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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

Meidell, B. A. & Stol, I. 1990: Distribution of *Nemastoma bimaculatum* (Fabricius, 1775) and *N. lugubre* (Müller, 1776) (Opiliones) in Norway, with a discussion on «east west pair of species». *Fauna norv. Ser. B, 37:* 1—8.

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.

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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.* Roewer (1914) separated *N. lugubre* (Müller) into two subspecies *N. lugubre bimaculatum* (Fabricius) and *N. lugubre unicolor* Roewer, a distinction that dominated the litterature 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 (MRY) 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 (Kongsberg, BØ), and Dønna 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 müNN» (most probably Skjolden, SFI).

Concerning the list of synonyms given by Gruber & Martens (1968), the references to Fabricius (1781) and Linnaeus (=C.v.Linné) (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,

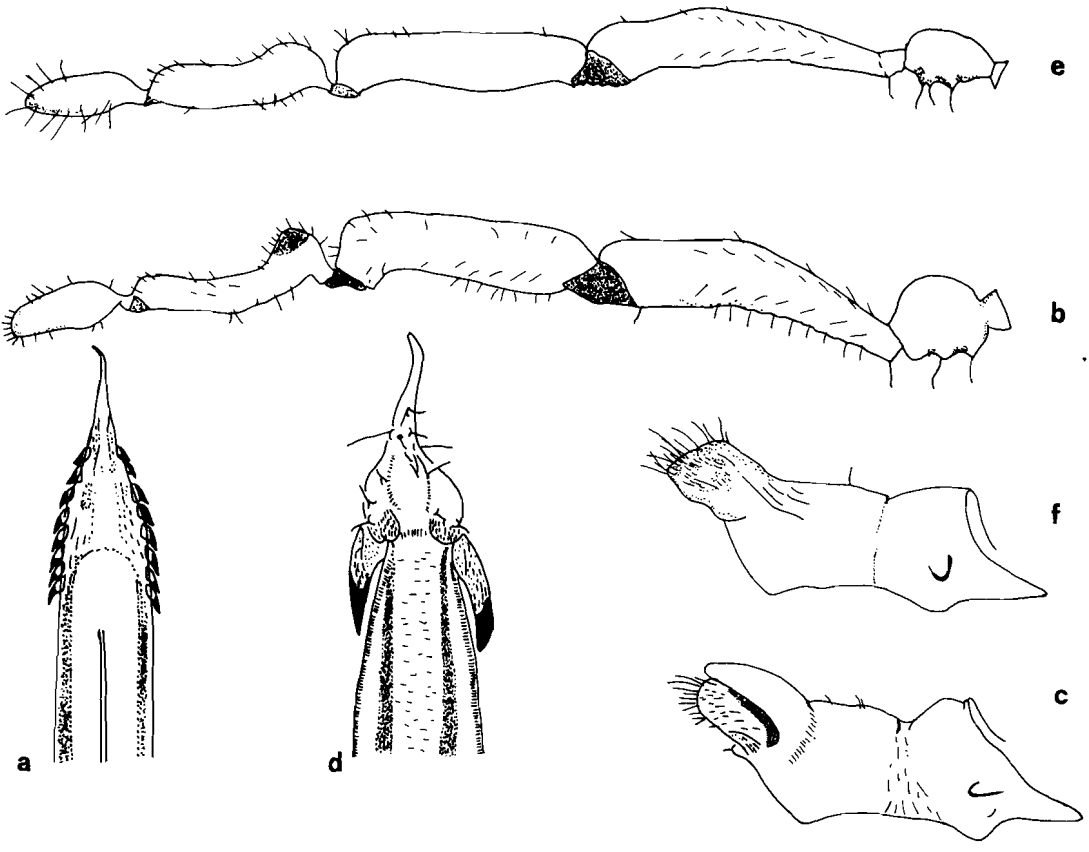

Fig. 1. Male characters. *N. bimaculatum* — a) penis, b) pedipalp, c) cheliceral apophysis. *N. lugubre* — d) penis, e) pedipalp, f) cheliceral apophysis. From Gruber & Martens (1968).

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 Dolmen; 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.

Province initials follow K. A. Økland (1981).

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

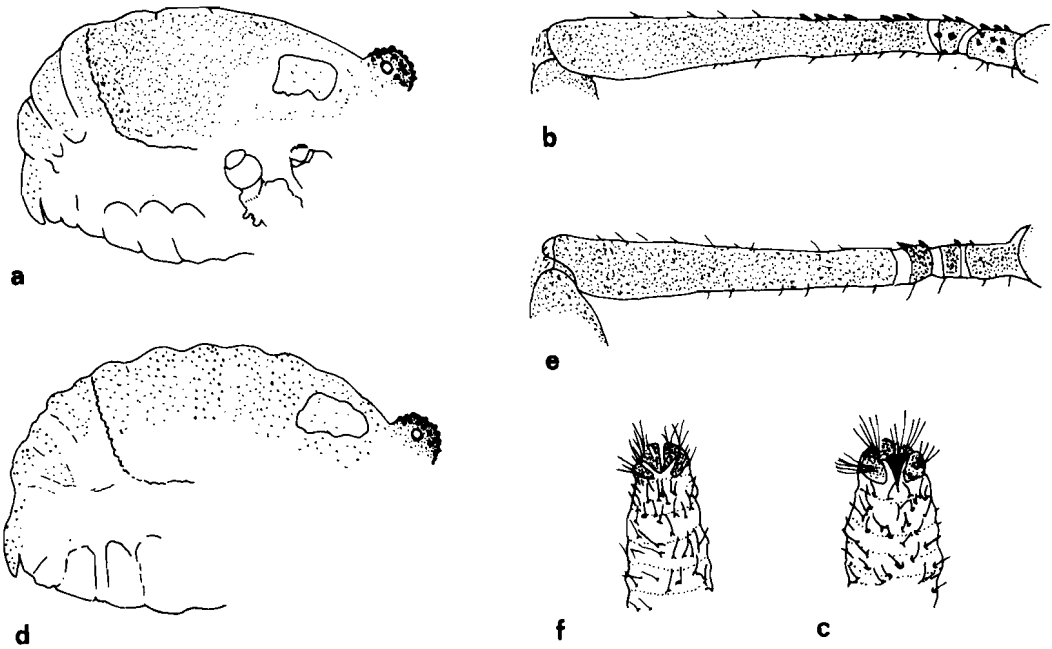

Fig. 2. Female characters. *N. bimaculatum* — a) body form, b) fourth femur laterally, c) ovipositor. *N. lugubre* — d) body, form, e) fourth femur laterally, f) ovipositor.

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

VAY, Søgne: Søgne 9 July—7 Nov. 1987 1 male + 1 female; Mandal: Kige 9 July—7 Nov. 1987 12 males + 9 females; Lyngdal: Nyland 9 July—7 Nov. 1987 12 males + 5 females. Flekkefjord: Fjellså 9 July—31 Oct. 1987 3 males + 2 females. VAI, Kvinesdal: Åse 9 July—7 Nov. 1987 3 males + 3 females; Sirdal: Tonstad 3 July—24 Oct. 1987 10 males + 5 females.

RY, Sokndal: Hauge, Åvendal 10 July—31 Oct. 1987 12 males + 20 females; Eigersund: Tengs 10 July—31 Oct. 1987 1 female; Hå: Vettaland 17 June 1976 3 males JM; Bjerkreim: Vikeså 3 July—24 Oct. 1987 2 males + 2 females; Time: Mossige 17 June 1976 1 female JM; Gjesdal: Byrkjedal 3 July—24 Oct. 1987 3 males + 8 females; Sandnes: Høyland 16 June 1976 1 female JM; Stavanger: Golfbanen 16 June 1976 3 males + 2 females JM, Gausel 1976—77 65 males + 38 females; Strand: Tau 1976—77 50 males + 26 females; Tysvær: Nedstrand 31 July 1974 1 male + 1 female HMS; Bokn: Håland 1976—77 48 males + 45 females, Hatlefjell 1976—77 6 males + 13 females, Vatnaland 1976—77 7 males + 3 females; Karmøy: Avaldsnes 1976—77 3 males + 5 females, Stol 1976—77 12 males + 9 females, Ferkingstad 1976—77 18 males + 28 females, Blikshavn 1976—77 19 males + 15 females + 10 juv, Skitnadal 1976—77 7 males + 4 females, Sandvatn 1976—77 7 males + 6 females + 15 juv., 27 June—29 Nov. 1987 1 male + 7 females, Stiklene 1976—77 2 males + 1 female. RI, Sauda: Sauda 24 July 1974 2 males + 6 females HMS.

HOY, Bømlo: Nautøy 19 May 1968 1 male + 2 females TS. Stord: Storsøy 1 May 1965—30 May 1967 37 males + 53 females + 1 juv. B. Kvamme; Tysnes: Ånuglo 17 Sept. 1953 1 female HTL, 4 June 1967 1 female HK; Os: Lepsøy 7 May 1964 1 female HK. Bergen, Store Milde, v/Geitahalsen 1 May 1965 1 male + 1 female L. G. Jensen, Espeland, Biologisk stasjon 23 May 1951—16 Jan. 1952 38 males + 29 females A. Tjønneland, Fantoft 7 May 1964 2 males + 1 female, 14 May 1964 1 male + 1 female HK, 1976—77 29 males + 25 females, Alvøen 1976—77 21 males + 16 females, Blekenberg 24 April 1943 1 male + 1 female HTL, Jonas Liesvei 1976—77 15 males + 40 females. HOI, Kvinnherad: Kvitbergsvatnet 16 Sept. 1972 4 males HK, Melsdalen 11 June 1943 1 female HTL, Rosendal 27 Aug. 1968 1 male, 24 Aug. 1969 1 female, 26 Aug. 1969 1 male + 5 females, 24 May 1970 2 males + 1 female, 2 May 1974 2 males, 22 May 1974 2 males, 1 May 1975 2 females, 10 May 1975 1 female fieldcourses, Uskedalen 11 June 1965 2 females HK, Varaldsøy, Vardheiane 25 May 1978 1 female fieldcourse; Jondal: Jondal 6 May 1957 6 males + 3 females HTL; Kvam: Fosse 4 July 1967 1 female TS, Porsmyr 8 May 1957 1 female HTL; Ullensvang: Børve 29 Aug. 1944 1 female, 16 April 1945 2 females HTL.

SFI, Aurland: Kvammadal 14 Aug. 1965 2 females, Vassbygda 15 Aug. 1965 1 female, Vatnahalsen 16 Aug. 1965 2 males + 1 female HK.

MRI, Surnadal: Skei 7 July—11 Oct. 1987 20 males + 17 females.

STI, Rennebu: Gorset 7 July—11 Oct. 1987 1 female; Midtre Gauldal; Støren 28 Aug. —16 Oct. 1977 2 males + 5 females, Reitstøa 7 July—11 Oct. 1987 1 female; Melhus: Flå 7 July—11 Oct. 1987 22 males + 23 females; Trondheim: Byneset, Mule 25 Aug. 1972 1 female, Langlo 1972 1 male + 1 female, Myrsund 1972 2 males + 2 females DD. STY, Snillfjord: Snillfjord 7 July—11 Oct. 1987 2 males + 2 females.

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

Nemastoma lugubre

VAY, Lyngdal: Nyland 9 July—7 Nov. 1987 5 males + 24 females; Mandal: Kige 9 July—7 Nov. 1987 1 male + 1 female; Søgne: Søgne 9 July—7 Nov. 1987 5 males + 10 females; Kristiansand: Mosby 19 Aug.—11 Oct. 1977 2 males, Randesund 4 July—7 Nov. 1987 6 males + 4 females.

VAI, Kvinesdal: Kvinlog 3 July—24 Oct. 1987 7 males + 5 females; Audnedal: Sveindal 3 July—24 Oct. 1987 1 male + 1 female.

AAY, Grimstad: Eide 4 July—28 Oct. 1987 4 males + 33 females; Froland: Hynnekleiv 4 July—28 Oct. 1987 3 males + 2 females; Moland: Flosta 4 July—28 Oct. 1987 10 males + 14 females; Risør: Risør 4 July—28 Oct. 1987 3 males + 10 females. AAI, Evje og

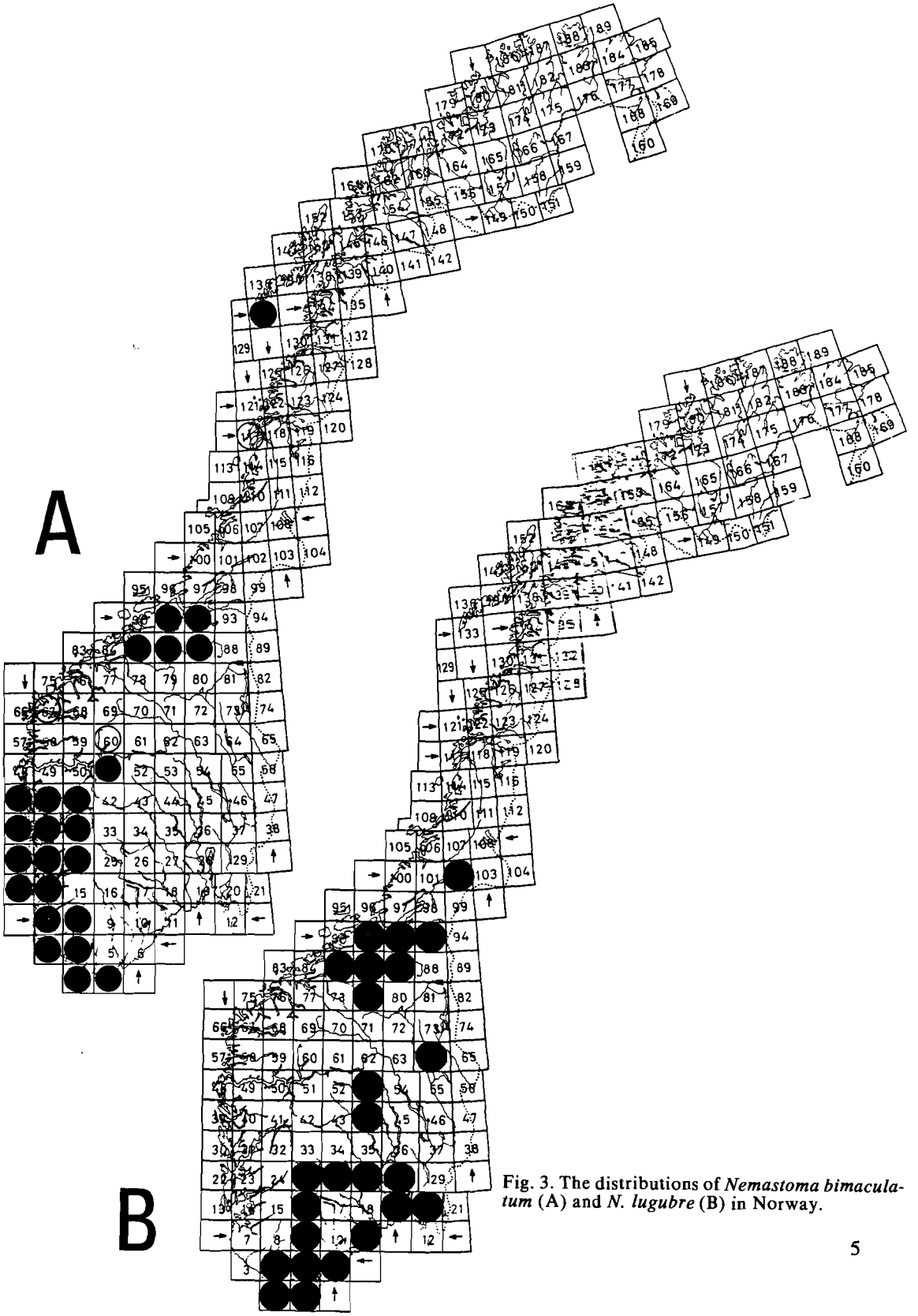

Fig. 3. The distributions of *Nemastoma bimaculatum* (A) and *N. lugubre* (B) in Norway.

Hornnes: Evje 3 July—24 Oct. 1987 9 males + 4 females; Bygland: Ose 5 July—9 Oct. 1987 1 male + 1 female; Bykle: Bykle 5 July—9 Oct. 1987 1 male.

TEI, Vinje: Edland 5 July—9 Oct. 1987 2 males + 1 female; Tinn: Rjukan 5 July—9 Oct. 1987 5 females.

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. Birkelid.

Ø, Borge: Torsnes 16 July 1974 1 male F. E. Klausen: Halden: Tistedalen 22 Aug.—14 Oct. 1977 3 males + 6 females.

OS, Sør-Aurdal: Vassfaret 2 Aug. 1972 1 male R. Wiger; Nord-Aurdal: Åbjør 6 July—10 Oct. 1987 3 males + 4 females.

HEN, Stor-Elvdal: Koppang 25 Aug.—15 Oct. 1977 7 males + 6 females.

MRI, Surnadal: Skei 7 July—11 Oct. 1987 25 males + 20 females; Rindal: Dalsegga 20 June 1972 17 males + 17 females DD.

STI, Oppdal: Oppdal 6 July—10 Oct. 1987 3 males + 4 females; Rennebu: Berkåk 6 July—10 Oct. 1987 4 males + 4 females, Gorset 7 July—11 Oct. 1987 5 females; Midtre Gauldal: Støren 10 Aug. 1972 8 females DD, 28 Aug.—16 Oct. 1977 17 males + 19 females, Reitstøa 7 July—11 Oct. 1987 7 males + 5 females; Melhus: Flå 7 July—11 Oct. 1987 14 males + 22 females; Orkdal: Orkdal 1972 14 males + 6 females; Trondheim: Byneset, Mule 25 Aug. 1972 1 female, Langlo 1972 7 males + 4 females, Myrsund 1972 3 females; Selbu: Selbu 1972 2 males + 3 females DD. NTI, Snåsa: Snåsa 3 July 1972 3 males + 6 females DD.

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

MRI, Surnadal: Skei.

STI, Rennebu: 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-

ught 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 apposed 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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Contribution to the knowledge of the Norwegian Lepidoptera III

LEIF AARVIK

Aarvik, L. 1989. Contribution to the knowledge of the Norwegian Lepidoptera III. *Fauna norv. Ser. B, 37:* 9—12.

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.

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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

Incurvaria circulella (Zetterstedt, 1839) FØ, Sør-Varanger: Ellenvann (EIS 160) ♂ 3 Jul. 1966 R. Mehl leg. ZMO coll. This is the second Norwegian record. Previously recorded from FI, Alta: Grønnåsen (as «Grönnessan») (EIS 165) (Laasonen et al. 1981).

Psychidae

Dahlica charlottae (Meier, 1957) BØ, Hurum: Filtvet (EIS 28) ♂ 9 May 1985 F. Midtgaard leg. L. Aarvik coll. Previously single records from NSI, Saltdal and from HES, Eidskog (Opheim & Fjeldså 1983).

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).

Nemapogon wolffiella Karsholt & Nielsen, 1976 AK, Asker: Heggedal (EIS 28) ♂ 7 Aug. 1977 K. Berggren leg. & coll.; AK, Ås: Nesset (EIS 28) ♂ 3—7 Jun. 1984 L. Aarvik leg. & coll. Previous record from HOI, Eidfjord: Hjølme (EIS 32) (Opheim & Fjeldså 1983).

Gracillariidae

Sauterina hofmanniella (Schleich, 1867) AK, Bærum: Ostøya (EIS 28) 1 ex 31 May 1986; AK, Frogn: Hallangen (EIS 28) 1 ex 28 May 1988; AK, Ås: Årungen (EIS 28) 9 ex 26 May 1984 L. Aarvik leg. & coll.

Previous records from VAY (Opheim & Fjeldså 1983) and VE, Larvik: Roppestad (EIS 19) (Borgersen et al. 1984).

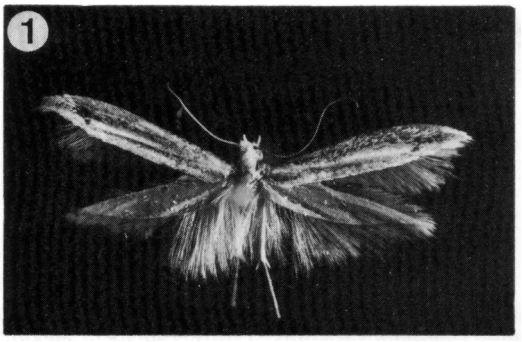

Fig. 1. *Euhyponomeutoides ribesiella* Joan. Specimen from Rollag.

Yponomeutidae

Euhyponomeutoides ribesiella (Joannis, 1900) (Fig. 1) AK, Ås: Årungen (EIS 28) ♂ 6—8 Oct. 1988 S. A. Bakke leg. & coll.; ON, Lom: Lom (EIS 70) ♂ 17 Sept. 1957 C. F. Lühr leg. VSM coll; BØ, Drammen: Underlia (EIS 28) ♀ 13 May 1988 Y. Berg leg. & coll; BV, Rollag: Rollag stasjon (EIS 35) ♀ 8 May 1983, ♀ 12 May 1983, ♀ 12 May 1984 B. A. Sagvolden leg., L. Aarvik, B. A. Sagvolden, S. Svendsen coll.

This species is new to Norway.

In accordance with an unpublished manuscript by J. Kyrki (Varis et al. 1987) *E. ribesiella* and *E. albithoracellus* Gaj, 1954 (= *rufella* Tengström, 1848) are allocated to a single genus, *Euhyponomeutoides* Gaj. Previously they were included in *Nordmaniana* Friese and *Kessleria* Nowicki respectively. *E. ribesiella* and *E. albithoracellus* are the only species of the genus. Both feed on *Ribes*.

The forewings of *albithoracellus* are plain brownish red, and head and thorax are white. The forewing of *ribesiella* varies from light reddish brown to pale yellow; it has a dark edged longitudinal line. Head and thorax concolorous with forewing. *E. ribesiella* is the largest of the two species, expanse 18—19 mm; the expanse of *albithoracellus* is 15—16 mm. The genitalia of both species are figured by Hannemann (1977).

In Sweden *ribesiella* is known from seven districts from Östergötland to Västerbotten (Svensson et al. 1987). In Finland known from most districts north to Ostrobottnia borealis northern part (Kyrki 1978).

Otherwise in DDR, BRD and S. France (Hannemann 1977).

The larva of *ribesiella* feeds on the leaves of various *Ribes* species in July and August. It hibernates as imago.

Atemelia torquatella (Lienig & Zeller, 1846) AK, Bærum: Kjaglidalen (EIS 28) ♂ 12 Jun. 1988; HES, Elverum: Løkting (EIS 55) ♂ 16 Jun. 1979 L. Aarvik leg. & coll. Previous record from ON, Dovre: Faksfall (EIS 71) (Opheim 1982).

Oecophoridae

Agonopterix astrantiae (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

Elachista elegans Frey, 1859 AK, Ås: Nesset (EIS 28) ♂ 14 Jul. 1986 L. Aarvik leg. & coll. New to Norway. In Sweden known from seven provinces north to Gästrikland (Svensson et al. 1987), in Finland from five southern districts (Kyrki 1978). Otherwise in Central Europe except Britain and Denmark (Traugott-Olsen & Nielsen 1977).

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

Scythris noricella (Zeller, 1843) AK, Ås: Ås (EIS 28) ♂ 12 Aug. 1984 L. Aarvik leg. & coll. In Norway previously recorded from OS, Gjøvik: Rambekk (EIS 45) (Aarvik 1983).

Gelechiidae

Teleiodes scriptella (Hübner, 1796) AK, Frogn: Hallangen (EIS 28) ♂ 3 Jul. 1987, ♂ 28 May 1988 L. Aarvik leg. & coll.

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

Phycitodes binaevella (Hübner, 1813) AK, Asker (EIS 28) ♂ 16 Aug. 1963 C. F. Lühr leg. VSM coll. New to Norway. In Sweden recorded north to Ångermanland (Svensson et al. 1987), all over S. Finland (Kyrki 1978). Common and widespread in Denmark. Otherwise throughout Europe and N. Africa to Afghanistan (Palm 1986).

Wings and genitalia are figured by Palm (1986).

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

Catoptria lythargyrella (Hübner, 1796) Ø, Råde: N. Sletter (EIS 19) ♂ 29 Jul. 1985 L. Aarvik leg. & coll. Previously recorded from VE, Tjøme: Moutmarka (EIS 19) (Opheim 1982).

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 Västergötland (Svensson et al. 1987), in Finland from the four southernmost provinces and Ostrobottnia 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).

Eudonia pallida (Curtis, 1827) HOI, Jondal: Herand (EIS 32) 2 ♂ 8—10 Jul. 1985 L. Aarvik leg. & coll. Previously recorded from VE, Tjøme: Mostranda (EIS 19) (Opheim 1975).

Ostrinia quadripunctalis (Denis & Schiffermüller, 1775) AK, Bærum: Ostøya (EIS 28) 1 ex 14 Jun. 1987 A. Bjørnstad leg. & coll., 1 ex 4 Jun. 1988 M. Falck leg. K. Myhr coll., 7 ex L. Aarvik leg. & coll. Previously a single male has been collected at AK, Frogn: Håøya (EIS 28) (Aarvik & Midtgaard 1986). The present records confirm that *O. quadripunctalis* is resident in Norway.

Ostrinia nubilalis (Hübner, 1796) VAY, Søgne (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).

Eupithecia egenaria (Herrich-Schäffer, 1848) AK, Bærum: Ostøya (EIS 28) ♂ 15 Jun. 1985; AK, Frogn: Hallangen (EIS 28) ♂ 28 May 1988 L. Aarvik leg. & coll. Previous records from Ø, Moss: Jeløy (EIS 19) and VAY, Kristiansand (EIS 2) (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 *chamomillae* was subsequently confirmed by dissection.

C. chamomillae 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 (Bretherton et al. 1983).

This species can be distinguished from the other Nordic grey *Cucullia* species by having the black veins in the forewing 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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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

Andersen, T., Ligaard, S., Pedersen, T. & Søli, G. E. E. 1990. Pitfall catches of Carabidae and Staphylinidae (Coleoptera) in a temporarily protected forest area on the Eidanger peninsula, Telemark, SE Norway. *Fauna norv. Ser. B. 37:* 13—22.

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 Staphylinidae 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-

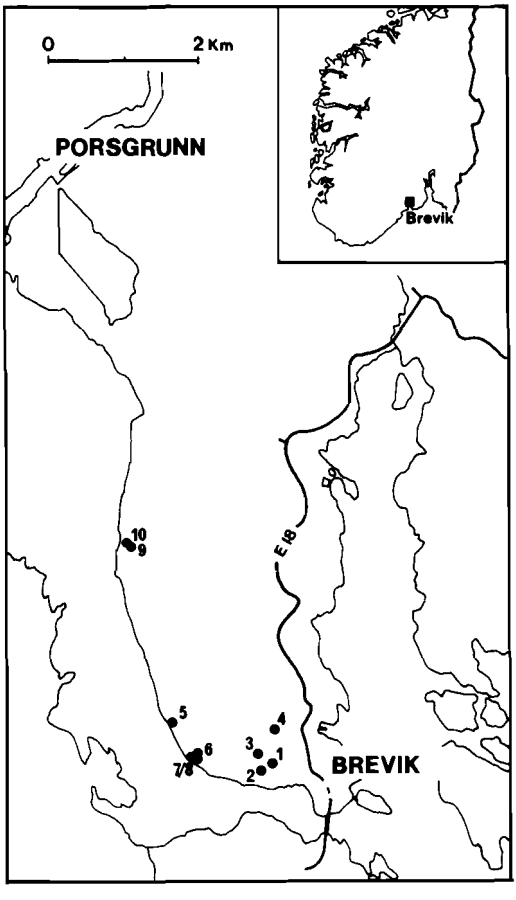

Fig. 1. Map of the Eidanger peninsula, Southeast Telemark, showing the exact position of the localities.

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 (Localition: 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 basiphilous pine forest. A humid stand of ash (*Fraxinus excelsior)* with *Equisetum hyemale* in the field layer, is forming another interesting vegetation type.

Basiphilous 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 assiciations within the area, but they were also intended to reflect the variation within the basiphilous pine forest and the thermophilous deciduous forest. Five trapping sites covered the basiphilous 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.

Loc.	Type	Humidity/exposure	Vegetation	Remarks
1	Basiophilous pine forest	Dry Sunexposed	Some shrubs of hazel *(Corylus aellana)* Ground layer sparsely developed	Large ant hills (*Formica rufa*- group)
2	Basiophilous pine forest	Medium Partly shady	Several deciduous trees Ground layer rich in herbs and grasses	Two traps situated close to deacaying tree trunks
3	Basiophilous pine forest	Dry Sunexposed	Some juniper *(Juniperus communis)* Ground layer mainly grasses pine trunk.	Ant hills (*F. rufa*- group) Two traps situated close to a decaying
4	Equiseto-Fraxinetum association	High Shady	Field layer entirely *Equisetum hyemale* Ground covered by mosses	Descending slopes towards small stagnant pond Small rodents and shrews frequent
5	Forest rim	Moist Sunexposed	Mixed forest Field layer dominated by herbs	Two traps situated close to a decaying pine trunk
6	Forest rim	Medium Partly shady	Mixed forest Shrubs of hazel *(C. avellana)* Ground layer sparsely developed	
7/8	Thermophilous deciduous forest	Medium Partly shady	Field layer sparsely developed	Two traps at the base of a large lime One trap close to decaying lime trunk
9	Thermophilous deciduous forest	Medium Partly shady	Some spruce and pine Field layer sparsely developed	Ant hills (*F. rufa*- group) Traps situated along a small brooklet
10	Thermophilous deciduous forest	Medium Sunexposed	Field layer with some shrubs *(Rosa)* Ground layer rich in herbs and grasses	Traps at the base of large elms Agricultural land surround the locality Small brooklet about 50 m away

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% formaldehyd 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. loc. 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.

SPECIES	LOCALITY								
	1	2	3	4	5	6	7/8	9	10
Carabus nemoralis Müller, 1764	-	1	1	3	7	4	1	19	18
C. hortensis Linnaeus, 1758	-	2	8	17	51	176	110	67	72
C. viclaceus Linnaeus, 1758	-	3	-	1	3	-	1	1	-
C. coriaceus Linnaeus, 1758	-	-	2	1	2	2	2	1	21
Cychrus caraboides (Linnaeus, 1758)	-	-	-	-	-	-	-	3	4
Leistus ferrugineus (Linnaeus, 1758)	-	-	-	2	-	2	-	1	1
Notiophilus aquaticus (Linnaeus, 1758)	-	-	-	-	-	-	-	-	1
N. biguttatus (Fabricius, 1779)	-	2	1	-	1	4	3	-	-
Loricera pilicornis (Fabricius, 1775)	-	-	-	1	-	-	-	1	-
Patrobus atrorufus (Ström, 1768)	-	-	-	1	16	2	-	48	11
Trechus secalis (Paykull, 1790)	-	-	-	-	2	-	-	-	-
Bembidion lampros (Herbst, 1784)	-	1	1	-	-	-	-	-	-
Pterostichus oblongopunctatus (Fabricius, 1787)	-	24	3	2	25	45	1	37	65
P. niger (Schaller, 1783)	-	-	-	-	-	-	-	65	96
P. melanarius (Illiger, 1798)	-	72	2	6	51	99	1	11	124
P. nigrita (Paykull, 1790)	-	-	-	-	-	-	-	-	1
P. strenuus (Panzer, 1797)	1	9	2	1	1	1	-	3	4
P. diligens (Sturm, 1824)	-	-	-	-	-	-	-	1	-
Abax parallelepipedus (Piller & Mitterpacher, 1783)	98	1563	423	606	1340	2150	5738	244	729
Agonum assimile (Paykull, 1790)	-	-	-	16	-	-	-	-	19
Amara brunnea (Gyllenhal, 1810)	-	-	-	-	-	1	-	-	-
Harpalus latus (Linnaeus, 1758)	-	1	-	-	-	-	-	-	4
H. quadripunctatus Dejean, 1829	-	4	-	-	-	-	-	-	2
Badister bullatus (Schrank, 1798)	-	-	-	-	-	-	4	-	-
Dromius notatus Stephens, 1827	-	-	1	-	-	-	1	-	-

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 *Agonum 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 does also occur 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, 1787) was taken in all localities, except locality 1. The species ranged third in locality 2, 3 and 5. *P. oblongopunctatus* is an eurytopic species, occuring 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-Fraxinetum 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 speciemens 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 Frierflauene 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.

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

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 Sør-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 tricolor* (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, *Quedius limbatus* (Heer, 1834) with 6.3% and *Othius 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, *Quedius 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 *Quedius 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. tricolor* 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. tricolor,* 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.

Quedius 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.

Quedius molochnus (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 (Fabricius, 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 indicate that the species ought to be consideres 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 (Bjørndalen 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, Søli 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.

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

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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.

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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

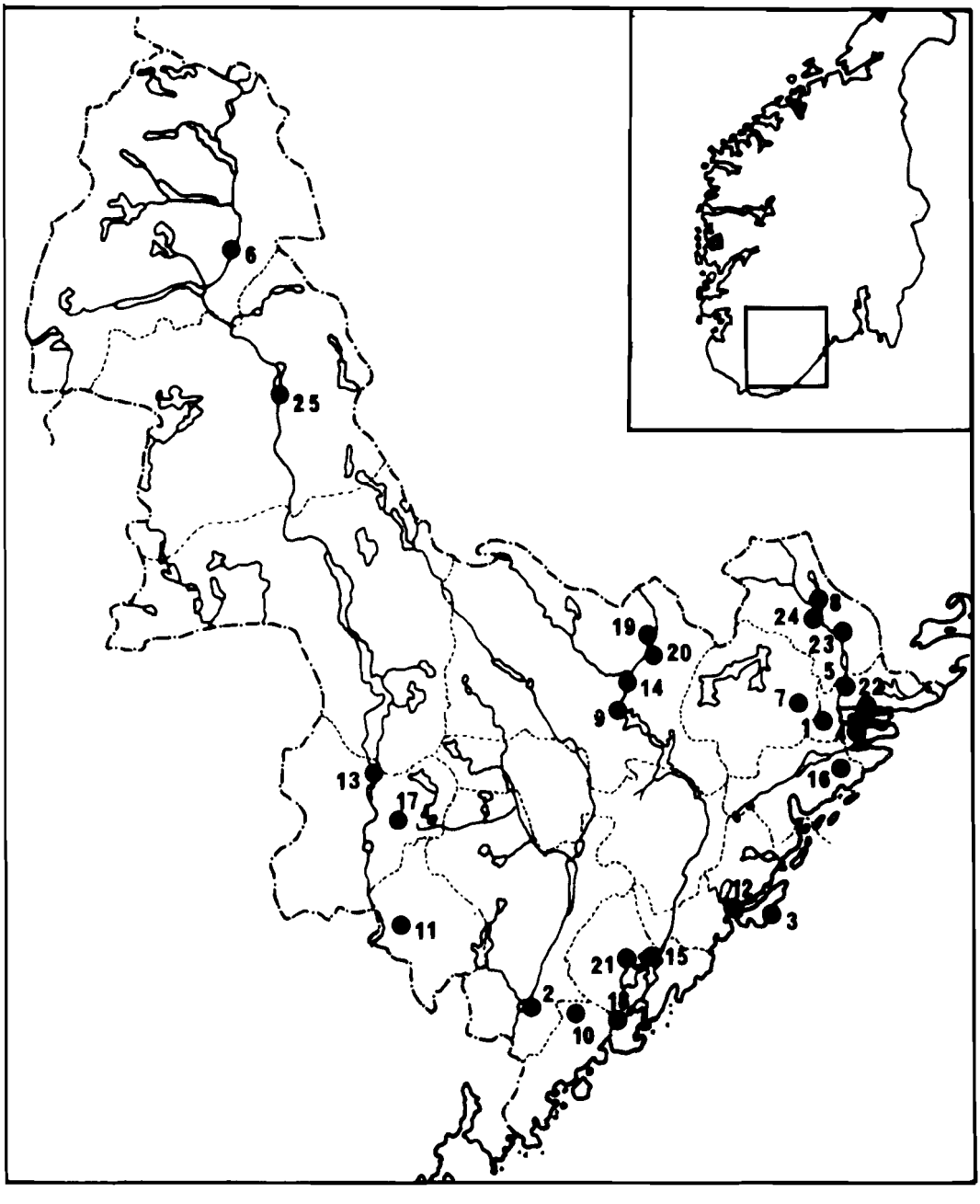

Fig. 1. Localities in outer and inner Aust-Agder; the numbers refer to the locality numbers in table 1.

Table 1. Localities in outer and inner Aust-Agder, with UTM- and EIS-reference.

No.	LOCALITY	REGION	MUNICIPALITY	UTM (32V)	EIS
1	Akland	AAY	Risør	NL023096	11
2	Birkeland	AAY	Birkenes	MK5565	6
3	Bjelland	AAY	Tromøy	MK9379	6
4	Bossvik	AAY	Risør	NL0608	11
5	Brøbergvannet	AAY	Risør	NL050149	11
6	Byklestøylane	AAI	Bykle	ML087845	16
7	Ekksjø	AAY	Vegårdshei	ML985127	10
8	Eskeland	AAY	Gjerstad	NL018280	11
9	Gjermundsnes	AAI	Åmli	ML695116	10
10	Grimenes	AAY	Lillesand	MK618648	6
11	Grossås	AAY	Iveland	MK330807	5
12	Hasselåsen	AAY	Arendal	MK871810	6
13	Kleivvollen	AAI	Bygland	ML3103	9
14	Krossbekk	AAI	Åmli	ML738208	10
15	Kvernhusmoen	AAY	Grimstad	MK7274	6
16	Laget	AAY	Tvedestrand	NL0403	11
17	Mitting	AAI	Evje og Hornnes	MK352939	5
18	Reddalsvann	AAY	Grimstad	MK689657	6
19	Sandåna	AAI	Åmli	ML751224	10
20	Sjødiplane	AAI	Åmli	ML7430	10
21	Skiftenes	AAY	Grimstad	MK702747	6
22	Stamsøykilen	AAY	Risør	NL078124	11
23	Sundebru	AAY	Gjerstad	NL049227	11
24	Ulltveit	AAY	Gjerstad	NL009262	11
25	Valle	AAI	Valle	ML164637	16

along lakes and rivers. Most of the material has been taken by the authors, but some specimens taken by L. Aarvik, 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 consideres 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: Gjermundsnes. VAY, Mandal: Holum, Stoveland; Søgne: Kvernhusvannet, Østerhus; Marnardal: Breland.

Family Glossosomatidae

Agapetus ochripes Curtis, 1834. VAY, Mandal: Stoveland.

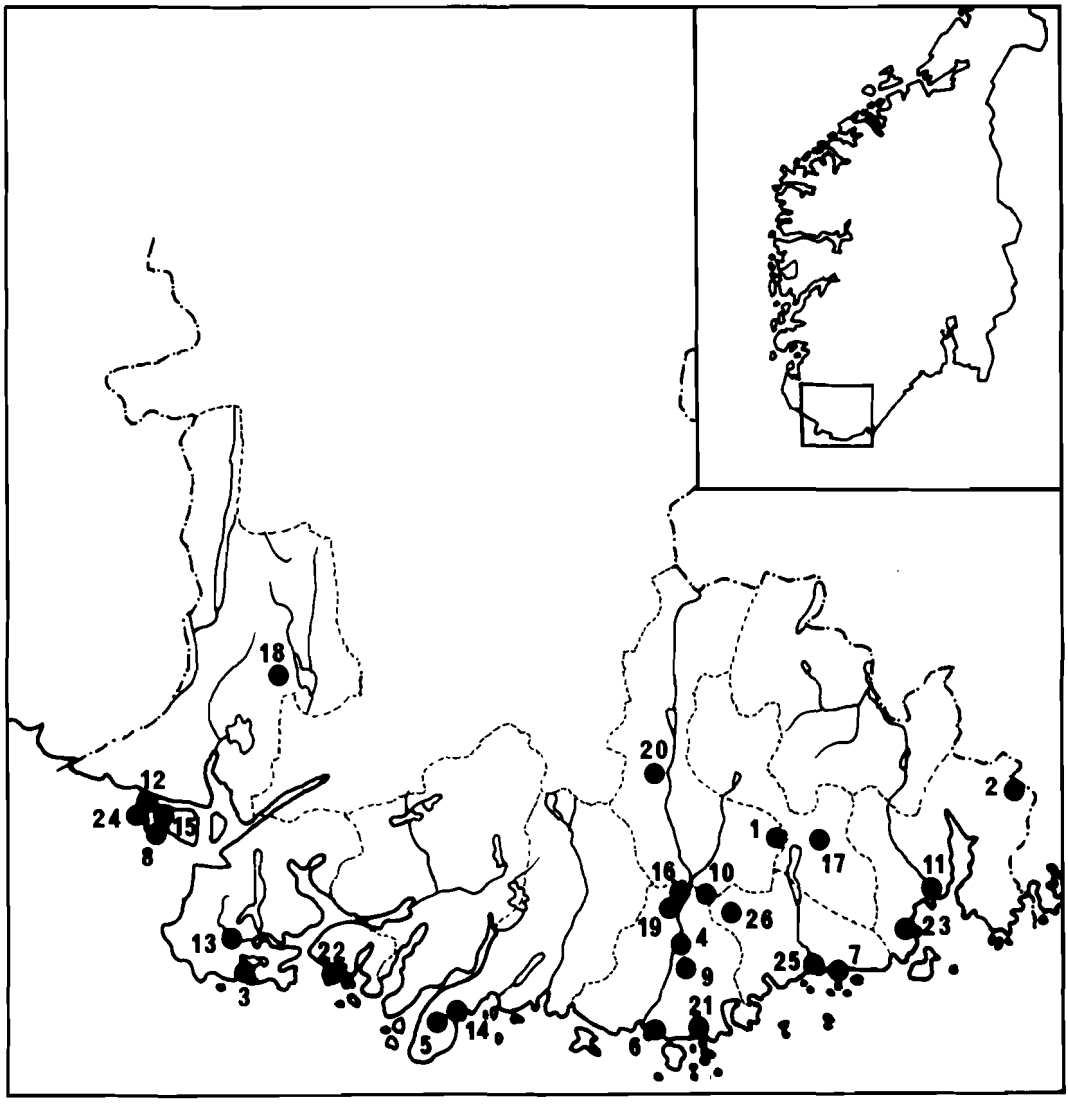

Fig. 2. Localities in outer Vest-Agder; the numbers refer to the locality numbers in table 2.

Family Hydroptilidae

Hydroptila pulchricornis Pictet, 1834. AAY, Risør: Akland 29 July 1987 5 ♂♂ 4 ♀♀ (net).
Oxyethira distinctella McLachlan, 1880. VAY, Farsund: Prestvann; Søgne: Kvernhusvannet.
O. flavicornis (Pictet, 1834). AAY, Risør: Brøbergvannet; Vegårdshei: Ekksjø; Tromøy: Bjelland; Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet.
O. frici Klapálek, 1891. AAY, Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet, Østerhus.

Family Psychomyiidae

Lype phaeopa (Stephens, 1836). VAY, Farsund: Viksvann 1978.
Tinodes waeneri (Linnaeus, 1758). VAY, Mandal: Stoveland; Farsund: Hanangervann; Søgne: Kvernhusvannet, Østerhus.

Table 2. Localities in outer Vest-Agder, with UTM- and EIS-reference.

No.	LOCALITY	REGION	MUNICIPALITY	UTM (32V)	EIS
1	Breland	VAY	Marnardal	MK244521	5
2	Drangsholt	VAY	Kristiansand	MK5057	6
3	Hanangervann	VAY	Farsund	LK663394	1
4	Holum	VAY	Mandal	MK129405	2
5	Jørenstad	VAY	Lindesnes	LK8633	1
6	Kleven	VAY	Mandal	MK097324	2
7	Kvernhusvannet	VAY	Søgne	MK316385	2
8	Lianstjern, Dragøy	VAY	Flekkefjord	LK542570	4
9	Lindland	VAY	Mandal	MK128377	2
10	Nomevann	VAY	Mandal	MK157464	2
11	Oddernes	VAY	Kristiansand	MK4247	2
12	Osmundstø, Hidra	VAY	Flekkefjord	LK552578	4
13	Prestvann	VAY	Farsund	LK645425	1
14	Ramsland	VAY	Lindesnes	LK881348	1
15	Råga, Hidra	VAY	Flekkefjord	LK560565	4
16	Smeland	VAY	Mandal	MK138450	2
17	Stokkeland	VAY	Songdalen	MK295523	5
18	Store Eikås	VAY	Flekkefjord	LK703724	4
19	Stoveland	VAY	Mandal	MK138446	2
20	Sveinall	VAY	Marnardal	MK120589	5
21	Tregde	VAY	Mandal	MK148315	2
22	Viksvann	VAY	Farsund	LK762422	1
23	Vågsbygd	VAY	Kristiansand	MK3842	2
24	Ysthus, Hidra	VAY	Flekkefjord	LK5556	4
25	Østerhus	VAY	Søgne	MK286389	2
26	Åsen	VAY	Søgne	MK197427	2

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

Cyrnus flavidus McLachlan, 1864. AAY, Vegårdshei: Ekksjø; Lillesand: Grimenes. AAI, Åmli: Krossbekk, Sjødiplane. VAY, Mandal: Stoveland; Marnardal: Breland.
C. insolutus McLachlan, 1878. AAY, Risør: Brøbergvannet; Grimstad: Reddalsvann;

Gjerstad: Sundebru; Vegårdshei: Ekksjø. VAY, Søgne: Kvernhusvannet.
C. trimaculatus (Curtis, 1834). AAY, Risør: Brøbergvannet; Gjerstad: Eskeland, Sundebru; Grimstad: Kvernhusmoen. AAI, Åmli: Gjermundsnes. VAY, Søgne: Østerhus; Marnardal: Breland.
Holocentropus dubius (Rambur, 1842). AAY, Risør: Brøbergvannet; Arendal: Hasselåsen; Grimstad: Kvernhusmoen; Lillesand: Grimenes. AAI, Åmli: Sandåna, Sjødiplane. VAY, Mandal: Holum; Søgne: Kvernhusvannet, Østerhus, Åsen.
H. picicornis (Stephens, 1836). AAY, Risør: Akland; Arendal: Hasselåsen; Gjerstad: Sundebru.
Neureclipsis bimaculata (Linnaeus, 1758). AAY, Arendal: Hasselåsen; Lillesand: Grimenes. AAI, Åmli: Gjermundsnes, Krossbekk, Sjødiplane; Bygland: Kleivvollen. VAY, Kristiansand: Oddernes; Mandal: Holum, Nomevann, Stoveland; Farsund: Hanangervann; Marnardal: Breland.
Plectrocnemia conspersa (Curtis, 1834). AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Gjerstad: Ulltveit; Tromøy: Bjelland; Lillesand: Grimenes; Birkenes: Birkeland. VAY, Kristiansand: Oddernes; Mandal: Holum, Stoveland; Flekkfjord: Råga, Store Eikås; Søgne: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.
Polycentropus flavomaculatus (Pictet, 1834). AAY, Arendal: Hasselåsen; Gjerstad: Eskeland, Ulltveit; Lillesand: Grimenes. AAI, Åmli: Gjermundsnes; Bykle: Byklestøylane. VAY, Mandal: Holum, Nomevann, Stoveland; Flekkefjord: Store Eikås; Søgne: Kvernhusvannet, Østerhus; Marnardal: Breland.
P. irroratus (Curtis, 1835). AAY, Lillesand: Grimenes. VAY, Kristiansand: Oddernes; Mandal: Holum; Flekkefjord: Store Eikås; Søgne: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

Family Hydropsychidae

Hydropsyche angustipennis (Curtis, 1834). AAY, Arendal: Hasselåsen.
H. pellucidula (Curtis, 1834). VAY, Søgne: Kvernhusvannet, Østerhus.

Family Phryganeidae

Agrypnia obsoleta (Hagen, 1864). AAY, Grimstad: Reddalsvann, Skiftenes; Vegårdshei: Ekksjø; Lillesand: Grimenes. AAI, Åmli: Gjermundsnes, Krossbekk, Sjødiplane; Evje og Hornnes: Mitting. VAY, Mandal: Holum, Nomevann.
A. picta Kolenati, 1848. VAY, Søgne: Kvernhusvannet.
A. varia (Fabricius, 1793). AAY, Grimstad: Reddalsvann; Lillesand: Grimenes; Birkenes: Birkeland. VAY, Kristiansand: Oddernes; Mandal: Holum; Flekkefjord: Lianstjern; Søgne: Kvernhusvannet, Østerhus, Åsen; Lindesnes: Jørenstad.
Oligotricha striata (Linnaeus, 1758). AAY, Grimstad: Skiftenes 1961.
Phryganea bipunctata Retzius, 1783. AAY, Lillesand: Grimenes. VAY, Mandal: Holum.
P. grandis Linnaeus, 1758. VAY, Mandal: Holum; Farsund: Hanangervann; Søgne: Kvernhusvannet, Østerhus.
Trichostegia minor (Curtis, 1834). VAY, Mandal: Tregde; Søgne: Kvernhusvannet.

Family Lepidostomatidae

Lepidostoma hirtum (Fabricius, 1775). AAY, Arendal: Hasselåsen. VAY, Mandal: Holum, Stoveland; Farsund: Hanangervann, Prestvann; 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; Lillesand: Grimenes. VAY, Mandal: Holum, Stoveland; Flekkefjord: Lianstjern, Råga; Søgne: Kvernhusvannet, Østerhus.
Grammotaulius nigropunctatus (Retzius, 1783). AAY, Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet, Østerhus.
G. nitidus (Müller, 1764). AAY, Lillesand: Grimenes 15—18 Aug. 1985 1 ♀ (light trap).
Limnephilus affinis Curtis, 1834. AAY, Grimstad: Reddalsvann; Lillesand: Grimenes. VAY, Kristiansand: Vågsbygd; Søgne: Kvernhusvannet, Østerhus; Lindesnes: Ramsland.
L. binotatus Curtis, 1834. VAY, Søgne: Kvernhusvannet, Østerhus.
L. borealis (Zetterstedt, 1840). AAY, Lillesand: Grimenes. AAI, Evje og Hornnes: Mitting.
L. centralis Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Kvernhusmoen, Reddalsvann, Skiftenes; Vegårdshei: Ekksjø;

Tromøy: Bjelland; Lillesand: Grimenes; Iveland: Grossås. AAI, Åmli: Gjermundsnes, Krossbekk; Evje og Hornnes: Mitting. VAY, Kristiansand: Oddernes; Mandal: Holum, Kleven, Lindland, Nomevann, Smeland, Stoveland; Flekkefjord: Lianstjern, Osmundstø, Råga, Store Eikås; Songdalen: Stokkeland; Søgne: Kvernhusvannet, Østerhus, Åsen; Marnardal: Sveinall; Lindesnes: Jørenstad, Ramsland.

L. coenosus Curtis, 1834. VAY, Søgne: Kvernhusvannet 1979.

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

L. extricatus McLachlan, 1865. AAY, Lillesand: Grimenes. VAY, Farsund: Hanangervann; Søgne: Kvernhusvannet, Østerhus.

L. flavicornis (Fabricius, 1787). AAY, Arendal: Hasselåsen; Tromøy: Bjelland; Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet, Østerhus.

L. griseus (Linnaeus, 1758). AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet.

L. lunatus Curtis, 1834. AAY, Arendal: Hasselåsen; Lillesand: Grimenes. VAY, Kristiansand: Oddernes; Søgne: Kvernhusvannet.

L. luridus Curtis, 1834. AAY, Arendal: Hasselåsen; Lillesand: Grimenes. VAY, Kristiansand: Oddernes; Mandal: Holum, Kleven, Lindland, Tregde; Flekkefjord: Lianstjern, Råga; Søgne: Kvernhusvannet, Østerhus; Marnardal: Sveinall; Lindesnes: Jørenstad.

L. marmoratus Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Tromøy: Bjelland; Lillesand: Grimenes. AAI, Evje og Hornnes: Mitting. VAY, Kristiansand: Oddernes; Mandal: Holum; Farsund: Prestvann; Søgne: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

L. rhombicus (Linnaeus, 1758). AAY, Arendal: Hasselåsen; Lillesand: Grimenes; Birkenes: Birkeland. AAI, Evje og Hornnes: Mitting. VAY, Mandal: Holum, Stoveland; Søgne: Kvernhusvannet, Østerhus.

L. sparsus Curtis, 1834. AAY, Arendal: Hasselåsen; Grimstad: Reddalsvann; Tromøy, Bjelland; Lillesand: Grimenes; VAY, Kristiansand: Vågsbygd; Mandal: Kleven, Lindland; Flekkefjord: Råga; Søgne: Kvernhusvannet, Østerhus; Marnardal: Sveinall; Lindesnes: Jørenstad.

L. stigma Curtis, 1834. AAY, Lillesand: Grimenes. VAY, Flekkefjord: Råga; Lindesnes: Jørenstad.

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

L. vittatus (Fabricius, 1798). AAY, Lillesand: Grimenes. AAI, Valle: Valle. VAY, Mandal: Nomevann.

Rhadicoleptus alpestris (Kolenati, 1848). AAY, Arendal: Hasselåsen; Lillesand: Grimenes. VAY, Mandal: Holum, Stoveland; Søgne: Kvernhusvannet, Østerhus.

Halesus radiatus (Curtis, 1834). AAY, Lillesand: Grimenes.

Micropterna lateralis (Stephens, 1837). AAY, Arendal: Hasselåsen; Iveland: Grossås. VAY, Mandal: Holum, Kleven, Lindland, Smeland, Stoveland; Flekkefjord: Lianstjern, Osmundstø, Store Eikås; Søgne: Kvernhusvannet, Østerhus; Marnardal: Sveinall.

M. sequax McLachlan, 1875. AAY, Risør: Stamsøykilen; Arendal: Hasselåsen; Grimstad: Reddalsvann; Lillesand: Grimenes; Birkenes: Birkeland. VAY, Mandal: Holum, Stoveland; Søgne: Kvernhusvannet, Østerhus; Lindesnes: Jørenstad.

Stenophylax permistus McLachlan, 1895. AAY, Arendal: Hasselåsen; Lillesand: Grimenes. VAY, Søgne: Kvernhusvannet, Østerhus.

Family Goeridae

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

Family Beraeidae

Beraea maura (Curtis, 1834). VAY, Flekkefjord: Ysthus 14 July 1982 4 ♀♀ (net).

Family Sericostomatidae

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

Family Molannidae

Molannodes tinctus (Zetterstedt, 1840). AAY, Arendal: Hasselåsen; Vegårdshei: Ekksjø. AAI, Åmli: Gjermundsnes, Sandåna, Sjødiplane; Evje og Hornnes: Mitting. VAY, Mandal: Nomevann.

Family Leptoceridae

Adicella reducta (McLachlan, 1865). VAY, Marnardal: Breland 27 June 1988 1 ♀ (net).

Athripsodes aterrimus (Stephens, 1836).

AAI, Åmli: Gjermundsnes, Krossbekk. VAY, Mandal: Nomevann; Farsund: Prestvann; Søgne: Kvernhusvannet.
A. cinereus (Curtis, 1834). AAY, Risør: Brøbergvannet. AAI, Åmli: Gjermundsnes, Krossbekk, Sjødiplane. VAY, Farsund: Hanangervann.
Ceraclea fulva (Rambur, 1842). VAY, Søgne: Kvernhusvannet.
C. senilis (Burmeister, 1839). AAY, Vegårdshei: Ekksjø.
Mystacides azurea (Linnaeus, 1761). AAY, Risør: Brøbergvannet; Vegårdshei: Ekksjø; Tvedestrand: Laget. AAI, Åmli: Gjermundsnes, Krossbekk. VAY, Kristiansand: Oddernes; Mandal: Holum, Stoveland; Farsund: Hanangervann, Prestvann, Viksvann; Søgne: Kvernhusvannet, Åsen.
M. longicornis (Linnaeus, 1758). VAY, Kristiansand: Drangsholt 1977.
Oecetis lacustris (Pictet, 1834). AAY, Risør: Brøbergvannet, Bossvik; Grimstad: Reddalsvann; Gjerstad: Sundebru; Vegårdshei: Ekksjø. VAY, Mandal: Nomevann, Stoveland; Søgne: Kvernhusvannet.
O. ochracea (Curtis, 1825). AAY, Grimstad: Reddalsvann; Lillesand: Grimenes. VAY, Mandal: Holum, Stoveland; Farsund: Hanangervann; Søgne: Østerhus.
O. testacea (Curtis, 1834). AAY, Arendal: Hasselåsen. VAY, Farsund: Prestvann; Søgne: Kvernhusvannet; Marnardal: Breland.
Triaenodes bicolor (Curtis, 1834). AAY, Risør: Akland, Bossvik; Gjerstad: Sundebru; Vegårdshei: Ekksjø. VAY, Kristiansand: Oddernes; Mandal: Holum, Nomevann; Søgne: Kvernhusvannet.
Ylodes reuteri (McLachlan, 1880). AAY, Grimstad: Reddalsvann 21 Aug. 1987 6 ♂♂ 23 ♀♀ (light trap).

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 & Søli (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 *Rhadicoleptus 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 & Søli (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: *Cyrnus flavidus* McLachlan, 1864, *P. flavomaculatus, Agrypnia 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 reccorded from this region.

From outer Vest-Agder Brekke (1946) recorded 21 species of Trichoptera, *Rhyacophila nubila* (Zetterstedt, 1840), *Cyrnus flavidus, C. trimaculatus* (Curtis, 1834), *Holocentropus dubius, Plectrocnemia conspersa* (Curtis, 1834), *Polycentropus flavomaculatus, Agrypnia 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, *Rhadicoleptus 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 siltalai* Döhler, 1963, *Chaetopteryx villosa* (Fabricius, 1798), *Limnephilus*

flavicornis (Fabricius, 1787), *Potamophylax cingulatus, P. latipennis, Stenophylax permistus* 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 palaearctic 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 Østersjøen: Skåne, Blekinge, Gotland, Östgötaland, Ångermanland 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 Østersjøen. 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 consideres ad 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 has been recorded from Vestfold and outer Telemark (Andersen 1975, Andersen & Søli 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 & Søli 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).

Beraea 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 herbage 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, Botosaneanu & 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 Hydroptilids, Hydropsychids, Leptocerids 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 Gjervollstadvann 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).

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Notes on the genus *Diastata* in Norway (Diptera, Diastatidae)

LITA GREVE AND JOHN O. SOLEM

Greve, L. & Solem, J. O. 1989. Notes on the genus *Diastata* in Norway (Diptera, Diastatidae). *Fauna norv. Ser. B, 37:* 33—35.

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 annd Campichaetinae 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 plumosety of the third antennal segment (short pubescence in the Campichoetidae, 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 obscurella* 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 Brittish 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, Tofte; Voss, Mjølfjell; and Bergen, Vollane. 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: Håøya EIS 28 MFA 27 June—22 July 1984 1 f. BØ Hurum: Tofte EIS 28 MF 8 Aug-1 Sept 1984 3 mm 10 ff. VE Tjøme: Kjære EIS 19 11 June 1965 1 m. AAY Birkenes: Sennumstad EIS 6 25 June—6 Aug 1986 2 mm 1 f; Øyestad: Flageborg, Asperholmen EIS 6 22 July—21 Sept 1981 Barber trap 2 mm 4 ff; Arendal: Hisøy, Lille Torungen EIS 6 Barber trap 26 June— 4 Aug 1981 1 f, 4 Aug—23 Sept 1981 1 m 2 ff. RY Tysvær: Kårstø EIS 13 Barber trap 5 Sept 1981 1 f. HOY Bergen: Vollane EIS 39 MF 31 July— 16 Aug 1986 3 ff. HOI Eidfjord: Hjølmodalen EIS 32 350 m a.s.l. 14 july 1967 in grass 1 m; Voss: Mjølfjell VLN 864317 EIS 41 MF 13 July— 3 Aug 1985 670 m a.s.l. 3 mm 1 f, 29 June— 6 Aug 1986 1 m 1 f. SFY Naustdal: EIS 58 MF 3—28 July 1986 2 ff. NTI Høylandet: Skiftesåa EIS 107 30 July—6 Aug 1986 MF 1 1 f; Tverråa EIS 107 23—30 July 1986 MF 1 1 f, 6—13 Aug. 1986 MF 1 1 m, 13—20 Aug 1986 MF 1 1 f, 20—27 Aug 1986 MF 1 1 f, 20—27 Aug 1986 MF 2 1 m 1 f.

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 Tverråa 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. Tverråa 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.

Diastata flavicosta Chandler, 1987. FØ Sør-Varanger: Svanvik, Svanhovd EIS 169 MF 20 June—4 Aug 1986 2 mm.

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 province 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 Osterøy: 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 Kvinherad: 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.

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Caddisflies (Trichoptera) from Jostedalen, West Norway

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Andersen, T., Hossain, M., Solhøy, T. & Søli, G. E. E. 1989. Caddisflies (Trichoptera) from Jostedalen, West Norway. *Fauna norv. Ser. B, 37:* 37—41.

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.

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INTRODUCTION

The river Jostedøla origins from the glacier Jostedalsbreen, the largest icecap in continental Europe with an area of 1252 km^2. 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 Lustrafjord 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 km^2. 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 screes. 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.

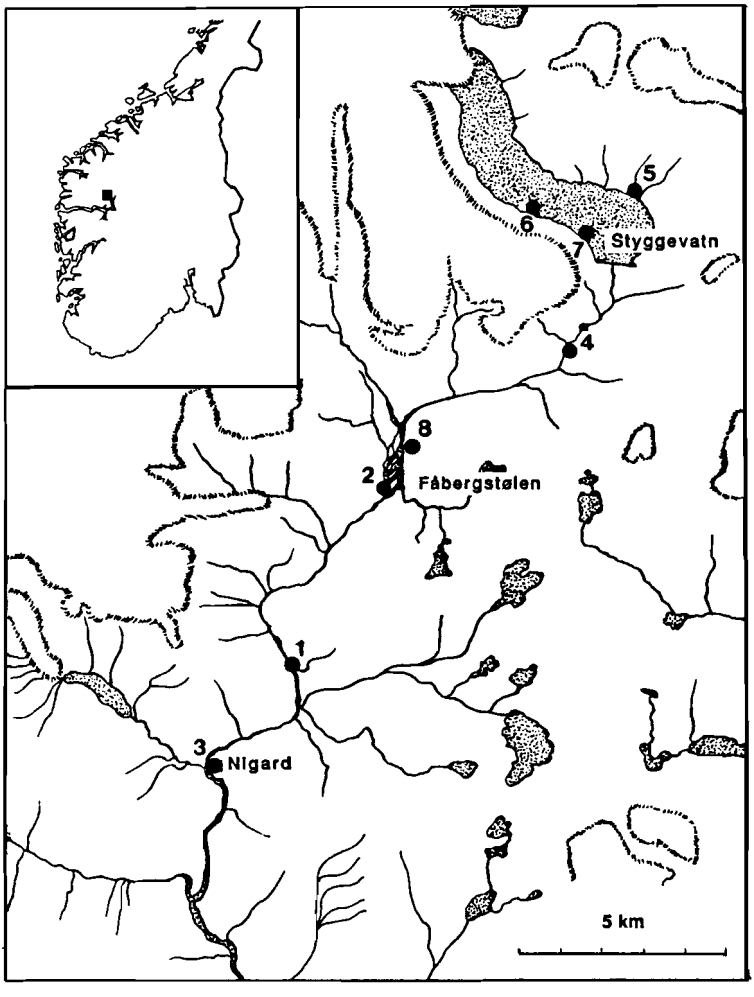

Fig. 1. The upper part of the Jostedalen valley in Luster in inner Sogn and Fjordane, showing the exact position of the localities. The localities are 1) Buhaug, 2) Fåberg, 3) Nigard, 4) Sprongdalen, 5) Styggevatn NE trap series 11, 6) Styggevatn SW trap series 21, 7) Styggevatn SW trap series 10, 8) Øyastrondi.

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

No.	Locality	UTM-reference	Altitude m a.s.l.	Method
1	Buhaug	32VMP106401	360	net
2	Fåberg	32VMP1343	510	net
3	Nigard	32VMP0837	250	light trap/net
4	Sprongdalen	32VMP180470	870	light trap
5	Styggevatn NE, trap ser. 11	32VMP197505	1210	pitfall trap
6	Styggevatn SW, trap ser. 21	32VMP178501	1180	pitfall trap
7	Styggevatn SW, trap ser. 10	32VMP184498	1170	pitfall trap
8	Øyastrondi	32VMP139448	560	malaise trap

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, Sprongdalen. Aug.—Sept. 22 ♂♂ 22 ♀♀

Limnephilidae

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

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

Anabolia concentrica (Zetterstedt, 1840) Locality: Nigard. Aug.—Sept. 1 ♂

Limnephilus coenosus Curtis, 1834 Localities: Nigard, Sprongdalen, Styggevatn SW trap series 10. Aug.—Sept. 12 ♂♂

L. griseus (Linnaeus, 1758) Locality: Fåbergstølane. 18 Aug. 1 ♂

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

L. stigma Curtis, 1834 Locality: Nigard. Aug.—Sept. 2 ♂♂

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

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

Rhadicoleptus alpestris (Kolenati, 1848) Localities: Nigard, Sprongdalen. June—Sept. 3 ♂♂

Halesus digitatus (Schrank, 1781) Localities: Nigard, Sprongdalen. Aug.—Sept. 3 ♂♂

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

Micropterna lateralis (Stephens, 1837) Localities: Nigard, Øyastrondi. June—Sept. 4 ♂♂ 6 ♀♀

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

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

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

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

Stenophylax vibex Curtis, 1834 Locality: Nigard. 16—20 Aug. 6 ♂♂ 4 ♀♀, 21 Aug.—11 Sept. 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 Jostedøla. *Plectrocnemia conspersa* (Curtis, 1834) was taken at 6 sites in the valley, between 220 m and 780 m a.s.l. *Agrypnia obsoleta* (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. extricatus* 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. *Rhadicoleptus 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.: *Rhyacophila 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, Halesus 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

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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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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

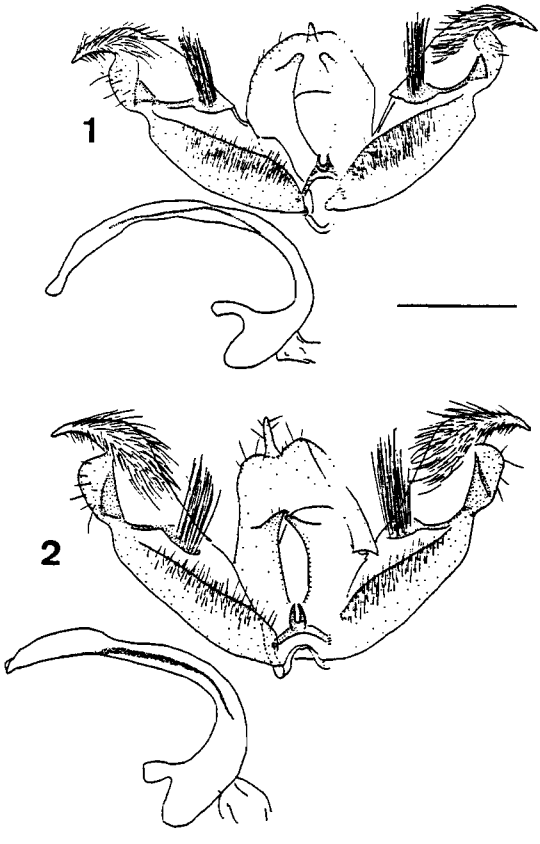

Fig. 1—2. Male genitalia of *Stenoptilia* Hb. - 1. *S. pterodactyla* L. Genital prep. 1815 L. Aarvik. - 2. *S. veronicae* Karv. Genital prep. 1817 L. Aarvik. Scale 0.5 mm.

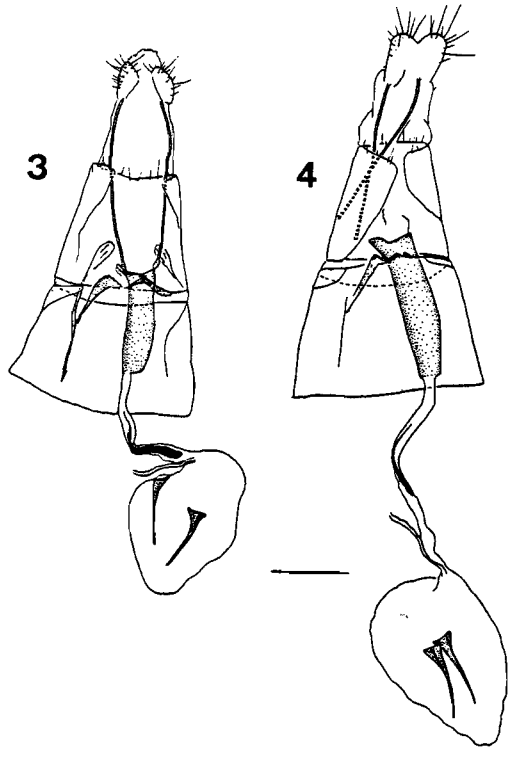

Fig. 3—4. Female genitalia of *Stenoptilia* Hb. - 3. *S. veronicae* Karv. Genital prep. 1775 L. Aarvik. -4. *S. pterodactyla* L. Genital prep. 1816 L. Aarvik. Scale 0.5 mm.

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 Müller, *Pygmaena fusca* 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).

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

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

ØYVIND HÅLAND

A thaumaleid midge, *Thaumalea truncata* Edwarda, 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.

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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 by 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 Martinovsky & 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 mentiones 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.

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

CECILIA L. MORESI AND REIDAR MEHL

The mosquito *Coquillettidia richiardii* (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 richiardii* (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 richardii* for this species.

The tribe Mansoniini inhabits principally tropical and subtropical areas. Only one species, *C. richiardii,* occures 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, Øland, Småland, Södermanland, Uppland and Båhuslän.

C. richiardii 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 decidious and coniferous trees, a small stream, and a small pond, rich in vegetation.

A special feature of *C. richiardii* 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. richiardii* 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.

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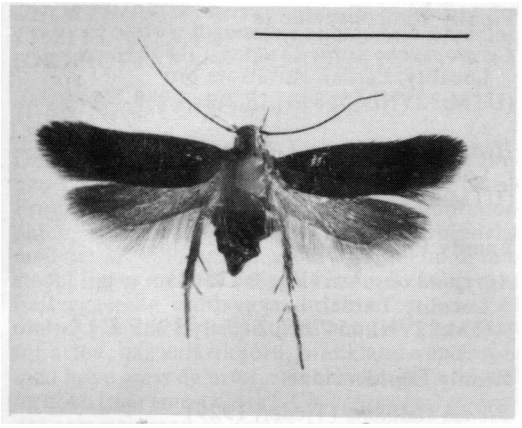
Svein Svendsen, Sodefjedveien PK 28, Stangenes, N-4639 Kristiansand S, Norway.

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 accross the forewings.

A. temerella is reported from Sweden north to Norrbotten (Nb), Denmark, Finland (Svensson et al. 1987) France (Leraut 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 identifiaction 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) (ARANEAE, GNAPHOSIDAE) 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.

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Trond Andersen, Zoological Museum, University of Bergen, Musépl. 3, N-5007 Bergen, Norway.

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).

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FURTHER ADDITIONS TO THE CADDIS FLY FAUNA (TRICHOPTERA) IN VESTFOLD, SE NORWAY

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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.

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Brekke (1946) recorded only 1 species, *Limnephilus centralis* Curtis, 1834, from Vestfold. Later, Økland (1964), Solem (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
Locality: Lardal: Solbergvatnet
(UTM:32VNL571779) 18 July 1988 1 ♂.

Family Hydropsychidae

Ceratopsyche nevae (Kolenati, 1858)
Locality: Lardal: Hukstrøm bru
(UTM:32VNL555849) 18 July 1988 1 ♂.

Hydropsyche siltalai Döhler, 1963
Locality: Brunlanes: Nevlunghavn
(UTM:32VNL507378) 16 Aug. 1984 1 ♀.

Family Phryganeidae

Agrypnia obsoleta (Hagen, 1864)
Locality: Lardal: Langevatn
(UTM:32VNL454785) 24 July 1985 9 ♂♂.

Family Leptoceridae

Ylodes simulans (Tjeder, 1929)
Locality: Lardal: Hukstrøm bru
(UTM:32VNL555849) 18 July 1988 1 ♂. 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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CHORTHIPPUS BIGUTTULUS (LINNAEUS 1758) FUNNET I GUDBRANDSDALEN (ON) (ORTHOPTERA: ACRIDIIDAE)

JEAN-FRANÇOIS VOISIN

Den 10.7.1988 ble en liten bestand av gresshoppen *Chorthippus biguttulus* funnet i ON, Nord-Fron (EIS 62), 2 km sør for Vinstra i Gudbrandsdalen, under en av ekskursjonene i forbindelse med det 22. entomologmøtet i Trondheim. Funnstedet ligger mellom E6 og en bratt skråning med fjellvegger og urer, og er orientert mot sør på omtrent 260 m høyde. Lokaliteten, som er typisk for arten, har kalkrik jord, brakkland-vegetasjon med høye gress og urter, samt busker (bl.a. einer) og noen traer (mest bjørk). *Ch. biguttulus* forekom der sammen med en annen markgresshoppe, *Podisma pedestris.* ingen av de to artene var tallrike, og hver hadde en hyppighetindeks /ILA, Voisin 1986) vel under 1.

Ch. biguttulus er meget utbredt og vanlig i Mellom- og Søreuropa. I Norden bebor den det sørlige Sverige og Finland, og går opp til lavlandet av Norrbotten (Holst 1986). I Norge er den hittil bare meldt fra traktene rundt Oslofjorden, sør til Arendal (Holst 1986, Aagaard og Hågvar 1987). Den er for eksempel tallrik i haver på Vakås (BØ Hvalstad, pers. iaktt.). Den nordligste lokalitet som Aagaard og Hågvar (1987) angir for den er Blindern (AK Oslo). Det er da omkring 190 km fra Nord-Fron, som således blir den nordligste lokalitet for arten i Norge.

Forekomsten av *Ch. biguttulus* i Nord-Fron er ikke så forbausende når en tar i betraktning alle varmekrevende billeartene som Andersen og Hansen (i trykk) lister fra Gudbrandsdalen. Dette er også tilfelle for mange plantearter (Gjaerevoll 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 kjøligere. Det ville være interessant å finne ut om *Ch. biguttulus* også finnes på andre, lignende lokaliteter i Gudbrandsdalen og langs Mjøsa. Da jeg i øyeblikket 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).

Det var en fornøyelse for meg å takke mine kollegaer som var med på ekskursjonen til Vinstra, O. Hanssen (som også korrigerte språket til den notisen), P. Jørum, R. Lundheim, V. Mahler, G. Pritzl og min sønn J.-L. Voisin.

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Book reviews

BØCHER, J. 1988. The Coleoptera of Greenland. Meddelelser om Grønland, Bioscience 26, 1988. Nyt Nordisk Forlag — Arnold Busck A/S, København. 100 pp.

Nesten femti år har gått siden en liste over Grønlands insektfauna 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 Bøcher.

Det meste av publikasjonens, eller kanskje 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 ypperlige tegninger, i de fleste tilfeller av både imagines og larver. Artene lar seg derfor lett identifisere. De fire grønlandske *Atheta*-artene 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 vessentlig 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 kompilasjonen 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 habitater virker noe bombatiske, siden diskusjonen baseres på fallfellefangster. Selv om forfatteren tar visse forbehold m.h.t. metodikkens svakheter, har f.eks. *Nebria-, Otiorhynchus-* og *Coccinella*-artene så ulik atferd at fangsttallene neppe gir grunnlag for vurderinger av artenes relative dominans.

Det meste av diskusjonen dreier seg imidlertid om zoogeografiske spørsmål, spesielt problemer omkring den grønlandske billefaunaens opprinnelse og innvandringshistorie. Dette er etter min mening bokens beste del. Ulike teorier blir grundig gjennomgått og diskutert på bakgrunn av artenes biologi og utbredelse, ikke bare når det gjelder Grønland, men hele Holarktis. Denne oversikten, sammen med de nesten 300 litteraturreferansene, gjør boken til et uunnværlig referanseverk for alle som er interesserte i arktiske insekters biologi og zoogeografi.

Dagfinn Refseth

PALM, E. 1989. Nordeuropas Prydvinger (Lepidoptera: Oecophoridae) — med særligt henblik på den danske fauna. Danmarks Dyreliv Bind 4. Fauna Bøger. København. 247 pp., 8 fargeplansjer, 214 tekstfigurer, 119 utbredelseskart. Pris DKK 420 + porto (bestilles fra Apollo Bøger, Lundbyvej 36, DK-5700 Svendborg, Danmark).

Dette er den tredje sommerfuglboka i serien «Fauna Bøger» og den andre som behandler en microlepidopterfamilie. (Tidligere har målerne og pyralidene blitt behandlet). I likhet med de fleste andre småsommerfuglfamilier 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 fargeplansjene er av bedre kvalitet. Bildene er meget skarpe, og dyrene 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 det at 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; Habitater; Økonomisk betydning; Udbredelsesforhold i Nordeuropa; Klassifikation.

Den spesielle delen innledes med en nøkkel til de fem underfamiliene. 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 samler 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 morfologiske og biologiske karakterer. Umiddelbart virker inndelingen både logisk og hensiktsmessig. I alle fall gjør den det lettere å få oversikt over denne til dels vanskelige slekten.

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

Det er få ting å sette fingeren på i boka, men enkelte av genitalfotografiene 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 uunnværlig for alle som interesserer seg for nord- og mellomeuropeiske micros.

L. Aarvik

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Book:

Mayr, E. 1913. *Animal species and evolution.* Harvard University Press. Cambridge, Mass.

Fittkau,E.J. 1962. Die Tanypodinae (Diptera, Chironomidae). Die Tribus Anatopyniini, Macropeloponi und Pentaneurini. *Abh. Larvalsyst. Insekten* 6: 453 pp.

Chapter:

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Content

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