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Annual variation in abundance of phototactic Lepidoptera as indicated by light-trap catches

SVERRE KOBRO

Kobro, S. 1991. Annual variation in abundance of phototactic lepidoptera as indicated by light-trap catches. *Fauna norv. Ser. B 38:* 1—4.

Annual variation in abundance of 28 species of phototactic lepidoptera common at one locality, is presented. A simplified light-trapping method was used to minimize the amount of work expended, and to reduce the influence of occasional weather conditions on the catch data.

Of the species, 19 had abundance maxima in one of two years during the six years studied. Nine of the species with maxima in 1984 have larvae living on moss, lichens or grass, while six of the most abundant species in 1988 have *Vaccinum,* bushes and trees as hostplants.

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INTRODUCTION

Annual variation in abundance of lepidoptera is well known by most collectors, but variation for a long period of time is documented only for a limited number of species, and mostly for larger ones. Reports are based on either historical sources (e.g. Gigja 1961, Tenow 1972), on direct observations (e.g. Pollard 1988), or on light-trapping (e.g. Taylor 1974).

The variations can be repeating events and either random or cyclic in character. The better they are described and understood, the more they can be helpful for predictive and preventive purposes.

The intention of this study is to describe variations in abundance for a long period of time for common, positive phototactic lepidoptera, at one single locality, and thereafter to detect possible regularity of the variations. Light-trapping and treatment of catch data for this purpose are discussed, and preliminary results from the first six years are presented.

MATERIALS AND METHODS

The light-trap used is of a simple funnel type with 160 W mixed light bulb (Osram HWL 160 W/235 V). The trap hung with the bulb one meter above the ground at precisely the same location each year. A new bulb was installed at the start of every season. The trap was situated in an edge habitat, between old coniferous forest, temperate deciduous forest, open grassland and a garden. The site was a shaded area and only to a small extent exposed to direct moonlight.

The trap was usually operated the three first nights every week from late June to late October in 1984—1989. Average number from nine nights (three nights in each of three consequtive weeks) is used as average of abundance each year (see discussion).

Most lepidoptera were identified, either by their genitalia, or by external characters. Geometrids (except the late flying species) were identified by Director emerit. J. Fjelddalen. I identified the remainder of the material. The nomenclature follows Schnack (1985).

It is an assumption in this work that phototactism and activity responses for each species are constant from year to year.

RESULTS

603 species were identified with a total of 23000 specimens. Only a few species were regarded as common, based on light-trapping during the six years.

28 species were recorded with an average abundance of at least 5 specimens each night. The variation in abundance for these species are shown in fig. 1 A, B.

Two species show particularly high abundance and strong variation in this period. *Eudonia truncicolella* (Stainton, 1849) had a maximum level of 156.0 specimens each night in 1984 and a minimum level of 4.1 in 1987, and *Rhopobota naevana* (Hübner, 1817) had a maximum of 115.2 in 1985 while only one single specimen was caught in 1989. The other species show more or less clear and even variation in abundance.

DISCUSSION

A. Methods

In 1984 the light-trap was operated almost every night from early spring until late autumn. A sampling method should give sufficiently high accuracy, without excessive work. To minimize the amount of work, three simplifications were made:

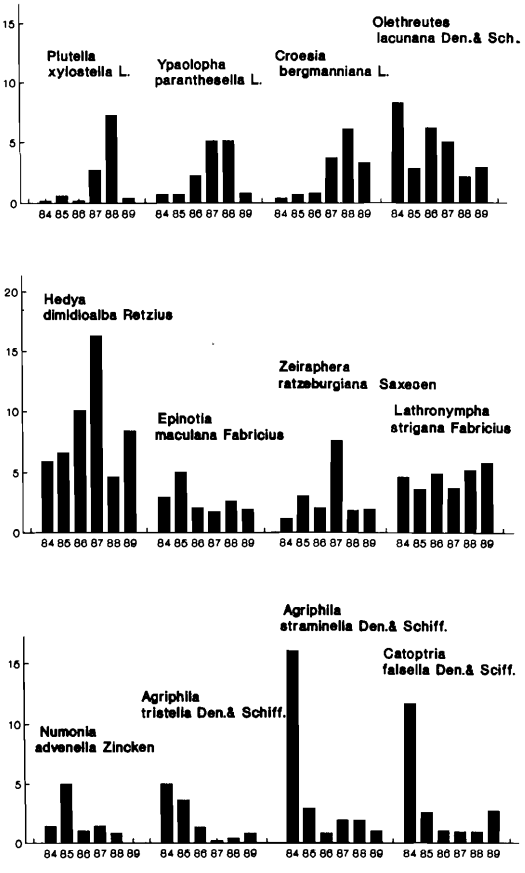

Fig. 1A. Annual variation in abundace of 28 species of phototactic lepidoptera. Average catch from 9 nights of light-trapping is used as a record of abundance.

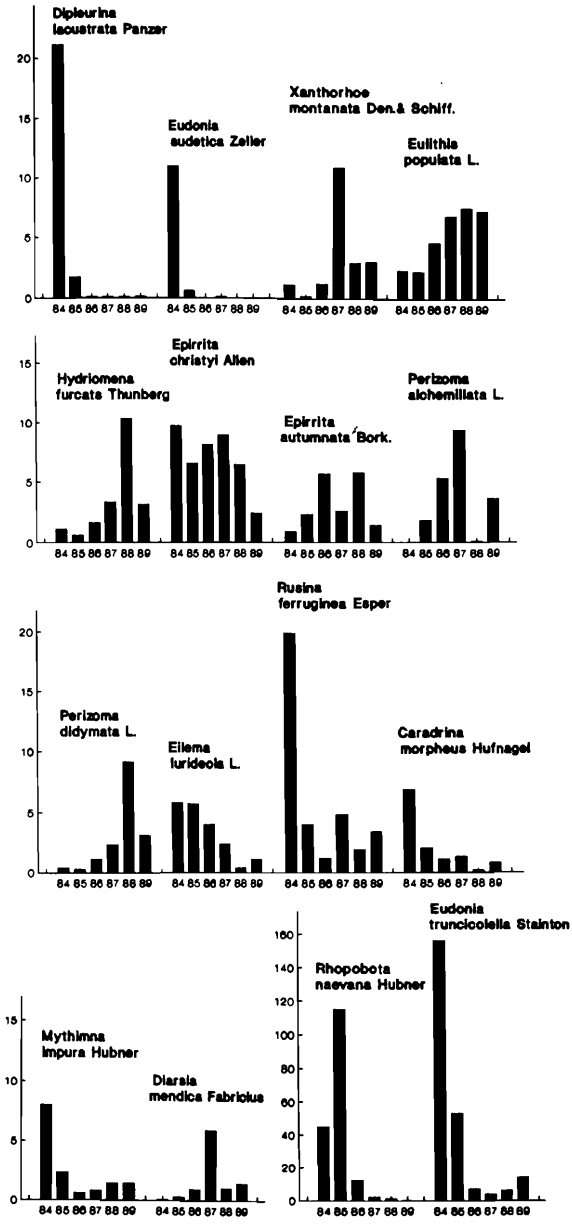

Fig. 1B. Annual variation in abundance, continued.

1) The total catches were low in April and May, increasing in June, and highest in July and August. Similar results are reported by Andersen (1982), Bakke (1974), and Taylor (1974). Therefore the trapping season was started in late June.

2) The number of nights each week the light-trap was operated should give reasonably good data for abundance of each species. Calculations done for July, a period which had by far the highest number of both species and specimens, showed that 75% of the species recorded with more than 5% dominance in one week, were recorded with at least 3% dominance when data were based on catches from the three first nights preferably. Therefore three nights were decided to be sufficient to give a reasonable estimate of the abundance of the species in any given week. Obvious bad nights (with an extremely small number of insects captured) were excluded and the trapping was continued for additional nights.

3) Many species caught have a flight peak limited to few weeks. Trap catches of single species can be represented by flight curves. The form of such a curve will be influenced by the weather. When conditions are favourable, the flight peak might be high and narrow, otherwise it might be lower and broader. Under prolonged favourable conditions, each specimen will also live longer and be more exposed to trapping. Therefore three weeks were selected to represent the flight peak.

Using the simplifications mentioned above, an average abundance was calculated from nine records (three records in each of three consequtive weeks). The highest average abundance for a species is used to represent the population size and is shown in fig. 1.

Light-trapping may not be the best method to study insect populations, because is does not give accurate data on the population size. Instead it gives data on the activity of phototactic insects. Activity is influenced by several conditions e.g. moonlight (Williams 1936, Taylor 1986), cloudiness and light (Persson 1971), geomagnetism and moonlight (Nowinszky & Toth 1983), temperature and rain (Pollard 1988), and moonlight, temperature and wind (McGeachie 1989).

Observations of butterflies were done when weather conditions met specified criteria (Pollard 1988). When a trap is used one should also make attempt to define the conditions. It is very difficult to define normal or standard weather conditions when the total response of the insects to all conditions are not known in detail. The difficulties can be overcome simply by leaving the decision to the insects themselves. When they react with activity, the conditions are favourable.

When conditions are optimal, the whole population is likely to be on the wing. Because measurements of activity are used as a record of abundance and an indicator of population size, arithmetic means are used to give full value to the high activity records. This will, in my opinion, give a more accurate description of abundance, than geometrical means (Williams 1936) or median values (McGeachie 1989), which are used when depressive effects on activity are studied.

By using the average for a limited period of the flight peak, instead of total catch, the influence of occasional conditions during the flight period will be reduced.

The standardized measurement of activity can be evaluated as relative records of abundance. When measured abundance is proportional to population size, comparison of the means will give relative but realistic representation of the change of population size over years.

B. Results

The variation patterns of the common species may be grouped in two categories. One group is characterized by even variations over the years, like for *E. truncicolella, Croesia bergmanniana* (L., 1758) and *R. naevana.* Such variations in abundance are interpreted as variations in population density at or near by the trapping site.

Itämies & Kyrki (1987) show several examples of smooth variations in abundance of tortricids over years. Also in their study *R. naevana* was one of the species with highest abundance and strong variations.

The other group has no even variations. On the contrary there seems to be a stable and low population level with high records in single years, as for *Zeiraphera ratzeburgiana* (Saxesen, 1849) and *Xanthorhoe montanata* (Denis & Schiffermüller, 1775). Different local populations can have assynchronous variations in density (Taylor & Taylor 1977). Whether the abrupt changes for *Z. ratzebur-*

giana and *X. montanata* are caused by outbreaks of the local population, or by migration from a neighbouring area, can not be interpreted from these data.

Some of the species shown in fig. 1 can not be placed in any of these two groups, because the year with the highest catch is the first in the study, as *Agriphila straminella* (Denis & Schiffermüller, 1775), *Dipleurina lacustrata* (Panzer, 1804) and *Rusina ferruginea* (Esper, 1785).

The two species with highest average abundance, and strong yearly variations, *E. truncicolella,* and *R. naevana* are small lepidoptera. This corresponds well with the theory of Gaston & Lawton (1988), which states that smaller insect species generate greater variations in population densities than larger ones.

Of the 28 species shown in fig. 1, 19 have the highest level of abundance in one of two years during the six years studied so far. 9 of the 12 species with a high level in 1984 have larvae living on moss, lichens or grass. 6 of the 7 most abundant species in 1988 are more polyphagous and have *Vaccinum, Salix* or other bushes and trees as their hostplants. This may indicate that the variation in abundance is connected with the lower trophic level, e.g. the quality and digestibility of the foodplants (Martinat 1987).

Whether the variations are random or cyclic in character remains to be investigated. The presented study will continue.

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I wish to acknowledge L. Aarvik for helping me with identification. I also wish to acknowledge A. Andersen, T. Andersen, E. Edland, J. Fjelddalen, T. Hofsvang and R. Meadow for reviewing drafts of the manuscript. Last but not least I wish to acknowledge my wife, G. Kobro, for operating the light-trap while I was on official journeys, and for permitting storage of material in her freezer.

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Received 20 May 1990

New records of Chironomidae (Diptera) from Norway (II), with two new species synonyms

Ø. A. SCHNELL

Schnell, Ø. A. 1991. New records of Chironomidae (Diptera) from Norway (II), with two new species synonyms. *Fauna norv. Ser. B. 38:* 5—10.

Thirtyone species of Chironomidae are reported for the first time from Norway. Nine species are new to Scandinavia. Of these 4 species belong to genera previously not recorded from the country, while one belong to a genus previously not recorded from Scandinavia. One species is new to the Palaearctic fauna. The new species name synonyms are *Pseudorthocladius (Pseudorthocladius) cranstoni* Sæther & Sublette 1983 with *Pseudorthocladius (Pseudorthocladius) macrovirgatus* Sæther & Sublette 1983; and *Pseudorthocladius (Pseudorthocladius) virgatus* Sæther & Sublette 1983 with *Pseudorthocladius (Pseudorthocladius) rectangilobus* Caspers & Siebert 1980.

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INTRODUCTION

In an previous paper (Schnell 1988b) I reported 28 species of Chironomidae as new to the Norwegian fauna. Later I have discovered 32 more species that have not earlier been reported from the country.

During the work I found specimens with character combinations that blurred the distinctions between earlier described closely related species; and as a result, two species names are synonymized.

As mentioned in my previous paper on the subject, there are large problems finding out which chironomid species have been recorded earlier from the country. A checklist of the Norwegian chironomid fauna is under preparation. It will also include the species recorded from Bjørnøya, Jan Mayen and Svalbard.

The specimens are sampled by me except when otherwise stated. All are kept in the Museum of Zoology, University of Bergen.

SYSTEMATIC LIST

Subfamily Tanypodinae

Monopelopia tenuicalcar (Kieffer)
HOY, Øygarden: Rong, 10 May 1988, 15 larvae; Bergen: Garpetjern, 21 June 1989, 12 males, leg.: A. Fjeldså.

This is the first record of the genus from Norway. In Scandinavia it has previously been found in Finland and in Southern Sweden.

Subfamily Orthocladiinae

Corynoneura arctica Kieffer
HOY, Bergen: Botanical Garden, 19 June 1988, 1 male; Vaksdal: Nesheimvatn, 5 June 1989, 1 male.

Corynoneura gratias Schlee
HOY, Vaksdal: Eksetjørni, 27 June 1987, 1 male; Sveio: Vigdarvatn, 5 June 1988, 1 male.

Corynoneura minuscula Brundin
HOY, Bergen: Garpetjern, 14 July 1987, 1 male, leg.: A. Fjeldså.

Cricotopus (Cricotopus) festivellus (Kieffer)
AAY, Birkenes: Store Hovvatn, 15 July 1989, 1 male.

Cricotopus (Cricotopus) patens Hirvenoja
NTY, Høylandet: Skiftesåa, 31 July 1988, 1 male, leg.: K. Aagaard.

Cricotopus (Cricotopus) tristis Hirvenoja
HOY, Vaksdal: Ekse, 10 July 1987, 1 larva and 3 pupal exuviae,, 28 July 1988, 1 pupal exuviae.

Oliver and Dillon (1988) described the

larva of *C. tristis* for the first time and added to Hirvenoja's description of the pupa. My specimens agree well with their descriptions.

Cricotopus (Isocladius) pilitarsis (Zetterstedt)
NSY, Bodø: Urskarstoppen, 27 July 1986, 1 male and 1 female, leg.: A. Fjeldså.

Dratnalia potamophylaxi (Fittkau & Lellak)
HOI, Kvam: Ugletveit, 23 April 1988, 6 larvae, leg.: T. Andersen.

The larvae key to *Dratnalia* Sæther & Halvorsen in Cranston et al. (1983), and my species identification has been confirmed by G. A. Halvorsen. The specimens were found inside larval cases of *Potamophylax cingulatus* (Stephens, 1837) (Trichoptera: Limnephilidae). One of the *Dratnalia* larvae was found in a small wound on the last abdominal segment of the Trichoptera larva, indicating that the chironomid larvae actually feed on their hosts.

This is the first record of the genus from Scandinavia. *D. potamophylaxi* was previously known only from Czechoslovakia, Poland and Germany (Cranston et al. 1989).

Georthocladius luteicornis (Goetghebuer)
AAY, Birkenes: Store Hovvatn, 28 May 1983, 4 female pupal exuviae, leg.: A. Jacobsen. HOI, Voss: Grøndalsvatn, 10 August 1989, 1 female pupal exuviae. HOY, Vaksdal: Ekso, 3 July 1967, 1 mature female pupa, leg.: R. Larsen, 2 October 1986, 1 larva, 26 July 1989, 1 female pupal exuviae.

A larva and a pupa belonging to the genus *Georthocladius* Strenzke was found during an investigation of the chironomid fauna in River Ekso in Western Norway (Schnell 1988a, sub *Georthocladius* cf. sp.n.). There were some question regarding the species identity of the larva and mature female pupa found. However, a closer comparison with the very detailed description given by Strenzke (1941) shows that there are no differences in the larva. The pupal exuviae found in River Ekso and at Lake Grøndalsvatn are not separable from those found at Lake Store Hovvatn, and they all agree with the description of the pupa given by Strenzke. According to Geotghebuer (in Strenzke 1941), the female of *G. luteicornis* has 10 setae on the squama. An examination of the adult types (two specimens, in a very bad state) shows that the number of setae on squama is 29—33 (three wings counted). The female pupa found in Ekso have about 35 setae on one squama and about 40 on the other. I therefore conclude that the specimens found in Norway belongs to *G. luteicornis*. Cranston et al. (1989), based on my unpublished record of *Georthocladius* cf. n. sp., states that there is a new, undescribed species in the genus from Norway. These specimens are now confirmed to be conspecific with *Georthocladius luteicornis* (Goetghebuer), and the statement made by Cranston et al. is thus in error.

G. luteicornis was reported as a semiterrestrial chironomid by Strenzke (1941), who found the larvae in wet sphagnum moss. All my specimens are sampled in truly aquatic habitats, and the larvae are most likely able to live in rivers and lakes as well. According to Coffman et al. (1986) the species has previously been found only in West Germany and the Netherlands. In addition, it was recorded from Ireland by Múrray & Ashe (1983). This is the first record of *G. luteicornis* from Scandinavia.

In the key to the pupae of Orthocladiinae (Coffman et al. 1986, couplet 118, p. 157) the generic names are interchanged. The pupae of *Georthocladius* have shagreen spinules on sternites II and III, while the pupae of *Pseudorthocladius* Geotghebuer have not.

Paracricotopus niger (Kieffer)
OS, Lunner: Hakkadalselva, 21 July 1988, 3 pupal exuviae, leg.: T. Andersen.

This is the first record of the genus from Norway. In Scandinavia it has previously been found in Southern Sweden (Brundin 1956).

Psectrocladius (Psectrocladius) oligosetus Wülker
HOY, Øygarden: Rong, 15 May 1988, 1 male pupa reared from larva.

The species is recorded from region 20 by Fittkau & Reiss (1978). This most likely refers to Wülker (1956), who found the species among the chironomids collected by A. Thienemann in the Abisko area in Sweden. This part of Sweden is included in region 20 by Illies (1978).

Pseudorthocladius (Pseudorthocladius) macrovirgatus Sæther & Sublette
Syn. *Pseudorthocladius (Pseudorthocladius) cranstoni* Sæther & Sublette, *syn. nov.*

AAY, Birkenes: Store Hovvatn, 1 July 1983, 1 male leg.: A. Jacobsen. HOY, Bergen: Frotveitvatn, 25 August 1987, 3 males.

According to Sæther & Sublette (1983), the only significant difference between *P. macrovirgatus* and *P. cranstoni* is that *P. macrovirgatus* has no seta on R_{4+5} and 6—8 setae on squama, while *P. cranstoni* has 4—9 setae on R and 10—15 setae on squama. The specimens found in Norway have 0—3 (mean 0.6) setae on R_{4+5} and 8—15 (mean 10) setae on squama (n=8 wings for both counts). The specimens from Frotveitvatn have slightly longer wings than *P. cranstoni,* while the specimen from Lake Store Hovvatn has wing lengths intermediate of the ranges given for *P. macrovirgatus* and *P. cranstoni.* These minor variations is not more than can be expected between populations of the same species living on different continents. I have also seen specimens from Bretagne, France (leg.: Y. Delettre) that are identical with the Norwegian specimens.

P. macrovirgatus was previously known from southeastern U.S.A., from Eire and from England. New to Scandinavia.

Pseudorthocladius (Pseudorthocladius) pilosipennis Brundin
NTI, Høylandet: Skiftesåa, 25 June 1988, 2 males, leg.: K. Aagaard.

Pseudorthocladius (Pseudorthocladius) rectangilobus Caspers & Siebert
Syn. *Pseudorthocladius (Pseudorthocladius) virgatus* Sæther & Sublette, *syn. nov.*
? Syn. *Pseudorthocladius (Pseudorthocladius) paravirgatus* Sæther & Sublette
HOY, Bergen: Fløyfjellet, 17 June 1983, about 100 males, leg.: A. Fjeldså; Vaksdal: Ekse, 7 June 1988, 1 male.

Sæther & Sublette (1983) described *P. virgatus* as a new species separated from *P. rectangilobus* by a much lower number of setae on R and R_1 and a slightly different inferior volsella. However, Caspers & Siebert (1980), who based their original description of *P. rectangilobus* on one single specimen, *added* the number of setae on R and R_1 for each wing. Their counts for both veins on each wing are 25 and 28. I have examined the holotype of *P. rectangilobus,* and it has 19, 21 setae on R and 6, 8 setae on R_1 on each wing respectively. I have also examined the type series of *P. virgatus,* and the number of setae on R and R_1 combined ranges from 4—18 (mean 11.9, n=23 wings). The setal counts for each of the veins are in the type series 3—14 (mean 9.2) on R and 0—6 (mean 2.7) on R_1 (n=23 wings). Cranston & Oliver (1988) found a maximum number of 19 setae on R and 11 setae on R_1 in Nearctic material of *P. virgatus.* The Norwegian specimens I have studied have 21—27 (mean 23.9) setae on R and R_1 combined, with 15—21 (mean 17.9) on R and 4—8 (mean 6) on R_1 (n=14 wings). This clearly shows that wing vein setation cannot separate the two species. The other difference used by Sæther & Sublette to separate *P. rectangilobus* from *P. virgatus* is the shape of the inferior volsella. This is not a reliable character, as the shape is highly variable, from rectangular to rounded in the same population. Cranston & Oliver (1988) also found much variation in this character in their Nearctic material. The type series of *P. virgatus* also have a variable inferior volsella.

Sæther & Sublette (1983) also described *P. paravirgatus* (based on one specimen) as closely related to *P. virgatus.* They separated it from *P. virgatus* because it lacked setae on clypeus and that the apex of the gonostylus was drawn out into a long point. Otherwise it was not separable from *P. virgatus.* One of the gonostyli in the holotype of *P. paravirgatus* has a long process as illustrated in Sæther & Sublette (1983, fig. 49). The other gonostylus has a much shorter process, but it is difficult to measure because of its orientation. In my opinion the holotype of *P. paravirgatus* is an aberrant individual belonging to *P. rectangilobus.*

P. rectangilobus was previously known from West Germany and southeastern U.S.A. New to Scandinavia.

Pseudosmittia trilobata (Edwards)
HOY, Bergen: Garpetjern, 14 July 1983, several hundred males, leg.: A. Fjeldså. NSY, Bodø: Falkflaug, 12 July 1989, 10 males, leg.: A. Fjeldså. NTI, Høylandet: Skiftesåa, 31 July 1988, 2 males, leg.: K. Aagaard.

The species is recorded from region 20 by Fittkau & Reiss (1978). Most likely this refers to finds by Thienemann (1941) from the Abisko area in Sweden. I have not found it mentioned in any publication on Norwegian chironomids.

Rheocricotopus (Psilocricotopus) tirolus Lehmann
SFI, Luster: Fåbergstølsgrandane, 25 July

1986, 1 mature female pupa, leg.: A. Fjellheim & Ø. A. Schnell.

Previously found in the Alps, in Scotland, Wales and Finland (Lehmann 1969, Langton 1984, Tuiskunen & Lindeberg 1986). New to Scandinavia.

Thienemannia gracilis Kieffer
HOY, Osterøy: Låstad, 15 October 1989, 3 males, leg.: A. Fjeldså. NTI, Høylandet: Skiftesåa, 7 August 1988, 1 male, leg.: K. Aagaard.

This is the first record of the genus from Norway. In Scandinavia it has previously been found Southern Sweden (Brundin 1956).

Subfamily Chironominae

Tribe Chironomini

Chironomus inermifrons Goetghebuer
NTI, Høylandet: Skiftesåa, 15 August 1988, 1 male, leg.: K. Aagaard.

This is a very characteristic *Chironomus* species with minute frontal tubercles (<15 μm), long spinules covering all of sternite I (the longest reaching 30 μm), and with the proximal 3/4 of femur on P_1 distinctly yellow. Also the hypopygium is distinct. *C. intermifrons* was described by Goetghebuer (1921) from specimens collected in Belgium. It was later reported from the British Isles (Scotland) by Edwards (1929). Pinder (1978) includes the species in his key to the British Chironomidae. According to Lindeberg & Wiederholm (1979), *C. inermifrons* has not been reported from the European mainland after Goetghebuer described it. Silfverberg (1986), in a summary of new finds of insects from Finland, list the species from two localities. New to Scandinavia.

Microchironomus tener (Kieffer)
AK, Oslo: Østensjøvatn, 6 July 1983, 1 male, leg.: A. Fjeldså.

Microtendipes rydalensis (Edwards)
OS, Lunner: Hakkadalselva, 21 July 1988, 1 pupal exuviae, leg.: T. Andersen.

Omisus caledonicus (Edwards)
RY, Tysvær: Storavatn, 23 May 1981, 2 males, leg.: T. Andersen.

The species is recorded from region 20 by Fittkau & Reiss (1978). This is most likely a misprint, since they do not record it from that part of Sweden which is included in region 22. Brundin (1949, sub *Microtendipes caledonicus)* found it several places in this area. I have not found the species mentioned in any publication on Norwegian chironomids.

Stenochironomus gibbus (Fabricius)
NSY, Bodø: Falkflaug, 12 July 1989, 1 male, leg.: A. Fjeldså.

Recorded from region 20 by Fittkau & Reiss (1978). Brundin (1949) found *S. gibbus* in three localities in the province of Jämtland in Sweden, which is situated within region 20 (Illies 1978).

Tribe Tanytarsini

Micropsectra bidentata Goetghebuer
HOY, Osterøy: Låstad, 29 October 1989, 1 male, leg.: A. Fjeldså.

Parasectra uliginosa Reiss
HOY, Vaksdal: Ekse, 10 June 1989, 1 mature male pupa, 26 July 1989, 1 mature female pupa.

According to Fittkau & Reiss (1978), *P. uliginosa* has earlier been found only in Germany. New to Scandinavia.

Rheotanytarsus distinctissimus Brundin
OS, Lunner: Hakkadalselva, 21 July 1988, 1 pupal exuviae, leg.: T. Andersen.

Tanytarsus anderseni Reiss & Fittkau
ON, Øystre Slidre: Øvre Heimdalsvatn, 19 June 1981, about 30 males in swarm, leg.: E. Willassen.

The species is previously known only from Greenland. However, the type locality (Nedre Sjodalsvatn) of its closest relative, *Tanytarsus norvegicus* (Kieffer), is situated only a few kilometers north of Øvre Heimdalsvatn. *T. anderseni* is most likely a junior synonym of *T. norvegicus.* A formal synonymy must await closer examination of the type material. New to the Palaearctic fauna.

Tanytarsus buchonius Reiss & Fittkau
AAY, Birkenes: Store Hovvatn, 10 July 1981, 3 males, leg.: A. Jacobsen.

The species has previously been recorded from West Germany and the British Isles (Fittkau & Reiss 1978). New to Scandinavia.

Tanytarsus debilis (Meigen)
AAY, Birkenes: Store Hovvatn, June 1983, 9 males, leg.: A. Jacobsen. HOY, Bergen: Botanical Garden, 12 May 1985, 1 male.

Tanytarsus ejuncidus (Walker)
AAY, Birkenes, Store Hovvatn, 10 July 1981, 4 males, leg.: A. Jacobsen, 14 July 1989, 2 males.

There are some problems about the identity of these specimens. Reiss & Fittkau (1971) described *Tanytarsus medius* as a new species closely related *Tanytarsus ejuncidus.* They separated them on the shapes of superior and inferior volsellae, and on the length of the median volsella. In the specimens from Lake Store Hovvatn, the shape of the superior volsella and the length of the median volsella fits *T. medius,* while the shapes of inferior and median volsella fits *T. ejuncidus.* Most likely the two species are synonyms. According to Reiss & Fittkau (1971) and Fittkau & Reiss (1978) *T. ejuncidus* has previously been recorded from Middle Europe. *T. medius* was recorded by Wiederholm (1974) from Mälaren in Middle Sweden. *T. ejuncidus* is recorded from Scandinavia for the first time.

Tanytarsus nemorosus Edwards
HOY, Meland: Eikelandsvatn, 7 August 1987, 1 mature male pupa, leg.: A. Bjørklund; Sveio: Vigdarvatn, 5 June 1988, 1 male with attached pupal exuviae.

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Spiders (Araneae) from islands of Øygarden, West Norway. Species associations, with ecological and zoogeographical remarks.

ERLING HAUGE, ANDERS BRUVOLL & TORSTEIN SOLHØY

Hauge, E.: A. Bruvoll & T. Solhøy 1991. Spiders (Araneae) from islands of Øygarden, West Norway. Species associations, with ecological and zoogeographical remarks. *Fauna norv. Ser. B 38:* 11—26.

Lists of adult spiders found in pitfall traps from 28 sampling sites on six coastal islands in West Norway are presented. The habitats sampled were beach meadows, mires, heather and a sitka spruce plantation. Comments on the ecology and distribution of the species are given, together with general zoogeographical remarks, especially in comparison with the spider faunas on the more remote north-atlantic islands listed by Ashmole (1979).

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INTRODUCTION

Spiders have been collected in 28 selected sites on six coastal islands in the Øygarden area, NW of Bergen (EIS:) (Fig. 1). Some general comments concerning the species associations on the islands have been discussed by Hauge & al. 1990), but only a few of the 91 species found in the present study were mentioned.

The total material consisted of 15112 adult specimens. The only previous study, with a comparable number of specimens from comparable habitats in West Norway, was published by Hauge (1976). This part of Norway belongs to the so-called north-temperate East Atlantic faunal area (Braendegaard 1958, Ashmole 1979). Discussing the spider fauna of Shetland together with the other North Atlantic islands as well, Ashmole (1979) reffered to the Fennoscandian fauna as playing a role as a potential contributor to the colonization of these islands. Our sampling sites on these coastal islands in Øygarden represent type of landscape (moorland/-heathland) not much different from the one which is dominant on Shetland (Hauge, Meidell & Solhøy in prep.). Both areas have a relatively mild, humid climate. Common faunal elements should therefore be expected. On the other hand differences between the more remote island group of Shetland and the continental islands of the Øygarden area should also be expected, according to the current theories of island biogeography (MacArthur & Wilson 1967) (see also Ashmole 1979, Bengtson & Hauge 1979).

SAMPLING AREAS, MATERIAL AND METHODS

A general description of the whole area was given by Hauge et al. (1990). The 28 habitats described below are, except for loc. S5, chosen as representative of the open landscapes of the most westerly Norwegian coast: mires, beach meadows and different stages of heather, more or less influenced by human activities and an oceanic climate. Loc. S5 is an area where sitka spruce has been planted in recent years.

The habitats on the islands of Herdlevær (H) and Skogsøy (S), Geitingen (G), Rossøy (R), Odden (O) and Kråka (K) are as follows:

Loc. H1.
Dominance of *Nardus stricta* and *Juncus squarrosus. Empetrum nigrum, Juniperus communis.* Flat. Relatively little grazed. Pitfalls beneath the junipers. Wet habitat.
Loc. H2.
Nardus (90%) and *Juncus squarrosus, Eriophorum angustifolium, Empetrum, Juniperus,*

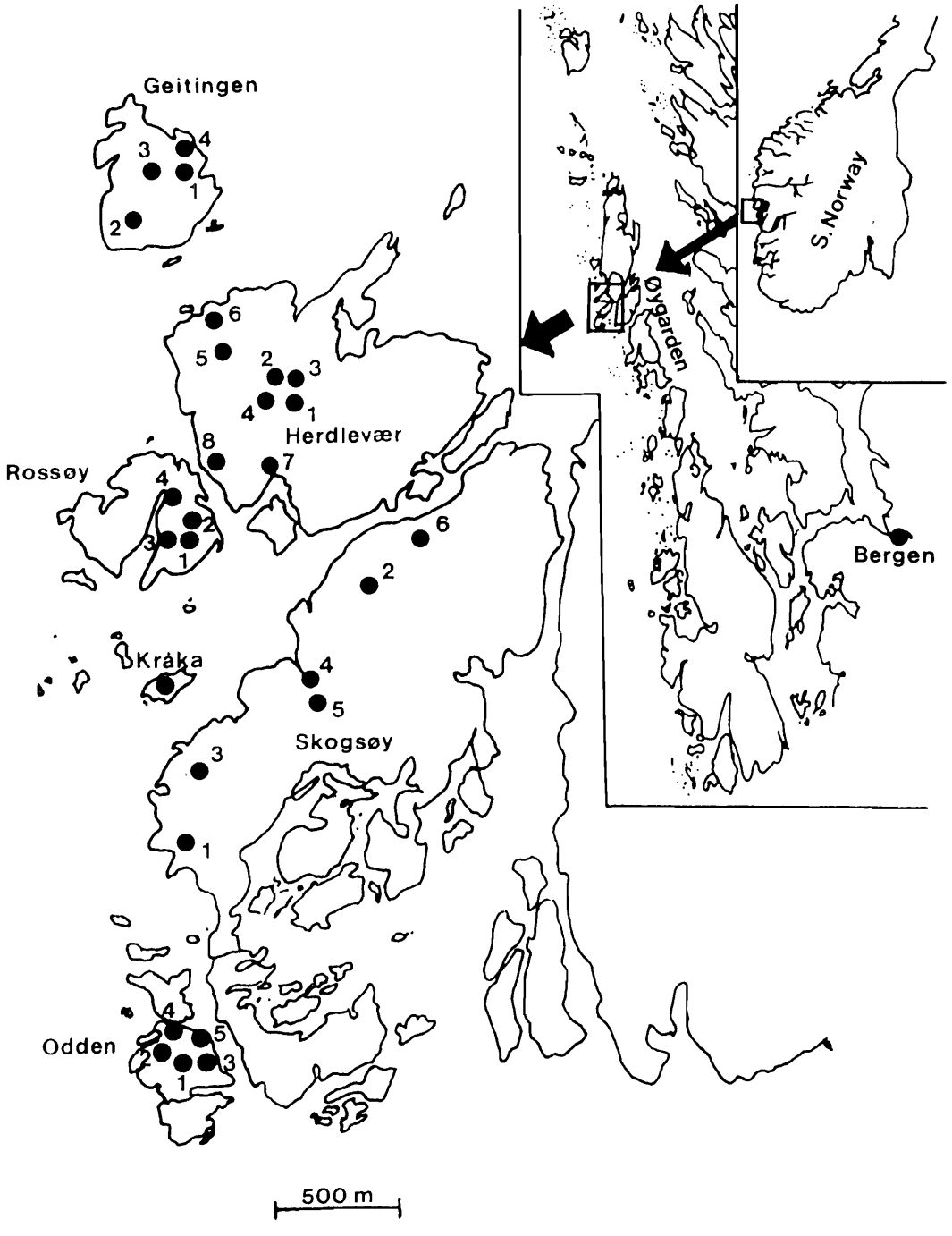

Fig. 1. the sampling sites on the islands of Herdlevær (H1—H8), Skogsøy (S1—S6), Geitingen (G1—G4), Rossøy (R1—R4), Odden (O1—O5) and Kråka (K).

Calluna vulgaris (scarce). *Hypnum jutlandicum.* Flat, partly drained atlantic highmoore. Wet habitat.

Loc. H3.

Nardus (60%) and *Empetrum. Juncus, Deschampsia flexuosa, Juniperus. Calluna* (scarce). *Cladonia* spp. and *Polytrichum* sp. Wind exposed N-faced hill. Very dry habitat in some periods.

Loc. H4.

Nardus (90%) and *Juncus. Eriophorum, Agrostis tenuis, Carex panicea, Sedum* sp., *Polytrichum, Leucobryum glaucum.* Sheltered in 2 m deep cleft. Relatively dry habitat.

Loc. H5.

Transition zone of atlantic highmoore and *Nardus/Juncus* association. The mire dominated by *Eriophorum* spp. and *Calluna* and *Empetrum.* Elsewhere: Abundance of *Calluna* and some *Juniperus, Empetrum.* Little grazed. Dry to wet habitat (variable).

Loc. H6.

Calluna (60%), eroded flecks dominated by *Cladonia* spp. and *Hypnum jutlandicum* (grazed). Some *Empetrum* and *Nardus.* Top of hill, previously cultivated. Medium wet habitat.

Loc. H7.

Beach meadow in sheltered bay. Dominance of *Festuca rubra* and *Rumex longifolius* and *Dactylus glomerata.* Boulders. Little grazed. Wet habitat.

Loc. H8.

Nardus heath. *Juncus* abundant. *D. flexuosa, Molinia caerula. Hypnum, Dicranum, Leucobryum, Plagiotecium undulatum.* Wind exposed W-faced slope. Relatively wet habitat.

Loc. S1.

Dominance of *Nardus* and *D. flexuosa, Agrostis, Juncus.* Some *Empetrum, Vaccinium vitis-idae. Hypnum jutlandicum* in the ground cover. Exposed top of hill. Heavily grazed. Relatively dry habitat.

Loc. S2.

Sheltered at the base of W-faced rock wall. *Calluna* (50%) and *Nardus. Juncus, D. flexuosa, Erica tetralix,*

Blechnum spicant, Juniperus. Hypnum jutlandicum abundant. Little graced. Medium wet habitat.

Loc. S3.

N-faced slope, transition zone towards a mire. Dominance of *Empetrum. Erica, Eriophorum, Juncus, Calluna* (scarce). *Hypnum jutlandicum* and *Sphagnuum* spp. in the ground cover. Wet habitat.

Loc. S4.

Beach meadow in bay. Dominated by grass, mainly *Festuca rubra. Agrostis tenuis, Juncus gerardi, Cochlearia officinalis.* Boulders. Mosses sparse. Intensive grazing. Wet habitat.

Loc. S5

Spruce plantation. *(Picea sitkensis).* No vegetation beneath the spruces. Relatively wet habitat.

Loc. S6.

Sheltered at the base of NW-faced rock wall. Overgrown by *Nardus* (dominating), *D. flexuosa, Juncus, Carex binervis, Festuca vivipara.* Some *Empetrum, V. vitis-idae* and *Juniperus. Hylocomium splendens, Hypnum jutlandicum* and *Sphagnuum* sp. Wet habitat.

Loc. G1.

Transition zone of atlantic highmoore and *Calluna* heath. Sheltered at the edge of the E-faced mire. Dominance of *Eriophorum vaginatum* and *Calluna. Vaccinium myrtillus, V. vitis-idea, Erica, Cornus suecica. Hylocomium splendens* and *Polytrichum.* Wet habitat.

Loc. G2.

Wind exposed W-faced hill with lots of bird deposites. Dominance of *D. flexuosa. Nardus, Juncus, Carex nigra, Potentilla erecta, Trientalis europaea, Luzula campestris, Lotus corniculatus.* Previously grazed. Relatively dry habitat.

Loc. G3.

Calluna heath on dark N-faced slope. Abundance of *Juniperus, Salix repens* and *V. myrtillus. D. flexuosa, Erica, Vaccinium uliginosum, V. vitis-idae* and *Empetrum.* Medium dry habitat.

Loc. G4.

Beach meadow sheltered in bay. Shellsand, well drained. *Plantago maritima, Triglochium maritima, Armeria maritima, Rumex longifolius, Leontodon autumnalis.* Relatively dry habitat.

Loc. R1.

Transition zone of atlantic highmoore and *Nardus* heath. At the edge of the mire, N-faced, shaded. Plant association similar to *R3,* but more *Juncus.* Also: *Eriophorum squarrosus.* Wet habitat.

Loc. R2.

E.faced slope. Similar to *R3,* but more pure *Nardus* heath. Relatively dry habitat.

Loc. R3.

W-faced slope with *Nardus* (90%). *Trientalis europaea. Poptentilla erecta, Oxyococcus*

quadripetalus, Erica, Carex pilulifera, D. flexuosa. Relatively wet habitat.
Loc. R4.
Beach meadow sheltered in bay. Strongly influence of haline water. Dominance of *Potentilla anserina* and *Stellaria media.* Also: *Festuca rubra, Poa* spp., *Taraxacum, Circium palustre, Rumex acetocella, Cochlearia officinalis.* Medium dry habitat.
Loc. O1.
Sheltered in depression. *Calluna, Nardus, Carex binervis, Succisa pratensis, Potentilla erecta* and *V. uliginosum.* Wet habitat.
Loc. O2.
Wind exposed hill with abundance of bird deposites. Dominance *D. flexuosa/Rumex acetocelia* (90%). *Cochlearia officinalis, Armeria maritima, Lotus corniculatus.* Relatively dry habitat.
Loc. O3.
Flat, open. *Calluna* (70%) and *Empetrum* (10%). *D. flexuosa, Erica, Potentilla erecta, Trientalis, Juniperus, Rubus chaemaemorus.* Relatively wet habitat.
Loc. O4.
Wind exposed hill with bird deposites. Dominated by *Armeria maritima, R. acetocella, Sedum anglicum, Poa trivialis, Cochlearis, Melandrium rubrum, Aira praecox, Lotus corniculatus, Plantago maritima.* Relatively dry habitat.
Loc. O5.
Wind exposed with bird deposites. A mosaic of several of the plant species listed above. Relatively dry habitat.
Loc. K.
An islet with soil and vegetation in small crevices. Lots of bird deposites. Luxurious flora in early summer. Dominance of *Rumex longifolius, Sedum rosea* and *Cochlearia.* Also: *Angelica sylvestris, Ranunculus acris, Festuca rubra, Armeria maritima, Matricaria inodora.* Medium wet habitat.

Pitfall traps were used. On the two largest islands, Herdlevær and Skogsøy (Loc. H1-H8 and Loc. S1-S6), trapping was continuous from April 1982 to May 1983. During this period the traps were emptied 18 times. The phenology of the species based on these catches, as well as the description of the traps and sampling procedure, is presented separately (Hauge et al. in press). On the four minor islands, Geitingen, Rossøy, Odden and Kråka, trapping was continuous from June to September 1982.

The material is deposited in the collections of the Zoological Museum, Bergen.

RESULTS AND DISCUSSION

The adult spiders caught on the six islands are listed in Table 1—6.

Comments on some of the species.

The range of the number of species found on the smallest island (Kråka, 18 species) and the largest island (Skogsøy, 73 species) is 55 (Tables 1—6). Hauge, Bruvoll & Solhøy (1990) found that the total number of species per island, as well as the number of species per locality per island, were highly correlated with the size of the islands, indicating an «island effect», according to the theories of island colonization (MacArthur & Wilson 1967).

The majority of the species found on these islands (88 species of a total of 91) were caught on either one or both of the two largest islands (Table 1 and 2). The contribution of the four smallest islands of «new» species in the total list was thus only 3 species. The shorter trapping period on the smaller islands may partly explain this.

On the other hand, even the islands of Herdlevær and Skogsøy had only 48 species in common, indicating that 40 species (45%) were absent from one of these two largest islands. Many of these «missing» species were relatively infrequent or among the less dominant ones in the material. From the total species caught on Herdlevær and/or Skogsøy 50 of them were present in our material with less than 10 specimens. Some of these species might be regarded as occasional guests in these open areas, reaching their optimal population density in other habitats, for instance in neighbouring woods. *Microneta viaria* and *Cryphoeca silvicola* are perhaps examples of this category, as well as *Stemonyphantes lineatus* (see discussion below). *C. silvicola,* however, relatively frequent and locally abundant in forests in Norway (Hauge, Meidell & Solhøy in prep.), was fairly common in open areas on Shetland (Ashmole 1979). Other species, for instance *Oedothorax fuscus, Halorates reprobus, Lepthyphantes tenuis* and *Antistea elegans* were obviously associated with damp places and under such optimal conditions may be quite abundant, as were *D. fuscus* and *Savignya frontata* at localities S4 and H7, but were absent elsewhere. Humid places are probably also favoured by *Centromerita bicolor* in this area, at least compared to *C. concinna,* which seems to be more associated with somewhat less humid places.

TABLE 1.
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF HERDLEVÆR (LOC.H1-H8).
N = TOTAL NUMBERS.

Species	H1	H2	H3	H4	H5	H6	H7	H8	N
Ceratinella brevis	-	-	-	-	-	1	-	-	1
C.brevipes	-	-	-	-	10	8	-	5	23
Walckenaeria nodosa	39	3	5	7	23	5	1	3	96
W.nudipalpis	-	-	-	-	-	-	-	7	7
Gonatium rubens	-	-	-	-	3	-	2	-	5
Dismodicus bifrons	15	8	-	-	7	-	-	-	30
Hypomma bituberc.	3	2	-	-	8	-	-	-	13
Gongylidiellum vivum	1	-	1	-	19	7	-	43	71
Oedothorax fuscus	-	4	-	-	-	-	207	1	212
Silometopus elegans	11	20	-	-	9	-	8	5	53
S.ambiguus	-	1	-	-	1	-	2	-	4
Savignya frontata	-	-	-	-	-	-	121	-	121
Cneph. obscurus	6	18	1	-	26	-	1	-	52
Peponocr. ludicrum	-	-	-	1	-	1	-	3	5
Pocadicnemis pumila	-	-	-	-	10	-	-	-	10
Micrargus herbigr.	4	-	5	50	33	9	1	-	102
Tapinocyba pallens	-	15	-	-	-	-	-	-	15
Tiso vagans	-	1	18	-	-	2	-	16	37
Erigonella hiemalis	-	-	-	1	-	-	1	-	2
Diploceph. permixtus	-	-	1	-	-	-	-	-	1
D. cristatus	-	-	-	-	-	-	4	-	4
Typhocrestus digit.	-	-	11	1	-	-	-	-	12
Erigone atra	-	-	2	-	-	-	3	-	5
E.promiscua	-	-	15	-	-	-	8	-	23
Notiomaso uncatus	-	2	-	-	2	-	3	-	7
Hilaira hardyi	-	3	21	-	2	1	-	-	27
Halorates reprobus	-	-	-	-	-	-	2	-	2
Agyneta conigera	39	1	32	18	7	17	-	-	114
A.decora	2	38	28	-	20	18	-	1	107
A.cauta	-	-	1	-	4	1	-	-	6
Meioneta beata	1	10	-	-	-	-	-	15	26
Porrhomma montanum	-	-	-	-	1	-	-	-	1
P.pallidum	-	-	-	-	-	1	-	1	2
Centromerus prudens	1	-	3	9	-	-	-	-	13
C.arcanus	1	-	-	-	-	-	-	-	1
Centromerita bicolor	86	11	-	-	-	-	99	1	197
C.concinna	127	84	349	168	144	280	13	211	1376
Saaristoa abnormis	-	-	-	8	-	-	-	-	8
Poeciloneta globosa	28	7	43	20	9	11	-	19	137
Tapinopa longidens	-	1	-	-	-	-	-	-	1
Bathyphantes gracil.	3	1	-	8	-	-	-	-	12
Bolyphantes luteol.	30	4	18	27	17	13	5	7	121
Lepthyphantes mengei	82	2	61	11	37	92	9	255	549
L.tenuis	-	-	-	1	-	-	21	-	22
L.zimmermanni	-	-	-	29	-	1	3	-	33
L.ericaeus	245	116	175	66	199	320	15	108	1244
Allomengea scopigera	-	3	-	-	-	-	1	-	4
Robertus scoticus	-	-	-	2	-	-	-	-	2
R.arundineti	2	35	-	-	-	-	-	-	37
Pachygnatha degeeri	41	244	-	-	24	-	1	2	312

Species	H1	H2	H3	H4	H5	H6	H7	H8	N
Textrix denticulata	1	-	-	-	-	-	-	-	1
Pardosa pullata	181	405	-	1	247	156	-	16	1006
P.nigriceps	3	-	-	-	56	1	-	-	60
P.palustris	28	14	54	-	5	50	3	41	195
Trochosa terricola	-	1	-	12	247	149	-	14	423
Pirata piraticus	-	4	-	-	-	-	-	-	4
Xysticus cristatus	-	-	14	-	1	8	-	7	30
Zelotes subterraneus	-	-	1	-	-	-	-	-	1
Clubiona trivialis	1	-	-	-	-	-	-	-	1
Scotina gracilipes	3	-	1	-	1	3	-	-	8
Ero furcata	-	-	-	-	1	-	-	-	1
Segestria senoculata	-	-	3	-	-	-	1	1	5
No.of specimens	983	1058	863	440	1173	1155	535	782	6989
No.of species	27	29	24	19	30	24	25	23	62
Two most dominating species' % of total	43	61	61	53	42	52	61	60	37
Three most domin. species' % of total	56	72	67	65	59	66	80	73	52
Four most domin. species' % of total	65	80	74	71	71	78	83	79	60

TABLE 2.
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF SKOGSØY (LOC.S1-S2).
N = TOTAL NUMBERS.

Species	S1	S2	S3	S4	S5	S6	N
C.brevipes	13	14	3	-	2	1	33
Walckenaeria antica	-	2	3	2	1	-	8
W.nudipalpis	10	12	16	1	27	16	82
W.acuminata	34	27	-	-	7	17	85
W.cuspidata	-	-	-	-	9	-	9
Gonatium rubens	75	25	5	9	-	2	116
Dismodicus bifrons	1	2	-	-	2	5	10
Hypomma bituberculatum	-	-	-	-	1	-	1
Dicymbium nigrum	1	-	1	2	-	11	15
Gongylidiellum vivum	29	6	-	21	-	2	58
Silometopus elegans	-	-	-	6	-	6	12
Savignya frontata	-	-	-	28	-	-	28
Cnephalocotes obscurus	2	2	-	-	-	3	7
Peponocranium ludicrum	1	-	1	-	-	-	2
Pocadicnemis pumila	-	-	-	-	1	5	6
Minyriolus pusillus	-	1	14	-	4	1	20
Tiso vagans	124	13	-	1	-	41	179
Metopobactrus promin.	-	-	-	1	-	-	1
Tapinocyba pallens	1	-	-	-	122	-	123
Evansia merens	-	1	-	-	-	-	1
Monocephalus castaneipes	-	-	-	-	-	1	1
Araeoncus crassiceps	-	2	-	-	-	-	2
Erigonella hiemalis	90	-	25	-	1	43	159
Diplocephalus permixtus	1	5	-	-	-	-	6
Typhocrestus digitatus	2	-	-	-	-	-	2
Erigone promiscua	-	-	40	-	-	-	40
Hilaira hardyi	10	-	-	-	-	-	10
Agyneta conigera	11	18	33	9	25	20	116
A.decora	-	-	1	-	-	2	3

Species	S1	S2	S3	S4	S5	S6	N
A.cauta	-	13	2	2	108	-	125
Meioneta beata	1	-	3	-	-	1	5
Micronета viaria	-	-	1	-	-	-	1
Porrhomma montanum	3	-	-	-	1	-	4
P.pallidum	1	-	-	-	3	1	5
P.convexum	-	-	-	-	4	-	4
Centromerita bicolor	-	-	-	14	-	-	14
C.concinna	390	84	63	4	6	90	637
Saaristoa abnormis	-	1	3	1	-	1	6
Poeciloneta globosa	16	-	2	1	2	1	22
Stemonyphantes lineatus	1	1	-	-	34	-	36
Bathyphantes gracilis	-	-	2	-	-	1	3
Bolyphantes luteolus	19	2	5	-	2	4	32
Lepthyphantes mengei	20	48	155	6	2	56	287
L.zimmermanni	40	35	41	4	8	101	229
L.ericaeus	143	145	99	2	117	83	589
L.obscurus	-	-	3	-	-	-	3
L.cristatus	-	-	-	-	-	1	1
Allomengea scopigera	-	-	-	3	-	-	3
Episinus angulatus	-	-	-	-	1	-	1
Robertus scoticus	-	2	29	-	-	2	33
R.arundineti	-	-	9	-	-	1	10
R.lividus	7	-	3	-	4	-	14
Pachygnatha degeeri	4	31	67	3	-	68	173
Cryphoeca silvicola	-	-	-	-	-	3	3
Hahnia helveola	-	-	-	1	-	1	2
H.pusilla	-	28	-	-	-	8	36
Antistea elegans	-	1	-	-	-	-	1
Pardosa pullata	14	144	109	46	13	209	535
P.nigriceps	51	60	91	10	90	19	321
Trochosa terricola	25	32	15	15	7	21	115
Pirata piraticus	-	-	2	-	-	-	2
Alopecosa pulverulenta	-	-	3	1	-	-	4
Xysticus cristatus	6	1	-	2	-	-	9
Micaria silesiaca	-	-	-	4	-	-	4
Drassodes cupreus	5	-	5	-	1	-	11
Haplodrassus signifer	8	1	-	1	1	-	11
Zelotes subterraneus	-	-	-	3	-	-	3
Phrurolithus festivus	-	4	-	25	-	-	29
Clubiona trivialis	-	-	-	-	2	-	2
Euophrys erratica	1	3	-	5	-	-	9
Ero furcata	-	2	-	-	-	-	2
Segestria senoculata	-	-	-	1	1	1	1
No.of specimens	1160	772	854	234	609	849	4488
No.of species	35	35	33	32	32	37	73
Two most dominating species' % of total	46	37	31	32	39	37	27
Three most dominating species' % of total	57	48	43	42	57	47	39
Four most dominating species' % of total	65	56	53	51	72	57	47

The real importance, in terms of numerical abundance, of some species in the area may have been obscured because of the use of only one sampling method — pitfall trapping. One example is perhaps *Minyriolus pusillus,* sometimes relatively abundant but obviously not travelling much around (see Merrett 1983, Hauge et al. 1990). Other species may be overrepresentated in the pitfalls, for instance the lycosids.

Some successful and typical inhabitants of this open landscape are *Lepthyphantes mengei, L. ericaeus, Centromerita concinna, Pachygnatha degeeri* and *Pardosa pullata.* In particular *L. ericaeus,* together with *Gongylidiellum vivum* and *Pardosa nigriceps,* should

TABLE 3
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF ROSSØY (R1-R4). N = TOTAL NUMBERS.

Species	R1	R2	R3	R4	N
Ceratinella brevipes	-	1	2	-	3
Walckenaeria antica	5	8	16	4	33
W.acuminata	-	-	2	1	3
W.nodosa	-	-	-	1	1
W.nudipalpis	4	3	4	1	12
Gonatium rubens	4	4	10	-	18
Gongylidiellum vivum	-	3	-	-	3
Savignya frontata	-	-	-	12	12
Cnephalocotes obscurus	2	3	1	-	6
Peponocranium ludicrum	1	-	1	-	2
Metopobactrus prominulus	-	-	1	-	1
Silometopus elegans	9	-	-	13	22
Araeoncus crassiceps	1	-	-	-	1
Erigonella hiemalis	9	4	-	-	13
Erigone promiscua	-	-	-	1	1
Agyneta cauta	10	-	16	-	26
A.conigera	10	9	3	-	22
A.decora	-	8	12	20	40
Porrhomma pallidum	-	-	-	1	1
Centromerita concinna	1	12	8	3	24
Poeciloneta globosa	-	1	2	-	3
Saaristoa abnormis	-	-	-	2	2
Bathyphantes gracilis	-	-	1	-	1
Bolyphantes luteolus	-	-	-	1	1
Lepthyphantes mengei	10	7	-	2	19
L.zimmermanni	-	-	-	2	2
L.tenuis	-	-	-	5	5
L.ericaeus	4	3	1	1	9
Pardosa pullata	132	213	217	46	608
P.palustris	-	8	9	1	18
Pirata piraticus	5	-	1	5	11
Trochosa terricola	44	19	54	5	122
Robertus lividus	1	2	-	1	4
Pachygnatha degeeri	137	91	77	10	315
Xysticus cristatus	-	2	-	-	2
Haplodrassus signifer	-	-	3	-	3
No. of specimens	389	401	441	138	1369
No. of species	18	19	21	22	36
% of 2 most dom. species	69	76	67	48	67
" " 3 " " "	80	81	79	57	76

be regarded as characteristic species of heathland in West Norway. *L. ericaeus* is common also on Shetland, present in all eastern parts of this north-atlantic area, also on the Isle of Muck (Inner Hebrides) (Dobson 1986), but absent from Iceland and Greenland (Ashmole 1979, Appendix). In Norway, it is distributed at least as far north to the Lofoten islands (latitude 68) (Ashmole & Planterose 1979). Further more it is relatively abundant in west Norwegian heathland, as determined by quadrat sampling and funnel extraction (Hauge 1976), and also frequent in sand dunes in both south Sweden (Almquist 1978) and Britain (Duffey 1968). *G. vivum,* on the other hand, was according to Ashmole

TABLE 4.
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF GEITINGEN (G1-G4). N = TOTAL NUMBERS.

Species	G1	G2	G3	G4	N
Ceratinella brevipes	1	-	3	-	4
Walckenaeria antica	-	3	9	-	12
W.nudipalpis	2	-	2	-	4
W.cuspidata	2	-	1	-	3
Gonatium rubens	13	16	8	-	37
Hypomma bituberculatum	1	-	-	-	1
Peponocranium ludicrum	1	1	3	1	6
Tiso vagans	-	65	-	-	65
Erigonella hiemalis	-	8	-	-	8
Micronета viaria	1	-	-	-	1
Agyneta cauta	3	-	-	-	3
A.conigera	8	10	18	-	36
A.decora	4	14	1	-	19
Centromerus arcanus	2	-	6	-	8
Centromerita concinna	3	20	10	7	40
Saaristoa abnormis	2	-	-	-	2
Poeciloneta globosa	-	-	-	1	1
Bolyphantes luteolus	2	-	-	-	2
Lepthyphantes mengei	6	-	22	2	30
L.zimmermanni	4	-	10	-	14
L.ericaeus	1	10	11	1	23
Pardosa pullata	53	19	10	58	140
P.palustris	-	9	-	1	10
P.nigriceps	127	99	143	132	501
Trochosa terricola	18	4	14	2	38
Thenoe minutissima	-	-	3	-	3
Pachygnatha degeeri	4	37	-	6	47
Xysticus cristatus	-	2	-	-	2
Oxyptila trux	1	-	-	-	1
Micaria silesiaca	-	-	-	4	4
Drassodes cupreus	6	2	8	1	17
Zelotes subterraneus	-	-	-	21	21
No. of specimens	265	319	282	237	1103
No. of species	23	16	18	13	32
Two most dominating species' % of total	68	51	59	80	58
Three most dominating species' % of total	77	63	65	89	64

(1979), not recorded from any of the Atlantic islands, except for a single specimen from the Faroes, and another one from the Isle of Muck (Inner Hebrides) (Dobson 1986). Since then there have been 5 additional records (but few specimens) from the Faroes (Bengtson & Hauge 1979). According to the data of Duffey (1968) and Hauge (1976) the species seems to prefer habitats with medium humidity. In contrast to *L. ericaeus,* it was absent from the material of Almquist (1973). According to Hauge (1976, Table VII-IX) *G. vivum* seems to be scarce in pitfall material compared with its real abundance in the area.

Pardosa nigriceps was found to be locally distributed on Shetland (Ashmole 1979).

TABLE 5.
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF ODDEN (01-05).
N = TOTAL NUMBERS.

Species	01	02	03	04	05	N
Ceratinella brevipes_	-	-	3	-	-	3
Walckenaeria antica	-	7	3	-	-	10
W.nudipalpis	-	-	1	-	-	1
Gonatium rubens	2	-	5	-	-	7
Gongylidiellum vivum	1	1	-	-	-	2
Cnephalocotes obscurus	-	-	7	-	-	7
Tiso vagans	-	2	-	-	-	2
Araeoncus crassiceps	-	1	1	1	1	4
Erigonella hiemalis	4	-	-	-	-	4
Agyneta conigera	1	-	6	-	-	7
Centromerita concinna	-	3	1	1	2	7
Poeciloneta globosa	2	5	10	-	8	25
Bathyphantes gracilis	8	-	-	-	-	8
Lepthyphantes mengei	12	14	17	-	1	44
L.zimmermanni	-	-	1	-	-	1
L.ericaeus	2	25	43	-	1	71
Pardosa pullata	19	14	1	-	-	34
P.nigriceps	84	38	225	-	1	348
Pirata piraticus	1	1	-	-	1	3
Trochosa terricola	2	13	7	1	-	23
Robertus scoticus	-	-	1	-	-	1
Pachygnatha degeeri	76	7	1	1	-	85
Xysticus cristatus	-	6	-	22	3	31
Micaria decorata	-	1	-	4	-	5
Drassodes cupreus	14	12	10	-	-	36
Zelotes subterraneus	-	-	-	2	-	2
Clubiona trivialis	-	3	-	-	-	3
Euophrys erratica	-	-	-	-	5	5
No. of specimens	228	153	343	32	26	779
No. of species	14	17	18	7	9	28
Two most dominating species' % of total	70	41	78	81	50	56
Three most dominating species' % of total	79	50	81	88	62	65

Our data supports this observation (Tables 1—6, see also discussion below). *Lepthyphantes mengei,* denoted as uncommon but widespread on Shetland (Ashmole 1979), subsequently reported from the Faroes (Bengtson & Hauge 1979), was frequent and in some of our sampling sites relatively abundant, even on the smallest islands (Tables 3—6). It also seems to be relatively abundant both in pitfalls and in quadrat samples (Hauge 1976), but is obviously most active during the late autumn and winter months (Hauge & al. in prep.). The species is widespread in Norway north to Troms (Hauge 1979), and is found on high ground in south Norway (Finse) (Hauge & Ottesen in prep.) as well as in areas with severe climatic conditions in northern Sweden (Holm 1950) and Finland (Palmgren 1975).

Trochosa terricola and *Pachygnatha degeri* were also frequent. However, both species vary in dominance much more from one locality to another, than does *L. mengei;* perhaps indicating narrower ecological range for the two species. Their known distribution is restricted to south Norway north to Trøndelag. Within this area *T. terricola,* at least, is widespread and very common, also in forest

TABLE 6.
SPIDERS (ADULT SPECIMENS) FROM THE ISLAND OF KRÅKA (K). N = TOTAL NUMBERS.

Species	N
Walckenaeria antica	1
Dismodicus bifrons	4
Hypomma bituberculatum	1
Metopobactrus prominulus	1
Silometopus elegans	2
Erigone promiscua	20
Typhocrestus digitatus	1
Centromerita concinna	2
C.bicolor	3
Poeciloneta globosa	17
Bolyphantes luteolus	1
Lepthyphantes mengei	1
L.zimmermanni	2
L.tenuis	1
Pardosa pullata	3
Pirata piraticus	25
Xysticus cristatus	1
Euophrys erratica	28
No. of specimens	108
No. of species	18
Two most dom. species' % of total	42
Three most dom. species' % of total	62
Four most dom. species' % of total	78

habitats. In Sweden it is distributed as far north as Ångermannland (Holm 1947); about the same latitude as Trøndelag. However, neither species have been recorded in the alpine areas of south Norway, except for one male of *P. degeeri* at about 1200 m a.s.l. in the area of Hallingsskarvet (Cooke 1967), nor have they been recorded from Iceland (Ashmole 1979). *P. degeeri* does not seem to have reached the Faroes either (Ashmole 1979), and *T. terricola* is obviously very scarce both on the Faroes and on Shetland (Ashmole 1979, Bengtson & Hauge 1979). These islands may be beyond their north-western limit of distribution.

Peponocranium ludicrum seems to have an even more restricted area of distribution than the latter two species. This species seems to be absent from all the North-Atlantic islands (Ashmole 1979), including Orkney (Locket & al. 1974), but present on the Isle of Muck of the Inner Hebrides (Dobson 1986). Otherwise it is widespread in most parts of the British mainland and obviously common in open coastal areas of Western Europe; «eine atlantische Verbreitung» (Wiehle 1960). Almquist (1973) found the species in all sites sampled. The species seems to be well established on the western coast of south Norway (Hauge 1976, 1980), and in the north-eastern areas it has reached the southern coast of Finland (Palmgren 1976). The species obviously prefers relatively dry habitats (Palmgren 1976, Hauge 1976), which probably are not among the most common ones in the North Atlantic. By comparison *Robertus arundineti,* obviously locally fairly abundant in some humid habitats of west Norway (Hauge 1976), should regarded as a member of the so-called «hygrophilous» species; it is common and widely distributed in the Atlantic (Ashmole 1979).

Very common and successful in the Øygarden area is *Lepthyphantes zimmermanni* (see Ashmole 1979). It is widespread in the British Isles (Locket & Millidge 1953) as well as in southern Norway, probably most common in the western areas (Hauge, Meidell & Solhøy in prep.), and is distributed at least as far north as the Lofoten islands in Northern Norway (Ashmole & Planterose 1979). In Øygarden (Table 1—6) it is relatively frequent, variable in abundance, but locally fairly dominant (Loc. S6). It was for instance totally absent from the area intensively sampled by Hauge (1976) at Lindås in similar habitats. In Norway the species has been found occasionally on relatively high ground, for example in the Vassfaret area (Hauge & Wiger 1980), but not above the timber line.

L. zimmermanni has been found on relatively high ground on Shetland (Ashmole 1979), as was *Poeciloneta globosa.* The latter has been recorded from mountainous areas in Britain (Lockett & Millidge 1953) and Norway (Kauri 1966, Hauge & Refseth 1979), and has been reported from more continental areas of SE Norway, such as Elverum, Rendalen and Hemsedal (Strand 1899, Hauge & Kvamme 1983) and from the coastal parts of Nord-Trøndelag, probably the most northern record of this species, indicating a large ecological range. *P. globosa* is evidently com-

mon and successful also on the other atlantic islands (see Ashmole 1979; Appendix). It is therefore somewhat puzzling that it was not recorded from Iceland (Ashmole 1979).

Almost the same may be said about *Bolyphantes luteous.* It is common in our samples, common and widespread in Norway north to Finnmark, and (in contrast to *P. globosa)* also recorded from above the tree line in the high mountain areas of Southern Norway (Hauge 1989).

Gonatium rubens, on the other hand, was reported as «common» also in Iceland, as well as in the whole north atlantic area (Ashmole 1979, Appendix), and also in the Øygarden area (Tables 1—6). It is widespread in Norway (at least up to Northern Nordland), being found in a variety of habitats (also in woods), but should primarily be regarded as an open land species (in contrast to *G. rubellum).* Locally it is also abundant in the high mountain areas of Southern Norway. Thus a very successful species with a wide ecological range.

Much the same may also be said about *Walckenaeria nudipalpis,* relatively frequent in our samples, and obviously also successful in the north-atlantic area (Ashmole 1979). The species is regarded by some authors (among them Dumpert & Platen 1985) as hygrophilous/hygrobiontic. It has been recorded from most parts of the country up to Northern Nordland, in coastal habitats as well as on relatively high ground and in the inner continental areas of SE Norway (Kauri 1966, Waaler 1972, Hauge & Refseth 1979, Hauge & Wiger 1980, Tveit & Hauge 1983, Hauge & Kvamme 1984), but in Norway never from areas above the tree line.

On the other hand, the more «rare» *W. nodosa* is hitherto recorded only twice in Norway; near Bergen (Andersen & al. 1980) and at Ringsaker in SE Norway (Waaler 1972). In addition three females were found in March 29th., 1971, on a farm in Fana, Bergen (T. Solhøy coll.). The species is classified as relatively common in Iceland (Ashmole 1976), a few specimens have been reported from the Faroes (Bengtson & Hauge 1979) and it is widespread (but obviously infrequent) in Britain (Locket at al. 1974). A few (but scattered) records in Finland (Palmgren 1976) and Sweden (Holm 1950) indicate a fairly wide and northern distribution (up to Lapland). A mainly northern distribution is also indicated for Britain (Locket & Millidge 1953). Compared with *W. nudipalpis* then, *W. nodosa* seems to have an equally wide distribution, but is obviously more ecologically specialized and therefore more local in occurrence. According to Palmgren (1976) also *W. nodosa* seems to prefer damp places. However, and it might be a coincidence, a glance through Table 1 and 2, leaves the impression (with the exception of loc. H8) that these two *Walckenaeria* species are replacing each other on the two largest islands, i.e. they do not seem to occur together on the same localities, *W. nudipalpis* is present on all localities on Skogsøy, *W. nodosa* on Herdlevær.

The same can be said about the two lycosid species, *Pardosa palustris* and *P. nigriceps.* The former is completely absent from the Skogsøy samples (Table 1), bur relatively common at Herdlevær (Table 2). Except for the high catches at H5, there seems to be a somewhat opposite trend for *P. nigriceps.* Both species should be regarded as common in this landscape, *P. nigriceps* even as a characteristic species. But a general trend for these two species in our material seems to be that high numbers of one of them is linked with scarcity or absence of the other. Does this has something to do with competition between two common and similar species? We can not answer the question. However, what we know is that *P. palustris* is an open land species which is said to be sensitive to an overhanging canopy in the vegetation, i.e. it prefers a completely open terrain. *P. nigriceps* probably is not so dependent on the absence of higher vegetation at the ground level. It has the habit of climbing in it (Ashmole 1979). In Norway *P. palustris* is widespread all over the country, from the sea level to open high mountain areas, sometimes very abundant, while *P. nigriceps,* on the other hand, seems to be restricted to the lowland and coastal areas and hitherto not registered north of Nord-Trøndelag. Therefore it is no surprise to register the greater success of *P. palustris* on the atlantic islands (Ashmole 1979, Appendix).

A similar relation of any of these two lycosids to the third one *(P. pullata)* is not clear. *P. pullata* is probably the most common lycosid species in the Øygarden area (Tables 1—6). It has a pronounced variation in abundance from locality to locality. The reason for this is obscure, but it seems to be rarer in localities that are relatively dry or highly

wind-exposed as well as in beach meadows, but also in the most sheltered places (H4 and S5).

Some general zoogeographical remarks

The nearest and the main source of species to our coastal islands should, without doubt, be the Norwegian mainland from where there are hardly any difficulties for most spider species to reach these islands. This in sharp contrast to what is generally accepted concerning more remote places such as Shetland, the Faroes and Iceland. Ashmole (1979) indicates a somewhat similar close connection between Orkney and the Scottish mainland, with the reservation that the spider fauna of Orkney still is very poorly investigated, comprizing 12% of the British Isles total (Ashmole 1979, Table 6).

When adding to that table the new species recorded from the Faroes (Bengtson & Hauge 1979) and three species new to Iceland (Hauge & Bengtson unpublished), the total on Shetland, the Faroes and Iceland as a percentage of the total on the British Isles are now 15%, 11%, and 15%, respectively. The corresponding figure form our catches compared to the Norwegian total (see Hauge 1989) is about 17%. This last mentioned figure should probably be regarded as too low, as our material is the result of pitfall trapping only, while Ashmole's figures include material obtained by other methods as well. If we for instance include 18 additional species collected by Hauge (1976) in similar habitats we are ending up with 21% of the Norwegian total number of recorded species.

Hauge (1976) collected spiders in Lindås, NE of Øygarden, but probably in somewhat less exposed localities. This reminds us about the fact that increase in numbers of sampling sites within a given area or habitat type may increase the chances of detecting additional species. The question is then: Was pitfall trapping in eight and six sites on the islands of Herdlevær and Skogsøy, respectively, sufficient to have a correct estimate of the species present? Figure 2 indicates that the answer is no, or at least that a few more sampling sites should have been included. Perhaps sampling also should have been done over a longer span of time, as well as with the use of more varied sampling methods. The result would thus have been an increase in number of species, which would have increased the percen-

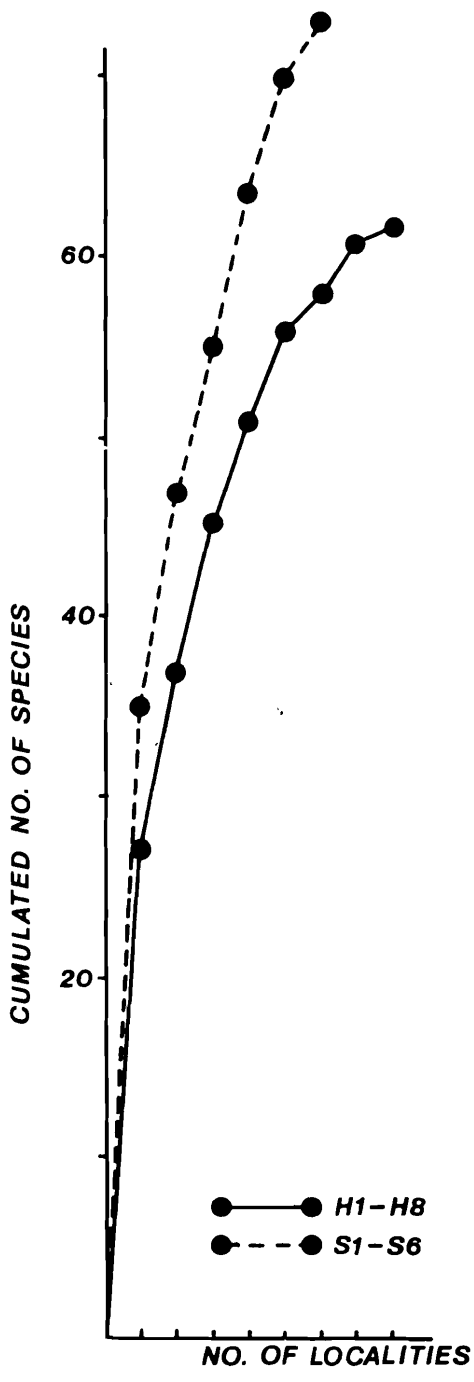

Fig. 2. Comulative numbers of species from eight localities on the island of Herdlevær (H1—H8) and six localities on the island of Skogsøy (S1—S6).

tage of the Norwegian total (see above), and in turn increased the gap between our sampling area and the Atlantic islands as concerns species diversity.

Not all of these additional species ought to be rare or little abundant in the area. The lists of Hauge (1976), for instance, contain species such as *Gongylidiellum latebricola* and *Zelotes latreillei,* relatively abundant in the heathland of Lindås, but absent in our material. It probably is of some importance that at Lindås (Hauge 1976) 74 species (in pitfalls + suction samples) were found within a small area where only two different habitat types were investigated, while 91 species was the total yield from 28 sampling sites on the six islands in the Øygarden area. Also, of the 109 species from these two areas (Øygarden and Lindås), they shared only 56 species (i.e. approximately 51%), which is somewhat similar to the 45% shared between Herdlevær and Skogsøy (see above).

Thus we are now starting to realize that there is a relatively rich and variable spider fauna in these open West Norwegian coastal habitats, even on these outermost and heavily exposed islands of the Øygarden area. The number of species (91) caught in our Øygarden localities exceeds the total known species from all the 4 atlantic islands listed by Ashmole (1979, Appendix). Besides, the total list from Shetland also includes some species which were defined by Ashmole (1979, Table 1) as so-called obligate montane species, totally absent from our lowland habitats. The 61 moorland species from Ashmole's Table 3 is therefore probably more comparable with our data, probably more correctly illustrating the real difference between Shetland and the coast of Norway. This difference is of course partly explained by the remoteness of the atlantic islands. There is another aspect as well: The forested areas in the island of Øygarden and their influence on the fauna of the open areas elsewhere (see discussion below).

The Øygarden localities and Shetland as a whole have approximately 55 species in common. The rest of the Shetland species (except for 6 species) are also recorded elsewhere in Norway, several of them in west Norway and some of them even in places similar to our Øygarden habitats. According to the theories of the colonizing of more remote places it is not very surprising that our sampling sites share only 31 and 33 species, respectively, with the Faroes and Iceland.

Ashmole (1979, Appendix) puts a question mark on the occurrence of *Gnaphosa leporina* and *Haplodrassus signifer* on Shetland. At least the latter seems to be relatively common in most parts of the North Atlantic. The former is fairly common in West Norwegian heather, and both are widespread in Norway, even up into the high mountain areas of S. Norway. *Drassodes lapidosus* is another (taxonomical) problem (see Locket & al. 1974). As far as we can see from the males in our material, it is the former subspecies, now *D. cupreus* (Blackwall), which is present in these West Norwegian areas; the females are still somewhat difficult to identify.

Altogether 36 species from Øygarden are not in the lists from Shetland. For some of them the explanation may be a certain association with forests. However, others should be regarded as typical open land species, for instance *Peponocranium ludicrum* and *Gongylidiellum vivum* (see discussion above). Lacking in the lists from Shetland are *Tapinocyba pallens* and *Minyriolus pusillus.* Both are very common and widespread in Norway and elsewhere in Fennoscandia, especially in woods, but have also proved to be quite abundant in west Norwegian heathland (especially *M. pusillus* (Hauge 1976)). Most understandable is the absence of *T. pallens* from Shetland. The presence of this species in Iceland (Ashmole 1979; Appendix) proves its ability to spread over long distances and to establish on this island, perhaps in the few Icelandic birch forests, a habitat which is practically absent from the other atlantic islands. In Northern Norway it seems to be very successful in such habitats (Hauge 1977) so there should probably be no macroclimatic reasons for its absence from Shetland and the Faroes. The data of Hauge (1977) also indicate that *M. pusillus* in these northern areas probably prefers more open, light exposed woods (it is a quite dark pigmented species), while the pale *T. pallens* was found to be more abundant in the darker and more closed part of the forest. In our material only two species, *Porrhomma convexum* and *Episinus angulatus,* are found exclusively on the only locality (S5) which should be regarded as a forested area, and only the latter should with some certainty be regarded as having some special affinity to wooded areas or to conifers. However, three other species, *Tapinocyba pallens, Agyneta decora,* and *Stemo-*

nyphantes lineatus, are abundant at this locality (see Tab. 1); significantly greater than their abundances elsewhere, to remind us of a very important factor: The presence of wooded areas in the Øygarden area (implanted spruces and natural stands of deciduous trees and pines) as a potentional source of enrichment and colonization of the nearby open areas. This in contrast to Shetland (as commented by Ashmole (1979)) and the other Atlantic islands.

The following species found in Øygarden have reached Iceland, but have not yet been registered on Shetland: *Walckenaeria cuspidata* (also found on the Faroes), *W. nodosa* (see discussion above), *Cnephalocotes obscurus* (absent from all other atlantic islands), *Lepthyphantes cristatus* (Iceland only), *Theonoe minutissima* (Iceland only, Hauge & Bengtson unpublished), and from the Lindås area (Hauge 1976): *Agyneta subtilis* (Iceland only) and *Maro lehtineni* (Iceland only). As was the case with *T. pallens* also, this list indicates that it is not only a question of being able to survive and establish in a suitable habitat.

However, it is also a question of selecting the right sampling site and season of the year. *W. cuspidata,* for instance, seems to have a wide ecological range. In Norway it is found in different habitats from almost all parts of the country, i.e. from the lowland up to the high mountain areas as well as in the north (Northern Troms). On the other hand, the species is most active in pitfall traps during a short period in late winter/early spring (Hauge & al. in prep.) and scarce during the rest of the year. It is therefore an example of a species which is likely to occur on Shetland. The lists of spiders on all the atlantic islands whould probably include a few more species if sampling times had been spread throughout the year. *Cnephalocotes obscurus,* recorded on Iceland only, lives under harsh climatic conditions in Øygarden (Table 4 and 6, Fig. 1). Allthough seldom very abundant it has a wide distribution in the nordic countries under different conditions, from sea level to relatively high in the mountains and is distributed quite far north (cf. Holm 1950), and like *T. pallens* is found in woods. Some authors, e.g. Tretzel (1952), regard this species as hygrophilous, Dumpert & Platen (1985) have designated it euryhygrophilous. They obviously consider it as a good disperser («Fadenflieger»), and even a pioner species. Why has this species not been recorded on the rest of the atlantic islands?

Some species obviously have their northern or north-western limit of distribution somewhere in this area simply due to change in general climatic factors towards higher latitudes. *Textrix denticulata,* has already been mentioned by Ashmole (1979) as a species close to its northern limit of distribution, and several other species are discussed by Hauge, & al. (in prep.). In this context we should perhaps also mention the scarcity of a whole group in this north-atlantic area, a thermophilous (sun-loving) family: the Salticidae.

Bengtson & Hauge (1979) found that two species, *Leptorhoptrum robustum* and *Lepthyphantes zimmermanni* the former absent from the present material, the latter common — constituted 51% of the total number of adult spiders included in their material from the Faroes. They concluded that the majority of the species should be regarded as «rare» according to their relatively abundances (but not neccessarily so according to their frequency). Referring to the theories of MacArthur & Wilson 1967), they suggested a relative high «turnover» of species, indicating that the spider fauna on the Faroes (and consequently the other atlantic islands) is still in an unstable state and that the postglacial colonization is not yet complete. Looking through our data from Øygarden (Tables 1—6) (pitfall material and thus comparable to that of Bengtson & Hauge (1979), there is hardly any difference: in the majority of our 28 sampling sites the two most dominant species comprise more than 50% of the total adult specimens in the material, and sometimes even much more. A few dominant species, in combination with a large group of less abundant species on the Faroes (and perhaps the other more remote atlantic islands) alone is no proof for a constant species «turnover» as suggested by Bengtson & Hauge (1979). At our latitudes this is quite normal. It is doubtful that the coastal islands in Øygarden represent unattaineble localities for immigrating spider species compared with the mainland. Here it is rather a question of establishing and surviving under the local conditions. The numbers of species present may rather depend on a combination of factors: size of the islands, habitat diversity and diversity in structure within each habitat, as indicated by Hauge at al. (1990), Hauge (1974, Fig. 3a) and Hauge (1977). Support for this is indicated in Tables 1—6: 1) There is a tendency for increasing importance (i.e. dominance in the pitfall catches) of fewer species with decreasing size of the island (ex-

cept for the smallest one, Kråka), both in regard to the total number of species on each island and each locality. Reservations should be applied to the significance of some of the localities where catchers were relatively small (loc. O4, O5, perhaps O2, as well as Kråka). 2) When regarding the two largest islands, Skogsøy and Herdlevær (Table 1 and 2), it seems clear that lumping together the numbers of specimens and numbers of species for each island in one column (N) results in relatively low values (27% and 37%, respectively, for the most dominant species) compared to the corresponding figures for each of the localities.

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Hydropsyche saxonica McLachlan, 1884 (Trichoptera, Hydropsychidae) new to Norway

TERJE BONGARD, JO VEGAR ARNEKLEIV, ARNE HAUG

Bongard, T., J. V. Arnekleiv, A. Haug. 1991. *Hydropsyche saxonica* McLachlan, 1884 (Trichoptera, Hydropsychidae) new to Norway. *Fauna norv. Ser. B 38:* 27—29.

Nineteen larvae of *Hydropsyche saxonica* McLachlan, 1884, were found in kick samples from the outlet brook of Lake Råvatn, Troms county, Northern Norway. This species is new to Norway. In addition, two larvae of *Beraeodes minutus* (Linnaeus, 1761), were found in kick samples from Lake Råvatn. This is a rare species with only 3 records from Southern Norway. Lake Råvatn has high pH and conductivity (8,14 and 154 μS/cm).

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MATERIAL AND METHODS

Three kick samples (Hynes 1961), each of one minute duration, were taken from lake Råvatn and its outlet brook, Troms county (map 1533 II, series M-711) on 12 August 1990. The mesh size of the net was 0,5 mm. The sample from the outlet brook (UTM 34W DB 342572), which is less than 1 meter wide an 10—20 cm deep, contained nineteen specimens of *Hydropsyche saxonica* McLachlan, 1884. This species is new to Norway.

In addition, two larvae of *Beraeodes minutus* (Linnaeus, 1761) were found in two kick samples from the littoral zone (UTM 34W DB 351574), and this species has only three previous findings in Norway (Aagaard & Hågvar 1987), all from the southern parts of the country.

The material is deposited at the Museum of Natural History and Archaeology, University of Trondheim.

RESULTS AND DISCUSSION

Head width measurements (maximum head width) of *H. saxonica* showed that the larvae were in 4th and 5th instar (Tab. 1).

Table 1. Head measurements (mm) of *Hydropsyche saxonica* McLachlan,1884 from Råvatnet, Troms county, Norway. 12 Aug. 1990.

	N	Range	Mean	+/-SD
4th instar:	12	1,09-1,27	1,21	0,05
5th instar:	7	1,77-1,92	1,83	0,06

In a study from Lerbäcken, South Sweden, Petersen (1985) found that 5th instar larvae of *H. saxonica* had a mean head width of 1,65 mm (N=34). The difference in head width between the two populations is significant.

In the Norwegian material no smaller instars than 4th and 5th were found, indicating only one cohort and that *H. saxonica* may have one year cycle in Lake Råvatn. The kick samples were sorted in the field while the animals were still alive. The samples were primarily taken to collect mayflies, and this opens for the possibility that younger instars (1st or 2nd) may have been overlooked.

Studies from the European continent and Southern Sweden have observed both univoltinism (Schumacher & Schremmer 1970, Germany, Wiberg-Larsen 1980, Denmark, Petersen 1987, Sweden) and semivoltinism (Dittmar 1955, Germany) In the case of univoltinism, *H. saxonica* has an early flight period and a fast growth during summer followed by overwintering as 5th instar (Petersen 1981). Several authors point at *H. saxonica's* preference for small streams and oligo/β-mesosaprobe water conditions (Schumacher & Schremmer 1970, Szczésny 1974, Illies 1978, Scherf 1983, Petersen 1989). Lake Råvatn is a clearwater lake in spite of the high values for pH (8,14) and conductivity (K_{18}+ 154 μS/cm). More extensive water quality testing must be done to reveal if there is a substantial limiting factor for plant growth in the lake (Wetzel 1983).

Badcock 1974 states only one safe locality for *H. saxonica* in England, and refers to another where the species has disappeared

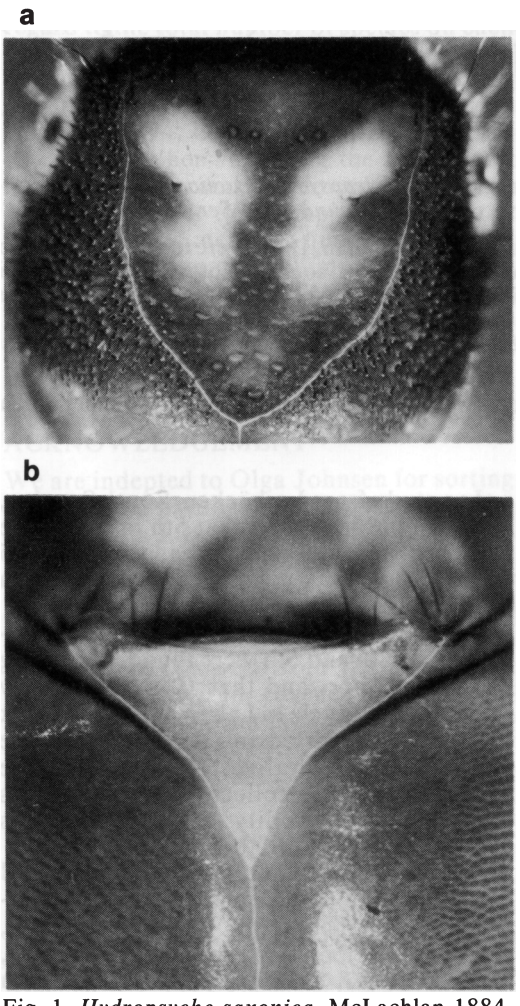

Fig. 1. *Hydropsyche saxonica,* McLachlan 1884, from Råvatnet, Troms county, Norway, 12 Aug. 1990. a) Head with frontoclypeus, 5th instar. Head width 1,92 mm. b) Submentum of same specimen.

due to pollution and drainage of the brook. *H. saxonica* is considered rare also in Scandinavia, with only a few localities in Sweden, Denmark and Finland (Nybom 1960, Wiberg-Larsen 1980, Petersen 1981, Gullefors 1988). It seems to have a generally southeastern distribution in these countries. The nearest finding to the locality in Troms is, to our knowledge, Lule lappmark in Sweden (Gullefors 1988). Also in Central Europe *H. saxonica* is considered rare, although it has a wide distribution (Lepneva 1964, Illies 1978, Scherf 1983).

The identification of the larvae follows Bongard 1990. The very dark, old Finnish material used in this key does not reveal any light anterior fleck on the frontoclypeal apotome. This is present not only in several works (Badcock 1977, Sedlák 1971, Szszésny 1974) but also in most of the Norwegian material (Fig. 1). However, the darkest larvae from Lake Råvatn do not have this visible anterior spot, and this is consistent with the drawing of *H. saxonica* in Wiberg-Larsen 1980.

The two *Beraeodes minutus* larvae were identified using Wiberg-Larsen 1979. Head widths of the larvae are 0,57 mm and 0,33 mm. The smallest larva does not have the characteristic marmorated pronotum, it therefore looks very much like a leptocerid, and this feature makes earlier instars of the species easy to overlook. One might, for this reason, expect *B. minutus* to be more widespread than previously known. Nearest records are Lule lappmark in Sweden (Gullefors 1988) and Kemi lappmark in Finland (Nybom 1960).

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Short communications

VELIA CAPRAI TAMANINI (HEM. HETEROPTERA, VELIIDAE) FOUND IN CENTRAL NORWAY

HANS OLSVIK

The waterbug *Velia caprai* Tamanini is reported from two localities in Møre and Romsdal: Kokvasstjern, Tustna, and Sandshavn, Aure and one in Sør-Trøndelag: Fauslandsbekken, Hitra. The species is new to the fauna of Møre and Romsdal and Sør-Trøndelag. The records represent a new northern border (63°36'N) for the species in Scandinavia.

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INTRODUCTION

The waterbug *Velia caprai* Tamanini is known to occur along the coast of southern Norway, from the Oslofjord area to the Bergen area (Warloe 1925, Jastrey 1981). The northernmost Norwegian record hitherto described is about 60°25'N, while the species is found north to about 61°N in Sweden (Coulianos & Ossiannilsson 1976).

RESULTS

July 29 1988 a number of imagines and nymphs were found in a small creek, the outlet of Kokvasstjern, Tustna (MRY, EIS 90, UTM 32V MR 552 114, ca. 30 m a.s.l.). It was found together with *Gerris lateralis, G. lacustris* and *G. odontogaster* in the slow-running parts of the creek.

August 30 1989 one imago was found in a very similar creek draining from an ombrogenous bog/-moor near Sandshavn, Aure (MRY, EIS 90, UTM 32V MR 642 159, ca. 40 m a.s.l.). As in Tustna, the species was found together with *G. lateralis, G. lacustris* and *G. odontogaster.*

On April 22 1983 two females were found in the creek Fauslandsbekken, Hitra (STY, EIS 95, UTM 32V MR 928 533, ca. 15 m a.s.l.). It was found in a back eddy where the current was less strong than elsewhere in the creek. No other waterbug species were recorded. The latitude of this locality is about 63°36'N.

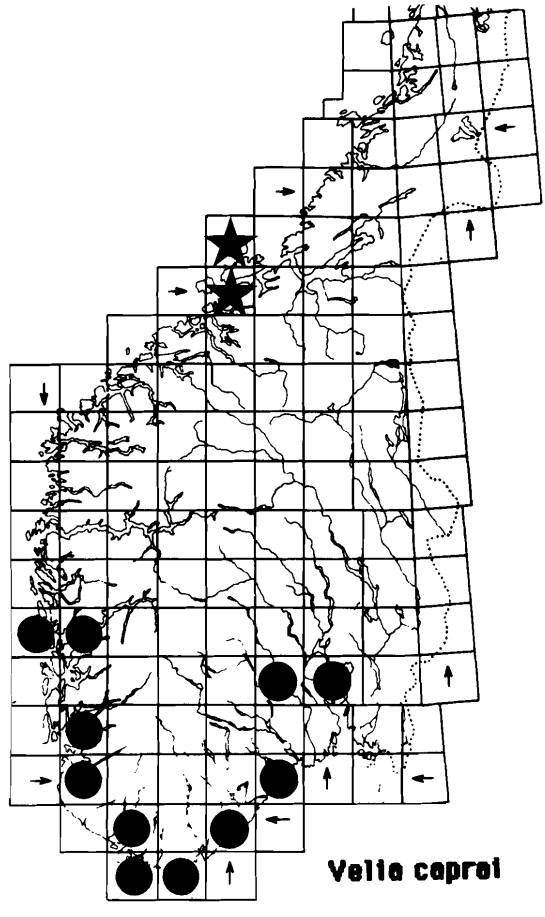

Fig. 1. The distribution of *Velia caprai* in Norway. Dots represent previously reported records and stars the new records.

DISCUSSION

Hitra represents a new northern distribution border of *V. caprai.* Nevertheless, this pattern fits well with a number of other species discovered in Central Norway for the first time (Aagaard & Dolmen 1973, 1977, Dolmen & Olsvik 1977, Dragseth & Hanssen 1981, Hanssen & Olsvik 1982).

The major reason why these turn up this far north is obviously that few investigations have been carried out in this area, and not an expanding tendency by the species.

V. caprai is probably a regular inhabitant of creeks and smaller streams along the coast, at least north to Trøndelag. Creeks running through ombrogenous bogs and moorland with scattered pine or birch forest are also a common type of habitat along the coast even further north in Norway.

ACKNOWLEDGEMENTS

Zoological Museum, Oslo, financed the investigation at Hitra in 1983.

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EUTHICONUS CONICICOLLIS (FAIRM. & LABOULBENE, 1855) (COL., SCYDMAENIDAE) OG *ANITYS RUBENS* (HOFFMANN, 1803) (COL., ANOBIIDAE) NYE ARTER I NORGE

ØYSTEIN PAULSEN

Euthiconus conicicollis Fairm. & Laboulbene) is reported new to Norway from Brunlanes, Vestfold province (UTM: 32VNL5350). One specimen was found, 28 April 1984.

Anitys rubens (Hoffmann) is reported new to Norway from Melsomvik, Vestfold province (UTM: 32VNL769654). Two females and two males were found in red-rotten wood of old oak, together with *Dorcatoma chrysomelina* Sturm, 1837, 19 Juli 1987.

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Scydmaeniden *Euthiconus conicicollis* er kun 1—1,2 mm lang og lever hovedsaklig i hule løvtrær, men også under løs bark. Ofte er den påtruffet sammen med maur som *Lasius niger, L. brunneus, L. fuliginosus* samt *Formica rufa,* (Hansen 1968). I Danmark er arten kun funnet i ett landskap (Hansen 1968), mens den i Sverige finnes i de aller sørligste deler (Lundberg 1986).

Ett eksemplar av *E. conicicollis* fant forfatteren 28. april 1984, i Brunlanes i Vestfold (UTM: 32VNL5350). Identifikasjonen er verifisert av Preben Ottesen, Biologisk Institutt, Universitetet i Oslo. Eksemplaret oppbevares i forfatterens samling.

Anobiiden *Anitys rubens* lever i rødmuldet ved i gamle eiker. Den forlater meget sjelden den plass den er klekket og man finner derfor ofte rikelig med døde dyr sammen med bare enkelte levende (Freude et al. 1969). Den lever ofte i selskap med *Dorcatoma flavicornis* og *D. chrysomalina. A. rubens* er rødbrun, nesten halvkuleformet og 2,5—3,3 mm lang (Hansen 1951). Den er funnet både i Danmark og i Sverige helt opp til Uppland (Lundberg 1986).

To hunner og to hanner ble av forfatteren funnet i en av de store eikene på Vestfold Lanbruksskoles eiendom i Melsomvik i Vestfold (UTM: 32VNL769654) 19. juli 1987, sammen med flere døde eksemplarer samt i selskap med *D. chrysomelina.* Identifikasjonen er verifisert av Preben Ottesen, som også har fått en hunn og en hann til sin samling.

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APHTHONA PALLIDA BACH (COL., CHRYSOMELIDAE) NEW TO THE NORDIC COUNTRIES

LARS OVE HANSEN & SINDRE LIGAARD

Aphthona pallida Bach is recorded for the first time in the Nordic countries. 3 ♂♂ and 2 ♀♀ were sweep-netted on the small calcareous island Langøya (VE Våle, EIS 19) in the middle of Oslofjord, South-Eastern Norway, most probably on *Geranium sanguineum.* Remarks on ecology and distribution are given.

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During an investigation of the insect and spider fauna on six small islands in the middle of Oslofjord (Hansen 1989), 3 ♂♂ and 2 ♀♀ of the chrysomelid beetle *Aphthona pallida* Back were sweep-netted on the small island Langøya, (VE Våle, EIS 19, UTM 32VNL7896), medio July 1987.

The island is of Silurian origin and has rich calcareous meadows with herbs e.g. *Meliothus spp., Artemisia absintium, A. campestris, Carlina vulgaris, Centaurea spp.* and *Geranium sanguineum.* Freude et al (1966) state *Geranium pratense* as the foodplant, but this plant is absent from Landøya and otherwise rare in the whole Oslofjord area (Rune Halvorsen Økland pers. med.). Only *G. robertianum* and *G. sanguineum* are present on Langøya. It was sweep-netted on *G. sanguineum,* so it is convenient that the specimens were collected on, or around this plant species. Most probably is *A. pallida* connected to *G. sanguineum* on Langøya.

A. pallida is recorded from the Baltic countries (Lundberg 1986). In Central Europe the species is reported from Southern Poland through Germany and southwards to Hungary and Austria (Freude, et al. 1966). The Norwegian records are thus the northernmost of the species in Europe.

Perhaps is the Norwegian record representing a relict population adapted to *G. sanguineum,* in contrast to the continental population on *G. pratense.*

ACKNOWLEDGEMENTS

We are greatly indebted to Stig Lundberg for the verification of the identification of the species. Further, we would like to thank Sigurd Hansen and Espen Bergsmark for technical assistance and Steinar Aase and Rune Halvorsen Økland for information about the botany on Langøya. The study was granted by the Directorate for Nature Management, Trondheim.

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EUSPHALERUM TORQUATUM (MARSHAM) (COL., STAPHYLINIDAE) NEW TO NORWAY

BJØRN A. SAGVOLDEN & LARS OVE HANSEN

The Staphylinid beetle *Eusphalerum torquatum* (marsham) is reported new to Norway. One beetle was sweep-netted on flowering *Barvarea vulgaris* at Ogna, Rogaland (RY) on 21 May 1988. Remarks on ecology and distribution are given.

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During the annual Whitesun meeting of the Norwegian Entomological Society 1988, an excursion was arranged to the sanddunes at RY Hå: Ogna (EIS 3) 21 May. Several staphylinid bettles were observed and sweep-netted on flowers of *Barbarea vulgaris* (leg.: Lars Ove Hanşen). The plants were growing in an open sandy area near the railway, which runs through the pine forest *(Pinus* spp.), behind the «Ogna landscape conservation area». The locality is only a few hundred meters from the sea. One of the beetles was later identified to be the staphylinid beetle *Eusphalerum torquatum* (Marsham), which has not been previously recorded in Norway.

Palm (1948) considers the species as a probably immigrant in Sweden, where it was first recorded around 1920. Since then it has been found numerous on flowers of *Caltha, Crataegus* and *Cytisus (Sarothamnus).* Imago is present in May—June and again in September (Hansen 1951), most probably hibernating in this stage.

In Europe *E. torquatum* is considered as a lowland species, distributed throughout the southeast. It becomes less abundant northwards and absent from montane areas (Lohse 1964). In Sweden it is only reported from the southernmost regions: Skåne (SK,) Blekinge (BI) and Halland (Ha); in Denmark from Jutland and the main islands (Lindroth 1960); it has not been reported from Finland, but from Karelia rossica USSR (Lundberg 1986). The Norwegian record is thus the northernmost in Fennoscandia.

ACKNOWLEDGEMENTS

We are greatly indebted to Anders Vik for the verification of the identification of the species, to Beatriz Torres Trejo for checking out the English, to Preben Ottesen for comments on the manuscript and to the Rogaland branch of the Norwegian Entomological Society for a nice and cosy arrangement.

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GRAMMOPTERA USTULATA SCALLER, 1783 (COL. CERAMBYCIDAE) I NORGE

BJØRNAR BORGERSEN

Grammaoptera ustulata Scaller is reported from Norway.

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Grammoptera ustulata Scaller ble funnet ved slaghåving blant busker og kratt i en vestlig vendt skråning ved VE, Larvik (Tjølling): Bisfjord, 11. juni 1981. Lokaliteten er i dag forsvunnet til fordel for et boligfelt, men lignende lokaliteter finnes i nærheten. En takk til Karl Erik Zachariassen som har kontrollbestemt arten.

Received 16 Nov. 1989

AMPEDUS SUECICUS (BOREALIS), PALM 1976), COL., ELATERIDAE) NY ART FOR NORGE

ROLF SVANEVIK

The elaterid beetle *Ampedus suecicus (borealis)* is reported found in Norway for the first time. One species was found in a rotten laying aspen near Larvik in the county of Vestfold (VE) EIS 19 on 16th October 1988.

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Smellerslekten *Ampedus* har 18 arter i Skandinavia, hvorav 13 arter er kjent fra Norge (Lindroth 1960, Silvferberg 1979). Samtlige arter utvikles i dødt trevirke av forskjellige slag. Artene er forholdsvis store; 6—17 mm.

Ampedus suecicus utvikles i løvtrær, først og fremst bjerk og osp. Dette eksemplaret ble funnet i puppekammer i morken ospestokk den 16.10.1988. Det ble senere funnet flere *Ampedus*-larver i samme stokken og i andre ospestokker i området.

Ampedus suecicus er funnet i Sverige og Finland og er her kjent fra de mellomste og nordlige delene. Arten er lett kjennelig ved sin strågule farge og det langstrakte pronotum. Eksemplaret befinner seg i forfatterens samling. Jeg takker Stig Otto Hansen for kontrollbestemmelse av arten.

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DENTICOLLIS RUBENS, (PILLER & MITTERPACHER 1783), (COL., ELATERIDAE) NY ART FOR NORGE

ROLF SVANEVIK & STIG OTTO HANSEN

The elaterid beetle *Denticollis rubens* is reported found in Norway for the first time.

One female was found flying in the sun near Larvik in the county of Vestfold (VE) EIS 19 on 17th June 1986 leg. Rolf Svanevik, and a male was hatched from a rotten aspen in Vestfold (VE) EIS 19, Larvik, Tanum on 22th April 1989 leg. Stig Otto Hansen.

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Smellerslekten *Denticollis* er representert med 3 arter i Skandinavia (Lindroth 1969, Silvferberg 1979) og alle tre er nå funnet i Norge. Artene utvikles i gammelt, vått trevirke, først og fremst av løvtrær.

Arten *Denticollis rubens* er kjent fra Danmark og de aller sydligste delene av Sverige (Skåne/-Blekinge), hvor den er sterkt knyttet til bøk. Arten

regnes til urskogsreliktene. Det første eksemplaret, en hunn, ble funnet flygende på en varm solrik ettermiddag i nærheten av mørk, fuktig løvskog (osp/oreskog) den 17.6.1986. Arten er senere klekket; 1 eks. 22.4.1989, en hann, fra morken fuktig osp bl.a. angrepet av *Sinodendron cylindrium.*

Arten er lett kjennelig med sin mørk-orangerøde farge og svarte ben/følehorn. Følehornene er iøyenfallende sterkt sagtakkete, spesielt hos hannen.

Eksemplarene befinner seg i forfatternes samlinger.

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NEW RECORDS OF LEPIDOPTERA FROM WESTERN NORWAY

MAGNE-HENRIK VELDE & LARS OVE HANSEN

Velde, M.-H. & Hansen, L. O. 19xx. New records of Lepidoptera from western Norway. *Fauna norv. Ser. B. 00:* xx—xx.

This paper presents 46 records of Lepidoptera not previously reported from the respective western Norwegian regions. 27 species are recorded for the first time in outer Rogaland (RY), 13 are «new» to inner Rogaland (RI), 2 to outer Hordaland (HOY), 2 to inner Hordaland (HOI) and 2 to inner Sogn og Fjordane (SFI).

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INTRODUCTION

This paper presents 46 records of Lepidoptera not previously reported from the respective western Norwegian regions. 27 species are recorded for the first time in outer Rogaland (RY), 13 are «new» to inner Rogaland (RI), 2 to outer Hordaland (HOY), 2 to inner Hordaland (HOI) and 2 to inner Sogn og Fjordane (SFI). The localities with full references are cited in Table 1. Further information about the localities are given in Haugen & Velde (1982) and Velde (1988). The nomenclature of the Lepidoptera is according to Svensson et al. (1987), EIS-grid numbers are according to J. Økland (1977) and localities are given in accordance with K. A. Økland (1981). Some of the records treated in this paper have earlier been listed in Velde (1988) and Stenløkk (1988).

METHODS

Most of the specimens are taken in light trap, for description of these, see Haugen & Velde (1982). Some specimens are sweep-netted mainly at daytime and still some are hatched from larvae. For the hatched specimens the larval food-plant is stated. All the specimens are collected by the authors: (LOH=Leg.: Lars Ove Hansen, (MHV)=Leg.: Magne-Henrik Velde.

SYSTEMATIC LIST

Adelidae

Nematopogon swammerdamella l.), Dale (RY), 22 May 1988 (LOH).

Tortricidae

Argyrotaenia ljungiana (Thunberg), Aurdal (RY), 17 May 1984 (MHV). *Philedonides lunana* (Thunberg), Hinderli (HOY), 15 July 1982 (MHV). *Acleris comariana* (Lienig & Zeller), Visnes (RY), 15 Aug. 1987 (MHV). *Olethreutes arcuella* (Clerck), Hustveit (RI), 12 June 1982 (MHV). *O. palustrana* (Lienig & Zeller), Røyravatn (RY), 7 July 1982 (MHV). *Apotomis semifasciana* (Hawarth), Vikingstad (RY), 15 July 1982 (MHV). *A. sororculana* (Zetterstedt), Kal-

Table 1. Cited localities with EIS and UTM references

Locality	Region	Municipality	EIS	UTM (32V)
Aurdal	RY	Vindafjord	23	LM1407
Buer	RI	Sauda	24	LM5124
Dale	RY	Sandnes	7	LL1536
Førstadvatn	RI	Sauda	24	LM6220
Hellandsbygd	RI	Sauda	24	LM6221
Hinderli	HOY	Sveio	22	KM9609
Hustveit	RI	Sauda	23	LM4707
Kalland	RY	Haugesund	13	KL9399
Krokavatn	HOY	Sveio	22	KM9812
Kvaløy	RY	Vindafjord	14	LL3197
Litlabø	RI	Sauda	24	LM6019
Luster	SFI	Luster	60	MP1818
Maurset	HOI	Eidfjord	33	MM0899
Mo	HOI	Etne	23	LM2918
Ogna	RY	Hå	3	LK1491
Røyksund	RY	Karmøy	13	KL9283
Røyravatn	RY	Vindafjord	23	LM3208
Stokka	RY	Vindafjord	14	LL1696
Svanndalen	RI	Sauda	23	LM4312
Vikingstad	RY	Karmøy	13	KL8788
Visnes	RY	Karmøy	13	KL8586
Øygard	RI	Sauda	24	LM5120

land (RY), 29 May 1984 (MHV). *A. sauciana* (Frölich), Svanndalen (RI), 25 July 1983 (MHV). *Endothenia quadrimaculana* (Haworth), Visnes (RY), 17 July 1986 (MHV). *Ancylis uncella* (Denis & Schiff.), Aurdal (RY), 17 May 1984 (MHV). *Epinotia brunnichana* (L.), Visnes (RY), 15 Aug. 1987 (MHV). *E. nisella* (L.), Luster (SFI), 10 Aug. 1984 (MHV). *Zeiraphera isertana* (Fabricius), Luster (SFI), 9 Aug. 1984 (MHV). *Epiblema cynosbatella* (L.), Kvaløy (RY), 29 April 1983 (MHV). *Eriopsela quadrana* (Hübner), Dale (RY), 22 May 1988 (LOH). *Pammene rhediella* (Clerck), Visnes (RY), 2 June 1986 (MHV).

Epermeniidae

Epermenia illigerella (Hübner), Ogna (RY), ex larva on *Aegopodium podagraria* 21 May 1988 (LOH).

Nymphalidae

Clossiana freja (Thunberg), Maurset (HOI), 27 June 1988 (MHV)

Drepaniidae

Falcaria lacertinaria (L.), Øygard (RI), 24 July 1983 (MHV). *Tetheella fluctuosa* (Hübner); Kvaløy (RY), 5 July 1983; Stokka (RY), 1 Jule 1984; (MHV).

Geometridae

Cyclophora albipunctata (Hufnagel), Stokka (RY), 1 June 1984 (MHV). *Xanthorhoe spadicearia* (Denis & Schiffermüller), Hustveit (RI), 12 June 1982 (MHV). *X. ferrugata* (Clerck), Buer (RI), 24 June 1983 (MHV). *X. annotinata* (Zetterstedt), Førstadvatn (RI), 26 July 1983 (MHV). *Epirrhoe tristata* (L.), Vikingstad (RY), 31 July 1981 (MHV). *Chloroclysta latefasciata* (Staudinger), Kvaløy (RY), 4 Aug. 1983 (MHV). *Thera firmata* (Hübner), Kvaløy (RY), 9 Sept. 1982 (MHV). *Euphyia unangulata* (Haworth), Vikingstad (RY), 13 July 1982 (MHV). *Chloroclystis debiliata* (Hübner), Kvaløy (RY), 5 July 1983 (MHV). *Carsia sororiata* (Hübner), Litlabø (RI), 26 July 1983 (MHV). *Aplocera plagiata* (L.); Buer (RI), 24 June 1983; Førstadvatn (RI), 26 VII 1983; (MHV). *Trichopteryx polycommata* (Denis & Schiff.), Kvaløy (RY), 29 April 1983 (MHV). *Acasis viretata* (Hübner), Røyksund (RY), 21 May 1980 (MHV). *Selenia tetralunaria* (Hufnagel), Stokka (RY), 1 June 1985 (MHV). *Crocallis elinguaria* (L.), Hellandsbygd (RI), 21 August, 1984 (MHV). *Arichanna melanaria* (L.), Krokavatn (HOY), June 1980 (MHV). *Bupalus piniaria* (L.), Hustveit (RI), 12 June 1982 (MHV). *Cabera exanthemata* (Scopoli), Svanndalen (RI), 25 July 1983 (MHV).

Lassiocampidae

Trichiura crataegi (L.), Førstadvatn (RI), 26 July 1983 (MHV).

Notodontidae

Furvula bifida (Brahm), Kvaløy (RY), 5 July 1983 (MHV). *Drymonia ruficornis* (Hufnagel), Stokka (RY), 1 June 1984 (MHV). *Clostera curtula* (L.), Stokka (RY), 1 June 1984 (MHV).

Lymantriidae

Dicallomera fascelina (L.), Hellandsbygd (RI), 29 July 1984 (MHV).

Noctuidae

Noctua fimbriata (Schreber), Vikingstad (RY), 30 Aug. 1982; Visnes (RY), 20 Aug. 1988 (MHV). *Eugraphe subrosea* (Stephens), Mo (HOI), 7 Aug. 1989 (MHV).

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FOUR LEPIDOPTERA NEW TO THE NORWEGIAN FAUNA

KJELL ARNE JOHANSON

Johanson, K. A. 1990. Four Lepidoptera new to Norwegian fauna. *Fauna norv. Ser. B 38:* 36—37.

Four Lepidoptera species: *Elachista argentella* (Clerck, 1759) (Elachistidae), *Zeiraphera rufimitrana* (Herrich-Schäffer, 1851) (Tortricidae), *Agrotis ripae* (Hübner, 1823) and *Apamea anceps* (Denis & Schiffermüller, 1775) (Noctuidae) were all taken in outer Vest-Agder in 1985.

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INTRODUCTION

Four Lepidoptera species; *Elachista argentella* (Clerck, 1759), *Zeiraphera rufimitrana* (Herrich-Schäffer, 1851), *Agrotis ripae* (Hübner, 1823) and *Apamea anceps* (Denis & Schiffermüller, 1775), previously not recorded from Norway, were all taken in outer Vest-Agder in 1985. Three of the species, *E. argentella, A. ripae* and *A. anceps* were caught on Øst-Hasselstrand on the Lista peninsula in early July, while the last species, *Z. rufimitrana,* was caught at Holum, 10 kilometers north of Mandal City.

The Lista peninsula is situated on the southernmost coast of Norway. It has large sandy beaches with high dunes. On Øst-Hasselstrand where the new species were caught, the remoter, sandy part of the beach is approximately 30 m wide, and the sand dunes approximately 2 m high. The dunes are covered with grasses, mainly *Elytrigia juncea* and *Ammophila arenaria,* but also some *Salix repens.* Behind the sand dunes there are wide plantations of conifers, mainly *Picea abies* and *P. sitchensis.*

The systematics follows Svensson (1987); the botanical names are according to Lid (1987).

THE SPECIES

Elachista argentella (Clerck, 1759).

Locality: VAY, Farsund: Øst-Hasselstrand (EIS 1, UTM:32VLK 620400) 5—6 July 1985 4♂♂ 9♀♀ (common).

One specimen of *E. argentella,* taken on 26 June 1972 at Klepp, Rogaland, is situated in the entomological collection in the Zoological Museum, University of Bergen. However, the specimen has been misidentified and only recently assigned to *E. argentella* (Leif Aarvik pers. com.)

E. argentella seems to be common at Øst-Hasselstrand. At sunset it climbed to the top of the grasses and was then easely caught with net. Later in the night it also came to light.

The larvae of *E. argentella* is recorded to mine in the leaves of different grasses (Traugott-Olsen & Schmidt Nielsen 1977). It is distributed throughout northern Europe, including all parts of Denmark and southern Sweden north to Bohuslän (Svensson 1987; Traugott-Olsen & Schmidt Nielsen 1977).

Zeiraphera rufimitrana (Herrich - Schäffer, 1851).
Locality: VAy, Mandal: Holum (EIS 2, UTM:32V MK 129405) 9—10 August 1985 1♂.

The specimen was taken in a light trap in a garden surrounded by mixed forest. The larvae feeds from April on the terminal shoots of various coniferous; on The British Isles especially on *Abies alba, A. cephalonica* and *Pinus pinea* (Bradley 1979). The species fly in July (Bradley 1979). The distribution covers Denmark, Sweden and Finland; in Denmark it is taken from all districts where it is rare (Palm 1982). In Sweden it is restricted to Skåne (Svensson 1987).

Z. rufimitrana is distinguised from *Z. ratzeburgiana* on the darker coloured fore vings. The genitalia is quite similar, but *Z. rufimitrana* has more rounded valvae and a smaller, rounded uncus compared to *Z. ratzeburgiana,* Fig. 1 a,b.

Agrotis ripae (Hübner, 1823).
Locality: VAy: Farsund: Øst-Hasselstrand (EIS 1, UTM:32VLK 620400) 5—6 July 1985 12♂♂ (light trap).

The larvae of *A. ripae* is recorded to feed on *Salsola kali, Atriplex* spp., *Rumex* spp., etc. (Heath & Emmet 1979). During daytime the larvae hide in the sand, but at night they climb up to the leaves of their foodplant, where they feed. The larvae pupated in late April and the flight period is in June (Skinner 1984). The species is easily caught on light, but can also be taken on sugar and on flowers like *Ammophila* spp., *Senecio* spp. and *Lemus arenarius* (Skinner 1984); it can sometimes also be found resting on the sand (Heath & Emmet 1979).

A. ripae is distributed throughout Denmark, and in Sweden is has been taken in Västergötland, Halland, Skåne, Öland and on Gotska Sandön (Svensson 1987).

Apamea anceps (Denis & Schiffermüller, 1775).
Locality: VAy: Farsund: Øst-Hasselstrand (EIS 1, UTM:32VLK 620400) 5—6 July 1985 2♂♂ (light trap).

The larvae of *A. anceps* feeds on flowers, leaves, seeds and roots of different grasses from August until it pupates in late April (Skinner 1984). The flight period covers June and July and it is easily caught on sugar and light (Skinner 1984).

The species is distributed in most parts of Sweden, Denmark and Finland (Svensson 1987).

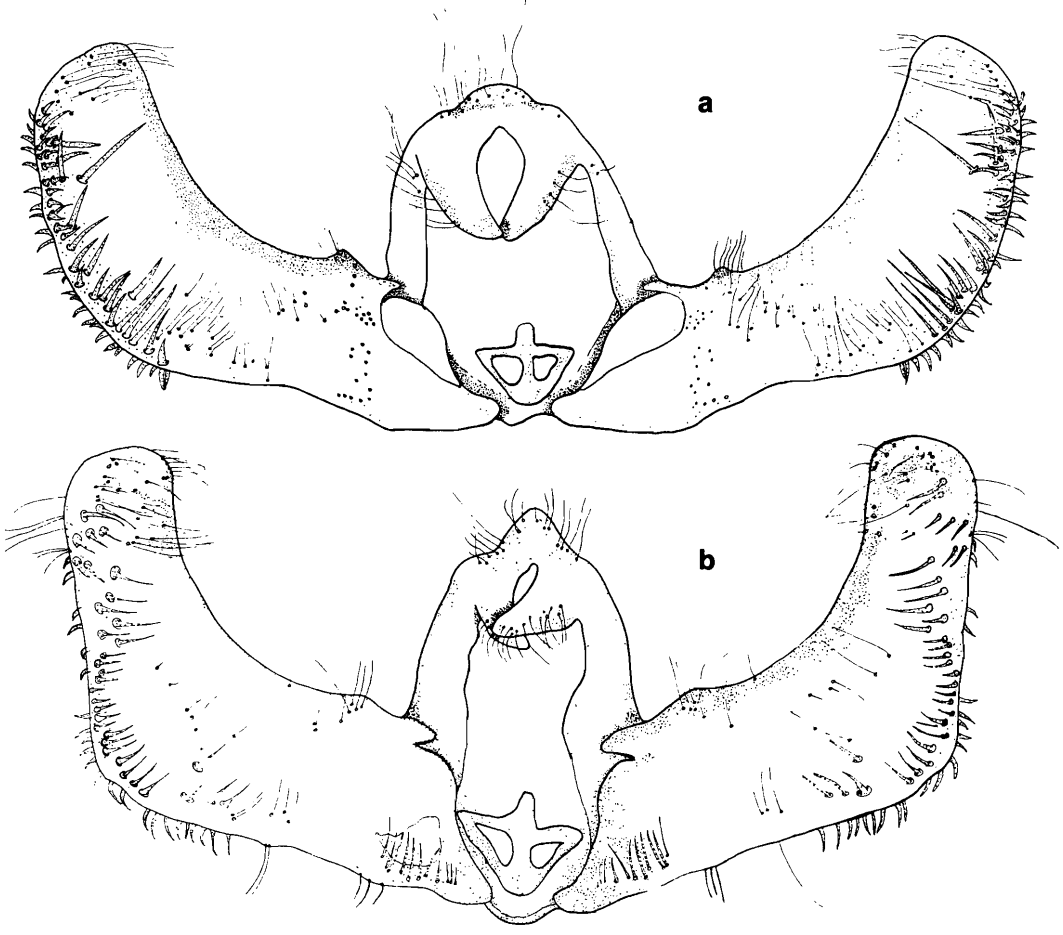

Fig. 1. Male genitalia of a) *Zeiraphera rufimitrana* and b) *Zeiraphera ratzeburgiana. Z. rufimitrana* is drawn from the specimen caught in Holum, while *Z. ratzeburgiana* is drawn from a Finnish specimen.

DISCUSSION

Both *Elachista argentella, Agrotis ripae* and *Apamea anceps* are inhabitants of coastal sanddunes. They are all found in northern Jutland and were suspected to occur in the sand dunes on the Lista peninsula. Their foodplants are found here, and the habitat seems suitable for these species. There are until now few studies on the insectfauna in the sand dune areas on Lista, and further studies will certainly reveal species until now unrecognized in Norway.

ACKNOWLEDGEMENTS

I am indebted to Svein Svendsen for allowing me information from the LEPARB database, to Leif Aarvik for examining the genitalia of *Z. rufimitrana* and to Trond Andersen and Anna Kari Evjen Olsen for commenting on the manuscript.

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ADDITIONS TO THE CADDIS FLY FAUNA (TRICHOPTERA) IN THE AGDER COUNTIES, SOUTH NORWAY

KJELL ARNE JOHANSON

Two species, *Trichostegia minor* (Curtis, 1834) and *Athripsodes aterrimus* (Stephens, 1836) are recorded for the first time from outer Aust-Agder, seven species, *Orthotrichia costalis* (Curtis, 1834), *Holocentropus picicornis* (Stephens, 1836), *Hydropsyche angustipennis* (Curtis, 1834), *Limnephilus fuscicornis* Rambur, 1842, *Colpotaulius incisus* (Curtis, 1834), *Ceraclea dissimilis* (Stephens, 1836) and *Ceraclea senilis* (Burmeister, 1839) are recorded from outer Vest-Agder and five species, *Cyrnus flavidus* (McLachlan, 1864), *Holocentropus dubius* (Rambur, 1842), *Agrypnia obsoleta* (Hagen, 1864), *Molannodes tinctus* (Zetterstedt, 1840) and *Athripsodes cinereus* (Curtis, 1834) are recorded for the first time from inner Vest-Agder.

The range of *Orthotrichia costalis,* which is considered as a rare species, is considerably extended to south-west.

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According to Andersen et al. (1990) 53 Trichoptera species have been recorded from outer Aust-Agder, 67 from outer Vest-Agder and 15 from inner Vest-Agder. The numbers are now raised to 55, 74 and 20 species, respectively. Still more species are undobtedly to be taken, particularly in the coastal areas. But the low number of species recorded from these areas may reflect an actual reduction in number of species due to acidification of the freshwater systems.

THE SPECIES

Family Hydroptilidae

Orthotrichia costalis (Curtis, 1834)
Locality: VAY, Farsund: Hanangervann (UTM:32VLK663394) 4 July 1990 1♂, net.

O. costalis is considered as a rare species in Norway (Aagaard & Hågvar 1987). The species was recorded as new to Norway from the lakes Borrevann and Åsrumvann in Vestfold (Andersen 1975). Later the species has been taken in Akershus and outer Telemark (Andersen & Søli 1989, Andersen, Ligaard & Søli 1990). According to Marshall (1978) the species inhabits ponds and lakes and slowly flowing water. The present male was netted in the dense vegetation along a small lake.

Family Polycentropodidae

Cyrnus flavidus McLachlan, 1864
Locality: VAI, Audnedal: Høyland (UTM: 32VMK055607) 11 July 1989 1♂, net.
Distributed north to Finnmark (Brekke 1946).

Holocentropus dubius (Rambur, 1842)
Locality: VAI, Audnedal: Høyland (UTM: 32VMK055607) 11 July 1989 1♂, net.
Distributed north to Troms (Brekke 1946).

Holocentropus picicornis (Stephens, 1836)
Locality: VAY, Marnardal: Skrovvatnet (UTM: 32VMK179513) 12 July 1990 1♂, net.
Recorded north to Finnmark (Solem 1970).

Family Hydropsychidae

Hydropsyche angustipennis (Curtis, 1834)
Locality: VAY, Mandal: Hogganvikvatnet (UTM: 32VMK037343) 16 July—8 Aug. 1990 1♂, light trap.
Distributed in south-eastern Norway, and is also recorded from Suldalslågen, Rogaland (Lillehammer 1965) and South Varanger, Finnmark (Solem 1970).

Family Phryganeidae

Agrypnia obsoleta (Hagen, 1864)
Locality: VAI, Audnedal: Høyland (UTM: 32VMK055602) 11 July 1989 1♂, net.
Common throughout the country (Brekke 1946).

Trichostegia minor (Curtis, 1834)
Locality: AAY, Nednes: Havodden (UTM: 32VMK820740) 30 July 1989 1♂, light trap, (leg. Sverre Kobro).
Distributed in coastal areas to outer Rogaland in south-west (Brekke 1946).

Family Limnephilidae

Limnephilus fuscicornis (Rambur, 1842)
Locality: VAY, Søgne: Lohnelier (UTM: 32VMK255402) 11—16 July 1989 1♂, light trap.
Recorded north to Finnmark (Brekke 1946).

Colpotaulius incisus (Curtis, 1834)
Locality: VAY, Farsund: Nesheimvatnet (UTM: 32VLK633404) 14 July 1990 1♂, net.
Distributed throughout the country (Brekke 1946).

Family Molannidae

Molannodes tinctus (Zetterstedt, 1840)
Locality: VAI, Audnedal: Høyland (UTM: 32VMK055607) 11 July 1989 1♂, net.
Distributed north to Finnmark (Brekke 1946).

Fauna norv. Ser. B 38: 38—39. Oslo 1991.

Family Leptoceridae

Athripsodes aterrimus (Stephens, 1836)
Locality: AAY, Tromøy: Skogstjernet (UTM: 32VMK879791) 16 July 1990 7♂♂ 1♀, net.
Distributed north to inner Nord-Trøndelag (Brekke 1946).

Athripsodes cinereus (Curtis, 1834)
Locality: VAI, Audnedal: Høyland (UTM: 32VMK055607) 11 July 1989 1♂, net.
Distributed north to Finnmark (Brekke 1946).

Ceraclea dissimilis (Stephens, 1836)
Locality: VAY, Mandal: Hogganvikvatnet (UTM: 32VMK037343) 9—11 Aug. 1990 1♂, light trap.
Distributed north to Finnmark (Tobias & Tobias 1971).

Ceraclea senilis (Burmeister, 1839)
Locality: VAY, Mandal: Hogganvikvatnet (UTM: 32VMK037343) 16 July — 8 Aug. 1990 8♂♂, light trap.
Distributed in southern Norway, also recorded from Finnmark (Brekke 1946).

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ACUPALPUS BRUNNIPES (STURM, 1825) (COL., CARABIDAE) NY ART FOR NORGE

STIG OTTO HANSEN

Acupalpus brunnipes (Sturm, 1825) (Carabidae) is reported new to Norway from Åven, Råde, Østfold county (Ø), EIS 20. One specimen was found on a beach often overflowed by saltwater 24th of May 1986.

Stig Otto Hansen, Gml. Stavernsv. 28, 3250 Larvik, Norway.

Løpebilleslekten *Acupulpus* har syv arter i Skandinavia, hvorav tre tidligere er kjent fra Norge (Lindroth 1960, Silverberg 1979). Artene er små (2.5—5 mm lange), og finnes helst på fuktig leirblandet bund.

Et eksemplar av *A. brunnipes* ble funnet 24. mai 1986 på en leirete strand, som ofte blir overskylt av tidevannet. Stranden er sparsomt bevokst med gress og enkelte saltkrevende urter. Lengre inn hvor jorden er mindre saltholdig finner man imidlertid langt flere vekster.

A. brunnipes er i Skandinavia tidligere bare kjent fra Syd-Sverige. De svenske funnene er få, og er gjort etter 1960. Av andre carabidae arter var følgende representert i område: *Acupalpus flavicollis, Acupalpus parvulus, Pogonus luridipennis.* Bembidion varium (2 eksemplarer tidligere i Norge bare kjent fra Eidsberg ved Glomma, Fauna Norwegian ser B, Vol. 31. No 1 1984, S. Ligaard in litt), *Bembidion aeneum* og *Bembidion minimum.*

Jeg takker Oddvar Hanssen, Stig Lundberg og Herr Sørensen (Sverige) for hjelp med bestemmelse av arten.

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CALITYS SCABRA (THUNBERG 1784) (COL., TROGOSITIDAE) GJENFUNNET I NORGE, NY ART FOR VESTFOLD

STIG OTTO HANSEN & BJØRNAR BORGERSEN

The trogosites beetle *Calitys scabra* (Thunberg, 1784) was captured near Larvik, Norway, for the first time in this century April the 5th 1989.

Stig Otto Hansen, Gml. Stavernsvei 28, 3250 Larvik. Bjørnar Borgersen, Gonvn. 61b, 3260 Østre Halsen.

Den meget sjeldne og lokale arten *Calitys scabra* (Thunberg, 1784) utvikles og tilbringer sitt liv som imago i gammel, morken soppinfisert ved av gran og *spesielt* furu (Landin B. O. 1970). Gamle tørre vindfall rike på resupinate kjuker er en forutsetning for artens eksistens. *C. scabra* krever større område med kontinuerlig tilgang på dødt trevirke med riktig konsistens. De tildels meget trege billene sitter gjerne godt gjemt i sprekker ofte på undersiden av liggende stammer. Grove forustammer som tilfredsstiller ovennevnte krav og, som ligger klar av bakken er etter våre observasjoner de mest attraktive. *C. scabra* overvintrer som imago.

Følgearter er tegene *Cixidae confinis* (Zetterstedt) og *C. lapponica* (Zetterstedt) (Ehnström Bengt och Walden, Henrich W. 1986). Både C. confinis og C. lapponica ble 22. april 1989 og 29. april 1989 funnet i antall i soppinfisert furu sammen med *C. scabra* C. lapponica er også funnet i morkne brannskadede furustammer ved Elverum, HEs den 20. mai 1989, og C. confinis er foruten i Vestfold funnet i Alvdal, HEn den 18. mai 1989. Også dette funnet i soppinfisert brannskadet furu. C. confinis og C. lapponica er tidligere ikke funnet i Norge. Funnene er gjort av S. O. Hansen.

S. scabra er også funnet i Sverige og Finland, og blir med sitt spesielle levevis og krav til den opprinnelige skogstype (urskog) regnet som sterkt truet. Arten betegnes som urskogsrelikt i de fleste land.

I Norge er det av denne arten tidligere gjort funn i følgende fylker: Akershus (AK), Hedmark sør (HEs), Buskerud øst (BØ) og Aust-Agder ytre (AAY) (Catalogus Coleopterorum Fennoscandiae et Daniae, Lindroth 1960). De norske funnene er få og stammer fra forrige århundre.

C. Scabra ble første gang gjenfunnet 5. april 1989, Pauler, Larvik, Vestfold fylke, EIS 19.

Det ble funnet rester av imagines i to gamle vindfall (furu). I den ene stammen ble det også konstatert angrep av *Tragosoma depsarium* (Linnaeus, 1767) (en fullvoksen larve ble funnet) samt flere eksemplarer av *Amp. peraeustus* (Fabricius, 1792), *Uloma rufa* (piller & Mitterpacher, 1783), *Drypthorus corticalis* (Paykull, 1792) og fire larver av C. scabra som senere ble klekket av S. O. Hansen (imagines kom frem 12., 18. og 20.07.89).

Et område på ca. 6 km² VE, Larvik, Pauler ble i april og mai systematisk undersøkt for å kartlegge videre hvorvidt det første funnet av *C. scabra* var av tilfeldig karakter. Denne undersøkelsen ga følgende funn:

22.04.89: 5 eksemplarer (SOH)
24.04.89: 2 eksemplarer (BB) og 1 eksemplar (SOH)
26.04.89: i antall (BB)
29.04.89: i antall (SOH)
19.08.89: 1 eksemplar (SOH)

Samtlige funn er gjort i furu ,med ett unntak (19.08 i tørr, morken kjuke på sterkt soppinfisert granstubbe).

Konklusjonen er at arten er meget lokal, men etablert i det undersøkte området sør-vest for Larvik. Deler av området er tildels rikt på vindfall, og arten skulle kunne ha gode muligheter for videre eksistens, såfremt ikke skogen blir avvirket.

Dyrene befinner seg i B. Borgersen og forfatterens samling.

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TETANURA PALLIDIVENTRIS FALLÉN, 1820 NEW TO NORWAY AND FURTHER ADDITIONS TO THE SCIOMYZIDAE FLY FAUNA (DIPTERA) IN MØRE OG ROMSDAL, NORWAY

LITA GREVE

The Sciomyzidae fly *Tetanura pallidiventris* Fallén, 1820 is reported new to Norway. Three males and eight females were collected in a Malaise trap at the NE end of Lake Snipsøyr at Hareidlandet, Hareid in Møre og Romsdal. *Limnia paludicola* Elberg, 1965; *Pherbellia albocostata* (Fallén, 1820); *P. dubia* (Fallén, 1820); *P. pallidiventris* (Fallén, 1820); *Renocera pallida* (Fallén, 1820) and *Tetanocera phyllophora* Melander, 1920 caught in the same trap are all recorded for the first time from Møre og Romsdal.

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Rozkošný (1984) published a comprehensive study on Norwegian Sciomyzidae. Since then Rozkošný & Greve (1984) and Greve & Økland (1989) have reported on the distribution of the family in Norway and all together 50 species have been recorded from the country. Still this number is low compared to those reported from the other Scandinavian countries.

Tetanura pallidiventris Fallén, 1820 was collected for the first time in Norway at Hareidlandet, Hareid, Møre og Romsdal. Three males and eight females were found in a Malaise trap located in the NE end of Lake Snipsøyr, EIS 75, UTM VLQ 441167. The trap was opened at 1. May, emptied six times through the summer 1990, and closed on 1. October. The *T. pallidiventris* material was collected in two periods: From 10. June—16. July: 3 males 6 females; 16. July—5. Aug.: 2 females. The trap was located in deciduous forest consisting of *Betula pubescens* Ehrh., *Alnus incana* (L.), *Acer platanoides* L. and *Salix sp.* The trap was placed at an open area in the forest. The vegetation at ground level was mostly Ranunculaceae. The locality has earlier been cultivated land.

Rozkošný (1984) reports *T. pallidiventris* from a few localities in Denmark, and scattered throughout Sweden from Upland, Västerbotton, Lycksele and Pite Lappmark. The locality in MRY (outer Møre og Romsdal, see Økland, 1981) is thus fairly isolated. *T. pallidiventris* is recorded from the British Isles (Kloet & Hincks, 1976).

Eight additional species of Sciomyzidae were collected in the Malaise trap at Hareidlandet: *Limnia paludicola* Elberg, 1965 (3 males 2 females); *Pherbellia albocostata* (Fallén, 1820) (3 males 6 females); *P. dubia* (Fallén, 1820) (5 males); *P. pallidiventris* (Fallén, 1820) (4 males 14 females); *Renocera pallida* (Fallén, 1820) (2 males 2 females); *Tetanocera elata* (Fabricius, 1781) (5 females); *T. phyllophora* Melander, 1920 (1 male 2 females) and *Trypetoptera punctulata* (Scopoli, 1763) (2 males).

Tetanocera elata has been recorded from both MRI and MRY and *Trypetoptera punctulata* from MRI, the remaining six species are all new to Møre og Romsdal. *L. paludicola* is probably not rare in Norway though relatively few records exist. *R. pallida* was recorded from several localities by Greve & Økland (1989). *T. phyllophora* is reported from scattered localities in Southern Norway. The remaining species are reported as common by Rozkošný (1984).

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I am indepted to Jostein Korsnes, Kvamsøy, who operated the Malaise trap during the summer 1900.

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AMARA HYPERBOREA DEJEAN, 1831 (COL. CARABIDAE) NY FOR NORGE

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The carabid beetle *Amara hyperborea* Dejean, 1831 is reported for the first time in Norway. The species was collected in three different localities in Finmark county: 3 specimens in Fi: Kautokeino 1 July 1989,; two specimens in Fn: Børselv 25 July 1989 and between 26 June and 11 September 1990 (in a pitfall trap); one specimen in Fø: Melkefoss in Pasvik 12 July 1989.

The habitat at Børselv is dry moorland with sandy soil and a vegetation dominated by *Empetrum hermaphroditum,* whereas the species was collected on a church wall in Kautokeino. The species has a high dispersal power and is supposed to be a recent immigrant in Norway.

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Under feltarbeid på ulike steder i Finnmark i 1989 ble *Amara hyperborea* for første gang funnet i Norge. Funnforholdene var følgende: 3 eksemplarer tatt 1.7 krypende på muren på Kautokeino Kirke, Kautokeino, Kautokeino Kommune i Fi (leg. B. A. Sagvolden og R. A. Lanto); 1 eksemplar tatt 12.7 under planke i sagbruk ved Melkefoss, Pasvik, Sør-Varanger Kommune i Fø (Leg. K. E. Zachariassen); et eksemplar tatt i telt 25.7 ved Børselv, Porsanger Kommune i Fn (leg. J. Schjetlein). I 1990 ble det satt 10 fallfeller som stod mellom 26.6 og 11.9 innen det samme området ved Børselv der det første eksemplaret ble tatt. Dette ga et helt nyklekket eksemplar av *Amara hyperborea* som resultat.

Da ingen notiser om artens habitatvalg tidligere synes å foreligge fra Fennoskandia, gis her en mer detaljert beskrivelse for funnene fra Børselv.

Området ligger på en morenerygg. Jorda er tørr og med vel utviklet podsolskikt. Substratanalyse fra bleikingsskiktet ga følgende vektprosenter av ulike fraksjoner: grus (> 2 mm): 20.1; meget grov sand (2—1 mm): 14.4; grov sand (1—0.5 mm): 21.3; middels sand (0.5—0.25 mm): 22.9; fin sand (0.25—0.063 mm): 18.7; silt (< 0.063 mm): 2.5. Det er altså en klar overvekt av de sandete fraksjonene.

Terrenget er åpent, flatt eller svakt hellende og omgitt av 2—3 høye, spredtstående trær av bjørk *(Betula pubescens)* og furu *(Pinus sylvestris).* Undervegetasjonen er for det meste tett, men relativt kort og dominert av fjellkrekling *(Empetrum hermaphroditum).* Videre forekommer blåbær (*Vaccinium myrtillus),* tyttebær (*V. vitis-idae)* og noe røslyng *(Calluna vulgaris)* og smyle *(Deschampsia flexuosa).* Ved siden av det ene eksemplaret av *A. hyperborea* ble følgende billarter tatt i fallfellene: *Amara brunnea* (15 eks.), *A. brunnea* larver (15 eks.), *Carabus glabratus* (3 eks), *Otiorrhynchus dubius* (1 eks) og *Byrrhus fasciatus* (1 eks). Lindroth (1955, 1968) gir en lignende beskrivelse av artens habitatvalg i Nordamerika. At *A. hyperborea* i Kautokeino ble tatt på kirkemur omgitt av gressmarker med spredte bjørketrær, tyder på at arten også etablerer seg på kulturpåvirkete marker. Funnet i et sagbruk i Pasvik er antakelig mere tilfeldig.

Det første funn av *A. hyperborea* i Finland ble gjort i 1927, men i de siste 25—30 år har arten blitt samlet en rekke steder i N Finland, først og fremst i distriktet Li som grenser til Finnmark (Bistrøm 1984). I tillegg til dette foreligger det i Fennoskandia et funn nær Peljekajse i Pite Lapmark i Sverige fra 1965 (Lindroth 1986). Da det foregikk utstrakt innsamling av biller i N Finland i forrige og begynnelsen av dette århundret og arten derfor vanskelig kan ha blitt oversett, mener Bistrøm (1984) at den har spredd seg raskt mot vest i senere tid. Det samme kan forekomstene i Norge tyde på. Også i Finnmark har det nemlig foregått utstrakt innsamling av biller tidligere uten at *A. hyperborea* har blitt funnet. Lindroth (1955) fremhver da også at arten må ha en usedvanlig spredningsevne med sine kraftig utviklete flygevinger.

At det ved Børselv ble funnet et helt nyklekket individ, viser at arten kan reprodusere, og antakelig allerede har faste populasjoner, i området. Funn så langt mot SV som Peljekajse i Pite lapmark (ca 66°30'N Br. 17°ØL) og så langt nord og øst som Børselv og Pasvik kan tyde på at arten er i ferd med å invadere N Fennoskandia på bred front.

Årsaken til denne ekspansjonen av *A. hyperborea* mot vest i ny tid er uviss. Ekspansjonen av en rekke carabider fra S mot N i Fennoskandia i dette århundret har vært sett i sammenheng med en klimaendring i dette området i samme periode og/eller som et resultat av menneskelig virksomhet (Lindroth 1972, Andersen 1987). I det minste den første forklaringen virker lite sannsynlig for *A. hyperborea.*

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UNSUCCESSFUL PARASITIC ASSOCIATIONS OF MITE LARVAE *(LEPTUS* SPP.) TO HARVESTMEN (OPOLIONES)

ARNOLD ÅBRO

Larval mites *(Leptus* spp.) attached to the mid-line of the eye tubercle of phalangids deteriorate presumable owing to host reactions.

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During fading summer, adult harvestmen could be found carrying ectoparasitic, bright red larval mites, attached to their legs and top of the eye tubercle; the larval mites exhibit several sizes, minute unengorged and fully replete larvae, as well as larvae of any intermediate size (Åbro 1988). The various sizes are due to varying degrees of engorgement of the mite idiosoma. The larvae belong to the genus *Leptus* Lattreille, 1796, following Southcott (1961).

As to the mites attached to the eye tubercle, some have their bite site laterally, close to the edge of the corneal lens; these larvae may be fully engorged. Larvae attached to the mid-line of the eye tubercle, however, are either small-sized or, if larger, have a wrinkled idiosoma, indicating that they are abortive (Fig. 1). Eighty-seven phalangids, collected in the Bergen region (western Norway), had a *Leptus* larva attached to the mid-line of the eye tubercle; of these, 22 had a small-sized, presumably recently attached larva, and 65 had a medium sized, wrinkled larva. Apparently, the cuticle of the mid-line is readily pierced, but the anchoring arrangement may have failed, perhaps due to some sort of defence reaction on the part of the host.

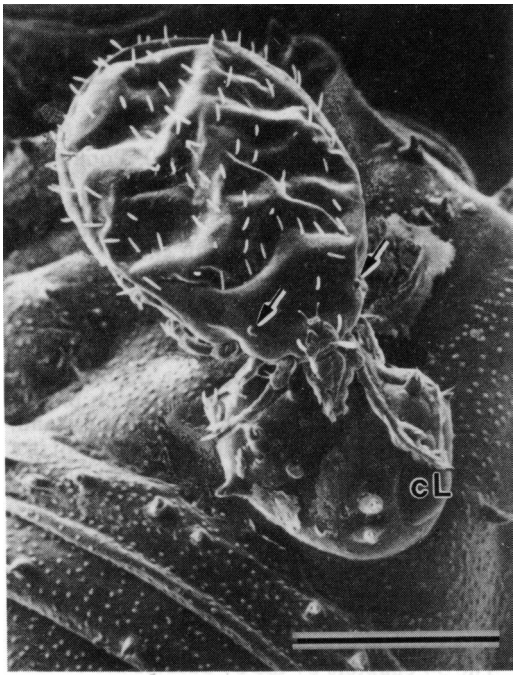

Fig. 1. A wrinkled abortive larval mite (*Leptus* sp.) attached to the mid-line of the eye tubercle of a harvestman (*Phalangium* sp.). Arrows point to the mite's single eyes. cL - corneal lens of the opilioned eye. Scale bar = 500 μm.

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Book reviews

WATT, A. D., LEATHER, S. R., HUNTER, M. D. & KIDD, N. A. C. (eds.) 1990. Population Dynamics of Forest Insects. 430 pp., 129 black-and-white illustrations, 38 tables, size 14.0 x 21.0 cm. Intercept Ltd., Andover (Hampshire, UK) ISBN 0-946707-28-6. Price GBP 40:-.

The co-existence between the plants and animals in a forest ecosystem is a most delicate state of equilibrium. Any displace in that equilibrium can get severe effects. For example, a decrease in a plant population can result in starvation for the animal feeding on that plant. On the other hand, an increase in an animal population can result in a higher feeding pressure on the plants they are feeding on. Conclusively, any small change can give rise to a catastroph.

Therefore, the knowledge of the population dynamics of forest insects is of great importance. This book is a summary from a conferense on population dynamics of forest insects held in Edinburgh 1989.

The 34 chapters by the 57 authors are divided into four major sections. Each chapter has its own list of references — all together some 1 000 citations. The first part deals with general population studies, with examples from pine-feeding insects, various aphids and the Douglas-fir tussock moth. Some of the long-term studies which almost cover a 200 year period give interesting data on population changes. The second part deals with insect-plant interactions. The examples are discussed from two point of views, viz. different insects groups e.g. moths, aphids and beetles; and different plants of economical interest e.g. birch and conifers. The important effect of air-pollution and the insect-plant relationship is also discussed. The third part deals with the natural enemies of insects as a factor for controlling population sizes. Here is the effect of predation by small mammals described, as well as the effect of parasitoid flies and wasps, and baculoviruses. The last part conserns various population models and pest management. Different models for describing the population dynamics of different species are tested for a better understanding of the natural population fluctuations. A combined subject- and taxonomic index finish the book.

The book is a good summary of recent results in a large field. The exemples and authors are mainly from the European and North American continents i.e. rather suitable for us in Northern Europe. However, the nature of the book as a conference report sometimes makes the chapters too short. Unfortunately, several of the computer designed illustrations suffer from bad resolution. The price is slightly too high.

Ulf Carlberg

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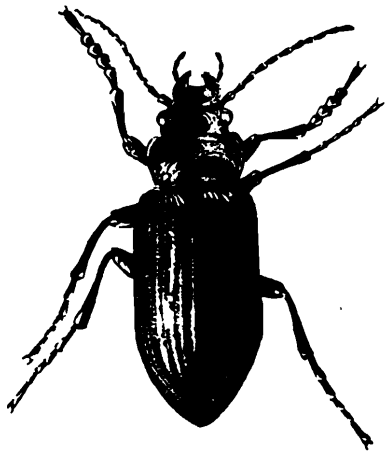

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