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gjensidig reduserte abonnementspriser på foreningens tidsskrifter vil for fremtiden derfor bare
gjelde mellom Norsk Entomologisk Forening og Norsk Ornitologisk Forening.
**Distribution of Nemastoma bimaculatum (Fabricius, 1775) and N. lugubre (Müller, 1776) (Opiliones) in Norway, with a discussion on «east-west pair of species»**

BJARNE A. MEIDELL AND INGVAR STOL


Detailed distributions of *N. bimaculatum* (Fabricius, 1775) and *N. lugubre* (Müller, 1776) in Norway are given. Both males and females are partly redescribed, and an attempt is made to clarify the confusing history of the species in Norway.

*N. lugubre* and *N. bimaculatum* fit well within the framework of an «east-west pair of species». The phylogenetic position of a species within its genus as well as the time available for migration and adaptation might be just as useful as ecological demands when explaining invertebrate patterns of distribution.

Ingvar Stol, N-4274 Stol, Norway.

**INTRODUCTION**

Several invertebrates of close phylogenetic relationship show an «east-west pair of species» in Scandinavia and north-western Europe. Examples of myriapods are listed by Meidell (1979) and spiders by Hauge et al. (in prep). Other examples might be derived from faunal lists and distributional maps published by various authors. The reason for these «pair of species» is probably the impact of the last glaciation and the invasional (or spreading) routes that followed deglaciation of the northern parts of Europe. It is expected that several invertebrate groups will show examples of such «east-west pairs» especially within groups with a relatively low spreading potential. The revision of the genus *Nemastoma* by Gruber & Martens (1968) produced descriptions of the species that made it possible to look into the Norwegian opilionid material often labelled as *Nemastoma lugubre-bimaculatum*.

**The Lugubre-bimaculatum problem**

*Nemastoma bimaculatum* was described in 1775 by C. Fabricius and the locality was given as Anglia. Fabricius used the name *Phalangium bimaculatum*. In 1776, O. F. Müller described another species, *Nemastoma lugubre*, without giving a locality. Müller used the name *Phalangium lugubre*. Roe (1914) separated *N. lugubre* (Müller) into two subspecies *N. lugubre bimaculatum* (Fabricius) and *N. lugubre unicolor* Roe (1914) separated *N. lugubre* (Müller) into two subspecies *N. lugubre bimaculatum* (Fabricius) and *N. lugubre unicolor* Roe, a distinction that dominated the literature and labelled material between 1914 and 1968. After nearly 200 years of confused and changing nomenclature, Gruber & Martens (1968) clearly described the two species *N. lugubre* and *N. bimaculatum*, and listed their synonyms. A short comment on the history of the two species in Norway is needed.

In 1779 Fabricius reported in his «Reise nach Norwegen» that he had found *Phalangium bimaculatum* at Volda (MRV) 5 Aug. 1778 and added «es ist das *Phalangium lugubre* Müller. Zool. Dan. 2297». As will be shown below this addition most probably was incorrect. Ellingsen (1894) is next in reporting *N. lugubre*. His records are from Fredrikstad (Ø) and Kragerø (TEY). Compared to our present knowledge these reports seem to hold true, and they are thereby, most probably, the first records of this species from Norway. Difficulties are encountered when
Storm (1898) reports *N. lugubre* from Trondheim (STI) and Selbu (STI) ((conf. the distributions given below). Strand (1900) quotes from Ellingsen and Storm and adds Botne and Sande (VE), Jondalen (Kongsvinger, BØ), and Økna and Løkta, two islands near Sandnessjøen (NSY). The last two localities might possibly refer to *N. bimaculatum*. In 1966 Kauri reported *N. lugubre* from Kvammadal, Aurland and Vassbygda (SFI). Among the previously published material these are the only specimens available for examination. In accordance with the distribution given below these samples have been revised to *N. bimaculatum* as noted by Stol (1982). Kauri (1977) also reports *N. lugubre* from Eidskog (HES).

When Gruber and Martens (1968) made their revision of the genus Nemastoma, they included a map of the distribution of the two species here concerned. This map will be shown to be quite incorrect for what it tells about the distribution of the two species in Norway.

Wunderlich (1973) published *N. bimaculatum* as new to Norway. This credit, must be given to Fabricius (1779). Wunderlich gives his locality as: «Bei Skjölden, ca 750 m NN» (most probably Skjolden, SFI).

Concerning the list of synonyms given by Gruber & Martens (1968), the references to Fabricius (1781) and Linnaeus (=C.v.Linne) (1789) should probably be removed from *N. lugubre* and included in *N. bimaculatum*.

MATERIAL AND METHODS

The total material comprises 528 males, 518 females and 26 juveniles of *N. bimaculatum* and 199 males and 267 females of *N. lugubre*.

In addition to the authors own collections,

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Fig. 1. Male characters. *N. bimaculatum* — a) penis, b) pedipalp, c) cheliceral apophysis. *N. lugubre* — d) penis, e) pedipalp, f) cheliceral apophysis. From Gruber & Martens (1968).
the material includes collections from the museums in Bergen, Oslo and Trondheim. The following abbreviations in the species list are used: JM, John Jastrey and Bjarne Meidell; HMS, Hauge, Meidell & Solhøy (1975); TS, Torstein Solhøy; DD, Dag Domen; HK, Hans Kauri; HTL, Hans Tambs-Lyche; TA, Trond Andersen; 1976—77 means pitfall-traps set up by Stol (1982) for his thesis work. In 1987 a program was carried through by I. Stol, trying to locate sympatric populations of the two species here concerned. This material will be used in an analysis on character-displacement. Pitfall-trapping was used in this program.

The material will also be used as part of a phylogenetic analysis of the genus *Nemastoma* (sensu Gruber & Martens 1968).

Our material is deposited at the Museum of Zoology, Bergen.


**IDENTIFICATION**

Males of the two species are easily distinguished by the form of their penis as well as their cheliceral apophysis and the form, curvature and dentition of the palpal tibia (Fig. 1).

In *N. bimaculatum* the dorsal opisthosoma of the females is only slightly denticulated and has a more or less flattened appearance. The femur of the fourth pair of legs has dorsally, near the body, several distinct denticulae. The distal setae of the ovipositor are almost three times the length of the basal setae (Fig. 2 a, b, c).

In *N. lugubre* the dorsal opisthosoma of the females is strongly denticulated, and the body appears globular. The femur of the fourth pair of legs has only a few denticulae dorsally near the body. The distal setae of the ovipositor are only two times the length of the basal setae (Fig. 2 d, e, f).

*Nemastoma bimaculatum* f. *unicolor*

Specimens with a fully black prosoma (forma *unicolor*) are rare (Gruber & Martens, 1968, Sankey & Savory, 1974). Fully black animals are reported on one occasion from England and one from France. Our material includes a male without traces of the silvery-white spots from Fantoft, Bergen (HOY), and a female

![Fig. 2. Female characters. *N. bimaculatum* — a) body form, b) fourth femur laterally, c) ovipositor. *N. lugubre* — d) body, form, e) fourth femur laterally, f) ovipositor.](image)
from Fjellså (VAY). A female from Tau (RY) has only very faint traces of spots. A male from Karmøy (RY) has the right spot greatly reduced.

SYNOPSIS OF THE SPECIES

Nemastoma bimaculatum


NNV, Moskenes: Moskenes, Å 8 Aug. 1968 1 male Godske exp.

Nemastoma lugubre


Fig. 3. The distributions of *Nemastoma bimaculatum* (A) and *N. lugubre* (B) in Norway.


VE, Nøtterøy: Tømmerholt 15 May 1975 1 male + 3 females; Ramnes: Langvann 18 May 1975 9 males + 4 females, 19 May 1975 1 male TA.

BØ, Kongsberg: 8 July 1977 Saggrenda 1 female, Skollenborg 1 female K. Birkeland.


GENERAL DISTRIBUTION

*N. bimaculatum* is characterized as an atlantic species (Gruber & Martens, 1968, Wunderlich, 1973, Martens 1978). It occupies northern Spain, almost all of France, the western parts of West-Germany, Great-Britain, The Faroe Islands (Kauri 1980), Shetlands, The Orkneys and Iceland. In Norway it is taken from Sogne and Mandal (VAY) in the south, along the western coast to Moskenes in Lofoten (NNV) in the north (Fig. 3 A).

*N. lugubre* is characterized by a continental distribution (subatlantic, middle-european Martens (1978)). It occurs north of the Alps almost without overlapping with *N. bimaculatum*. In the east it reaches Bulgaria, Romania, West-Russia and up to Finland and Sweden. In Norway *N. lugubre* is reported from the eastern parts of the country south to Lyngdal (VAY) and north to Snåsa (NTI) (Fig 3 B).

In Sør Trøndelag, as well as in Vest-Agder there are overlapping zones between *N. bimaculatum* and *N. lugubre*. Sympatric populations are recorded from the following localities: VAY, Sogne: Sogne; Mandal: Kige; Lyngdal: Nyland.

MRI, Surnadal: Skiei.

STI, Rønnebu: Gorset; Midtre Gauldal: Reitstøa and Støren; Melhus: Flå; Trondheim: Byneset (Mule), Langlo and Myrsund.

The distribution in Norway, as shown by Gruber & Martens (1968) and Martens (1978), is clearly incorrect as noted by Stol (1982).

«EAST-WEST PAIR OF SPECIES»

The invasion of terrestrial invertebrates to Norway, following the last glaciation, has up to now been given little attention. Due to the topography, several routes (tracks) for colonization of Norway are possible. The main route was certainly via Denmark and Southern Sweden, splitting up in 1) a south-western route along the coast, 2) a direct western route across the pine-covered passes during the postglacial climatic optima and 3) a more northern route via Trøndelag. For several species designed as arctic, invasion via northern Finland and Soviet is predictable. The last (not necessarily latest) direction from which animals invaded Norway, is from the west. Several terrestrial invertebrates have a distribution in northern Europe that might only be accounted for by successful migration across the relative short distance of sea that existed between Norway and Doggerland approximately 6000 BC. *N. bimaculatum* probably can be included among these.

Anthropochory, however, is a factor that might interact with, and even replace, natural distribution obscuring the conclusions. The different connections between Western Norway and Britain by seafarers the last 1000 years are well known.

Synanthropy, antropochory, and mode and speed of spreading must be taken into account. Several diplopod species are bro-
ought to Norway by man. They only appear locally on clearly synanthropic localities. *N. bimaculatum* and *N. lugubre*, with wide distributions and relative high vagility, both clearly are of indigenous origin (here opposed to anthropochory).

Parthenogenesis also can account for successful spreading over long distances. Interestingly, in several instances, it is the species invading Scandinavia from the east that are reproducing parthenogenetically (Meidell 1969, 1970). The parthenogenetic opilionid *Megabunus diadema* (Fabricius, 1779) with its western distribution is an exception.

Several invertebrate species, in Scandinavia confined to Western Norway, seem to have an eastern vicariant species either ecologically (when the species are more distantly related) or phylogenetically. For myriapods several examples are given by Meidell (1979), for other groups further research certainly will reveal the same pattern. Our phylogenetic research on the genus *Nemastoma* so far, indicates that *N. bimaculatum* form the western sister species of the rest of the genus of which *N. lugubre* has the most successful spreading, covering eastern Europe including Scandinavia except Western Norway. Further analysis of morphology of this genus is needed. *M. diadema* seems to have a fairly similar situation with 4 endemic species in the Alps, but here the eastern equivalent to *diadema* is not yet found.

Among the Chilopoda there are two species, *Strigamia maritima* (Leach 1817) and *Pachymerium ferrugineum* (C. L. Koch 1835), that have general distributions similar to the two *Nemastoma* species mentioned here. These species are in different genera (but in the same family). Very few groups have been given a proper phylogenetic analysis and it is probable that several cases like this will appear. Like for the *bimaculatum*—*lugubre* confusion, *S. maritima* and *P. ferrugineum* as well as *Geophilus insculptus* Attems 1895 and *G. proximus* C. L. Koch 1847 have been confused due to a certain degree of overall similarity and, not at least, «unexpected occurrence». Even in Britain the occurrence of the bisexual «race» of *Polyxenus lagurus* (L.) was overlooked until 1979.

The lack of a species in a certain area very often is explained with reference to unfulfillment of ecological demands. The phylogenetic position of a species within its genus as well as the time available for migration and adaptation might be just as useful when explaining invertebrate patterns of distribution.

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REFERENCES


Received 29 May 1989
Contribution to the knowledge of the Norwegian Lepidoptera III

LEIF AARVIK


The following species are reported new to Norway: *Stenoptinea cyaneimarmorella* (Millière, 1854); *Euhyponomeutoides ribesiella* (Joannis, 1900); *Elachista elegans* Frey, 1859; *Teleiodes scriptella* (Hübner, 1796); *Phycitodes binaevella* (Hübner, 1813); *Pediasia fascelinella* (Hübner, 1813); *Ostrinia nubilalis* (Hübner, 1796) and *Cucullia chamomillae* (Denis & Schiffermüller, 1775). In addition new distributional records are given for some rare species already known from Norway.

Leif Aarvik, Nyborgvn. 19 A, N-1430 Ås, Norway.

The main part of the present material was collected by the author in the years 1985—1988. Additional specimens were discovered among unidentified material in the collections of the Zoological museum in Oslo (ZMO) and in Vitenskapsmuseet in Trondheim (VSM). Single records made by Sigurd A. Bakke, Yngvar Berg, Kai Berggren, Anders Bjørnstad, Morten Falck, Fred Midtgaard and Bjørn A. Sagvolden are also included.

**Incurvariidae**


**Psychidae**


**Tineidae**

*Stenoptinea cyaneimarmorella* (Millière, 1854) synonym: *Celestica angustipennis* (Herrich-Schäffer, 1855) AK, Nesodden: Spro (EIS 28) 26 Jul. 1924 K. Haanshus leg. ZMO coll. The species is new to Norway. In Sweden recorded from seven districts north to Uppland (Svensson et al. 1987) and from three southern districts in Finland (Kyrki 1978). Otherwise throughout most of Europe except the Iberian peninsula, also in Lebanon (Hannemann 1977, Pelham-Clinton 1985).

Externally this species does not resemble other N. European tineids; the forewings are extremely narrow with three small scale-tufts in disc.

The larva feeds on lichens growing on plum trees or on rotten wood of plum trees (Hannemann 1977, Pelham-Clinton 1985).


**Gracillariidae**


Previous records from VAY (Opheim & Fjeldså 1983) and VE, Larvik: Roppestad (EIS 19) (Borgersen et al. 1984).
The larva of *ribesiella* feeds on the leaves of various *Ribes* species in July and August. It hibernates as imago.


**Oecophoridae**

*Agonopterix asstraniæ* (Heinemann, 1870) MRI, Surnadal: Kvanne (EIS 85) ♂ 17 Aug. 1970 R. Mehl leg. ZMO coll. This is the first Norwegian specimen. The species was subsequently collected at MRY, Molde: Sekken (EIS 77) in 1980 and published as new to Norway (Aarvik 1987).

**Elachistidae**


The species is figured and described in detail in the monograph by Traugott-Olsen & Nielsen (1977).

Food-plants are various grasses (Traugott-Olsen & Nielsen 1977).

**Scythrididae**


**Gelechiidae**


New to Norway. In Scandinavia known from one locality in Sweden: Småland (Bengtsson 1976, Svensson et al. 1987) and from the district LFM in Denmark (Schnack ed. 1985). Otherwise throughout Europe inc-
luding Britain and also Asia Minor (Bengtsson 1976). Bengtsson (1976) brings a photograph of the moth and a figure of the male genitalia, Pierce & Metcalfe (1935) and Steuer (1988) figure the genitalia of both sexes, and Sokoloff (1985) has a beautiful coloured figure of the moth.

The food-plants are *Acer platanoides* and *A. campestre* (Bengtsson 1976, Sokoloff 1985).

**Limacodidae**

*Heterogenea asella* (Denis & Schiffermüller, 1775) AK, Frogn: Hallangen (EIS 28) ♀ 26 Jun. 1988 L. Aarvik leg. & coll. This is the second Norwegian record of the species. The first record is from AAY, Tvedestrand: Laget (EIS 11) (Knaben 1935).

**Pyralidae**


Wings and genitalia are figured by Palm (1986).

The larva feeds in seedheads of various Asteraceae: *Cirsium, Carduus, Aster, Chrysanthemum* and *Artemisia* (Palm 1986).


*Pediasia fascelinella* (Hübner, 1813) Ø, Råde: N. Sletter (EIS 19) ♀ 29 Jul. 1985 L. Aarvik leg. & coll. This species is new to Norway. In Sweden recorded north to Västerbotten (Svensson et al. 1987), in Finland from the four southernmost provinces and Östrobottnia media (Kyrki 1978). It is widespread in Denmark. Otherwise throughout Europe and even Central Asia (Palm 1986).

The habitat is sandy places, often dunes. The larva lives in a subterranean tube feeding on various grasses (Palm 1986).

The moth is figured by Palm (1986).


*Ostrinia nubilalis* (Hübner, 1796) VAY, Sogn: (EIS 2) ♀ 13 Jul. 1958 C. F. Lühr leg. VSM coll. New to Norway. This species has an almost cosmopolitan distribution. It is also known as a migrant and has been recorded from many places where it is not resident. The Norwegian specimen certainly is a migrant. *O. nubilalis* is resident in S. Sweden and E. Denmark. Migrants have been recorded in C. Sweden and S. Finland (Palm 1986). The larva is polyphagous and is often a pest on maize, *Zea*, in N. America and Europe (Palm 1986).

The moth is figured by Palm (1986).

**Geometridae**

*Idaea emarginata* (Linnaeus, 1758) Ø, Rygge: Sildebauen (EIS 19) 7 ex 23—26 Jul. 1985 L. Aarvik leg. & coll. Previously this species has only been recorded from a few localities in VE (Skou 1984).


**Noctuidae**

*Cucullia chamomillae* (Denis & Schiffermüller, 1775) Ø, Rygge: Sildebauen (EIS 19) ♀ 24 May 1980 L. Aarvik leg. & coll. This species is new to Norway. The Norwegian specimen was pointed out as a possible *chamomillae* by the Swedish lepidopterist, Claes Eliasson. It had previously been identi-
fied as *C. lucifuga*. The identity as *chamomilla*ae was subsequently confirmed by dissection.

*C. chamomilla*ae has been collected north to Bohuslän and Västmanland in Sweden (Svensson et al. 1987), all over Denmark (Schnack ed. 1985), but there is no record from Finland. Otherwise the distribution is Eurasiatic, and it has been found all over Europe except the northernmost parts (Breherton et al. 1983).

This species can be distinguished from the other Nordic grey *Cucullia* species by having the black veins in the fore wing extending into the cilia.

The flight period is April-May. The larva feeds in May and June on flowers of various Asteraceae: *Anthemis, Matricaria,* and *Chrysanthemum.*

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REFERENCES


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Pitfall catches of Carabidae and Staphylinidae (Coleoptera) in a temporarily protected forest area on the Eidanger peninsula, Telemark, SE Norway

TROND ANDERSEN, SINDRE LIGAARD, TOM PEDERSEN AND GEIR E. E. SØLI


Pitfall trapping from March to November 1983 on the Eidanger peninsula, yielded a total of 14,403 specimens of 25 Carabidae species, and 1,093 specimens of 42 Staphylinid species. A total of 50 traps were operated at 10 sites in three different plant associations: basiphilous pine forest, thermophilous deciduous forest and in a humid stand of ash with Equisetum hyemale in the field layer.

The dominant carabid species in all three plant associations was Abax parallelepipedus (Piller & Mitterpacher, 1783), constituting from nearly 50 to 99% of the family total at the different trapping sites. The dominant staphylinid species were Zyras humeralis (Gravenhorst, 1802), Drusilla canaliculata (Fabricius, 1787) and Philonthus decorus (Gravenhorst, 1802).

Permanent preservation has been suggested for large stands of basiphilous pine forest and thermophilous deciduous forest on the Eidanger peninsula. Most of the carabid and staphylinid species recorded are common and widespread in Norway. However, A. parallelepipedus has a very restricted distribution in Norway, and the dominant position of this species substantiate the urge for permanent preservation.

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INTRODUCTION

One of the major tasks in natural conservation is to maintain the biodiversity. In Norway wildlife conservation has until now been centered on birds and mammals. However, during the last decades there have been a growing understanding for the fact that if the biodiversity shall be maintained, insects and other invertebrates have to be included in the conservation work. Insects, with probably more than 15,000 species, is by far the largest group of animals in Norway.

In Norway the first steps for conservation of insects were taken by the Norwegian Entomological Society, and since 1983 The Norwegian Ministry for the Environment (Miljøverndepartementet) has yearly granted a few projects on invertebrates recommended by the Society. One of the first of these projects was a study of the macrolepidopteran fauna in a temporarily protected forest area and its nearest surroundings on the Eidanger peninsula in Southeast Telemark (Ellefsen 1984, Søli 1987). In connection with this project, ground living invertebrates were collected in pitfall traps in the major plant associations occurring in the area. The spider fauna has previously been treated by Ellefsen and Hauge (1986). The present study deals with the coleopteran families Carabidae and Staphylinidae.

The aim of the present study is to outline the Carabidae and Staphylinidae fauna in the area with particular reference to species richness, relative abundance and the occurrence of rare and eventually endangered species.

STUDY AREA

The study area is situated in the southwestern part of the Eidanger peninsula (Fig. 1). The coastal regions of Telemark have a favou-

Fig. 1. Map of the Eidanger peninsula, Southeast Telemark, showing the exact position of the localities.

Rable climate with warm summers and relative mild winters. Mean January and July temperatures are -2.7°C and 16.8°C, respectively (Location: Langøytangen, DNMI 1985). The average annual precipitation is 885 mm (Location: Porsgrunn, DNMI 1987). The bedrocks are Cambro-Silurian sediments, mainly limestone and shales.

The vegetation in the area has been thoroughly studied (see e.g. Bjørndalen 1977, 1980, 1986a, 1986b). Two plant associations are predominant: thermophilous deciduous forest and a dry variant of basophilous pine forest. A humid stand of asher (Fraxinus excelsior) with Equisetum hyemale in the field layer, is forming another interesting vegetation type.

Basophilous pine forest (Convallario-Pinetum)
A herb rich forest found on shallow calcareous soils. The tree layer is dominated by pine (Pinus sylvestris), but spruce (Picea abies), juniper (Juniperus communis) and several deciduous trees are frequent. The field layer is characterized by Convallaria majalis in the early summer, later by herbs like Arctostaphylos uva-ursi, Geranium sanguineum and Antennaria dioica.

Thermophilous deciduous forest (Ulmo-Tilietum)
The forest is dominated by elm (Ulmus glabra) and lime (Tilia cordata), with scattered oak (Quercus spp.), hazel (Corylus avellana) and maple (Acer platanoides). Due to the dense foliage, the forest floor is shady and the field layer sparsely developed. The field layer is dominated by Hepatica nobilis in spring, and by grasses during the summer and autumn. The ground is covered with a thin layer of humus and dead leaves. The forest beyond the precipices in the western part of the study area, called Frierflauene, is especially well developed (Locality 7/8).

The Equiseto-Fraxinetum association
Within the Eidanger peninsula this plant association occurs in a restricted damp area, some 20 x 70 m in extension, in the descending slopes towards a small stagnant pond. The tree layer is composed of ash, with some older (Alnus incana) along the shores. The field layer consists exclusively of Equisetum hyemale, and the ground is covered by a thick layer of mosses (Brachythecium spp. and Eurrhynchium spp.). Small rodents and shrews were particularly frequent at this locality.

METHODS AND MATERIAL
The trapping sites were primarily selected to cover the three major plant associations within the area, but they were also intended to reflect the variation within the basophilous pine forest and the thermophilous deciduous forest. Five trapping sites covered the basophilous pine forest (Locs. 1, 2, 3, 5 and 6). Two of these, Locs. 5 and 6, had a high proportion of deciduous trees and are below called forest
Table 1. The pitfall trap localities on the Eidanger peninsula, Southeast Telemark. The position of the localities are shown in Fig. 1.

<table>
<thead>
<tr>
<th>Loc.</th>
<th>Type</th>
<th>Humidity/exposure</th>
<th>Vegetation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basioilous pine forest</td>
<td>Dry, Sunexposed</td>
<td>Some shrubs of hazel (<em>Corylus aellana</em>)</td>
<td>Large ant hills (<em>Formica rufa</em> - group)</td>
</tr>
<tr>
<td>2</td>
<td>Basioilous pine forest</td>
<td>Medium, Partly shady</td>
<td>Several deciduous trees</td>
<td>Two traps situated close to decaying tree trunks</td>
</tr>
<tr>
<td>3</td>
<td>Basioilous pine forest</td>
<td>Dry, Sunexposed</td>
<td>Some juniper (<em>Juniperus communis</em>)</td>
<td>Ant hills (<em>F. rufa</em> - group)</td>
</tr>
<tr>
<td>4</td>
<td>Equiseto-Fraxinetum association</td>
<td>High, Shady</td>
<td>Field layer entirely <em>Equisetum hyemale</em></td>
<td>Descending slopes towards small stagnant pond</td>
</tr>
<tr>
<td>5</td>
<td>Forest rim</td>
<td>Moist, Sunexposed</td>
<td>Mixed forest</td>
<td>Two traps situated close to a decaying pine trunk</td>
</tr>
<tr>
<td>6</td>
<td>Forest rim</td>
<td>Medium, Partly shady</td>
<td>Mixed forest, Shrubs of hazel (<em>C. aellana</em>)</td>
<td>Two traps at the base of a large lime trunk</td>
</tr>
<tr>
<td>7/8</td>
<td>Thermophilous deciduous forest</td>
<td>Medium, Partly shady</td>
<td>Field layer sparsely developed</td>
<td>One trap close to decaying lime trunk</td>
</tr>
<tr>
<td>9</td>
<td>Thermophilous deciduous forest</td>
<td>Medium, Partly shady</td>
<td>Some spruce and pine</td>
<td>Ant hills (<em>F. rufa</em> - group)</td>
</tr>
<tr>
<td>10</td>
<td>Thermophilous deciduous forest</td>
<td>Medium, Sunexposed</td>
<td>Field layer with some shrubs (<em>Rosa</em>)</td>
<td>Traps at the base of large elms</td>
</tr>
</tbody>
</table>

rim communities. Three sites covered the thermophilous deciduous forest (Locs. 7/8, 9 and 10), and one site the Equiseto-Fraxinetum association (Loc. 4). A more detailed description of the trapping sites are given in Tab. 1.

A total of 50 pitfall traps in series of 5 at each trapping site, were used. The traps were operated from 24 March to 4 November in 1983, and emptied three times during the season. At locality 3 the trapping was terminated at 17 August. Glass bottles, 56 mm in diameter, and 117 mm depth, filled one third with 4% formaldehyde with a trace of soap as detergent, were used as traps. The traps were equipped with roofs.

The material comprises of 15,496 adult specimens belonging to 67 species. The fauna in the different localities is outlined with respect to number of specimens and species. Number of specimens caught at each locality (5 pitfall traps) are expressed as catches pr. unit time, i.e. the catches pr. loco pr. day x 100. The nomenclature follows Silfverberg (1979).

RESULTS

Family Carabidae

A total of 14,403 Carabidae specimens belonging to 25 species were taken (Tab. 2). The catches, both in number of species and number of specimens, differ highly between the localities, also within the two major plant associations.

The catches in locality 1 were very low, only two species, and 51.3 specimens pr. unit time. The dominant species in this locality was *Abax parallelepipedus* (Piller & Mitterpacher, 1783) with 99% of the family total. In locality 2, 11 species were taken, and the
Table 2. Carabidae species taken in pitfall traps at 10 localities on the Eidanger peninsula, Grenland, Southeast Telemark in 1983.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>LOCALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Carabus nemoralis</em> Müller, 1764</td>
<td>-</td>
</tr>
<tr>
<td><em>C. hortensis</em> Linnaeus, 1758</td>
<td>-</td>
</tr>
<tr>
<td><em>C. vicinus</em> Linnaeus, 1758</td>
<td>-</td>
</tr>
<tr>
<td><em>C. coriaceus</em> Linnaeus, 1758</td>
<td>-</td>
</tr>
<tr>
<td><em>Cytherus caraboides</em> (Linnaeus, 1758)</td>
<td>-</td>
</tr>
<tr>
<td><em>Leistus ferrugineus</em> (Linnaeus, 1758)</td>
<td>-</td>
</tr>
<tr>
<td><em>Notiophilus aquaticus</em> (Linnaeus, 1758)</td>
<td>-</td>
</tr>
<tr>
<td><em>N. biguttatus</em> (Fabricius, 1779)</td>
<td>-</td>
</tr>
<tr>
<td><em>Loricera pilicornis</em> (Fabricius, 1775)</td>
<td>-</td>
</tr>
<tr>
<td><em>Patrobus atrorufus</em> (Ström, 1768)</td>
<td>-</td>
</tr>
<tr>
<td><em>Trechus secalis</em> (Paykull, 1790)</td>
<td>-</td>
</tr>
<tr>
<td><em>Bembidion lampros</em> (Herbst, 1784)</td>
<td>-</td>
</tr>
<tr>
<td><em>Pterostichus oblongopunctatus</em> (Fabricius, 1787)</td>
<td>2</td>
</tr>
<tr>
<td><em>P. niger</em> (Schaller, 1783)</td>
<td>-</td>
</tr>
<tr>
<td><em>P. melanarius</em> (Illiger, 1798)</td>
<td>-</td>
</tr>
<tr>
<td><em>P. nigrita</em> (Paykull, 1790)</td>
<td>-</td>
</tr>
<tr>
<td><em>P. strenuus</em> (Panzer, 1797)</td>
<td>1</td>
</tr>
<tr>
<td><em>P. diligens</em> (Sturm, 1824)</td>
<td>-</td>
</tr>
<tr>
<td><em>Abax parallelepipedus</em> (Piller &amp; Mitterpacher, 1783)</td>
<td>98</td>
</tr>
<tr>
<td><em>Aeron um assimile</em> (Paykull, 1790)</td>
<td>-</td>
</tr>
<tr>
<td><em>Amara brunnea</em> (Gyllenhal, 1810)</td>
<td>-</td>
</tr>
<tr>
<td><em>Harpalus latus</em> (Linnaeus, 1758)</td>
<td>1</td>
</tr>
<tr>
<td><em>H. quadripunctatus</em> Dejean, 1829</td>
<td>-</td>
</tr>
<tr>
<td><em>Badister bullatus</em> (Schrank, 1798)</td>
<td>-</td>
</tr>
<tr>
<td><em>Dromius notatus</em> Stephens, 1827</td>
<td>-</td>
</tr>
</tbody>
</table>

Catches yielded 871.5 specimens pr. unit time. The dominant species in this locality were *A. parallelepipedus* with 92.9% of the family total, *Pterostichus melanarius* (Illiger, 1798) with 4.3% and *P. oblongopunctatus* (Fabricius, 1787) with 1.4%. A total of 10 species were caught in locality 3, but the locality yielded only 230.1 specimens pr. unit time. The dominant species in this locality were *A. parallelepipedus* with 95.3% of the family total and *Carabus hortensis* Linnaeus, 1758 with 1.8%.

Locality 4 yielded a comparatively high number of species, i.e. 12, but the number of specimens pr. unit time was only 340.4. The dominant species were *A. parallelepipedus* with 92.2% of the family total, *C. hortensis* with 2.6% and *Aeron um assimile* (Paykull, 1790) with 2.4%.

Both locality 5 and 6 yielded 11 Carabidae species, and the catches of specimens pr. unit time were 1314.9 and 1288.1, respectively. The dominant species in both localities were *A. parallelepipedus* with 89.4% and 86.5% of.
the family total, respectively, C. hortensis with 3.4% and 7.1% and P. melanarius with 3.4% and 4.0%, respectively.

The localities 7/8 yielded no less than 1909.4 specimens pr. unit time, and the number of species encountered were 10. The dominant species in these localities were A. parallelepipedus with 97.9% of the family total and C. hortensis with 1.9%.

In localities 9 and 10 the catches of specimens pr. unit time were 260.6 and 606.7, respectively, and the number of species caught were 14 and 16. The dominant species in locality 9 were A. parallelepipedus with 48.5% of the family total, C. hortensis with 13.3% and Pterostichus niger (Schaller, 1783) with 12.9%. The dominant species in locality 10 were A. parallelepipedus with 62.3% of the family total, P. melanarius with 10.6% and P. niger with 8.2%.

The species

Carabus hortensis Linnaeus, 1758 was taken in all localities, except locality 1. The species ranged second in locality 3, 4, 5, 6, 7/8 and 9. C. hortensis is most typical for deciduous and mixed forests, and has a preference for humus rich and rather dry habitats. In Central Europe it occurs also in coniferous forests (Lindroth 1985). In the investigated area, C. hortensis seems to avoid the basiphilous pine forest, despite a high proportion of deciduous trees. However, the species is numerous in the forest rim localities.

Pterostichus oblongopunctatus (Fabricius, 1777) was taken in all localities, except locality 1. The species ranged third in locality 2, 3 and 5. P. oblongopunctatus is an eurytopic species, occurring in most deciduous and coniferous forests, especially in light stands (Lindroth 1986). In the study area, the species shows a somewhat similar distribution to P. melanarius.

Pterostichus niger (Schaller, 1783) was taken in locality 9 and 10, where it ranged third in both localities. According to Lindroth (1986) P. niger occurs in almost every sort of forest community, but prefers deciduous and mixed forests on humus rich, rather dry soils. In the study area this species was not taken in the basiphilous pine forest localities, neither in the thermophilous forest in the slopes below Frierflauane, or in the locality with the Equiseto-Praxinetum association. Its abundance in the thermophilous forest localities 9 and 10 may be sought in the neighboring rim habitats and agricultural land.

Pterostichus melanarius (Illiger, 1798) was taken in all localities except locality 1. The species ranged second in locality 2, 5 and 10, and third in locality 6. P. melanarius is a very eurytopic species and occurs most commonly in open and not too dry and sandy grounds. It is also abundant in agricultural land, forest edges and in light woods (Lindroth 1986). Considering the present results, P. melanarius seems to prefer a well developed ground layer. It should be noticed, however, that the species was only presented by 1 specimen in the thermophilous deciduous forest at locality 7/8. According to Lindroth (1986), P. melanarius is often found together with P. niger, but P. melanarius is often more abundant in dryer and less shaded areas than P. niger. No such association between the two species is evident in the present sets of material.

Abax parallelepipedus (Piller & Mitterpacher, 1783) was the dominant Carabidae in all ten localities. The species constituted 89.5% of all Carabidae specimens collected; in locality 7/8 no less than 5,738 specimens were taken. A. parallelepipedus is an eurytopic species occurring in different kinds of forests (Lindroth 1986). The species is very common in mountainous regions in Central Europe, where it prefers dark and moist habitats in wooded areas (Thiele 1977). In Denmark the species prefers dark, shady forest floors, particularly in beech woods, where it can be rather common (Bangsholt 1983). In the construction of soil cocoons, A. parallelepipedus is dependent on clay mixed soils (Lindroth 1986). In the present study its high dominance in the deciduous forest localities is clearly in accordance with the known habitat preferences of A. parallelepipedus, and may also explain its avoidance of the dry and sun exposed localities in the basiphilous pine forest (locality 1 and 3). Its very high abundance in the forest rim communities along the precipices at Frierflauane is striking, but may partly be due to a high degree of mobility.

Agonum assimile (Paykull, 1790) was only taken in locality 4 and 10; in locality 4 it ranged third. According to Lindroth (1986) A. assimile is a stenotypic species, occurring in cool, wet and shaded habitats in deciduous forests, particularly stands of Alnus and Fraxinus. This is in accordance with the present results. Concerning locality 10, the speci-
Table 3. Staphylinidae species taken in pitfall traps at 10 localities on the Eidanger peninsula, Grenland, Southeast Telemark in 1983.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>LOCALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philonthus laminatus (Creutzer, 1799)</td>
<td>1 2 3 4 5 6 7/8 9 10</td>
</tr>
<tr>
<td>P. decorus (Gravenhorst, 1802)</td>
<td>- - 28 141 167 8 38 75</td>
</tr>
<tr>
<td>Gabrius vernalis (Gravenhorst, 1806)</td>
<td>- 1 - - - -</td>
</tr>
<tr>
<td>Platydracus latebricola (Gravenhorst, 1806)</td>
<td>- - - - - - 5</td>
</tr>
<tr>
<td>Ocypus brunnipes (Fabricius, 1781)</td>
<td>- 2 1 1 4 5 - 1</td>
</tr>
<tr>
<td>O. melanarius Heer, 1839</td>
<td>2 - - - - 1 9</td>
</tr>
<tr>
<td>Quedius xanthopus Erichson, 1839</td>
<td>- - - - 1 - -</td>
</tr>
<tr>
<td>O. fuliginosus (Gravenhorst, 1802)</td>
<td>- - - - 14 - -</td>
</tr>
<tr>
<td>Q. molochinus (Gravenhorst, 1806)</td>
<td>- 1 - 1 7 1 - 1</td>
</tr>
<tr>
<td>Q. picipes (Mannerheim, 1830)</td>
<td>- - - - - 1 -</td>
</tr>
<tr>
<td>Q. limbatus (Heer, 1834)</td>
<td>1 11 2 13 15 4 -</td>
</tr>
<tr>
<td>Xantholinus tricolor (Fabricius, 1787)</td>
<td>- 4 3 3 - 7 8 4 7</td>
</tr>
<tr>
<td>X. clairei Coiffait, 1956</td>
<td>- 2 2 - 4 6 2 - 2</td>
</tr>
<tr>
<td>Othius punctulatus (Goeze, 1777)</td>
<td>1 1 5 - 1 3 19 2 4</td>
</tr>
<tr>
<td>O. angustus Stephens, 1833</td>
<td>- - 1 - 5 - 3</td>
</tr>
<tr>
<td>Rugilus rufipes Germar, 1836</td>
<td>1 1 - - - -</td>
</tr>
<tr>
<td>Lathrobium fulvipenne Gravenhorst, 1806</td>
<td>- - - - 1 - 2</td>
</tr>
<tr>
<td>L. brunnipes (Fabricius, 1792)</td>
<td>- - - - 1 - -</td>
</tr>
<tr>
<td>Omalium rivulare (Paykull, 1789)</td>
<td>- - - - 1 - -</td>
</tr>
<tr>
<td>O. caesum Gravenhorst, 1806</td>
<td>- - - 2 1 -</td>
</tr>
<tr>
<td>O. excavatum Stephens, 1834</td>
<td>- - 1 - - -</td>
</tr>
<tr>
<td>Anthobiom atrocephalum (Gyllenhal, 1827)</td>
<td>- 4 - - 2 8 - 1</td>
</tr>
<tr>
<td>Mycetoporus longicornis Mâklin, 1847</td>
<td>- - - - 3 - 2 -</td>
</tr>
<tr>
<td>Bolitobius inclinans (Gravenhorst, 1806)</td>
<td>- - - - 1 - -</td>
</tr>
<tr>
<td>Sepedophilus testaceus (Fabricius, 1792)</td>
<td>- - - - 1 - -</td>
</tr>
<tr>
<td>Tachinus signatus (Gravenhorst, 1802)</td>
<td>- - 11 3 3 - - 1</td>
</tr>
<tr>
<td>T. laticollis Gravenhorst, 1802</td>
<td>- - 2 - - - -</td>
</tr>
<tr>
<td>Aleochara brevipennis Gravenhorst, 1806</td>
<td>- - 1 7 - - -</td>
</tr>
<tr>
<td>Oxypoda lividipennis Mannerheim, 1830</td>
<td>- - - 1 - - -</td>
</tr>
<tr>
<td>O. spectabilis Märkel, 1842</td>
<td>- - 2 - - - -</td>
</tr>
<tr>
<td>O. umbrata (Gyllenhal, 1810)</td>
<td>- - - - - - 1</td>
</tr>
<tr>
<td>O. praecox Erincon, 1839</td>
<td>- - 3 - - 1 -</td>
</tr>
<tr>
<td>ilyobates subopacus Palm, 1935</td>
<td>- - 2 - - -</td>
</tr>
<tr>
<td>Lioguia oblongiuscula (Sharp, 1869)</td>
<td>- - - 1 - - -</td>
</tr>
<tr>
<td>Geostiba circellaris (Gravenhorst, 1806)</td>
<td>- 2 - 2 2 1 - -</td>
</tr>
<tr>
<td>Xenota fungi (Gravenhorst, 1806)</td>
<td>1 - 1 - - -</td>
</tr>
<tr>
<td>Notothecta sodalis (Erichson, 1837)</td>
<td>- - 1 - - -</td>
</tr>
<tr>
<td>Drusilla canalicula (Fabricius, 1787)</td>
<td>14 2 41 4 35 -</td>
</tr>
<tr>
<td>Zyras humeralis (Gravenhorst, 1802)</td>
<td>71 2 139 3 - - 1 33</td>
</tr>
<tr>
<td>Z. cognatus (Märkel, 1842)</td>
<td>- 1 - - - - -</td>
</tr>
<tr>
<td>Stenus ludyi Fauvel, 1885</td>
<td>- - - - - 1 -</td>
</tr>
</tbody>
</table>

18
mens most probably originated from shady areas in the descending slopes towards a small brook, about 50 metres from the traps.

The most remarkable record was that of *A. parallelepipedus*. There are only three previous records of this species in Norway, viz.: AK: Etterstad, Vestre Aker (one specimen), TEY: Brevik, Porsgrunn (numerous) (Schøyen 1880), and TEY: Jomfruland (Johan Andersen pers. com.). Elsewhere in Fennoscandia the species is recorded from the western parts of Skåne in Sweden (Lindroth 1945, 1986).

Further, *Dromius notatus* Stephens, 1827 is distributed in the coastal regions of southern Norway, from Østfold and Akershus southwest to outer Rogaland. The remaining Carabidae species have all been recorded at least north up to Sor-Trøndelag; most of them are distributed north up to Troms or Finnmark.

**Family Staphylinidae**

A total of 1,093 Staphylinidae specimens belonging to 42 species were taken (Tab. 3). Also within the Staphylinidae the catches, both in number of species and specimens, differ highly between the localities.

Locality 1 yielded 5 species and 38.9 specimens pr. unit time. The dominant species in this locality was *Zyras humeralis* (Gravenhorst, 1802) with 94.7% of the family total. Locality 2 yielded only 15.0 specimens pr. unit time, distributed on 9 species. The dominant species in this locality were *Drusilla canaliculata* (Fabricius, 1787) with 48.3% of the family total and *Xantholinus trieolor* (Fabricius, 1787) with 13.8%. In locality 3, 14 species were taken and the catches yielded 90.2 specimens pr. unit time. The dominant species in this locality were *Z. humeralis* with 79.9% of the family total, *Qedius limbatus* (Heer, 1834) with 6.3% and *Othis punctulatus* (Goeze, 1777) with 2.9%.

Locality 4 yielded 16 species and 43.0 specimens pr. unit time. The dominant species in this locality were *P. decorus* with 33.7% of the family total, *Qedius fuliginosus* (Gravenhorst, 1802) with 16.9% and *Tachinus signatus* (Gravenhorst, 1802) with 13.3%.

Both locality 5 and 6 yielded a relatively high number of species, 10 and 17 species, respectively. Number of specimens pr. unit time were also the highest of all the localities studied, with 178.9 and 113.0 specimens. The dominant species in locality 5 were *Philonthus decorus* (Gravenhorst, 1802) with 69.1% of the family total, *D. canaliculata* with 20.1% and *Qedius molochinus* (Gravenhorst, 1806) with 3.4%. The dominant species in locality 6 were *P. decorus* with 76.6% of the family total, *Q. limbatus* with 6.0% and *X. trieolor* with 3.2%.

The localities 7/8 yielded 36.8 specimens pr. unit time, while the number of species was 16. The dominant species in these localities were *D. canaliculata* with 31.0% of the family total, *O. punctulatus* with 16.8% and *Q. limbatus* with 13.3%.

In localities 9 and 10 the catches of specimens pr. unit time were 27.5 and 74.6, respectively, and the number of species were 9 and 13. The dominant species in locality 9 were *P. decorus* with 71.7% of the family total and *Q. limbatus* and *X. trieolor*, both with 7.5%. The dominant species in locality 10 were *P. decorus* with 52.1% of the family total, *Z. humeralis* with 22.9% and *Ocypus melanarius* Heer, 1839 with 6.3%.

**The species**

*Philonthus decorus* (Gravenhorst, 1802) was the most abundant species in locality 4, 5, 6, 9 and 10, and was also taken in locality 7/8. *P. decorus* is a common species, particularly in woodlands (Palm 1963, Horion 1965). In the present study, the species seems to avoid the basiphilous pine forest, except the forest rim communities where it was the most abundant species.

*Ocypus melanarius* Heer, 1839 ranged third in locality 10 and was also taken in locality 2 and 9. According to Horion (1965) the species is often found in light and humid woodlands, under stones and rotting logs, beneath mosses etc., but also on agricultural land and in gardens.

*Qedius fuliginosus* (Gravenhorst, 1802) was only taken in locality 4, where it ranged second. According to Palm (1963) and Horion (1965) *Q. fuliginosus* is a woodland species, preferring open, wet habitats, where it is found under stones, beneath mosses, decaying leaves etc., often near water. This obviously correspond well the occurrence of *Q. fuliginosus* in the study area.

*Qedius molochinus* (Gravenhorst, 1806) ranged third in locality 5 and was also taken in locality 2, 4, 6 and 9. According to Horion (1965) the species is found under mosses and
and rotting leaves, often in wet places like bogs and marshes, but also in woodlands and on open land.

*Quedius limbatus* (Heer, 1834) was taken in all localities, except locality 2, 5 and 10. It ranged second in locality 3, 6 and 9, and third in locality 7/8. According to Palm (1963) and Horion (1965) *Q. limbatus* is most common among rotting vegetation in humid woodlands.

*Xantholinus tricolor* (Fe'ricius, 1787) was taken in all localities, except locality 1 and 5. It ranged second in locality 2 and 9, and third in locality 6. According to Palm (1963) *X. tricolor* is found both in woodlands and in open fields. It is often numerous among dead and rotting leaves (Horion 1965).

*Othius punctulatus* (Goeze, 1777) was taken in all localities, except locality 4. The species ranged second in locality 7/8 and third in locality 3. *O. punctulatus* is a woodland species, preferring deciduous forests, but it can also be found in coniferous forests (Palm 1963, Horion 1965).

*Tachinus signatus* (Gravenhorst, 1802) ranged third in locality 4 and was also taken in locality 5, 6 and 10. According to Horion (1965) and Palm (1966) the species is very eurytopic, found in moss or under stones, in decaying organic matter etc. Strand (1965) found a relatively high number of this species in underground tunnels of the water vole (*Arvicola terrestris*). Voles and shrews were particularly common at locality 4, and it might be that *T. signatus* is associated with vole tunnels at the site.

*Drusilla canaliculata* (Fabricius, 1787) was the most abundant species in locality 2, ranged second in locality 5 and 7/8 and it was also taken in locality 3 and 6. *D. canaliculata* is frequent in both wet and dry habitats, most common in open lands, among rotting leaves, mosses etc. (Horion 1967, Palm 1972). According to Horion (1967) *D. canaliculata* is often found together with ants. In the present study, however, no such association is evident.

*Zyras humeralis* (Gravenhorst, 1802) was the most abundant species in locality 1 and 3, ranged second in locality 10, and was also taken in locality 2, 4 and 9. *Z. humeralis* is associated with ants like *Lasius* - and *Formica*-species, and the beetle is often frequent where such ant hills are situated close to old tree trunks (Horion 1967, Palm 1972). In the present study the high dominance of this species in locality 1 and 3, might be explained by this association with ants.

None of the Staphylinidae species taken can be considered as rare. Some ten species have a more or less restricted distribution in the coastal regions of southern Norway, and there are relatively few previous records of *Bolitobius inclinans* (Gravenhorst, 1806) and *Oxypoda praecox* Erichson, 1839. However, most of the Staphylinidae species are common and widespread, recorded north up to northern Norway.

**DISCUSSION**

Although the localities were selected to allow the identification of discrete communities within the major plant association found in the area, the results illustrate that the species composition in these plant associations overlap widely. Further, the catches in the different trap series within the two major plant associations differ both in density of individuals as well as in species composition. The results thus clearly demonstrate that within the study area no separate Carabidae or Staphylinidae communities can be assigned to the two major plant associations.

Pitfall trapping have been used extensively for studies on surface dwellers like spiders, centipedes, ants and beetles, studies which have provided valuable information on the ecology and distribution of these animals. However, ever since Barber (1931) introduced pitfall traps, there have been much controversy to what extent the catches are representative for the fauna. Many studies have shown that catch size is influenced by a wide range of factors apart from population size, like e.g. the activity pattern of the species, and the construction of the traps. The obtained results is thus not necessarily representative for the Carabidae and Staphylinidae fauna in the area.

One major criteria from the conservation point of view is the occurrence of rare species. The present study indicate that the Carabidae and Staphylinidae fauna in the area are dominated by common and widespread species, which can be met with in a variety of habitats. The one remarkable exception is *Abax parallelepipedus*, which has a very restricted distribution in Scandinavia. This species was highly dominant in all three plant associations studied, and nearly 13,000 specimens were taken during the study. There
are very few previous records of this species in Norway, and most of the records are from the same area. This indicates that the species ought to be considered as an 'endangered' or at least as a 'considerate' species in Norway.

No less than 164 Carabidae species have been recorded from Telemark (Lindroth 1985, 1986). The number of species encountered in the present study makes up only approximately 15% of this fauna. Of Staphylinidae 398 species are recorded from Telemark (Lindroth 1960). The number of species encountered in the present study makes up only approximately 11% of this fauna. Based on the present results the area can thus not be said to have a particularly rich fauna neither of Carabidae nor Staphylinidae. However, pitfall trapping will only give a narrow specter of the actual fauna in the area, and such comparisons are thus not very informative.

Permanent preservation has been suggested for large stands of the basiphilous pine forest and the thermophilous deciduous forest on the Eidanger Peninsula (Bjornalen et al. 1973). Previous studies on the invertebrate fauna have indicated that within other insect orders, the area holds a comparatively high number of rare species, of which several has not been taken elsewhere in Norway (Ellefsen 1984, Ellefsen & Hauge 1986, Soli 1987). During the last decades areas with basiphilous pine forest in southeastern Telemark have been extensively used for urbanization, and the occurrence of this relatively rare vegetation type in Norway has thus been very much reduced. The occurrence of *A. parallelepipedus* in the area substantiate the urge for permanent preservation of Frierflauane.

ACKNOWLEDGEMENTS

The study was granted by the Norwegian Ministry for the Environment (Miljøverndepartementet). We are indebted to R. Lund for sorting out the material.

REFERENCES


Received 10 March 1989
Faunistical records of Caddis flies (Trichoptera) from Aust-Agder and Vest-Agder, South Norway

TROND ANDERSEN, LARS OVE HANSEN, KJELL ARNE JOHANSON, TORSTEIN SOLHØY AND GEIR E. E. SOLI


Records of a total of 71 Trichoptera species are given. 52 species are taken in outer Aust-Agder, 16 species in inner Aust-Agder and 61 species in outer Vest-Agder. The total number of species until now recorded from these regions is 53 in outer Aust-Agder, 16 in inner Aust-Agder and 67 in outer Vest-Agder.

One species, Ylodes reuteri (McLachlan, 1880), is not previously recorded from Norway. Further, records of the following «rare» species are given: Hydroptila pulchricornis Pictet, 1834 and Grammotaulius nitidus (Müller, 1764) from outer Aust-Agder, and Beraea maura (Curtis, 1834) and Adicella reducta (McLachlan, 1865) from outer Vest-Agder.

Freshwater systems in Aust-Agder and Vest-Agder are strongly affected by acid precipitation. It is suggested that the increased acidity results in both an impoverishment of the Trichoptera fauna and to an alteration in the dominance ratio between the abundant species.

INTRODUCTION

In South Norway acid precipitation has affected freshwater systems strongly, particularly in Aust-Agder and Vest-Agder. The fish populations in a high number of lakes and streams in this region have been lost; but acidified ecosystems exhibit a reduced number of species at all trophic levels. Raddum & Fjellheim (1984) have for instance demonstrated that several Trichoptera species are not found in more acid river systems in southwestern Norway.

Despite large scale projects directed towards the effects of acid precipitation on freshwater systems, surprisingly little attention seems to have been paid to the study of distribution and occurrence of invertebrates inhabiting these freshwater systems. Without knowledge of the present distribution and occurrence of these animals it will be difficult in future to get some idea of the long term effects on this fauna. The present paper is thus an attempt to summarize our knowledge on the Trichoptera fauna in the Agder counties, as well as to add new information about this fauna.

STUDY AREA, MATERIAL AND METHODS

The total material comprises approximately 11,725 imagines. Most of the material has been collected between 1979 and 1988, but a few specimens were also taken in the 1960's and early 1970's. In outer and inner Aust-Agder 25 localities have been visited, fig. 1; in outer Vest-Agder 26 localities, fig. 2. The exact localities, with UTM- and EIS-references are listed in tables 1 & 2. The biogeographical regions are in accordance with Strands’ system as revised by Økland (1981).

Most of the material has been taken in light traps, but a small collection of caddis flies has also been taken in malaise traps. In addition caddis flies have been collected with sweepnets or searched for on stones and vegetation.
Fig. 1. Localities in outer and inner Aust-Agder; the numbers refer to the locality numbers in table I.
Table 1. Localities in outer and inner Aust-Agder, with UTM- and EIS-reference.

<table>
<thead>
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<th>No.</th>
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along lakes and rivers. Most of the material has been taken by the authors, but some specimens taken by L. Aarvig, A. Fjeldså, A. Fjellberg, T. R. Nielsen, G. Pedersen and S. Solhøy are also included. In addition, a few specimens deposited in the entomological collection at the Zoological Museum, University of Bergen, have been identified.

Date of capture, number of males and females and method are only given for species which are considered as rare in Norway (see Aagaard & Hågvar 1987). For species not taken in the 1980's the year of capture is given.

THE SPECIES

**Family Rhyacophilidae**

*Rhyacophila nubila* (Zetterstedt, 1840). AAY, Gjerstad: Ulltveit; Lillesand: Grimenes. AAI, Åmli: Gjermundsnæs. VAY, Mandal: Holm, Stoveland; Sogne: Kvernhusvannet, Østerhus; Marnardal: Breland.

**Family Glossosomatidae**

*Agapetus ochripes* Curtis, 1834. VAY, Mandal: Stoveland.
Family Hydroptilidae


Fig. 2. Localities in outer Vest-Agder; the numbers refer to the locality numbers in table 2.

Family Psychomyiidae


O. frici Klapálek, 1891. AAY, Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet, Østerhus.
Table 2. Localities in outer Vest-Agder, with UTM- and EIS-reference.

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<th>No.</th>
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**Family Ecnomidae**

*Ecnomus tenellus* (Rambur, 1842). AAY, Risør: Brøbergvannet; Grimstad: Reddalsvann; Vegårdshei: Ekksjø; Lillesand: Grimenes. VAY, Kristiansand: Oddernes; Mandal: Holum, Nomevann, Stoveland; Søgne: Kvernhusvannet, Østerhus.

**Family Polycentropodidae**

Gjerstad: Sundebru; Vegårshei: Ekkjø. VAY, Søgne: Kvernhusvannet. 
*C. trimaculatus* (Curtis, 1834). AAY, Risør: Brøbergvannet; Gjerstad: Eskeland, Sundebru; Grimstad: Kvernhusmoen. AAI, Åml: Gjermundnes. VAY, Søgne: Østerhus; Marnardal: Breland. 

*Holocentropus dubius* (Rambur, 1842). AAY, Risør: Brøbergvannet; Arendal: Hasselåsen; Grimstad: Kvernhusmoen; Lillesand: Grimenes. AAI, Åml: Sandåna, Sjødiplane. VAY, Mandal: Holum; Søgne: Kvernhusvannet, Østerhus, Åsen. 


*Phryganea bipunctata* Retzius, 1783. AAY, Lillesand: Grimenes. VAY, Mandal: Holum. 

*P. grandis* Linnaeus, 1758. VAY, Mandal: Holum; Farsund: Hanangervann; Søgne: Kvernhusvannet, Østerhus. 

*Trichostega minor* (Curtis, 1834). VAY, Mandal: Tregde; Søgne: Kvernhusvannet. 

**Family Lepidostomatidae** 

*Lepidostoma hirtum* (Fabricius, 1775). AAY, Arendal: Hasselåsen. VAY, Mandal: Holum, Stoveland; Farsund: Hanangervann; Marnardal: Breland. 

*P. irroratus* (Curtis, 1835). AAY, Lillesand: Grimenes. VAY, Mandal: Holum; Flekkefjord: Lianstjern; Søgne: Kvernhusvannet, Østerhus. 

**Family Limnephilidae** 

*Apatania stigmatella* (Zetterstedt, 1840). VAY, Mandal: Holum. 

*Chaetopteryx villosa* (Fabricius, 1798). VAY, Mandal: Holum. 

*Glyphotaelius pellucidus* (Retzius, 1783). AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 

*P. centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 

*Limnephilus affinis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 


*L. binotatus* Curtis, 1834. VAY, Søgne: Kvernhusvannet, Østerhus. 

*L centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Kvernhusmoen, Reddalsvann, Skiftenes; Vegårdshei: Ekkjø; Søgne: Kvernhusvannet, Østerhus. 

*A. picta* Kolenati, 1848. VAY, Søgne: Kvernhusvannet. 

*A. varia* (Fabricius, 1793). AAY, Grimstad: Reddalsvann; Lillesand: Grimenes; Birkenes: Birke. 

*VAY, Søgne: Kvernhusvannet, Østerhus, Åsen; Marnardal: Breland. 

*Phryganea bipunctata* Retzius, 1783. AAY, Lillesand: Grimenes. VAY, Mandal: Holum. 

*P. grandis* Linnaeus, 1758. VAY, Mandal: Holum; Farsund: Hanangervann; Søgne: Kvernhusvannet, Østerhus. 

**Family Limnephilidae** 

*Apatania stigmatella* (Zetterstedt, 1840). VAY, Mandal: Holum. 

*Chaetopteryx villosa* (Fabricius, 1798). VAY, Mandal: Holum. 

*Glyphotaelius pellucidus* (Retzius, 1783). AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 

*P. centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 

*Limnephilus affinis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 


*L. binotatus* Curtis, 1834. VAY, Søgne: Kvernhusvannet, Østerhus. 

*L centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Kvernhusmoen, Reddalsvann, Skiftenes; Vegårdshei: Ekkjø; Søgne: Kvernhusvannet, Østerhus. 

**Family Lepidostomatidae** 

*Lepidostoma hirtum* (Fabricius, 1775). AAY, Arendal: Hasselåsen. VAY, Mandal: Holum, Stoveland; Farsund: Hanangervann; Marnardal: Breland. 

*P. irroratus* (Curtis, 1835). AAY, Lillesand: Grimenes. VAY, Mandal: Holum; Flekkefjord: Lianstjern; Søgne: Kvernhusvannet, Østerhus. 

*P. centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjeland. 


*P. irroratus* (Curtis, 1835). AAY, Lillesand: Grimenes. VAY, Mandal: Holum; Flekkefjord: Lianstjern; Søgne: Kvernhusvannet, Østerhus. 

*P. centralis* Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Kvernhusmoen, Reddalsvann, Skiftenes; Vegårdshei: Ekkjø; Søgne: Kvernhusvannet, Østerhus.
Tromøy: Bjelland; Lillesand: Grimenes; Iveland: Grossås. AAI, Åmlø: Gjermundnes, Krossbekk; Evje og Hornnes: Mitting. VAY, Kristiansand: Oddernes; Mandal: Holum, Kleven, Lindland, Nomevann, Smeland, Stoveland; Flekkefjord: Lianstjern, Osmundstø, Råga, Store Eikås; Songdalen: Stokkeland; Sogn: Kvernhusvannet, Østerhus, Åsen; Marnardal: Sveinall; Lindesnes: Jørenstad, Ramsland.


*L. elegans* Curtis, 1834. AAY, Lillesand: Grimenes. VAY, Mandal: Holum, Stoveland; Flekkefjord: Store Eikås; Sogn: Kvernhusvannet, Østerhus.


*L. flavicornis* (Fabricius, 1787). AAY, Arendal: Hasselasen; Tromøy: Bjelland; Lillesand: Grimenes. VAY, Sogn: Kvernhusvannet, Østerhus.


*L. lunatus* Curtis, 1834. AAY, Arendal: Hasselasen; Lillesand: Grimenes. VAY, Mandal: Holum, Kleven, Lindland, Tregde; Flekkefjord: Lianstjern, Råga; Sogn: Kvernhusvannet, Østerhus; Marnardal: Sveinall; Lindesnes: Jørenstad.

*L. luridus* Curtis, 1834. AAY, Arendal: Hasselasen; Lillesand: Grimenes; Birkenes: Birkeland. VAY, Mandal: Holum, Stoveland; Sogn: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

*L. marmoratus* Curtis, 1834. AAY, Arendal: Hasselasen; Grimstad: Reddalsvann; Tromøy: Bjelland; Lillesand: Grimenes. AAI, Mandal: Holum; Sogn: Kvernhusvannet, Østerhus; Marnardal: Sveinall; Lindesnes: Jørenstad.

*L. rhombicus* (Linnaeus, 1758). AAY, Arendal: Hasselasen; Lillesand: Grimenes; Birkenes: Birkeland. AAI, Mandal: Holum; Farsund: Prestvann; Sogn: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

*L. subcentralis* Brauer, 1857. AAY, Lillesand: Grimenes.


*Rhadicoleptus alpestris* (Kolenati, 1848). AAY, Arendal: Hasselasen; Lillesand: Grimenes; Iveland: Grossås. VAY, Mandal: Holum, Kleven, Lindland, Smeland, Stoveland; Flekkefjord: Lianstjern, Osmundstø, Store Eikås; Sogn: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

**Family Goeridae**

*Goera pilosa* (Fabricius, 1775). VAY, Mandal: Stoveland; Sogn: Østerhus.

**Family Beraeidae**


**Family Sericostomatidae**

*Sericostoma personatum* (Spence in Kirby & Spence, 1826). VAY, Kristiansand: Vagsbygd.

**Family Molannidae**


**Family Leptoceridae**

AIA, Åmli: Gjermundsnes, Krossbekk. VAY, Mandal: Nomevann; Farsund: Pretstvann; Søgne: Kvernhusvannet.


Ceraclea fulva (Rambur, 1842). VAY, Søgne: Kvernhusvannet.


O. ochracea (Curtis, 1825). AAY, Grimstad: Reddalsvann; Lillesand: Grimenes. VAY, Mandal: Holeum, Stoveland; Farsund: Hanganervann; Søgne: Østerhus.


DISCUSSION

Since Brekke (1946) published his check-list on Norwegian caddis flies, new records of Trichoptera from Aust-Agder and Vest-Agder have been given by Statens forurensningstilsyn (1982), Andersen & Solli (1987) and Fjellheim & Raddum (1988). Prior to Brekke (1946), Morton (1901) recorded four Trichoptera species: Holocentropus dubius (Rambur, 1842), Phryganea bipunctata Retzius, 1783, Limnephilus centralis Curtis, 1834 and Rhadioleptus alpestris (Kolenati, 1848) from Kristiansand in outer Vest-Agder. Tjeder (1932) also recorded one species Micropterna sequax McLachlan, 1875 from Lyngdal in outer Vest-Agder, a record which must have been overlooked by Brekke (1946).

From outer Aust-Agder Brekke (1946) recorded three species, Polycentropus flavomaculatus (Pictet, 1834), L. centralis and Athripsodes cinereus (Curtis, 1834). Andersen & Solli (1987) recorded Grammotaulius nitidus (Müller, 1764) as new to Norway from outer Aust-Agder. Fjellheim & Raddum (1988) recorded five Trichoptera species from Lake Store Hovvatnet in Birkenes: Cyornus flavidus McLachlan, 1864, P. flavomaculatus, Agrynpia obsoleta (Hagen, 1864), Molanna angustata Curtis, 1834 and Mystacides azurea (Linnaeus, 1761). Of these we failed to take M. angustata. The number of Trichoptera species now recorded from outer Aust-Agder is 53, as the remaining 45 species recorded here have previously not been recorded from this region.

Brekke (1946) did not give records of Trichoptera from inner Aust-Agder. The 16 species recorded here have thus previously not been recorded from this region.

From outer Vest-Agder Brekke (1946) recorded 21 species of Trichoptera, Rhyacophila nubila (Zetterstedt, 1840), Cyornus flavidus, C. trimaculatus (Curtis, 1834), Holocentropus dubius, Plectrocnemia conspersa (Curtis, 1834), Polycentropus flavomaculatus, Agrynpia obsoleta, Phryganea bipunctata, Lepidostoma hirtum (Fabricius, 1775), Limnephilus affinis Curtis, 1834, L. centralis, L. coenosus Curtis, 1834, L. extricatus McLachlan, 1865, L. fenestratus (Zetterstedt, 1840), L. stigma Curtis, 1834, L. subcentralis Brauer, 1857, Rhadioleptus alpestris, Sericostoma personatum (Spence in Kirby & Spence, 1826), Athripsodes cinereus (Curtis, 1834), A. commutatus (Rostock, 1874) and Mystacides azurea. Of these we failed to collect three species, L. fenestratus, L. subcentralis and A. commutatus. Brekke (1946) also recorded Potamophylax stellatus auct. from outer Vest-Agder, which may either refer to P. cingulatus (Stephens, 1837) or P. latipennis (Curtis, 1834). Further, Statens forurensningstilsyn (1982) recorded 12 species taken in the Saulandsvann and Gjervollstadvann area in Farsund in 1981, viz.: R. nubila, H. dubius, Neureclipsis bimaculata (Linnaeus, 1758), P. conspersa, P. flavomaculatus, Hydropsyche siltali Döhler, 1963, Chaetopteryx villosa (Fabricius, 1798), Limnephilus...
flavicornis (Fabricius, 1787), Potamophylax cingulatus, P. latipennis, Stenophylax permissus McLachlan, 1895 and Adicella reducta (McLachlan, 1865). Of the latter one larvae was taken in a stream on 8. Oct. 1981. Of the species recorded by Statens forurensningstilsyn (1982) we failed to take H. siltalai, P. cingulatus and P. latipennis. The number of Trichoptera species now recorded from outer Vest-Agder is 67, as the remaining 38 species recorded here have previously not been recorded from this region.

Brekke (1946) recorded 15 species from inner Vest-Agder. The present paper do not give further information on the caddis fly fauna in this region.

Ylodes reuteri (McLachlan, 1880) is not previously recorded from Norway. The species has a palaeartic distribution; in Europe it is taken in central and northern parts, including Denmark, Sweden and Finland (Botosanenu & Malicky 1978, Andersen & Wiberg-Larsen 1987). In Sweden it seems restricted to the eastern, coastal areas along the Östersjøen; Skåne, Blekinge, Gotland, Östgötaland, Ängermanland and Västerbotten (Forsslund & Tjeder 1942, Gullefors 1988). The species inhabits both lentic and slowly flowing waters rich in vegetation (Tobias & Tobias 1981). In Sweden it occurs in the brackish water in the Östersjøen. The present specimens were taken in a light trap situated close to lake Reddalsvann. The lake is connected with the sea through a channel and has brackish water. The vegetation along the shores consists mainly of Phragmites australis, but also some Scirpus lacustris and Typha sp. (Berggren & Svendsen 1987).

Four of the species recorded here are considered as rare in Norway (Aagaard & Hågvar 1987). Of these, Hydroptila pulchricornis Pictet, 1834 was recorded for the first time in Norway from Femsjøen near Halden in Østfold (Solem 1970). Later the species was recorded from Vestfold and outer Telemark (Andersen 1975, Andersen & Soli 1989, Andersen et al. 1990). According to Marshall (1978) the species inhabits lakes, ponds, rivulets and brooks. The present specimens were all netted in the vegetation along a lake.

Grammotaulius nitidus (Müller, 1764) was recorded for the first time in Norway from Grimenes in Lillesand in outer Aust-Agder in 1985 (Andersen & Soli 1987). The present record is from the same locality from August 1985. In 1986 a light trap was operated throughout the flight period at the exact same locality, but the species was not taken this year. However, the species has recently been recorded from Langøya in Våle in Vestfold (Andersen & Hansen 1990).

Berea maura (Curtis, 1834) was proved to belong to the Norwegian fauna based on specimens taken at Børveneset in Ullensvang in inner Hordaland (Andersen 1980); an uncertain record from Skjervet in Odda in inner Hordaland was given by McLachlan (1903). The larvae is semiterrestrial, living among moist, decaying leaves or among moist moss (Wiberg-Larsen 1979). According to Mosely (1939) the species is often found in the heritage bordering rocky springs or small waterfalls.

Adicella reducta (McLachlan, 1865) was recorded as new to Norway from outer Rogaland (Forsslund 1936); later a few new records from the same region were given by Jensen (1942). The species has also been recorded from outer Sogn og Fjordane (Andersen 1974), and recently also from outer Vest-Agder (Statens forurensningstilsyn 1982). The species inhabits springs, streams and small rivers (Mosely 1939, Botosanenu & Malicky 1978, Tobias & Tobias 1981). The present female was netted along a small stream, flowing through an area grown with alder (Alnus glutinosa).

Even though the present contribution increase the number of species known from the Agder counties considerably, there should be a high number of species still to be taken. However, the lack of e.g. Potamophylax spp. in the present material, and the low representation of Hydropsychids, Hydropilids, Lepidoperines of the genus Athripsodes and Ceraclea and Limnephilids particularly among Limnephilus and Halesus, which all are species easily attracted to light traps, might indicate that the Trichoptera fauna in the area is impoverished due to acidification. Statens forurensningstilsyn (1985) stated for instance that H. siltalai and other less tolerant caddis fly species had disappeared in the Saulandsvann and Gjervollstadsvann area in Farsund, where they were found in 1981.

The present material also include comparatively many records of Polycentropodids, which are known to be more tolerant toward acidification (see Raddum 1979, Raddum & Fjellheim 1984). In the light trap catches at Grimenes in outer Aust-Agder, both H. dubius and N. bimaculata were very abundant
both in 1985 and 1986. Increased acidity might therefore well alter the dominance ratio between the Trichoptera species too, as has been demonstrated for Ephemeroptera and Chironomidae during a liming project in the area (see Raddum et al. 1986).

ACKNOWLEDGEMENTS
We are indebted to Leif Aarvik, Kai Berggren, Arild Fjeldså, Arne Fjellberg, Tore R. Nielsen, Gustav Pedersen, Severin Solhøy and Svein Svendsen for supplying us with material. We also want to thank Lita Greve Jensen for allowing us to study the collection of caddis flies in the Zoological Museum in Bergen. Financial support was given by L. Meltzers Høyskolefond.

REFERENCES

Received 29 June 1988
Notes on the genus *Diastata* in Norway (Diptera, Diastatidae)

LITA GREVE AND JOHN O. SOLEM


*Diastata flavicosta* Chandler, 1987 and *Diastata ornata* Meigen, 1830 are reported new to Norway. New records are given for *Diastata costata* Meigen, 1830 and *Diastata nebulosa* (Fallén, 1823). *D. costata* is a common species in southern Norway.

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The Palaearctic species of the genus *Diastata* was revised by Chandler (1987), who recognized the fam. Diastatidae with only one genus, *Diastata*. Soós & Papp (1984) placed both the subfamilies Diastatinae and Campichoetinae in the family Diastatidae.

The family Diastatidae sensu Chandler is recognized on characters of the wings and the antenna, like two breaks of the costa (one in Campichoetidae) and long plumosity of the third antennal segment (short pubescence in the Campichoettidae, for details see Chandler (1987)).

Chandler (1987) described new species also from North-Western Europe, and older material of *Diastata* from Norway should be reexamined using his key. Chandler (1987) included much material from Sweden and Finland, but has only one record from Norway.

Diastatidae flies are very small, usually between 2—4 mm, and they are easily overlooked in the field. They are sparsely represented in most museum collections in Norway, and no Norwegian dipterist since Siebke (1877) has surveyed this family. Siebke cited Zetterstedt’s records only, and had no additional records of his own. Walker (1848—1849) mentioned *Diastata obscurrella* from Hammerfest in Finnmark province. This might have been a misidentification because today no specimens belonging to fam. Diastatidae is in the material collected by Walker and stored in the British Museum, Natural History (A. C. Pont pers. comm.)

Storm (1896) noted *Diastata nebulosa* from the Statsbygd area in outer South Trøndelag province, but no material exists today in the very poor remnants of the Storm collection in University of Trondheim, the Museum.

*Diastata* species are found in forest, marsh and bog. Remarkably little is known of their habits and their immature stages are unknown, so only speculation that the larvae may be saprophagous is presently possible (Chandler 1987). In literature on aquatic insects, *Diastata* larvae is not mentioned.

A small material of Diastatidae sensu Chandler is present in the Museum of Zoology, University of Bergen. The material has partly been collected at random, and partly sorted out from samples collected for various purposes.

More consistent sampling have been with Malaise traps (= MF) at Frogn, Håøya; Hurum, Toft; Voss, Mjølfjell; and Bergen, Volan. However, they were emptied at irregular intervals. Only the four traps run in 1986 at Høylandet, North Trøndelag, were emptied regularly every week during June—October. These traps were set across 2 streams, 2 at each stream, with the main objective to sample aquatic insects.

This is the first report on *Diastata* from Norway after Chandler’s (1987) revision. For each record an EIS square is noted. MF = Malaise trap. The material is listed below.
LIST OF SPECIES

Diastata costata Meigen, 1830. AK Frogn: 

Chandler (1987) reported D. costata to be widespread in Sweden, and in a wider scale it has a holarctic distribution. The records in ZMB indicate D. costata to be a widespread species in Norway south of Dovre. The locality at Mjølfjell was in an open birch forest with some pines and junipers, the localities at Håøya and Tofte represent rich, deciduous forests, and two localities in AAY, Asperholmen and Lille Torungen, are open areas in the outer skerries of the coast.

The Høylandet localities Tverraa MF 1 and 2, and Skiftesåa MF 1 have mostly spruce in the surrounding. But birch and alder are also present. At Skiftesåa ferns are present along the stream, and blueberry and various species of mosses are abundant in the spruce forest. All surroundings of the sites sampled are damp, and mires/bogs are present nearby. Tverraa and Skiftesåa run through a forest that is very little managed by man. This is clearly demonstrated by all deciduous and coniferous windfallen trees found in every stage of the decomposing process. Thus, D. costata has been collected in very different habitats in southern Norway.

The flight period in North Trøndelag was in 1986 the end of July through August. In the very southern part of Norway, D. costata has been recorded from June to September.


D. flavicosta is reported from Norway for the first time. According to Chandler (1987) it is widespread in Sweden and Finland, with several localities in the northern provinces. The first Norwegian locality is from a northern area, not far from the localities in northern Sweden and northern Finland. The distribution in Finland, Norway and Sweden indicates that D. flavicosta has a fairly northern distribution in Fennoscandia.

Diastata nebulosa (Fallén, 1823). AK Frogn. 
Håøya EIS 28 MF A 3—16 June 1984 1 m, MF B 5—19 May 1984 1 m, 3—16 June 1984 1 f. NTI Høylandet: Skiftesåa EIS 107 MF 2 4—11 June 1986 1 f.

Chandler (1987) reported this species from Norway, but no locality was given. This material is in the Becker collection in Museum National d'Histoire Naturelle, Paris. D. nebulosa is known from several provinces in Sweden and Finland (Chandler 1987) north to the Bottenvik area. According to Siebke (1877) Zetterstedt recorded this species from Northern Norway.

The record from Håøya represents a rich deciduous forest. The locality is described in details in Greve & Midtgaard (1986).

Høylandet, Skiftesåa 2 is in a spruce forest with some birch and alder. There is a lot of mosses in the terrestrial vegetation, and as at Skiftesåa 1 a lot of windfallen trees of all stages in the decomposing process.

Diastata ornata Meigen, 1830. HOY Østerøy: Barsvann EIS 39 23 May 1984 1 m, 2 ff.

The locality Barsvann is a bog near lake Barsvann, and the flies were collected near the edge of the water.

There is also a female from HOI Kvinhørad: Ljosmyr EIS 31, collected 22 May 1970, which probably belongs to this species.

This is the first record from Norway, but Chandler (1987) mentioned records from several provinces in Sweden and Finland.

Our data indicate that D. costata is widespread in Norway south of Dovre, but as it has a holarctic distribution, D. costata is probably common in North Norway also. The distribution we have found fits well with the distribution indicated by Chandlers (1987).

We shall notice that only a few specimens
were recorded at each site. Does this indicate that the *Diastata* spp. are not abundant at any site, or is it because the adults behave in such a way that only a few specimens is caught in Malaise traps?

Judged from the collections from Høylandet, *D. costata* is flying from July and throughout most part of August. Malaise trap collections elsewhere had much longer time intervals between each emptying, and thus only limited data on flight periods are obtained. However, the captures of *D. nebulosa* have been done in May and early June, and indicate a flight period in early summer.

*Diastata fuscula* has yet not been found in Norway, but it is recorded in Skåne and Halland in Sweden, and may be expected to occur in the very south of Norway also.

**ACKNOWLEDGEMENTS**

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**REFERENCES**


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Caddisflies (Trichoptera) from Jostedalen, West Norway

TROND ANDERSEN, MOFAKHTAR HOSSAIN, TORSTEIN SOLHØY & GEIR E. E. SØLI

During a study of terrestrial invertebrates in the Jostedalen in 1988, a total of 196 Trichoptera specimens belonging to 19 species were caught.

Eighteen of the species belong to the family Limnephilidae. *Stenophylax vibex* Curtis, 1834 has not previously been taken in the Nordic countries. Four more species are not previously recorded from inner Sogn and Fjordane. The total number of species recorded from Jostedalen is now 26.


INTRODUCTION

The river Jostedøla origins from the glacier Jostedalsbreen, the largest icecap in continental Europe with an area of 1252 km². During the late 1970's and the 1980's the river and its tributaries have been under regulation for production of hydroelectric power. A reservoir has been built at Lake Styggevatn, and hydro-electric power stations are under construction.

As a consequence of these rather pronounced human impacts on the watercourses and parts of the precipitation area, documentation of the flora and fauna have been carried out in a series of projects. During the summer and early autumn 1988 a project studying habitat selection and distribution of terrestrial arthropods was carried out. The main sampling area was around Lake Styggevatn, in the zone which should be flooded by the reservoir at 1150—1200 m a.s.l. In addition some localities in the Stordalen and Sprongdalen valleys were surveyed (250—900 m a.s.l.). In connection with this project some caddisflies were collected which made a significant contribution to the knowledge of this group in these unique areas proposed as a national park.

STUDY AREA

Jostedalen runs some 45 km north from the Gaupnefjord, a 4 km long branch of the Lu-strafjord in the inner part of the Sognfjorden, fig. 1. Jostedalen has largely been shaped by ice as can be seen on the wide troughs, with steep valley sides rising to over 1000 m with truncate spurs, hanging valleys and other glacial features. Most of the side valleys to the west and north end in ice tongues from the Jostedalsbreen.

The Jostedøla is the main river draining the valley, with a watershed area of approximately 860 km². The river and its tributaries are mostly very fast flowing and cold. The drainage system is entrenched into a series of canyons and wide glacial troughs which have followed the accumulation of ice front deltas and glacio-fluvial end-moraine deposits. During post glacial times much sediments have been reworked into alluvial terraces and flood plains. During the summer months the run-off of the Jostedøla is greatly affected by the melting of the glacier, and the river has a high suspended load which mainly results from recent glacial erosion.

Above the three line at 800—900 m a.s.l. are more oligotrophic alpine heaths, snow bed areas and extensive areas of barren rock and boulder screees. The higher areas of woodland consist almost exclusively of birch, with a variable degree of willow thickets along rivers and brooks. At lower levels are found areas with alder and aspen and also pine or mixed forests.
Fig. 1. The upper part of the Jostedalen valley in Luster in inner Sogn and Fjordane, showing the exact position of the localities. The localities are 1) Buhaug, 2) Fæberg, 3) Nigard, 4) Sprongdalen, 5) Styggevatn NE trap series 11, 6) Styggevatn SW trap series 21, 7) Styggevatn SW trap series 10, 8) Øyastrondi.

Table 1. Localities, with UTM-reference, in the Jostedalen. All localities are situated in Luster in inner Sogn og Fjordane.

<table>
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<th>No.</th>
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<th>Method</th>
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<td>net</td>
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<tr>
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<td>32VMP1343</td>
<td>510</td>
<td>net</td>
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<td>Nigard</td>
<td>32VMP0837</td>
<td>250</td>
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<td>560</td>
<td>malaise trap</td>
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</table>

MATERIAL AND METHODS

A total of 196 specimens belonging to 19 species were taken. Most of the material has been collected in light traps, but a few specimens have also been taken in malaise traps, pitfall traps and with nets (Table 1).

THE SPECIES

Rhyacophilidae

Rhyacophila nubila (Zetterstedt, 1840) Localities: Fåbergstølane, Nigard, Sprosngdalen. Aug.—Sept. 22 22 22 22 2

Limnephilidae

Apatania zonella (Zetterstedt, 1840) Localities: Buhaug, Styggevatn SW trap series 21. June—July 5 3

Chaetopteryx villosa (Fabricius, 1798) Localities: Styggevatn NE trap series 11, Øyastrondi. Aug.—Sept. 4 2 22 22 2

Anabolia concentrica (Zetterstedt, 1840) Localities: Nigard. Aug.—Sept. 1 2

Limnephilus coenosus Curtis, 1841 Localities: Nigard, Sprosngdalen, Styggevatn SW trap series 10. Aug.—Sept. 6 2 2 2

L. griseus (Linnaeus, 1758) Locality: Fåbergstølane. 18 Aug. 2 2

L. sparsus Curtis, 1834 Localities: Fåbergstølane, Nigard. Aug.—Sept. 20 3 3 3

L. stigma Curtis, 1841 Locality: Nigard. Aug.—Sept. 2 2

L. vittatus (Fabricius, 1798) Locality: Nigard. Aug. 1 2

Phacopteryx brevipennis (Curtis, 1834) Locality: Fåbergstølane. 17 Aug. 1 2

Rhacicolepus alpestris (Kolenati, 1848) Localities: Nigard, Sprosngdalen. June—Sept. 3 2

Halesus digitatus (Schrank, 1781) Localities: Nigard, Sprosngdalen. Aug.—Sept. 3 2

H. tesselatus (Rambur, 1842) Locality: Nigard. Aug.—Sept. 1 2

Micropterna lateralis (Stephens, 1837) Localities: Nigard, Øyastrondi. June—Sept. 6 2 2 2 2 2

M. sequax McLachlan, 1875 Locality: Nigard. Aug.—Sept. 34 2 2 2

Potamophylax cingulatus (Stephens, 1837) Localities: Fåbergstølane, Nigard, Sprosngdalen. Aug.—Sept. 10 2 2 2

P. latipennis (Curtis, 1834) Locality: Nigard. Aug.—Sept. 15 4 2

P. nigricornis (Pictet, 1834) Locality: Øyastrondi. July—Aug. 2 2 2

Stenophylax vibex Curtis, 1841 Locality: Nigard. 16—20 Aug. 6 4 2 2 2, 21 Aug.—11 Sept. 2 2

DISCUSSION

An expedition from the Hull University visited Jostedalen in July and August 1979 (University of Hull 1980). They collected a total of 14 Trichoptera species in the valley system; the material was identified by Ross Andrew.

Glossosoma intermedia (Klapálek, 1892) was taken at sea level near the mouth of the river Josteda. Plectrocnemia conspersa (Curtis, 1834) was taken at 6 sites in the valley, between 220 m and 780 m a.s.l. Agrypnia obsolata (Hagen, 1858) was taken at 7 sites between 169 m and 780 m a.s.l. Apatania auricula (Forsslund, 1930) was recorded from two sites, at sea level and at 1150 m a.s.l. This species probably refers to A. zonella (Zetterstedt, 1840). Limnephilus affinis Curtis, 1834 was also taken at two sites, at sea level and at 1150 m a.s.l. L. centralis Curtis, 1834 was taken at three sites from 280 m up to 740 m a.s.l. L. coenosus Curtis, 1834 was taken at one site at 790 m a.s.l. L. extricaetus McLachlan, 1865 was also taken at one site, at sea level. L. stigma Curtis, 1834 was taken at two sites, at 100 m and 240 m a.s.l. Phacopteryx brevipennis (Curtis, 1834) was taken at one site, at 100 m a.s.l. Rhacicolepus alpestris (Kolenati, 1848) was taken at one site at 740 m a.s.l. Potamophylax latipennis (Curtis, 1834) was taken at five sites, from sea level up to 420 m a.s.l. P. nigricornis (Pictet, 1834) was taken at one site, at 540 m
a.s.l. *Micropterna lateralis* (Stephens, 1837) was taken at one site at 540 m a.s.l.

In connection with the regulation of the river system for hydroelectric purposes a limnological study of the river system at Fåbergstølane was performed by The Laboratory for Freshwater Ecology and Inland Fisheries (LFI) University of Bergen in 1982 (Fjellheim & Raddum 1982). Apart from Limnephilidae indet., larvae of eight Trichoptera species were recorded, viz.: *Rhacophila nubila* (Zetterstedt, 1840), *Plectrocnemia conspersa*, *Limnephilus borealis* (Zetterstedt, 1840), *L. centralis*, *L. coenosus*, *L. elegans* Curtis, 1834, *Phacopteryx brevipennis* and *Potamophylax* sp. In later years more thorough studies performed by LFI on the fresh water invertebrates in the Jostedalen have not revealed further species in this restricted area (Fjellheim pers.com.).

Previous to the present study 17 Trichoptera species was recorded from the Jostedalen valley system. The present study adds 9 more species to the list, the number of Trichoptera species now recorded from the valley being 26.

*Stenophylax vibex* has previously not been taken in the Nordic countries. The species is distributed in the Mediterranean area, the Alps, southern part of Germany, France, Belgium, England and Scotland; outside Europe it has also been taken in Iran (Botosaneanu & Malicky 1978, Stroot 1985). The species inhabits streams (e.g. Hickin 1967). The occurrence of *S. vibex* in Jostedalen is very surprising. As no less than 12 specimens were taken during a period of nearly a month, this may indicate that the species has a stable population in Jostedalen. This population seems, however, to be very isolated. During the last two decades large samples of Trichoptera, collected with light traps in a high number of different localities in western Norway, have been identified without proving the presence of this species. Botosaneanu and Malicky (1978) indicate that *S. vibex* has a mainly western distribution in North Europe. This isolated population in the mountainous regions of the inner part of western Norway sustain this. *S. vibex* might be the only Trichoptera species which have a western distribution in Scandinavia. However, the climate in Jostedalen is not a typical atlantic one; the climate is more continental, with less precipitation than most places in western Norway.

In his check-list of Norwegian caddisflies, Brekke (1946) recorded 22 species from the faunistical region inner Sogn og Fjordane. Later major contributions to the Trichoptera fauna of the region have been given by Løken (1966), Andersen (1980), University of Hull (1980) and Fjellheim & Raddum (1982). However, of the species recorded in the present paper, four species, *Anabolia concentrica*, *Limnephilus griseus*, *L. sparsus*, *Hale/us tesselatus*, are not previously recorded from this region. In western Norway *A. concentrica* has only been recorded from outer Hordaland (Brekke 1946). *H. tesselatus* is distributed in eastern Norway and in Trøndelag; the present record is thus the first one from western Norway. The number of species taken in inner Sogn og Fjordane have now reached 40.

Even though the present paper adds some 35% to the species number recorded from the Jostedalen, there ought to be a relatively high number of species still to be recorded in this unique valley system. Most of the Trichoptera species until now recorded from the Jostedalen are species mainly inhabiting lowland areas in western Norway. When comparing with the Trichoptera fauna of the Hardangervidda mountain plateau (Andersen 1979), the almost totally lack of records of alpine fauna elements from Jostedalen is evident. Jostedalsbreen is the largest glacier in continental Europe and one should suspect the area to be inhabited by a comparatively high number of such elements. Information on habitat preferences, altitudinal range etc. of the different Trichoptera species so far taken in the valley is also very scanty.

The river systems in the valley undoubtedly have a very interesting fauna. Studies on the Chironomidae fauna have e.g. led to the description of new species and also a new genus (Schnell & Sæther 1988, Sæther & Schnell 1988). The findings of *S. vibex* indicate that the Trichoptera fauna is worth a more comprehensive study. One must hope that the human impact on the water courses in this unique area, will not be too comprehensive for most of the species to survive.

ACKNOWLEDGEMENTS

We thank The Norwegian Water Resources and Electricity Board for generous economical support during the field work.
REFERENCES


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**Short communications**

**STENOPTILIA VERONICAE KARVONEN (LEPIDOPTERA, PTEROPHORIDAE) NEW TO NORWAY**

LEIF AARVIK AND ANDERS BJØRNSTAD

*Stenoptilia veronicae* Karvonen is reported for the first time in Norway. Drawings of male and female genitalia are published for the first time.

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Anders Bjørnstad, Oppsalstubben 7 B, N-0685 Oslo 6, Norway p.t. P. O. Box 1051, Kigoma, Tanzania

One of us (A.B.) was last summer (July 1988) collecting Lepidoptera in Troms and Finnmark. Among the material there was a plume moth belonging to the genus *Stenoptilia* that did not match any of the known Norwegian species. We were of the opinion that it might be a specimen of *S. veronicae* Karvonen, 1932. However, no material of this species seemed to be available in Norway, and also apparently no drawings of the genitalia has been published. A pair of bona fide *S. veronicae* from Finland collected and identified by V. J. Karvonen was obtained through exchange and dissected. Comparison of the genitalia of the Norwegian specimen, a female, and the Finnish female, showed them to be conspecific.

Karvonen (1932) compared *S. veronicae* with *S. pelidnodactyla* (Stein) and *S. bipunctidactyla* (Scopoli). However, both the morphology of the genitalia and the biology show that *S. veronicae* is

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**Fig. 1—2. Male genitalia of Stenoptilia Hb. - 1. S. pterodactyla L. Genital prep. 1815 L. Aarvik. - 2. S. veronicae Karv. Genital prep. 1817 L. Aarvik. Scale 0.5 mm.**

**Fig. 3—4. Female genitalia of Stenoptilia Hb. - 3. S. veronicae Karv. Genital prep. 1775 L. Aarvik. - 4. S. pterodactyla L. Genital prep. 1816 L. Aarvik. Scale 0.5 mm.**
closely related to *S. pterodactyla* (Linnaeus). The food-plant of the former is *Veronica longifolia* (Karvonen 1932), and that of the latter is *Veronica chamaedrys* (Hannemann 1977). Externally *S. veronicae* differs from *pterodactyla* in having a large discal spot consisting of two confluent dots. In *pterodactyla* the dots are tiny and not confluent. On the average *pterodactyla* is smaller (expanse 20-24 mm) compared with *veronicae* (23-26 mm). The Norwegian specimen of *veronicae*, however, measures only 21 mm. The genitalia of these two species are figured (Figs. 1-4).

The Norwegian specimen was collected in FI, Karasjok: on the bank of Karasjokka river at Halddenjargga, 7 km WSW of Karasjok township (UTM 35WMT353052; EIS 166) 135 m.a.s.l. 14 Jul. 1988, A. Bjørnstad no. 12840. The bank here consisted of large alluvial sandy flats with a rich flora of alpine plants viz. *Astragalus alpinus*, *Gymnadenia conopsea*, *Polygonum viviparum*, *Cerastium alpinum*, *Saxifraga aizoides*, *Thymus serpyllum* ssp. *tanaensis*, *Pedicularis* spp. and *Veronica longifolia*.

Unfortunately there was only time for a brief stop-over at Halddenjargga. It seems to be an interesting locality from a lepidopterological point of view: *Caloplusia hochenwarthi* Hochenwarth was plentiful, and so was *Erebia medusa polaris* Staudinger. Other Lepidoptera taken were *Perizoma minorata* Treitschke, *Epirrhoe alternata* MUller, *Pygmaenafusca* Thunberg and *Polopeustis altensis* Wocke.

Apart from the new Norwegian find, *S. veronicae* has been recorded from northern Sweden (Norrbotten and Torne Lappmark) (Svensson et al. 1987) and almost all over Finland where it is locally common (Karvonen 1932, Kyrki 1978).

ACKNOWLEDGEMENTS

We thank Jaakko Karvonen, Oulu, Finland for sending a male and a female of Finnish *Stenoptilia veronicae*.

REFERENCES


Received 17 Febr. 1989

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**THAUMALEA TRUNCATA EDWARDS 1929 (DIPTERA: THAUMALEIDAE) FOUND AT SANDNESSJØEN, NORTHERN NORWAY**

**ØYVIND HÅLAND**

A thaumaleid midge, *Thaumalea truncata* Edwards, male was captured at Sandnessjøen in Nordland (66°N), by a small stream on sept. 7, 1988. This is the second record from Norway and the northernmost record of this species.

Øyvind Håland, Horvensveien 106, N-8800 Sandnessjøen, Norway.

*Thaumales truncata* Edwards 1929 was described on material from England and the Continent. Material from Norway, collected by E. Strand at Krødsherred, Buskerud, was also studied by Edwards. Krødsherred was until now the northernmost finding-place of this species, at 60°13’N. It has also been found in Sweden, but no further north than at Halmstad in Skåne (Andersson 1977).

On sept. 7, 1988 I captured a male *Th. truncata* by a small stream at Sandnessjøen, Nordland (EIS 117), at 66°N. The stream is not polluted by human activity. It originates in a boggy area, and although the flow may be very small in dry summers it never dries up completely. In the spring spates it may be 40—50 cm deep. I had on several occasions earlier found larvae of *Thaumalea* in this stream.

As shown by Collart (1945) and later by Martynovskyy & Rozkosny (1976), *Th. truncata* is the same species as *Th. tricuspis* Tjeder 1949 (which is not synonymous with *Th. testacea* Ruthe as indicated by Willassen 1987). Collart (1945) also mentions that one individual male might have 2 teeth at the distal end of one dististylus and 3 at the other. This is the case in my specimen.

The specimen, which has been mounted in euparal, is in the author’s collection.

REFERENCES


Received 6 Febr. 1989

THE FIRST RECORD OF THE MOSQUITO COQUILLETTIDIA RICHIARDII (FICALBI) (DIPTERA, CULICIDAE) IN NORWAY

CECILIA L. MORESI AND REIDAR MEHL

The mosquito Coquillettidia richardi (Ficalbi, 1889) is reported for the first time from Norway.

Cecilia L. Moresi and Reidar Mehl, Entomology section, National Institute of Public Health, N-0462 Oslo 4, Norway.

The mosquito Coquillettidia richardi (Ficalbi, 1889) belongs to the tribe Mansoniini in the subfamily Culicinae. Coquillettidia is by some authors regarded as a subgenus of Mansonia. Natvig (1948) in his book on Danish and Fennoscandian mosquitoes used the name Taeniorhynchus richardi for this species.

The tribe Mansoniini inhabits principally tropical and subtropical areas. Only one species, C. richardi, occurs in Europe. Natvig (1948) summarized the records of this species from Denmark, South-west Finland and southern Sweden. Dahl (1977) recorded the species from six provinces in Sweden: Skåne, Öland, Småland, Södermanland, Uppland and Båhuslän.

C. richardi was collected for the first time in Norway by one of us (CM) at Tomb, Råde in Østfold on 2 July 1988. One female was found in a sample of mosquitoes collected for blood analyses. It had just taken a full blood meal from a person. In addition to this species the sample contained: Aedes vexans, Aedes communis and Aedes cantans.

The landscape at the location is rather flat and is situated near the sea. There are open fields, forests with deciduous and coniferous trees, a small stream, and a small pond, rich in vegetation.

A special feature of C. richardi biology is the larva’s unusual method of obtaining air. The larva and pupa do not take air from the surface, as other European mosquitoes, but obtain air from stems and roots of waterplants by piercing them with their specialised siphon and horns (Wesenberg-Lund, 1918, 1921–1922).

From the known range of the species, it was expected to be found also in Norway. Tomb is not far from the nearest locality Bohuslän in Sweden. Probably C. richardi occurs on several other suitable locations in South Norway.

Mehl, Traavik & Wiger (1983) listed 36 mosquito species from Norway. By this report, the number should be adjusted to 37.

We are indebted to G. B. White for confirming the identification of the species.

REFERENCES


Received 12 Jan. 1989

ANA CAMPSIS TEMERELLA (LIENIG & ZELLER, 1846) (LEP., GELECHIIDAE) NEW TO NORWAY

LARS OVE HANSEN & SVEIN SVENDSEN

The gelechiid moth Anacampsis temerella (Lienig & Zeller, 1846) is reported new to Norway. Several specimens were reared from larvae on Salix repens L. at Ogna, Rogaland (RY). Remarks on ecology, distribution and a brief diagnosis of the species are given.

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Svein Svendsen, Sodefjedveien PK 28, Stangenes, N-4639 Kristiansand S, Norway.

During the annual Whitesun meeting 1988 of the Norwegian Entomological Society, an excursion
Anacampsis temerella, scale 5 mm.

was arranged to the sanddunes at RY Hå: Ogna (EIS 3) 21 May. Several larvae were found (leg. L. O. Hansen & S. Svendsen) on Salix repens L. growing on the sanddunes inside the landscape conservation area. Each larva made a web on the leaves of the plant and several buds were attacked on each plant.

The collected larvae finished the S. repens while in captivity, but accepted Salix caprea L. until they pupated. 10 ex. of Anacampsis temerella (Lienig & Zeller 1846) hatched primo June. This is the first Norwegian record of the species. Bradford (1969) mentions S. repens as larval foodplant, Benander (1928) only Salix sp.

The genitalia are figured by Pierce & Metcalfe (1935) but newly emerged specimens can be determined on the wing patterns. Remarkable is the broad black transversal band running across the forewings.

A. temerella is reported from Sweden north to Norrbotten (Nb), Denmark, Finland (Svensson et al. 1987) France (Lerault 1980), England (Bradley 1972) and European USSR (Piskunov 1981). Further distribution in Europe is poorly recorded.

ACKNOWLEDGEMENT

We are indebted to Bengt Å. Bengtson and Ingvar Svensson for the verification of the identification of the species, to Anders Bjørnstad for checking out the english and to Devegg Ruud for taking the photography.

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ECHEMUS ANGUSTIFRONS (WESTRING, 1862) (ARANEÆ, GNAPHOSIDÆ) A NEW SPIDER FOR NORWAY

FINN ERIK KLAUSEN AND TROND ANDERSEN

ABSTRACT

A female of Echemus angustifrons (Westring, 1862) was taken in Moutmarka, Tjøme in Vestfold, SE Norway, in July 1986.


A female of Echemus angustifrons (Westring, 1862) was taken in Moutmarka on the island of Tjøme in Vestfold on 20 July 1986. Moutmarka has an open, coastal landscape with shrubs and meadows. The specimen was taken between stones overgrown with lichens, in an sun-exposed area with bare rocks and moraine deposits.

The species is distributed in Western Europe (Platnick & Shadab 1976). In Sweden it has been recorded from Skåne, Småland, Öland, Gotland, Västergötland and Bohuslän (Lohmander 1942, 1953, Tullgren 1946, Holm 1977). It has been taken under stones or in stone walls (Lohmander 1942, 1953, Holm 1977). The female of E. angustifrons is about 6.4 mm long, with light brown carapace and brownish gray abdomen (Platnick &
Shadab 1976). The egg-cocoons are placed on the underside of stones; they are approximately 8 mm long and contain from 21 to 28 eggs (Holm 1940).

REFERENCES

Received 22 May 1989

FURTHER ADDITIONS TO THE CADDIS FLY FAUNA (TRICHOPTERA) IN VESTFOLD, SE NORWAY
TROND ANDERSEN AND GEIR E. E. SØLI

ABSTRACT
Four species, Oxyethira distinctella McLachlan, 1880, Ceratopsyche nevae (Kolenati, 1858), Hydropsyche siltalai Döhler, 1963 and Agrypnia obsoleta (Hagen, 1864) are recorded for the first time from Vestfold. In addition a new record of Ylodes simulans (Tjeder, 1929) is given.


Brekke (1946) recorded only 1 species, Limnephilus centralis Curtis, 1834, from Vestfold. Later, Økland (1964, 1972), Andersen (1975, 1983) and Andersen & Hansen (1990) have added new species. Totally, 104 Trichoptera species have until now been recorded from Vestfold.

THE SPECIES
Family Hydroptilidae
Oxyethira distinctella McLachlan, 1880

Family Hydropsychidae
Ceratopsyche nevae (Kolenati, 1858)
Hydropsyche siltalai Döhler, 1963

Family Phryganeidae
Agrypnia obsoleta (Hagen, 1864)
Locality: Lardal: Langevatn (UTM:32VNL454785) 24 July 1985 ø. The species is considered as rare in Norway (Aagaard & Hågvar 1987). It was recorded as new to Norway from Fiskevatn in Sør-Varanger (Tobias & Tobias 1971), and has later been taken in Vestfold (Andersen 1975).

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Received 23 June 1989.
CHORTHIPPUS BIGUTTULUS (LINNAEUS 1758) FUNNET I GUDBRANDSDALEN (ON) (ORTHOPTERA: ACRIDIIDAE)

JEAN-FRANÇOIS VOISIN


Forekomsten av Ch. biguttulus i Nord-Fron er ikke så forbauende når en tar i betraktning alle varektevende billeartene som Andersen og Hansen (i trykk) lister fra Gudbrandsdalen. Dette er også tilfelle for mange plantaerter (Gjærevell 1973). Alle kan sannsynligvis anses som relikter fra de postglaciale varmetidene som, på grunn av spesielt gode lokale klimaforhold, har klart å overleve i Gudbrandsdalen mens faunaen generelt trakk seg sørover da klimaet ble kjoligere. Det ville være interessant å finne ut om Ch. biguttulus også finnes på andre, lignende lokaliteter i Gudbrandsdalen og langs Mjøsa. Da jeg i øyeblekk ikke var oppmerksom på funnets interesse, har jeg ikke oppbevart noen eksemplar av Ch. biguttulus fra Nord-Fron, noe som heller ikke var nødvendig, da arten kjennes lett igjen på sine dekkvinger med utvidete kostal- og subkostalfelter (cf Holst 1986).


LITTERATUR


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Received 12 May 1989
Nesten femti år har gått siden en liste over Grønlands insektafla ble publisert. I løpet av denne tiden er det registrert 27 nye arter av Coleoptera fra dette store området, og alle tilgjengelige opplysninger om disse — og 44 andre arter — er nå sammenstilt av Jens Bocher.

Det meste av publikasjonens, eller kanske vi skal si bokens, 100 sider inneholder en fyldig beskrivelse av artene og deres levevis. Forfatteren har hatt med opplysninger om taksonomi, artskjennetegn, variasjon og dynamikk, utbredelse (både lokal og generell), habitat og livssyklus. Artenes utbredelse på Grønland er illustrert ved prikkart. De artene som etter all sannsynlighet er innført med menneskets hjelp, er avbildet med fotografier. Forøvrig er artsbeskrivelsene supplert med ytterligere tegninger, i de fleste tilfeller av både imagines og larver. Artene lar seg derfor lett identifiser. De fire grønlandske Atheta-arterne er til og med tilgodesett med en liten bestemmelsesnøkkel. Skal man være kritisk, er det et lite minus at det under beskrivelsen av artene ikke er henvist til tegningene. Dette er imidlertid ingen vesentlig innvending, siden illustrasjonene som regel er plassert i direkte tilknytning til omtalen av de enkelte artene.

Teksten omfatter en lang rekke opplysninger (med referanser) om artenes biologi, også i andre deler av deres utbredelsesområde. Denne komplisjonen legger dermed grunnlaget for bokens generelle del, hvor ulike sider ved den grønlandske billefaunaens økologi og zoogeografi tas opp til diskusjon. Her må det bemerkes at konklusjonene m.h.t. forskjeller i artenes dominans i ulike habitat virker noe bombatisk, siden diskusjonen baseres på fallfellefangster. Selv om forfatteren tar visse forbehold m.h.t. metodikkens svakhet, har f.eks. Nebria-, Otiorhynchus- og Coccinella-arterne så ulikk atferd at wangstallene neppe gir grunnlag for vurderinger av artenes relative dominans.


Dagfinn Refseth


Dette er den tredje sommerflugtboka i serien «Fauna Bøger» og den andre som behandler en microlepidopterfamilie. (Tidligere har målerne og pyralidene blitt behandlet). I likhet med de fleste andre småsommerflugt familier er oecophoridene en gruppe det har vært vanskelig å arbeide med pga. mangel på litteratur. Derfor dekker Palms bok et sterkt følt behov.

Det faller naturlig å sammenligne boka med de to forgjengerne i serien, spesielt med pyralideboka. Etter min mening er boka om Oecophoridae klart bedre enn sine forgjengere. Det skyldes først og fremst at de fotografiske fargeplanskjene er av bedre kvalitet. Bildene er meget skarpe, og det er vist i tilstrekkelig forstørrelse (2x). En liten innvending har jeg når det gjelder fargene: Mange oecophorider har en tydelig rødlig fargetone, men denne rødfargen kommer for dårlig fram.

En forbedring er at det det finnes nøkler til slekter og til dels også til arter og artsgrupper. Dessuten gis det en omtale og diagnose av hver slekt.

I den generelle delen av boka, som også er rikt illustrert, finner vi bl.a. følgende kapitler: Diagnosticering; Zoogeografi; Imago — det voksne insekt; Æg, larve og puppe; Habitat; Økonomisk betydning; Udbredelsesforhold i Nordeuropa; Klassifikasjon.

Det spesielle delen innledes med en nøkkel til de fem underfamilien. Under beskrivelsen av hver art finnes følgende punkter: Kendetegn; Udbredelse; Bionomi og til slutt et engelsk summary. Jeg vil spesielt framheve punktet «Udbredelse». Der har forfatteren gjort et meget stort arbeid for å skaffe ajourførte data, og utbredelsen i hele den nordlige delen av Europa er beskrevet særdeles grundig.

Mange oecophorider er lette å klekke — noen arter finnes nesten utelukkende som larver — og en samlte vil finne mye nyttig stoff under punktet «Bionomi».

Den store slekten Agonopterix — 37 arter i Nordeuropa — har forfatteren delt inn i fem artsgrupper. Denne nye inndelingen er basert både på utbredelse og morfologiske og biologiske karakterer. Umiddelbart virker inndelingen både logisk og hen­

skitsmessig. I alle fall gjør den det lettere å få oversikt over denne dels vanskelige slekten.

Boka avsluttes med en meget omfattende litteratur­ liste med henvisning til øvrige kilder samt et register.

Det er få ting å sette fingeren på i boka, men enkelte av genialtografiene er dessverre blitt for mørke. Det gjelder fig. 107, 165 og 166. Men ved en helhetsvurdering av boka blir de nevnte negative punktene bare bagateller. Boka vil være et standardverk i årtier framover, og er absolutt unnuværlig for alle som interesserer seg for nord­
og mellom europeiske micros.

L. Aarvik
GUIDE TO AUTHORS.

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Underline all generic and species names. Approximate position of figures and tables in the text should be indicated in the margin. All Acknowledgements should be given under a single heading in the end of the text, immediately before the references.

Figures and Tables. Send two copies. All illustrations should be identified lightly with the author's name and the figure number.

The placing of figures and tables should be indicated in the margin. If the article is in Norwegian, the figures and tables should have both Norwegian and English text. Write Table and Fig. both in running text and over/under tables and figures.

Take care that all text in the figures is large enough for a format of column or page width, c. 7 or 14 cm. Never let odd words or numbers go outside the breadth of other elements of the figure. Figures with cross-hatching (bar charts) must not be drawn so large that it is difficult to judge the result of a considerable size reduction. When a dense cross-hatching is greatly reduced it will coalesce and thereby lead to confusion with an entirely black area. Choose contrasting patterns. Authors with access to a machine able to type Latin names in italics should utilize this in all tables instead of underlining. We will then be more free to photograph tables without the underlining of Latin names detracting from the appearance of the tables.

Nomenclature. The first time a binomen is used in the text the name of its author should be included. Author names should be written in full, except l. for Linnaeus. Dates can be included when considered necessary, i.e. Rhyacophila nubila (Zetterstedt, 1840).

References. In the text: Black (1979), Black & Blue (1973:100), or «as noted by Green (1978) and Black (1979)». Multiple references should be given in chronological order, i.e. (Black & Blue 1973, Green 1976, 1979, Black 1978).

List of references are to be unnumbered and in international alphabetical order (i.e. Å = AA, Æ and Å = Ae, Ø and Õ = Æø). Titles of journals should be abbreviated according to the World List of Scientific Periodicals. Do not refer to papers «in prep.» among the references.

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