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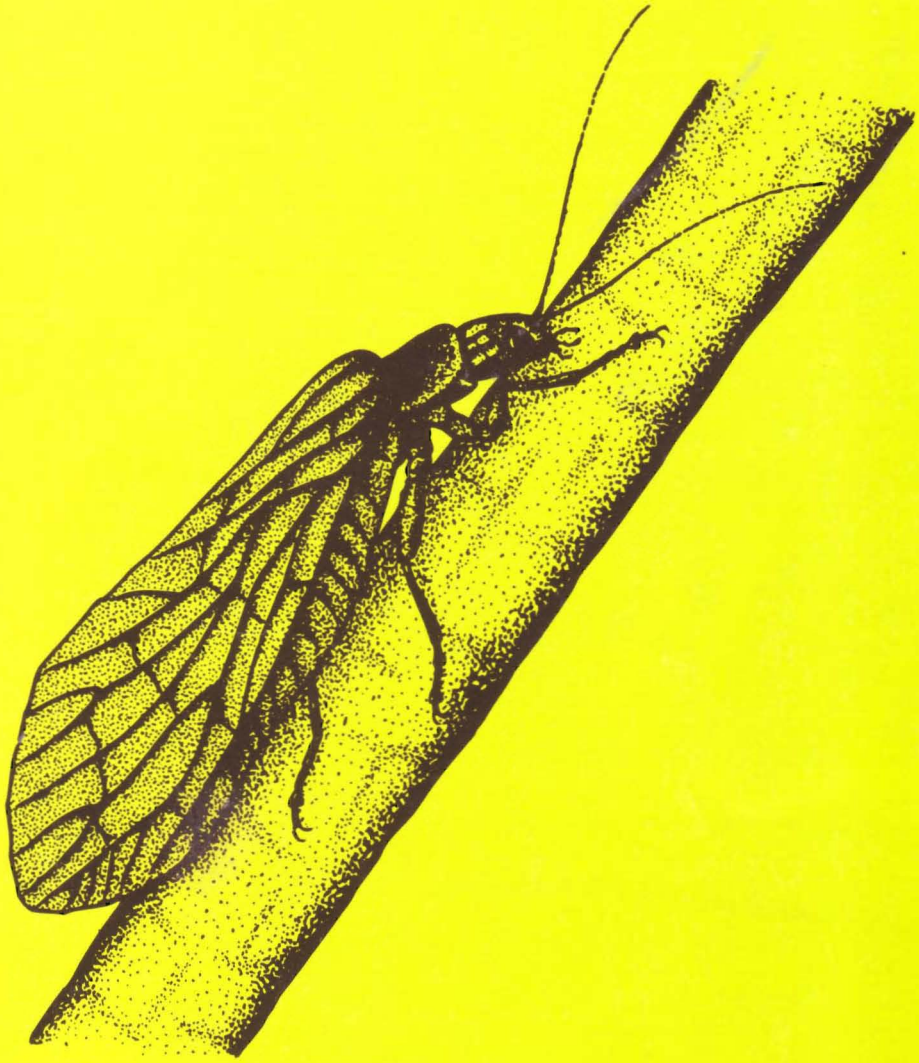

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Population fluctuations of *Epirrita autumnata* Bkh. and *Operophtera brumata* (L.) (Lep., Geometridae) during 25 years and habitat distribution of their larvae during a mass outbreak in a subalpine birch forest in Central Norway

Olav Hogstad

Hogstad, O. 1997. Population fluctuations of *Epirrita autumnata* Bkh. and *Operophtera brumata* (L.) (Lep., Geometridae) during 25 years and habitat distribution of their larvae during a mass outbreak in a subalpine birch forest in Central Norway. - Fauna norv. Ser. B 44: 1-10.

Population fluctuations of *Epirrita autumnata* and *Operophtera brumata* larvae were recorded during 25 summers (1972-96) in a homogeneous oligotrophic heath birch *Betula pubescens tortuosa* forest in Budal (about 62°45'N-10°30'E), Central Norway. The larvae were collected by sweep netting when they were in instars 4 or 5. *E. autumnata* had population peaks in 1975-76, 1986 and 1996. The species had also mass outbreak in the area in 1966. *O. brumata* fluctuated in a similar way. Thus, the mass occurrence of the two species fit well into the 9-10 year cyclus recorded elsewhere in northern Fennoscandia. The population densities varied from 0 to 175 larvae/100 sweeps (*E. autumnata*) and from 0 to 220 larvae/100 sweeps (*O. brumata*). During the period of population increase and crash (1973-78), the proportion of larvae caught in birch decreased, while those caught in the bush and field layers increased. The number of *E. autumnata* larvae/100 sweeps in birch during the peak year 1975 was highest in mid June and then levelled off to nil in mid July, while the numbers caught in dwarf birch, willows and field layer were fairly stable during June and decreased in July. Instars 1-3 occurred in birch until about 20 June, while all *E. autumnata* larvae caught in July were of instar 5. During the two first weeks in July most larvae migrated down to the forest floor to pupate.

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INTRODUCTION

The autumnal moth *Epirrita autumnata* has a circumpolar distribution, but has severe outbreaks, or mass occurrences, only in the subalpine birch region at high altitudes of Fennoscandia (Tenow 1972, Bylund 1995). The winter moth *Operophtera brumata*, that also has severe outbreaks, is found in more peripheral parts of Fennoscandia, and appears also in central and northwestern Europe. Such outbreaks normally imply only transient reduction in growth of birches, and pass without long-term effects on the ecosystem (Eckstein et al. 1991). However, sometimes the larvae especially of *E. autumnata*, may occur in extremely high numbers and cause conspicuous damage to birch trees with a lowering of the forest line as a consequence (Nuorteva 1963, Kallio & Lehtonen 1975). The larvae attacks on the trees of these two geometrid species are relatively synchronized and re-occur with intervals of about 9-10 years (Tenow 1972).

In the present study, the population fluctuations of *E. autumnata* and *O. brumata* were recorded during 25 summers in a heath birch *Betula pubescens* ssp. *tortuosa* forest in Central Norway. In six of these years it was focused on the occurrence of larvae living on birch,

dwarf birch *Betula nana,* willows *Salix* spp. and in the field layer. During these years (1973-78), the observations cover one population peak; from the population increase to its crash. In the larval peak year 1975, the phenology of the *E. autumnata* larvae was studied, i.e. the time when the different instars occurred, when the fullgrown larvae migrated down to the forest floor, and the larvae use of different tree and plant species.

The species

Epirrita autumnata is univoltine, i.e. has one generation per year. The moths fly from late August to mid-October. The female lays, on average, about 170 eggs on short shoots, under bud scales, bark flakes or lichen lobes, mainly on birch branches or twigs (Figure 1). The eggs (about 1mm long and 0.7mm wide) overwinter and hatch at budburst in the following spring. Newly hatched larvae are found at the end of May or, most frequently, in the beginning of June. The larvae lives freely on the birch leaves, and after five instars, the larvae are full-grown (20-27mm long) in the beginning of July.

The larvae has a green head, olive-green body with a whitish ventral side and three light lines along each side of the body. Spiraculae are light brown. The full-grown larvae migrates from the birch tree into the forest floor where it spins a cocoon and pupates. The pupa is redbrown, about 10mm long and 4mm wide. The pupal period lasts about 11/2-2 months, then the moths of the new generation fly and the cycle is completed (Tenow 1972). In the Budal area the main flight period is in September.

The most important host plant is birch, but it is frequently found on dwarf birch, alder *Alnus* sp og wil-

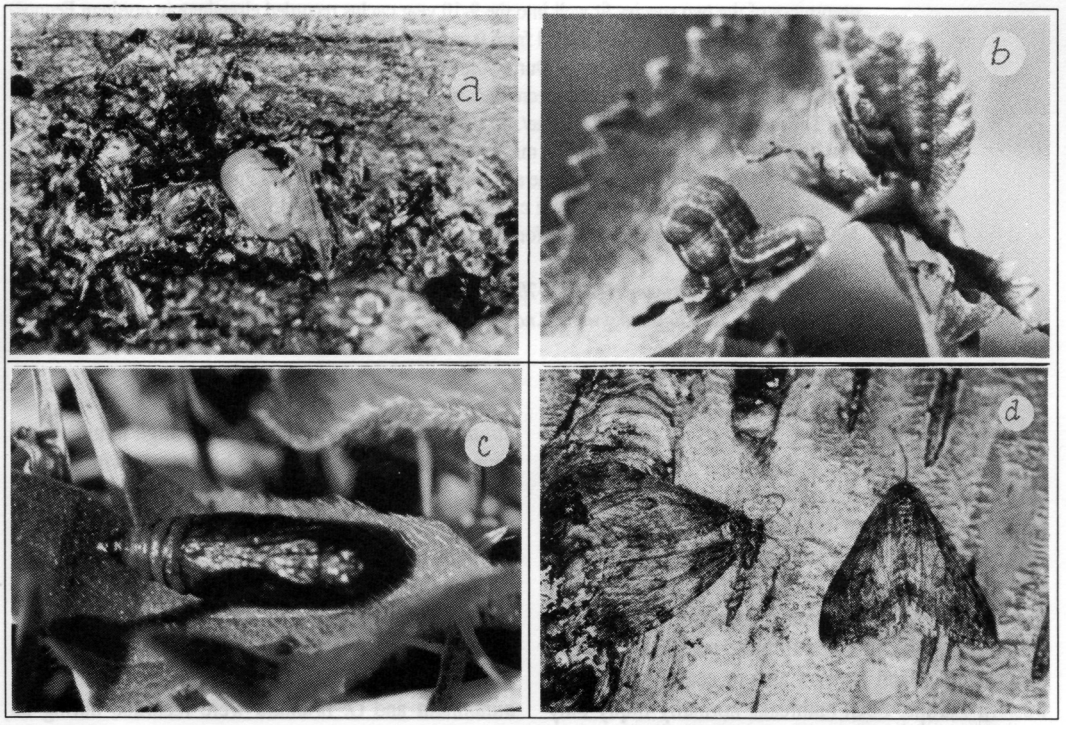


Figure 1
Life cycle of *E. autumnata*. The eggs (a), laid by the female in August-October, hibernate and hatch the following spring. The larvae (b) are full-grown in the beginning of July, then it spins a cocoon and pupates (c). After about 11/2 months, the moth has its flight period in autumn (d).

lows. In peak years larvae are also found on plant species in the field layer (Tenow 1972).

Operophtera brumata has a life cycle similar to that of *E. autumnata*. The larvae have five instars, the last being about 15-22mm long. The last instar larvae appears in two colour variants, one with a light green body and a light green head, and one with a dark green body with a nearly black head. Both have three marked white-yellow lines along each side of the body (Figure 2). The imago females have stunted wings and are unable to fly, the males are winged and fly in the autumn. *O. brumata* is far more polyphagous than *E. autumnata* and about 100 host plants are noted (Tenow 1972). In Budal is the larvae found on the same species as *E. autumnata* and starving larvae also attack several additional plant species in the field layer.

STUDY AREA

The study was made in a homogeneous oligotrophic heath birch forest in Budal (about 62°45'N-10°30'E), Central Norway. The forest area is unmanaged and situated in the transition zone between oceanic and continental climate. The mean monthly temperature and the mean monthly amount of precipitation in the area are shown in Figure 3. The growing season in the region is 140-160 days (i.e. mean temperature higher than 6 °C; Nordiska ministerrådet 1984).

The forest extends from an altitude of about 780 m a.s.l. in the bottom of the valley to the forest line at about 900 m a.s.l. The general tree height is 4-5m (Figure 4). The shrub layer is in general poorly developed, but can be rather dense in some places. On dry ground it is dominated by birch (0.5-2 m) and juniper *Juniperus communis* (0.5-1 m), in damper places by

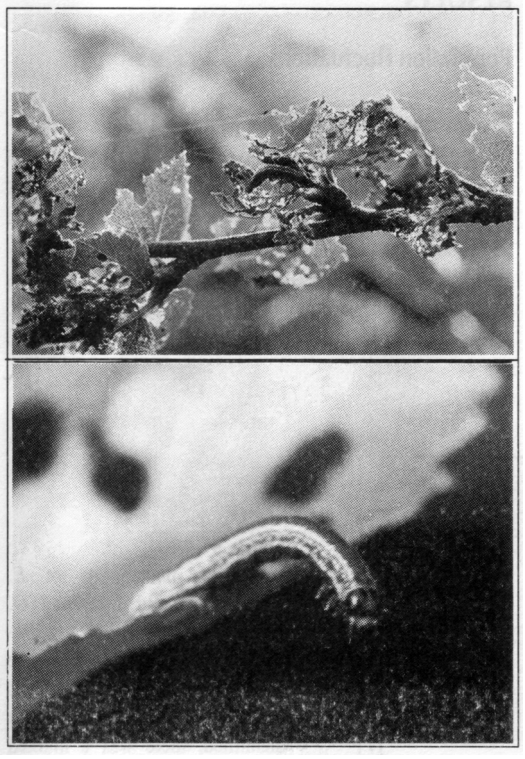


Figure 2
The larvae of *O. brumata* spins one or several birch leaves to a shelter where it stays several hours of the day.

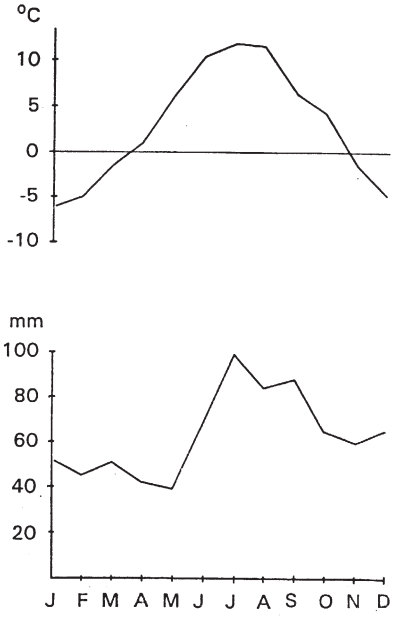


Figure 3
Monthly temperature normals for Budal (above) and precipitation normals for Berkåk (25 km west of Budal) in the period 1961-90 (Det Norske Meteorologiske institutt 1991a,b).

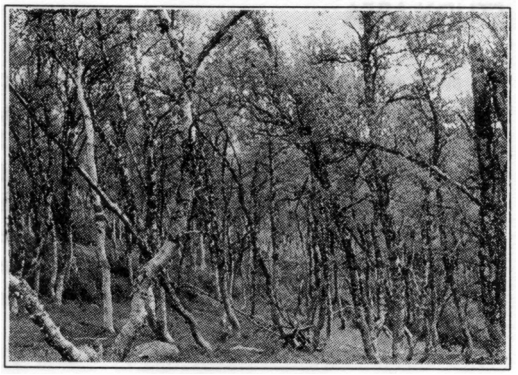


Figure 4
Heath birch forest in the study area.

willows (especially *Salix glauca* and *S. phylicifolia*) and dwarf birch. The field layer is mostly dominated by *Vaccinium myrtillus*, in some places by *Empetrum hermaphroditum*. Other common species are *Vaccinium vitis-idaea*, *V. uliginosum*, *Melampyrum pratense*, *Deschampsia flexuosa*, *D. caespitosa* and *Nardus stricta*.

METHODS AND MATERIAL

The larvae were collected at random in a south-west slope of the valley, for 2-3 km at 800-830 m a.s.l. In the years 1972-96 the larvae were collected from branches from the lowest four metres of birch trees (i.e. nearly the whole tree height) by a sweep-net. Each year, 5-15 collections, each of 100 sweeps, were taken in the first days of July, i.e. when the larvae were in 4-5th instars (Figure 8). The width of the head capsules of both species were clearly divided into five instars: *E. autumnata*: 1=<0.44 mm; 2=0.47-0.59 mm; 3=0.66-0.94 mm; 4=1.0-1.34 mm; 5>1.4 mm. *O. brumata*: 1<0.31 mm; 2=0.31-0.5 mm; 3=0.51-0.75 mm; 4=0.76-1.06 mm; 5>1.06 mm (cf. Hogstad 1996).

In 1973-78 sweep-netting were made, in addition to birch trees, also in dwarf birches, willows, junipers and in the field layer. 3-5 collections were taken every 5th day during June-July, every 10th day during May and August-October.

To find the point of time when the larvae migrated down to the forest floor to pupate, four vessels (each of 0.116 m^2) filled with water were placed under birches. The vessels were inspected every 5 day from June to mid-August 1975.

RESULTS

Population fluctuations

E. autumnata had population peaks in 1966 (no sweep-netting, but see Hogstad 1968), 1975-76 and 1986 plus an extremely high density in 1996, i.e. every 10 year (Figure 5). *O. brumata* had peaks in 1966, 1976-77 and 1986, and also this population increased considerably in 1996. The variation of both population densities was extremely high; from 0 to a mean of 175 larvae/100 sweeps (*E. autumnata*) and from 0 to 220 larvae/100

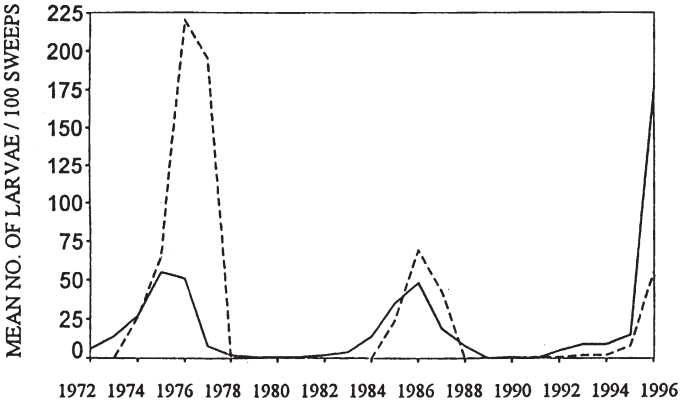


Figure 5
Population fluctuations of *E. autumnata* (solid line) and *O. brumata* (stippled) during 1972-96. Mean number of larvae (instars 4 and 5) per 100 sweeps in birch trees. Although not quantified, there was a marked outbreak of *E. autumnata*, and a lesser of *O. brumata* also in 1966.

sweeps (*O. brumata*). Although the two populations fluctuated synchronously (Spearman rank correlation r_s=0.74, P<0.001, n=25), the density of *O. brumata* was in 1976 about four times higher than that of *E. autumnata*. In 1996, the density of *E. autumnata* was very high, more than three times the density in the peaks in 1975-76 and 1986. While the latter two peak years succeeded 3-4 years of relatively even population increase of *E. autumnata*, the population density did not increase notably the two years prior to the 1996 increase. In the population peaks of the two geometrid species in 1975-76 and 1986, the larvae of *O. brumata* had a relatively high density also the year after the decrease of *E. autumnata*. The population increase as well as the decrease of the peaks of *O. brumata* were more marked than those of *E. autumnata* (cf. Figure 5). In the years when both species were recorded, the phenology of the larval stages of *E. autumnata* were 5-10 days in advance of *O. brumata*.

Distribution in different habitats 1973-78

During the period of population increase and crash, the larvae proportion in birch trees decreased (Figure 6). The reduction in use of birch for *E. autumnata* was marked from 1976, i.e. in the peak year and the following years. *E. autumnata* used the bush and field layers to a greater degree than *O. brumata*, and in 1977 the greatest proportion of *E. autumnata* was found in willows. The proportion of *0. brumata* caught in dwarf birch and willows was small in all years except for 1977 and 1978. The proportion of larvae found in the field layer was relatively high (15-25%) for both species species in the years 1975 to 1977. In the peak year 1976, the *V. myrtillus* was completely defoliated in the end of June, and in some places the ground was covered with larval frass and dead larvae.

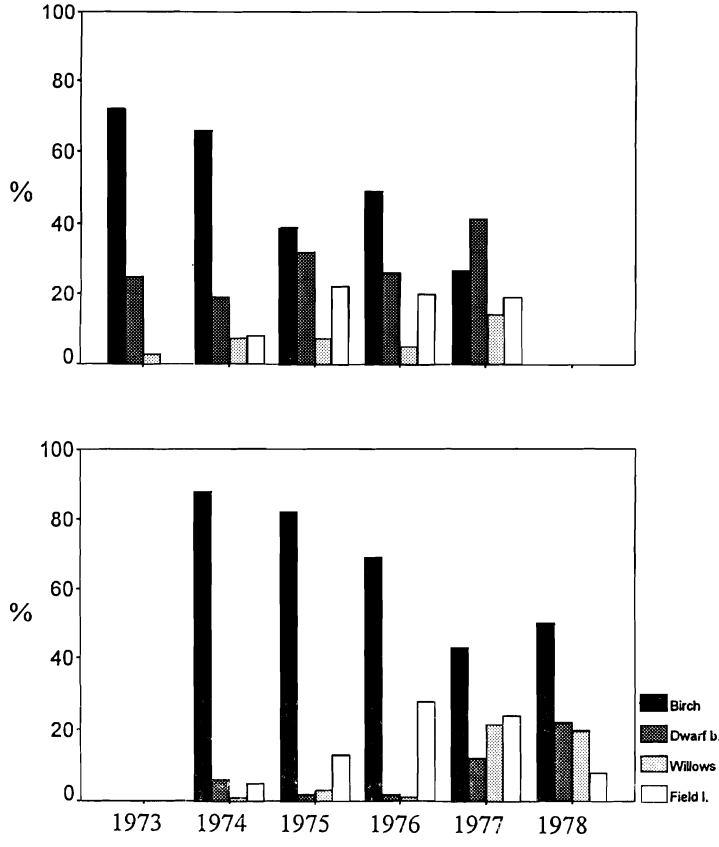


Figure 6
Distribution (%) of *E. autumnata* (above) and *O. brumata* (below) larvae per 100 sweeps in birch trees, dwarf birch, willows and in the field layer in the years 1973-78.

Distribution of *E. autumnata* in different habitats during the peak year 1975

The number of larvae caught in birch trees was highest in mid June and then levelled off to nil in mid July (Figure 7). The numbers caught in dwarf birch, willows and the field layer were fairly stable during June, and then decreased in July.

Phenology of larval stages of *E. autumnata* in the peak year 1975

The distribution of the five larval stages of *E. autumnata* in birch trees showed that instars 1-3 occurred until 20 June, while in July all larvae caught were of instar 5 (Figure 8).

The time when the larvae migrated down to the forest floor to pupate in 1975 agreed with the time for larval stage that year (Figure 9).

DISCUSSION

The mass occurrence of the moth species *E. autumnata* and *O. brumata* in Budal fits well into the 9-10 years cyclus recorded elsewhere in northern Fennoscandia. The populations increase in 3-4 years, have 1-2 peak years before they crash during 2-3 years. In the Ammarnäs area, northern Sweden, severe outbreaks of *E. autumnata* were recorded in 1963-64, 1974-75 and 1985-86 (Svensson 1996), nearly synchronously with the recordings from Budal.

According to Tenow (1972), there has been seven outbreaks of *E. autumnata* and *O. brumata* in South Norway during the period 1900-68. Since the outbreaks of the two species in general are synchronous, only the outbreaks of *E. autumnata* will be mentioned. While the outbreak peak in 1905-09 was rather low, the next in 1915-22 was relatively high. During 1922-28, one of the most severe mass occurrences occurred in South Norway, and in North Finland the birch forest was killed in large areas, resulting in a permanent lowering of the forest limit (Nuorteva 1963). The next outbreak (1933-39) was weaker than normal and no forest damage was recorded. In 1942-50 severe attacks occurred in South Norway, and in Budal 1943-44 some forest areas were partially defoliated (J. Hindbjørg pers. comm.). In 1954-56 the larvae attacks were wide-spread but less severe in South Norway, while the next, that reached a peak in 1966 in Budal, was rather high (cf. Hogstad 1968), although no serious harm was recorded. Neither have the later outbreaks in 1975-76, 1986 and 1996 defoliated birch forest areas in Budal.

Thus, the damage of the different outbreaks varies considerably in intensity. Except for the mass occurrence of *E. autumnata* in 1943-44, the birch forest in Budal has not been harmed to any great extent. However, in Lierne (64°25'N), Nord-Trøndelag, large areas of birch

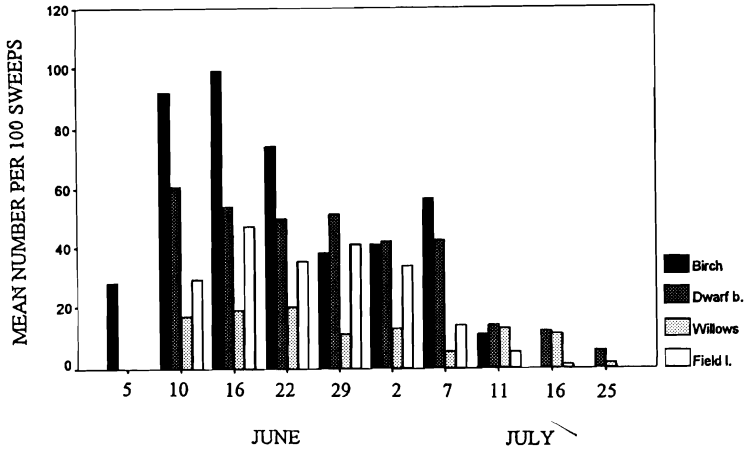
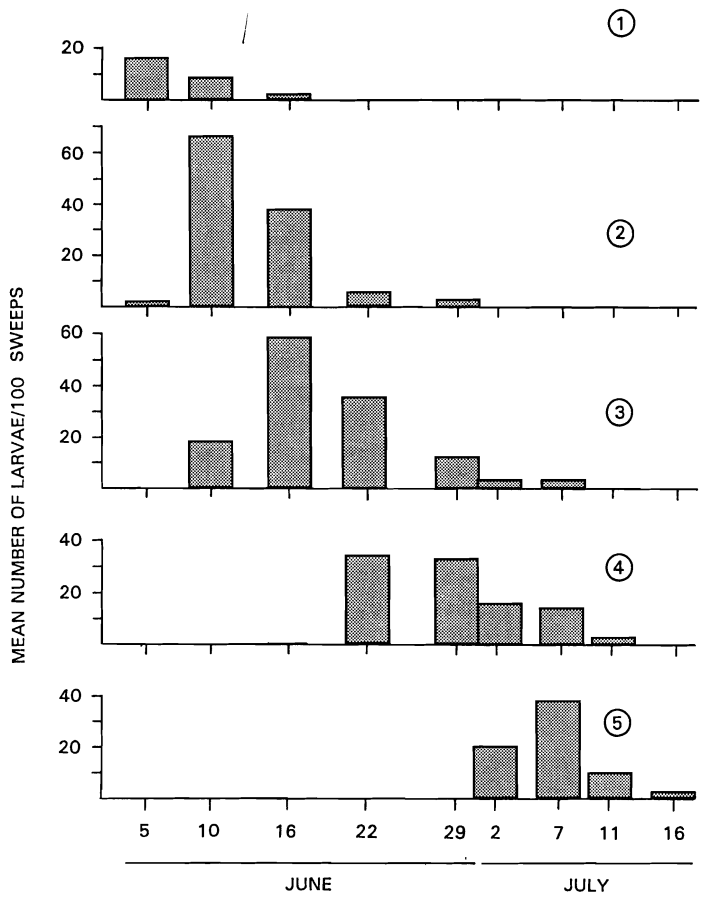


Figure 7
Mean number of *E. autumnata* larvae per 100 sweeps in birch trees, dwarf birches, willows and in the field layer during June-July 1975.

Figure 8
Mean number of *E. autumnata* larvae per 100 sweeps in birch trees during June-July 1975. Encircled numbers denote larvae instar number.



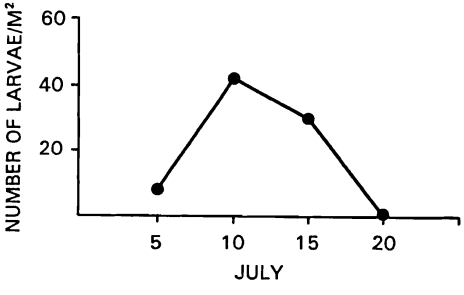


Figure 9
The time for migration of larvae to the forest floor to pupate. Number of *E. autumnata* larvae/m^2 during July 1975 fallen into four vessels placed on the ground under birch trees.

forests were defoliated and in some areas trees died after the attack of *E. autumnata* in 1986 and 1987 (P.G. Thingstad unpubl.).

There is a marked synchrony in outbreak periods of *E. autumnata* and *O. brumata* in Fennoscandia (see Tenow 1972, present study), probably caused by the two species' systematically close relationship (McGuffin 1958), their similar food and being parts of the same ecosystem and climatic conditions. Since the two species use the same food resource, it may be speculated about the exsistence of competition between the species. In areas where the two species occur in sympatry, *E. autumnata* generally appears in greater abundances than *O. brumata* in the higher parts of the valley slope

(cf. Tenow 1975). In the years when both species have mass outbreaks in overlapping height zones, *E. autumnata* obviously decreases most markedly in areas where *O. brumata* occurred the previously year (e.g. Hågvar 1972, Tenow 1972, 1975).

The Budal study was made in the middle belt of the valley slope, and consequently no difference in height levels between the two species was found. The population of *E. autumnata* started to decrease in all vegetation layers in 1976. However, the mass outbreak of *E. autumnata* obviously did not harm the vegetation to an essential degree, since the *O. brumata* larvae had an additional population increase in 1976 as well as in 1977. The same pattern, although in smaller scale, was observed in 1986 and 1987. However, it is often difficult to decide whether altered population patterns of two sympatric species is a result of interspecific competition or different tolerances to changes in the habitat. The significance of interspecific competition in the population dynamics of phytophagous insects has therefore been questioned (e.g. Strong et al. 1984, Hawkins 1988, Faeth 1992).

The cyclicity in density at 9-10 year intervals of the two geometrid species in northern Fennoscandia must be created by a factor or factors that cause feedbacks with time lags of suitable duration. The heath birch responds to herbivory by creating feedbacks with a time lag of 2-4 years, i.e. changes quality in the leaves that contributes to the ten-year cyclisity (cf. Haukioja 1991). Chemical resistance of plant species against herbivorous insects is known to increase after insect attacks on foliage, a resistance that may endure for years (e.g. Haukioja 1980, 1982, Haukioja & Hanhimäki 1985). Being the most important defoliator of the mountain birch, *E. autumnata* induces long-term induction that is highest at the peak of *E. autumnata* population. Birch leaves of trees previously attacked by *E. autumnata* larvae were of lower quality as food for the larvae than intact leaves (Haukioja & Hanhimäki 1985, Hanhimäki & Senn 1992). Thus, populations of *E. autumnata* within outbreak ranges have smaller larvae (Hogstad 1996), pupates in smaller size, have a reduced viability and have lower potential rate of increase than populations outside outbreak ranges. Induced long-term resistance may therefore represent one of the most important factors in the population dynamics of *E. autumnata*. As this resistance lasts for at least four years (Haukioja 1980), it provides an explanation why an outbreak does not follow in several consecutive years.

However, also parasitism may be an important factor in explaining population fluctuations in *E. autumnata* (Bylund 1995). During six years within the outbreak range of *E. autumnata* in northern Fennoscandia, six phenologically early species of parasitoids (all hymenopterans) were found, while only three species were found outside the outbreak range (Ruohomäki 1994). Furthermore, the impact of larval parasitoids seems to increase with a time lag, an effect that is consistent with the cyclic population fluctuations of *E. autumnata* (cf. Ruohomäki 1994). As the parasitism of *E. autumnata* tend to be highest just after peak densities of the larvae, parasitism and chemical resistance may be difficult to separate (e.g. Haukioja & Hanhimäki 1985).

Although the temperature probably has none or a minor effect on the cyclisity of the outbreaks, the local climate in winter (cf. Tenow 1975, Niemelä 1979, Tenow & Nilssen 1990) as well as in summer (cf. Tenow 1975, Niemelä 1980, Hanhimäki & Senn 1992) may have a modifying effect on the outbreaks. Like *E. autumnata*, *O. brumata* overwinters in the egg stage on the trees. Since the eggs of *O. brumata* freeze at a higher temperature than those of *E. autumnata* (MacPhee 1967, Nilssen & Tenow 1990), the relatively low density recorded of the latter species in Budal 1996 may have been caused by several extremely cold periods in the area the winter 1995-96. The variation in the reproductive capacity of *E. autumnata* seem to explain the cyclisity of the outbreaks (cf. Ruohomäki & Haukijoa 1992).

So far, the most likely explanation for the cyclisity of *E. autumnata* and *O. brumata* is the induced response hypothesis, i.e. changes in the quality of leaves as food caused by the feeding by the larvae (cf. Haukioja 1991).

In 1997 the population density of *E. autumnata* decreased to a mean of 16 larvae/100 sweeps, while *O. brumata* (mostly the dark green variant) increased to 340 larvae/100 sweeps. The mass occurrence of the latter resulted in several partially defoliated areas below 830 m a.s.l.

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SAMMENDRAG

Populasjonsfluktuasjoner hos fjellbjørkemåler *Epirrita autumnata* og liten frostmåler *Operophtera brumata* gjennom 25 år og deres habitatfordeling ved masseforekomst i fjellbjørkeskog i Budal, Sør-Trøndelag

I årene 1972-96 ble det foretatt fangst av fjellbjørkemåler (Figure 1) og liten frostmåler (Figure 2) i heibjørkeskog i Budal, Sør-Trøndelag. Undersøkelsesområdet ligger i overgangssonen mellom oseanisk og kontinentalt klima (Figure 3). Skogen består av fjellbjørk *Betula pubescens* ssp. *tortuosa* med trehøyde 4-5 m (Figure 4). Insektfangstene ble foretatt med slaghåv, 5-15 serier a 100 håvslag i bjørk i de første dagene i juli, dvs da larvene var i 4. eller 5. larvestadium. Fangstene varierte fra 0 til 175 larver/100 håvslag for fjellbjørkemåler og fra 0 til 220 larver/100 håvslag for liten frostmåler (Figure 5). Begge målerartene hadde masseforekomst i 1975-76, 1986 og 1996. Også i 1966 var det masseforekomst av artene i området (ikke kvantifisert). Disse regelmessige masseforekomstene passer godt inn i den 9-10 årige syklusen som er funnet i Nord-Fennoscandia.

I 1973-78 ble det foretatt håvslag i bjørk, dvergbjørk, vier og i feltsjiktet hver 5. dag i juni-juli og hver 10. dag i mai og august-oktober. I løpet av disse årene, som representerer oppbygging og populasjonskrasj hos målerartene, avtok andelen av larver i bjørk (Figure 6). Reduksjonen av fjellbjørkemåler-larver i bjørk var særlig markert fra 1976, dvs da populasjonen avtok i antall. Fjellbjørkemålerne brukte busk- og feltsjiktet i større grad enn frostmålerne, og i 1977 ble de fleste fjellbjørkemålerne fanget i vier. Andelen av frostmålere i dvergbjørk og vier var liten i alle årene unntatt i 1977 og 1978. Andelen av larver i feltsjiktet var relativt høy (15-25%) hos begge artene i årene 1975-77. I toppåret 1976 var blåbærlyngen temmelig avspist av larvene.

I 1975, da tettheten av fjellbjørkemåler var høyest, var andelen fjellbjørkemålere i bjørk størst i midten av juni. Deretter avtok bestanden til null midt i juli. Fangsten i dvergbjørk vier og i feltsjiktet var imidlertid relativt stabil i juni før de avtok i juli (Figure 7). Fjellbjørkemålerne var i larvestadiene 1-3 inntil 20. juni, i juli var alle i stadium 5 (Figure 8). I løpet av de to første ukene i juli hadde nær alle larvene sluppet seg ned på bakken for å forpuppe seg (Figure 9).

Populasjonsfluktuasjonen hos de to målerartene er synkrone, og muligheten for konkurranse mellom dem er diskutert. Årsaken til den sykliske fluktuasjonen hos målerartene er også diskutert, med forandring i bjørkebladenes kvalitet, forårsaket av de bladspisende larvene, som den mest trolige forklaring.

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Habitat distribution of riparian species of Bembidiini (Col., Carabidae) in South and Central Norway

Johan Andersen

Andersen, J. 1997. Habitat distribution of riparian species of Bembidiini (Col. Carabidae) in South and Central Norway. - Fauna norv. Ser. B 44: 11-25.

The macro- and microhabitat distribution of riparian Bembidiini species in South and Central Norway was studied by means of quadrat sampling and time catch. Many species are habitat specialists and show a stable choice through their distribution ranges, although some exeptions exist (*Bembidion bipunctatum, B. femoratum*). Although the lithophilous species (confined to gravelly/stony ground) may seem to form a uniform group, they are well segregated by differences in moisture, substratum, exposure and macrohabitat requirements. All species pairs showed low microhabitat overlap. The only exception was *Asaphidion pallipes-Bembidion quadrimaculatum*, but these species are well separated in other resource dimensions. The proximate and ultimate causes for the micro-macrohabitat distribution of the species are discussed. A connection between habitat choice and geographical distribution is also discussed.

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INTRODUCTION

A large number of species of *Bembidion* occur in riverine habitats in the holarctic region (Netolitzky 1942, 1943, Lindroth 1963, Freude 1976). According to Lindroth (1949, 1963) and Thiele (1977) *Bembidion* is an example of a genus in which spatial intrageneric isolation is often absent, indicating that interspecific competition is of little importance in determining the spatial distribution of the species. This conclusion, however, was based on rather incomplete knowledge of the micro- and macrohabitat selection of the species (cfr. Andersen 1983a). Andersen (1970) studied the habitat distribution of the riparian Bembidiini species at some localities in Central and Northern Norway, but the environment was not sufficiently divided into macro- and microhabitats. More recently, the macro- and microhabiatat distribution and the spatial overlap of the species in Northern Norway were examined in detail by Andersen (1983a, 1988). The present paper is a corresponding study of the macro- and microhabitat distribution and the spatial overlap of the species of the tribe at many localities in South and Central Norway.

STUDY AREA, MATERIAL AND METHODS

The study comprises more than 100 localities in South and Central Norway. In addition to the localities given in Andersen & Hansen (1993) the following localities were investigated: 150. Oppdal (8 km N of Kongsvoll, at the river Driva; 151. Melhus and Midtre Gauldalen, between Flå and Folstad. 7 localities at the river gaula; 152. Hurdal. Between Skomteflaten and Skrukkeli, at the river Skandøla. The material has been collected in May-September in 1970-1995 and comprises >5 800 individuals.

The methods used are the same as those described in Andersen (1983a). Most of the investigations are based on timed handcollecting (time-catch).

According to Greenstone (1979) there is a significant correlation between catch per unit effort (time catch) and absolute population indices. The author emphasizes, however, that it would be prudent to restrict the use of this method to situations in which most are held constant. This requirement is often not fulfilled on river

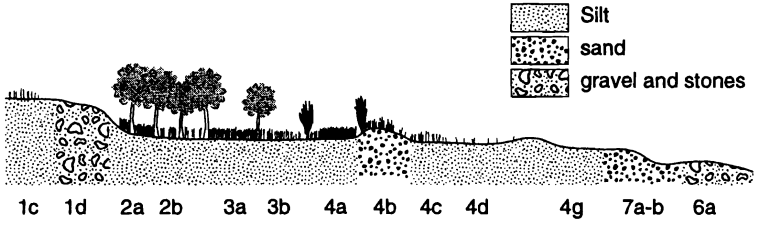

Figure 1
Transverse section of a river bank with its habitats. Habitat 5 and 6b, which are weakly saline, are not drawn. For further description see Table 1.

banks. However, with the time-catch method it has been observed that the size of the area investigated per unit time changes with the microhabitat in a certain way; for example, it increases progressively from places with dense vegetation to places without vegetation (Andersen 1983 a). If the yield per unit time in dense vegetation is as high as or higher than in sparse vegetation, it is likely that the species is most abundant in the dense vegetation. It is therefore often possible to compare the relative abundance of a species in different microhabitats by the time-catch method. The relationships between the microhabitats are as follows (Andersen 1983a, p. 133): area of 4d, 4g, 7> area of 6> area of 3a; area of 3a< area of 4b, 4c< area of 4d, 4g, 7; area of 2b, 3b< area of 4d, 4g, 7. With the same degree of coverage (density and size of stones and gravel, density of litter or vegetation) investigated areas per unit time are approximately equal (see also Greenstone 1979), e.g. area of 3a = area of 2a, 4a; area of 6a I= area of 6a II-III. Only those microhabitats that are present in the same macrohabitats and localities, and sampled on the same or two consecutive days during similar weather conditions can be compared for a species (Greenstone 1979).

At the river Gaula (locality 39 in Andersen & Hanssen (1991)) quantitative sampling was made in August 1973 and 1994. The sampling area was 0.125 m^2, except in microhabitat 4d where it was 0.72 (0.8 x 0.9) m^2. Microhabitat overlap between species was calculated by means of Pianka's formula (1975). For further information about sampling procedures, weather conditions and statistics see Andersen (1983a, 1988) and Andersen & Hanssen (1993).

DESCRIPTION OF MACROHABITATS AND MICROHABITATS

The macrohabitat categories were as follows: a) banks of large rivers; b) banks of smaller rivers; c) banks of very small rivers and brooks; d) lake shores; e) sea shores. Large rivers have a total length of >65 km and a precipitation area of more than 1000 km^2. Gudbrandsdalslågen (localities 132-134), Glomma (localities 143-149), Gaula (localities 39-40, 151), Orkla (locality 27) and Verdalselva (localities 15-17) constitute this group. They have broad banks which are developed in the same manner as described by Andersen (1970). The smaller rivers have a length between 10-60 km and usually with a drainage area <1 000 km^2 whereas category c) have a total length of <10 km. The largest tributaries of the large rivers are included in category b). The rivers of category a) and b) are rather slow-flowing and usually with well developed sandy and/or silty flats. Contrary to this the smallest rivers and brooks flow rapidly. Silty and sandy flats are absent or poorly developed. The brooks are the smallest lotic waters with gravel/stone banks.

The lake shores are composed of gravel/stones or sand. Sea-shores (estuaries) have only been investigated in a few places. The substratum was made up of gravel/stones or silt. A certain microhabiatat frequently occurs in more than one macrohabitat.

The microhabitats are shown and described in Figure 1 and in Table 1. The microhabitat 6a was subdivided according to elevation above the water and as to moisture content of the substratum underlying the gravel/-stones (Andersen 1983 a) in the following way:

I: Zones closest to the water. Substratum saturated with water.

Table 1. Characteristics of the microhabitats. Further subdivisions of microhabitat 6a are mentioned in the text. For more details of the habitats, see Andersen (1970a).

Mico habitat No.	Place of occurrence	Elevation above water	Exposure	Vegetation coverage	Substratum type at surface	below surface	Water % (dry weight)	Notes
1c	River banks	Elevated	Open	2-5	Silt	Silt	5-15	Partly without connection with water body
1d	River banks	Elevated	Open	0-1	Gravel stones	Fine sand or silt	5	« « «
2a	Medium - large rivers	Medium elevation	Shady under bushes	4-5	Silt	Silt	15-30	
2b	«	«	«	1-2	«	«	«	Dense leaf litter
3a	«	«	Partly shaded by bushes	4-5	«	«	«	
3b	«	«	«	1-3	«	«	15-25	± dense leaf litter
4a	«	«	Open	4-5	«	«	15-30	
4b	«	Elevated	«	2-4	Fine sand or silt	Fine sand or silt	10	Vegetation xerop- hilous (e.g Achillea millefolium, a rotundifolia, Ltus corniculatus)
4c	«	Low-lying	Often some-what shaded	3	Silt	Silt	330	Vegetation hygrophilous (e.g. Agrostis stolonifera Equisetum fluviatile)
4d	«	Medium elevation	Open	1	«	«	10-25	
4g	«	«	«	0	«	«	«	
5	Estuaries	Close to water	«	3-5	«	«	330	Partly submerged by tide. Vegetation hal ophilous (e.g. Juncus gerardi, Cochlearia officinalis, Puccinella sp.).
6a	All types of fresh waters	Varying	«	0-(1)	Stones, gravel	Varying	Varying	Near water
6b**	Estuaries, seashores	±Elevated	«	0	«	«	«	Partly submerged only by spring tide.
7a	Medium-large rivers	±Elevated	«	0	Medium-fine sand	Medium-fine sand	<1	Sand loose and dry on surface.
7b-c	«	±Low-lying	«	0	«	«	>1	Sand ± moist.

* May form a thin layer above coarser material
** Erroneously given as 6a in Andersen (1970a, p. 29, line 12 from above.
*** Hult-Sernander's scale

II: Zones higher up. Moisture content 1.6-3.0% (heterogeneous substratum); 15.0-25.0% (silty substratum).
III: Rather elevated zones. Moisture content: 0.7-1.0% (heterogeneous); 2.0-5.0% (silt).

Microhabitat 6a was further subdivided according to the type of substratum underlying the surface layer and according to exposure (shady, open).

RESULTS

Micro- and macrohabitat distribution of the species

The micro- and macrohabitat occurrence of the species are as follows:

Asaphidion pallipes (Duftschmid) occurs regularly on ruderal places and in sand and clay pits far from water in Gudbrandsdalen and in Sør-Trøndelag county (see also Andersen 1970). In quadrat samples the species was found in microhabitats 2a, 3a and 4b at the river Gaula (Table 2). The difference in abundance between these microhabitats was not statistically significant. However, timecatch results from Gaula (loc. 39, 151) as well as earlier investigations indicate that 4b, i.e. elevated, rather dry, silty sites with some vegetation, is the preferred microhabitat (Figure 3, Andersen 1970, 1983a).

Bembidion argenteolum Ahrens. Except for the occurrence at the lake Selbusjøen (loc. 46) this species is confined to the banks of large rivers in Norway. Figure 2 confirms the psammophilous nature of the species. *B. argenteolum* shows a preference to medium-sized or rather fine sand (Andersen 1970, 1978). In the breeding phase *B. argenteolum* seems to occur about equally abundantly on dry and weakly moistened sand during sunny weather (Andersen 1970) whereas it seems to prefer dry sites during cloudy weather (Figure 2). Figure 2. indicates that the new generation of the species prefers dry sand even during sunny weather prior to hibernation (locality 133, August). This was also confirmed by the following observations (made without time notion): During sunny weather in August and early September more than 150 specimens were collected, almost without exception, on dry, loose sand rather far from water. Such specimens were usually found conce-

Table 2. Abundance (number per 0.125 m^2) of *Bembidiini* species in different microhabitats by the river Gaula (localities 39, 40, 150) in August 1973. The sampling area was 0.125 m^2, except in 4 d where it was 0.72 m^2. The numerals in italics are significantly ($p < 0.05$, Mann-Whitney U-test) higher than those in the microhabitats marked with asterics. Numerals for 4d could not be tested against those from the other microhabitats.

	Microhabitats								
	1d	2a,3a	3b	4a	4b	4c	4d	6a silt	
Species								I	III
Bembidion femoratum	1.30	0*	0*	0*	0.05*	0*	0.04	0*	0.56
B. quadrimaculatum	0.43	0*	0*	0*	1.10	0*	0	0*	0*
B. schuppelii	0*	1.22	0.06*	0*	0*	0*	0	0*	0*
B. lunatum	0*	0.06*	0.94	1.72	0.01*	0.08	0	0*	0*
Asaphidion pallipes	0*	0.17	0	0	0.33	0	0	0	0
Bembidion semipunctatum	0*	0*	0.22	0*	0*	1.24	0	0*	0*
B. dentellum	0	0	0	0	0	0.20	0	0	0
B. bruxellense	0	0	0	0	0	0.12	0	0	0
B. litorale	0	0	0	0	0	0	0.29	0	0
B. prasinum	0*	0*	0*	0*	0*	0*	0	0.96	0*
B. petrosum	0	0	0	0	0	0	0.04	0	0.36
Number of samples	23	18	18	18	21	23	9	25	23

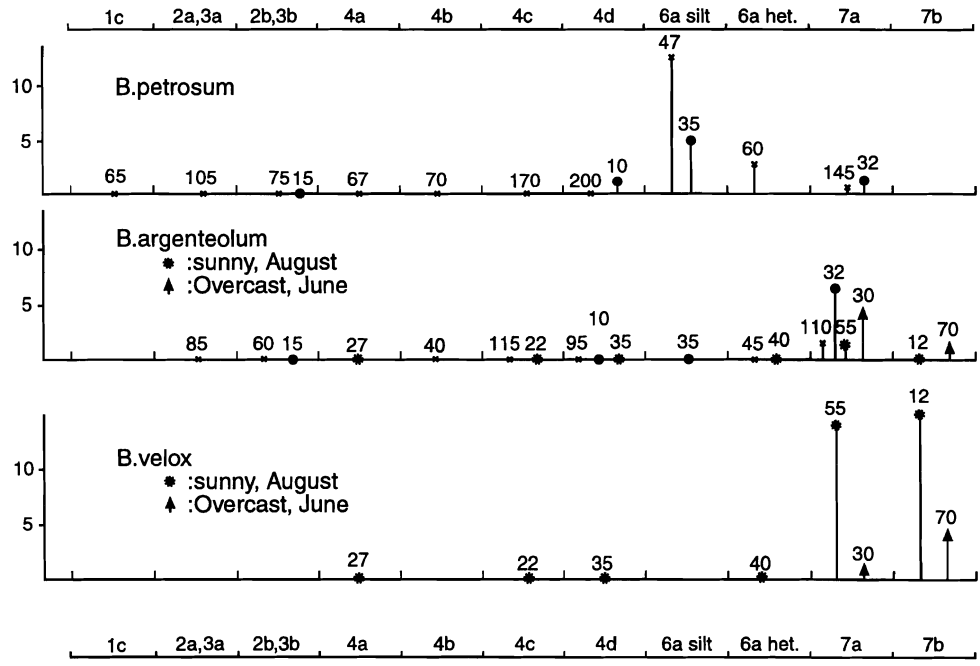

Figure 2
Microhabitat distribution of three *Bembidion* species according to time catches (catches per 10 min; Y-axis). Note that the area investigated per unit time changes with the microhabitat. Only values represented by similar symbols are comparable. Numerals above the symbols give the time spent at the microhabiatat. For description of microhabitats see Table 1 and Figure 1.

aled (under small pieces of bark or wood etc.) whereas breeding specimens largely were found running about or flying in the sun or dug down during cloudy weather (Andersen 1970, 1978).

B. velox (L.) occurs frequently both on river banks and on lake shores. In its ecological requirements the species resembles *B. argenteolum* with which it frequently occurs, but it has significantly higher requirements to moisture (Figure 2, data from overcast weather: X^2 = 27.1, $p<0.001$).

B. lapponicum Zetterstedt has only been found at the banks of large rivers. All the specimens collected by the present investigation were found on dry or moist, sandy or silty sites without vegetation which is in full accordance with earlier results (Andersen 1970, 1983a). Consequently, the species seems to be less selective with regard to substratum than the closely related *B. velox*.

B. litorale (Olivier) is confined to the banks of medium-sized and large rivers in Norway. In Denmark and Sweden it has recently been found in secondary habitats (clay or sand pits) (Lindroth 1985, Roger Pettersson, pers comm.). At the banks of the river Gaula (loc. 39), Orkla (loc. 27) and Verdalselva (loc. 16) the species was found exclusively in silty sites, but at the river Leira (loc. 113) it occurred on clayish ground. The present investigation (Table 2 and Figure 3) as well as earlier investigations (Andersen 1970) show that sparsely vegetated or barren sites with a varying degree of moisture are preferred. *B. litorale* is rather flexible with regard to substratum choice (present investigation, Andersen 1970, 1978), but the species is obviously very sensitive to vegetational successions (Andersen & Hanssen 1993).

B. lampros (Herbst) has usually not been found on the river bank proper. By time-catch it was found abundantly in eulittoral, usually culture-favoured sites (microhabitat 1c) not very far from rivers (Figure 3).

B. bipunctatum (L.). Contrary to in Northern Norway this species seems to be limited to the vicinity of water bodies in South and Central Norway. However, it has been found at all types of waters, fresh as well as saline. The species occurs regularly in several microhabitats (Figure 4), but it often has a restricted microhabitat distribution within limited areas. At most of the large rivers in Sør-Trøndelag and Nord-Trøndelag counties it occurs only in saline habitats at estuaries (microhabitat 5 and 6b). At the river Rauma (loc. 54-58), however, *B. bipunctatum* also occurred in microhabitats 2a and 4c on the real river bank.

B. dentellum (Thunberg) was found at the large rivers as well as on lake shores, often at the fringes of rather eutrophic waters. It was found exclusively in microhabitats 2b, 3b and 4c (Table 2 and Figure 3) on river banks, which is in complete agreement with earlier results (Andersen 1970). Thus, the species prefers very wet, silty or clayish soil with a somewhat developed vegetation or with a sparse one, but in the latter case in a shady position (vide also Lindroth 1985).

B. semipunctatum (Donovan) occurs exclusively on river banks in Fennoscandia. Specimens found outside such habiatats are obviously accidental visitors without ability to establish permanent populations (Lindroth 1985). At the river Leira (loc. 113) the species occurred on clayish ground, whereas it otherwise only was present in silty spots. Time-catch gave higher yields in microhabitat 3b and 4c than in 4d (Figure 3), indicating that the first two are the preferred ones (see Material and methods). Quadrat samples indicate that the species is more abundant in 4c than in 3b, but the difference was not statistically significant (Table 2). These results are in accordance with earlier ones (Andersen 1970) and it is concluded that the preferred microhabitats of the species are moist, silty (sometimes clayish) sites with moderately developed vegetation cover in open position or slightly shaded sites with sparse plant cover.

B. obliquum Sturm has no close association with river banks although it may be abundant at such places, e.g. at Verdalselva (loc. 15) and Orkla (loc. 27). It is often abundant at the borders of very wet, densely vegetated lake shores. All the time catch material is from Verdalselva. At this river the method gave higher yields in microhabitat 4d than in 4c (Figure 3), but the method does not allow for the conclusion that it is more abundant in sparsely vegetated sites than in more densely vegetated ones (see Material and methods). According to Lindroth (1945) *B. obliquum* occurs in very wet, bare spots surrounded by dense vegetation.

B. schuppelii Dejean has been found exclusively on river banks in South and Central Norway. The present results (Table 2 and Figure 3) as well as earlier ones (Andersen 1970, 1983 a) show that *B. schuppelii* prefers moist silty sites with rather dense vegetation, often in shady position (microhabiatats 2a, 3a and 4a).

B. quadrimaculatum (L.) is not confined to river banks. It is common on arable land, at roadsides, in sand pits etc. and in microhabitat 1c closer to the rivers. On the river bank proper mostly found in microhabitat 4b and 4d, i.e. on sparsely vegetated, or barren, medium to little moistened, silty sites (Table 2 and Figure 3, Andersen 1970).

B. difficile (Motschulsky) has been found on the banks of small as well as large rivers in South and Central Norway. In Sør-Trøndelag and Nord-Trøndelag counties, however, it is absent or accidental at the borders of the large rivers. The species was found in shady positions, either on moist silty ground with a litter (withered foliage) layer and some vegetation (microhabitat 2b) or on gravelly-stony ground with an underlying layer of moist silt (Figure 4). The microhabitat requirements of *B. difficile* are the same in Northern Norway (Andersen 1983a).

B. fellmanni Mannerheim. Most records of this species in South and Central Norway are from the subalpine or alpine regions (Andersen 1960, Fjellberg 1972, Fridén 1984) but by the present investigation it was found abundantly in the lowland at the river Rauma (loc. 56). It occurred under large stones with a moist silty substratum in shady position. In other localities investigated during the present study, only single specimens were found.

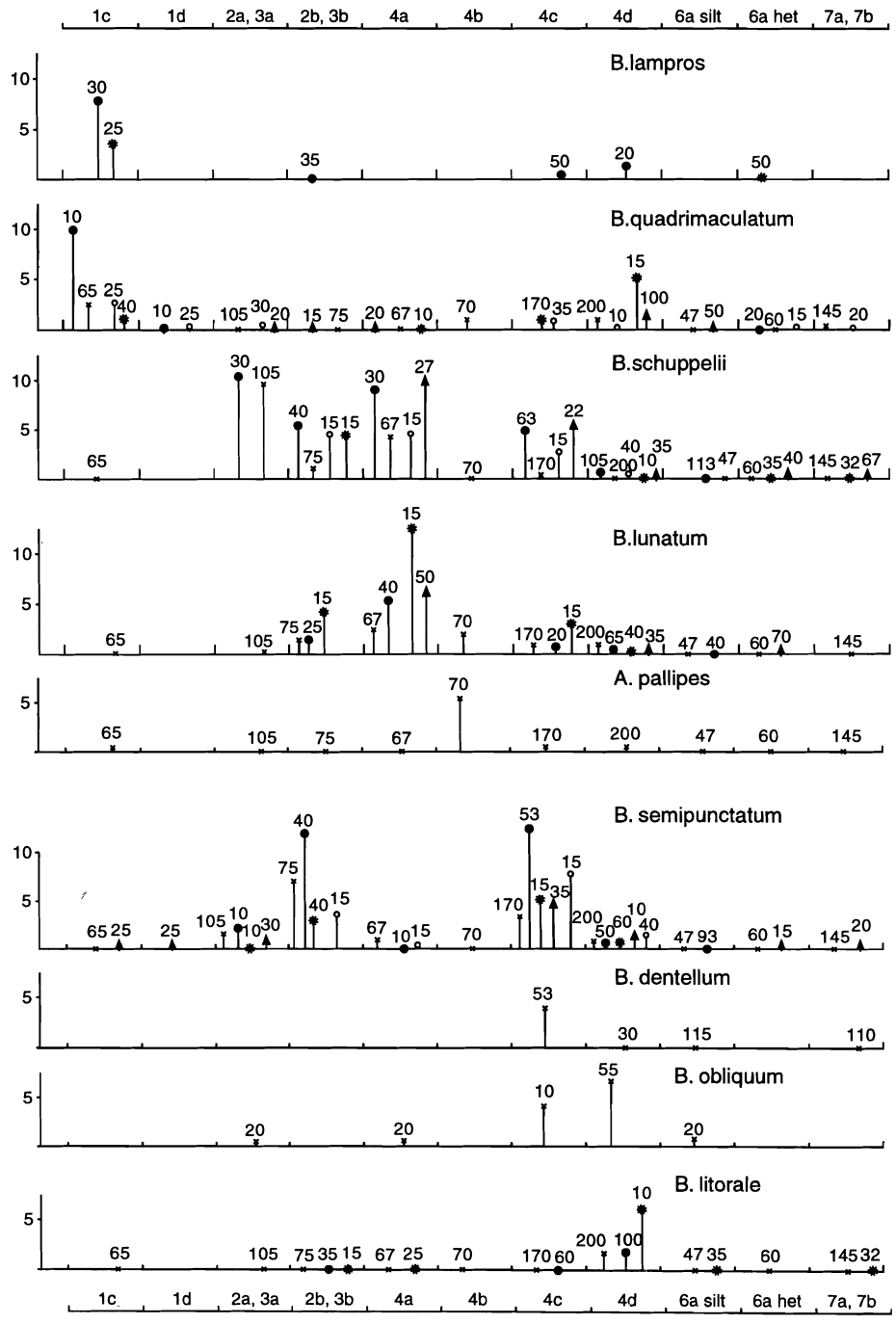

Figure 3
Microhabitat distribution of Bembidiini species according to time catches. For further explanation, see Figure 2.

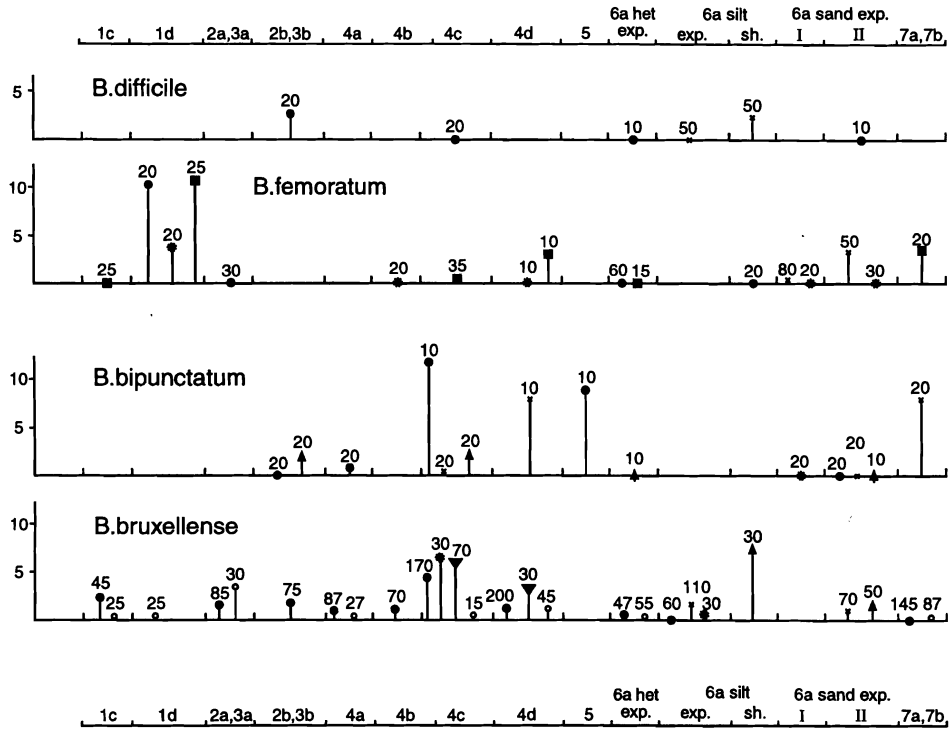

Figure 4
Microhabiatat distribution of four *Bembidion* species according to time catches. het: heterogeneous substratum underneath gravel/stones; exp: exposed; sh: shady. For further explanation, see Figure 2.

Table 3. Abundance (number per 0.125 m^2) of *Bembidion* species in some microhabitats by the river Gaula (localities 39, 40, 150) in August 1994. For further explanation see Table 2.

	Microhabitats		
	6a het		6b
Species	I	II	III
Bembidion prasinum	1.80	0.10	<0.1*
B. saxatile	0.10	0	0.14
B. petrosum	0.40	0.80	0.14
B. virens	0	0*	0.82
Number of samples	10	10	22

B. virens Gyllenhal occurs regularly at the fringes of all types of freshwater (Figure 5). It also occurs frequently at the sea (Table 3, Andersen 1983a). The species is lithophilous, i.e. confined to gravelly/stony sites. Compared with *B. prasinum* (Duftschmid) and *B. saxatile* Gyllenhal, *B. virens* is less abundant at places with an underlying layer of silt and especially clay (Figure 6, Tables 4 and 5). The catch per unit effort was higher in 6a II than in 6a I (Figure 6). Since the catch per unit effort is about the same in these two zones it may be concluded that the species often is most abundant in zones at some distance from the water. The microhabitat requirements are the same in Northern Norway (Andersen 1983a).

B. prasinum (Duftschmid) prefers banks of rivers (Figure 5). It is clearly lithophilous, but the underlying type of substratum is less important (Figure 6, Table

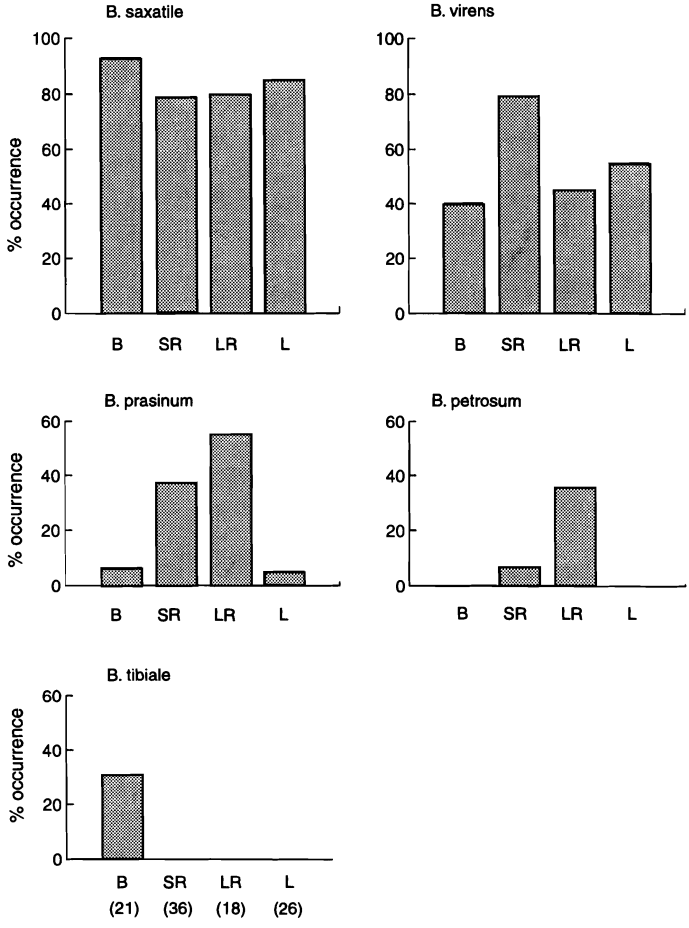

Figure 5
The occurrence of lithophilous *Bembidion* species in various macrohabitats. The numerals in brackets are the total number of localities where the macrohabitat is represented. B: edges of brooks and very small rivers; SR: banks of smaller rivers; LR: banks of large rivers; L: lake shores.

5). *B. prasinum* has a clear preference to the zones closest to water (Table 2 and 3, Figure 6). The species has similar microhabitat requirements in Northern Norway (Andersen 1983a).

B. hastii Sahlberg is only present in or near mountains in South and Central Norway, but the species is probably able to establish populations in the coniferous zone at a few places. The species is lithophilous (Andersen 1970, 1983 a) and in full accordance with this the few specimens collected in South Norway were found on gravelly/stony ground.

B. tibiale (Duftschmid). This species which has a very limited distribution in Northern Europe (Andersen & Hanssen 1993), occurs exclusively at the fringes of fast-flowing brooks (Figure 5). The catch per unit effort was higher in shady sites than in open ones (Figure 6). Since the catches per unit effort is about the same in open and shady position, it may be concluded that the species is most abundant in the latter microhabitat. The species is most abundant in the zone closest to the river (Figure 6, vide discussion of microhabitat preference of *B. virens* above). In Central Europe the ecological requirements of the species is almost identical (Freude et al. 1976, Koch 1989, Andersen unpublished data).

B. nitidulum (Marsham) has been found at clayish slopes above brooks and small rivers, but also away from open water on various types of culture-influenced

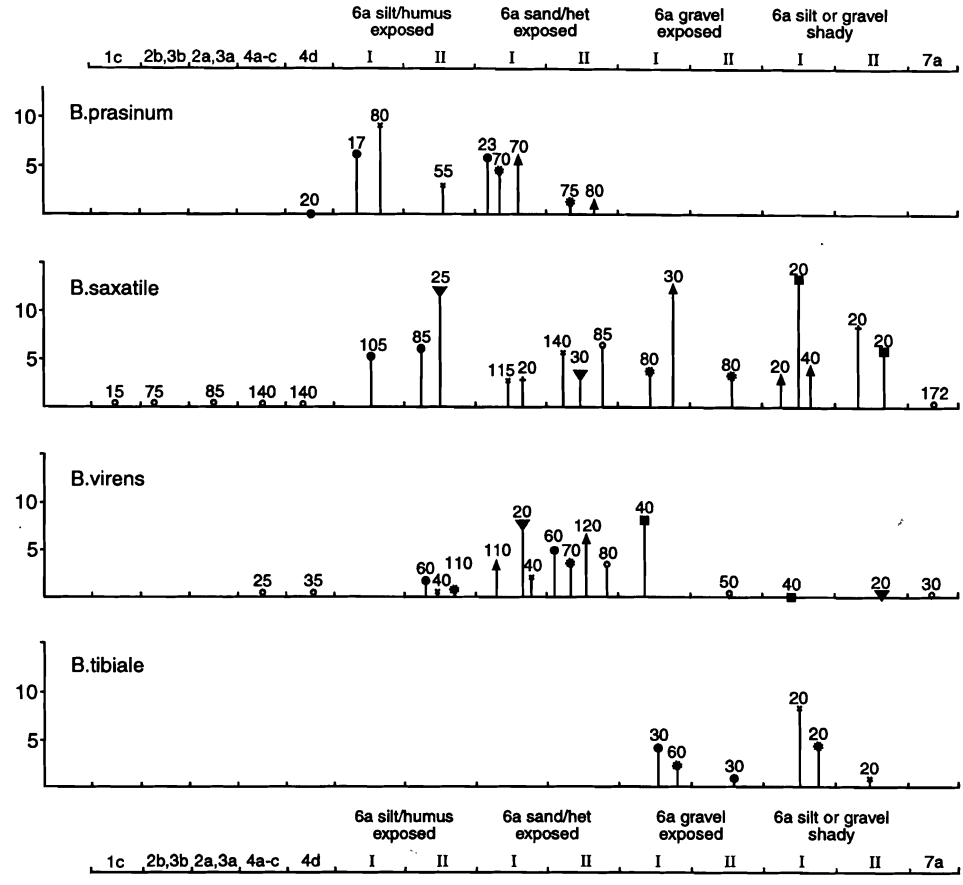

Figure 6
Microhabitat distribution of four lithophilous *Bembidion* species according to time catches. For further explanation, see Figure 2 and 4.

ground e.g. on roadsides and in clay pits. The vegetation is very sparse or absent. The species is frequently found hiding in cracks in the clay. These findings are in accordance with those of Lindroth (1945, 1985), but in South Norway the species occurs both in open and rather shady positions.

B. lunatum (Duftschmid) occurs on banks of large rivers and in secondary habitats such as clay pits, fields and on roadsides. The present investigation revealed a clear preference to silty sites with a rather dense and often tall vegetation (Table 2 and Figure 3) which is in full accordance with previous results (Andersen 1970, 1983a).

B. femoratum Sturm occurs both on river banks, lake shores and in various types of culture-influenced habitats. Both quadrat sampling and time catch show that the species is most abundant in microhabitat 1d, i.e. in dry, gravelly/stony sites with an underlying layer of silt at some distance from the river, but it is also quite abundant in rather dry, gravelly/stony sites on the real river bank (Figure 4, Table 2). Earlier (Andersen 1970) gravelly/stony and silty sites were found to be about equally preferred, but microhabitat 1d was not investigated in that work. In South and Central Norway the species may, therefore, be most abundant in more or less dry, gravelly/stony sites just like in Northern Nor-

Table 4. Number of specimens of *Bembidion virens* and *B. saxatile* collected in various types of microhabitats. Hand collecting with or without time notion. Both species are not necessarily found within the same locality but distance between occurrences of the two species has never been more than 10 km.

I: Schist stones/gravel; silt/clay or heterogeneous substratum underneath.
II: Round stones/gravel; silt/clay underneath, exposed.
III: As the previous, but shady.
IV: Round gravel/stones with coarse sand and gravel underneath, exposed.
V: As the previous, but fine sand underneath.

Species	Microhabitat type I	II	III	IV	V
Bembidion virens	0	3	1	235	64
B. saxatile	220	191	78	151	8
Number of localities	4	13	2	20*	3

* Dominance ratio between the two species varied with locality.

way (Andersen 1983a). I do not regard *B. femoratum* as really lithophilous, however, since it is able to establish populations at places without a gravelly/stony cover (personal observation in Denmark and on the island Gotland in South Sweden).

B. bruxellense Wesmael is very euryoecious and has been found at fringes of all types of waters except at sea. It occurs also on culture-influenced ground far from open water. The species is present in many microhabitats on river banks such as silty places with a varying degree of plant cover and it may also be abundant in gravelly/stony spots, usually in rather elevated parts (Figure 4).

B. petrosum siebkei Sparre Schneider prefers large rivers (Figure 5). According to time catch the species prefers gravelly/stony spots (Figure 2). Although *B. petrosum* was found in microhabitat 4d in quadrat samples (Table 2) it is no doubt lithophilous. The species has a preference for silt underlying/gravel stones (cfr. also Andersen 1978) and is often abundant in zones at some distance from the river (Table 2, 3, Andersen 1970, 1983a).

B. saxatile Gyllenhal occurs at all types of freshwater (Figure 5) as well as at the sea. The species is clearly lithophilous, but it is more euryoecious than any other beetle species of that ecological group (Tables 4, 5, Figure 6). Thus it is the only species present at places with gravel/stones of schist (Table 4). Furthermore, it is completely independent of the type of underlying substratum and occurs even in places with clay (Table 4, 5, Figure 6, Andersen 1983a). Contrary to *B. virens*, *B. prasinum* and *B. petrosum* the species occurs abundantly also in shady positions and is able to colonize secondary, human-made habitats such as gravel pits

Table 5. Distribution of species pairs of four lithophilous *Bembidion* species in relation to differences in microhabitat variables. Data are based on handcollecting both with or without time notion. Different vertical groups partly contain the same material. *sax*: *B.saxatile*; *vir*: *B.virens*; *pra*: *B.prasinum*; *tib*: *B.tibiale*; A:exposed; B: shady; sa: sand under gravel/stones; si: silt or clay under gravel/stones; c: coarse; f: finer; I: close to the river; II: more distantly (elevated) from the river; n: number of samples; p: number of localities with significant differences ($p < 0.05$) in distribution of species (χ^2-tests).

	A	B	A	B	A I	A II	B I	B II	A I	A II	A I	A II	Si	Sa
sax	51	81			11	10	0	0	44	99			65	97
vir	84	0	26	0							21	35	8	85
pra									142	34	44	12		
tib			15	9	13	2	22	6						
n	3		1		2				9		5		5	
p	2		1		1				6		2		3	

(personal observation on Gotland in S Sweden; cfr. also Lindroth 1945).

Habitat overlap of species

The microhabitat overlap of the species pairs at the river Gaula was generally very low (Table 6), with a mean of a < 0.07. The only species pair with a high overlap was *Asaphidion pallipes-Bembidion quadrimaculatum*.

DISCUSSION

The present investigation as well as information given by Lindroth (1963, 1974), Andersen (1970, 1983a), Freude (1976) and Koch (1989) indicate that many Bembidiini species are macro- and/or microhabitat specialists and have the same main choices within their distribution ranges. Thus, the lithophilous species *B. virens, B. prasinum, B. hastii, B. tibiale* and *B. saxatile* are confined to gravelly/stony habitats throughout their geographical ranges. Furthermore, the zones closest to the rivers are occupied by *B. prasinum*, those higher up by *B. virens* in South-Central as well as in Northern Norway. Several species that were found to be confined to fine-grained substratum by the present investigation (e.g. *B. argenteolum, B. litorale, B. dentellum, B. lunatum, B. semipunctatum, B. nitidulum* and *B. schuppelii*) also seem to choose the same main habitats in other parts of their distribution ranges (cfr. Lindroth 1963, 1974, Freude 1976, Koch 1989). There are some obvious exceptions, however. In Northern Norway *B. bipunctatum* is a common species in eulitoral, culture influenced sites, e.g. in vaste places, ruderal sites (Andersen 1970, unpublished data) whereas it is strictly riparian in South and Central Norway. *B. femoratum* is a common species in litoral, as well as eulitoral habitats in South and Central Norway, whereas it seems to be strictly eulitoral in Northern Norway. Such habitat shifts are most likely attributable to differences in microclimate due to differences in the angle of incidence of sun-rays (Andersen 1993).

It is now well documented that the proximate causes for the habitat segregation of the riparian *Bembidion* species are different responses and tolerances to abiotic factors such as temperature, relative humidity, light response, substratum and type of coverage (Andersen 1978, 1985a, b, 1986, 1988, Sowig 1986). Abiotic factors may also be responsible for differences in macrohabitat selection (Andersen 1983a). The preference of *B. petrosum*, for banks of large rivers (Andersen 1983a, present paper) may be explained by its demands for a silty substratum underlying gravel/stones since brooks and the smallest rivers rarely have that substratum. The reason why *B. prasinum* seldom occurs around brooks and the smallest rivers may be that this hygrophilous species does not tolerate splashing of water (Andersen

Table 6. Microhabitat overlap of species pairs of *Asaphidion* (A.) and *Bembidion* (B.) at the river Gaula. *B. dentellum* and *B. saxatile* are omitted due to low abundance. *: material from 1973, **: material from 1994.

		a	b	c	d	e	f	g	h	i	j
Bembidion femoratum	(a)*										
B. schuppelii	(b)*	0									
B. lunatum	(c)*	<0.01	0.05								
B. quadrimac.	(d)*	0.37	0	<0.01							
B. pallipes	(e)*	0.04	0	0.02	0.83						
B. semipunct.	(f)*	0	<0.01	0.13	0	0					
B. litorale	(g)*	0.05	0	0	0	0	0				
B. prasinum	(h)*	0	0	0	0	0	0	0			
B. petrosum	(i)*	0.40	0	0	0	0	0	0	0		
B. prasinum	(h)**									0.50	<0.01
B. petrosum	(i)**										0.17
B. virens	(j)**										

1983a). *B. prasinum* is usually absent at the estuaries of rivers and at sea shores whereas *B. virens* may be abundant at such places (e.g. Table 3). This difference between the two species may be due to differences in their moisture requirements. *B. prasinum* keeps close to rivers (Table 2, 3, Figure 6) and due to the effect of tides, estuaries and sea-shores may be too unstable habitats for this species. *B. virens*, on the contrary, dwells in zones further from the water (Figure 6) and may, therefore, largely avoid the effects of low and high tide.

Contrary to the other lithophilous species, *B. saxatile* and *B. tibiale* are commonly present in shady habitats. At least for *B. saxatile* this is in accordance with the fact that it showed a weaker response towards directed light in experiments than the other lithophilous species that have been tested (Andersen 1989).

there are, however, still unsolved questions regarding the mechanisms behind the microhabitat selection of species. *B. saxatile* is the only lithophilous species frequently present on banks and shores with stones or gravel of schist. Whether this difference between species is due to a refined difference in response to contact stimuli or some other factor is unknown. Several species have a habitat shift in connection with hibernation (Andersen 1968, unpublished data). The mechanism behind this shift has not been examined.

Quadrat samples conducted at the banks of river Gaula indicated that nearly all the species were separated by microhabitat. The only exception was the pair *A. pallipes- B. quadrimaculatum*. These two species are, however, separated both by activity and life cycle. Thus *B. quadrimaculatum* shows much more diurnal activity than *A. pallipes* and the first species is an imaginal hibernator, whereas *A. pallipes* hibernates both as larva and adult (Andersen 1970). The two species therefore show apparent resource partitioning.

The following six species occur at the banks of Gaula but they were not found in quadrat samples: *B. bipunctatum, B. nitidulum, B. tetracolum, B. lampros, B. argenteolum* and *B. lapponicum* (Andersen 1970). According to Andersen (1970) they are distributed as follows: *B. bipunctatum* occurs exclusively in microhabitats 5 and 6b. In the first mentioned microhabitat it is the only species present whereas it occurs together with *B. virens* in 6b. *B. nitidulum* occurs exclusively and as the only species on clayish slopes far from the river. *B. tetracolum* seems to be an irregular visitor at the banks of Gaula. *B. lampros* occurs only in microhabitat 1c, i.e. in eulitoral sections. The only other species occuring in the same microhabiatat is *B. quadrimaculatum*. The latter species is comparatively common also on the river bank proper. *B. lapponicum* and *B. argenteolum* show less obvious spatial segregation, although the first one is found exclusively in sandy sites, whereas the latter also occurs in silty sites. The two species show no apparent differences in life cycle and activity, both being imaginal hibernators with diurnal activity (Andersen 1970). There is, however, a difference in size, the size ratio between the two species being 1: 1.3. It is possible that this implies a difference in food selection between the two species (Andersen 1988). It is concluded that all the above species are generally well segregated by micro- macrohabitat or some other resource dimension, e.g. activity, life cycle or perhaps food selection.

Traditionally niche-segregations have largely been explained as a result of interspecific competition in the past (Connell 1980). Although the importance of this interaction among carabid beetles can not be ignored, the evidence is weak (Niemelä 1993). Other ultimate causes for the spatial segregation of the *Bembidion* species may be predation and parasitism (Andersen & Skorping 1990, 1991), but it is unlikely that these two interactions alone are responsible for all the observed microhabitat differences between the species.

The macro-microhabitat preferences of the riparian species also influence their geographical distribution (Andersen 1983 c, Andersen & Hanssen 1993). This especially applies to the lithophilous species. With a few exceptions, all the Coleoptera species of this ecological group are absent from the lowlands of Northern and northermost parts of Central Europe, i.e. South Sweden, Denmark, South Finland, Northern Germany, The Baltic States and large parts of The Netherlands. The explanation is that banks and shores of freshwaters in lowland areas mostly lack a gravelly/stony substratum; a comparatively high relief is necessary to form extensive gravelly/stony banks at least at running waters (Andersen 1983c; vide also photographs in

Andersen & Hanssen 1992). Gravelly/stony banks at freshwaters may occur secondarily in lowland areas, but the lithophilous species seem to be unable to colonize secondary habitats. The only exception is *B. saxatile*. The euryoecious nature of this species explains why it is the only lithophilous species that is widely distributed in South Sweden and the other parts of the lowlands of Northern and the northermost parts of Central Europe. Within the two last mentioned areas, however, *B. saxatile* mostly occurs on gravelly-clayish sea-shores (Lindroth 1945), a macrohabitat that is avoided by the other lithophilous species. Lindroth (1949) suggested that this occurence on sea-shores was due to microclimate, but according to the discussion above, it is more likely that absence of suitable habitats at freshwater fringes are responsible for the macrohabitat distribution pattern within the areas of concern. The macrohabitat selection of *B. saxatile* in the northernmost part of Central Europe therefore indicates that suitable habitats for the majority of the other, more stenoecious lithophilous species are absent in the lowlands of Europe.

The ecological requirements of the sand and silt species may also, in part, determine their distribution as discussed by Andersen (1983 c) and Andersen & Hanssen (1993).

ACKNOWLEDGEMENT

I would like to express my gratitude to N. Peterson for help with the english.

SAMMENDRAG

Habitatvalg hos strandlevende Bembidion-arter (col. Carabidae) i Sør-Norge og Trøndelag

Ripare Bembidiini-arters makro/mikrohabitat-fordeling i sørlige og midtre deler av Norge ble studert ved hjelp av kvadratprøvetaking og tidsbestemt håndplukk. Mange av artene er habitatspesialister og ser ut til å ha et stabilt valg gjennom sitt utbredelses-område, selv om enkelte unntak finnes (*Bembidion bipunctatum, B. femoratum*). Selv om alle de litofile artene er bundet til grusete/steinete steder, er de klart atskilt i sine krav til fuktighet, substrat, eksponering og i makrohabitat. Alle artspar viste lav mikrohabitat overlapp. Eneste unntak var *Asaphidion pallipes-Bembidion quadrimaculatum*, men disse to artene er klart atskilt i andre ressursdimensjoner. Mekanismer bak artenes habitatvalg blir diskutert. En sammenheng mellom habitatvalg og geografisk utbredelse diskuteres også.

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First announcement

6TH EUROPEAN CONGRESS OF ENTOMOLOGY ČESKÉ BUDĚJOVICE, CZECH REPUBLIC AUGUST 23-29, 1998.

The 6th European Congress of Entomology will be held in České Budějovice (about 150 km south of Prague) from the 23th to 29th August 1998. It will be hosted by the Institute of Entomology of the Czech Academy of Sciences, the University of South Bohemia and the Czech Entomological Society.

The programme will include 1-2 days of plenary lectures, 3-4 days of offered papers and posters arranged in specialist symposia and a 1 day excursion.

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Mycetophilids (Diptera, Sciaroidea) from southeastern Norway

Bjørn Økland & Alexander I. Zaitzev

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

The present article gives a survey of mycetophilid species trapped during the research programme «Forest Ecology and Multiple Use». The material contains altogether 320 species of mycetophilids, of which 162 species are assumed to be new records for the Norwegian fauna, and five species have been described as new species for science in separate publications. Also species numbers of mycetophilids from Norway in previous publications are reviewed. Including the present material, the total number of mycetophilid species in Norway based on publications is at least 430.

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INTRODUCTION

The mycetophilids are small to medium-sized dipterous insects. Most of the species are associated with forest environments; however, some species occur above tree-line or in other tree-less environments (Hutson et al. 1980, Väisänen 1984). According to existing rearing records, the larvae of most species develop in fungal microhabitats, while only a few species feed on algae, mosses and liverworts or are saprophagous in bird nests (Hackman et al. 1988, Yakovlev 1994).

A comprehensive material of mycetophilids was collected during the research programme «Forest Ecology and Multiple Use» (1990-94; Solbraa 1996), including altogether 43353 identified specimens. The main purpose was to achieve new information about how the diversity of this insect group is related to ecological factors in the forest landscape. Many mycetophilids appear to be favoured by shady habitats of oldgrowth forests. In the analyses, this group was most strongly influenced by the percent of oldgrowth forest in a wide surrounding landscape (100 km^2), and by dead-wood continuity indicated by the presence of a high number of certain species of wood-inhabiting fungi and lichens (Økland 1995a, Økland 1996a). Clearcutting was found to induce a long-lasting reduction in species richness of mycetophilids (Økland 1994).

Knowledge of what species to be found is basic in many kinds of studies. In neighbouring countries, a check list of Diptera is found in England (Kloet & Hincks 1975) and Finland (Hackman 1980), while Norway has no modern check list of Diptera species. The number of mycetophilid species in Norway has been estimated to 497 (G.E.E.Söli, in Ottesen 1993); however, far less species are published records.

This paper is meant to be a contribution to a future check list of Norwegian Diptera. It presents a list of mycetophilid species found during the the research programme «Forest Ecology and Multiple Use», and gives a short survey of species numbers of mycetophilids found in previous publications.

METHODS

The present material was collected in three ecological studies:

i) in 1991, mycetophilids were collected with one malaise trap (Townes 1962) in each of 15 sites. The material was identified by Bjørn Økland. Site descriptions are given in Table 1 (site 1-15), and additional information about study area and sampling design is found in Økland (1994).

ii) in 1992, mycetophilids were collected with 30 trunk-window traps (Økland 1996b) in each of 4 sites (sites 16-19 in Table 1). The material was identified by Alexander I. Zaitzev.

iii) in 1993, mycetophilids were collected with one malaise trap in each of 19 sites, and were identified by Alexander I. Zaitzev. Site informations are found Table 1 (sites 20-38), and additional information about study area and sampling design is found in Økland (1995a, 1996a).

Table 1. Information about the sampling sites. reg. = region code given by Økland (1981). trunk-w. = trunk-window traps.

no.	site	municipality	reg.	UTM code	forest type	traps	period
1	Høgkollen	Rælingen	AK	32VPM144356	spruce-dominated	malaise	22/4-1/6-91
2	Tappenberg I	Rælingen	AK	32VPM144358	spruce-dominated	malaise	22/4-1/6-91
3	Tappenberg II	Rælingen	AK	32VPM143362	spruce-dominated	malaise	22/4-1/6-91
4	Krokvannskalven	Rælingen	AK	32VPM136368	spruce-dominated	malaise	22/4-1/6-91
5	Styggvann	Lørenskog	AK	32VPM119424	spruce-dominated	malaise	22/4-1/6-91
6	Børtervann I	Enebakk	AK	32VPM150297	spruce-dominated	malaise	22/4-1/6-91
7	Børtervann II	Enebakk	AK	32VPM154297	spruce-dominated	malaise	22/4-1/6-91
8	Støa	Enebakk	AK	32VPM170278	spruce-dominated	malaise	22/4-1/6-91
9	Nygard	Enebakk	AK	32VPM174278	spruce-dominated	malaise	22/4-1/6-91
10	Kongsvika vest	Enebakk	AK	32VPM159288	spruce-dominated	malaise	22/4-1/6-91
11	Bysætermosan	Enebakk	AK	32VPM120315	spruce, clearcut	malaise	22/4-1/6-91
12	Skjelbreia	Enebakk	AK	32VPM110330	spruce, clearcut	malaise	22/4-1/6-91
13	Ravnåsen	Enebakk	AK	32VPM185273	spruce, clearcut	malaise	22/4-1/6-91
14	Trangene	Enebakk	AK	32VPM157289	spruce, clearcut	malaise	22/4-1/6-91
15	Kongsvika sør	Enebakk	AK	32VPM161283	spruce, clearcut	malaise	22/4-1/6-91
16	Østby	Lørenskog	AK	32VPM1243	spruce-dominated	trunk-w.	28/4-6/9-92
17	Styggvann	Lørenskog	AK	32VPM119424	spruce-dominated	trunk-w.	28/4-6/9-92
18	Tappenberg	Rælingen	AK	32VPM1436	spruce-dominated	trunk-w.	28/4-6/9-92
19	Løkebrudalen	Lørenskog	AK	32VPM0836	spruce, regrowth	trunk-w.	28/4-6/9-92
20	Hirkjølen	Ringebu	OS	32VNP843450	spruce-dominated	malaise	15/6-17/8-93
21	Skvaldra	Ringsaker	HES	32VPN013903	spruce-dominated	malaise	15/6-17/8-93
22	Tronkeberget	Stor-Elvdal	HEN	32VPP124132	mixed coniferous	malaise	15/6-17/8-93
23	Helvete	Gausdal	OS	32VNP364034	spruce-dominated	malaise	15/6-17/8-93
24	Imsdalen	Ringebu	OS	32VNP867260	spruce-dominated	malaise	15/6-17/8-93
25	Elferdalen	Notodden	TEI	32VNM177124	mixed coniferous	malaise	15/6-17/8-93
26	Håkåseter	Sør-Fron	OS	32VNP399099	spruce-dominated	malaise	15/6-17/8-93
27	Tjuruverket	Gausdal	OS	32VNN416873	spruce-dominated	malaise	15/6-17/8-93
28	Tappenberg I	Rælingen	AK	32VPM144358	spruce-dominated	malaise	15/6-17/8-93
29	Tjøstøl	Aremark	Ø	32VPL572786	spruce-dominated	malaise	15/6-17/8-93
30	Finntjern	Jevnaker	OS	32VNM848718	spruce-dominated	malaise	15/6-17/8-93
31	Totenåsen	Østre Toten	OS	32VPN133163	spruce-dominated	malaise	15/6-17/8-93
32	Hesteskotjern	Jevnaker	OS	32VNM854737	spruce-dominated	malaise	15/6-17/8-93
33	Skotjernfjell	Lunner	OS	32VNM996797	spruce-dominated	malaise	15/6-17/8-93
34	Matholhøgda	Aremark	Ø	32VPL593695	spruce-dominated	malaise	15/6-17/8-93
35	Lortholkollen	Ringerike	BØ	32VNM846679	spruce-dominated	malaise	15/6-17/8-93
36	Ormetjernkampen	Gausdal	OS	32VNN454841	spruce-dominated	malaise	15/6-17/8-93
37	Fjellsjøkampen	Hurdal	AK	32VPN062049	spruce-dominated	malaise	15/6-17/8-93
38	Rundkollen	Nittedal	AK	32VNM988711	spruce-dominated	malaise	15/6-17/8-93

The taxonomy followed the nomenclature of the Catalogue of Palaearctic Diptera (Soós & Papp 1988), with additions from Väisänen (1984), Matile (1990) and Zaitzev (1994). The material is preserved in 70% alcohole at Norwegian Forest Reserach Institute, Ås.

RESULTS

The material contained altogether 320 species of mycetophilids (Sciaroidea), including 43353 specimens. Most species belonged to the family Mycetophilidae (289), while a smaller number of species belonged to Bolitophilidae (14), Keroplatidae (14) and Diadocidiidae (3) (Table 2). The material includes five species described as new species for science in previous publications (Zaitzev & Økland 1994, Økland 1995b).

Table 2. The mycetophilid species (Sciaroidea) captured in southeastern Norway in the period 1991-93 within the research programme «Forest Ecology and Multiple Use». For each species, the table gives the total number of individuals, the percent of the sites from which the species was trapped, and trapping sites (given as numbers with reference to Table 1). Species assumed to be new records for the Norwegian fauna are denoted by asterisks. Species described as new for science are denoted by double asterisks.

Family Bolitophilidae

**Bolitophila (Bolitophila) austriaca* (Mayer, 1950); 4 ind.; 5,3 % of sites; site no.: 20, 27.

Bolitophila (Bolitophila) cinerea Meigen, 1818; 7 ind.; 13,2 % of sites; site no.: 18, 23, 25, 27, 36.

**Bolitophila (Bolitophila) saundersi* (Curtis, 1836); 1 ind.; 2,6 % of sites; site no.: 21.

**Bolitophila (Cliopisa) aperta* Lundström, 1914; 8 ind.; 10,5 % of sites; site no.: 16, 23, 27, 30.

Bolitophila (Cliopisa) bimaculata Zetterstedt, 1838; 2 ind.; 5,3 % of sites; site no.: 23, 26.

Bolitophila (Cliopisa) dubia Siebke, 1863; 1 ind.; 2,6 % of sites; site no.: 30.

**Bolitophila (Cliopisa) edwardsiana* Stackelberg, 1969; 1 ind.; 2,6 % of sites; site no.: 21.

**Bolitophila (Cliopisa) fumida* Edwards, 1941; 2 ind.; 2,6 % of sites; site no.: 23.

Bolitophila (Cliopisa) hybrida (Meigen, 1804); 10 ind.; 13,2 % of sites; site no.: 16, 23, 24, 32, 36.

**Bolitophila (Cliopisa) nigrolineata* Landrock, 1912; 39 ind.; 15,8 % of sites; site no.: 23, 30, 32, 33, 36, 37.

**Bolitophila (Cliopisa) obscurior* Stackelber, 1969; 4 ind.; 5,3 % of sites; site no.: 23, 27.

**Bolitophila (Cliopisa) occlusa* Edwards, 1913; 1 ind.; 2,6 % of sites; site no.: 33.

**Bolitophila (Cliopisa) pseudohybrida* Landrock, 1912; 1 ind.; 2,6 % of sites; site no.: 36.

**Bolitophila (Cliopisa) rossica* Landrock, 1912; 2 ind.; 2,6 % of sites; site no.: 27.

Family Keroplatidae

Subfamily Macrocerinae

**Macrocera grandis* Lundström, 1912; 2 ind.; 5,3 % of sites; site no.: 27, 30.

**Macrocera parva* Lundström, 1914; 197 ind.; 34,2 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 31, 32, 33, 36, 37, 38.

Macrocera pumilio Loew, 1869; 1 ind.; 2,6 % of sites; site no.: 21.

Macrocera stigma Curtis, 1837; 2 ind.; 2,6 % of sites; site no.: 38.

**Macrocera stigmoides* Edwards, 1925; 3 ind.; 7,9 % of sites; site no.: 21, 27, 29.

**Macrocera zetterstedti* Lundström, 1914; 57 ind.; 18,4 % of sites; site no.: 23, 24, 26, 27, 29, 36, 38.

Subfamily Keroplatinae

Keroplatus testaceus (Dalman, 1818); 1 ind.; 2,6 % of sites; site no.: 34.

**Neoplatyura flava* (Macquart, 1826); 1 ind.; 2,6 % of sites; site no.: 28.

**Orfelia discoloria* (Meigen, 1818); 2 ind.; 5,3 % of sites; site no.: 22, 33.

**Orfelia falcata* A.Zaitzev, 1994; 2 ind.; 5,3 % of sites; site no.: 30, 33.

**Orfelia unicolor* (Staeger, 1840); 3 ind.; 2,6 % of sites; site no.: 29.

**Pyratula perpusilla* (Edwards, 1913); 2 ind.; 5,3 % of sites; site no.: 27, 36.

**Pyratula zonata* (Zetterstedt, 1852); 7 ind.; 5,3 % of sites; site no.: 25, 29.

Urytalpa ochracea (Meigen, 1818); 1 ind.; 2,6 % of sites; site no.: 32.

Family Diadocidiidae

**Diadocidia* (Adidocidia) *borealis* Coquillett, 1900; 30 ind.; 28,9 % of sites; site no.: 21, 22, 23, 26, 27, 31, 32, 33, 35, 36, 37.

Diadocidia (Diadocidia) ferruginosa (Meigen, 1830); 22 ind.; 23,7 % of sites; site no.: 21, 22, 24, 25, 29, 31, 32, 33, 35.

Diadocidia (Diadocidia) spinosula Tollett, 1948; 14 ind.; 26,3 % of sites; site no.: 17, 25, 26, 28, 29, 31, 33, 35, 36, 37.

Family Mycetophilidae

Subfamily Mycomyinae

**Mycomya (Calcomycomya) pulchella* (Dziedzicki, 1885); 5 ind.; 10,5 % of sites; site no.: 30, 32, 33, 36.

Mycomya (Mycomya) annulata (Meigen, 1818); 242 ind.; 31,6 % of sites; site no.: 22, 25, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38.

Mycomya (Mycomya) bicolor (Dziedzicki, 1885); 3 ind.; 5,3 % of sites; site no.: 27, 31.

**Mycomya (Mycomya) brunnea* (Dziedzicki, 1885); 2 ind.; 5,3 % of sites; site no.: 31, 34.

Mycomya (Mycomya) cinerascens (Macquart, 1826); 2 ind.; 5,3 % of sites; site no.: 36, 38.

**Mycomya (Mycomya) dziedzickii* Väisänen, 1981; 1 ind.; 2,6 % of sites; site no.: 21.

Mycomya (Mycomya) egregia (Dziedzicki, 1885); 3 ind.; 7,9 % of sites; site no.: 22, 27, 35.

Mycomya (Mycomya) fasciata (Zetterstedt, 1838); 9 ind.; 10,5 % of sites; site no.: 21, 27, 31, 36.

**Mycomya (Mycomya) festivalis* Väisänen, 1984; 2 ind.; 2,6 % of sites; site no.: 30.

Mycomya (Mycomya) hackmani Väisänen, 1984; 4 ind.; 2,6 % of sites; site no.: 27.

**Mycomya (Mycomya) humida* Garrett, 1924; 20 ind.; 7,9 % of sites; site no.: 21, 27, 36.

Mycomya (Mycomya) maculata (Meigen, 1804); 5 ind.; 5,3 % of sites; site no.: 21, 36.

Mycomya (Mycomya) marginata (Meigen, 1818); 2 ind.; 2,6 % of sites; site no.: 31.

**Mycomya (Mycomya) mituda* Väisänen, 1980; 1 ind.; 2,6 % of sites; site no.: 26.

Mycomya (Mycomya) nigricornis (Zetterstedt, 1852); 4 ind.; 2,6 % of sites; site no.: 21.

Mycomya (Mycomya) nitida (Zetterstedt, 1852); 98 ind.; 28,9 % of sites; site no.: 19, 21, 23, 24, 25, 27, 33, 34, 35, 36, 38.

**Mycomya (Mycomya) norna* Väisänen, 1984; 14 ind.; 13,2 % of sites; site no.: 22, 23, 27, 30, 32.

**Mycomya (Mycomya) prominens* (Lundström, 1913); 3 ind.; 7,9 % of sites; site no.: 9, 14, 22.

**Mycomya (Mycomya) pseudoapicalis* (Landrock, 1925); 1 ind.; 2,6 % of sites; site no.: 36.

Mycomya (Mycomya) ruficollis (Zetterstedt, 1852); 1330 ind.; 42,1 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 38.

Mycomya (Mycomya) shermani Garrett, 1924; 780 ind.; 34,2 % of sites; site no.: 21, 22, 24, 26, 27, 28, 30, 31, 32, 33, 35, 36, 38.

**Mycomya (Mycomya) sigma* Johannsen, 1910; 2 ind.; 5,3 % of sites; site no.: 27, 37.

**Mycomya (Mycomya) tenuis* (Walker, 1856); 1 ind.; 2,6 % of sites; site no.: 6.

Mycomya (Mycomya) trivittata (Zetterstedt, 1838); 19 ind.; 18,4 % of sites; site no.: 22, 24, 25, 30, 33, 36, 38.

Mycomya (Mycomya) tumida (Winnertz, 1863); 8 ind.; 13,2 % of sites; site no.: 20, 21, 32, 33, 36.

Mycomya (Mycomya) vittiventris (Zetterstedt, 1852); 86 ind.; 31,6 % of sites; site no.: 21, 22, 24, 26, 27, 30, 31, 32, 33, 35, 36, 38.

**Mycomya (Mycomyopsis) confusa* Väisänen, 1979; 1 ind.; 2,6 % of sites; site no.: 35.

**Mycomya (Mycomyopsis) penicillata* (Dziedzicki, 1885); 76 ind.; 7,9 % of sites; site no.: 22, 25, 38.

**Mycomya (Neomycomya) fimbriata* (Meigen, 1818); 77 ind.; 26,3 % of sites; site no.: 25, 27, 28, 29, 30, 31, 32, 33, 35, 38.

Neoempheria pictipennis (Halliday, 1833); 1 ind.; 2,6 % of sites; site no.: 34.

Subfamily Sciophilinae

Acnemia falcata Zaitzev, 1982; 46 ind.; 28,9 % of sites; site no.: 21, 23, 24, 27, 30, 31, 32, 33, 35, 36, 38.

Acnemia nitidicollis (Meigen, 1818); 207 ind.; 65,8 % of sites; site no.: 1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 21, 22, 23, 25, 26, 27, 28, 29, 33, 34, 36, 38.

**Acomoptera difficilis* (Dziedzicki, 1885); 11 ind.; 18,4 % of sites; site no.: 21, 22, 23, 25, 26, 27, 35.

Allocotocera pulchella (Curtis, 1837); 1070 ind.; 39,5 % of sites; site no.: 21, 22, 23, 24, 25, 28, 29, 30, 31, 32, 33, 34, 35, 37, 38.

**Anaclileia dispar* (Winnertz, 1863); 52 ind.; 23,7 % of sites; site no.: 21, 23, 24, 26, 27, 30, 35, 36, 37.

Azana anomala (Staeger, 1840); 74 ind.; 23,7 % of sites; site no.: 4, 21, 23, 24, 26, 27, 31, 36, 38.

**Leptomorphus (Leptomorphus) quadrimaculatus* (Matsumura, 1916); 5 ind.; 10,5 % of sites; site no.: 30, 32, 33, 37.

**Megalopelma nigroclavatus* (Strobl, 1909); 1 ind.; 2,6 % of sites; site no.: 22.

**Monoclona furcata* Johannsen, 1910; 7 ind.; 15,8 % of sites; site no.: 21, 22, 25, 27, 33, 35.

Monoclona rufilatera (Walker, 1837); 3 ind.; 7,9 % of sites; site no.: 25, 29, 32.

Neuratelia nemoralis (Meigen, 1818); 27 ind.; 18,4 % of sites; site no.: 19, 20, 22, 23, 26, 27, 36.

Paratinia sciarina Mik, 1874; 1 ind.; 2,6 % of sites; site no.: 35.

**Phthinia humilis* Winnertz, 1863; 4 ind.; 10,5 % of sites; site no.: 21, 23, 26, 32.

**Phthinia mira* Ostroverkhova, 1979; 3 ind.; 7,9 % of sites;

site no.: 24, 25, 36.

**Phthinia setosa* Zaitzev, 1994; 5 ind.; 7,9 % of sites; site no.: 22, 33, 36.

Polylepta borealis Lundström, 1912; 17 ind.; 10,5 % of sites; site no.: 21, 24, 30, 33.

Polylepta guttiventris (Zetterstedt, 1852); 46 ind.; 26,3 % of sites; site no.: 21, 23, 24, 26, 27, 31, 33, 35, 36, 37.

**Sciophila adamsi* Edwards, 1925; 7 ind.; 7,9 % of sites; site no.: 24, 27, 36.

***Sciophila balderi* Zaitzev et Økland, 1994; 5 ind.; 5,3 % of the sites; site no.: 3, 16

**Sciophila bicuspidata* Zaitzev, 1982; 14 ind.; 5,3 % of sites; site no.: 20, 26.

**Sciophila buxtoni* Freeman, 1956; 1 ind.; 2,6 % of sites; site no.: 18.

**Sciophila distincta* Garrett, 1925; 3 ind.; 5,3 % of sites; site no.: 4, 12.

**Sciophila exserta* Zaitzev, 1982; 3 ind.; 2,6 % of sites; site no.: 29.

Sciophila fenestella Curtis, 1837; 2 ind.; 5,3 % of sites; site no.: 33, 34.

Sciophila geniculata Zetterstedt, 1838; 10 ind.; 10,5 % of sites; site no.: 27, 30, 31, 33.

Sciophila hirta Meigen, 1818; 28 ind.; 10,5 % of sites; site no.: 4, 21, 33, 35.

**Sciophila lutea* Macquart, 1826; 1 ind.; 2,6 % of sites; site no.: 29.

**Sciophila nonnisilva* Hutson, 1979; 3 ind.; 5,3 % of sites; site no.: 27, 36.

**Sciophila rufa* Meigen, 1830; 14 ind.; 2,6 % of sites; site no.: 19.

**Sciophila salassea* Matile, 1983; 3 ind.; 7,9 % of sites; site no.: 23, 24, 36.

**Sciophila spinifera* Zaitzev, 1982; 4 ind.; 10,5 % of sites; site no.: 20, 21, 24, 36.

***Sciophila subbiscupidata* Zaitzev et Økland, 1994; 4 ind.; 5,3 % of sites; site no.: 1, 8

***Syntemna haagvari* Økland, 1995; 4 ind.; 7,9 % of sites; site no.: 22, 27, 36.

Syntemna hungarica (Lundström, 1912); 709 ind.; 47,4 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38.

**Syntemna nitidula* Edwards, 1925; 6 ind.; 15,8 % of sites; site no.: 21, 25, 30, 36, 37, 38.

**Syntemna penicilla* Hutson, 1979; 14 ind.; 13,2 % of sites; site no.: 23, 27, 31, 35, 36.

Syntemna relicta (Lundström, 1912); 16 ind.; 13,2 % of sites; site no.: 21, 29, 30, 31, 36.

**Syntemna setigera* (Lundström, 1914); 212 ind.; 36,8 % of sites; site no.: 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 34, 35, 36, 38.

**Syntemna stylata* Hutson, 1979; 117 ind.; 39,5 % of sites; site no.: 21, 22, 23, 24, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37.

Subfamily Gnoristinae

Apolephthisa subincana (Curtis, 1837); 878 ind.; 76,3 % of sites; site no.: 1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38.

Boletina basalis (Meigen, 1818); 514 ind.; 60,5 % of sites; site no.: 1, 4, 5, 6, 8, 9, 12, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 35, 36, 37.

Boletina borealis Zetterstedt, 1852; 21 ind.; 7,9 % of sites; site no.: 24, 33, 36.

Boletina brevicornis Zetterstedt, 1852; 35 ind.; 23,7 % of sites; site no.: 20, 22, 24, 26, 27, 30, 32, 35, 36.

Boletina cincticornis (Walker, 1848); 23 ind.; 7,9 % of sites; site no.: 24, 27, 36.

**Boletina cornuta* A.Zaitzev, 1994; 1 ind.; 2,6 % of sites; site no.: 24.

**Boletina dispecta* Dziedzicki, 1885; 1 ind.; 2,6 % of sites; site no.: 3.

**Boletina erythropyga* Holmgren, 1883; 31 ind.; 23,7 % of sites; site no.: 2, 5, 20, 22, 24, 27, 32, 33, 36.

Boletina gripha Dziedzicki, 1885; 14918 ind.; 94,7 % of sites; site no.: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38.

**Boletina griphoides* Edwards, 1925; 8 ind.; 2,6 % of sites; site no.: 24.

Boletina groenlandica Staeger, 1845; 320 ind.; 23,7 % of sites; site no.: 20, 21, 23, 24, 26, 27, 33, 36, 37.

**Boletina jamalensis* A.Zaitzev, 1994; 7 ind.; 7,9 % of sites; site no.: 20, 21, 24.

**Boletina lundbecki* Lundström, 1912; 321 ind.; 23,7 % of sites; site no.: 1, 5, 20, 23, 24, 26, 27, 35, 36.

Boletina lundstromi Landrock, 1912; 31 ind.; 18,4 % of sites; site no.: 5, 20, 23, 24, 26, 27, 31.

Boletina maculata Holmgren, 1870; 29 ind.; 23,7 % of sites; site no.: 3, 5, 14, 20, 21, 23, 24, 27, 36.

Boletina nigricans Dziedzicki, 1885; 1613 ind.; 44,7 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37.

Boletina nigrofusca Dziedzicki, 1885; 4075 ind.; 23,7 % of sites; site no.: 1, 2, 20, 21, 23, 24, 26, 27, 36.

Boletina pectinunguis Edwards, 1932; 1 ind.; 2,6 % of sites; site no.: 21.

Boletina plana (Walker, 1856); 305 ind.; 42,1 % of sites; site no.: 2, 20, 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 35, 36, 37, 38.

**Boletina polaris* Lundström, 1915; 1 ind.; 2,6 % of sites; site no.: 5.

Boletina sciarina Staeger, 1840; 638 ind.; 39,5 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 30, 32, 33, 34, 35,

36, 38.

**Boletina silvatica* Dziedzicki, 1885; 18 ind.; 5,3 % of sites; site no.: 22, 31.

Boletina trivittata (Meigen, 1818); 133 ind.; 50,0 % of sites; site no.: 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 21, 23, 24, 27, 36.

**Boletina villosa* Landrock, 1912; 3 ind.; 7,9 % of sites; site no.: 27, 33, 35.

**Coelophthinia thoracica* (Winnertz, 1863; 4 ind.; 7,9 % of sites; site no.: 26, 31, 32.

Coelosia flava (Staeger, 1840); 23 ind.; 18,4 % of sites; site no.: 23, 27, 32, 33, 36, 37, 38.

Coelosia silvatica Landrock, 1918; 7 ind.; 15,8 % of sites; site no.: 13, 16, 20, 22, 24, 36.

Coelosia tenella (Zetterstedt, 1852); 18 ind.; 26,3 % of sites; site no.: 20, 25, 27, 28, 29, 30, 31, 33, 35, 36.

Coelosia truncata Lundström, 1909; 26 ind.; 28,9 % of sites; site no.: 20, 21, 23, 24, 27, 30, 31, 32, 35, 36, 38.

Drepanocercus spinistylus Söli, 1993; 80 ind.; 36,8 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 36, 37.

Dziedzickia marginata (Dziedzicki, 1885); 144 ind.; 34,2 % of sites; site no.: 21, 22, 23, 24, 25, 27, 28, 30, 32, 33, 35, 36, 38.

Gnoriste bilineata Zetterstedt, 1852; 11 ind.; 7,9 % of sites; site no.: 20, 23, 26.

Gnoriste longirostris Siebke, 1863; 1 ind.; 2,6 % of sites; site no.: 31.

Grzegorzekia collaris (Meigen, 1818); 1 ind.; 2,6 % of sites; site no.: 38.

**Hadroneura palmeni* Lundström, 1906; 1 ind.; 2,6 % of sites; site no.: 7.

Palaeodocosia janickii (Dziedzicki, 1923); 109 ind.; 44,7 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 38.

**Saigusaia flaviventris* (Strobl, 1894); 3 ind.; 2,6 % of sites; site no.: 28.

Speolepta leptogaster (Winnertz, 1863); 2 ind.; 5,3 % of sites; site no.: 30, 36.

Synapha vitripennis (Meigen, 1818); 173 ind.; 28,9 % of sites; site no.: 22, 24, 25, 28, 29, 31, 32, 33, 34, 35, 37.

Subfamily Leiinae

**Docosia fumosa* Edwards, 1925; 3 ind.; 7,9 % of sites; site no.: 3, 5, 8.

**Docosia gilvipes* (Walker, 1856); 2 ind.; 5,3 % of sites; site no.: 11, 22.

**Ectrepesthoneura* bucera Plassmann, 1980; 287 ind.; 31,6 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 30, 32, 33, 36, 37.

**Ectrepesthoneura colyeri* Chandler, 1980; 48 ind.; 7,9 % of sites; site no.: 25, 29, 34.

Ectrepesthoneura hirta (Winnertz, 1846); 756 ind.; 63,2 % of sites; site no.: 2, 4, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38.

**Ectrepesthoneura nigra* Zaitzev, 1984; 5 ind.; 5,3 % of sites; site no.: 21, 24.

**Ectrepesthoneura pubescens* (Zetterstedt, 1860); 30 ind.; 18,4 % of sites; site no.: 11, 20, 22, 23, 35, 36, 37.

**Ectrepesthoneura referta* Plassmann, 1976; 513 ind.; 34,2 % of sites; site no.: 20, 21, 22, 23, 24, 27, 30, 31, 32, 33, 35, 36, 37.

***Ectrepesthoneura tori* Zaitzev et Økland, 1994; 10 ind.; 5,3 % of sites; site no.: 3, 16.

**Leia bimaculata* (Meigen, 1804); 1 ind.; 2,6 % of sites; site no.: 22.

Leia subfasciata (Meigen, 1818); 103 ind.; 18,4 % of sites; site no.: 20, 21, 22, 25, 30, 35, 36.

Leia winthemi Lehmann, 1822; 29 ind.; 23,7 % of sites; site no.: 21, 22, 24, 25, 27, 29, 33, 34, 36.

Rondaniella dimidiata (Meigen, 1804); 63 ind.; 23,7 % of sites; site no.: 21, 22, 25, 28, 32, 33, 36, 37, 38.

Tetragoneura sylvatica (Curtis, 1837); 66 ind.; 7,9 % of sites; site no.: 28, 33, 34.

Subfamily Mycetophilinae

Tribe Mycetophilini

**Dynatosoma cochleare* Strobl, 1895; 3 ind.; 7,9 % of sites; site no.: 5, 6, 17.

Dynatosoma fuscicorne (Meigen, 1818); 49 ind.; 26,3 % of sites; site no.: 21, 22, 24, 26, 27, 29, 30, 31, 33, 36.

**Dynatosoma nigromaculatum* Lundström, 1913; 6 ind.; 7,9 % of sites; site no.: 17, 18, 28.

***Dynatosoma norwegiense* Zaitzev et Økland, 1994; 3 ind.; 7,9 % of sites; site no.: 4, 6, 19

Dynatosoma reciprocum (Walker, 1848); 24 ind.; 47,4 % of sites; site no.: 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 16, 17, 18, 22, 24, 27, 30, 32.

Dynatosoma rufescens (Zetterstedt, 1838); 23 ind.; 10,5 % of sites; site no.: 22, 27, 30, 36.

Dynatosoma thoracicum (Zetterstedt, 1838); 12 ind.; 13,2 % of sites; site no.: 4, 18, 22, 25, 36.

Epicypta aterrima (Zetterstedt, 1852); 2 ind.; 5,3 % of sites; site no.: 4, 6.

**Mycetophila abiecta* (Lastovka, 1963); 1 ind.; 2,6 % of sites; site no.: 22.

**Mycetophila adumbrata* Mik, 1884; 6 ind.; 5,3 % of sites; site no.: 22, 25.

**Mycetophila assimilis* Matile, 1967; 16 ind.; 13,2 % of sites; site no.: 16, 17, 22, 25, 36.

**Mycetophila attonsa* (Laffoon, 1957); 125 ind.; 31,6 % of sites; site no.: 16, 17, 18, 19, 23, 25, 28, 30, 32, 33, 35, 37.

**Mycetophila autumnalis* Lundström, 1909; 9 ind.; 7,9 % of sites; site no.: 16, 17, 18.

**Mycetophila bohemica* (Lastovka, 1963); 10 ind.; 13,2 % of sites; site no.: 18, 25, 27, 32, 36.

**Mycetophila brevitarsata* (Lastovka, 1963); 263 ind.; 39,5 % of sites; site no.: 20, 21, 22, 23, 24, 25, 27, 28, 30, 31, 32, 33, 35, 36, 38.

**Mycetophila caudata* Staeger, 1840; 1 ind.; 2,6 % of sites; site no.: 30.

Mycetophila confluens Dziedzicki, 1884; 28 ind.; 18,4 % of sites; site no.: 17, 18, 21, 25, 26, 27, 36.

Mycetophila curviseta Lundström, 1911; 3 ind.; 7,9 % of sites; site no.: 21, 25, 29.

**Mycetophila dentata* Lundström, 1913; 17 ind.; 21,1 % of sites; site no.: 21, 22, 26, 27, 29, 30, 32, 33.

*Mycetophila dziedzickii Chandler, 1977; 12 ind.; 5,3 % of sites; site no.: 22, 27.

**Mycetophila finlandica* Edwards, 1913; 8 ind.; 13,2 % of sites; site no.: 27, 28, 32, 37, 38.

Mycetophila fungorum (De Geer, 1776); 345 ind.; 57,9 % of sites; site no.: 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38.

**Mycetophila hetschkoi* Landrock, 1918; 163 ind.; 34,2 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 34, 35, 36.

**Mycetophila ichneumonea* Say, 1823; 112 ind.; 39,5 % of sites; site no.: 16, 21, 22, 23, 24, 25, 27, 28, 30, 31, 32, 33, 36, 37, 38.

**Mycetophila immaculata* (Dziedzicki, 1884); 1 ind.; 2,6 % of sites; site no.: 36.

**Mycetophila laeta* Walker, 1848; 197 ind.; 44,7 % of sites; site no.: 16, 17, 18, 19, 20, 21, 22, 25, 27, 28, 29, 30, 32, 33, 35, 36, 38.

**Mycetophila lapponica* Lundström, 1906; 1 ind.; 2,6 % of sites; site no.: 21.

**Mycetophila lubomirskii* Dziedzicki, 1884; 21 ind.; 10,5 % of sites; site no.: 22, 33, 34, 36.

Mycetophila luctuosa Meigen, 1830; 16 ind.; 15,8 % of sites; site no.: 16, 18, 19, 24, 25, 31.

Mycetophila marginata Winnertz, 1863; 9 ind.; 10,5 % of sites; site no.: 18, 19, 27, 36.

Mycetophila ocellus Walker, 1848; 2 ind.; 5,3 % of sites; site no.: 26, 30.

Mycetophila schnablii (Dziedzicki, 1884); 8 ind.; 10,5 % of sites; site no.: 20, 21, 27, 36.

Mycetophila sordida van der Wulp, 1874; 2 ind.; 5,3 % of sites; site no.: 22, 25.

Mycetophila strigatoides (Landrock, 1927); 2 ind.; 5,3 % of sites; site no.: 27, 30.

**Mycetophila stylata* (Dziedzicki, 1884); 28 ind.; 10,5 % of sites; site no.: 22, 25, 27, 38.

**Mycetophila unguiculata* Lundström, 1913; 1 ind.; 2,6 % of sites; site no.: 33.

**Mycetophila xanthopyga* Winnertz, 1863; 7 ind.; 10,5 % of sites; site no.: 18, 20, 22, 31.

Phronia biarcuata (Becker, 1908); 2 ind.; 5,3 % of sites; site no.: 21, 36.

**Phronia bicolor* Dziedzicki, 1889; 1 ind.; 2,6 % of sites; site no.: 5.

Phronia braueri Dziedzicki, 1889; 205 ind.; 39,5 % of sites; site no.: 20, 21, 22, 24, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36, 38.

Phronia caliginosa Dziedzicki, 1889; 657 ind.; 89,5 % of sites; site no.: 1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38.

Phronia cinerascens Winnertz, 1863; 167 ind.; 57,9 % of sites; site no.: 1, 2, 3, 14, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 35, 36, 38.

**Phronia cordata* Lundström, 1914; 56 ind.; 7,9 % of sites; site no.: 24, 27, 36.

**Phronia digitata* Hackman, 1970; 4 ind.; 5,3 % of sites; site no.: 21, 36.

**Phronia disgrega* Dziedzicki, 1889; 5 ind.; 13,2 % of sites; site no.: 21, 22, 27, 29, 35.

**Phronia dziedzickii* Lundström, 1906; 1 ind.; 2,6 % of sites; site no.: 36.

**Phronia elegans* Dziedzicki, 1889; 1 ind.; 2,6 % of sites; site no.: 31.

Phronia flavicollis Winnertz, 1863; 119 ind.; 50,0 % of sites; site no.: 4, 5, 14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 35, 36, 38.

Phronia forcipata Winnertz, 1863; 98 ind.; 23,7 % of sites; site no.: 21, 22, 23, 25, 26, 32, 35, 36, 38.

Phronia fusciventris Van duzee, 1928; 7 ind.; 7,9 % of sites; site no.: 21, 24, 27.

**Phronia jocosa* Gagné, 1975; 3 ind.; 7,9 % of sites; site no.: 1, 5, 18.

**Phronia mutabilis* Dziedzicki, 1889; 1 ind.; 2,6 % of sites; site no.: 5.

Phronia nigricornis (Zetterstedt, 1852); 15 ind.; 15,8 % of sites; site no.: 21, 22, 27, 29, 32, 36.

**Phronia nigripalpis* Lundström, 1909; 5206 ind.; 50,0 % of sites; site no.: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38.

**Phronia obtusa* Winnertz, 1863; 2 ind.; 2,6 % of sites; site no.: 11.

**Phronia peculiaris* Dziedzicki, 1889; 3 ind.; 5,3 % of sites; site no.: 21, 36.

Phronia persimilis Hackman, 1970; 2 ind.; 5,3 % of sites; site no.: 13, 20.

**Phronia petulans* Dziedzicki, 1889; 3 ind.; 7,9 % of sites; site no.: 1, 11, 36.

**Phronia siebeckii* Dziedzicki, 1889; 1 ind.; 2,6 % of sites; site no.: 25.

**Phronia tenuis* Winnertz, 1863; 4 ind.; 7,9 % of sites; site

no.: 20, 27, 36.

**Phronia willistoni* Dziedzicki, 1889; 4 ind.; 10,5 % of sites; site no.: 1, 5, 8, 36.

**Platurocypta testata* (Edwards, 1925); 1 ind.; 2,6 % of sites; site no.: 3.

**Sceptonia concolor* Winnertz, 1863; 7 ind.; 15,8 % of sites; site no.: 20, 22, 24, 25, 35, 38.

Sceptonia fumipes Edwards, 1925; 205 ind.; 39,5 % of sites; site no.: 16, 20, 21, 22, 23, 24, 25, 26, 27, 30, 32, 33, 34, 35, 36.

Sceptonia fuscipalpis Edwards, 1925; 33 ind.; 26,3 % of sites; site no.: 9, 22, 24, 25, 27, 30, 33, 34, 35, 36.

Sceptonia nigra (Meigen, 1804); 12 ind.; 21,1 % of sites; site no.: 3, 4, 5, 7, 10, 11, 13, 18.

**Sceptonia regni* Chandler, 1991; 10 ind.; 15,8 % of sites; site no.: 25, 26, 29, 30, 32, 35.

**Sceptonia tenuis* Edwards, 1925; 19 ind.; 18,4 % of sites; site no.: 4, 6, 13, 15, 21, 22, 24.

**Trichonta aberrans* Lundström, 1911; 1 ind.; 2,6 % of sites; site no.: 2.

Trichonta atricauda (Zetterstedt, 1852); 37 ind.; 15,8 % of sites; site no.: 21, 22, 24, 27, 31, 36.

**Trichonta comica* Gagné, 1981; 2 ind.; 5,3 % of sites; site no.: 27, 36.

**Trichonta comis* Gagné, 1981; 4 ind.; 7,9 % of sites; site no.: 4, 5, 11.

**Trichonta delicata* Gagné, 1981; 4 ind.; 7,9 % of sites; site no.: 21, 27, 36.

Trichonta facilis Gagné, 1981; 1 ind.; 2,6 % of sites; site no.: 27.

Trichonta fissicauda (Zetterstedt, 1852); 31 ind.; 21,1 % of sites; site no.: 20, 21, 22, 23, 27, 33, 35, 36.

**Trichonta flavicauda* Lundström, 1914; 16 ind.; 13,2 % of sites; site no.: 21, 24, 26, 27, 36.

**Trichonta fragilis* Gagné, 1981; 1 ind.; 2,6 % of sites; site no.: 14.

**Trichonta generosa* Gagné, 1981; 2 ind.; 2,6 % of sites; site no.: 36.

Trichonta hamata Mik, 1880; 92 ind.; 34,2 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 30, 31, 32, 33, 36, 38.

Trichonta melanura (Staeger, 1840); 139 ind.; 63,2 % of sites; site no.: 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 20, 21, 22, 23, 24, 25, 27, 30, 31, 32, 36.

Trichonta subfusca Lundström, 1909; 273 ind.; 34,2 % of sites; site no.: 21, 22, 23, 24, 25, 27, 29, 30, 32, 33, 35, 36, 38.

Trichonta submaculata (Staeger, 1840); 3 ind.; 2,6 % of sites; site no.: 36.

Trichonta terminalis (Walker, 1856); 2 ind.; 5,3 % of sites; site no.: 33, 36.

**Trichonta venosa* (Staeger, 1840); 16 ind.; 15,8 % of sites; site no.: 22, 25, 30, 31, 35, 36.

**Trichonta vitta* (Meigen, 1830); 111 ind.; 44,7 % of sites; site no.: 4, 7, 8, 14, 20, 21, 22, 23, 24, 26, 27, 28, 32, 35, 36, 37, 38.

**Trichonta vulgaris* Loew, 1869; 2 ind.; 5,3 % of sites; site no.: 20, 31.

**Zygomyia humeralis* (Wiedemann, 1817); 17 ind.; 13,2 % of sites; site no.: 1, 5, 14, 25, 28.

**Zygomyia kiddi* Chandler, 1991; 32 ind.; 18,4 % of sites; site no.: 21, 25, 27, 28, 30, 32, 35.

Zygomyia notata (Stannius, 1831); 10 ind.; 10,5 % of sites; site no.: 4, 5, 9, 10.

**Zygomyia pictipennis* (Staeger, 1840); 2 ind.; 2,6 % of sites; site no.: 24.

Zygomyia pseudohumeralis Caspers, 1980; 86 ind.; 39,5 % of sites; site no.: 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 34, 35, 36, 38.

**Zygomyia semifusca* (Meigen, 1818); 75 ind.; 28,9 % of sites; site no.: 16, 22, 25, 28, 29, 30, 32, 34, 35, 36, 38.

**Zygomyia valida* Winnertz, 1863; 2 ind.; 2,6 % of sites; site no.: 26.

Zygomyia vara (Staeger, 1840); 6 ind.; 7,9 % of sites; site no.: 20, 27, 36.

**Zygomyia zaitzevi* Chandler, 1991; 5 ind.; 2,6 % of sites; site no.: 22.

Tribe Exechiini

Allodia (Allodia) anglofennica Edwards, 1921; 14 ind.; 13,2 % of sites; site no.: 16, 17, 18, 19, 23.

Allodia (Allodia) lugens (Wiedemann, 1817); 127 ind.; 21,1 % of sites; site no.: 9, 13, 16, 17, 18, 19, 20, 23.

Allodia (Allodia) lundstroemi Edwards, 1921; 3 ind.; 5,3 % of sites; site no.: 17, 20.

Allodia (Allodia) pixydiiformis Zaitzev, 1982; 88 ind.; 21,1 % of sites; site no.: 1, 8, 11, 15, 16, 17, 18, 19.

Allodia (Allodia) septentrionalis Hackman, 1971; 8 ind.; 10,5 % of sites; site no.: 16, 17, 18, 27.

**Allodia (Allodia) simplex* Zaitzev, 1982; 2 ind.; 5,3 % of sites; site no.: 1, 3.

Allodia (Allodia) truncata Edwards, 1921; 10 ind.; 13,2 % of sites; site no.: 9, 16, 17, 18, 19.

Allodia (Allodia) tuomikoskii Hackman, 1971; 8 ind.; 10,5 % of sites; site no.: 21, 23, 27, 36.

**Allodia (Brachycampta) czernyi* (Landrock, 1912); 6 ind.; 7,9 % of sites; site no.: 5, 16, 18.

Allodiopsis (Notolopha) cristata (Staeger, 1840); 2 ind.; 5,3 % of sites; site no.: 23, 27.

Anatella ciliata Winnertz, 1863; 8 ind.; 18,4 % of sites; site no.: 17, 18, 25, 27, 31, 36, 38.

Anatella flavomaculata Edwards, 1925; 1 ind.; 2,6 % of sites; site no.: 5.

**Anatella gibba* Winnertz, 1863; 1 ind.; 2,6 % of sites; site no.: 11.

Anatella lenis Dziedzicki, 1923; 3 ind.; 7,9 % of sites; site no.: 16, 17, 27.

**Brachypeza (Brachypeza) bisignata* Winnertz, 1863; 5 ind.; 10,5 % of sites; site no.: 5, 27, 29, 36.

**Brevicornu (Brevicornu) arcticum* (Lundström in Lundström & Frey, 1913); 2 ind.; 2,6 % of sites; site no.: 20.

Brevicornu (Brevicornu) bipartitum Lastovka et Matile, 1974; 158 ind.; 18,4 % of sites; site no.: 4, 20, 21, 22, 24, 27, 36.

Brevicornu (Brevicornu) boreale (Lundström, 1914); 1 ind.; 2,6 % of sites; site no.: 27.

**Brevicornu (Brevicornu) disjunctum* Zaitzev, 1988; 2 ind.; 2,6 % of sites; site no.: 12.

**Brevicornu (Brevicornu) fennicum* (Landrock, 1927); 4 ind.; 5,3 % of sites; site no.: 4, 5.

Brevicornu (Brevicornu) foliatum (Edwards, 1925); 39 ind.; 26,3 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 32, 33, 36.

**Brevicornu (Brevicornu) fuscipenne* (Staeger, 1840); 31 ind.; 36,8 % of sites; site no.: 1, 2, 3, 4, 5, 6, 7, 10, 12, 13, 15, 27, 31, 36.

Brevicornu (Brevicornu) griseicolle (Staeger, 1840); 5 ind.; 5,3 % of sites; site no.: 23, 26.

Brevicornu (Brevicornu) griseolum (Zetterstedt, 1852); 26 ind.; 15,8 % of sites; site no.: 7, 20, 22, 24, 27, 36.

Brevicornu (Brevicornu) kingi (Edwards, 1925); 35 ind.; 28,9 % of sites; site no.: 1, 2, 4, 6, 8, 9, 11, 12, 14, 27, 36.

**Brevicornu (Brevicornu) occidentale* Zaitzev, 1988; 2 ind.; 2,6 % of sites; site no.: 36.

Brevicornu (Brevicornu) ruficorne (Meigen, 1838); 132 ind.; 31,6 % of sites; site no.: 4, 16, 17, 18, 19, 21, 24, 26, 27, 31, 35, 36.

Brevicornu (Brevicornu) sericoma (Meigen, 1830); 66 ind.; 42,1 % of sites; site no.: 1, 2, 3, 4, 5, 6, 10, 13, 16, 17, 19, 21, 22, 24, 27, 36.

**Brevicornu (Stigmatomeria) crassicorne* (Stannius, 1831); 2 ind.; 5,3 % of sites; site no.: 5, 14.

Cordyla brevicornis (Staeger, 1840); 124 ind.; 60,5 % of sites; site no.: 2, 4, 5, 12, 14, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38.

**Cordyla crassicornis* Meigen, 1818; 16 ind.; 26,3 % of sites; site no.: 3, 5, 7, 11, 25, 28, 31, 35, 36, 38.

Cordyla fissa Edwards, 1925; 3 ind.; 7,9 % of sites; site no.: 1, 5, 14.

**Cordyla flaviceps* (Staeger, 1840); 11 ind.; 10,5 % of sites; site no.: 22, 27, 29, 34.

Cordyla fusca Meigen, 1804; 114 ind.; 71,1 % of sites; site no.: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 21, 22, 23, 25, 26, 27, 30, 31, 32, 33, 37, 38.

**Cordyla murina* Winnertz, 1863; 262 ind.; 52,6 % of sites; site no.: 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38.

**Cordyla nitens* Winnertz, 1863; 3 ind.; 2,6 % of sites; site no.: 30.

**Cordyla parvipalpis* Edwards, 1925; 75 ind.; 34,2 % of sites; site no.: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 29.

Cordyla pusilla Edwards, 1925; 2 ind.; 5,3 % of sites; site no.: 4, 25.

Cordyla semiflava (Staeger, 1840); 3 ind.; 7,9 % of sites; site no.: 1, 3, 21.

**Cordyla sixi* (Barendrecht, 1938); 14 ind.; 23,7 % of sites; site no.: 20, 21, 22, 23, 24, 26, 27, 35, 36.

Exechia confinis Winnertz, 1863; 11 ind.; 10,5 % of sites; site no.: 8, 16, 17, 18.

Exechia contaminata Winnertz, 1863; 4 ind.; 7,9 % of sites; site no.: 10, 16, 17.

Exechia dizona Edwards, 1924; 2 ind.; 5,3 % of sites; site no.: 17, 21.

Exechia dorsalis (Staeger, 1840); 19 ind.; 18,4 % of sites; site no.: 1, 9, 13, 14, 16, 17, 18.

Exechia exigua Lundström, 1909; 4 ind.; 5,3 % of sites; site no.: 17, 23.

Exechia frigida (Boheman, 1865); 5 ind.; 10,5 % of sites; site no.: 22, 23, 27, 36.

Exechia fusca (Meigen, 1804); 21 ind.; 10,5 % of sites; site no.: 16, 17, 18, 36.

**Exechia lundstroemi* Landrock, 1923; 7 ind.; 10,5 % of sites; site no.: 16, 17, 18, 24.

**Exechia lucidula* (Zetterstedt, 1838); 1 ind.; 2,6 % of sites; site no.: 3.

Exechia nigra Edwards, 1925; 1 ind.; 2,6 % of sites; site no.: 24.

**Exechia nigroscutellata* Landrock, 1912; 2 ind.; 2,6 % of sites; site no.: 17.

**Exechia parva* Lundström, 1909; 8 ind.; 10,5 % of sites; site no.: 16, 17, 18, 19.

Exechia parvula (Zetterstedt, 1852); 4 ind.; 5,3 % of sites; site no.: 16, 17.

Exechia pseudocincta Strobl, 1910; 1 ind.; 2,6 % of sites; site no.: 16.

**Exechia repanda* Johannsen, 1912; 4 ind.; 10,5 % of sites; site no.: 3, 11, 17, 19.

**Exechia separata* Lundström, 1912; 5 ind.; 7,9 % of sites; site no.: 16, 18, 27.

Exechia unimaculata (Zetterstedt, 1860); 1 ind.; 2,6 % of sites; site no.: 5.

Exechiopsis (Exechiopsis) clypeata (Lundström, 1911); 2 ind.; 5,3 % of sites; site no.: 22, 27.

**Exechiopsis (Exechiopsis) forcipata* (Lackschewitz, 1937); 3 ind.; 2,6 % of sites; site no.: 17.

Exechiopsis (Exechiopsis) indecisa (Walker, 1856); 3 ind.; 7,9 % of sites; site no.: 5, 22, 27.

Exechiopsis (Exechiopsis) intersecta (Meigen, 1818); 1 ind.; 2,6 % of sites; site no.: 11.

Exechiopsis (Exechiopsis) lackschewitziana (Stackelberg, 1948); 1 ind.; 2,6 % of sites; site no.: 18.
Exechiopsis (Exechiopsis) pseudindecisa Lastovka et Matile, 1974; 1 ind.; 2,6 % of sites; site no.: 22.
Exechiopsis (Exechiopsis) pseudopulchella (Lundström, 1912); 1 ind.; 2,6 % of sites; site no.: 11.
Exechiopsis (Exechiopsis) pulchella (Winnertz, 1863); 12 ind.; 18,4 % of sites; site no.: 1, 14, 16, 19, 22, 25, 33.
Exechiopsis (Exechiopsis) sagittata Lastovka et Matile, 1974; 1 ind.; 2,6 % of sites; site no.: 22.
Exechiopsis (Exechiopsis) subulata (Winnertz, 1863); 2 ind.; 5,3 % of sites; site no.: 22, 33.
Exechiopsis (Xenexechia) leptura (Meigen, 1830); 1 ind.; 2,6 % of sites; site no.: 4.
Rymosia fasciata (Meigen, 1804); 3 ind.; 7,9 % of sites; site no.: 5, 6, 28.
Rymosia placida Winnertz, 1863; 2 ind.; 2,6 % of sites; site no.: 16.
Rymosia signatipes (van der Wulp, 1859); 1 ind.; 2,6 % of sites; site no.: 8.
Tarnania tarnanii (Dziedzicki, 1910); 5 ind.; 5,3 % of sites; site no.: 22, 30.

DISCUSSION

The taxonomic tools have been considerably developed since the earliest records of mycetophilids from Norway. Several of the old-record taxa still exist, but many of them are found under new genera or species names due to revisionary works. It might be that new identifications according to modern taxonomy would prove that some of the old records were placed in wrong taxa.

In the catalogue of Siebke (1877), 62 species names are recognized as still-existing mycetophilid taxa. In addition, this work contains some unknown species names and species considered doubtful in modern literature (Soós & Papp 1988). Soot-Ryen (1942) summarized the published records of mycetophilids up to the beginning World War II, and included also some old records which were not mentioned in the catalogue of Siebke. This publication added another 12 mycetophilid species of still existing taxa (though, some of them under new names today), and raised the total number to 74. The inventory of Krogerus (1960) contained 2 species records of mycetophilids from Norway; however, none of them were new to the Norwegian fauna. If the old records were put in correct taxa according to modern taxonomy, all of the abovementioned publications and the Catalogue of Palaearctic Diptera (Soós & Papp 1988) included altogether 96 mycetophilid species from Norway.

The number of mycetophilid records has accelerated in the ninties. Two new species were added by Økland & Söli (1992), 41 species by Kjærandsen (1992, 1993), and 129 species by Söli (1994a, 1994b), giving altogether 268 species from Norway. Apparently, the present material adds another 162 new species. With the abovementioned assumptions, at least 430 mycetophilid species are documented by Norwegian records in the literature, 15 species of Bolitphilidae, 22 species of Keroplatidae (incl. Macrocerinae), 4 species of Diadocidiidae and 389 species of Mycetophilidae. Thus, we are getting closer to the estimate of 497 mycetophilid species in Norway given in Ottesen (1993).

The present review of the Norwegian species numbers of mycetophilids is not exhaustive. Previous publications of Norwegian mycetophilids may have been overlooked, and there are several records of mycetophilids which have not been published, and they may contain new species for the Norwegian fauna. The rapid progress of new Norwegian records in recent years may indicate that there are still many species to be found. It is assumed that many new records may be done in deciduous forest of the lowlands, since modern studies of such forests are under-represented. Furthermore, revisionary works may change species names and rearrange the classification at higher levels. Despite this, the present review of species records may hopefully be a useful contribution to a future check list of Diptera in Norway.

SAMMENDRAG

Soppmygg (Diptera, Sciaroidea) fra Østlandet (Norge)

Denne artikkelen gir en oversikt over soppmyggarter fanget i løpet av forskningsprogrammet "Skogøkologi og flersidig skogbruk". Matrialet omfatter i alt 320 soppmyggarter, hvorav 162 arter antas å være nye for den den norske faunaen, og 5 er nybeskrevne arter som er gjengitt i egne publikasjoner. Det gis også en oversikt over artsantall av soppmygg fra Norge i tidligere

publikasjoner. Inkludert dette matrialet er antallet av publiserte soppmyggarter fra Norge minst 430.

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Fangstanlegg for rein, gammel virksomhet og tradisjon i Rondane

handler om hvordan de første nordmenn jaktet og levde. Her får du en utførlig beskrivelse av hvordan steinaldermennesket brukte sin kløkt for å fange rein, og de sinnrike innretningene de brukte til dette.

Edvard K. Barth (19.04.1913 - 23.04.1996) har en spesiell plass i norsk zoologi. Som biolog, skribent og naturfotograf er det få som kan slå hans store produksjon av publisert stoff om norsk natur. Merkelig nok skulle det gå over førti år før hans tanker og fotos om dyregravene i Rondane skulle komme ut i trykket form. Dette er en bok som viser stor sakkunnskap og innlevelse for våre tidligste landsmenn.

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Faunistic remarks on Norwegian Ichneumonidae (Hymenoptera)

Matthias Riedel & Øistein Berg

Riedel, M. & Berg, Ø. 1997. Faunistic remarks on Norwegian Ichneumonidae (Hymenoptera). - Fauna norv. Ser. B 44: 39-53.

The distribution of many European Ichneumonidae (Hymenoptera) is still incompletely known. In this faunistic survey, we record 275 species from Norway which have been mostly collected in the Southern parts of the country. 78 of them are new for the fauna of Norway.

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INTRODUCTION

The Ichneumonidae form an extremely large family of Hymenoptera with an estimated 60 000 extant species worldwide. More than 2 000 different species occur in England, and similar numbers might be assumed for other European countries (Gauld and Bolton 1988).

This large, diverse, and important group of parasitoid wasps has attracted only a few entomologists, and our knowledge of the distribution of many species is still fragmentary. Older lists accounting Norwegian Ichneumonidae (Strand 1898, 1900, 1906, 1913, 1919; Ulbricht 1912; Roman 1936, 1942) are largely outdated now and should be used with care, since the nomenclature of most groups has been changed substantially in the last decades. Furthermore, recent revisions redefined the limitations of many species and described a considerable amount of new ones. However, for major groups of Ichneumonidae (e.g. many genera of the subfamilies Phygadeuontinae, Mesochorinae and Ctenopelmatinae) these modern revisions which would be necessary for an unequivocal determination are still lacking.

Some newer publications deal with ichneumonids from Norway (Jussila 1973, 1976a, 1976b; Wiig 1982), but it is clear that these faunistic inventories remain fragmentary. Thus, it seems desirable to make some additions.

MATERIAL

In the present paper we address to a small collection of Ichneumonidae being compiled within the last few years. To avoid misinterpretations we excluded all species from this list which have not been identified certainly. The remaining material was mostly collected in the Southern parts of the country.

LIST OF SPECIES

Species new for the fauna of Norway are marked by asterisks. Biogeographic regions are given according to Økland (1981)

ADELOGNATHINAE

1 *Adelognathus brevicornis* Holmgren, 1855
BØ Hurum: Mølen (EIS 19),1 ♀ 14 July 1989. Known from Northern and Central Europe and found in Norway (Roman 1918).

ALOMYINAE

2 *Alomya debellator* (Fabricius, 1793)
Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♂ 10 August 1989; AK Asker: Vardåsen (EIS 28), 1 ♂ 6

June 1993, previously known from Norway (Strand 1913, Roman 1942, Jussila 1973, 1976a).

ANOMALONINAE

3 *Agrypon clandestinum* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 20 July 1992. Recorded from Norway (Strand 1900).

4 *Agrypon flaveolatum* (Gravenhorst, 1807)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 20 August 1988, widespread in Norway (Strand 1900, 1913, Roman 1936, Jussila 1973, 1976a).

5 *Agrypon flexorium* (Thunberg, 1822)
Ø Aremark: Vestfjella (EIS 21), 1 ♀ 29 August 1992, known from Norway (Strand 1913, Roman 1942).

6 *Erigorgus cerinops* (Gravenhorst, 1829)
HOI Ulvik: Finse (EIS 42), 1 ♀27 July 1991. Recorded from Norway (Strand 1913).

*7 *Therion brevicorne* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀1988. A rare species which has previously been recorded from Central Europe (Gauld and Mitchell 1977).

8 *Therion circumflexum* (Linné, 1758)
OS Gran: Buhammeren (EIS 36), 1 ♂ 7 July 1991, widespread in Norway (Strand 1906, 1913, Roman 1936, Jussila 1976a).

BANCHINAE

Banchini

9 *Banchus falcatorius* (Fabricius, 1775)
BØ Hurum: Verket, Verksøya (EIS 28), 1 ♂ 18 June 1989, previously known from Norway (Strand 1898, 1906, 1913, Jussila 1976a, Fitton 1985).

10 *Banchus volutatorius* (Linné, 1758)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀5 July 1990, found throughout Norway (Strand 1906, 1913, Roman 1936, 1942, Jussila 1976a, Fitton 1985).

11 *Exetastes adpressorius* (Thunberg, 1822)
AK Ås: Årungen (EIS 28), 1 ♀25 July 1993; AK Bærum: Borøya (EIS 28), 1 ♀10 August 1993; TEI Bø: Verpe (EIS 17), 1 ♀and 2 ♂ 31 July and 1 August 1993. Previously recorded from Norway (Roman 1942)

12 *Exetastes illusor* (Gravenhorst, 1829)
Ø Moss: Jeløy, Alby Gods (EIS 19), 1 ♂ 28 June 1993, known from Norway (Roman 1936, Jussila 1976a).

13 *Exetastes laevigator* (Villiers, 1789)
FN Porsanger: Gåradak (Goarahat) (EIS 174), 1 ♂ 27 June 1992; FN Porsanger: Børselv (EIS 182), 1 ♂ 26 June 1992, found earlier in Norway (Strand 1898, 1906, Roman 1936).

Glyptini

14 *Glypta (Diblastomorpha) cylindrator* (Fabricius, 1787) [syn. *bicornis* Boie, 1850]
MRI Sunndal: Sande (EIS 78), 1 ♀19 July 1983, known from Norway (Jussila 1976a).

15 *Glypta (Conoblasta) extincta* (Ratzeburg, 1852) [syn. *nigriventris* Thomson, 1889]
Ø Sarpsborg: Tune, Tunevannet (EIS 20), 1 ♂ 16 June 1991, widespread in Northern and Central Europe, recorded from Norway (Jussila 1976a).

16 *Glypta mensuator* (Fabricius, 1775) [syn. *lugubrina* Holmgren, 1860]
RY Karmøy: Vea (EIS 13), 1 ♀22 August 1993, recorded from Norway (Strand 1898).

*17 *Glypta resinanae* Hartig, 1838
Ø Moss: Jeløy, Alby Gods (EIS 19), 1 ♂ 28 June 1993, widespread in Europe (Aubert 1978).

18 *Glypta scalaris* Gravenhorst, 1829
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀10 August 1993, 1 ♂ 23 August 1993; Ø Moss: Jeløy, Alby Gods (EIS 19), 1 ♂ 28 June 1993, widespread in Northern and Central Europe, found in Norway (Roman 1936, Jussila 1976a, 1976b).

Lissonotini

19 *Alloplasta piceator* (Thunberg, 1822)
Ø Hvaler: Akerøya (EIS 12), 1 ♀ 6 June 1992; Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♀ 23 June 1991; VE Tjøme: Moutmarka (EIS 19), 1 ♀ 12 June 1989, throughout Europe, previously known from Norway (Roman 1942, Jussila 1976a).

20 *Arenetra pilosella* (Gravenhorst, 1829)
OS Lunner: Grindvold (EIS 36), 2 ♂ 1 May 1988, recorded from Norway (Jussila 1976a).

21 *Cryptopimpla errabunda* (Gravenhorst, 1829)
VE Tjøme: Moutmarka (EIS 19), 1 ♂ 8 June 1992. Widespread in Northern and Central Europe, found in Norway (Jussila 1973, 1976a).

22 *Lissonota clypeator* (Gravenhorst, 1829) [syn. *cylindrator* auct. nec Fabricius]
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 24 July 1993; Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 2 ♂ 28 July 1993; Ø Sarpsborg: Visterområdet (EIS 20), 1 ♂ 25 August 1992; Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♂ 13 July 1992; Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1 ♂ 12 July 1992; AK Bærum: Sandvika (EIS 28), 1 ♀ 18 July 1992; AAY Risør: Laget (EIS 11), 1 ♀ 3 July 1983, known from Norway (Strand 1913, Roman 1942, Jussila 1973, 1976a).

23 *Lissonota coracinus* (Gmelin, 1790) [syn. *bellator* Gravenhorst, 1807]
Ø Sarpsborg: Tune, Råkil (EIS 20), 4 ♂ 10 August 1993, 16 July 1993, 28 July 1993, 13 August 1993.

Widespread in Norway (Strand 1906, 1913, Roman 1942, Jussila 1973, 1976a).

*24 *Lissonota culiciformis* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 25 August 1993, widespread in Europe and recorded from Sweden and Finland (Aubert 1978).

*25 *Lissonota freyi* Hellén, 1915
ON Lom: Memurubu, 985 m.a.s.l. (EIS 61), 1 ♂ 27 August 1989, known from Finland and Central Europe, a holarctic species (Aubert 1978).

*26 *Lissonota funebris* Habermehl, 1923
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 24 April 1993, known from Finland and Central Europe (Aubert 1978).

27 *Lissonota rusticator* (Thunberg, 1822) [syn. *segmentator* auct. nec Fabricius]
Ø Skjeberg: Grimsøy, Dusa (EIS 20), 1 ♀ 17 July 1993, reported from Norway (Roman 1936, Jussila 1976a)

*28 *Lissonota setosa* (Geoffroy, 1785)
TEI Bø: Verpe (EIS 17), 1 ♀ 31 July 1993, distributed throughout Europe (Aubert 1978)

29 *Meniscus catenator* (Panzer, 1804)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 12 June 1988; Ø Aremark: Bøensætre (EIS 21), 1 ♀ 18 July 1992; AK Asker: Semsvannet, Tømmervika (EIS 28), 1 ♀ 9 July 1989; VE Larvik: Brunlanes, Mørje (EIS 11), 1 ♀ 7 July 1983, widespread in Norway (Strand 1898, Roman 1936, 1942, Jussila 1976a).

COLLYRIINAE

*30 *Collyria coxator* (Villiers, 1789)
BØ Røyken: Hyggen, Kinnartangen (EIS 28), 1 ♀ 17 June 1989, widespread in Europe.

CREMASTINAE

*31 *Cremastus geminus* Gravenhorst, 1829
AK Bærum: Borøya (EIS 28), 1 ♀ 20 June 1993; BØ Hurum: Verket, Verksøya (EIS 28), 1 ♂ 18 June 1989, widespread in Europe (Sédivy 1970).

32 *Cremastus infirmus* Gravenhorst, 1829
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 13 August 1993, reported from Norway (Jussila 1976a).

CTENOPELMATINAE

Ctenopelmatini

33 *Xenoschesis fulvipes* (Gravenhorst, 1829)
HOI Ulvik: Finse (EIS 42), 1 ♀ 19 July 1991, reported from Norway (Strand 1900, Jussila 1973)

Mesoleiini

34 *Alexeter fallax* (Holmgren, 1855)
SFI Vik: Orvedal (EIS 50), 1 ♂ 16 July 1991, previously found in Norway (Roman 1936, Jussila 1976a).

35 *Alexeter nebulator* (Thunberg, 1822) [syn. *gracilentus* Holmgren, 1855]
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 16 July 1988, widespread in Norway (Strand 1913, 1919, Roman 1936, 1942, Jussila 1973, 1976a).

*36 *Alexeter rapinator* (Gravenhorst, 1829)
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♂ 13 August 1993, known from Central Europe.

37 *Alexeter sectator* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 21 September 1986; Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♀ 25 September 1992; BØ Nedre Eiker: Hagatjern, M.I.F.-hytta (EIS 28), 1 ♀ 22 September 1989, found throughout Norway (Strand 1906, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

38 *Anoncus gracilicornis* Holmgren, 1855
Ø Aremark: Bøensætre (EIS 21), 1 ♀ 18 July 1992, previously described throughout Norway (Strand 1898, 1913, Roman 1936, Jussila 1973, 1976a).

*39 *Campodorus incidens* (Thomson, 1894)
Ø Sarpsborg: Tune, Tunevannet (EIS 20), 1 ♀ 22 August 1992, known from Sweden.

40 *Campodorus molestus* (Holmgren, 1855)
ON Lom: Memurubu, 985 m.a.s.l. (EIS 61), 1 ♂ 27 August 1989, previously known from Norway (Jussila 1973, 1976a).

41 *Campodorus viduus* (Holmgren, 1855)
HES Åsnes: Fjellet (EIS 47), 1 ♂ 13 June 1989, found in Norway (Roman 1936, Jussila 1973, 1976a).

42 *Lagarotis debitor* (Thunberg, 1822)
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♀ 25 September 1992; AK Asker: Båstad (EIS 28), 1 ♀ 16 September 1992, known from Norway (Roman 1936).

*43 *Lamachus eques* (Hartig, 1838)
VAY Marnardal: Bjelland (EIS 5), 1 ♂ 3 May 1982, widespread in Northern and Central Europe.

44 *Mesoleius* s.str. *armillatorius* (Gravenhorst, 1807)
Ø Aremark: Bøensætre (EIS 21), 1 ♂ 9 July 1993, previously recorded from Norway (Roman 1936, Jussila 1976a).

45 *Scopesis fraternatus* (Holmgren, 1855)
ON Dovre: Dombås (EIS 71), 1 ♂ 15 July 1988.

Widespread in Northern and Central Europe, reported from Norway (Jussila 1973).

46 *Scopesis frontator* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 1 October 1987; found in Norway (Strand 1913).

Euryproctini

47 *Euryproctus crassicornis* Thomson, 1889
Ø Fredrikstad: Borge (EIS 20), 1 ♀ 24 July 1993, known from Norway (Strand 1913).

48 *Gunomeria macrodactyla* (Holmgren, 1855)
Ø Aremark: Bøensætre (EIS 21), 1 ♀ 9 July 1993, recorded from Norway (Roman 1942).

*49 *Hadrodactylus graminicola* Idar, 1979
AK Asker: Semsvannet (EIS 28), 2 ♂ 31 May 1992, found in Northern and Central Europe (Idar 1981).

50 *Hadrodactylus paludicola* (Holmgren, 1854)
Ø Aremark: Bøensætre (EIS 21), 1 ♂ 9 July 1993. Widespread in Northern and Central Europe, known from Norway (Jussila 1976a).

51 *Hadrodactylus tarsator* Thomson, 1883
Ø Hvaler: Akerøya (EIS 12), 1 ♂ 6 June 1992, known from Norway (Idar 1974).

52 *Pantorhaestes xanthostomus* (Gravenhorst, 1829)
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 21 August 1992. Previously recorded from Norway (Strand 1906, Roman 1936, Jussila 1973, 1976a).

53 *Syndipnus macrocerus* Thomson, 1888
BV Nore og Uvdal: Tunhovd, Langedrag (EIS 43), 1 ♀ 1992, earlier reported from Norway (Roman 1936, Jussila 1976a, 1976b).

Perilissini

54 *Absyrtus vicinator* (Thunberg, 1822)
Ø Sarpsborg: Visterområdet (EIS 20), 1 ♂ 27 August 1992; BØ Nedre Eiker: Hagatjern (EIS 28), 1 ♂ 18 September 1992, found in Norway (Strand 1913, Jussila 1976a).

55 *Perilissus filicornis* (Gravenhorst, 1820)
Ø Sarpsborg: Skjeberg, Blåkollen (EIS 20), 1 ♀ 31 May 1992, known from Norway (Strand 1906, Jussila 1973, 1976a).

56 *Perilissus rufoniger* (Gravenhorst, 1820)
Ø Eidsberg: Mysen (EIS 20) 1 ♂ 23 May 1993; AK Asker: Vardåsen (EIS 28), 1 ♂ 6 June 1993, previously reported from Norway (Strand 1898, 1919, Jussila 1973).

57 *Perilissus spilonotus* (Stephens, 1838) [syn. *subcinctus* Holmgren, 1855]
Ø Fredrikstad: Onsøy, Rauer (EIS 19), 2 ♀ 29 July 1989, widespread in Northern and Central Europe, reported from Norway (Roman 1936).

Pionini

58 *Pion fortipes* (Gravenhorst, 1829)
VE Tjøme: Moutmarka (EIS 19), 1 ♂ 7 June 1989 and 1 ♀ 12 June 1989; previously recorded from Norway (Strand 1898, 1913, Roman 1942, Jussila 1976a).

59 *Rhorus longicornis* (Holmgren, 1856)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 20 August 1992, found in Norway (Jussila 1973, 1976a).

*60 *Sympherta facialis* (Hellén, 1941)
VE Larvik: Hedrum, Gjønnesvann (EIS 19), 1 ♀ 29 June 1983; known from Central Europe and Finland (Hinz 1991).

DIPLAZONTINAE

61 *Diplazon annulatus* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Tunevannet (EIS 20), 1 ♂ 16 June 1991, previously reported from Norway (Roman 1936, Jussila 1973, 1976a).

62 *Diplazon laetatorius* (Fabricius, 1781)
AAY Arendal: Merdø (EIS 6), 1 ♀ 13 June 1992, previously known from Norway (Roman 1942, Jussila 1973, 1976a).

63 *Diplazon pectoratorius* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 June 1988, recorded from Norway (Strand 1913, Roman 1936, 1942, Jussila 1973, 1976a).

*64 *Diplazon scutatorius* Teunissen, 1934
Ø Skjeberg: Skjebergdalen (EIS 20), 1 ♀ 15 August 1990, a widespread species which was mixed with *D. tetragonus* (Thunberg) until its status has recently been clarified by Diller (1982).

65 *Diplazon tetragonus tetragonus* (Thunberg, 1822)
Ø Moss: Jeløy, Reierbukta (EIS 19), 1 ♀ 30 August 1992; Ø Råde: Tomb (EIS 20), 1 ♂ 29 May 1991; found throughout Norway (Strand 1913, Roman 1936, 1942, Jussila 1973, 1976a).

66 *Promethes sulcator sulcator* (Gravenhorst, 1829)
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 2 ♀ 21 August 1992; Ø Fredrikstad: Borge, Persnes (EIS 20), 1 ♂ 9 September 1993, Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 4 September 1988, widespread in Norway (Roman 1936, 1942, Jussila 1973, 1976a).

67 *Sussaba pulchella* (Holmgren, 1856) [syn. *laticarpus* Thomson, 1890]
FN Porsanger: Lakselv (EIS 174), 1 ♂ 25 June 1992, found earlier in Norway (Roman 1936, Jussila 1973, 1976a).

68 *Syrphoctonus neopulcher* (Horstmann, 1968) [syn. *pulcher* auct. nec Holmgren]
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 21

August 1992, previously found in Norway (Roman 1936, 1942, Jussila 1973, 1976a).

69 *Syrphophilus bizonarius* (Gravenhorst, 1829)
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♂ 29 July 1992, Ø Fredrikstad: Borge, Persnes (EIS 20), 1 ♂ 9 September 1993, previously known throughout Norway (Strand 1906, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

70 *Tymmophorus rufiventris* (Gravenhorst, 1829) [syn. *holmgreni* Bridgman, 1882]
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♂ 15 August 1990. Widespread in Northern and Central Europe, reported from Norway (Strand 1913).

EPHIALTINAE

Rhyssini

71 *Rhyssa persuasoria* (Linné, 1758)
VE Larvik: Tagtvedt, Orøya (EIS 19), 1 ♂ 9 June 1978, previously known from Norway (Strand 1898, Jussila 1976a).

Delomeristini

72 *Delomerista laevis* (Gravenhorst, 1829)
HOI Ulvik: Finse (EIS 42), 1 ♀ 27 July 1991; widespread in Norway (Strand 1900, 1913, Roman 1936, Jussila 1973, 1976a)

73 *Delomerista mandibularis* (Gravenhorst, 1829)
AK Asker: Vardåsen (EIS 28), 1 ♂ 6 June 1993, known from Norway (Strand 1898, Roman 1936)

74 *Perithous divinator* (Rossius, 1790)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 18 July 1993; Ø Hvaler: Asmaløy, Huser (EIS 12), 2 ♀ 25 May 1991, found earlier in Norway (Jussila 1976a).

75 *Perithous scurra* (Panzer, 1805) [syn. *mediator* Fabricius, 1804 praeocc.]
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 10 August 1993, recorded from Norway (Strand 1898, 1906, Jussila 1976a).

Pimplini

*76 *Apechthis rufata* (Gmelin, 1790)
VAY Kristiansand: Bråvann (EIS 2), 1 ♀ 12 June 1990, widespread in Europe (Aubert 1969).

77 *Itoplectis alternans* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 5 September 1987 and 1 ♀ 28 May 1988, known from Norway (Jussila 1976a).

78 *Itoplectis aterrima* Jussila, 1965
AK Asker: Vardåsen (EIS 28), 1 ♀ 28 August 1993, widespread in Europe and known from Norway (Jussila 1976a).

*79 *Itoplectis clavicornis* (Thomson, 1877)
AAY Grimstad: Søm (EIS 6), 1 ♂ 5 May 1986, known from Sweden, Finland, and Central Europe (Aubert 1969).

80 *Itoplectis maculator* (Fabricius, 1775)
Ø Sarpsborg: Tune, Grålum (EIS 20), 1 ♀ 16 June 1993; AK Asker: Vardåsen (EIS 28), 1 ♀ 20 May 1989 and 1 ♀ 3 June 1992; AK Oslo: Sogn (EIS 28), 1 ♀ 16 July 1989, reported from Norway (Strand 1898, Roman 1942).

81 *Pimpla flavicoxis* Thomson, 1877
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 August 1993; Ø Råde: Tomb (EIS 20), 1 ♂ 29 May 1991; widespread in Norway (Strand 1900, 1906, Ulbricht 1912, Roman 1936, 1942, Jussila 1973, 1976a).

82 *Pimpla hypochondriaca* (Retzius, 1783) [syn. *instigator* Fabricius, 1793]
VE Larvik: Brunlanes, Mørje (EIS 11), 1 ♀ 12 August 1981 and 1 ♀ 22 August 1980; TEI Hjartdal: Sauland (EIS 26), 1 ♂ 1 August 1993, known from Norway (Strand 1898, Jussila 1973).

83 *Pimpla sodalis sodalis* (Ruthe, 1859)
HOI Ulvik: Finse (EIS 42), 1 ♀ 1 July 1993; previously reported from Norway (Strand 1906, 1913, Roman 1936, Jussila 1973).

84 *Pimpla spuria* Gravenhorst, 1829
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 16 July 1993; Ø Sarpsborg: Visterområdet (EIS 20), 1 ♂ 18 August 1992; Ø Fredrikstad: Onsøy, Mærrapanna (EIS 20), 1 ♂ 26 August 1992; known from Norway (Roman 1942, Jussila 1976a).

85 *Pimpla turionellae turionellae* (Linné, 1758)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 20 July 1990, 1 ♀ 30 July 1988, 1 ♀ 11 May 1993 and 1 ♂ 20 August 1993; widespread in Norway (Strand 1898, 1906, 1913, Ulbricht 1912, Roman 1936, 1942, Jussila 1976a).

*86 *Pimpla wilchristi* Fitton, Shaw & Gauld, 1988
RY Karmøy: Vea. (EIS 13), 1 ♀ 22 August 1993; known from Britain, the distribution of this newly described species is unknown.

Ephialtini

87 *Clistopyga incitator* (Fabricius, 1793)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 10 June 1992 and 10 October 1993, previously found in Norway (Strand 1906, 1913, Jussila 1973, 1976a).

88 *Ephialtes manifestator* (Linné, 1758)
AK Asker: Bleiker (EIS 28), 1 ♀ 27 August 1985, known from Norway (Strand 1898, Roman 1936, Jussila 1976a).

*89 *Exeristes roborator* (Fabricius, 1793)
VAY Marnardal: Bjelland (EIS 5), 2 ♀ and 1 ♂ May

1982. Widespread in the Palaearctic region (Aubert 1969).

90 *Seropus stercorator* (Fabricius, 1793)
AK Bærum: Vestmarka (EIS 28), 1 ♀ 29 July 1992, found previously in Norway (Roman 1942, Jussila 1976a).

*91 *Liotryphon crassisetus* (Thomson, 1877)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 30 June 1993, widespread in Northern and Central Europe (Aubert 1969).

92 *Paraperithous gnathaulax* (Thomson, 1877)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 30 June 1993, known from Norway (Jussila 1976a).

93 *Scambus (Endromopoda) arundinator* (Fabricius, 1804)
Ø Fredrikstad: Torsnes/Nes (EIS 20), 1 ♀ 17 June 1993, recorded from Norway (Jussila 1976a).

94 *Scambus (Endromopoda) detrita* (Holmgren, 1860)
AK Bærum: Tanum (EIS 28), 1 ♀ 5 June 1992; AK Bærum: Borøya (EIS 28), 1 ♀ 10 August 1993; TEY Nome: Ulefoss (EIS 18), 1 ♀ 31 July 1993, known from Norway (Strand 1900, 1913, Roman 1936, Jussila 1973).

*95 *Scambus (Ateleophadnus) nigricans* (Thomson, 1877)
AK Asker: Gullhella st. (EIS 28), 1 ♀ 5 August 1989, widespread in Northern and Central Europe (Aubert 1969).

96 *Scambus* s.str. *annulatus* (Kiss, 1924) [syn. *nucum* auct. nec Ratzeburg]
AAY Arendal: Tromøy (EIS 6), 1 ♂ 6 October 1979, reported from Norway (Roman 1936, 1942).

97 *Scambus* s.str. *brevicornis* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 30 June 1993; AK Bærum: Borøya (EIS 28), 1 ♀ 20 June 1993, distributed throughout Norway (Jussila 1973, 1976a).

98 *Scambus* s.str. *buolianae* (Hartig, 1838)
Ø Moss: Jeløy, Reierbukta (EIS 19), 1 ♀ 30 August 1992; Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 21 August 1992; AK Oslo: Sogn (EIS 28), 1 ♀ 11 July 1989; AK Bærum: Ostøya (EIS 28), 1 ♀ 23 May 1992; BØ Nedre Eiker: Hagatjern (EIS 28), 1 ♀ 18 September 1992, known from Norway (Jussila 1973, 1976a).

99 *Scambus* s.str. *vesicarius* (Ratzeburg, 1844)
Ø Sarpsborg: Visterområdet (EIS 20), 2 ♀ 18 August 1992 and 31 August 1992, known from Norway (Roman 1942, Jussila 1973, 1976a).

*100 *Tromatobia oculatoria* (Fabricius, 1798)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 1 June 1992; widespread in Europe (Aubert 1969).

101 *Tromatobia ovivora* (Boheman, 1821)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 October 1993; BØ Drammen: Sauesætra (EIS 28), 1 ♀ 3 October 1992; widespread in Europe, recorded earlier from Norway (Ulbricht 1912, Strand 1913).

Polysphinctini

102 *Acrodactyla degener* (Haliday, 1838)
AK Asker: Båstad (EIS 28), 1 ♀ 7 October 1993, reported from Norway (Jussila 1973).

103 *Acrodactyla quadrisculpta* (Gravenhorst, 1820)
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 21 August 1992; known from Norway (Strand 1913).

104 *Oxyrrhexis carbonator* (Gravenhorst, 1807)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 26 June 1988 and 2 ♀ 1 and 10 June 1992, known from Norway (Strand 1913, Roman 1942, Jussila 1976a).

*105 *Schizopyga circulator* (Panzer, 1801)
Ø Hvaler: Akerøya (EIS 12), 1 ♂ 6 June 1992; widespread in Europe (Aubert 1969).

*106 *Zatypota bohemani* (Holmgren, 1856)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 August 1993; widespread in Europe (Aubert 1969).

*107 *Zatypota discolor* (Holmgren, 1860)
TEI Bø (EIS 17), 1 ♂ 31 July 1993; known from Northern and Central Europe (Aubert 1969).

108 *Zatypota percontatoria* (Müller, 1776) [syn. *gracilis* Holmgren, 1860]
Ø Fredrikstad: Onsøy, Mærrapanna (EIS 20), 1 ♂ 26 August 1992, widespread in Europe and recorded from Norway (Strand 1898).

Poemenini

109 *Poemenia hectica* (Gravenhorst, 1829) [syn. *tipularia* Holmgren, 1860]
OS Gran: Buhammeren (EIS 36), 1 ♀ 7 July 1991, known from Northern and Central Europe, recorded from Norway (Strand 1898).

ICHNEUMONINAE

Listrodomini

*110 *Anisobas cingulatorius* (Gravenhorst, 1820)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 18 June 1993; VE Tjøme: Hvasser syd (EIS 19), 1 ♀ 6 June 1992. Widely distributed in Europe (Heinrich 1980).

Coelichneumonini

111 *Coelichneumon deliratorius* (Linné, 1761)
AAY Grimstad: Søm (EIS 6), 1 ♂ 5 July 1987; recorded from Norway (Jussila 1976a).

*112 *Coelichneumon falsificus* (Wesmael, 1844)
NTI Lierne: S Furusjøen (EIS 108), 1 ♂ 22 June 1988; widespread in Northern and Central Europe.

113 *Coelichneumon nigerrimus* (Stephens, 1835) [syn. *derasus* Wesmael, 1844]
BØ Hurum: Mølen (EIS 19), 1 ♂ 14 July 1989; known from Norway (Strand 1913, Roman 1942).

*114 *Coelichneumon serenus* (Gravenhorst, 1829)
VAY Lyngdal: Nebbdal (EIS 4), 1 ♀ 30 April 1982, 1 ♂ 17 April 1981, widespread in Europe.

115 *Protichneumon fusorius* (Linné, 1758)
AAY Grimstad (EIS 6), 1 ♂ 5 July 1987; recorded from Norway (Strand 1898).

116 *Protichneumon pisorius* (Linné, 1758)
AK Asker: Nesøya (EIS 28), 1 ♂ 16 June 1993; known from Norway (Roman 1942, Jussila 1976a).

Ichneumonini

117 *Aoplus ruficeps* (Gravenhorst, 1829)
BØ Nedre Eiker: Hagatjern (EIS 28), 1 ♀ 22 September 1989; FV Måsøy: Rolvsøy, Nordhavna (EIS 186), 1 ♂ 24 June 1992; known from Norway (Jussila 1976a).

118 *Barichneumon peregrinator* (Linné, 1758)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♂ 18 April 1987 and 1 ♂ 26 June 1988; VAY Farsund: Einarsneset (EIS 1), 1 ♀ 7 August 1992, recorded from Norway (Strand 1906, Jussila 1976a).

119 *Chasmias motatorius* (Fabricius, 1775)
Ø Fredrikstad: Torsnes (EIS 20), 1 ♀ 27 March 1992; found in Norway (Jussila 1976a).

120 *Cratichneumon fabricator* (Fabricius, 1793)
Ø Fredrikstad: Onsøy, Engelsviken (EIS 20), 1 ♀ 3 October 1987, found throughout Norway (Strand 1900, 1913, Roman 1936, Jussila 1976a).

121 *Cratichneumon rufifrons* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 26 June 1988; AK Asker: Risenga (EIS 28), 1 ♂ 4 June 1989; SFI Vik: Vikoyri (EIS 50), 1 ♂ 25 June 1989, widespread in Norway (Strand 1900, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

122 *Cratichneumon viator viator* (Scopoli, 1763) [syn. *nigritarius* Gravenhorst, 1820]
AK Asker: Båstad (EIS 28), 1 ♀ 5 October 1993; distributed throughout Norway (Strand 1898, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

123 *Ctenichneumon castigator* (Fabricius, 1793)
VE Tjøme: Hvasser syd (EIS 19), 1 ♂ 6 June 1992, previously reported from Norway (Strand 1906).

*124 *Ctenichneumon divisorius* (Gravenhorst, 1820)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♂ 22 January 1988 and 20 April 1993, 3 ♀ 25 July 1991, 15 February 1993, 10 March 1993; AK Bærum: Haslum (EIS 28), 1 ♂ 13 September 1990, found throughout Europe.

125 *Diphyus amatorius* (Müller, 1776)
AK Oslo: Nøklevann, Kattisa (EIS 28), 1 ♂ 1 August 1985; VE Larvik: Hedrum, Vestmarka (EIS 19), 1 ♂ 31 July 1983; known from Norway (Strand 1898, Jussila 1976a).

*126 *Diphyus ochromelas* (Gmelin, 1790) [syn. *pulchellus* Christ, 1791]
AK Asker: Bleiker (EIS 28), 1 ♀ 23 September 1989, widespread in Europe.

127 *Hepiopelmus melanogaster* (Gmelin, 1790)
VE Larvik: Hedrum, Vestmarka (EIS 19), 1 ♂ 29 July 1983, previously found in Norway (Roman 1942).

128 *Ichneumon bucculentus bucculentus* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 June 1988; recorded from Norway (Strand 1906, Jussila 1976a).

129 *Ichneumon confusor* Gravenhorst, 1829
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 24 July 1993; VAY Farsund: Einarsneset (EIS 1), 1 ♂ 8 August 1992; previously known from Norway (Roman 1942, Jussila 1973, 1976a).

130 *Ichneumon extensorius* Linné, 1758
Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♂ 6 August 1992; Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 11 May 1993 and 24 July 1993; Ø Aremark: Vestfjella (EIS 21), 1 ♂ 29 August 1992; AK Bærum: Vestmarka (EIS 28), 1 ♂ 29 July 1992; BØ Drammen: Sauesætra (EIS 28), 1 ♂ 3 October 1992; VE Larvik: Tjølling, Heggdal (EIS 19), 2 ♀ 1 May 1983; widespread in Norway (Strand 1913, Roman 1942, Jussila 1976a).

131 *Ichneumon gracilentus* Wesmael, 1844
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 26 April 1985; Ø Fredrikstad: Gansrød (EIS 20), 1 ♂ 26 August 1991; known from Norway (Strand 1913, Roman 1942, Jussila 1976a).

132 *Ichneumon lapponicus* Hellén, 1951
RY Sandnes: Arboretet (EIS 7), 1 ♂ 15 July 1988; known from Norway (Jussila 1976a, Hilpert 1992).

133 *Ichneumon luteipes* Wesmael, 1855
FV Måsøy: Rolvsøy, Stoppelfjorden (EIS 180), 1 ♂ 20 July 1992, previously recorded from Norway (Strand 1898, 1913, Roman 1942, Hilpert 1992).

134 *Ichneumon sarcitorius sarcitorius* Linné, 1758
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 18 July 1990, previously known from Norway (Strand 1898, Jussila 1976a, Hilpert 1992).

135 *Ichneumon simulans* Tischbein, 1873 [syn. *variolosus* Holmgren, 1879]
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♂ 21 August 1992; widespread in Europe, known from Norway (Strand 1913, Roman 1942).

136 *Ichneumon stramentarius stramentarius* Gravenhorst, 1820
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 20 July 1988; AK Asker: Semsvannet, Tømmervika (EIS 28), 1 ♂ 9 July 1989; OS Gran: Buhammeren (EIS 36), 1 ♂ 26 July 1988, widespread in Norway (Strand 1898, Roman 1936, Jussila 1973, 1976a).

137 *Ichneumon suspiciosus* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 November 1988; AK Fet: Gan (EIS 37), 1 ♀ 15 April 1991; recorded from Norway (Roman 1942, Jussila 1976a).

*138 *Limerodops elongatus* (Brischke, 1878)
Ø Sarpsborg: Skjeberg, Blåkollen (EIS 20), 1 ♂ 4 September 1992; known from Central Europe.

139 *Stenaoplus pictus* Gravenhorst, 1829 [syn. *ratzeburgi* Hartig, 1838]
VE Tjøme: Sønstegård (EIS 19), 1 ♀ 6 June 1992, recorded from Norway (Strand 1913, Jussila 1976a).

*140 *Stenichneumon culpator* (Schrank, 1802)
Ø Aremark: Bøensætre (EIS 21), 1 ♂ 18 July 1992; widespread in Europe.

*141 *Virgichneumon tergenus* (Gravenhorst, 1820)
BØ Røyken: Hyggen, Kinnartangen (EIS 28), 1 ♂ 24 July 1993, VE Larvik: Kloppsand (EIS 19), 1 ♀ 13 June 1993; widespread in Europe.

*142 *Vulgichneumon suavis* (Gravenhorst, 1820) [syn. *lepidus* Gravenhorst, 1829]
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ ex pupa 25 February 1993; previously known from Central Europe.

Eurylabini

*143 *Eurylabus torvus* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 7 September 1987; VE Tjøme: Hvasser syd (EIS 19), 1 ♀ 6 June 1992; known from Central Europe.

*144 *Eurylabus tristis* (Gravenhorst, 1829)
AK Asker: Fusdal (EIS 28), 1 ♂ 27 June 1993; widespread in Europe.

*145 *Probolus concinnus* Wesmael, 1853
VAY Kristiansand: Kuholmen (EIS 2), 1 ♀ 30 August 1976; widespread in Northern and Central Europe.

146 *Probolus culpatorius* (Linné, 1758)
BØ Drammen: Sauesætra (EIS 28), 1 ♂ 3 October 1992, known from Norway (Strand 1898, Jussila 1973, 1976a).

Platylabini

*147 *Apaelecticus bellicosus* Wesmael, 1844
TEY Nome: Ulefoss (EIS 18), 1 ♂ 31 July 1993; found in Northern and Central Europe.

*148 *Apaelecticus mesostictus* (Gravenhorst, 1829)
Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1 ♂ 12 July 1992; widespread in Europe.

149 *Platylabus pedatorius* (Fabricius, 1793)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 October 1993; known from Norway (Strand 1898, Jussila 1976a).

*150 *Platylabus rufiventris* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 1 November 1992; found in Northern and Central Europe.

Phaeogenini

151 *Aethecerus nitidus* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 10 July 1992, previously recorded from Norway (Strand 1913).

*152 *Centeterus confector* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 25 August 1993; distributed throughout Europe.

153 *Dirophanes (Phaeogenes* auct.) *invisor* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 12 April 1991; known from Norway (Jussila 1976a).

154 *Misetus oculatus* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 10 August 1993, known from Norway (Roman 1936).

*155 *Oiorhinus pallipes* Wesmael, 1844
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 18 August 1993; known from Finland and Central Europe.

156 *Phaeogenes* s.str. *melanogonos* (Gmelin, 1790)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 25 August 1993, VE Larvik: Mølen (EIS 11) 1 ♀ 12 June 1993; previously recorded from Norway (Strand 1906, 1913, Jussila 1976a).

*157 *Tycherus (Phaeogenes* auct.) *coriaceus* (Perkins, 1953)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 10-11 May 1993; known from Northern and Central Europe.

MESOCHORINAE

158 *Mesochorus fulgurans* (Curtis, 1838)
AK Asker: Bleiker (EIS 28), 1 ♀ 22 October 1989; BØ Nedre Eiker: Hagatjern (EIS 28), 1 ♀ 22 September 1989; recorded from Norway (Strand 1913, Roman 1942, Jussila 1973).

159 *Mesochorus punctipleuris* Thomson, 1885
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 3 ♂ 21 August 1992, known from Norway (Jussila 1973).

* 160. *Mesochorus semirufus* Holmgren, 1858
TEI Bø: Bø sentrum (EIS 18), 1 ♀ 8 September 1992, found in Northern and Central Europe.

METOPIINAE

161 *Chorinaeus funebris* (Gravenhorst, 1829)
Ø Fredrikstad: Borge, Persnes (EIS 20), 1 ♂ 9 July 1993, reported from Norway (Strand 1900, 1906, 1913).

*162 *Colpotrochia cincta* (Scopoli, 1763)
HES Sør-Odal: Skarnes (EIS 37), 1 ♂ 3 September 1989; BØ Røyken: Kinnartangen (EIS 28), 1 ♂ 24 July 1993, widespread in Northern and Central Europe.

163 *Exochus gravipes* (Gravenhorst, 1820)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 10 August 1993. Widespread in Europe, known from Norway (Strand 1906, Roman 1936, Jussila 1976a).

*164 *Exochus lentipes* Gravenhorst, 1829
AK Bærum: Vestmarka (EIS 28), 1 ♀ 29 July 1992; BØ Hurum: Mølen (EIS 19), 1 ♀ 14 July 1989; known from Central Europe and Sweden.

*165 *Exochus mitralis australis* Thomson, 1895
Ø Fredrikstad: Borge, Gansrød (EIS 20), 1 ♂ 24 July 1993. Widespread in Europe.

166 *Exochus nigripalpis nigripalpis* Thomson, 1887
AAY Arendal: Tromøya, Hove (EIS 6), 1 ♀ 2 August 1992, known from Norway (Strand 1913, Jussila 1973).

167 *Exochus pictus pictus* Holmgren, 1856
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 7 June 1993 and 18 June 1993, previously recorded from Norway (Strand 1906, 1913, Jussila 1973, 1976a).

*168 *Metopius (Ceratopius) fuscipennis* (Wesmael, 1849)
VE Larvik: Kloppsand (EIS 19), 1 ♂ 11 June 1993. Widespread in Europe, known from Sweden and Finland.

*169 *Triclistus longicalcar* Thomson, 1887
AAY Arendal: Tromøya, Hove (EIS 6), 1 ♂ 2 August 1992, found in Northern and Central Europe.

*170 *Trieces facialis* (Thomson, 1887)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 28 July 1993, previously recorded from Southern Sweden.

OPHIONINAE

171 *Enicospilus ramidulus* (Linné, 1758)
AK Frogn: Solbergstrand (EIS 28), 1 ♂ 5 June 1990; VE Larvik: Hedrum, Faret (EIS 19), 1 ♂ 29 July 1982; VE Larvik: Kloppsand (EIS 19), 1 ♀ 12 June 1993, known from Norway (Jussila 1976a).

172 *Ophion luteus* (Linné, 1758)
AK Bærum: Haslum (EIS 28), 2 ♀ 15 August 1990 and 18 August 1990; AK Asker: Båstad (EIS 28), 1 ♂ 27 August 1992 and 2 ♀ 10 and 25 August 1993; OS Lunner: Grindvold (EIS 36), 1 ♂ 6 August 1991, found throughout Norway (Jussila 1973, Wiig 1982).

173 *Ophion obscuratus* Fabricius, 1798
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 19 May 1992; BØ Drammen: Bragernesåsen (EIS 28), 1 ♀ 22 May 1992; VE Tjøme: Moutmarka (EIS 19), 1 ♂ 12 June 1989, recorded from Norway (Jussila 1976a, Wiig 1982).

174 *Ophion parvulus* Kriechbaumer, 1879
BØ Nedre Eiker: Hagatjern (EIS 28), 1 ♀ 18 September 1992, reported from Norway (Wiig 1982).

175 *Ophion pteridis* Kriechbaumer, 1879
BØ Nedre Eiker: Hagatjern, M.I.F.-hytta (EIS 28), 1 ♀ 22 September 1989, previously recorded from Norway (Wiig 1982).

176 *Ophion scutellaris* Thomson, 1888
AAY Grimstad: Søm (EIS 6), 1 ♀ 8 May 1986, known from Norway (Wiig 1982).

ORTHOCENTRINAE

177 *Orthocentrus frontator* (Zetterstedt, 1838) [syn. *repentinus* Holmgren, 1856]
Ø Fredrikstad: Gansrød (EIS 20), 1 ♀ 13 May 1992, known from Norway (Strand 1906, 1913, Jussila 1973, 1976a).

OXYTORINAE

178 *Aniseres pallipes* Förster, 1871
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 4 September 1988. Known from Central Europe, probably found in Norway previously (Roman 1942).

179 *Cylloceria caligata* (Gravenhorst, 1829)
TEI Bø (EIS 17), 1 ♀ 31 July 1993, reported from Norway (Ulbricht 1912, Strand 1913, Roman 1942).

180 *Cylloceria melancholica* (Gravenhorst, 1820)
HOI Ulvik: Finse (EIS 42), 1 ♀ 18 July 1991; found throughout Norway (Ulbricht 1912, Strand 1913, Roman 1936, 1942, Jussila 1976a).

181 *Cylloceria sylvestris* (Gravenhorst, 1829) [syn. *striolata* Hellén, 1915]
FV Måsøy: Rolvsøy, Gargo (EIS 186), 1 ♀ 19 July 1992, previously recorded from Norway (Jussila 1973).

*182 *Megastylus suecicus* Van Rossem, 1983
Differs from the original description by its black face with two small yellow streaks below the antennal sockets, otherwise similar to the description of the type.
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 July 1993, known from Sweden and Netherlands (Van Rossem 1983).

183 *Pantisarthrus lubricus* (Förster, 1871) [syn. *inaequalis* Förster, 1871]
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 October 1993; VE Sande: Bjørkøya (EIS 19), 1 ♀ 27 May 1989, known from Norway (Jussila 1973, 1976a).

PHYGADEUONTINAE (GELINAE sensu Townes)

Mesostenini

184 *Acrocrinus stylator* (Thunberg, 1822) [syn. *macrobatus* Gravenhorst, 1829]
VE Larvik: Tagtvedt (EIS 19), 1 ♀ 24 June 1983, recorded from Norway (Strand, 1898).

185 *Agrothereutes abbreviatus* (Fabricius, 1794) [syn. *abbreviator* Fabricius, 1798]
BØ Drammen: Sauesætra (EIS 28), 1 ♀ 3 October 1992, previously known from Norway (Strand 1898, 1913, Roman 1936, Jussila 1973).

*186 *Agrothereutes grossus* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 18 June 1993; widespread in Northern and Central Europe.

*187 *Aritranis fugitiva* (Gravenhorst, 1829)
BØ Hurum: Verket, Verksøya (EIS 28), 1 ♀ 18 June 1989; known from Northern and Central Europe.

188 *Ischnus migrator* (Fabricius, 1775)
AK Bærum: Bærumsmarka (EIS 28), 1 ♀ 28 April 1990; AK Asker: Vardåsen (EIS 28), 1 ♀ 30 March 1990, recorded from Norway (Strand 1900, 1913 Roman 1936, 1942, Jussila 1973).

189 *Itamoplex (Cryptus* auct.) *armator* (Fabricius, 1804)
AK Asker: Fusdal (EIS 28), 1 ♂ 27 June 1993; VE Larvik: Kloppsand (EIS 19), 2 ♂ 13 June 1993; found in Norway (Strand 1900, Roman, 1942, Jussila 1973, 1976a).

190 *Itamoplex (Cryptus* auct.) *titubator* (Thunberg, 1822)
AK Asker: Vardåsen (EIS 28), 1 ♀ 13 June 1989, 1 ♀ and 1 ♂ 6 June 1993; HES Åsnes: Fjellet (EIS 47), 1 ♀ 13 June 1989; HOI Ulvik: Finse (EIS 42), 1 ♀ 27 July 1991, known from Norway (Strand 1898, 1906, 1913, Roman 1936, 1942).

191 *Itamoplex (Cryptus* auct.) *viduatorius* (Fabricius, 1804)
Ø Hvaler: Akerøya (EIS 12), 1 ♀ 29 May 1993; AK Bærum: Vestmarka (EIS 28), 1 ♀ 29 July 1992, widespread in Norway (Strand 1898, 1906, 1913, Roman 1942, Jussila 1976a).

192 *Pycnocryptus director* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 31 May 1993; AK Bærum: Ostøya (EIS 28), 1 ♀ and 1 ♂ 23 May 1992; AK Asker: Vardåsen (EIS 28), 1 ♀ 6 June 1993; reported earlier from Norway (Strand 1906, 1913, Jussila 1976a).

193 *Sphecophaga vesparum vesparum* Curtis, 1840
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 22 May 1992; AK Bærum: Borøya (EIS 28), 2 ♀ 20 June 1993; known from Norway (Roman 1942, Jussila 1976a).

*194 *Stenarella domator domator* (Poda, 1761) [syn. *gladiator* Scopoli, 1763]
Ø Sarpsborg: Tune, Råkil (EIS 20), 3 ♀ 5 June 1990, 28 May 1993, 7 June 1993; AK Asker: Bleiker (EIS 28), 1 ♀ 11 September 1993, widespread in Central and Southern Europe (Horstmann 1989).

195 *Trychosis legator legator* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 August 1993; AK Bærum: Ostøya (EIS 28), 1 ♂ 23 May 1992; VE Sande: Bjørkøya (EIS 19), 1 ♀ 27 May 1989, recorded from Norway (Strand 1906, Roman 1942, Jussila 1976a).

Hemigasterini (=Aptesini)

196 *Aptesis nigrocinctus* (Gravenhorst, 1829)
Ø Fredrikstad: Onsøy, Rauer (EIS 19), 1 ♂ 29 July 1989; Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 25 June 1987, 1 ♂ 22 August 1992; Ø Sarpsborg: Skjeberg (EIS 20), 1 ♂ 4 September 1992, widespread and common in Norway (Strand 1906, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

197 *Cubocephalus distinctor* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 30 June 1993, found in Norway (Roman 1936).

198 *Cubocephalus nigriventris* (Thomson, 1896)
AAY Arendal: Nidelven (EIS 6), 1 ♀ 8 July 1992; known from Norway (Strand 1913, Roman 1936).

199 *Echthrus reluctator* (Linné, 1758)
VE Tjøme: Hvasser (EIS 19), 1 ♀ 7 June 1993; previously reported from Norway (Jussila 1976a).

200 *Giraudia gyratoria* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 19 July 1988, 1 ♂ 26 June 1988, 1 ♂ 5 July 1989; widespread in Europe, reported from Norway (Strand 1906).

201 *Pleolophus basizonius* (Gravenhorst, 1829)
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 1 ♀ 10 September 1992, found in Norway (Strand 1913, Roman 1942, Jussila 1976a).

202 *Polytribax arrogans* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 1 July 1991; AK Bærum: Tanum (EIS 28), 1 ♂ 5 June 1992; previously reported from Norway (Strand 1898, Roman 1942, Jussila 1973).

Phygadeuontini

*203 *Amphibulus gracilis* Kriechbaumer, 1893
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♂ 1 and 5 October 1988; Ø Sarpsborg: Tune, Jelsnes (EIS 20), 1 ♂ 20 September 1992; BØ Nedre Eiker: Hagatjern, M.I.F.-hytta (EIS 28), 2 ♂ 22 September 1989 and 1 ♂ 18 September 1992. A rare, but widespread species (Sawoniewicz 1990).

204 *Atracodes arator* (Haliday, 1838)
Ø Sarpsborg: Tune, Holleby (EIS 20), 1 ♂ 12 June 1993, previously found in Norway (Jussila 1979).

*205 *Bathythrix fragilis* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 18 August 1993; widespread in Europe, known from Sweden and Finland (Sawoniewicz 1980).

206 *Bathythrix strigosus* (Thomson, 1884)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 28 July 1993. Previously found in Norway (Strand 1913).

207 *Dichrogaster aestivalis* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 July 1993; known from Norway (Strand 1913).

*208 *Dichrogaster longicaudata* (Thomson, 1884) [syn. *diatropus* Townes, 1983]
Ø Sarpsborg: Visteområdet (EIS 20), 1 ♀ 31 August 1992; Ø Rakkestad: Buerbakkene (EIS 20), 1 ♂ 29 May 1993, known from North and Central Europe, holarctic (Townes 1983).

*209 *Dichrogaster modesta* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 25 August 1993; AK Bærum: Borøya (EIS 28), 1 ♀ and 1 ♂ 10 August 1993; TEI Bø: Verpe (EIS 17), 1 ♀ 1 August 1993; found in Northern and Central Europe.

210 *Endasys analis* (Thomson, 1883)
AK Asker: Risenga (EIS 28), 1 ♂ 4 June 1989; known from Norway (Strand 1913).

*211 *Endasys plagiator* (Gravenhorst, 1829)
BØ Røyken: Hyggen, Kinnartangen (EIS 28), 1 ♂ 17 June 1989; widespread in Europe, known from Sweden and Finland (Sawoniewicz and Luhman 1992).

*212 *Endasys thunbergi* Sawoniewicz and Luhman, 1992 [syn. *rubricator* Thunberg, 1822 praeocc.]
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 June 1993; found in Sweden, Denmark, Finland, and Central Europe.

213 *Gelis areator* (Panzer, 1804)
Ø Sarpsborg: Borgarsyssel (EIS 20), 1 ♀ 8 August 1993; Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 25 July 1993, widespread in Norway (Strand 1906, 1913, Roman 1936, Jussila 1976a).

214 *Glyphicnemis profligator* (Fabricius, 1775)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 18 July 1993; reported from Norway (Roman 1942, Jussila 1976a).

*215 *Lochetica westoni* (Bridgman, 1880)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ and 1 ♂ 30 June 1993. Widespread in Europe.

216 *Phygadeuon vagans* Gravenhorst, 1829
Ø Sarpsborg: Tune, Råkil (EIS 20), 3 ♂ 16 July 1993, 20 July 1993, 28 July 1993; found earlier in Norway (Roman 1942, Jussila 1973).

217 *Rhembobius perscrutator* (Thunberg, 1822) [syn. *nigritus* Gravenhorst, 1829]
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 25 April 1993 and 3 May 1993; known from Norway (Roman 1942).

218 *Stilpnus subzonulus* Förster, 1876
AK Asker: Båstad (EIS 28), 1 ♂ 10 October 1993; reported from Norway (Jussila 1973).

PORIZONTINAE

219 *Campoletis (Anilastus) holmgreni* (Tschek, 1871)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 18 July 1993; Ø Moss: Jeløy, Alby Gods (EIS 19), 1 ♀ 28 June 1993. Widespread in Northern and Central Europe, known from Norway (Jussila 1973, 1976a).

220 *Campoletis (Anilastus) latrator* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♂ 26 June 1988 and 30 June 1993, distributed throughout Norway (Strand 1906, 1913, Roman 1936, 1942, Jussila 1976a).

221 *Campoplex borealis* Zetterstedt, 1838
Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♀ 22 June 1993, found in Norway (Jussila 1973, 1976a).

222 *Cymodusa cruentata* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 10 October 1993; widespread in Europe.

223 *Diadegma areolaris* (Holmgren, 1860)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 28 May 1993; known from Norway (Strand 1913).

*224 *Diadegma combinata* (Holmgren, 1860)
FN Porsanger: Gåradak (Goarahat) (EIS 174), 1 ♀ 27 June 1992, widespread in Northern and Central Europe (Horstmann 1969).

225 *Diadegma erucator* (Zetterstedt, 1838)
AK Bærum: Vestmarka (EIS 28), 1 ♀ 29 July 1992. Probably found earlier in Norway (Strand 1913: as *Angitia rufipes*).

226 *Diadegma majalis* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 18 June 1993. Found in Norway (Jussila 1973).

*227 *Diadegma neomajalis* Horstmann, 1969
VAY Kristiansand: Buene (EIS 2), 1 ♀ 26 April 1980; known from Germany and Sweden.

*228 *Diadegma trochanterata* (Thomson, 1887)
VAY Farsund: Einarsneset (EIS 1), 1 ♀ 7 August 1992. Known from Sweden (Horstmann 1969).

229 *Diadegma sordipes* (Thomson, 1887)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 12 June 1988, previously reported from Norway (Jussila 1976a).

*230 *Dusona nidulator* (Fabricius, 1804)
ON Dovre: Dombås (EIS 71), 1 ♀ 26 May 1992, widespread in Northern and Central Europe.

*231 *Dusona pulchripes* (Holmgren, 1872)
Ø Hvaler: Akerøya (EIS 12), 1 ♀ 29 May 1993; found in Northern and Central Europe.

232 *Dusona stragifex* (Förster, 1868)
VE Tjøme: Moutmarka (EIS 19), 1 ♀ 12 June 1989; widespread in Europe, known from Norway (Roman 1942, Jussila 1973, 1976a).

233 *Dusona tenuis* (Förster, 1868)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 10 June 1992; found previously in Norway (Strand 1913, Roman 1942).

234 *Dusona terebrator* (Förster, 1868)
Ø Fredrikstad: Øra (EIS 20), 1 ♀ 20 May 1993, known from Norway (Roman 1942).

235 *Enytus apostata* (Gravenhorst, 1829)
AAY Arendal: Moland, Eydehavn (EIS 6), 1 ♀ and 1 ♂ 24 June 1978 ex *Scythropia crataegella* (Linné, 1767) (Lepidoptera: Yponomeutidae); reported from Norway (Strand 1906, Roman 1942, Jussila 1973, 1976a).

236 *Sinophorus turionus* (Ratzeburg, 1844) [syn. *planiscapus* Thomson, 1887]
AK Bærum: Vestmarka (EIS 28), 1 ♀ 29 July 1992, widespread in Northern and Central Europe, found in Norway (Roman 1936, Jussila 1973).

*237 *Tranosemella completa* (Horstmann, 1973)
FV Måsøy: Rolvsøy, Gunnarnes (EIS 186), 1 ♀ 22 June 1992. Previously known from the Alps, probably a boreoalpine species.

238 *Tranosemella praerogator* (Linné, 1758)
Ø Fredrikstad: Onsøy, Mærrapanna (EIS 20), 1 ♀ 26 August 1992. Previously reported from Norway (Strand 1913, Jussila 1973).

TERSILOCHINAE

*239 *Barycnemis alpina* (Strobl, 1901)
ON Lom: Memurudalen, 1200 m.a.s.l. (EIS 61), 1 ♂ 26 August 1989, known from Sweden and the Alps (Horstmann 1981).

240 *Barycnemis bellator* (Müller, 1776)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 13 August 1993; FN Tana: Darjåkkskaidi, 320-450 m.a.s.l. (EIS 175), 1 ♀ 16 July 1990, previously recorded from Norway (Horstmann 1981).

241 *Barycnemis gravipes* (Gravenhorst, 1829)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 29 August 1993; found in Norway (Strand 1906).

242 *Barycnemis harpura* (Schrank, 1802)
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♀ 28 July 1993; Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 13 and 18 August 1993; AK Bærum: Borøya (EIS 28), 1 ♂ 10 August 1993; SFI Vik: Framfjord (EIS 50), 1 ♀ 17 July 1991; widespread and common in Norway (Strand 1906, 1913, Roman 1936, Jussila 1973).

243 *Tersilochus (Gonolochus) caudatus* Holmgren, 1860
Ø Aremark: Bøensætra (EIS 21), 1 ♀ and 1 ♂ 15 May 1993, known from Southern Norway (Horstmann 1971).

244 *Tersilochus jocator* Holmgren, 1858
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 8 May 1993; reported from Norway (Horstmann 1971).

*245 *Tersilochus subdepressus* Thomson, 1889
Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♀ 22 April 1992; widespread in Northern and Central Europe (Horstmann 1981).

TRYPHONINAE

Phytodietini

*246 *Phytodietus albipes* Holmgren, 1860
Ø Moss: Jeløy, Reierbukta (EIS 19), 1 ♀ 30 August 1992; AK Asker: Vardåsen (EIS 28), 1 ♀ 7 August 1993, found in Sweden.

247 *Phytodietus arcuatorius* (Thunberg, 1822)
Ø Fredrikstad: Torsnes/Nes (EIS 20), 1 ♀ 15 May 1992, known from Norway (Roman 1942).

248 *Netelia (Bessobates) cristatus* (Thomson, 1888)
AK Asker: Båstad (EIS 28), 1 ♀ 5 October 1993; found in Norway (Jussila 1973, 1976a).

249 *Netelia (Bessobates) latungula* (Thomson, 1888)
Ø Fredrikstad: Onsøy, Rauer (EIS 19), 1 ♀ 29 July 1989, known from Norway (Jussila 1973, 1976a).

250 *Netelia (Bessobates) virgata* (Fourcroy, 1785)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 7 October 1987; BØ Nedre Eiker: Hagatjern, M.I.F.-hytta (EIS 28), 3 ♀ 22 September 1989, 2 ♀ 18 September 1992, previously recorded from Norway (Jussila 1976a).

251 *Netelia melanurus* (Thomson, 1888)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 11 September 1989; AK Asker: Båstad (EIS 28) 1 ♂ 9 August 1993 and 1 ♀ 19 August 1993; widespread in Europe, probably found in Norway (Roman 1942).

252 *Netelia ocellaris* (Thomson, 1888)
Ø Hvaler: Akerøya (EIS 12), 1 ♀ 6 June 1992, recorded from Norway (Delrio 1974).

*253 *Netelia opaculus* (Thomson, 1888)
Ø Sarpsborg: Visterområdet (EIS 20), 1 ♀ 15 April 1992, widespread in Europe (Delrio 1974).

Thymaridini

*254 *Cladeutes discedens* (Woldstedt, 1872)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 20 April 1988 and 1 ♀ 25 April 1993, a rare species, known from Finland and Austria.

*255 *Thymaris tener* (Gravenhorst, 1829)
Ø Fredrikstad: Borge, Borge Varde (EIS 20), 3 ♀ 21 August 1992;

Exenterini

*256 *Eridolius (Anisoctenion) alacer* (Gravenhorst, 1829)
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♀ and 2 ♂ 25 September 1992; Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♂ 8 October 1990; Ø Sarpsborg: Tune, Jelsnes (EIS 20), 1 ♂ 20 September 1992 and 1 ♂ 1 August 1992; known from Central Europe and Sweden (Kerrich 1952).

257 *Eridolius pygmaeus* Holmgren, 1855
SFI Vik: Framfjord (EIS 50), 1 ♀ 17 July 1991; previously reported from Norway (Roman 1936, Jussila 1973).

258 *Exenterus abruptorius* (Thunberg, 1822)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 4 July 1991 and 1 ♀ 20 June 1988; AK Fet: Enebakkneset (EIS 29), 1 ♀ 27 June 1990; known from Norway (Strand 1913, Jussila 1976a).

259 *Exenterus amictorius* (Panzer, 1801)
Ø Sarpsborg: Tune, Tunevannet (EIS 20), 1 ♀ 16 June 1991, found in Norway (Strand 1900, 1919, Roman 1936).

260 *Exenterus ictericus* (Gravenhorst, 1829)
RY Karmøy: Vea (EIS 13), 1 ♂ and 1 ♀ 22 August 1993; previously reported from Norway (Strand 1913, Roman 1942, Jussila 1976a).

261 *Smicroplectrus jucundus jucundus* (Holmgren, 1855)
FN Tana: Darjåkkskaidi, 320-450 m.a.s.l. (EIS 175), 1 ♀ 16 July 1990, recorded earlier from Norway (Jussila 1973, 1976a).

Tryphonini

262 *Cosmoconus elongator* (Fabricius, 1775)
AK Oslo: Skullerud (EIS 28), 1 ♂ 17 August 1989, previously known from Norway (Strand 1906, Jussila 1976a, Roman 1942).

*263 *Cosmoconus meridionator* Aubert, 1963
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♂ 13 July 1993; Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 25 August 1993; Ø Fredrikstad: Onsøy, Mærrapanna (EIS 20), 1 ♂ 26 August 1992; AK Asker: Vardåsen (EIS 28), 1 ♀ 28 August 1993, widespread in Central Europe and found in Finland (Kasparyan 1973).

264 *Cosmoconus ceratophorus* Thomson, 1888
SFI Vik: Framfjord (EIS 50), 1 ♂ 17 July 1991, previously known from Norway (Jussila 1976a).

265 *Ctenochira marginata* (Holmgren, 1855)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 12 September 1992; recorded from Norway (Strand 1906, 1913).

*266 *Ctenochira sphaerocephala* (Gravenhorst, 1829)
RY Karmøy: Vea (EIS 13), 1 ♀ 22 August 1993; known from Northern and Central Europe.

*267 *Dyspetes arrogator* Heinrich, 1949 [syn. *praerogator* auct. nec Linné]
Ø Sarpsborg: Borgarsyssel (EIS 20), 1 ♂ 8 August 1993; Ø Sarpsborg: Tune, Råkil (EIS 20), 2 ♀ 7 September 1987 and 1 ♂ 10 August 1993; Ø Sarpsborg: Tune, Tunevannet (EIS 20), 1 ♂ 22 August 1992; AK Bærum: Borøya (EIS 28), 2 ♂ 10 August 1993; widespread in Europe (Kasparyan 1973).

268 *Polyblastus varitarsus* (Gravenhorst, 1829)
Ø Aremark: Vestfjella (EIS 21), 1 ♀ 29 August 1992, previously recorded from Norway (Strand 1906, 1913, Roman 1942).

269 *Tryphon* s.str. *auricularis* Thomson, 1883
Ø Sarpsborg: Skjeberg, Skjebergdalen (EIS 20), 1 ♀ 28 July 1993, Ø Rakkestad: Sølje (EIS 20), 1 ♀ 21 July 1991; known from Norway (Roman 1942).

270 *Tryphon* s.str. *thomsoni* Roman, 1939 [syn. *vulgaris* auct. nec Linné]
Ø Sarpsborg: Tune, Jelsnes (EIS 20), 1 ♀ 2 July 1993; reported from Norway (Strand 1906, 1913, Jussila 1976a).

271 *Tryphon (Stenocrotaphon) obtusator* (Thunberg, 1822)
Ø Sarpsborg: Skjeberg, Grimsøy (EIS 20), 1 ♀ 10 August 1989; AK Bærum: Tanum (EIS 28), 2 ♂ 5 June 1992; HES Kongsvinger: Digernessætra (EIS 38), 1 ♂ 13 June 1989; VE Larvik: Hedrum, Vestmarka (EIS 19), 2 ♂ 8 July 1983; found earlier in Norway (Strand 1898, Jussila 1973, 1976a).

272 *Tryphon (Symboethus) bidentatus* Stephens, 1835 [syn. *incestus* Holmgren, 1855]
AK Asker: Fusdal (EIS 28), 1 ♂ 27 June 1993; widespread in Norway (Strand 1898, 1913, Roman 1936, 1942, Jussila 1973, 1976a).

273 *Tryphon (Symboethus) brunniventris* Gravenhorst, 1829
Ø Rakkestad: Sølje (EIS 20), 1 ♂ 28 June 1991, previously known from Norway (Roman 1936, 1942, Jussila 1973, 1976a).

*274 *Tryphon (Symboethus) duplicatus* var. *discedens* (Heinrich, 1953)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♀ 30 June 1993, known from Central Europe and Siberia (Kasparyan 1973).

*275 *Tryphon (Symboethus) hinzi* (Heinrich, 1953)
Ø Sarpsborg: Tune, Råkil (EIS 20), 1 ♂ 18 June 1992, known from Germany and Russia (Kasparyan 1973).

DISCUSSION

Whereas Roman (1936, 1942) and Jussila (1973, 1976a, 1976b) mostly worked with material from Northern Norway as well as the Western coast and mountains of Southern Norway, most of the material included in the present study was collected in the lowlands of Southeastern Norway. This area has a more continental climate with drier and hotter summers and is known to have the highest number of species in the country for several insect groups. Many of the species newly recorded from Norway in this paper are widespread throughout Central Europe. This pattern of distribution is also found in most species of Lepidoptera - a major hostgroup for the Ichneumonidae - occurring in the Southeastern lowlands of Norway.

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SAMMENDRAG

Funn av norske Ichneumonidae (Hymenoptera)

Funn av 275 arter snylteveps av familien Ichneumonidae er omtalt, 78 av disse artene er ikke tidligere publisert fra Norge. De fleste funn er gjort i lavlandet på Østlandet. Familien er lite undersøkt i Norge.

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XIth European Congress of Lepidopterology
B-2390 Malle Belgium
22 - 26 March 1998

First announcement

The XIth European Congress of Lepidopterology will be organised by the *Societas Europaea Lepidopterologica* (SEL) in the "Provinciaal Vormingscentrum Malle", at about 25 km NE Antwerpen, Belgium, from Sunday 22 to Thursday 26 March 1998.

Plenary sessions:

Conservation biology
Ecology and population biology
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Contribution to the knowledge of the Norwegian Lepidoptera V

Leif Aarvik, Sigurd A. Bakke, Yngvar Berg, Kai Berggren, Lars Ove Hansen, Kai Myhr & Svein Svendsen

Aarvik, L., Bakke, S.A., Berg, Y., Berggren, K., Hansen, L.O., Myhr, K. & Svendsen, S. 1997. Contribution to the knowledge of the Norwegian Lepidoptera V. - Fauna norv. Ser. B 44: 55-70.

The following 45 species are reported new to Norway: *Stigmella sakhalinella* Puplesis, 1984, *Stigmella microtheriella* (Stainton, 1854), *Stigmella centifoliella* (Zeller, 1848), *Stigmella ulmivora* (Fologne, 1860), *Stigmella basiguttella* (Heinemann, 1862), *Ectoedemia albibimaculella* (Larsen, 1927), *Ectoedemia intimella* (Zeller, 1848), *Lampronia redimitella* Zeller, 1846, *Karsholtia marianii* (Rebel 1936), *Monopis monachella* (Hübner, 1796), *Bucculatrix latviaella* Sulcs, 1990, *Pseudoswammerdamia combinella* (Hübner, 1786), *Stephensia brunnichella* (Linnaeus, 1767), *Elachista quadripunctella* (Hübner, 1825), *Elachista compsa* Traugott-Olsen, 1974, *Elachista eskoi* Kyrki & Karvonen, 1985, *Biselachista occidentalis* (Frey, 1882), *Coleophora vulnerariae* Zeller, 1839, *Coleophora lassella* Staudinger, 1859, *Hypatopa segnella* (Zeller, 1873), *Athrips tetrapunctella* (Thunberg, 1794), *Gelechia cuneatella* Douglas, 1852, *Gnorimoschema herbichii* (Nowicki, 1864), *Gnorimoschema streliciella* (Herrich-Schäffer, 1854), *Caryocolum blandella* (Douglas, 1852), *Dichomeris latipennella* (Rebel, 1937), *Brachmia blandella* (Fabricius, 1798), *Acleris shepherdana* (Stephens, 1852), *Aethes dilucidana* (Stephens, 1852), *Dichelia histrionana* (Frölich, 1828), *Lobesia abscisana* (Doubleday, 1849), *Notocelia trimaculana* (Haworth, 1811), *Notocelia tetragonana* (Stephens, 1834), *Gypsonoma aceriana* (Duponchel, 1843), *Cydia inquinatana* (Hübner, 1799), *Pammene inquilina* T. Fletcher, 1938, *Pselnophorus heterodactyla* (Müller, 1764), *Adaina microdactyla* (Hübner, 1813), *Elegia similella* (Zincken, 1818), *Scoparia basistrigalis* Knaggs, 1866, *Agriphila latistria* (Haworth, 1811), *Timandra comai* Schmidt, 1931, *Eupithecia abbreviata* Stephens, 1831, *Orgyia antiquoides* (Hübner, 1822) and *Calamia tridens* (Hufnagel, 1766). Notes on biology and distribution are briefly given for each species. Additionally, a number of species previously reported from Norway are for various reasons deleted from the Norwegian list.

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INTRODUCTION

This article gives information on Lepidoptera collected new to Norway in recent years. In addition a couple of species discovered among older unidentified material are recorded. Some of these species are listed as Norwegian in the Swedish catalogue (Svensson et al 1994), but no details on their discovery in Norway have been published. The identifications of all specimens mentioned in the present paper have been checked by at least one of the authors.

In the present paper we delete from the Norwegian list several species of which we are unable to trace voucher specimens or find other evidence of their occurrence in this country. Some species entered the list by virtue of error. They are also deleted.

The following abbreviations are used in the text:
NISK = Norsk institutt for skogforskning, Ås.
ZMO = Zoologisk museum, Universitetet i Oslo.

SPECIES DELETED FROM THE NORWEGIAN LIST

Nepticulidae

In connection with the monograph of the Nepticulidae and Opostegidae of North West Europe (Johansson et al. 1990), all available Norwegian material of the family Nepticulidae was critically examined. It turned out to be impossible to confirm the occurrence in Norway of a number of species. This applies in particular to some species published by Nils Grønlien. In spite of this, all these species were still listed as Norwegian in the new edition of the Swedish catalogue (Svensson et al. 1994).

Stigmella tiliae (Frey, 1856)
Grønlien (1926) recorded the species from HOI, Granvin: Skjervet. The record could not be confirmed by Johansson et al. (1990).

Stigmella glutinosae (Stainton, 1858)
Grønlien (1937) recorded the species (as *rubescens* Heinemann) from TEY, Bamble. The record could not be confirmed by Johansson et al. (1990).

Stigmella alnetella (Stainton, 1856)
Listed as Norwegian by Krogerus et al. (1971). The record was not confirmed by Johansson et al. (1990).

Stigmella malella (Stainton, 1854)
Grønlien (1932) recorded the species from AAY, Risør. The record could not be confirmed by Johansson et al. (1990).

Stigmella catharticella (Stainton, 1853)
Grønlien (1932) recorded the species from AK, Oslo. The record could not be confirmed by Johansson et al. (1990).

Stigmella oxyacanthella (Stainton, 1854)
Grønlien (1932) recorded the species from TEY, Kragerø and AAY, Risør. The record could not be confirmed by Johansson et al. (1990).

Stigmella hybnerella (Hübner, 1796)
The statement in Johansson et al.(1990: 186) that Grønlien (1932) reported this species from Norway, is erroneous. Grønlien merely stated that *hybnerella* (as *gratiosella* Duponchel) had not yet been found in Norway. Still, *S. hybnerella* is erroneously listed as Norwegian by Svensson et al. (1994).

Stigmella plagicolella (Stainton, 1854)
Grønlien (1932) recorded the species from VE, Tønsberg: Frodeåsen. The record could not be confirmed by Johansson et al. (1990).

Stigmella lemniscella (Zeller, 1839)
Grønlien (1932) recorded this species (as *marginicolella* Stainton) from VE, Larvik. The record could not be verified by Johansson et al. (1990).

Stigmella continuella (Stainton, 1856)
Grønlien (1937) recorded this species from VE, Tønsberg og TEY, Bamble: Stathelle. The record could not be verified by Johansson et al. (1990).

Stigmella pretiosa (Heinemann, 1862)
Erroneously recorded from Norway in Svensson et al. (1994).

Stigmella hemargyrella (Kollar, 1832)
Grønlien (1932) recorded the species (as *basalella* Herrich-Schäffer) from Ø, Rygge: Larkollen and TEY, Bamble: Stathelle. The record could not be verified by Johansson et al. (1990).

Stigmella atricapitella (Haworth, 1828)
Grønlien (1932), without specifying any exact locality, recorded the species as doubtfully Norwegian. The species' occurrence in Norway could not be confirmed by Johansson et al. (1990).

Trifurcula eurema (Tutt, 1899)
Erroneously listed as Norwegian by Svensson et al. (1994).

Ectoedemia arcuatella (Herrich-Schäffer, 1855)
Grønlien (1937) recorded the species from HOI, Granvin: Skjervet. The record could not be verified by Johansson et al. (1990).

Adelidae

Nemophora cupriacella (Hübner, 1819)
Erroneously listed as Norwegian by Svensson et al. (1994).

Tischeriidae

Tischeria marginea (Haworth, 1828)
Erroneously listed as Norwegian by Svensson et al. (1994).

Tineidae

Monopis imella (Hübner, 1813)
Haanshus (1933) listed *imella* from AK, and Opheim & Fjeldså (1983) from VAy. We cannot find correctly identified specimens from either of these two districts. In the collection of the Zoological Museum of Oslo specimens of *Monopis laevigella* (Denis & Schiffermüller, 1775) were misidentified as *imella*.

Gracillariidae

Caloptilia fidella (Reutti, 1853)

This species was published new to Norway by Opheim (1977) based on a specimen from AK, Bærum: Sandvika 15 Aug. 1934 E. Barca leg. When searching for this specimen in ZMO, it was found that it had been eaten by dermestids when kept in a cigar box at Opheim's office. Opheim had dissected the specimen, and the genitalia had been stored in alcohol. The genitalia were now remounted as a permanent slide and embedded in euparal. They do not represent *C. fidella*, but are most probably *Caloptilia semifascia* (Haworth, 1828). In 1977 Opheim was unable to recognize the real *C. semifascia.* He misidentified another congener, *C. hemidactylella* (Denis & Schiffermüller, 1775), as *semifascia.* This explains why he had difficulties in identifying Barca's specimen correctly.

Oecophoridae

Depressaria chaerophylli Zeller, 1839

Erroneously listed as Norwegian by Svensson et al. (1994).

Coleophoridae

Coleophora amellivora Baldizzone, 1979

Erroneously listed as Norwegian by Svensson et al. (1994).

Gelechiidae

Scrobipalpa artemisiella (Treitschke, 1833)

Erroneously listed as Norwegian by Svensson et al. (1994).

Caryocolum cauligenella (Schmid, 1863)

Erroneously listed as Norwegian by Svensson et al. (1994).

Arctiidae

Eilema sororcula (Hufnagel, 1766)

Haanshus (1920) reported to have collected two specimens at AK, Nesodden: Spro on 14 June 1916 and 30 Jul. 1917 respectively. Opheim (1972) doubted this record. Probably Haanshus' «*sororcula*» represents worn specimens of *Eilema deplana* (Esper, 1787). No *sororcula* specimens are present in the Haanshus collection which is preserved at the Zoological Museum in Oslo.

Noctuidae

Acronicta cuspis (Hübner, 1813)

Sparre Schneider (1882) claimed to have found a larva on *Alnus* at AAY, Tvedestrand: Nes Verk in 1873. Unfortunately the pupa died, and there is no material from Nes Verk to confirm the record. As there is no other specimens from Norway, we find it correct to delete the species from the Norwegian list.

Panemeria tenebrata (Denis & Schiffermüller, 1775)

Wocke (1864) stated that he found two specimens at HES, Hamar on 31 May 1962. This represents the only record from Norway. Sparre Schneider indicated that Wocke not always was careful in his notes on records. In his 1864 paper Wocke stated on page 173 that «*Vanessa urticae, io* und *antiopa* flogen Ende Mai in überwinterten Exemplaren nicht selten bei Sigstadt und in Gudbrandsdalen». At this time the conspicuous *Inachis io* (Linnaeus, 1758) was not yet found in Norway. At Schøyen's request Wocke had to admit he had no collected specimens, but thought that he had seen it. The first record of *Inachis io* was reported from AAY, Risør 35 years later (Sparre Schneider 1902). Similarly, we suspect that Wocke's record of *Panemeria tenebrata* was not of collected specimens, and that he misidentified some other small moth species. Dr. Wolfram Mey of Zoologisches Museum der Humboldt-Universität zu Berlin kindly has informed us (by letter) that he could not find any Norwegian *tenebrata* specimens in the Staudinger/Wocke collection of that institution. There are a few old records of *Panemeria tenebrata* from the southernmost part of Sweden, and this represents the nearest records of the species. We consider it highly improbable that *tenebrata* really was collected in Norway, and so we delete it from the Norwegian list.

SPECIES NEW TO NORWAY

Nepticulidae

In the present paper we record species of Nepticulidae that are new to Norway relative to Johansson et al. (1990).

Stigmella sakhalinella Puplesis, 1984

AAY, Arendal: Tromøy, Skottjern (EIS 6) 1 male 27 Jun. 1988 K. Berggren leg. & coll. The identification was verified by Roland Johansson.

S. sakhalinella is known from central Europe including Britain, Ireland, The Netherlands, southern Poland, western Russia, Austria, France, Switzerland, Hungary, Italy, eastern Russia and NE China (Johansson et al. 1990). It was collected for the first time in Sweden in the Stockholm area in 1990 (Svensson 1992). Previous records of this species from Scandinavia, under the name *Stigmella distinguenda* Heinemann, 1862, are based on misidentifications.

Imago, genitalia and the larval mine are figured in Johansson et al. (1990).

The larva of *sakhalinella* is a leaf miner on various *Betula* species (Johansson et al. 1990).

Stigmella microtheriella (Stainton, 1854)

AK, Oslo: Manglerud (EIS 28) 1 female 27 Sept. 1984 reared from mine on *Corylus avellana* L. Aarvik leg. & coll. Grønlien (1932) reported the species from Vestfold and Aust-Agder, but there seems to be no preserved specimens as this record was not confirmed by Johansson et al. (1990).

S. micotheriella is distributed throughout Europe to western Russia and Caucasus in the east and Italy and Greece in the south. In Sweden it has been recorded north to 62 northern latitude.

Imago, genitalia and the leaf mine on the host plant, *Corylus*, are figured in Johansson et al. (1990). The larva also mines the leaves of *Carpinus*.

Stigmella centifoliella (Zeller, 1848)

BØ, Drammen: Bragernesåsen (EIS 28) 1 female 28 Aug. 1993 cocoon on *Rosa*, imago emerged 6 Sept. 1993, K. Berggren leg. & coll.

S. centifoliella is distributed in England and continental Europe; Mediterranean region, N. Africa and Canary Islands. In N Europe only from Copenhagen in Denmark and Gotland in Sweden (Johansson et al. 1990).

Host plants are various *Rosa* species and *Sanguisorba* (Johansson et al. 1990).

S. centifoliella is closely related to *S. anomalella* (Goeze, 1783) but differs in having a distinct white fascia. Imago, genitalia and the leaf mine are figured by Johansson et al. (1990).

Stigmella ulmivora (Fologne, 1860)

VAY, Kristiansand: Gimle (EIS 2) 4 specimens 10 Sept. 1994 reared from leaf mines on *Ulmus glabra* K. Berggren leg. & coll. In 1993 several mines were found at this locality, but no imagines emerged. Grønlien (1932) reported having found mines of this species at HOI, Granvin and TEY, Porsgrunn: Brevik, but this record could not be confirmed (Johansson et al. 1990).

S. ulmivora is widely distributed throughout Europe; in N Europe from S Sweden north to Västmanland and in eastern Denmark (Johansson et al. 1990).

Imago, genitalia and leaf mines on the host plant, *Ulmus*, are figured by Johansson et al. (1990).

Stigmella basiguttella (Heinemann, 1862)

BØ, Røyken: Kinnartangen (EIS 28) 1 male 11 Jun.1991 L.O. Hansen leg. & coll.; VAY, Kristiansand: Bråvann (EIS 2) 8 specimens 19 May, 3 specimens 11 Jun. 1993 K. Berggren leg. & coll.

S. basiguttella is widely distributed in E, C and S Europe; in N Europe known from Denmark, two southern districts in Finland and in Sweden north to Västmanland (Johansson et al. 1990.

Imago, genitalia and the leaf mine on the host plant, *Quercus*, are figured by Johansson et al. 1990).

Ectoedemia albibimaculella (Larsen, 1927)

Ø, Hvaler: Asmaløy, Huser 1 male 3 Jul. 1994 L. Aarvik leg. & coll. This species is listed as Norwegian by Johansson et al. (1990), but there is no indication where it has been found.

The present record confirms the presence of this species in Norway.

According to Johansson et al. (1990) *E. albibimaculella* has been found in central Poland and Italy; in northern Europe it is known from two localities in Jutland, Denmark. It is widespread in Finland and Sweden.

Imago, genitalia and the leaf mine on the host plant, *Arctostaphylos uva-ursi*, are figured by Johansson et al. (1990).

Ectoedemia intimella (Zeller, 1848)

Ø, Sarpsborg: Sarpsborg (EIS 20) 1 male 21 Jun. 1922 E. Barca leg., ZMO coll.; AK, Ås: Vardåsen (EIS 28) 1 male 4 Jun. 1990 L. Aarvik leg. & coll.; VAY, Kristiansand: Stangenes (EIS 2) 2 females July 1992 S. Svendsen leg., K. Berggren coll. Grønlien (1937) recorded the mines of *intimella* from TEY, Bamble, but this record could not be confir-

med (Johansson et al. 1990).

E. intimella occurs in most of Europe including Denmark and S Sweden and S Finland (Johansson et al. 1990).

Imago, genitalia and the leaf mine on the host plants, various *Salix* species, are figured by Johansson et al. (1990).

Prodoxidae

Lampronia redimitella Zeller, 1846

NSI, Saltdal: Rusånes (EIS 127) 1 female 26 Jun. 1992 K. Berggren & K. Myhr leg., K. Berggren coll.

The species is known from Carelia in Russia (Zagulajev 1989); it is widely distributed in Finland north to the district Ostrobottnia borealis southern part (Kyrki 1978); in Sweden known from the three districts Södermanland, Uppland and Norrbotten (Svensson et al. 1994).

The male genitalia are figured by Zagulajev (1989), forewing and female genitalia by Benander (1953). A photo of the moth was published by Svensson (1993b).

The larva of *redimitella* develops in the buds of *Ribes* (Svensson 1993a).

Tineidae

Karsholtia marianii (Rebel, 1936) Figure 1

VAY, Kristiansand: Stangenes (EIS 2) 1 male10 Jun. 1990, 1 male 28 Jun. 1990, 1 male 16 Jul. 1990 S. Svendsen leg., NISK coll., 1 female same locality and collector 12 Jul. 1990 K. Berggren coll. The specimens were collected indoors in a room with stored firewood. The wood originated from the forest close to the house.

This species is known from Sicily, S Sweden and Denmark only (Gaedike 1986). In Sweden it has been found in the districts Skåne, Småland and Öland (Svensson et al. 1994).

The genitalia of the moth are figured by Gaedike (1986).

In Denmark moths have been collected at dawn flying near old *Corylus* trees. It is not known whether the larva feeds on lichens or fungi (Gaedike 1986).

Monopis monachella (Hübner, 1796) Figure 2

AAY, Arendal: Tromøy, Bjelland (EIS 6) 1 male17 Aug. 1989 S.A. Bakke leg. & coll.

This species has been reported to have a world-wide distribution, but it has been shown that a complex of similar species is involved. Our species is widespread in Europe and the Palaearctic region including the Himalayas (Pelham-Clinton 1985). It occurs in Denmark, S Finland, and there are records from eight Swedish districts north to Uppland (Svensson et al. 1994).

Monopis monachella has a characteristic wing pattern and cannot be confused with any other European tineid species (Pelham-Clinton 1985).

Like its congeners this species feeds on animal products like skin, owl pellets, dead animals and in birds' nests (Pelham-Clinton 1985).

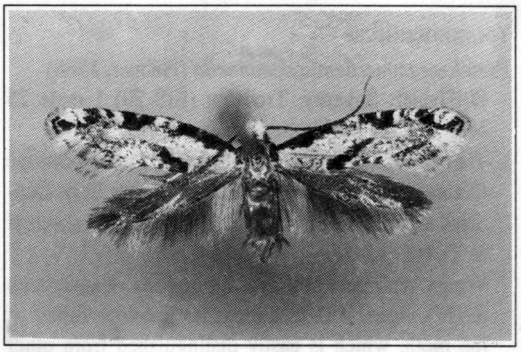

Figure 1
Karsholtia marianii (Rebel)

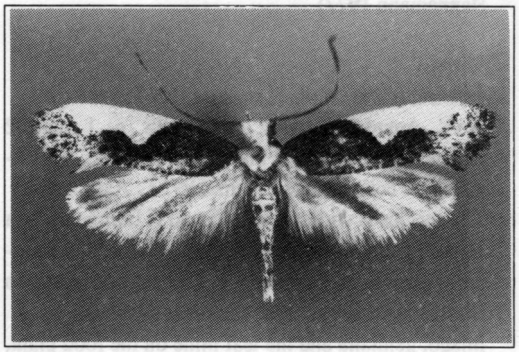

Figure 2
Monopis monachella (Hübner)

Bucculatricidae

Bucculatrix latviaella Sulcs, 1990

BØ, Krødsherad: Sandum (EIS 35) 1 male 28 Jul. 1923 E. Barca leg., ZMO coll.

The specimen was discovered in a box with unidentified Lepidoptera at ZMO.

B. latviaella was recently described from Latvia where it had been collected in two localities; it was also discovered a specimen from SE Finland (Sulcs 1990). It has not yet been found in Sweden.

Imago and genitalia of *B. latviaella* and the closely related sea shore species *B. maritima* Stainton, 1851, are figured in the original description (Sulcs 1990).

The habitat of *B. latviaella* is dry meadows, very different from that of *B. maritima*. The food plant is not known, but probable candidates are *Chrysanthemum leucanthemum* or *Achillea millefolium* (Sulcs 1990).

Yponomeutidae

Pseudoswammerdamia combinella (Hübner, 1786)

Ø, Hvaler: Spjærøy, Tredalen (EIS 20) 1 male 25 May 1991 O. Sørlibråten leg & coll.

This species is widespread in S and central Europe (Hannemann 1977). In N Europe known from Denmark and S Sweden north to Bohuslän (Svensson et al. 1994).

Wings and genitalia are figured by Hannemann (1977). Agassiz (1987) provides a colour figure of the moth, which is easily distinguished from other yponomeutids by its distinct copper spot in the apex of the forewing.

The larva feeds on *Prunus spinosa* (Agassiz 1987, Hannemann 1977).

Elachistidae

Stephensia brunnichella (Linnaeus, 1767)

AAY, Arendal: Tromøy, Hefte (EIS 6) 1 male, 2 females 20 Jun. 1989, 1 male 27 Jun. 1991 S.A. Bakke leg. & coll., 1 male 27 Jun. 1991 L. Aarvik coll.

The species is widespread in S and C Europe to Asia Minor (Traugott-Olsen & Nielsen 1977). In N Europe known from Denmark, S Finland and north to Uppland in S Sweden (Svensson et al 1994).

Imago, genitalia and the leaf mine on the food plant, *Satureja vulgaris*, are figured in the monograph on Elachistidae by Traugott-Olsen & Nielsen (1977).

Elachista quadripunctella (Hübner, 1825)

AK, Bærum: Sandvika (EIS 28) 1 female Jul. 1934 E. Barca leg., ZMO coll.

The Norwegian specimen was discovered among unidentified specimens at ZMO.

The species is widespread in Europe from the Baltic to Italy, France and Belgium; not in Britain (Traugott-Olsen & Nielsen 1977). In N Europe known from the Swedish districts Västergötland and Uppland only (Svensson et al. 1994).

Imago and genitalia are figured by Traugott-Olsen & Nielsen (1977).

The larva is a leaf miner on *Luzula* (Traugott-Olsen & Nielsen 1977).

Elachista compsa Traugott-Olsen, 1974

MRI, Sunndal: Oppdølstranda (EIS 85) 1 male 16-23 Jun. 1988 S.A. Bakke leg. & coll.

This *Elachista* species is widespread in C Europe, but with only few records in the west; not in Britain. There are records from a few districts in Denmark and S Finland; north to Uppland in Sweden (Traugott-Olsen & Nielsen 1977, Svensson et al. 1994).

Imago and genitalia are figured by Traugott-Olsen & Nielsen (1977).

The larva is a leaf miner of *Melica* and *Deschampsia* (Traugott-Olsen & Nielsen 1977).

Elachista eskoi Kyrki & Karvonen, 1985

AAY, Grimstad: Reddalsvann (EIS 6) 2 males 26 Jun. 1986 K. Berggren & S. Svendsen leg., K. Berggren coll.

Elachista eskoi was recently described from several localities in S and C Finland (Kyrki & Karvonen 1985). It was subsequently recorded from W Jutland, Denmark (Buhl et al. 1987); Scotland (Pelham-Clinton 1988) and Norrbotten in N Sweden (Svensson 1988).

Wings and genitalia are figured in the original description (Kyrki & Karvonen 1985), by Buhl et al. (1987) and Pelham-Clinton (1988). The food plant is not known, but the habitat is wet places like river banks and sea shores (Kyrki & Karvonen 1985, Buhl et al. 1987).

Biselachista occidentalis (Frey, 1882) (= *Biselachista freyi* sensu auct.)

AK, Oslo: Malmøya (EIS 28) 9 Jul. 1990 4 males S.A. Bakke leg. & coll., 2 males, 1 female L. Aarvik leg. & coll., 2 males H. Aarvik leg. & coll., Malmøya 31 Jul. 1990 6 males, 3 females L. Aarvik leg. &

coll., Malmøya 10 Aug. 1990 1 male, 1 female S. A. Bakke leg. & coll.; Ø, Hvaler: Asmaløy, Huser (EIS 12) 2 males 31 Jul. 1994 L. Aarvik leg. & coll.

The «species» called *Biselachista freyi* (Staudinger, 1870) by Traugott-Olsen & Nielsen (1977) was shown by Traugott-Olsen (1994) to be a complex of several closely related species. *Biselachista freyi* was reported as Norwegian by Traugott-Olsen & Nielsen (1977), but this record was based on a single specimen only labelled «Norway».

According to Traugott-Olsen (1994) *B. occidentalis* is distributed in Switzerland, Germany, Czech Republic and the Swedish districts Gotland and Småland.

Imagines and genitalia of *B. occidentalis* and relatives are figured by Traugott-Olsen (1994).

In Germany the present species was bred from *Carex humilis* (Traugott-Olsen 1994).

Coleophoridae

Coleophora vulnerariae Zeller, 1839

VAY, Farsund: Einarsneset (EIS 1) 1 male 30 May 1991, 1 male 2 Jul. 1991, 14 specimens 3-5 Jun. 1995 K. Berggren leg. & coll., 1 male 20 Jun. 1991 S.A. Bakke leg. & coll.

C. vulnerariae is widespread in Europe (Patzak 1974). In N Europe known from Denmark and S Sweden north to Västergötland (Svensson et al. 1994).

The genitalia of this species which feeds on *Anthyllis*, are figured by e.g. Patzak (1974).

Coleophora lassella Staudinger, 1859

VAY, Flekkefjord: Sireosen (EIS 4) 1 male 26 Jun.-17 Jul. 1902 E. Strand leg., ZMO coll.

The Norwegian specimen was discovered by Ole Karsholt in a box with unidentified Microlepidoptera lent to the Zoological Museum in Copenhagen in connection with the work on the monograph of the N European Elachistidae (Traugott-Olsen & Nielsen 1977).

C. lassella is distributed through Europe, N Africa and Asia Minor (Patzak 1974). In N Europe known from Denmark, Finland, Denmark and Sweden, but apparently rare as it has been found in three Swedish districts only: Gotland, Bohuslän and Södermanland (Svensson et al. 1994).

This species, of which the biology is not known, can be identified using the genitalia figures in Patzak (1974).

Blastobasidae

Hypatopa segnella (Zeller, 1873) (= *Holcocera perfugella* Jonasson, 1985) Figure 3

TEY, Kragerø: Oterøy (EIS 11) 1 male, 1 female 24-25 Jul. 1995; AK, Frogn: Håøya (EIS 28) 1 female 12 Aug. 1995 S.A. Bakke leg. & coll.

Holcocera perfugella Jonasson, 1985 was synonymized with *Blastobasis segnella* Zeller, 1873 and placed in the genus *Hypatopa* Walsingham by Sinev (1993).

Sinev (1993) recorded *segnella* from several E European countries and from Austria, Greece, Italy and France. In N Europe known from Sweden in eight districts from Blekinge to Värmland (Svensson et al. 1994).

The genitalia are figured by Jonasson (1985) and Sinev (1993), the moth is figured by Jonasson (1985). The biology is not known.

Gelechiidae

Athrips tetrapunctella (Thunberg, 1794)

VAY, Farsund: Nordhassel (EIS 1) 1 female 5 Jul. 1985 S. Svendsen leg., NISK coll.; Farsund: Einarsneset (EIS 1) 1 male, 1 female 7 Jun. 1991, 3 males 2 Jul. 1991, 1 male 4 Jun. 1995 K. Berggren leg. & coll.; 1 male 20 Jun. 1991 S.A. Bakke leg. & coll.; AK, Sørum: Egner (EIS 37) 1 female 13 Jun. 1993 O. Sørlibråten leg., L. Aarvik coll.

This species is distributed in N Europe in Denmark, Finland and Sweden; in Sweden it is widely distributed, being known from most districts from Skåne to Jämtland (Svensson et al. 1994). Also known from

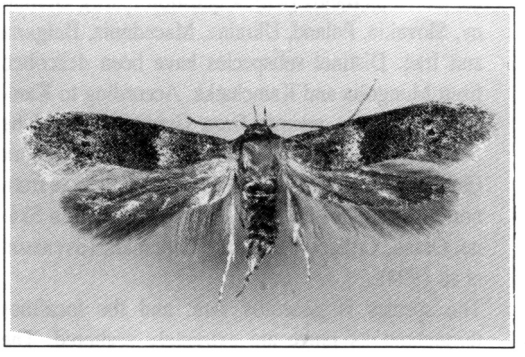

Figure 3
Hypatopa segnella (Zeller)

Great Britain (Kloet & Hincks 1972). The occurrence of this species in further European countries is not clear to us.

The genitalia are figured by Pierce & Metcalfe (1935) (as *subocellea*).

The larva feeds on *Lathyrus palustris* (Svensson 1993a).

Gelechia cuneatella Douglas, 1852

AK, Ås: Ås (EIS 28) 1 male 17 Aug. 1989 L. Aarvik leg. & coll. The specimen flew off the trunk of an old *Salix caprea* tree.

This species was listed as Norwegian, from AK, by Haanshus (1933). However, it was deleted from the Norwegian list by Opheim (1978). Thus, the present record is the first confirmed one from this country.

According to Sattler (1960) *G. cuneatella* is distributed in central Europe. In N Europe known from Denmark, Finland and Sweden north to Medelpad, but the records are scattered (Svensson et al. 1994).

The genitalia of *cuneatella* and other European species in the genus *Gelechia* are figured by Sattler (1960). Imagines of most N European *Gelechia* species, including *cuneatella,* are figured by Schnack (1978).

The food plant is *Salix caprea* and other species of *Salix* Schnack (1978), Svensson (1993a).

Gnorimoschema herbichii (Nowicki, 1864) Figure 4

VAY, Farsund: Einarsneset (EIS 1) 4 males, 1 female 28 Jul. 1995 S.A. Bakke, K. Berggren & L. Aarvik leg. et coll. On a previous visit to Einarsneset, 3 Jun. 1995, K. Berggren observed a specimen running on the ground, but unfortunately was not able to catch it.

Povolny (1992) recorded *herbichii* from Spain, France, the Netherlands (with a question mark), Germany, Slovakia, Poland, Ukraine, Macedonia, Bulgaria and Iraq. Distinct subspecies have been described from Mongolia and Kamchatka. According to Karsholt (1995) the records from Germany should be confirmed. In N Europe in three districts in Denmark (Schnack ed. 1985); in Finland in most districts from north to south (Kyrki 1978); and in Sweden in Skåne, Öland, Gotland and Torne Lappmark (Svensson et al. 1994).

The species is generally rare, and the localities throughout its range are extremely scattered. The habitat is sandy sites or places with poor soil (Povolny 1992).

Povolny (1992) gave figures of the genitalia and a coloured figure of the whole moth.

The food plant is not known, but it has often been found where *Thymus* grows (Povolny 1992). *Thymus* does not grow in the Norwegian locality.

Gnorimoschema streliciella (Herrich-Schäffer, 1854)

FI, Karasjok: Buddasnjarga (EIS 159) 11 males 5 Jul. 1992 K. Berggren & K. Myhr leg. & coll.; 1 male 5 Jul. 1994 S. Svendsen leg., K. Berggren coll.

This species has a scattered distribution in Europe. There are records from E Germany, just old ones, (Karsholt 1995), Poland and the Alps. In Mongolia and Siberia where it appears to be more common, it was known under the name *G. mongolorum* Povolny, 1969 (Povolny 1992). In N Europe known from Jutland in Denmark (Schnack ed. 1985); Finland, scattered from north to south (Kyrki 1978); and from Skåne and Gotland in S Sweden (Svensson et al. 1994).

Povolny (1992) figured this species in colour and also illustrated the male and female genitalia.

The biology of *streliciella* is not known, but the moths are usually found in localities with *Thymus* (Povolny 1992).

Caryocolum blandella (Douglas, 1852)

AAY, Grimstad: Eide (EIS 6) 1 male, 1 female 24 Aug. 1984 K. Berggren leg. & coll. The two specimens were attracted to light. The record of this species from VAy by Opheim (1978) is a misidentification of *Caryocolum blandelloides* Karsholt, 1981.

In central Europe there are confirmed records from Great Britain, France, Germany and Austria (Huemer 1988). In N Europe from Finland, Denmark and S Sweden north to Bohuslän (Svensson et al. 1994).

Huemer (1988) figured the wings and genitalia of this species.

The larva of *blandella* feeds on *Stellaria holostea* (Huemer 1988).

Dichomeris latipennella (Rebel, 1937) (= *Acanthophila piceana* Sulcs, 1968)

AK, Ås: Årungen (EIS 28) 1 female 16-22 Jun. 1989 S.A. Bakke & L. Aarvik leg., L. Aarvik coll. The specimen was captured in a light trap.

In central Europe known from Austria (Huemer & Tarmann 1993), Germany (Karsholt 1995, Sulcs 1968) and Latvia (Sulcs 1968). In N Europe from Finland and in Sweden from 12 districts in all parts of the country (Svensson et al. 1994).

D. latipennella is difficult to recognize on external characters. The genitalia which are useful for identification are figured by Sulcs (1968).

Sulcs (1968) gave a detailed description of its biology. The larva developes in the buds of female flowers of tall *Picea* trees.

Brachmia blandella (Fabricius, 1798) Figure 5

Ø, Hvaler: Asmaløy, Huser (EIS 12) 1 male 31 Jul. 1994 L. Aarvik leg. & coll.

Known from Spain (Vives Moreno 1994), Austria (Huemer & Tarmann 1993), Germany (Karsholt 1995), Belgium (De Prins 1983) and probably several further European countries. In N Europe from Denmark, Finland and the following Swedish districts: Skåne, Blekinge, Småland, Öland, Gotland and Södermanland (Svensson et al. 1994).

The food plant is not known, but it is probably grasses (Svensson 1993).

The male genitalia are figured by Piskunov (1981).

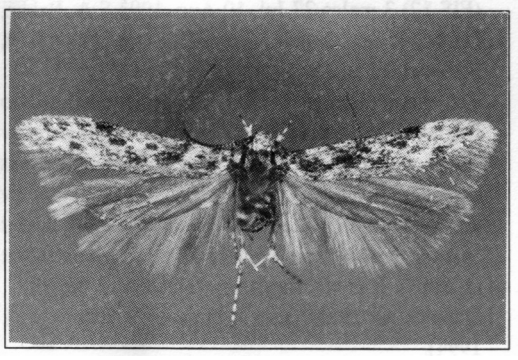

Figure 4
Gnorimoschema herbichii (Nowicki)

Tortricidae

Acleris shepherdana (Stephens, 1852)

AAY, Grimstad: Reddalsvann (EIS 6) 1 male 14 Aug. 1986 K. Berggren leg. & coll.

A. shepherdana is known from central Europe and S Siberia (Bradley et al. 1973). In N Europe recorded from Denmark and Skåne, Blekinge and Västergötland in Sweden (Svensson et al. 1994).

The moth is figured by Bradley et al. (1973).

The habitat is fens and marshy places where the food plant, *Filipendula ulmaria*, grows. It has also been reported to feed on *Sanguisorba* and *Alchemilla* (Bradley et al. 1973).

Aethes dilucidana (Stephens, 1852) Figure 6

AAY, Lillesand: Hestholmen (EIS 6) 2 females 23 Jun. 1984; AAY, Arendal: Tromøy, Spornes (EIS 6) 1 male 16 Jun. 1985 bred from stem of *Angelica archangelica* ssp. *litoralis* K. Berggren leg. & coll.; AAY, Arendal: Tromøy, Bjelland (EIS 6) 7 males 15-16 Jun. 1991, 24 specimens 18 Apr. 1992 bred from stems of *A. archangelica* ssp. *litoralis* S. A. Bakke leg. & coll.; Ø, Rygge: Sildebauen (EIS 19) 2 males, 1 female 21 Jun. 1986 bred from stem of *A. archangelica* ssp. *litoralis*; VE, Larvik: Rakke (EIS 19) 1 female 13 Jun. 1990 L. Aarvik leg. & coll.

Outside Scandinavia this species is only known from England, Sicily, N Africa and S Russia (Bradley et al. 1973). In N Europe from NE Jutland in Denmark and the Swedish districts Halland, Västergötland and Bohuslän (Schnack ed. 1985, Svensson et al. 1994).

The moth is figured by Bradley et al. (1973).

In Norway *A. dilucidana* lives on sea shores where

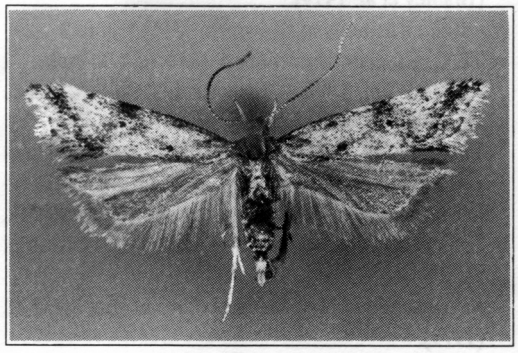

Figure 5
Brachmia blandella (Fabricius)

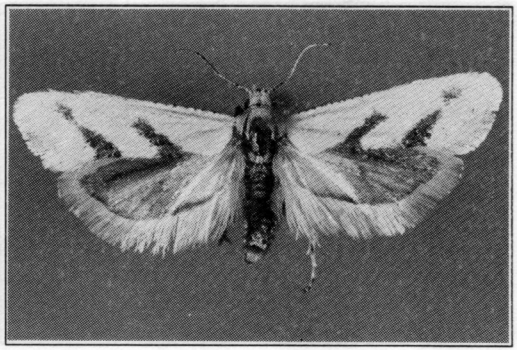

Figure 6
Aethes dilucidana (Stephens)

the larva feeds on the flowers of *Angelica archangelica* ssp. *litoralis*. Mature larvae hibernate in the stem of the food plant. In England the food plant is *Pastinaca*. There is even a record on *Heracleum sphondylium* (Bradley et al. 1973).

Dichelia histrionana (Frölich, 1828) Figure 7

VAY, Kristiansand: Stangenes (EIS 2) 1 female 18 Aug. 1984 S. Svendsen leg., NISK coll.; Kristiansand: Bråvann (EIS 2) 1 female 12 Aug. 1994, 3 males 27 Jul.-1 Aug. 1995 K. Berggren leg. & coll.; Kristiansand: Hånes (EIS 2) 1 male 1 Aug. 1995 S. Svendsen leg., K. Berggren coll.; AK, Ås: Ås (EIS 28) 1 female 25 Jul. 1989, 2 males 8-9 Jul. 1990, 4 males, 1 female 16 Aug.-6 Sept. 1991, 1 male 26 Aug. 1992, 4 males 28-31 Jul. 1993 S. A. Bakke leg. & coll., 1 male, 1 female 1-16 Aug. 1995 L. Aarvik leg. & coll.; AAY, Arendal: Tromøy, Bjelland (EIS 6) 3 males 20-21 Jul. 1994 S.A. Bakke leg. & coll.

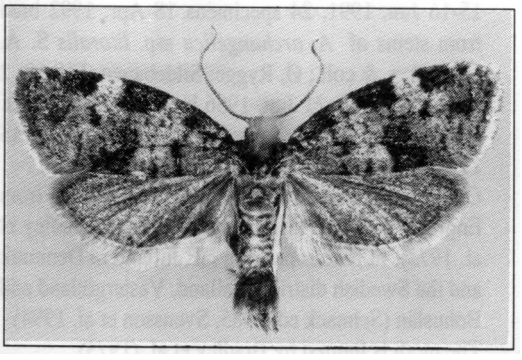

Figure 7
Dichelia histrionana (Frölich)

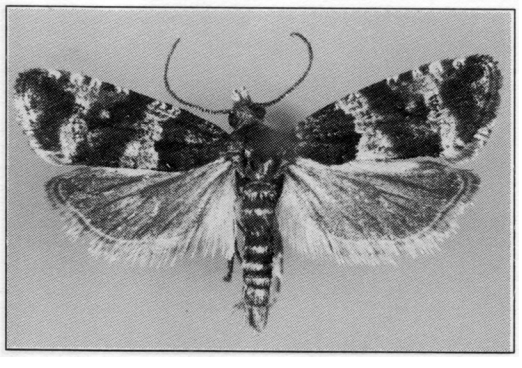

Figure 8
Lobesia abscisana (Doubleday)

D. histrionana is distributed in central and S Europe (Kuznetsov 1989). In N Europe known from Denmark, Finland and Sweden north to Gästrikland (Svensson et al. 1994).

Larsen & Vilhelmsen (1986) gives a colour illustration of the moth.

The larva feeds on various species of *Picea* and *Abies* (Kuznetsov 1989). The Norwegian records indicate that *Abies* is the preferred host in this country.

Lobesia abscisana (Doubleday, 1849) Figure 8

VAY, Kristiansand: Bråvann (EIS 2) 1 male 31 Jul. 1991, 1 female 2 Aug. 1991, 2 females 25 Jul. 1994, 2 males, 2 females 27 Jul.-1 Aug. 1995; VAY, Farsund: Einarsneset (EIS 1) 1 male 28 Jul. 1995; AAY, Lillesand: Storemyr (EIS 6) 3 males 2-3 Aug. 1991; AAY, Arendal: Tromøy, Skottjern (EIS 6) 3 males 25 Jul. 1994 K. Berggren leg. & coll.; Tromøy, Bjelland (EIS 6) 1 male 7 Jul. 1992, 1 male 27 Jul. 1995 S.A. Bakke leg. & coll.; Ø, Hvaler: Asmaløy, Huser (EIS 12) 3 males 27 Jul.-10 Aug. 1993 S.A. Bakke, L. Aarvik leg & coll., 1 male 27 Jul. 1995 B.M. Fjellstad leg. & coll.

The distribution in central Europe is restricted to England, Ireland, Holland, Belgium and Germany (Bradley et al. 1979, Palm 1982). In N Europe it has extended its range in recent years. It was found new to Sweden in Skåne in 1983 (Svensson 1984); now it extends north to Bohuslän and Uppland (Svensson et al. 1994). It is widespread in Denmark (Palm 1982, Schnack ed. 1985); also in Finland (Svensson et al. 1994).

The moth is figured by Bradley et al. (1979).

The larva developes in the shoots of *Cirsium arvense* (Bradley et al. 1979).

Notocelia trimaculana (Haworth, 1811) Figure 9

TEY, Kragerø: Jomfruland (EIS 11) 4 males, 1 female 9 Jun. 1990, 1 male 8 Jul. 1990 S.A. Bakke leg. & coll.

This species has a wide distribution throughout Europe and eastwards to Japan; North Africa (Bradley et al. 1979). In N Europe known from Denmark, Finland and Sweden north to Dalarne (Svensson et al. 1994).

N. trimaculana is figured in colour in Bradley et al. (1979).

The food plant is *Crataegus*, occasionally *Prunus* or *Pyrus* (Bradley et al. 1979).

Notocelia tetragonana (Stephens, 1834) Figure 10

MRI, Sunndal: Sunndalsøra (EIS 78) 2 males 23 Jun. 1988; STI, Trondheim: Gaulosen (EIS 92) 1 male 10 Aug. 1987, 2 males 14 Jul. 1988 S.A. Bakke leg. & coll.; NTI, Frosta: Tautra (EIS 97) 17 males, 2 females 6 Jul. 1988 S.A. Bakke, B.Å. Bengtsson, L. Aarvik leg. & coll.; Frosta: Haugan (EIS 92) 3 males, 1 female 14 Jul. 1995 K. Berggren, K. Myhr leg. & coll.; AK, Asker: Brønnøya (EIS 28) 1 male 8 Jul. 1989 L. Aarvik leg. & coll.

According to Bradley et al. (1979) distributed in central and SE Europe including Britain and Ireland. In N Europe known from Finland and and the two Swedish districts Gotland and Närke (Svensson et al. 1994). The first Swedish record was made at Göksholm in Närke in 1976 (Bengtsson 1980). *N. tetragonana* is generally considered as a rare species.

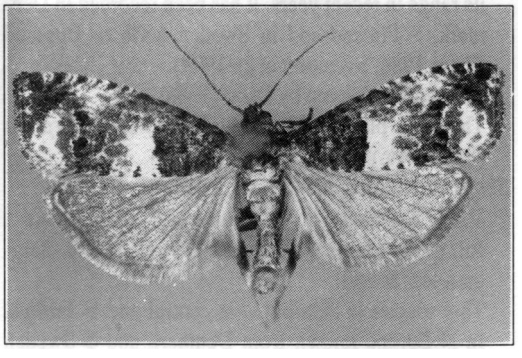

Figure 9
Notocelia trimaculana (Haworth)

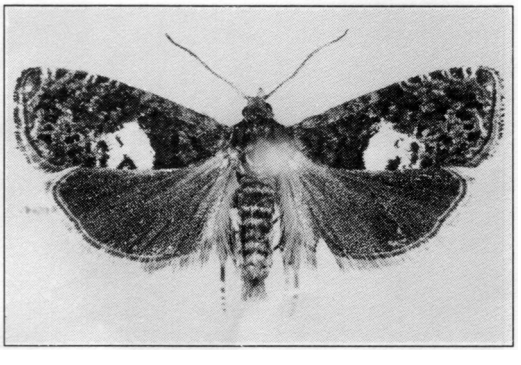

Figure 10
Notocelia tetragonana (Stephens)

This leaf roller is figured by Bradley et al. (1979) and by Bengtsson (1980).

The larva feeds in spun leaves of *Rosa* (Bradley et al. 1979).

Gypsonoma aceriana (Duponchel, 1843)

VAY, Kristiansand: Augland (EIS 2) 1 male bred from *Populus* May 1985 K. Berggren leg. & coll.

Distributed through most of Europe, also N Africa, Turkey and Iraq (Bradley et al. 1979). In N Europe in Denmark and the five southernmost districts in Sweden (Svensson et al. 1994).

The moth is figured in Bradley et al. (1979).

The larva feeds in the shoots and leaf stalks of various poplar species, e.g. *P. nigra*, *P. alba*, *P. balsamifera* (Bradley et al. 1979).

Cydia inquinatana (Hübner, 1799)

BØ, Røyken: Jerdal (EIS 28) 1 male 16 Jun. 1990 Y. Berg leg. & coll.

C. inquinatana is distributed in central and S Europe (Palm 1982). In N Europe in S Finland, E Denmark and in 10 Swedish districts north to Gästrikland (Palm 1982, Svensson et al. 1994).

The moth is figured by Larsen & Vilhelmsen (1990), and its male genitalia by Kuznetsov (1989).

The larva feeds in the fruits of *Acer platanoides* (Palm 1982).

Pammene inquilina T. Fletcher, 1938

AAY, Arendal: Tromøy, Hefte (EIS 6) 1 male 12 May 1996 S.A. Bakke leg. & coll.; VAY, Kristiansand: Bråvann (EIS 2) 1 male15 May 1996 K. Berggren leg. & coll. Both specimens were collected with the aid of pheromones.

Distributed through central Europe eastwards to Russia (Bradley et al. 1979). In N Europe known from all over Denmark (Schnack ed. 1985) and in S Sweden north to Västergötland (Svensson et al. 1994). In 1995 collecting with the aid of pheromones resulted in records of *inquilina* from further Swedish districts north to Bohuslän (Ingvar Svensson pers. comm.).

The moth is figured by Bradley et al. (1979), and the genitalia by Kuznetsov (1989).

The larva develops in hymenopterous galls on *Quercus* (*Andricus* and *Biorhiza*) (Bradley et al. 1979).

Pterophoridae

Pselnophorus heterodactyla (Müller, 1764) Figure 11

AK, Asker: Brønnøya (EIS 28) 1 male 22 Jun. 1980 S. Svendsen leg., NISK coll.; Ø, Hvaler: Hvaler kir-

ke (EIS 12) 1 male 18 Jun. 1988 L. Aarvik leg. & coll.; TEY, Kragerø: Jomfruland (EIS 11) 1 female 8 Jul. 1990 S.A. Bakke leg. & coll.

Distributed throughout Europe (Gielis 1996). In N Europe from Denmark, Finland and Sweden north to Jämtland (Svensson et al. 1994).

Imago and genitalia are figured by Gielis (1996).

The food plant is *Lactuca muralis* (Svensson 1993); in central Europe also *Prenanthes purpurea* and *Lapsana communis* (Gielis 1996).

Adaina microdactyla (Hübner, 1813) Figure 12

AAY, Lillesand: Grimenes (EIS 6) 3 females 7 Aug. 1993 K. Berggren leg. & coll.

Widely distributed in Europe; even Iran, Japan, the Solomon Islands and Indonesia (Gielis 1996). In N Europe from Denmark, Finland and north to Västmanland in Sweden (Svensson et al. 1994).

Imago and genitalia are figured by Gielis (1996).

The larva develops in the stems of *Eupatorium canabinum* (Gielis 1996).

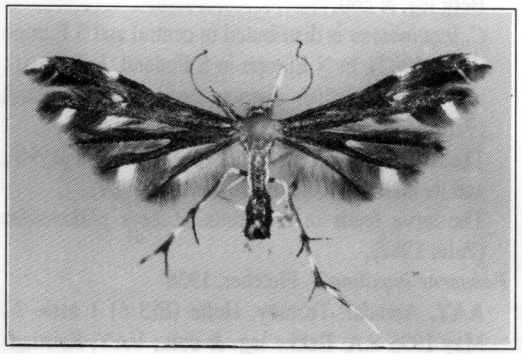

Figure 11
Pselnophorus heterodactyla (Müller)

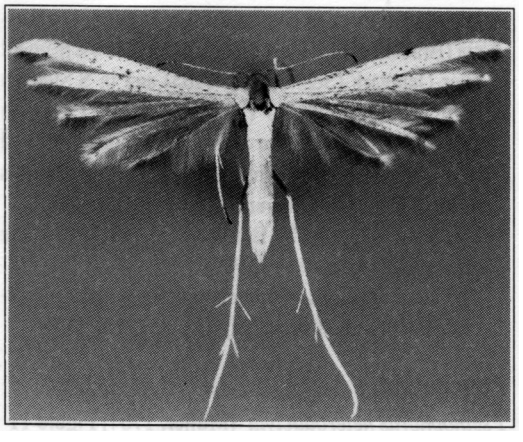

Figure 12
Adaina microdactyla (Hübner)

Pyralidae

Elegia similella (Zincken, 1818) Figure 13

AAY, Arendal: Saltrød, Alvika (EIS 6) 1 female 16 Jul. 1987 A. Flor leg., K. Berggren coll.; AAY, Arendal: Tromøy, Bjelland (EIS 6) 19 specimens 9 Jun.-1 Jul. 1992, 2 males 22 Jul. 1993; TEY, Kragerø: Oterøy (EIS 11) 1 male 25 Jul. 1995 S.A. Bakke leg. & coll.; VAY, Kristiansand: Hånes (EIS 2) 1 male, 1 female 25-26 Jun. 1995, 1 male 28 Jul.1995 S. Svendsen leg., K. Berggren coll.; Ø, Hvaler: Asmaløy, Huser (EIS 12) 1 male 16 Jul. 1995 B.M. Fjellstad leg. & coll.

E. similella is distributed in central Europe where it is local and uncommon. In N Europe it has extended its range in recent years. It has been recorded in Denmark, S Finland and in Sweden north to Uppland (Palm 1986, Svensson et al. 1994).

The moth is figured by Palm (1986).

The food plant is *Quercus*, occasionally *Carpinus* (Palm 1986).

Scoparia basistrigalis Knaggs, 1866

VAY, Kristiansand: Kuholmen (EIS 2) 1 female 1 Jul. 1973; 1 female Stangenes 28 Jun. 1976 K. Berggren leg. & coll.

This species is distributed in central and N Europe. In N Europe known from Denmark and S Sweden north to Västmanland (Palm 1986, Svensson et al. 1994).

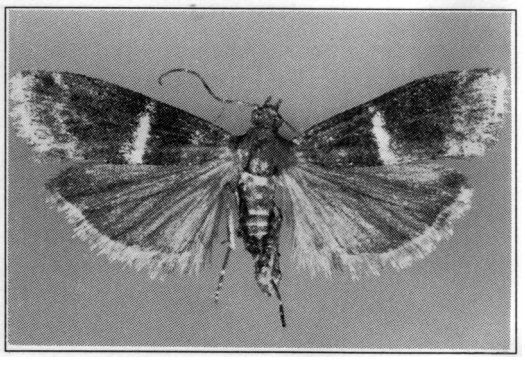

Figure 13
Elegia similella (Zincken)

The moth is figured in (Palm 1986).

The biology of this species is unknown, but the larva, like its congeners, probably feeds on moss. The habitat is deciduous forest (Palm 1986).

Agriphila latistria (Haworth, 1811)

AAY, Grimstad: Reddalsvann (EIS 6) 1 female 21 Aug. 1987 K. Berggren leg. & coll.; VAY, Farsund: Einarsneset (EIS 1) 1 male 28 Aug. 1990 S. Svendsen leg., NISK coll.

This species has a wide distribution in central and S Europe, N Africa and Asia Minor. It has extended its range in recent years, and it was recorded for the first time in Denmark in 1974 (Palm 1986). In 1991 it was collected in Skåne in S Sweden (Svensson 1993b).

The moth is figured in Palm (1986).

The larva of *A. latistria* constructs a case on the ground from where it feeds on grasses. Its preferred habitat in our neighbouring countries is sandy places near the sea (Palm 1986).

Geometridae

Timandra comai Schmidt, 1931

Ø, Moss: Jeløy (EIS 19) 1 male 19 Sept. 1952 M.A. Grude-Nielsen leg., ZMO coll.; AAY, Tvedestrand: Borøy (EIS 6) 1 male 6 Aug. 1969 J. Kielland leg., ZMO coll.; Arendal: Tromøy, Bjelland (EIS 6) 1 male 10 Aug. 1970 S.A. Bakke leg. & coll.; AAI, Åmli: Åmli (EIS 10) 19 Aug. 1970 A. Bakke leg., S.A. Bakke coll.; VAY, Kristiansand: Kuholmen (EIS 2) 1 male 7 Jun. 1970, 1 female 1 Sept. 1976 K. Berggren leg. & coll.

The well known species, *Timandra griseata* Petersen, 1902, has been shown to consist of two closely related species in N Europe (Kaila & Albrecht 1994). The commoner species in central Scandinavia retains the name *griseata*, and for the more southerly distributed of the pair, the name *Timandra comai* Schmidt, 1931 is available. Kaila & Albrecht (1994) reported *comai* from several countries in central and S Europe. It extends eastwards to the Novosibirsk region in Siberia. In N Europe in S Sweden north to Uppland and in S Finland to 62 latitude. In Denmark *comai* is common; the only Danish specimen of *griseata* was collected in 1994! (Larsen 1995). *Timandra griseata* is a boreal species which outside the Nordic countries is known from Estonia and E Russia: Carelia and the Leningrad area (Kaila & Albrecht 1994).

The taxa differ externally; *griseata* being on the average larger and with extensive grey dusting on the wings. *T. comai* is more yellow and is sparsely dusted with brownish grey scales. The pattern is usually more distinct in the latter. Slight differences between the two have been found in the female genitalia, but there are no obvious differences in the male genitalia. In Skou (1984) plate 3, fig. 3 shows *griseata*, and fig. 1, 2 and 4 show *comai*.

The flight period of both species last through most of the warm season. However, the peak occurrence of *griseata* is late June and that of *comai* is August. The first specimens of *comai* appear about two weeks before those of *griseata* (Kaila & Albrecht 1994). The food plants of *comai* are *Polygonum* and *Rumex*. These are probably also food plants of *griseata* (Larsen 1995).

Eupithecia abbreviata Stephens, 1831

VAY, Kristiansand: Stangenes (EIS 2) 1 male 17 May 1985 S. Svendsen leg., NISK coll.

E. abbreviata is distributed throughout Europe except the northernmost part (Skou 1984). In Denmark it is widely distributed and quite common; in Sweden known from the four southernmost districts being common in Skåne (Skou 1984, Svensson et al. 1994).

Imago and genitalia are figured in Skou (1984).

The larva feeds on *Quercus*, and the flight period is from the end of April till the beginning of June (Skou 1984).

Lymantriidae

Orgyia antiquoides (Hübner, 1822) (= *ericae* Germar, 1824)

TEY, Kragerø: Jomfruland (EIS 11) 1 male 30 Jul. 1984 A. Eriksen leg., S.A. Bakke coll.

This moth is distributed in the northernmost part of central Europe from the Netherlands eastwards to the Ural Mts. In Hungary, Romania and Bulgaria represented by the larger subspecies *intermedia* Frivaldszky, 1865. Further east it has been recorded in Mongolia and China (Freina & Witt 1987). In N Europe known from Denmark, Finland and Sweden. In S Sweden recorded north to Bohuslän and Dalsland. In connection with its distribution in Finland it also occurs in Norrbotten in N Sweden (Svensson et al. 1994).

The moth is figured in colour in Gullander (1963) and Freina & Witt (1987).

The habitat is moors where the food plants are *Calluna, Erica, Myrica, Andromeda* and *Salix* (Freina & Witt 1987).

Noctuidae

Calamia tridens (Hufnagel, 1766)

Ø, Rygge: Larkollen (EIS 19) 1 male 7 Aug. 1995 S.A. Bakke leg. & coll.

This species has a wide distribution in S and central Europe. It extends eastwards as far as NW China (Skou 1991). In N Europe in Denmark, the southern third of Finland and in Sweden north to Värmland. Since the 1970'ies it has declined in Finland, and in Sweden it is common only in the southernmost part of the country (Skou 1991, Svensson et al. 1994).

The moth is figured in colour in Skou (1991).

Its preferred habitat is sandy places where the larva feeds on various grasses (Skou 1991).

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SAMMENDRAG

Om norske Lepidoptera V

I artikkelen blir 45 sommerfuglarter rapportert nye for Norge. For hver av disse artene blir utbredelse og biologi kort beskrevet. Videre henvises det til relevant litteratur for bestemmelse av artene. 26 arter som har vært nevnt i litteraturen som forekommende i Norge, slettes fra den norske listen da det ikke finnes bevart materiale som bekrefter angivelsene.

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Collembola from Nordaustlandet, Svalbard

Arne Fjellberg

Fjellberg, A. 1997. Collembola from Nordaustlandet, Svalbard. - Fauna norv. Ser. B 44: 71-75.

A survey of 10 different localities from central and northern part of Nordaustlandet, Svalbard, gave 34 species of Collembola of which three are reported for the first time from the Norwegian arctic islands: *Bonetogastrura nivalis* (Martynova), *Anurida maritima* (Guérin), *Vertagopus arcticus* Martynova. Highest number of species were recorded from rich meadow sites surrounding bird-cliffs. The extreme northern Phippsöya had a clearly depauperate species assemblage with the lowest average number of species per sample.

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INTRODUCTION

The Collembola fauna of the arctic islands of Norway was reviewed by Fjellberg (1994). The terrestrial invertebrate fauna of the large island Nordaustlandet in the northeastern section of the Svalbard archipelago has never been explored, mainly due to its inaccessibility. Only along the Hinlopen strait, separating Nordaustlandet from Spitsbergen, has there been a few samples made during earlier expeditions.

In the period 3-8 Aug. 1995 an expedition organised by the the Norwegian research project TERRÖK visited a number of sites along the north coast of Nordaustlandet, including the remote islands Sjuöyane (Phippsöya and Nelsonöya) and Brochöya (Figure 1). The expedition was based on the coast guard ship «Senja» and the use of helicopter made the field work very efficient.

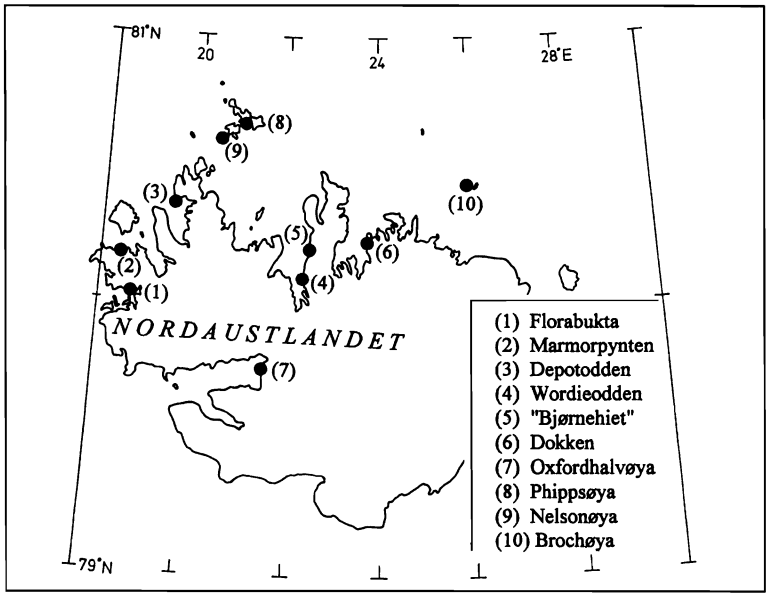

Figure 1
Collecting sites in Nordaustlandet, Svalbard 3-8 Aug. 1995.

METHODS

The following sites were visited (Figure 1):

(1) Florabukta, Murchisonfjorden. Rich S-facing slopes below bird-cliffs. Lush vegetation, deep soil with humus. Some samples from plateau above the bird cliffs (fell-fields, solifluction soil, drier sites). 15 samples.
(2) Marmorpynten in Pentavika on N-shore of Storsteinhalvöya. Rised beach ridges, stony polar deserts with scattered vegetation only. Some lush vegetation along streams and wet depressions, and near seashore. Dolomite outcrops and ridges with dry crevice vegetation. 20 samples.
(3) Depotodden at Brennevinsfjorden. Rocky habitats from sea shore to foot of bird cliffs. Mostly lush vegetation on sand/gravel and around boulders. 5 samples.
(4) Wordieodden at Rijpfjorden. Steep, rocky habitats above sea-shore. Lush vegetation. Mossy habitats among driftwood on beach. 4 samples.
(5) «Björnehiet» between Brinknuten and Sandfordhögda at Rijpfjorden. Moss and lichens among stones in polar desert. Short stop at refuel site. 1 sample.
(6) Dokken at Duvefjorden. Sand/gravel beach along sea shore. Moss and grass vegetation, some *Salix polaris*. 3 samples.
(7) Oxfordhalvöya at Wahlenbergfjorden. Dry, stony beach ridges (polar deserts) with lush vegetation along streams, ponds and in depressions. Crevice vegetation on rocky outcrops. Goose manure along ponds and lakes. 11 samples.
(8) Phippsöya, Sjuöyane. Around cabin facing Trollsundet. Sand/gravel with scattered vegetation on rised beach ridges near sea. Otherwise rocky habitats and bird cliffs with varied vegetation. 15 samples.
(9) Nelsonöya, Sjuöyane. Top plateau (140 m a.s.l.) of island. Thick, manured moss/lichen among rocks. Bird-cliff. 3 samples.
(10) Brochöya. Moss, grass and lichens among rocks and driftwood near sea shore. Arctic tern colony. 5 samples.

On each site - except on (5) and (8) - samples were selected so as to cover a wide spectrum of the available habitat types. Eightythree soil/litter samples of variable size (usually 300-500 ccm), collected by the author, were brought back to the mainland and extracted in open Tullgren funnels. Also some Collembola samples collected by other invertebrate specialists of the research team have been identified.

RESULTS

The following species have been identified from the samples:

Family Hypogastruridae

Hypogastrura tullbergi (Schäffer, 1900)
One of the most common species, being present in 59% of the samples. Particularly abundant - and often dominant - in dry, stony beach ridges with scattered vegetation and in crevice vegetation on rocks and cliffs. Less common in damp, mossy sites. - Recorded in all collecting sites except Brochöya.

Hypogastrura concolor (Carpenter, 1900)
Less common than previous species (28% of samples), and usually in wetter habitats like mossy sites in bird colonies and along ponds with goose droppings. The records indicate that it becomes more abundant in the extreme northern sites (Phippsöya, Nelsonöya, Brochöya). On Phippsöya it was also common in moss and lichens on dry, sandy beach ridges. - Florabukta, Marmorpynten, Depotodden, Dokken, Oxfordhalvöya, Phippsöya, Nelsonöya, Brochöya.

Hypogastrura viatica (Tullberg, 1872)
Usually in seashore habitats with rich organic deposits. Also in bird cliffs and along ponds and lakes. - Florabukta, Marmorpynten, Depotodden, Oxfordhalvöya, Brochöya.

Ceratophysella longispina (Tullberg, 1876)
Common in damp seashore meadows and in wet, mossy upland habitats. Also in bird-cliffs, on reindeer droppings and on carcasses. - Florabukta, Marmorpynten, Depotodden, Wordieodden, Dokken, Oxfordhalvöya.

Bonetogastrura nivalis (Martynova, 1973)
In crevice vegetation on rocks and in plant cushions in stony, dry tundra. Abundant in thick turf under old whalebones on rised beach ridges. A few collections also from wet sites. - Marmorpynten, Oxfordhalvöya (8 samples in all).

Willemia scandinavica Stach, 1949
A characteristic species in closed meadow vegetati-

on in drier sites under bird-cliffs and on seashores. - Florabukta, Depotodden, Dokken, Oxfordhalvöya.

Willemia similis Mills, 1934

Together with previous species, but less abundant. - Florabukta, Depotodden, Oxfordhalvöya.

Xenylla humicola (Fabricius, 1780)

Usually in sites with rich nitrophilous vegetation - like in bird-cliffs, on seashores, and near cabins and hunting stations. Both wet and dry conditions. - Florabukta, Oxfordhalvöya.

Family Neanuridae

Anurida polaris (Hammer, 1954)

Common in a variety of habitats, avoiding only the driest sites. Most abundant during wet conditions. - Recorded in all sites except Dokken.

Anurida maritima (Guérin, 1836)

In moss and lichens at seashore. - Dokken (1 specimen).

Micranurida pygmaea (Börner, 1901)

Meadow vegetation on gravelly slope at foot of bird-cliffs. - Dokken.

Friesea quinquespinosa Wahlgren, 1900

Mostly in dry sites in bird-cliffs and on seashores. - Florabukta, Marmorpynten, Depotodden.

Family Onychiuridae

Oligaphorura groenlandica (Tullberg, 1876)

Common in a variety of wet habitats, often very abundant in moss and grass along run-off water below bird-cliffs. Less common in dry upland tundra. - Present in all collecting sites.

Oligaphorura ursi (Fjellberg, 1984)

Only three records from deep soil below bird-cliffs, from dry beach ridge and from damp moss in a streambed. - Florabukta, Oxfordhalvöya.

Protaphorura arctica (Tullberg, 1876)

Aundant under stones and in rock vegetation in bird-cliffs and on seashores. Avoids wet sites. - Florabukta, Depotodden.

Protaphorura duplopunctata (Strenzke, 1954)

In rock crevices and vegetation in bird cliffs and on seashores. - Florabukta, Depotodden.

Tullbergia simplex Gisin, 1958

Only once in a dry slope below a bird-cliff with rich vegetation and deep soil. - Florabukta.

Mesaphorura macrochaeta Rusek, 1976

Only in three samples from deep soil under rich vegetation below bird-cliffs. - Florabukta, Depotodden.

Family Isotomidae

Pseudanurophorus inoculatus Bödvarsson, 1937

Only once in deep soil under rich vegetation below bird-cliffs. - Florabukta.

Folsomia alpha Grow & Christiansen, 1976

Usually in moderately dry beach meadows, beach ridges and bird-cliffs. Less common in upland tundra. Very abundant in moss on top of Nelsonöya. - Florabukta, Marmorpynten, Depotodden, Oxfordhalvöya, Phippsöya, Nelsonöya.

Folsomia bisetosa Gisin, 1953

Common in dry bird-cliff meadows, in crevice vegetations on rocks, in plant cushions in dry upland tundra. Few records from wet sites. - Florabukta, Marmorpynten, Depotodden, Wordieodden, Dokken, Oxfordhalvöya, Brochöya.

Folsomia quadrioculata (Tullberg, 1871)

Common and abundant in rich vegetation in both dry and wet sites from seashores, bird-cliffs and upland tundra. - Present in all sites except Marmorpynten. The absence of the species from all 20 samples from Marmorpynten may be due to the very meagre conditions in the area.

Folsomia regularis Hammer, 1953

Common and abundant in both coastal and upland tundra, with a preference for wet, mossy sites. - Records from all collecting sites except Depotodden.

Archisotoma besselsi (Packard, 1897)

Only two records from seashores, in littoral gravel and under driftlogs. - Marmorpynten, Phippsöya.

Archisotoma polaris Fjellberg & Poinsot, 1975

Two records from seashores, under stones and among debris. -Marmorpynten.

Agrenia bidenticulata (Tullberg, 1876)

Common and abundant in various types of tundra, especially numerous in moss along streams and ponds and on *Nostoc* in wet places without other vegetation. - Florabukta, Marmorpynten, Wordieodden, Oxfordhalvöya, Phippsöya, Brochöya.

Isotoma anglicana Lubbock, 1862

Only in two samples from the surroundings of an old hunting cabin and in rich vegetation at foot of a bird-cliff (abundant). - Florabukta.

Isotoma neglecta Schäffer, 1900

A few samples from wet moss along ponds and stre-

ams and among driftwood on seashore. - Wordieodden, Oxfordhalvöya.

Isotoma tshernovi Martynova, 1974

A few samples from meadows and moss vegetation, mostly in damp habitats. - Florabukta, Wordieodden, Oxfordhalvöya.

Vertagopus arcticus Martynova, 1969

A characteristic species in dry, arctic tundra. In crevice vegetation on rocks, among flakes of whittered dolomite and shale, in sand and gravel on raised beach ridges. Particularly abundant on Phippsöya. - Florabukta, Marmorpynten, Dokken, Oxfordhalvöya, Phippsöya.

Family Entomobryidae

Lepidocyrtus lignorum (Fabricius, 1871)

Only one sample from meadow vegetation in dry tundra. - Marmorpynten.

Family Neelidae

Megalothorax minimus (Willem, 1900)

Only in one sample from plant cushions on a dry gravel tundra. - Oxfordhalvöya.

Family Sminthuridae

Sminthurides malmgreni (Tullberg, 1876)

Common in wet tundra, in vegetation along ponds, streams and seashores. - Florabukta, Marmorpynten, Wordieodden, Dokken, Oxfordhalvöya.

Family Katiannidae

Sminthurinus concolor (Meiner, 1896)

Only in one sample from a bird-cliff, where it was abundant under stones and overhanging vegetation on rocks, some also creeping freely exposed over the rock. - Florabukta.

DISCUSSION

The 34 species of Collembola which were found in the present survey, is a relatively high number compared to the 49 species known from the whole of Svalbard archipelago, excluding Jan Mayen and Björnöya (Fjellberg 1994). This certainly reflects the broad variation and locally very diverse structure of the habitats in Nordaustlandet, in particular in the vicinity of the bird-cliffs and on seashores.

Although sampling intensity and sample size vary between the localities, Table 1 reflects the differences in habitat and faunal diversity. The 11 species from Phippsöya, based on 15 samples, clearly indicates a depauperate fauna compared to the 26 species from Florabukta present in 15 samples. Similar conditions are illustrated by the 7 species from Nelsonöya (3 samples) and the 13 species from Dokken (3 samples) and 7 species (5 samples) from Brochöya and 15 species (5 samples) from Depotodden.

Large tracts of Nordaustlandet are dominated by strongly whittered raised beach ridges and upland tundra with moss, lichens and only scattered patches of higher vegetation. Samples from such plant communities often had only 2 or 3 species per sample. The highest number of species per sample are coming from the richer meadow habitats along bird-cliffs, with a maximum of 11 species in a sample from Florabukta. Next come three seashore samples each with 9 species (Depotodden, Dokken, Wordieodden). On average the 15 samples from Phippsöya had only 3.8 species, with a maximum of 6 species in a meadow sample from the foot of a bird-cliff.

The present survey revealed three species which have not been reported from the Svalbard area before: *Anurida maritima, Bonetogastrura nivalis* and *Vertagopus arcticus*. The former species (one individual) is possibly accidental, but is a marine littoral species which

Table 1

Locality	Number of samples	Number of species	Average number of species per sample
Florabukta	15	26	5.5
Marmorpynten	20	17	4.9
Depotodden	5	15	7.2
Wordieodden	4	11	7.3
«Björnehiet»	1	5	5.0
Dokken	3	13	7.3
Oxfordhalvöya	12	21	5.5
Phippsöya	15	11	3.8
Nelsonöya	3	7	5.7
Brochöya	5	7	5.0

may pop up in seashore habitats almost anywhere. The two others are true arctic species and their presence in Nordaustlandet and apparent absence in Spitsbergen may reflect a faunal gradient in the Svalbard archipelago. *B.nivalis* is know from the north coast of Siberia (Franz Josef Land to Wrangel Island (Bebenko et al. 1994), while *V. arcticus* is circumpolar and even present in alpine sites in mainland Scandinavia (Fjellberg 1988). The latter species was particularly abundant in Phippsöya and appears to be a representative of the high arctic polar desert fauna.

ACKNOWLEDGEMENTS

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Short communications

Norwegian records of *Cixidia confinis* (Zetterstedt) and *C. lapponica* (Zetterstedt) (Homoptera, Achilidae)

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INTRODUCTION

The two homopteran species *Cixidia confinis* and *C. lapponica* have a rather unusual way of life as they both feed on fungal hyphae in rotten logs of conifers, mainly pine. Both insects are broad and flattened, adapted to penetrate narrow spaces in wood cracks where small flocks of adults and juveniles may be found on areas infested by fungi.

Both species have a boreal distribution and *C. confinis* is endemic to Fennoscandia including Estonia. According to Ossiannilsson (1978) the species are very rare in Sweden and Finland, being absent from Norway and Denmark. Ehnström & Waldén (1986) regard the species as vulnerable in Sweden, being threatened by modern forestry practice.

Hansen & Borgersen (1991) reported the first Norwegian records from Vestfold where both species were found associated with the rare beetle *Calitys scabra* (Trogositidae) on old, fallen pine trunks (EIS 19, VE: Larvik, Pauler. 22.IV. and 29.IV.1989). The same authors reported a record of *C. lapponica* from EIS 55, HEs: Elverum, 20.V.1989 and of *C. confinis* from EIS 72, HEn: Alvdal, 18.V.1989. On both occassions the species were found in dead pine trunks affected by forest fires and fungal attacks. On 10. July 1996 we found both species together in a fallen pine trunk near northerne end of Lake Farrisvann, VE: Larvik (EIS 18). The trunk was lying on a SW-facing hillside about 280 m a.s.l., freely exposed to sun and wind. The trunk was completely dry and the insects were gathered around a whitish mycelium in the narrow spaces between the longitudinal, concentric lamellae of the splintered wood. Both juveniles and adults were present. The presence of these two rare species in the area around Farrisvann adds to an accumulating evidence of a genuine relic forest fauna of boreal affinity in this area (Fjellberg et al. 1996, Fjellberg & Hansen 1997).

SAMMENDRAG

Norske funn av *Cixidia confinis* (Zetterstedt) og *C. lapponica* (Zetterstedt) (Homoptera, Achilidae)

De to uvanlige sikadene *Cixidia confinis* (Zetterstedt) og *C. lapponica* (Zetterstedt) lever i sprekker på soppinfiserte stubber og stammer av furu der de livnærer seg av sopphyfene. De förste norske funn av begge artene ble rapportert i 1991 fra Vestfold og fra söndre Hedmark (*C. lapponica*) og nordre Hedmark (*C. confinis*). Sommeren 1996 ble begge artene funnet sammen nær nordenden av Farrisvannet, Vestfold, på en liggende soleksponert furu der veden var oppsprukket i langsgående, konsentriske lameller med sopphyfer mellom lamellene. Artene har en boreal utbredelse og er sjeldne også i våre naboland, der de regnes som truet av moderne skogbruk.

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Peltis grossa (L.) - still present in Norway (Coleoptera, Trogositidae)

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INTRODUCTION

The wood-living trogositid beetle *Peltis grossa* has been recorded in Norway in the counties Hedmark, Akershus, Buskerud, Telemark and Aust-Agder. Most records are very old and the species has not been seen after 1940 (Zachariasssen 1990, Hanssen 1995). Also in Sweden it has become rare and probably extinct in most localities in southern part of the country (Ehnström & Waldén 1986).

For some years we have been aware of the presence of remnants of primeval boreal forests in the hilly parts of inner Vestfold, mainly in the districts north and west of Larvik. Due to difficult topography old stands of spruce, pine, aspen, beech and oak have escaped modern forestry on hilltops and in ravines. A number of rare forest insects have already been found in these sites (Halvorsen et al. 1983 , Borgersen et al. 1985, Hansen 1991, Hansen & Borgersen 1991, Fjellberg et al. 1996, Fjellberg & Hansen 1997). On 10 July 1996 we searched a hilly area near the northern end of lake Farrisvannet (VE: Larvik, EIS 19) and soon discovered the characteristic elongate flight holes of *Peltis grossa* in rotten stumps of spruce and birch. Remnants of imagines were found inside the stumps, and finally a live imago was spotted while sitting on the bark at foot of a dry spruce. Two days later the area was visited again, and a further five live specimens were found hiding under bark and in crevices on dead spruce. On 14 July a pupa was found in rotten birch, hatching during the first week of August. One imago was found in rotten spruce on 31 August, and finally one imago in rotten aspen on 1 September. The aspen was lying on the ground and had several characteristic flight holes of *Peltis*. The wood was infested with mycelium and had a firm consistence. The root end of the fallen log also had larval attacks of the lucanid beetle *Ceruchus chrysomelinus* (Hoch.), of which one imago was found on a spruce stump in the same area on 12 July. The latter species was recorded new to Norway from a nearby locality a few years ago (Hanssen 1995). Alle records of imagines and observations of flight holes were made over a stretch of 3 km in altitudes 200-300 m a.s.l. Most flight holes were found in standing 1-3 m tall stumps of spruce with red-rotten, fairly moist wood being infeseted with a whitish mycelium. These trees had been broken by wind. A standing, dead birch was also attacked, and a single fallen spruce trunk had a few flight holes. Apparently the beetle avoids dry, exposed sites as all the infested stumps were in N- or E-facing slopes or in other positions with reduced insulation.

SAMMENDRAG

Peltis grossa (L.) - fortsatt til stede i Norge (Coleoptera, Trogositidae)

Den sjeldne trelevende billen *Peltis grossa* (L.) har ikke vært funnet i Norge siden för 1940, og man har antatt at den kunne være utdödd. Sommeren 1996 ble det funnet en rekke flyvehull og enkelte imago i stående og liggende stammer av död gran, bjerk og osp nær nordenden av Farrisvannet i Vestfold. Angrep ble registrert over en strekning på 3 kilometer, men var begrenset til nord- og östskråninger og andre steder med redusert innstråling. De fleste flyvehullene ble sett i 1-3 m höye stubber etter trær som var knekket av snö eller vind.

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Cnemacantha muscaria (Fallèn, 1823) (Dipt., Lauxaniidae), a species new to Norway

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The Lauxaniid fly *Cnemacantha muscaria* (Fallèn, 1823) is here recorded new to Norway. A total of 1 ♂, 12 ♀ ♀ and 1 specimen is represented in the collections of Zoological Museum, University of Oslo(=ZMO) and Zoological Museum, University of Bergen (=ZMB). Most of the material has been collected fairly recently, however, there are two old dry mounted specimens in the Zoological Museum which at least one female belongs to this species. The rest of the material is alcohol fixated.

Material: AK Oslo: M.(Museum?) Tøyen 25 June (18)49 1 ♀ ZMO; Havnen? (Uncertain locality) 31 May (18) 49 1 specimen ZMO; Bærum: Ostøya EIS 28 Malaise Trap 21 July-12 August 1984 1 ♀ leg. Fred Midtgaard ZMB. BØ Kongsberg: Hvamslia EIS 27 1 ♀ 19 July 1995 leg. B.A.Sagvolden ZMB; Drammen: Underlia Malaise trap.June 1992 2 ♀ ♀, May 1994 1 ♂ 2 ♀ ♀, June 1994 4 ♀ ♀ ZMB. TEI Tinn: Rjukan, Håkanes EIS 26 July 1995 Malaise trap 1 ♀ leg. B. A. Sagvolden ZMB.

Cnemacantha muscaria (Fallèn, 1823) has been recorded in Europe from Southern Sweden and Southern Finland in the north and to Italy in the south, the British Isles included (Soòs, 1984).

C.muscaria is a small, 2-3 mm, blackish fly. Among the Lauxaniidae it can be recognized on account of the.strikingly infuscated wings with blackish costal border. The middle tibia bears a pair of ventral apical spurs. On thorax there are six rows of acrostichal bristles.

The postvertical bristles are crossed in the family Lauxanidae and this character is used to key out flies of this family. The female from TEI had postvertical bristles approximately paralell, while the others had the «normal» type of crossed postverticals.

The dark color and the small size probably makes *C.muscaria* easy to overlook in Malaise trapped material. Still *C.muscaria* is obviously rare in Norway and the species has probably a southern distribution in Norway as elsewhere in Fennoscandia. Collin (1948) says it appears to be very rare in the British Isles as he only had seen a total of four specimens from the British isles; two from England and two from Scotland.

One of the two old specimens from Zoological museum, Univ. Oslo is lacking the abdomen and part of the thorax, but still seems to be correct determined. The exact position of the locality "Havnen" is uncertain. Both the female and the specimen have a label marked with the name *Cnemacantha muscaria*, but no determinator is given.

Dr. László Papp, Budapest (pers.comm.), an expert on this family, considers *C.muscaria* a fairly rare fly which is nowhere abundant.

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SAMMENDRAG

***Cnemacantha muscaria* (Fallèn,1823) (Dipt. Lauxaniidae) funnet i Norge**

Lauxaniiden *Cnemacantha muscaria* (Fallèn, 1823) er ikke tidligere rapportert fra Norge. Materiale er innsamlet er innsamlet fra AK Oslo: Tøyen and Bærum: Ostøya, BØ Kongsberg: Hvamslia, Drammen: Underlia og TEI Tinn: Rjukan, Håkanes. *C.muscaria* er antagelig sjelden her i landet. Den kjente utbredelsen er ellers fra sør Fennoscandia til Italia. Arten ser ikke ut til å være vanlig forekommende noen steder innenfor utbredelsesområdet.

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Arytaina genistae (Latreille,1804) (Homoptera, Psylloidea), a new Psyllid for Norway

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A psyllid *Arytaina genistae* (Latreille, 1804) is reported new to Norway. One female of *A. genistae* was collected in a Malaise trap at TEI Tinn: Håkanes EIS 26 October 1995. The trap was operated throughout the summer 1995 by Bjørn A.Sagvolden. No other specimens were sorted out from the material.

A.genistae is common and widely distributed in Denmark and known from some provinces in southern Sweden: Sk. Bl. and Öl.

A.genistae belongs to the sub.fam. Arytaininae in the fam. Psyllidae. Vein R+M+Cu1 in the forewing is bifurcate, giving rise to R and M+Cu1. The head has genal cones. The metatibiae have apically around 5 large black spurs, the basal metatarsal segment has one black apical spur only. The family have two genera and only the wings of *Arytaina* are characteristically marked with long, light brownish spots in cells R2 and CU2. In addition there are spots along the wing border in M l, M2 and CU1.

For a more detailed description see Ossiannilsson (1992).

According to Ossiannilsson (1992) *Sarothamnus scoparius, Genista tinctoria* and *Cysticus* spp. are all possible hosts for this species.

Håkanes is located at Tinnsjø (Tinnsjå) at 191 m a s l . The Malaise tent was situated on an open meadow with a mixed forest of large *Salix* sp.and *Populus tremulus* L., intermingled with *Betula* sp., *Sorbus aucuparia* L., *Prunus padus* L., *Pinus silvestris* L. and *Picea abies* (L.). The areas near by is either farmland or occupied by private cabins partly with gardens.

SAMMENDRAG

Arytaina genistae (Latreille, 1804) (Homoptera Psyllidae) ny art for Norge

Arytaina genistae (Latreille, 1804) er en psyllide som ikke tidligere er rapportert fra Norge. I oktober 1995 ble en hunn fanget i en Malaisefelle ved Håkanes, Tinn kommune, EIS26 TEI. Bjørn A.Sagvolden satte opp fellen og tømte den regelmessig gjennom sommeren 1995, men bare denne ene hunnen ble funnet i fellematerialet. Arten er vanlig over hele Danmark og er ellers i Fennoscandia kjent fra noen fylker i sør Sverige.

De fleste psyllider har klare vinger, men hos *A.genistae* har vingene et karakteristisk brunt flekkmønster.

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New names in Diptera: pearl midge, ground midge and log midge

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The family Cecidomyiidae consists of three subfamilies: Lestremiinae, Porricondylinae and Cecidomyiinae. Up to now, gall midges has been used as a popular name for the whole family, while no popular names have been developed for the subfamilies. However, the name gall midge is a misleading name for the family, because two of the subfamilies utilize quite other microhabitats and do not contain gall makers at all. In Table 1, new English and Norwegian names are suggested for family and subfamilies.

Table 1. New English and Norwegian names for Cecidomyiidae and its subfamilies. - Nye engelske og norske navn for Cecidomyiidae med tilhørende underfamilier.

Latin	English	Norwegian
Cecidomyiidae	pearl midge	perlemygg
Lestremiinae	ground midge	feltmygg
Porricondylinae	log midge	lægermygg
Cecidomyiinae	gall midge	gallmygg

Pearl midge is short and easy to say, and the name derives from the pearl-string-shaped antennae which is very characteristic for this family. Ground midge is a short name, reflecting that many species in Lestremiidae develop in microhabitats within the ground layer of the forest, such as litter, in dead wood and fungi. Also, log midge is a short and informative name. Many species in Porricondylinae develop in dead wood, such as logs of various tree species. Gall midge is hereby restricted to the subfamily which really contains the gall makers.

SAMMENDRAG

Nye tovingenavn: Perlemygg, feltmygg og lægermygg

Familien Cecidomyiidae omfatter tre underfamilier: Lestremiinae, Porricondylinae og Cecidomyiinae. Gallmygg har til nå vært et populærnavn for hele denne familien, mens underfamiliene har vært uten populære navn. Gallmygg er imidlertid et misvisende navn for denne familien, fordi to av underfamilene utnytter andre mikrohabitater og inkluderer ingen galledannere. Tabell 1 presenterer nye engelske og norske navn for familie og underfamilier.

Perlemygg er et kort og lett å si, og navnet er knyttet til de perlekjedeliknende antennene som er svært karakteristisk for denne familien. Feltmygg er et kort navn som gjenspeiler at mange av artene i Lestremiinae har larveutvikling i mikrohabitater knyttet til feltsjiktet av skogen, som for eksempel i strøfall, dødt virke og sopp. Også lægermygg er et kort og informativt navn (læger er flertallsformen av låg som betyr liggende tre eller trestamme) . Mange av artene i Porricondylinae har larveutvikling i dødt virke, deriblant i læger av ulike treslag. Gallmygg er herved begrenset til den underfamilien hvor det virkelig finnes galledannere.

Palaeomymar duisburgi (Stein, 1877) (Hym., Mymarommatoidea) – a species and superfamily new to the Norwegian fauna

Lars Ove Hansen

A single ♂ of the minute wasp *Palaeomymar duisburgi* (Stein, 1877) was collected in a malaisetrap in SE Norway, Akershus county (AK), Asker: Bjørkås (EIS 28), 24 Aug.–10 Oct. 1995. This is the first record of the superfamily Mymarommatoidea in Norway. The systematic position of the group through the last 25 years is briefly reviewed.

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INTRODUCTION

The family Mymarommatidae is represented with a single species in Europe (Nikolskaya 1978), and worldwide with about ten extant species in a single genus (i.e. *Palaeomymar)* (Gibson, 1993, Lin 1994). However, the family is ancient and specimens have been found in amber from the Cretaceous, Baltic and Dominican periods (i.e. 25–100 million years ago). Ottesen (1993) gave an account of the number of species in the different families of insects in Norway, and also included several unrecorded but highly probable families. Mymarommatidae is not included here. Nothing is known about the biology of the family, but a specimen has once been rared from a bracket fungus (Gibson 1993). *P. duisburgi* is recorded from Sweden, Denmark, Germany, Switzerland, Belgium, Bohemia, France, England and China (Stein 1877, Landin 1971, Fitton et al. 1978, Kalina 1989, Lin 1994).

SYSTEMATIC POSITION & DIAGNOSIS

The systematic position of the group has been at issue (table 1). Nikolskaya (1978) includes the family in the superfamily Proctotrupoidea. However, some authors (e.g. Landin 1971, Fitton et al. 1978) include the group in Mymaridae, while others put it in a separate chalcidoid family, Mymarommatidae, close to Mymaridae (e.g. Gauld & Bolton 1988, Borror et al. 1989, Kalina 1989). Gauld & Bolton (1988) stress that the placement of the group in Chalcidoidea is questionable because the species lack the characteristic longitudinal multiporous plate sensilla found on the antennae of other members of this superfamily. Gibson (1993) finally puts the group in a separate superfamily: Mymarommatoidea. According to Gibson (1993) the family is characterized by very small species; all less than 1 mm; antenna geniculate; flagellum filiform in male and with club of 1-2 flagellomeres in female; male with 11 flagellomers, female with 7–9; head with strongly convex frontal surface and flat posterior surface separated by a pleated membrane, contracting dorsally in a bellow-like manner; individuals alate, brachypterous or apterous; fore wing of fully winged specimens spoon shaped with mesh-like pattern; wing with long marginal setae; hind wing of fully winged specimens reduced to short, stalk-like, apically bifurcate wein; tarsi with 5 tarsomeres.

Table 1. The systematic position of *Palaeomymar* through the last 25 years.

Auctor	Family	Superfamily
Landin (1971)	Mymaridae	Chalcidoidea
Nikolskaya (1978)	Serphitidae	Proctotrupoidea
Fitton et al. (1978)	Mymaridae	Chalcidoidea
Gauld & Bolton (1988)	Mymarommatidae	Chalcidoidea
Borror et al. (1989)	Mymarommatidae	Chalcidoidea
Kalina (1989)	Mymarommatidae	Chalcidoidea
Naumann (1991)	Mymarommatidae	Chalcidoidea
Gibson (1993)	Mymarommatidae	Mymarommatoidea

THE NORWEGIAN RECORD

A single ♂ of *Palaeomymar duisburgi* (Stein, 1877) (= *Petiolaria anomala* Blood & Kryger, 1922) appeared in a malaisetrap in Akershus county (AK) Asker: Bjørkås, (UTM-ED50: 32VNM839293) 24 Aug.–10 Oct. 1995 (leg. O. Hanssen & LOH). The length of the body is about 0.6 mm. The malaisetrap was situated in a southfaced warm slope with mixed forest dominated by hazel *(Corylus avellana)*, lime *(Tilia cordata)*, rowan *(Sorbus aucuparia)*, oak *(Quercus* sp.), spruce *(Picea abies)* and pine *(Pinus sylvestris)*. The chalcareous ground is rich in orchids and other basiphilous herbs. Dead and decaying wood are abundant in the area. The samples from the malaisetraps contained also many Mymaridae and Trichogrammatidae (Chalcidoidea), as well as some interesting Aculeata. The specimen is deposited at the Zoological Museum in Oslo.

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SAMMENDRAG

***Palaeomymar duisburgi* (Stein, 1877) (Hym., Mymarommatoidea) – ny art og overfamilie for den norske fauna**

En ♂ av mikrovepsen *Palaeomymar duisburgi* (Stein, 1877) ble fanget i et malaisetelt i Akershus fylke (AK), Asker: Bjørkås (EIS 28), 24 Aug.–10 Oct. 1995, Sør-øst-Norge. Dette er første funn av overfamilien Mymarommatoidea i Norge. Gruppens systematiske posisjon over de siste 25 år er kort belyst.

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Palpomyia remmi Havelka, 1974 (Diptera, Ceratopogonidae) new to Norway

Jaroslaw Krzywinski

The first record of *Palpomyia remmi* Havelka (Diptera, Ceratopogonidae) in Norway is presented. The species has not been reported in Scandinavia as yet. Notes on its general distribution are given. On the basis of morphological data it is concluded that *P. remmi* may be conspecific with North American *P. canadensis* Grogan & Wirth.

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INTRODUCTION

The biting midges, Ceratopogonidae (Diptera) are tiny (body length 1-4 mm) nematocerous flies. Though commonly present in a wide range of semiaquatic and aquatic habitats in immature stages they are still poorly known in many regions of the world. Only hematophagous forms that take blood from mammals and birds have been studied better because of their importance in medical and veterinary terms. In the blood feeding group, *Culicoides* characterized by wings patterned with dark and light spots are notorious pests in northern Europe, known by their bites causing intense sharp pain and long lasting irritation not only to specialists in entomology.

Females of *Palpomyia* are predators capturing their prey in flight. They attack almost exclusively the males of other Nematocera or the smaller Ephemeroptera. Female, in addition to her other prey, usually eats the male during mating, reducing his body to an empty cuticle. This phenomenon was described in details by Downes (1978). Males are not predators and feed on sugar taken from the nectar of flowers.

Apart from *Culicoides* studied by Nielsen (1964) in Denmark Scandinavian biting midges have not received comprehensive treaty since Staeger (1839), Zetterstedt (1838, 1850, 1855) and Lundström (1910, 1916). The Ceratopogonidae are particularly poorly known in Norway. Only 20 species have been reported in this country to date (Krzywinski in press, Szadziewski et al. in press). For a comparison - 57 species of Ceratopogonidae have been encountered in Finland (Hackman 1980) and as many as 156 species in Britain (Kloet & Hincks 1976).

During the study of the collection of biting midges in the Natural History Museum (London), a male specimen of *Palpomyia remmi* Havelka, 1974 captured at Nordland, Svartisen, Engabreen V., 16. June-8. Sep. 1950 by L. Davies (B. M. 1950-542) was found. The species is new to Norway. The determination was confirmed by a comparison of Norwegian specimen with a male specimen from Germany, which was determined by Dr. Havelka.

P. remmi is known from northern Hessen (Havelka 1974, 1976) and environs of Bonn (Havelka & Caspers 1981) in Germany. Moreover Havelka (1981) mentioned the species also from the Alps (near Innsbruck) but this record is not clear. Remm (1988) listed the species from Estonia in Soós & Papp's Catalogue of Palaearctic Diptera. However, neither in any other publication concerning the biting midges, nor in an extensive unpublished Remm's handwritten catalogue, where every specimen of *Palpomyia* captured in the former USSR and determined by Remm had been put, any record of *P. remmi* from Estonia was found. For this reason the record from Estonia (Remm 1988) is treated here as doubtful.

P. canadensis Grogan & Wirth from North America is very closely related to *P. remmi*. Grogan & Wirth (1979) suggest that *P. canadensis* is restricted to cold habitats as in the north it ranges to near the Arctic Circle and in the south it has been recorded from high altitudes in the mountains. Present record of *P. remmi* from the locality beyond the Arctic Circle evidence that the distribution of both species is very similar.

The development of *P. remmi* takes place in cold waters of small brooks (Havelka 1976) and springs (Havelka & Caspers 1981). The species is abundant in brooks (up to 103 individuals per m^2), where constitutes up to 48% of total number of Ceratopogonidae collected by emergence traps set over water, whereas only individual specimens were captured over springs.

According to the illustrations of male genitalia given by Havelka (1974) in his original description of *P. remmi* ninth sternum is less than 2 times broader than long. The specimens from Norway and from Germany studied by the author have ninth sternum much shorter, 3.5 times broader than long (Figure 1). Because ninth sternum is pale brown and almost hyaline its distal margin is hardly visible; this probably resulted in Havelka's misinterpretation of its shape.

The present comparison of *P. remmi* male specimens with the description and illustrations of *P. canadensis* revealed no differences between these two species as stated by Grogan & Wirth (1979). Hence, *P. remmi* differs from the American species only in little more yellowish female legs and distal wing infuscation (Grogan & Wirth l.c.). Thus *P. canadensis* and *P. remmi* may be conspecific. However, to determine it more materials of both sexes, including types, should be studied.

ACKNOWLEDGEMENTS

I am grateful to Dr. Brian Pitkin for the loan of the material and his help during my study of Ceratopogonidae in The Natural History Museum, London. I also wish to thank Mr. Kalle Remm from Estonia for his hospitality and allowing me to study the catalogues of the late Dr. H. Remm.

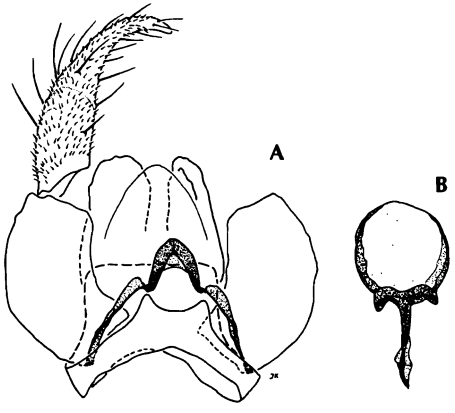

Figure 1
Palpomyia remmi, A - male terminalia (parameres removed); B - parameres.

SAMMENDRAG

Palpomyia remmi Havelka, 1974 (Diptera, Ceratopogonidae) ny for Norge

Palpomyia remmi Havelka, 1974 (Diptera, Ceratopogonidae) rapporteres her fra Norge for første gang.

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Molorchus umbellatarum (Schreber, 1759) (Coleoptera, Cerambycidae) new to Norway

John Skartveit

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The cerambycid *Molorchus umbellatarum* is reported new to Norway. One specimen was collected on umbellifer flowers on a meadow at VE, Tjøme, Gon (EIS 19), 24 June 1995, and a second specimen nearby on 12 July 1995.

One specimen of *Molorchus umbellatarum* (Schreber) was collected by the author on umbellifer flowers (species not recorded but probably *Anthriscus sylvestris*) at VE,Tjøme: Gon (EIS 19) on 24th June 1995. The specimen was collected, together with several other cerambycids (*Gaurotes virginea* (L.), *Stenostola ferrea* (Schrank) and *Anoplodera sanguinolenta* (L.)) on a meadow covered with umbellifers and *Urtica dioica*, surrounded by mixed deciduous and coniferous forest. There were several small orchards in the surrounding area. On 12 July 1995 a second specimen was collected by A. Fjellberg in a garden approximately 200 meters away from the locality where the first specimen was taken. The south end of the island Tjøme is known to have an unusually rich insect fauna (Andersen and Søli 1988).

Molorchus umbellatarum is habitually rather similar to the common species *M. minor* (L.) but differs in that the third antennal segment is not longer than the first, the femorae less thickened apically, and the lateral tubercles on the pronotum more rounded.

The species has previously been recorded from Sweden, Denmark, Latvia and Lithuania (Silfverberg 1992), and also from Great Britain (Bily and Mehl 1989). It is widespread in Europe (Bily and Mehl 1989). According to Bily and Mehl (1989), the main host plant for the species is apple (*Pyrus malus*) but *Rosa canina*, *Rubus* spp. (Duffy 1946), *Cornus sanguineum* and *Viburnum opulus* (Demelt 1966) have also been recorded as hosts. The life cycle takes two years and imagines emerge in June-July (Bily and Mehl 1989).

ACKNOWLEDGEMENTS

Thanks to Lita Greve, Bergen, for the loan of specimens from the Andreas Strand collection, by which the identification of the specimen could be verified, and to Arne Fjellberg, Tjøme, for permission to cite his record of *M. umbellatarum*, and also for keen advice on interesting localities on Tjøme.

SAMANDRAG

Trebukken *Molorchus umbellatarum* (Schreber) vert rapportert som ny for Noreg. Eit eksemplar av arten vart samla på skjermplanteblomster på VE,Tjøme: Gon (EIS19), 24. juni 1995, og eit eksemplar til vart funne like ved 12. juli 1995 (A.Fjellberg leg.). Arten er tidlegare funnen i Sverige, Danmark og det meste av Europa. Vertsplanta er vanlegvis apal (*Pyrus malus*), men *M. umbellatarum* kan også finnast i andre lauvtre og buskar.

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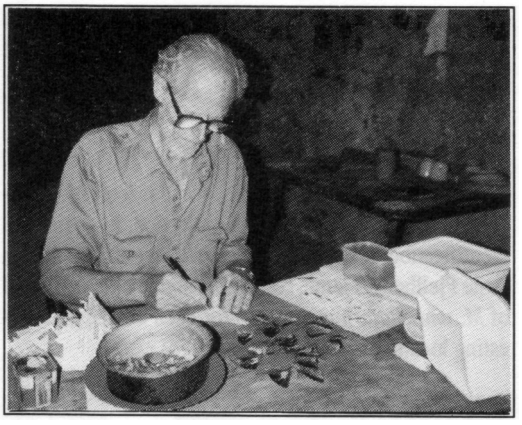

IN MEMORIAM
Jan Kielland (1923-1995)

Jan Kielland in a typical field situation: papering the day's catch of various *Charaxes* butterflies while absentmindedly consuming cold remains of his modest supper of maize porridge and beans. Rubondo Island, Lake Victoria 2.4.1991 (photo A. Bjørnstad).

Jan Gabriel Adalbert Kielland was tragically killed in a road accident in Tanzania on the 9th of October 1995. Only 5 days earlier he had left Norway for yet another collecting trip to his beloved Tanzania. In Nairobi he joined up with his fellow collector, Ivan Bampton, and together they set off for Dar es Salaam to arrange for necessary permits before heading for a poorly investigated area in southern Tanzania. Just before reaching Dar es Salaam they hit a stranded lorry in the dark. Jan was killed on the spot.

Jan Kielland was born in Oslo on the 2nd October 1923. His interest for insects started very early: already at the age of six he had his first collection of coleoptera and lepidoptera. But it was not until his parents bought a house on Borøy outside Tvedestrand that his collecting became large-scale and systematic. He very early became a member of the Norwegian Entomological Society and started supplying specimens for the Zoological Museum, Oslo. Several of the species from Borøy were first records for Norway and were subsequently published by Magne Opheim in his 'Catalogue of the Lepidoptera of Norway'.

In 1945 Jan migrated to what was then the Tanganyika Territory to help his elder brother on his farm at the Ngorongoro Crater. Later he started mica prospecting as a source of income, but throughout his 30 years stay in Tanzania butterfly collecting was his main interest. Even after his return to Norway in 1974, practically every autumn he would pack up his modest field equipment and leave for Tanzania to make use of the rainy season for more butterfly collecting.

It is impossible even to guess the number of specimens Jan collected in Africa over the past 50 years, but it must be in the order of hundreds of thousands. After an average season in Tanzania - from October till May - he would come back to Norway with 10,000-15,000 specimens. These he would use partly for his scientific studies, partly for sale to manage to finance his next collecting trip.

Jan's scientific work consists of more than 30 published articles plus an almost endless series of unpublished progress reports to the Tanzania Commission for Science and Technology ('Utafiti'), the body which has to approve any research work involving field work in that country. In addition he reported the results of his surveys of the butterfly fauna of the various national parks directly to the Serengeti Research Institute.

With a few exceptions only, Jan's publications (see Appendix) were directly connected to his study of Tanzanian Rhopalocera leading up to his major work 'Butterflies of Tanzania' which was published in 1990. This described all the 1120 species of butterflies known from Tanzania at that time. Only a handful of these had not been collected by Jan himself.

Jan's last 5 years were devoted to the study of the butterfly fauna of the extensive swamp forests in the Kagera Region close to the Uganda border, one of the few areas he had not yet explored and with a fauna related to the Central African biotic regime of the Congo Basin. This work added more than 250 new species records of Rhopalocera for Tanzania including more than 30 species new to science.

Jan's intention was to publish a supplementary volume to his 'Butterflies of Tanzania', and he left a nearly 150 page long handwritten manuscript covering most of the new species additions. He had planned to make the 1995-96 season his last collecting period before completing this volume. This work is now being carried on by the Nairobi-based 'African Butterfly Research Institute' (ABRI) formed by Jan's close friend Steve Collins in co-operation with another

close friend of Jan, Colin Congdon. ABRI will also take over the majority of Jan's collection ensuring its proper curation. Thus Jan's lifework will be carried on.

In all Jan described and published 144 taxa of Afrotropical butterflies. The majority of these were of Tanzanian origin. But a few new species from other parts of Africa were described in connection with his major revisions of various of the very difficult and critical Satyrid genera of *Ypthima* (1982a), *Aphysoneura* (1989b), *Neocoenyra* (1990a) and *Henotesia* (1994a). Most of the types were presented to the Natural History Museum, London, an institution he visited on uncountable occasions. Jan always based his descriptions on meticulous genitalia dissection work. Thousands of microscopic slides and hundreds of genitalia drawings form an extremely important part of the collection he left.

Although Jan's main interest was focused on the Rhopalocera he would always collect other groups of insects during his many safaris. The undersigned was generously offered his collection of moths, amounting to more than 20 000 papered specimens from various parts of Tanzania. Till now only about one third have been mounted, but already many of these (probably in the order of hundreds) have turned out to be undescribed species. Jan also supplied many other research workers with Tanzanian material, notably the late Vincent Allard who described many new species of Cetoniinae (Coleoptera: Scarabidae) based on Jan's collections. Jan had an international network of contacts and friends, a fact emphasized by the many new species named in honour of him.

Beside his near life-long membership in the Norwegian Entomological Society, Jan was a member of the Union des Entomologistes Belges through which most of his articles were published in their journal Lambillionea. In his later years he also became a member of the Lepidopterist's Society of Southern Africa as well as the Wildlife Conservation Society of Tanzania.

It is doubtful whether there exist any living man who has covered more ground in Tanzania than Jan Kielland. He visited every region in the nearly one million sq.km big country. He would not hesitate to start on long safaries lasting for weeks in absolutely roadless tracts of wilderness. Many of the areas will probably never be revisited while still in their present state. They are simply too remote and too troublesome to reach. Several of the forests he visited along Lake Tanganyika in the sixties and seventies now no longer exist. His collections from these forests, including several endemic species, represent a documentation for the future of a fauna now partly extinct. His near encyclopedic knowledge of the Tanzanian bush enabled him to move about without maps nor a compass and without ever getting lost.

Jan's observations of the dwindling occurrences of virgin forests became a growing concern to him in his later years. His progress reports to 'Utafiti' more and more took the form of appeals for the conservation of these unique habitats. Jan's very last publication (1995) was a cry of urgency for one of the unique swamp forests (Munene) in Kagera, where drastic decimation and destruction took place within the five-year-period 1990-95.

Jan found his final resting place on top of Wanzizi, a small hill which was one of his favourite stamping grounds and where now *Alaena kiellandi* slowly flutters over his ashes.

Anders Bjørnstad, Henneseid, N-3750 Drangedal, Norway.

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Helene Oleane Tambs-Lyche 1913-1993

Det er relativt få kvinner blant norske entomologer. Helene Tambs-Lyche er en av disse, og hun har gjort en meget viktig innsats innenfor sitt felt av norsk entomologi.

Helene Tambs-Lyches forskningsfelt var norske bladlus ord. Hemiptera, o.fam.Aphidoidea, en insektsgruppe som inneholder mange skadedyr med stor relevans også for anvendt forskning. Det er tilbørlig henvist til hennes arbeider i O.E.Heies 6 binds verk - 1980-95 over Fennoscandias og Danmarks bladlus.

Helene Tambs-Lyche arbeidet først noen perioder,1946-47 og en tid på femti-tallet, med stipend både på Ås og i Nord Norge. Hun tok hovedfag ved Universitetet i Bergen 1952 og oppgaven hadde tittelen " En oversikt over norske bladlus av gruppene Aphidini og Callipterini, spesielt de som lever på potet". Deler av oppgaven ble publisert i arbeidene som ble trykket i Norsk Entomologisk Tidsskrift i 1950 og 1957. Året 1953-54 arbeidet hun som museumsstipendiat ved Zoologisk Museum, Universitetet i Bergen. Etter dette arbeidet videre som forskningsstipendiat med arbeidsplass på daværende Biologisk Stasjon i årene 1954-57, fra 1957 til 1959 som universitetsstipendiat v/ Norsk Almenvitenskapelige Forskningsråd. Sent høsten 59 ble hun ansatt i en amanuensis stilling ved Zoologisk Museum, Universitetet i Bergen. Her arbeidet hun noen år frem til 1965.

Hun sluttet i denne stillingen og fulgte sin mann Hans Tambs-Lyche til India hvor han arbeidet i Bombay. Etter dette fikk han en stilling i Danmark, og Helene Tambs-Lyche bosatte seg i Kjøbenhavn.

I Danmark arbeidet hun videre som privatforsker, og hadde altså samlet bortimot tyve år med ansettelse ved vitenskapelige institutioner. Helene Tambs-Lyche tok med en betydelig

bladlus-samling til Danmark, og denne bladlussamlingen er nå etter hennes død gitt til Zoologisk Museum, Zoologisk Institutt , Universitetet i Bergen. Et siste arbeide ble etterlatt upublisert, og ble ferdiggjort for publikasjon av O.E.Heie - se Tambs-Lyche og Heie, 1994. Heie uttaler i forordet til denne publikasjonen at arbeidet er meget viktig fordi kjennskapen til bladlusfaunaen i Norge fremdeles er ufullstendig.

Helene Tambs-Lyches samling av preparater av norske bladlus er nå deponert i Zoologisk Museum, Zoologisk Institutt, Univ. i Bergen. Samlingen er på omtrent 8 000 preparater. Journalføring av materialet er begynt, men det vil nok gå en tid før dette er fullført.

Jeg har gode minner om Helene Tambs-Lyche som en munter, trivelig og hjelpsom kollega.

Jeg vil tilslutt takke for opplysninger fra Dr.philos Astrid Løken, og fra Helene Tambs-Lyches datter, sivilarkitekt Bente Odner, begge Oslo.

Publikasjoner av Helene Tams-Lyche:

1950. Aphids on potato foliage in Norway. I. With a supplement on aphids in greenhouses. - Norsk ent.Tidsskr. 8, 17-41.

1955.Undersøkelser over den norske bladlusfaunaen. Foredrag 9.Nordiske Entomologmøtet. - Norsk Entomologisk Tidsskrift 9:123 -125.

1956. Kvantitative undersøkelser over flygende bladlus i Norge 1954-55. - Nordisk Jordbrugsforskning. Årg- 38, 1956 ss.462-463.

1957. Aphids on potato foliage in Norway.II. Investigations of potato fields in North Norway. - Norsk ent.Tidsskr. 10, 73-90.

1957. Bladlusangrepene på sitka-gran. - Norsk Skogbruk 18/9, 470-473.

1958. Tambs-Lyche, H. & J.S.Kennedy, 1958. Relation between growth pattern and resistance to *Aphisfabae* Scopoli in three varieties of field bean (*Vicia faba* L.). - Ent.exp.& appl. 1, 225-239.

1959. A new species of *Schizaphis* Börner (Hom., Aphid.) attacking *Phleum pratense* in Norway. - Norsk ent. Tidskr. 11,88-93.

1960. Hestemaur. Godbiter fra samlingene. - Bergens Tidende ll.6.1960.

1961. Noen norske bladlus (Homoptera, Aphidae), vesentlig fra kulturplanter. - Norsk ent. Tidsskr. ll, 224-234.

1961. Fugleedderkopp. Godbiter fra samlingene. - Bergens Tidende 18.3.1961.

1962. Manna. - Nordisk Medicin 67/ 449, 1-7.

1962. Skorpioner. Godbiter fra samlingene. - Bergens Tidende 9.6.1962.

1963. Dvergmus. Godbiter fra samlingene. - Bergens Tidende 9.2.1963.

1964. Bladlus på korn og gress i Norge. - Nordisk Jordbruksforskning. Suppl.8, del I, pp 359-360. Kongressforedrag?

1964. Brugden. Godbiter fra samlingene. - Bergens Tidende 8.2.1964.

1968. Studies on Norwegian Aphids (Hom., Aphidoidea) I. The subfamily Dactynotinae Börner. - Norsk ent. Tidsskr. 15, 1-17.

1970. Studies on Norwegian Aphids (Hom. Aphidoidea) II. The subfamily Myzinae (Mordvilko) Börner. - Norsk ent. Tidsskr. 17, 1 - 16.

1971. Aphids from the Canary Islands. - Ent.scand. 2 , 125-131.

1971. Bladlusene. - Norges Dyr, Bind 4, s.258-263.

1973. Pludselig masseopptræden af asiatisk bladlusart på småblomstret balsamin i Europa (Hom., Aphidoidea). - Ent. Meddr., 41, 167-173.

1975. Dynamics of Aphididae populations on Hardangervidda. Ecological Studies. Analysis and Synthesis, Vol. 17. Fennoscandian Tundra Ecosystems, Part 2 (F.E.Wielgolaski ed.), - Springer-Verlag, Berlin Heidelberg New York, 84-87.

1994. Tambs-Lyche, H. (+) & O.E.Heie, 1994. Studies on Norwegian Aphids (Hom., Aphidoidea) III. - Fauna norv. Ser. B. 41, 65-84.

Videre er det referert til viktige bidrag av Helene Tambs-Lyche i følgende artikler:

1958. Fjelddalen, J. Sterke angrep av skadedyr på korn og gras i 1956. - Tidskr. For Det Norske landbruk, hft.4, ss.66-83. S.2. l.avsnitt refereres det til *Schizaphis graminum* Rondani som i 1959 ble bestemt av H.T-L tilen annen art se 1959 i listen over.

1964. Fjelddalen, J.Aphids recorded on cultivated plants in Norway 1946-62, - Norsk ent. Tidskr. 12, 259-295. S. 260 takkes H.T-L for en del av bestemmelses arbeidet.

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Short Communications are also accepted. Unless such contributions are kept very short (i.e. less than two pages in the final print), they must be structured in the same way as outlined for manuscripts (see above).

Nomenclature. The first time a binomen of an invertebrate or a little-known vertebrate is used in the text, the name of the author should be included. Names of authors should be written in full, except L. for Linnaeus. The date of the initial description can be included when considered necessary, for example *Rhyacophila nubila* (Zetterstedt, 1840). All Latin names of genera and species in the text and tables should be in italics. Names of higher taxa and other Latin terms should be left unitalicised and put in parentheses when their English synonyms are included.

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Paper:

Løken, A. 1962. Social wasps in Norway (Hymenoptera, Vespidae). - Norsk Ent. Tidsskr. 12: 191-218.

Book:

Haftorn, S. 1971. Norges fugler. - Universitetsforlaget, Oslo. (In Norwegian)

Chapter:

Horn, H.S. & Rubenstein, D.I. 1984. Behavioural adaptations and life history. - Pp. 279-298 in Krebs, J.R. & Davies, N.B. (eds.). Behavioural ecology. An evolutionary approach. 2nd ed. Blackwell Scientific Publications, London.

Report:

Anker-Nilssen, T. & Øyan, H.S. 1995. Hekkebiologiske langtidsstudier av lunder på Røst. (Long-term studies of the breeding biology of Puffins at Røst.) - NINA Fagrapport 15: 1-48. (In Norwegian with English summary)

Thesis:

Harvey, H.H. 1963. Pressures in the early history of the Sockeye Salmon. - Ph.D. thesis, University of British Colombia, Vancouver.

Conference proceedings:

Spong, P., Bradford, J. & White, D. 1970. Field studies of the behavior of the Killer Whale (*Orcinus orca*). - Pp. 169-174 in Poulter, T.C. (ed.). Proceedings of the Seventh Annual Conference on Biological Sonar and Diving Mammals, Menlo Park, California., October 23 and 24, 1970. Stanford Research Institute, Menlo Park, California.

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Short communications

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