollag: Bråtåsen (EIS 35), September 1994, 1 □, leg. L. O. Hansen & B. A. Sagvolden, coll. NHMO.

Mycomya (Mycomya) levis (Dziedzicki, 1885)
OS: Gausdal: Svatsum (EIS 53), 19 July 1995, 1 □, leg. B. A. Sagvolden, coll. NHMO.

Mycomya (Mycomya) siebecki (Landrock, 1912)
TEY: Porsgrunn: Gravastranda (EIS 18), 13 June - 12 July 1988, 1 □, leg. G. Søli, coll. NHMO; **TRI:** Målselv: Høgskardhus (EIS 147), 9 September 1987, 1 □, leg. G. Søli, coll. NHMO.

Mycomya (Mycomya) subarctica Väisänen, 1979
TRI: Målselv: Devdisvatn (Dødesvatn) (EIS 147), 9 September 1987, 1 □, leg. G. Søli, coll. NHMO; Målselv: Høgskardhus (EIS 147), 9 September 1987, 1 □, leg. G. Søli, coll. NHMO; Målselv: Svalheim, Dividalen (EIS 147), 9 September 1987, 1 □, leg. G. Søli, coll. NHMO; Storfjord: Nyli, Signaldalen (EIS 155), 9 September 1987, 1 □, leg. G. Søli, coll. NHMO.

Mycomya (Mycomya) tridens (Lundström, 1911)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 8 □□, leg. O. Kurina.

Mycomya (Mycomyopsis) affinis (Staeger, 1840)
TRY: Tromsø: Litlemoen, Breivikeidet (EIS 163), 1 September 1987, 5 □□, leg. G. Søli, coll. NHMO; **FV:** Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 5 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Mycomya (Mycomyopsis) neolittoralis

Väisänen, 1984
TEY: Drangedal: Skultrevassåsen (EIS 11), 10 July - 8 August 1995, 2 □□, leg. A. Bakke, coll. NHMO.

Mycomya (Mycomyopsis) permixta Väisänen, 1984
TRY: Tromsø: Skittenelvdal (EIS 162), 13 September 1987, 3 □□, leg. G. Søli, coll. NHMO.

Neuratelia nigricornis Edwards, 1941
MRI: Norddal: Tafjord (EIS 77), 15 June 1989, 1 □, leg. G. Søli, coll. NHMO.

Palaeodocosia alpicola (Strobl, 1895)
TEY: Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 1 □,leg. G. Søli, coll. NHMO.

Phronia conformis (Walker, 1856)
AK: Nesodden: Fagerstrand (EIS 28), August - September 1980, 1 □, leg. S. Kobro, coll. NHMO.

Phronia nitidiventris (van der Wulp, 1858)
TEY: Porsgrunn: Brevik, Dammane (EIS 11), 27 June - 12 July 1988, 1 □, leg. G. Søli, coll. NHMO; Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 1 □,leg. G. Søli, coll. NHMO.

Phronia tieffii Dziedzicki, 1889
AAY: Iveland: Tolleklev (EIS 5), 20 May 1991, 1 □, leg. G. Søli, coll. NHMO; **AK:** Nesodden: Fagerstrand (EIS 28), August - October 1989, 2 □□, leg. S. Kobro, coll. NHMO.

Phronia unica Dziedzicki, 1889
HOY: Bergen: Riple (EIS 31), 23 April 1991, 1 □, leg. J. Kjærandsen, coll. NHMO.

Phthinia winnertzi Mik, 1869
HOY: Os: Lepsøy (EIS 30), 27 July 1990, 1 □, leg. J. Kjærandsen, coll. NHMO; Os: Gåssand (EIS 31), 4 - 11 July 1991, 1 □, leg. Halvorsen, coll. NHMO; Os: Sæleli (EIS 31), 20 - 27 June 1991, 1 □, leg. Halvorsen, coll. NHMO; Lindås: Helltveit (EIS 40), 17 - 31 August 1991, 1 □, leg. G. Søli, coll. NHMO; **BV:** Rollag: Rollag, 6 August 1993, 1 □, leg. B. A. Sagvolden, coll. NHMO.

Sciophila quadriterga Hutson, 1979
FV: Alta: Møllenes, Kåfjord (EIS 173), 8 August - 10 September 1995, 2 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

Synapha fasciata Meigen, 1818
TEY: Drangedal: Skultrevassåsen (EIS 11), 10 July - 8 August 1995, 1 □, leg. A. Bakke, coll. NHMO.

Syntemna daisetzuzana Okada, 1938
TEY: Porsgrunn: Brevik, Dammane (EIS 11), 26 June - 12 July 1988, 2 □□, leg. G. Søli, coll. NHMO; Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 25 □□ 5 □□, leg. G. Søli, coll. NHMO.

Tarnania nemoralis (Edwards, 1941)
VE: Larvik: Brånakollene (EIS 19), 19 May 2005, 2 □□, leg. O. Kurina og J. Kjærandsen.

Trichonta beata Gagné, 1979
TEY: Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 1 □, leg. G. Søli, coll. NHMO.

Trichonta lyrica Gagné, 1981
TEY: Porsgrunn: Hitterødbekken (EIS 18), 13 June - 11 July 1988, 1 □, leg. G. Søli, coll. NHMO.

Trichonta patens Johannsen, 1912
FV: Alta: Buolamalia, Detsika (EIS 173), 8 August - 10 September 1995, 2 □□, leg. L. O. Hansen & H. Rinden, coll. NHMO.

COMMENTS

A few species in the check list are included in the Fauna Europaea database (Chandler 2004), but as far as known to the authors, records for these species have never been published. These species are: *Allodia zaitzevi* Kurina 1998, *Boletina falcata* Polevoi & Hedmark, 2004, *Cordyla nitidula* Edwards, 1925, *Exechia nigrofusca* Lundström, 1909, *Mycetophila biusta* Meigen, 1818, *Mycomya (L.) pectinifera* Edwards, 1924, *Phronia* *vittrea* Plassmann, 1999 and *Syntemna elegantia* Plassmann, 1978. The species are marked with a diamond sign (◊) in the check list.

One recently recorded species, *Phronia jacosa* Gagne, 1975 (Økland & Zaitzev 1997) has been omitted from the list. No other records exist outside the Nearctic region of this species, and it has so far not been possible to trace the original material.

CONCLUSIVE REMARKS

Our knowledge about Norwegian fungus gnats has improved considerably during the last 15 years. The number of localities thoroughly sampled and studied, however, is still restricted, and the actual number of species will by certainty exceed 473. Among our neighbouring countries, Finland is by far the best studied with respect to Mycetophilidae, and 525 species have been recorded (Polevoi & Yakovlev 2004). The corresponding number from Sweden is about 382, but a new list will be published soon, and the number of species will then probably be comparable to that from Finland (J. Kjærandsen, pers com.). The variation in topography and climate in Norway exceed that of both Sweden and Finland, hence, there are good reasons to suppose the actual number of species of Mycetophilidae in Norway to be close to 550.
Fauna europaea (Chandler 2004) lists only 5 species from Svalbard (and Jan Mayen), viz. *Boletina maculata, Coelosia tenella, Exechia frigida, Mycomya islandica* and *Phronia egregia,* of which all, except *M. islandica,* have also been recorded from the mainland. Unfortunately, the dipterous fauna of Svalbard is still poorly investigated, but as fungus gnats in general appear to be rather common in polar regions, the number of species may well stay close to 50.

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REFERENCES

Chandler, P.J. 2004. Fauna Europaea: Mycetophilidae. Fauna Europaea version 1.2. http://www.faunaeur.org

Gagné, R. J. 1981. A monograph of *Trichonta* with a model for the distribution of Holarctic Mycetophilidae (Diptera). U. S. Dept. Agric. Technical Bull. 1638: 1 – 64.

Hackman, W. 1970. New species of the genus *Phronia* Winnertz (Diptera, Mycetophilidae) from Eastern Fennoscandia and notes on the synonymies in this genus. Notulae Ent. 50, 41 – 60.

Hackman, W. 1971. Three new species of the *Allodia lugens* group from Northern Europe (Dipt. Mycetophilidae). Ann. Ent. Fenn. 37, 3 – 7.

Hansen, L. O. & Falck, M. 2000. Insektfaunaen ved Østensjøvannet. 34 pp.

Kjærandsen, J. 1993. Diptera in mines and other cave systems in southern Norway. Entomol. Fenn. 4, 151 – 160.

Kjærandsen, J. & Kurina, O. 2004. A new species of *Cordyla* Meigen from Norway (Diptera: Mycetophilidae). Norw. J. Entomol. 51, 137 – 143.

Kurina, O. 2003. On the validity of the species *Exechiopsis aemula* Plassmann and *Exechiopsis pulchella* (Winnertz) (Diptera, Mycetophilidae). Norw. J. Entomol. 50, 3 - 10.

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

Økland, B. & Zaitzev, A. I. 1997. Mycetophilids (Diptera, Sciaroidea) from southeastern Norway. Fauna norv. Ser. B 44, 27 – 37.

Polevoi, A. V. 2003. Review of the Fennoscandian species of the genus *Syntemna* Winnertz (Diptera, Mycetophilidae) including the description of a new species. Studia dipterologica 10, 133 – 142.

Siebke, H. 1853. Beretning om en i Sommeren 1850 foretagen entomologisk Reise i en Deel af Gudbrandsdalen. Nyt Magazin for Naturvidenskaberne, Bd. 7. H. 3, No. IX. Diptera, 291 – 306.

Siebke, H. 1863. Beretning om en i Sommeren 1861 foretagen entomologisk Reise. Nyt Magazin for Naturvidenskaberne, Bd. 12, No. V. Diptera, 108 – 110, 114 – 115, 148 – 192.

Siebke, H. 1866. Entomologisk Reise i Romsdals Amt i Sommeren 1864. Nyt Magazin for

Naturvidenskaberne, Bd. 14, No. VI Diptera, 375 – 388.

Siebke, H. 1872. Bidrag til Norges Insektfauna. Beretning om en i Østerdalen foretagen Reise i 1870. Nyt Magazin for naturvidenskaberne, Bd. 19, No. 3. Diptera, 75 – 102.

Siebke, H. 1877. *Enumeratio Insectorum Norvegicorum, Fasciculum IV.* Broegger, Oslo.

Søli, G. E. E. 1993. The first Palaearctic record of the mycetophilid genus *Drepanocercus* Vockeroth (Diptera: Mycetophilidae). Ent. scand. 24, 73 – 77.

Søli, G. E. E. 1994. Fungus gnats from Jostedalen, West Norway (Diptera: Diadocidiidae and Mycetophilidae). Fauna norv. Ser. B 41, 1 – 12.

Søli, G. E. E. 1997. The systematics and phylogeny of *Coelosia* Winnertz, 1863 (Diptera, Mycetophilidae) Ent. Scand. Suppl. 50, 57 – 139.

Soós, Á. & Papp, L. (Eds.). 1988. Catalogue of Palaearctic Diptera. Volume 3: Ceratopogonidae – Mycetophilidae. Akadémiai Kiadò. Budapest. 448 pp.

Soot-Ryen, T. 1943. A review of the literature on Norwegian Diptera until the year 1940. Tromsø Museums Årshefte 65 (1945), 1 – 46.

Väisänen, R. 1984. A monograph of the genus *Mycomya* Rondani in the Holarctic region (Diptera, Mycetophilidae). Acta Zool. Fenn. 177, 1 – 346.

Zaitzev, A. I. 1999. Review of fungus gnats from the *signata* group of the genus *Mycetophila* Meig. (Diptera, Mycetophilidae) from Palaearctic fauna with description of new species [in Russian]. Zoologicheskoe Zhurnal 78, 1080 – 1090.

Zaitzev, A. I. & Økland, B. 1994. Four new species of fungus gnats from Norway (Diptera, Mycetophilidae). Studia dipterologica 1(2), 181 – 186.

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Spiders active on snow in Southern Norway

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In Norway, insects and springtails which are active on snow have been fairly well studied, but not the spider fauna. A sample of 439 spiders collected on snow during many years and from several localities in South Norway, contained 46 species, including 12 which were only identified to genus level. Spiders occurred on snow during all winter months, mainly at temperatures around or above 0 °C, but even down to –7 °C. Most species belonged to Linyphiidae. Comparisons with Finnish pitfall-trapping below snow and a Norwegian study on the spider fauna on spruce branches during winter show that nearly all species colonise the snow surface from the subnivean air space, probably climbing up along stems and bushes penetrating the snow. In late winter, the spider fauna on snow is dominated by *Bolepthyphantes index*, which constructs nets in small depressions in the snow surface, for instance footprints of animals, and catches winter active springtails. During very warm days in April, subadults of *Philodromus* sp. can start wind dispersal by sending out "flying threads" from trees and may land in large numbers on snow. From there they probably seek snow-free patches. As a group, spiders evidently contain many cold-adapted species, and Finnish studies have showed that almost any species may be encountered on snow. Long-term pitfall trapping near Bergen showed that some spider species had their main activity during winter, indicating winter reproduction. For most spiders, their occurrence on snow in mild weather may simply be a continuation of their normal subnivean activity. There should be a large evolutionary potential for more spider species to adapt to use the food resource represented by winter active insects and springtails on snow.

Key-words: Spiders, Aranea, snow, winter activity

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INTRODUCTION

Certain invertebrates are known to be regularly active on the snow surface in Fennoscandia. Well-known examples are the wingless insects *Chionea* spp. (Diptera, Limoniidae) and *Boreus* spp. (Mecoptera) which both lay eggs during winter (Hågvar 1971, 1976, 2001), swarming winter gnats (Diptera, Trichoceridae) (Dahl 1965) and Collembola migrating on the snow surface (Leinaas 1981, 1983, Hågvar 1995, 2000). Winter active spiders, however, have been much less studied. In Fennoscandia, spiders are often observed being active on the snow surface, mainly at temperatures around and above 0 °C. Huhta & Viramo (1979) recorded more than hundred species on snow in Northern Finland. However, the function of this activity is little understood. Only one species, *Bolepthyphantes index* (Thorell, 1856), is known to have the regular habit of building nets on the snow surface. The nets are constructed over small holes or cavities in the snow, for instance over foot-prints of animals. This occurs mainly during late winter and the net is used for catching winter active Collembola as well as for feeding and mating (Hågvar 1973).

The study of Huhta & Viramo (1979) indicated that most spider species active on snow are ground-living and colonize the snow surface from the subnivean air space. Here, the temperature is usually close to 0 °C (Coulianos & Johnels 1962). Pitfall-trapping, both in Fennoscandia and Canada, have demonstrated activity throughout the winter of spiders and other invertebrates below the snow (e.g. Näsmark 1964, Koponen 1976, Aitchison 1984a, 1989).

This study from several localities in Southern Norway illustrates a rather species-rich spider fauna on snow. Besides giving basic information on the phenomenon from this part of Fennoscandia, it allows for a comparison with the spider fauna on branches of spruce during winter (Hågvar & Hågvar 1975). Overwintering spiders on trees represent a potential source for colonizing the snow surface.

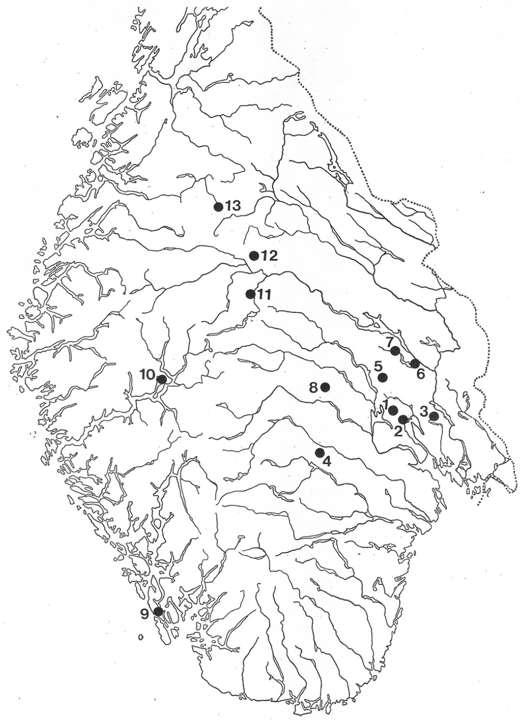

Figure 1. Localities in Southern Norway where spiders have been collected on snow: Local name, county and approximate altitude are as follows: **1:** Nordmarka, Buskerud and Akershus (200 - 500 m). **2:** Bærum, mainly near Dælivann, Akershus (100 - 200 m). **3:** Østmarka, Akershus (100 - 300 m). **4:** Vegglifjell, mainly Votnedalen, Buskerud (ca. 800 m). **5:** Gullentjern, Gran, Oppland (600 m). **6:** Bøn, Eidsvoll, Akershus (150 m). **7:** Hurdal, Akershus (200 - 400 m). **8:** Vassfaret, Buskerud (ca. 700 m). **9:** Haugesund, Rogaland (ca. 100 m). **10:** Sogndal, Sogn & Fjordane (10-50 m). **11:** Skåbu, Oppland (ca. 900 m). **12:** Furusjøen, Oppland (ca. 900 m). **13:** Kongsvoll, Oppland (ca. 1000 m).

MATERIAL AND METHODS

Between 1968 and 2005, 439 spiders were collected on snow, mainly by the first author. The samplings were made during skiing and had a random character. However, collections from different winter months, many years and several localities give a general picture of the species which can be encountered on snow.

Most samplings were made in coniferous forests. Thirteen localities in Southern Norway were visited (Figure 1). Local name, county and approximate altitude are given in the figure text. Spruce forest (*Picea abies* (L.) KARST.) dominated in many localities, except in locality 12 (pine forest, *Pinus silvestris* L.), locality 10 (mixed deciduous forest), locality 2 (mixed forest with spruce, pine and several deciduous trees), locality 9 (open heath with *Calluna vulgaris* (L.) and young pine plantations), locality 6 (open cultural landscape), and locality 13 (treeless alpine habitat). The spruce forest sites were a mosaic of forest, bogs, lakes and rivers, with several deciduous tree species. Maximum snow depth was usually between 0.5 and 2 meter in the various localities and the snow-covered period lasted from 3-4 to 6 months. Temperatures were measured in shadow, usually 1.5 m above the snow.

RESULTS

Species composition

A typical collection from the snow surface consisted of several species, even among a restricted number of individuals. This is reflected in the total material which includes a high number of species from several families but with rather few individuals of most species (Table 1). Altogether 46 species were recorded, including 12 which were only identified to genus level. Most species belonged to the family Linyphiidae. *Bolepthyphantes index* from this family was the most abundant species representing 38 % of the total material. Nearly one quarter of the material consisted of immature stages (mainly subadults) of *Pardosa* sp. (Lycosidae) and Philodromus sp. (Philodromidae). The next most common species were three Linyphiids: *Pityohyphantes phrygianus* (27 individuals), *Helophora insignis* (20 individuals) and *Tenuiphantes cristatus* (12 individuals). One of the three *Zornella cultrigera* individuals was taken in February far North in Norway (Alta, Eibydalen with pine forest, about 100 m a.s.l.).

Phenology

As shown in Table 1, spiders were found on snow during all winter months. In high altitude forests patches of snow may remain even throughout May and a male of *B. index* was sampled on snow as late as 25 May at locality 4. Spiders may occur on snow in mild weather during the whole snow-covered period, but sampling was not given priority when there were large patches of snow-free ground, which is often the case during the very early and very late winter phase. Two thirds of the individuals were sampled towards the end of the winter, in April. In this month air temperature may reach 5-10 ^{o}C on sunny days and some snow-free patches often exist where soil and vegetation may reach even higher temperatures. Spiders may easily colonise snow from these patches. However, the month with the next highest catch (64 individuals) was December. This was mainly due to young stages of *Pityohyphantes phrygianus* and adults of *Helophora insignis*.

The three most abundant species, *B. index*, *Pardosa* sp. and *Philodromus* sp. were taken mainly in April. For *B. index*, the activity maximum in April was very clear, and was repeated several years and in various localities.

Activity on snow

Bolepthyphantes index is known to construct nets over small cavities in the snow surface (Hågvar 1973). Such nets were observed regularly at temperatures around or above 0 ^{o}C in March and especially April during many years and in several localities. An example was 3 April 2005 in locality 12, when 18 females and 3 males were picked from about 20 nets. Most nets contained only one female and were probably newly made, constructed during a sunny day with 4-8 ^{o}C. The distance between nets was about 5-10 m in this occasion. On 17 April 2005 at locality 4, a net was constructed across a ski track during less than an hour, in sunny weather at about 8 ^{o}C. Usually, *B. index* was sampled when walking on the snow. Probably all the collected species are able to walk on snow and a large part of the material consisted of actively moving animals.

Except for *B. index* feeding on prey (mainly Collembola) in their net, feeding by spiders on the snow surface was only observed once. An adult female of *Helophora insignis* was observed feeding on a juvenile *Anyphaena accentuata* on 11 November 1971 at locality 2. It was calm and overcast, and 2 ^{o}C.

In very warm and sunny weather in April, subadults of *Philodromus* sp. are probably starting "ballooning" from vegetation. On 18 April 2003 at locality 4, an individual was caught when it was drifting slowly 20 cm above the ice of a lake, hanging on its thread. It was sunny and unusually warm (13-15 ^{o}C). The wind was very faint, but this relatively large spider was easily flying. Another individual was observed drifting slowly about 2.5 m above the ice of another lake, without loosing height. It was not caught, but it was observed that the spider climbed its thread during the flight. During the next two days with similar weather conditions, a large number of *Philodromus* subadults were observed walking rather rapidly around on the snow and 21 individuals were sampled. Because many of these were observed in the middle of lakes or large bogs, with a long distance to snow-free spots and penetrating vegetation, it is assumed that they had

Table 1. Spiders collected on snow during different winter months. m = males, f = females, j = juveniles, s = subadults. The total number of each species is shown, as well as the number of winters in which a given species was recorded. To the right, the locality numbers for each species are given, with the number of specimens collected in each locality in parenthesis.

Family and species	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	No. of winters	Loc. no. (ind. sampled)
Anyphaenidae									
Anyphaena accentuata (Walckenaer, 1802)		2j						2	2(1), 10(1)
Araneidae									
Araniella cf. *cucurbitina*(Clerck, 1757)							2j	2	1(2)
Araniella sp.							3ms, 2fs	2	1(4), 2(1)
Araneidae sp.							1j	1	2(1)
Clubionidae									
Clubiona subsultans Thorell, 1875			1f					1	1(1)
Clubiona sp		2j		1j				2	1(2), 7(1)
Dictynidae									
Dictyna arundinacea (Linnaeus, 1758)		1f						1	1(1)
Dictyna sp.					1ms	7ms	2ms	5	4(9), 8(1)
Gnaphosidae									
Drassodes sp.							1j	1	1(1)
Gnaphosa sp.							1j	1	1(1)
Gnaphosidae sp.							3ms	1	4(1), 12(2)
Haplodrassus sp.					3j		9ms, 3fs	6	4(10), 7(3), 11(1),12(1)
Hahniidae									
Cryphoeca silvicola (C. L. Koch, 1834)		1m	1m, 1f					2	1(1), 2(2)
Linyphiidae									
Bolyphantes alticeps (Sundevall, 1833)			1f					1	3(1)
Bolepthyphantes index (Thorell, 1856)	1m			1f	1m	10m,2f	97m, 54f	13	1(18), 4(85), 5(3), 6(1), 12(59)

Table 1. continued

Family and species	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	No. of winters	Loc. no. (ind. sampled)
Centromerita bicolor (Blackwall, 1833)			1m					1	3(1)
Dicymbium nigrum (Blackwall 1834)			1f					1	2 (1)
Dicymbium tibiale (Blackwall, 1836)			1m, 2f					1	3(3)
Diplocephalus latifrons (O.P.-Cambridge, 1863)			2m, 3f					1	3(5)
Drepanotylus uncatus (O.P.-Cambridge, 1873)						1m	1m	2	4(1), 5(1)
Erigone atra Blackwall, 1833							1m	1	6(1)
Helophora insignis (Blackwall, 1841)		1f	3m, 16f					2	2(4), 3(16)
Hilaira pervicax Hull, 1908			1m				1f	2	3(1), 4(1)
Macrargus boreus Holm, 1968							4m	3	4(2), 11(1), 13(1)
Macrargus carpenteri (O.P.-Cambridge, 1894)							5m	1	4(5)
Macrargus rufus (Wider, 1834)			1f					1	3(1)
Mughiphantes suffusus(Strand, 1901)						1f		1	7(1)
Oedothorax sp.							1f	1	1(1)
Obscuriphantes obscurus (Blackwall, 1841)						1f		1	4(1)
Oryphantes angulatus (O.P.-Cambridge, 1881)			1m				2m	2	2(2), 3(1)
Pityohyphantes phrygianus (C.L.Koch, 1836)		3j	17j, 1ms, 2fs	1j		1ms, 1j	1ms	6	1(7), 2(12), 4(1), 6(2), 7(2), 10(3)
Savignia frontata Blackwall, 1833			1f					1	2(1)
Tenuiphantes alacris (Blackwall, 1853)	1f	1m, 1f		1f				4	1(2), 7(1), 10(1)
Tenuiphantes cristatus (Menge, 1866)			1m	1m	2m	1m, 1f	5m, 1f	6	1(4), 2(5), 3(2), 6(1)
Mengei (Kulczynski, 1887)			1f					1	3(1)
Walckenaeria cuspidata (Blackwall, 1833)							1m	1	4(1)
Walckenaeria kochi (O. P.-Cambridge, 1872)						1m		1	3(1)
Walckenaeria nudipalpis (Westring, 1851)		1m	3m				1m	4	1(1), 3(2), 4(1), 9(1)
Zornella cultrigera (L.Koch, 1879)					1m		2m	3	12(2), Alta(1)
Linyphia sp.					2j			2	3(1), 7(1)
Linyphiidae sp.						1j		1	1(1)
Liocranidae									
Agroeca brunnea (Blackwall, 1833)							2m	1	1(2)

Table 1. continued

Family and species	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	No. of winters	Loc. no. (ind. sampled)
Lycosidae									
Acantholycosa sp.						1 ms		1	6(1)
Pardosa sp.				1ms		1ms, 2j	31ms, 12j, 5fs	7	1(7), 2(1), 4(41), 5(1), 6(1), 7(1)
Xerolycosa sp.					1j	1j		2	6(1), 7(1)
Philodromidae									
Philodromus sp.		1j	1j		1j	2j	32s, 13j	9	1(7), 2(3), 4(34), 7(3), 10(1), 12(2)
Thanatus sp.							1ms	1	12(1)
Tetragnathidae									
Pachygnatha degeeri Sundevall, 1830		1m						1	10(1)
Pachygnatha listeri Sundevall, 1830			1m					1	3(1)
Tetragnatha sp.					1j			1	4(1)
Thomisidae									
Xysticus sp.							1ms	1	4(1)
Zoridae									
Zora spinimana (Sundevall, 1833)							1m	1	4(1)
Zora sp.							2ms	1	4(2)

landed after flying. The general snow depth was about 1 m. As seen from Table 1, *Philodromus* sp. has been collected on snow from several localities and years, and mainly in April.

Weather conditions

Weather data are not available from all samplings, but the temperature was usually noted. Figure 2 illustrates the climatic conditions during sampling, when weather data were recorded. If temperature varied during sampling, the mean temperature is given. Conditions when *B. index* was observed on snow are in black and show that this spider prefers temperatures above zero and calm, sunny weather. When the climatic data for all species are combined, the temperature range spans from –7 to 14 °C, with most observations around or above zero, often between 0 and 5 °C. However, several observations were also below zero. In most cases there was no wind, but the sky could be cloudy or clear.

DISCUSSION

Spiders on snow: An annual phenomenon with many species involved

The present material from several localities and throughout several years shows that spider activity on snow is an annual, geographically general phenomenon. Spiders were found in all winter months. A large number of species participate in this activity, but most species are uncommon. Two studies from Northern Finland support this general picture. In a large material of more than two thousand spiders collected on snow, Huhta & Viramo (1979) documented activity throughout the winter except for the coldest period in February. As many as 102 species were recorded, most of them in relatively low numbers but with a few dominant species. A smaller collection by Koponen (1989) revealed fourteen species of which four were regarded as regularly active on snow.

Huhta & Viramo (1979) suggested that almost any spider species present in the community may be found on snow. Most of the species in the present material were also recorded by Huhta & Viramo (1979), except for the following six species represented by few specimens: *Anyphaena accentuata, Diplocephalus latifrons, Mugiphantes suffusus, Obscuriphantes obscurus, Walckenaeria kochi, Pachygnatha degeeri,* and the genera *Acantholycosa, Araniella, Linyphia, Oedothorax, Thanatus,* and *Xerolycosa.* A common feature of the present and the two Finnish studies was a strong dominance of *Bolepthyphantes index* on snow towards the end of the winter, in April.

Although the snow spider fauna in Southern Norway and Northern Finland have many species in common, considerable differences exist

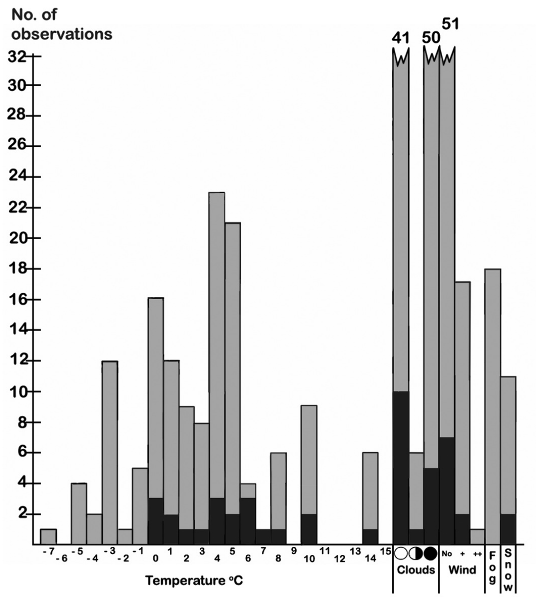

Figure 2. Climatic conditions when spiders were sampled from the snow surface. One “observation” means that a species was present on one occasion at that condition, for instance temperature, but without indicating number of individuals. Data for the most abundant species, *Bolepthyphantes index*, are shown in black. Cloud conditions are indicated as clear sky, partly cloudy or completely cloudy (black). There was either no wind, a faint wind (+) or a strong wind (++). Finally, the number of observations are given for foggy weather or when it was snowing.

regarding certain dominant species. The most numerous species recorded by Huhta & Viramo (1979), *Macrargus rufus,* was represented by only one individual in the present material. *Tmeticus affinis* (Blackwall, 1855) was abundant in the study of Huhta & Viramo (1979) and *Gnaphosa sticta* Kulczyn'ski, 1908 in the material of Koponen (1989), but these were absent in the present material. In fact, among the fourteen species in the latter study, collected far North at Kevo, only *Bolepthyphantes index, Zornella cultrigera and Cryphoeca silvicola* were taken in Southern Norway. This probably mirrors the local character of the spider fauna, and for instance *Gnaphosa intermedia* is a Northern species restricted to Lapland (Koponen 1976).

Is the snow surface colonized from below or from above?

Theoretically, spiders may colonize the snow surface either from the subnivean air space or from trees and other high vegetation. Huhta & Viramo (1979) found that the majority of the species in their material live permanently on the ground or in low field vegetation, so they must have colonized from below. The presence of some tree-living species was explained by involuntary falling, but this could not be the main reason for species encountered regularly on snow.

At Kevo, Koponen (1976, 1989) compared the spider fauna on snow with pitfall catches below the snow. He concluded that most spider species found on the snow were abundant also in the subnivean pitfall traps, so the snow surface activity was an extension of the normal winter activity below the snow. However, many species active below the snow did not appear on the snow surface. In Norway, Waaler (1972) caught *Macrargus rufus* and *Tenuiphantes cristatus* in the subnivean space. The ecological meaning of the subnivean spider activity is poorly understood. In Canada, Aitchison (1989) has suggested that active subnivean spiders may represent an important food source for overwintering shrews.

Also in the present material, most species are typically living on the ground or in the field vegetation, and must have colonized the snow surface from below (see Huhta & Viramo (1979) for habitat preferences). Even at great snow depth, a small air space is usually created along penetrating stems and bushes, so winter active invertebrates have a certain possibility to migrate between the snow surface and the subnivean environment.

A study of the invertebrate fauna on branches of spruce during five winter months near Oslo by Hågvar & Hågvar (1975) gives an idea of spider species that might have colonized the snow surface by dropping down. Among 701 spiders from 15 taxa on spruce branches, only 4 taxa were recorded on snow: *Philodromus* sp. (dominant group on branches, representing 33-45 % of these spiders in different months), *Dictyna* sp. (4-15 %), *Pityohyphantes phrygianus* (0-10 %), and *Araniella cucurbitina* (0-3 %). Tree-living individuals of these taxa were all juveniles. The dominance of *Philodromus sp*. on spruce branches may explain the relatively high numbers of subadults on snow in April, especially in warm weather. The observation of "flying" individuals and many specimens on snow, even in areas without penetrating vegetation, indicates a mass exodus from trees during the first, warm days in late winter. Huhta & Viramo (1979) and Koponen (1989) also reported *Philodromus* sp. from the snow surface in Northern Finland. We assume that the limited number of the three other taxa on the snow surface was due to accidental falling from trees.

Our conclusion is therefore that the majority of snow surface active spiders in Southern Norway colonize from the subnivean air space, a few species drop in small numbers involuntarily from trees and subadults of *Philodromus* sp. may colonize the snow surface in late winter due to a mass exodus from trees during warm weather and suitable wind conditions.

Remarks to some species

In Norway, Østbye (1966) found a specimen of *Centromerus incillium* (L. Koch, 1881), which had constructed a net in a crevice in the snow surface and captured collembolans. Several individuals of this species were collected on snow in early winter in Northern Finland, and it was considered by Huhta & Viramo (1979) to be one of rather few species that had its main period of activity during winter. *C. incillium* was, however, not found in the present study and no more nets on snow have later been found. Only *Bolepthyphantes index* has been reported as a regular net-building species on snow. In a detailed study of this species, Hågvar (1973) observed locally high densities of nets in small depressions in the snow surface, up to one net per 2 m^2. The present study shows that *B. index* inhabits forest areas of different types and altitudes, that it is the most common spider encountered on snow in Southern Norway, and that net-building on snow is a normal activity in late winter when the air temperature rises above zero. In Northern Finland as well, *B. index* was a numerous species on snow (Huhta & Viramo 1979, Koponen 1989). According to Hågvar (1973), it is well adapted to cold conditions. Its preference temperature is around 4 ^oC, it is able to be active in a supercooled state down to about –9 ^oC, and survives down to its supercooling point around –15 ^oC.

A considerable number of subadult *Pardosa* sp. were taken on snow in the present study, mainly in sunny and very warm weather (8-15 ^oC) in April. This genus was not present on spruce branches (Hågvar & Hågvar 1975), but the animals might have colonized from bare patches which start to appear at this time, for instance below certain trees and in south-faced slopes. It is not known whether this genus starts ballooning early after winter by climbing the vegetation. Huhta & Viramo (1979) sampled a high number of juvenile *Pardosa* sp. in early winter when there was very little snow, which also indicates colonization from bare patches.

Huhta & Viramo (1979) mentioned nine species in their material, which according to the literature had their main period of activity during the winter. Of these, six were present in the present material, all as adults but in low numbers: *Macrargus rufus, M. carpenteri, Centromerita bicolor, Drepanotylus uncatus, Tenuiphantes cristatus,* and *Walckenaeria nudipalpis.*

Phenology, age and sex ratio

Huhta & Viramo (1979) found the highest number of species and individuals in early winter (November), few animals in the cold mid-winter period, and a top of individuals again in April, mainly due to one species, *Bolepthyphantes index*. Although this species can be recorded on snow throughout the winter, Hågvar (1973), Palmgren (1975) and the present study support the conclusion that its activity on snow has a clear peak in late winter. During periods with a day temperature exceeding 0 ^oC, especially in April, this species can show high abundance and activity on the snow. In the large material of Huhta & Viramo (1979), this was the only species showing a peak occurrence in late winter. The present study, which included samplings on some very warm days in April, showed that also *Philodromus* sp. and *Pardosa* sp. can be numerous on snow in late winter. Huhta & Viramo (1979) showed that *Pardosa* sp. can even be numerous on snow during early winter. The differences between these two studies are probably due to a lack of late winter samples at high temperatures in the Finnish study and few very early winter samplings on patcy or very thin snow cover in the present study. High activity of many spider species on the first, thin snow layer in mild weather has also been observed by the present authors, but without doing sampling. Our conclusions are that many cold-tolerant species can continue their autumn activity on the first snow in mild weather, that no species show a peak of occurrence on snow during mid-winter, and that *B. index*, and a few other species, have a maximum activity on snow in late winter. The phenology of the last group implies an active, early start in a snow-covered ecosystem.

Several species in Table 1, as well as in Huhta & Viramo (1979) were represented only by juveniles or subadults. Good examples from the present study are *Pardosa* sp. (Figure 3) and *Philodromus* sp. The very early activity start in these rather large spiders may give them a prolonged growth season.

Females were generally more numerous than males in the material of Huhta & Viramo (1979). Males, however, predominated in their material of *Bolepthyphantes index, Tenuiphantes cristatus, Macrargus carpenteri, Walckenaera* spp., *Tmeticus affinis*, and *Centromerus* spp. The present material confirms this for *B. index,* and also for the three next taxa. Most nets of *B. index* referred to in the present study contained only one female, indicating that it had been constructed by a female.

Weather conditions

Also Huhta & Viramo (1979) found most spiders on snow in mild weather, with highest activity at temperatures several degrees above zero. Their coldest observation was at –2.6 °C, while we found spiders down to –7 °C. Several of our samlings were made in foggy weather, and some when snowing. The great majority of the spiders were taken in calm weather with no wind, but the sky could be either cloudy or sunny. The most typical situation would thus be a windless day with temperatures above zero and a wet snow surface. At temperatures close to zero, a cloud-covered sky might be an advantage. This is because the cloud cover would ensure that the temperature would not fall too rapidly during the evening, so the animals would have time to retreat to the subnivean space before being frozen. In late winter, however, with mild nights, spiders might use sunny days and stay on snow during night without facing the danger of freezing.

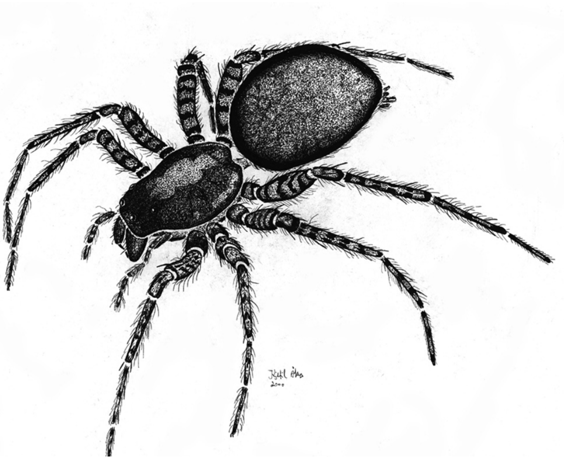

Figure 3. On warm days during late winter (April), juveniles and subadults of *Pardosa* sp. are often active on the snow surface. The picture shows an adult *Pardosa amentata* (Clerck, 1757). Drawing by Kjetil Aakra.

Pitfall studies in snow-poor areas confirm winter activity in spiders

On Askøy near Bergen, Aakra (1998) ran pitfall traps throughout 14 months, including winter trapping (31 October 1996 to 28 April 1997), with periodic snow cover of 1-9 cm thickness. The following four species in the present material were clearly winter active as the majority, or a large portion of the total material (both sexes), were trapped during the winter period: *Macrargus rufus* (in fact confined to the winter period), *Helophora insignis, Tenuiphantes alacris*, and *T. cristatus*. As virtually all, or the majority, of males in these species (and even some additional ones) were caught during winter, Aakra (1998) concluded that they breed during the winter period. Three additional species from the present study were taken in winter pitfall traps in Iceland, in hayfields and pastures with occasional snow cover (Gudleifsson & Bjarnadottir 2004): *Erigone atra, Savignia frontata,* and *Tenuiphantes mengei*. Regular winter activity is clearly a normal feature among several spiders and deserves to be more closely studied.

Why active on snow?

Except for the catching of prey, feeding and copulation of *Bolepthyphantes index* in nets, the yearly activity of many spider species on snow is difficult to understand. Huhta & Viramo (1979) presented some theoretical explanations, as escapement from water-logged soil during thaw weather, or simply a continuation of normal activity in spite of low temperatures. They stressed that species which have their main period of activity during winter could represent a special adaptation to avoid competition with other species by utilizing the resource offered by winter active insects.

Aitchison (1984b) has shown that certain spiders can feed at temperatures close to 0 °C. This may imply that some of the spiders active under snow are able to feed there. Except for *B. index*, the present study included only one observation of a spider feeding on snow (*Helophora insignis* feeding on a juvenile *Anyphaena accentuata*). Since several species of Collembola may be very abundant and active on snow in mild weather (Hågvar 1995, 2000), they represent a huge, nearly unused food source for predators. It may be that *B. index* represents a start in an evolution where more predators like spiders gradually will adapt to feed on snow Collembola. Clearly, spiders represent an invertebrate group with many cold tolerant species having a large potential to adapt further to winter activity also above the snow.

We support the view of Huhta & Viramo (1976) that the snow surface activity on mild days may simply be an extention of their normal subnivean activity and that many spiders probably end up on snow by more or less chance. However, the easy and probably predation-free movement on the snow surface may have a certain function in migration. During sunny weather, spiders may move rather rapidly on snow and their bodies are probably heated by solar radiation. Especially in late winter, migration on snow may allow spiders to identify and colonize the first warm and snow-free spots, giving them an early start in feeding, growth and reproduction. Spiders staying in the subnivean environment may be several weeks delayed in their life cycle compared to animals able to localize the first snow-free patches.

Hågvar & Greve (2003) showed that a number of flies are also regularly winter active, and recorded 44 species live on snow over a period of 20 years. A few species carried eggs throughout the winter but without depositing them. Many of the species were saprophagous Heleomyzidae and Sphaeroceridae. The hypothesis was presented that cold-adapted, saprophagous flies may have an advantage during snow melt in colonizing suitable substrates, such as excrement or dead bodies which had accumulated in a frozen state during winter. These resources are made available during a short time at snow melt. In this way these flies may outcompete, for instance, saprophagous beetles which are interested in the same resources, but need a higher temperature to be active. The activity on snow of these flies may simply reflect a continuous awareness for suitable substrates at low temperatures, "waiting" for substrates to melt and be available. This would be a different strategy from winter active spiders. We assume that most spiders on snow are casual visitors from the subnivean community and that the subnivean activity may be the main purpose of being active at low temperatures. It remains, however, to understand the purpose of subnivean activity of spiders.

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REFERENCES

Aakra, K. 1998. Epigeic spiders of the island of Askøy, western Norway. 148 pp. Cand. Scient. Thesis, Zoological Museum, University of Bergen.

Aitchison, C.W. 1984a. The phenology of winter-active spiders. J. Arachnol. 12, 249-271.

Aitchison, C.W. 1984b. Low temperature feeding by winter-active spiders. J. Arachnol. 12, 297-305.

Aitchison, C.W. 1989. The ecology of winter-active collembolans and spiders. Aquilo Ser. Zool. 24, 83-89.

Coulianos, C.-C. & Johnels, A.G. 1962. Note on the subnivean environment of small mammals. Ark. Zool. Ser. 2, 15, 363-370.

Dahl, C. 1965. Studies on swarming activity in Trichoceridae (Diptera) in Southern Sweden. Opusc. Ent. Suppl. 27, 1-68.

Gudleifsson, B.E. & Bjarnadottir, B. 2004. Spider (Araneae) populations in hayfields and pastures in northern Iceland. JEN 128 (4), 284-291.

Hågvar, E.B. & Hågvar, S. 1975. Studies on the invertebrate fauna on branches of spruce (*Picea abies* (L.)) during winter. Norw. J. Entomol. 22, 23-30.

Hågvar, S. 1971. Field observations on the ecology of a snow insect, *Chionea araneoides* Dalm. (Dipt., Tipulidae). Norsk ent. Tidsskr. 18, 33-37.

Hågvar, S. 1973. Ecological studies on a winter-active spider *Bolyphantes index* (Thorell) (Araneida, Linyphiidae). Norsk ent. Tidsskr. 20, 309-314.

Hågvar, S. 1976. Phenology of egg development and egg-laying in a winter-active insect, *Chionea araneoides* Dalm. (Dipt., Tipulidae). Norw. J. Entomol. 23, 193-195.

Hågvar, S. 1995. Long distance, directional migration on snow in a forest collembolan, *Hypogastrura socialis* (Uzel). Acta Zool. Fennica 196, 200-205.

Hågvar, S. 2000. Navigation and behaviour of four Collembola species migrating on the snow surface. Pedobiologia 44, 221-233.

Hågvar, S. 2001. Occurrence and migration on snow, and phenology of egg-laying in the winter-active insect *Boreus* sp. (Mecoptera). Norw. J. Entomol. 48, 51-60.

Hågvar, S. & Greve, L. 2003. Winter active flies (Diptera, Brachycera) recorded on snow – a long-term study in south Norway. Studia Dipt. 10, 401-421.

Huhta, V. & Viramo, J. 1979. Spiders active on snow in northern Finland. Ann. Zool. Fennici 16, 169-176.

Koponen, S. 1976. Spider fauna (Araneae) of Kevo area, northernmost Finland. Rep. Kevo Subarctic Res. Stat. 13, 48-62.

Koponen, S. 1989. Spiders (Araneae) on snow surface in subarctic Lapland. Aquilo Ser. Zool. 24, 91-94.

Leinaas, H. P. 1981. Activity of Arthropoda in snow within a coniferous forest, with special reference to Collembola. Holarct. Ecol. 4, 127-138.

Leinaas, H. P. 1983. Winter strategy of surface dwelling Collembola. Pedobiologia 25, 235-240.

Näsmark, O. 1964. Vinteraktivitet under snön hos landlevande evertebrater. Zoologisk Revy 1, 5-15.

Østbye, E. 1966. Edderkoppen som fanger collemboler i nett vinterstid. Fauna (Oslo) 19, 43.

Waaler, P. F. 1972. Overvintring og subnival aktivitet hos noen edderkopper. Trasop skolehage 1967-72. 22 pp. Unpublished manuscript.

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Lauxania minor Martinek, 1974 (Diptera, Lauxaniidae) in Norway and *Sapromyza obsoleta* Fallén, 1820 (Diptera, Lauxaniidae) deleted from the Norwegian fauna

Lita Greve

Greve, L. 2006. *Lauxania minor* (Martinek, 1974) (Diptera, Lauxaniidae) in Norway, and *Sapromyza obsoleta* Fallén, 1820 (Diptera, Lauxaniidae) deleted from the Norwegian fauna. Norw. J. Entomol. 53, 83-84.

Lauxania minor Martinek, 1974 is recorded as a new species to Norway from Bjørkås, Asker Akershus (AK). Material previously published as *Sapromyza obsoleta* Fallén, 1820, has been examined and proved to be misidentified. *S. obsoleta* is therefore deleted from the Norwegian fauna.

Key Words: *Lauxania minor, Sapromyza obsoleta,* Lauxaniidae, Diptera, Norway

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INTRODUCTION

The subfamily Lauxaniinae (family Lauxaniidae, Diptera) is quite diverse in Scandinavia, and includes by far most of the species of Lauxaniidae recorded from Norway. By now 38 species of this subfamily have been published from Norway, compared to 2 species of the subfamily Homoneurinae see Greve & Merz (2003).

A new Lauxaniidae species from Norway was identified while surveying material of the genus *Lauxania* Latreille, 1804. Two species of the genus *Lauxania* have so far been recorded from Norway, the widely distributed *L. cylindricornis* (Fabricius, 1794) and the rare *L. albomaculata* Strobl, 1909 which has recently been recorded from Norway (Greve & Merz 2003). Martinek (1974) described a third species *L. minor* from Central Europe, today placed in the subgenus *Callixania* Papp, 1978. One male belonging to *L. minor* was discovered in the present material.

SUBFAMILY LAUXANIINAE

Lauxania (Callixania) minor **Martinek, 1974.**
AK Asker: Bjørkås (EIS 28), Malaise trap, 4 June – 2 July 1995, 1 ♂ leg. L.O. Hansen & O. Hanssen.

L. minor Martinek has the characteristic extended postpedicel which is also found in *L. cylindricornis* (Fabricius). The antennae of *L. minor* situated on a pronounced edge at the middle of the height of the eyes, without any swelling below the antennae. In *L. cylindricornis* there is a distinct swelling <u>below</u> the antennae. There are clear differences in the genitalia of both sexes which are figured in Martinek (1974). Dr. B. Merz, Genevé has confirmed my determination of this specimen.

The record of *L. minor* is the first from Fennoscandia and Denmark, and *L. minor* has not been recorded from other parts of Northwestern Europe. The specimen is deposited in the Zoological Museum, University of Bergen.

Sapromyza obsoleta Fallén, 1820 deleted from the Norwegian fauna.

Sapromyza obsoleta Fallén, 1820 was described by Fallén from Skåne in southernmost Sweden. Merz (2003) examined 1 □ and 5 □□ from Fallén´s collection which are assumed to originate from Skåne and designated the male as the lectotype.

The diagnostic characters for *S. obsoleta* are apically black palpus and postpedicel, 0+3 dorsocentral setae with a few elongate setulae anteriad, unspotted abdomen, and no preapical seta on hind tibia. The hind leg has tibia with a very long curved apical spine, and there is a conspicuous brush of black setulae on hind metatarsus.

Sapromyza obsoleta Fallén, 1820 was first mentioned from Norway by Zetterstedt (1847 p. 2323) from Christiania (= Oslo) in Akershus province, leg. Moe, and from the community of Levanger and Næs (=Thynes) in the province of Northern Trøndelag.

The author borrowed Zetterstedt´s material from the Museum of Zoology, University of Lund, six specimens altogether. Three are labelled with localities and three are not, but some specimens have green labels which show with certainty that they are from Norwegian localities. No specimen was labelled "Levanger".

All specimens have a preapical dorsal setae on the hind tibias and for this reason none of them are *S. obsoleta*. All of them has 1+ 3 dorsocentral setae and belong therefore not to the genus *Sapromyza*.

Siebke (1877) listed a total of 22 species of Lauxaniidae among them S. obsoleta. Most of these are valid species today and the major part of Siebke´s material was correctly determined.

All specimens of *S. obsoleta* in Siebke´s collection, males and females, determined as *S. obsoleta* Fallén, and deposited in Zoological Museum, University of Oslo, however, have preapical dorsal setae on the hind tibias and for this reason none of them belong to this species. Twenty-one specimens have been examined, one belonged to the family Heleomyzidae, another specimen without data and lacking the head is probably a *Minettia* sp. Seventeen specimens probably belong to different species of the genus *Meiosimyza*. Only two specimens are belonging to the genus *Sapromyza*, both of them with distinct preapical dorsal seta on hind tibia. I have seen no other material determined as *S. obsoleta* in Norwegian collections. *Sapromyza obsoleta* are herewith deleted from the Norwegian list of Lauxaniinae.

Since *S. obsoleta* Fallén, 1820 was described on material from Skåne in Sweden, there is a possibility that this species also may be discovered in Norway in the future.

Acknowledgements. I wish to express my thanks to Lars Ove Hansen, Zoological Museum, University of Oslo and Oddvar Hanssen, NINA, Trondheim who collected the material of *Lauxania minor*, and to Dr. Bernhard Merz, Muséum d´histoire naturelle, Genève who verified my determination of the specimen.

REFERENCES

Greve, L. & Merz, B. 2003. *Homoneura consobrina* (Zetterstedt, 1847) and *Lauxania albomaculata* Strobl, 1909 (Diptera, Lauxaniidae) in Norway. Norw. J. Entomol. 50, 107 – 108.

Martinek, V. 1974. New European species *Lauxania minor* sp.n. and redescription of species *Lauxania cylindricornis* (Fabr.)(Diptera, Lauxaniidae). Biológia (Bratislava) 29, 609 – 617.

Merz, B. 2003. The Lauxaniidae (Diptera) described by C.F. Fallén with description of a misidentified species of *Homoneura* van der Wulp. Insect Systematics and Evolution (Group 6), 34, 345 – 360.

Siebke, J.H.S. 1877. Enumeratio Insectorum Norvegicorum Fasciculum IV. Catalogum Dipterorum Continentem. Xiv + 255 pp. A.W. Brøgger, Christianiae (Oslo).

Zetterstedt, J.W 1847. Diptera scandinaviae disposita et descripta. 6 2163 – 2580. Ex officina lundbergiana, Lundae (Lund).

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Checklist of Nordic Pseudoscorpiones

Ingvar Stol

Stol, I. 2006. Checklist of Nordic Pseudoscorpiones. Norw. J. Entomol. 53, 85-87.

A checklist of the Nordic pseudoscorpions, including Norway, Denmark, Sweden, Finland, The Faroe Islands and Iceland is presented. A total of 25 Nordic species are currently known, of which 16 are from Norway, 19 from Denmark, 20 from Sweden, 17 from Finland, 1 from The Faroe Islands and 2 from Iceland.

Keywords: Pseudoscorpiones, Checklist, Nordic countries.

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THE CHECKLIST

A checklist of the pseudoscorpions (order Pseudoscorpionida) from the Nordic countries has so far not been available. Although the comprehensive catalogue of Harvey (1990) deals with all species on a world basis, there is no checklist dealing exclusively with the Nordic species. Stol (2005), however, has recently treated all Nordic species in a key, but this publication is in Norwegian.

The present list is based on the literature available for Norway (Ellingsen 1897, 1901, 1903, 1910, Klausen 1975, 1998, Frøiland 1976, Stol 2005), Denmark (Thydsen Meinertz 1962, Andersen 1987, 1988, Skipper 2002, Stol 2005), Sweden (Lohmander 1939, Gärdenfors & Wilander 1992, Stol 2005), Finland (Kaisila 1949, Palmgren 1973, Hippa et al. 1984, Stol 2005), The Faroe Islands (Henriksen 1938, Stol 2005), Iceland (Henriksen 1938, Agnarsson 1998, Stol 2005).

Presently, 16 species are reported from Norway, 19 from Denmark, 20 from Sweden, 17 from Finland, 1 from the Faroe Islands and 2 from Iceland. A total of 25 species are known from the Nordic countries.

Kaisila (1949) and Harvey (1990) incorrectly reported *Apocheiridium rossicum* Redikorzev, 1935 from Finland. The species which occurs in Finland appears to be *Apocheiridium ferum* (E. Simon, 1879) (Stol 2005, Finn Erik Klausen, pers. comm.).

Neobisium sylvaticum (C. L. Koch, 1835) is also omitted from the Finnish list. Harvey (1990) mentioned the species from Finland, but has most probably misinterpreted the information given by Palmgren (1973) (Stol 2005, Finn Erik Klausen, pers. comm.). The species does most probably not occur in the Nordic countries.

The checklist is presented in Table 1 with the species in a systematic order.

Acknowledgements. I am very grateful to Dr. Erling Olafsson, Icelandic Institute of Natural History, Reykjavik, Iceland for procuring literature and to Dr. Finn Erik Klausen, Agder University College, Department of Natural Sciences, Kristiansand S, Norway for information.

Table 1. Checklist of the pseudoscorpiones (order Pseudocorpionida) from the Nordic countries.
N = Norway, D = Denmark, S = Sweden, Fi = Finland, Fa = Faroe Islands, I = Island.

Family and species	**N**	**D**	**S**	**Fi**	**Fa**	**I**
Superfamily Chthonioidea Daday, 1888						
Family Chthoniidae Daday, 1888						
Chthonius ischnocheles (Hermann, 1804)	X	X	X			
Chthonius tetrachelatus (Preyssler, 1790)	X	X	X	X		
Superfamily Garypoidea E. Simon, 1879						
Family Garypidae E. Simon, 1879						
Larca lata (H, J. Hansen, 1884)		X	X			
Superfamily Neobisioidea J. C. Chamberlin, 1930						
Family Neobisiidae J. C. Chamberlin, 1930						
Microbisium brevifemoratum (Ellingsen, 1903)	X	X	X	X		
Microbisium suecicum Lohmander, 1945			X			
Neobisium carcinoides (Hermann, 1804)	X	X	X	X	X	X
Family Syarinidae J. C. Chamberlin, 1930						
Syarinus strandi (Ellingsen, 1901)	X			X		
Superfamily Cheiridioidea H. J. Hansen, 1893						
Family Cheiridiidae H. J. Hansen, 1893						
Apocheiridium ferum (E. Simon, 1879)				X		
Cheirdium museorum (Leach, 1817)	X	X	X	X		
Superfamily Cheliferoidea Risso 1826						
Family Cheliferidae Risso, 1826						
Chelifer cancroides (L., 1758)	X	X	X	X		X
Dactylochelifer latreillei (Leach, 1817)		X	X	X		
Family Chernetidae Menge,1855						
Allochernes peregrinus Lohmander, 1939			X			
Allochernes powelli (Kew, 1916)		X				
Allochernes wideri (C. L. Koch, 1843)	X	X	X	X		
Anthrenochernes stellae Lohmander, 1939		X	X			
Chernes cimicoides (Fabricius, 1793)	X	X	X	X		
Chernes nigrimanus Ellingsen, 1897	X		X	X		
Dendrochernes cyrneus (L. Koch,1873)	X		X	X		
Dinocheirus panzeri (C. L. Koch, 1837)	X	X	X	X		
Lamprochernes chyzeri (Tömösvary, 1882)	X	X	X	X		
Lamprochernes nodosus (Schrank, 1803)	X	X	X	X		
Lamprochernes savignyi (E. Simon, 1881)		X				
Pselaphochernes dubius (O. P. Cambridge, 1892)	X	X	X	X		
Pselaphochernes scorpioides (Hermann, 1804)	X	X	X	X		
Family Withiidae J. C. Chamberlin, 1931						
Withius piger (E. Simon, 1878)		X				

REFERENCES

Agnarsson, I. 1998. Islenskar langfætlur og drekar. Fjölrit Natturufrædistofnunar 35, 1-36.

Andersen, M. 1987. Mosskorpionen *Lamprochernes nodosus* (Schrank, 1761) i Danmark (Pseudoscorpiones). Entomol. Meddr. 55, 23-25.

Andersen, M. 1988. Mosskorpionen *Anthrenochernes stellae* Lohmander genfundet i Danmark. Entomol. Meddr. 56, 125-126.

Ellingsen, E. 1897. Norske Pseudoscorpioner. Forh. Videnskabsselsk. Christiania 5, 1-21.

Ellingsen, E. 1901. Sur une espe'ce novelle d`*Ideobisium*, genre des Pseudoscorpions de l`Europe. Bull. Soc. zool. France 26, 86-89.

Ellingsen, E. 1903. Norske Pseudoscorpioner II. Forh. Videnskabsselsk. Christiania 5, 1-18.

Ellingsen, E. 1910. Myriapoda und Pseudoscorpiones. Nyt Mag. Naturvidensk. 48, 344-348.

Frøiland, Ø. 1976. Pseudoscorpiones. Zoological Museum, University of Bergen. Fauna Hardangervidda 8, 11-12.

Gärdenfors, U. & Wilander, P. 1992. Sveriges klokrypare med nyckel til arterna. Ent. Tidskr. 113, 20-35.

Harvey, M. S. 1990. Catalogue of the Pseudoscorpionida. 726 pp. Manchester University Press.

Henriksen, K. L. 1938. Opiliones and Chernetes. The Zoology of Iceland 3 (53), 1-9.

Hippa, H, Koponen, S. & Mannila, R. 1984. Invertebrates of Scandinavien Caves I. Araneae, Opiliones and Pseudoscorpionida (Arachnida). Ann. Ent. Fenn. 50, 23-29.

Kaisila, J. 1949. A revision of the pseudoscorpion fauna of Eastern Fennoscandia. Ann. Ent. Fenn. 15, 72-92.

Klausen, F. E. 1975. Notes on the Pseudoscorpiones of Norway. Norw. J. Entomol. 22, 63-65.

Klausen, F. E. 1998. Additional records of pseudoscorpions from Norway. Fauna norv. Ser. B 45, 100-103.

Lohmander, H. 1939. Zur Kenntnis der Pseudoskorpionfauna Schwedens. Ent. Tidskr. 60, 279-323.

Palmgren, P. 1973. Über die Biotopverteilung Waldbodenlebender Pseudoscorpionidea (Arachnoidea) in Finland und Österreich. Comm. Biol. 61, 1-11.

Skipper, L. 2002. Pseudoscorpiones - mosskorpioner. http://hjem.get2net.dk/lars_skipper/mosskorpioner1.htm_

Stol, I. 2005. Nordiske mosskorpioner (Pseudoscorpiones). Norske Insekttabeller (Oslo) 18, 1-35.

Thydsen Meinertz, N. 1962. Mosskorpioner og mejere. Danm. Fauna 67, 7-109.

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The mistletoe associated psyllid *Cacopsylla visci* (Curtis, 1835) (Homoptera, Psyllidae) in Norway

Lars Ove Hansen & Ian D. Hodkinson

Hansen, L. O. & Hodkinson, I.D. 2006. The mistletoe associated psyllid *Cacopsylla visci* (Curtis, 1835) (Homoptera, Psyllidae) in Norway. Norw. J. Entomol. 53, 89–91.

Approximately 50 specimens of *Cacopsylla visci* were reared from a branch of mistletoe (*Viscum album*) collected on the small Oslofjord island of Mølen at Hurum, E Buskerud (BØ); July 1990. Attacks were also observed in July 1999, and both adults and nymphs (IV-V) were observed in early May 2000, which indicates that the species may hibernate in these stages. This is the first Fennoscandian records of the species and represents most probably a new northern limit for the species.

Key-words: Homoptera, Psyllidae, mistletoe, *Viscum album, Tilio-Ulmetum,* Oslofjord, Mølen.

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INTRODUCTION

The Fennoscandian populations of mistletoe (*Viscum album*) are small and restricted (Hultén 1971). In Norway the distribution covers some small islands in the Oslofjord and some populations on the adjacent mainland (Hanssen 1933, Lid 1985). In Sweden mistletoe is found around Mälaren, some places in Kalmar and one place in Östergötland (Hultén 1971, Lid 1985). The Danish populations are restricted to the westcoast of Zealand, but it is also present some other places where it has been introduced to gardens. Mistletoe is not found in Finland. The present distribution of *V. album* is given in Figure 1. Several species of insects are associated with *V. album* in C and S Europe (e.g. Coleoptera, Hemiptera), but none of these have hitherto been recorded in the Nordic countries. This contribution deals with the first record of the psyllid *Cacopsylla visci* (Curtis, 1835) in the Nordic countries. According to Klimaszewski (1973), this species is monophagous on *V. album* in Europe.

THE RECORDS

Attacks by the psyllid *Cacopsylla visci* (Curtis, 1835) were recorded on the island of Mølen in E Buskerud BØ, Hurum: (EIS 19; UTM 32VNL8595) on *V. album*. A small branch (c. 15 cm.) attacked by nymphs (II-V) was collected on 4 July 1990, and about 50 psyllids hatched through July and early August. Later attacks of *C. visci* were observed in July 1999, and both adults and nymphs (IV-V) were observed in early May 2000. This may indicate that the species hibernates in these stages. The collected material is deposited in the collections at the Natural History Museum, University of Oslo.

The island Mølen is 0.25 km^2 and lies about 3.5 km from the mainland. The flora is interesting from a national point of view (Hagen 1950). Remarkably, here is an old and dense elm-lime forest (*Tilio-Ulmetum*), which covers a large part of the interior of the island. An interesting insect and arachnid fauna has been recorded (Hauge & Hansen 1991, Hansen & Ligaard 1992). Mistletoe

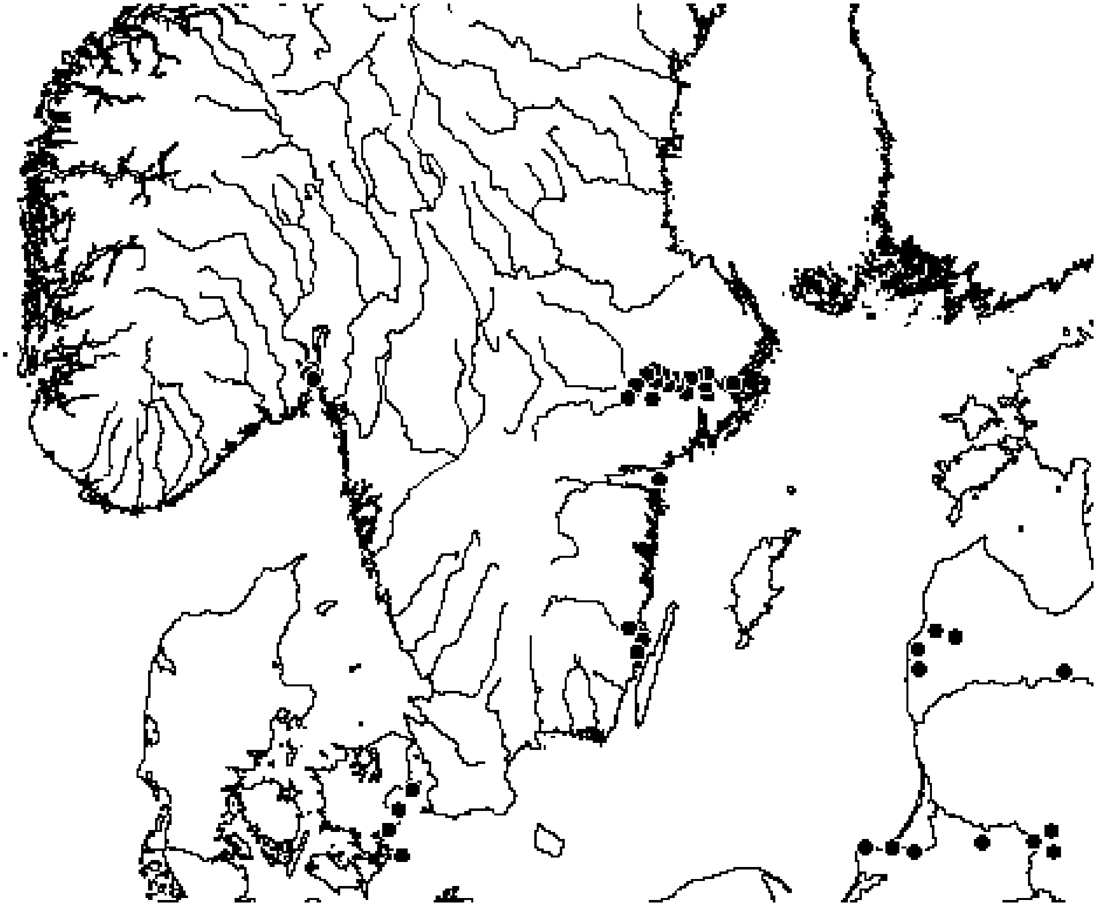

Fig. 1. The distribution of Mistletoe (*Viscum album*) in Fennoscandia and Denmark (after Hultén 1971, Lid 1985). Introduced populations are not included.

is quite abundant on the island, and attacks several hosts (e.g. *Crataegus, Malus, Rosa, Frangula*), but most frequently lime (*Tilia cordata*), on which the psyllids were found. One of the lime-trees where the psyllids were collected, is shown in Figure 2. This tree suffers from quite heavily attacs of mistletoe.

The vernacular Norwegian name «mistelteinsuger» is suggested.

DISTRIBUTION

C. visci is not recorded from Sweden, Denmark, Finland, or the Baltic countries, but is found in Austria, the former Czechoslovakia, France, Hungary, Poland, Switzerland, U.K. and the southwestern parts of the former USSR, including Georgia and the Ukraine (Klimaszewski 1973). The present record represents most probably a new northern limit for the species. Even though *C. visci* has not been recorded elsewhere in Fennoscandia and Denmark, it may follow

Fig. 2. One of the lime-trees (*Tilea cordata*) where attacks of *C. visci* were observed on *Viscum album* at the island Mølen in Hurum municipality, 1999. Photo: Lars Ove Hansen.

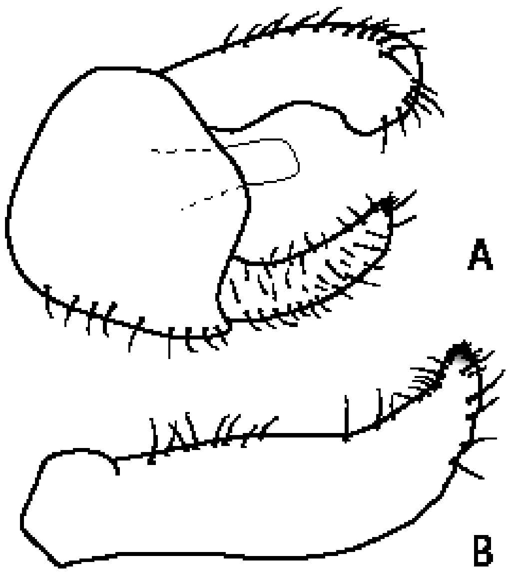

Fig. 3. The male genitalia (terminalia) with right paramere of *Cacopsylla visci*.

the natural distribution of *V. album*, but less probable on localities where mistletoe has been introduced.

DETERMINATION

C. visci is not included in the monograph on the Psylloidea of Fennoscandia and Denmark (Ossiannilsson 1992). However, *C. visci* may be separated from other species of *Cacopsylla* by the means of the genital terminalia of the male (Figure 3). Due to the association of *C. visci* with mistletoe, the species may easy be recognized when it is hatched from this plant.

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REFERENCES

Hagen, A. 1950. Mølens flora. 69 pp. Landsforbundet for naturfredninger i Norge.

Hansen, L.O. & Ligaard, S. 1992. Coleoptera from six small islands in the middle Oslofjord, SE Norway. Fauna norv. Ser. B 39, 23–31.

Hanssen, J. 1933. Misteltеinen i Norge. Nyt mag. f. Naturv. 72, 283-340.

Hauge, E. & Hansen, L.O. 1991. Spiders (Araneae) from six small islands in the middle Oslofjord, SE Norway. Fauna norv. Ser. B 38, 45–52.

Hultén, E. 1971. Atlas of the distribution of vascular plants in Northwestern Europe. 532 pp. Generalstabens litografiska anstalts förlag, Stockholm.

Klimaszewski, S.M. 1973. The jumping plant-lice or psyllids (Homoptera: Psylloidea) of the Palaearctic: an annotated check-list. Ann. Zool., Warsaw, 30, 155–286.

Lid, J. 1985. Norsk og svensk flora. 837 pp. Det norske Samlaget. Oslo.

Ossiannilsson, F. 1992. The Psylloidea (Homoptera) of Fennoscandia and Denmark. Fauna Ent. Scand. 26, 1- 347.

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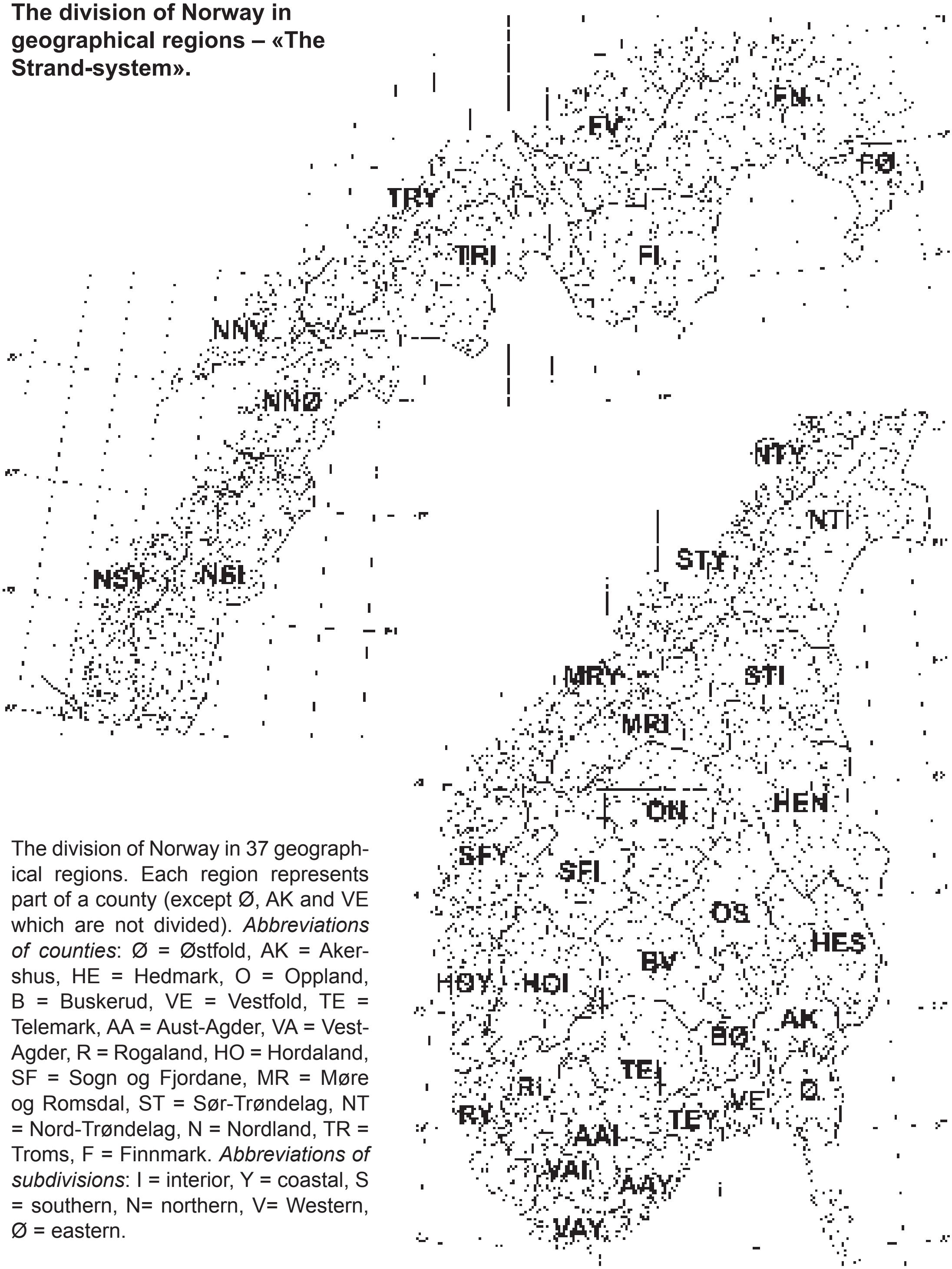
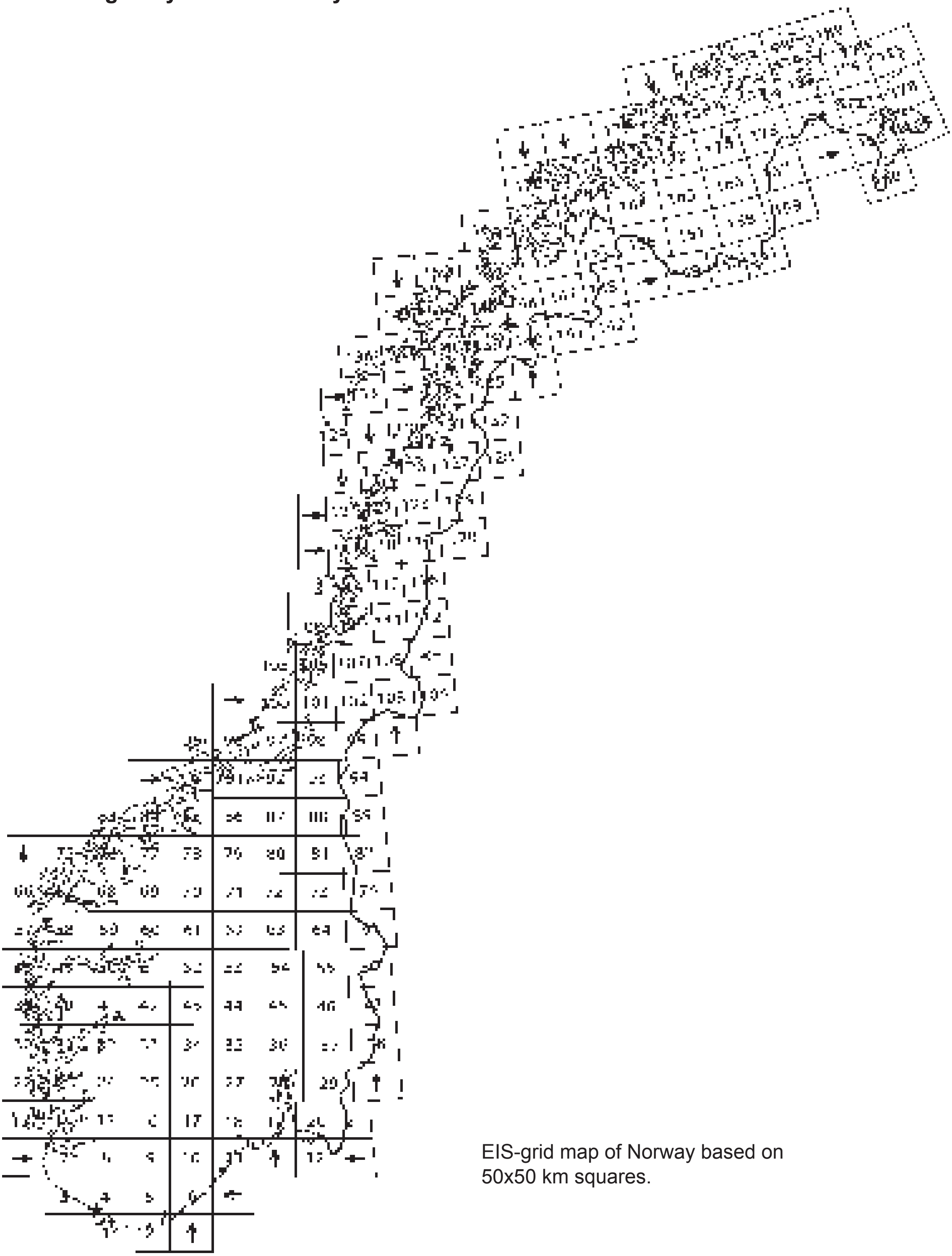
The division of Norway in geographical regions – «The Strand-system».



The division of Norway in 37 geographical regions. Each region represents part of a county (except Ø, AK and VE which are not divided). *Abbreviations of counties*: Ø = Østfold, AK = Akershus, HE = Hedmark, O = Oppland, B = Buskerud, VE = Vestfold, TE = Telemark, AA = Aust-Agder, VA = Vest-Agder, R = Rogaland, HO = Hordaland, SF = Sogn og Fjordane, MR = Møre og Romsdal, ST = Sør-Trøndelag, NT = Nord-Trøndelag, N = Nordland, TR = Troms, F = Finnmark. *Abbreviations of subdivisions*: I = interior, Y = coastal, S = southern, N= northern, V= Western, Ø = eastern.

The EIS-grid system of Norway



EIS-grid map of Norway based on
50x50 km squares.

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Abstract should not exceed 300 words and should cover the main results and conclusions of the paper Authors, year, title of paper and Norw. J. Entomol. Vol. No. should be inserted above the abstract.

Tables are typed on separate sheets and numbered consecutively. Each Table must have a heading. Write «Table» in full both in the text and Table heading. Avoid vertical lines in the Tables.

Figures should (if at all possible) be submitted electronically as separate files, e.g. in JPEG, TIFF or EPS formats, with resolution not less than 600 dpi. The Figures must be numbered consecutively and all Figures must be referred to in the text. Write «Figure» in full. On paper copies the names(s) of the author(s) should be written in the margin of each figure. The size of the figure must not exceed 210 x 290 mm (standard A4). The author should take into consideration that most figures have to be reduced. In *line drawings* the line thickness should not be less than 0.25 mm after reduction, and capital letters should not be smaller than 2.0 mm. Choose contrasting patterns and avoid fine tone rasters. Photographs must be of high quality with good contrasts. Maps and morphological illustrations, e.g. pictures of insects, should include a scale bar.

Nomenclature. Scientific names of genera and species should be written in italics. The name of the author and year of description (if appropriate), separated by a comma, should be included the first time the name of an insect or another terrestrial arthropod is mentioned in the text, e.g. *Rhyacophila nubila* (Zetterstedt, 1840). Names of authors should be written in full, except L. for Linnaeus.

Localities. In faunistic papers the names of Norwegian localities should be according to K.A. Økland (1981), Fauna (Oslo) 34, 167-178, and preferably the EIS number or UTM should be added. Dates are written e.g. as 17 May 2005 or 17.V.2005.

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Examples:

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Chant, D.A. & McMurtry, J.A. 1994. A review of the subfamilies Phytoseiinae and Typhlodrominae (Acari: Phytoseiidae). Int. J. Acarol. 20, 223-310.

Book

Borror, D.J., Tripleton, C.A. & Johnson, N.F. 1989. An introduction to the study of insects. Sixth edition. 875 pp. Saunders College Publ., Philadelphia.

Chapter in book

Dennis, R.L.H. & Williams, W.R. 1995. Implications of biogeographical structures for the conservation of European butterflies. Pp. 213-230 in Pullin, A.S. (ed.), Ecology and conservation of butterflies. Chapman & Hall, London.

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Articles

Information

The present journal is a continuation of **Fauna norvegica Series B** (Norwegian Journal of Entomology). With Volume 45 (1998) the publication of this journal by the Foundation for Nature Research and Cultural Heritage Research (NINA-NIKU) has been discontinued. Starting with Volume 46, the journal is published as **Norwegian Journal of Entomology** by the Norwegian Entomological Society. Editor is Professor Lauritz Sømme, University of Oslo.